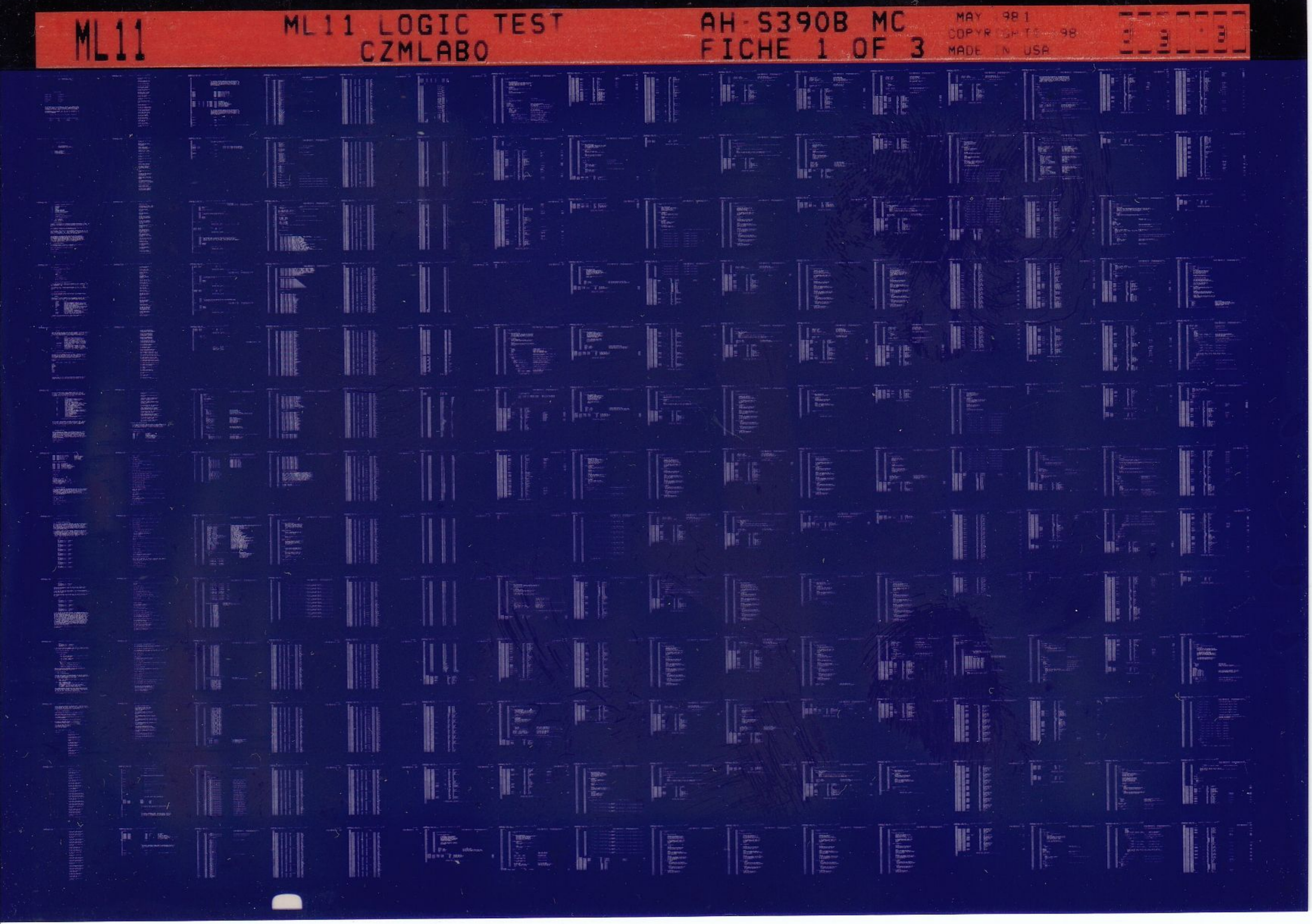
ML11

ML11 LOGIC TEST
CZMLABO

AH-S390B MC
FICHE 1 OF 3

MAY 98 1
COPYRIGHT 98
MADE IN USA



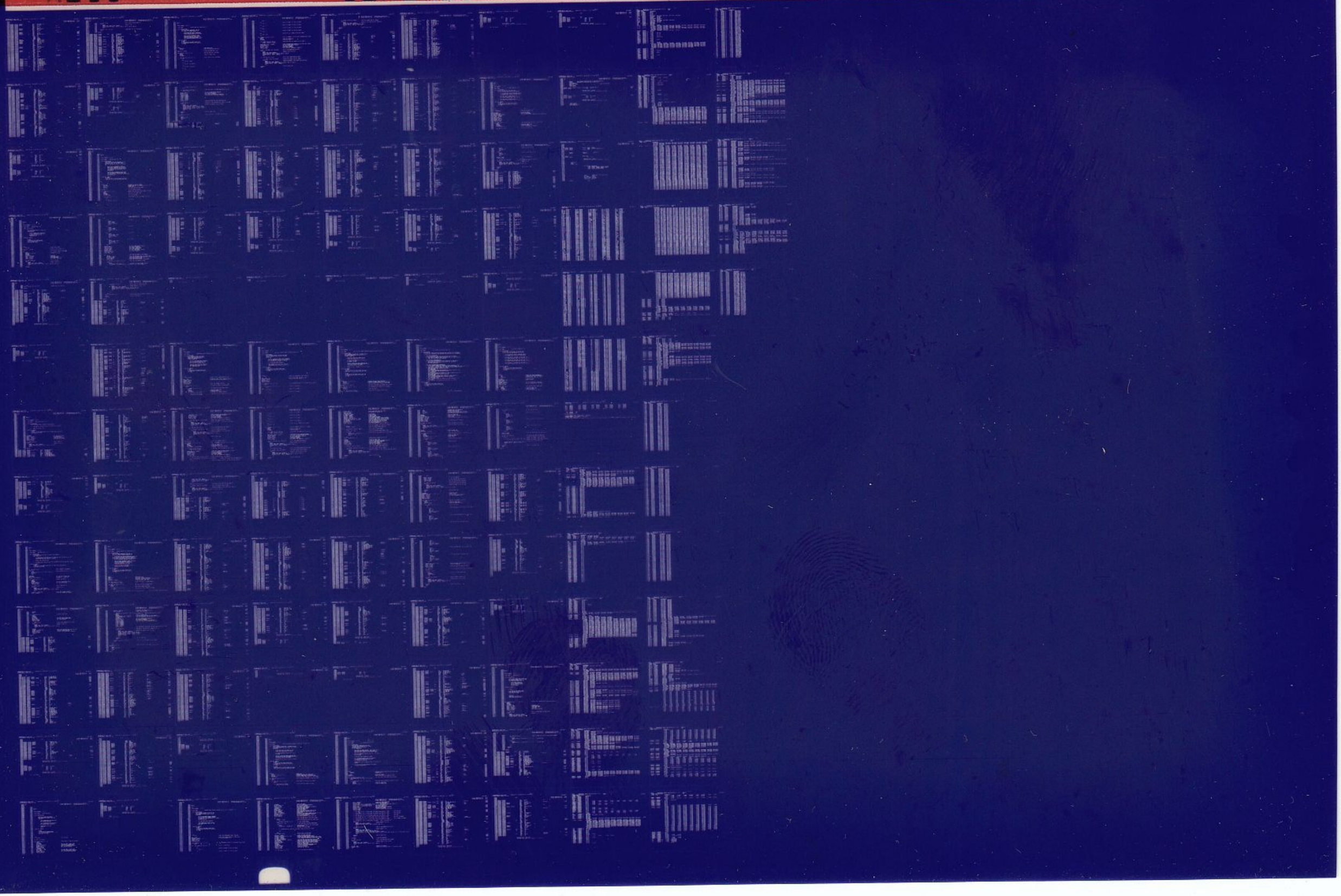
ML11 ML11 LOGIC TEST AH-S390B MC
CZMLABO FICHE 2 OF 3

ML11

ML11 LOGIC TEST
CZMLABO

AH-S390B MC
FICHE 3 OF 3

MAY 1981
COPYRIGHT © 1981
MADE IN USA



```
1                       .TITLE CZMLABO ML-11 LOGIC TEST
2                       .SBTTL  USER DOCUMENTATION
                                                .REM &
```

IDENTIFICATION

PRODUCT CODE:	AC-S388B-MC
PRODUCT NAME:	CZMLABO ML11 LOGIC TEST
PRODUCT DATE:	2-FEB-81
MAINTAINER:	TOM LANWSBY
AUTHOR:	D.W.NEALE

THE INFORMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE AND SHOULD NOT BE CONSTRUED AS A COMMITMENT BY DIGITAL EQUIPMENT CORPORATION. DIGITAL EQUIPMENT CORPORATION ASSUMES NO RESPONSIBILITY FOR ANY ERRORS THAT MAY APPEAR IN THIS DOCUMENT.

NO RESPONSIBILITY IS ASSUMED FOR THE USE OR RELIABILITY OF SOFTWARE ON EQUIPMENT THAT IS NOT SUPPLIED BY DIGITAL OR ITS AFFILIATED COMPANIES.

COPYRIGHT (C) 1981 BY DIGITAL EQUIPMENT CORPORATION

THE FOLLOWING ARE TRADEMARKS OF DIGITAL EQUIPMENT CORPORATION:

DIGITAL	PDP	UNIBUS	MASSBUS
DEC	DECUS	DECTAPE	

TABLE OF CONTENTS

2-	2	USER DOCUMENTATION
4-	1	PROGRAM HEADER AND TABLES
43-	1	MISCELLANEOUS CODING SECTION

1.0	GENERAL INFORMATION
1.1	PROGRAM ABSTRACT
1.2	SYSTEM REQUIREMENTS
1.3	RELATED DOCUMENTS AND STANDARDS

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

2.0 OPERATING INSTRUCTIONS
2.1 COMMANDS
2.2 SWITCHES
2.3 FLAGS
2.4 HARDWARE QUESTIONS
2.5 SOFTWARE QUESTIONS
2.6 EXTENDED P-TABLE DIALOGUE
2.7 QUICK STARTUP PROCEDURE

3.0 ERROR INFORMATION

4.0 PERFORMANCE AND PROGRESS REPORTS

5.0 DEVICE INFORMATION TABLES

6.0 TEST SUMMARIES

1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

DIAGNOSTIC ENGINEERING WAS CONTRACTED BY MEMORY ENGINEERING TO MAKE THIS DIAGNOSTIC IN ORDER TO AID MEMORY ENGINEERING TO DESIGN AND DEBUG THE ML-11, AID FIELD SERVICE FOR FIELD REPAIRS AND INSTALLATIONS OF THE ML-11.

THIS DIAGNOSTIC PRODUCT WILL BE DESIGNED TO TEST FROM ONE TO EIGHT ML-11 UNITS OFF A SINGLE RH11 OR RH70 CONTROLLER.

THE FUNCTIONAL LEVEL (FRU) OF THIS DIAGNOSTIC PRODUCT WILL BE TO THE LOGIC FUNCTION LEVEL (I.E. DRIVE SELECTION). UPON DETECTION OF AN ERROR BY THE DIAGNOSTIC, THE LOGIC FUNCTION AND RESPECTIVE MODULE WHICH IT IS LOCATED ON WILL BE PRINTED TO THE OPERATOR.

THIS DIAGNOSTIC HAS BEEN WRITTEN FOR USE WITH THE DIAGNOSTIC RUNTIME SERVICES SOFTWARE (SUPERVISOR). THESE SERVICES PROVIDE THE INTERFACE TO THE OPERATOR AND TO THE SOFTWARE ENVIRONMENT. THIS PROGRAM CAN BE USED WITH XXDP+, ACT, APT, SLIDE AND PAPER TAPE. FOR A COMPLETE DESCRIPTION OF THE RUNTIME SERVICES, REFER TO THE XXDP+ USER'S MANUAL. THERE IS A BRIEF DESCRIPTION OF THE RUNTIME SERVICES IN SECTION 2 OF THIS DOCUMENT.

1.2 SYSTEM REQUIREMENTS

THE HARDWARE DESIGN IS EXPECTED TO CONFORM TO THE STANDARDS SET FORTH IN THE MASSBUS SPECIFICATION (DEC STANDARD 159).

PDP-11 WITH MINIMUM OF 28K WORDS OF MEMORY

CONSOLE TERMINAL

RH11 OR RH70

1 TO 8 ML-11 DRIVES ON INTERMIXED BUS

XXDP+ LOAD MEDIA

1.3 RELATED DOCUMENTS AND STANDARDS

1. SUPPRGC.DOC
2. SUPINT.MEN
3. SUPFUN.C
4. XXDPPLUS.DOC
5. BLISS LANGUAGE GUIDE
6. BLISS-16 USER'S GUIDE

1.4 DIAGNOSTIC HIERARCY PREREQUISITES

IT WILL BE ASSUMED THAT PRIOR TO THE RUNNING OF THIS DIAGNOSTIC THAT ALL APPROPRIATE CPU, MAIN MEMORY AND RH CONTROLLER DIAGNOSTICS HAVE BEEN SUCCESSFULLY RUN.

THIS DIAGNOSTIC WILL HOWEVER PERFORM MINIMAL RH TESTS TO ENSURE ITS EXISTANCE AND BASIC FUNCTIONALITY BEFORE LOGIC TESTS ARE ALLOWED TO RUN.

2.0 OPERATING INSTRUCTIONS

THIS SECTION CONTAINS A BRIEF DESCRIPTION OF THE RUNTIME SERVICES. FOR DETAILED INFORMATION, REFER TO THE XXDP+ USER'S MANUAL (CHQUS).

2.1 COMMANDS

THERE ARE ELEVEN LEGAL COMMANDS FOR THE DIAGNOSTIC RUNTIME SERVICES (SUPERVISOR). THIS SECTION LISTS THE COMMANDS AND GIVES A VERY BRIEF DESCRIPTION OF THEM. THE XXDP+ USER'S MANUAL HAS MORE DETAILS.

COMMAND	EFFECT
START	START THE DIAGNOSTIC FROM AN INITIAL STATE
RESTART	START THE DIAGNOSTIC WITHOUT INITIALIZING
CONTINUE	CONTINUE AT TEST THAT WAS INTERRUPTED (AFTER ^C)
PROCEED	CONTINUE FROM AN ERROR HALT
EXIT	RETURN TO XXDP+ MONITOR (XXDP+ OPERATION ONLY!)
ADD	ACTIVATE A UNIT FOR TESTING (ALL UNITS ARE CONSIDERED TO BE ACTIVE AT START TIME
DROP	DEACTIVATE A UNIT
PRINT	PRINT STATISTICAL INFORMATION (IF IMPLEMENTED BY THE DIAGNOSTIC - SECTION 4.0)
DISPLAY	TYPE A LIST OF ALL DEVICE INFORMATION
FLAGS	TYPE THE STATE OF ALL FLAGS (SEE SECTION 2.3)
ZFLAGS	CLEAR ALL FLAGS (SEE SECTION 2.3)

A COMMAND CAN BE RECOGNIZED BY THE FIRST THREE CHARACTERS. SO YOU MAY, FOR EXAMPLE, TYPE 'STA" INSTEAD OF 'START".

2.2 SWITCHES

THERE ARE SEVERAL SWITCHES WHICH ARE USED TO MODIFY SUPERVISOR OPERATION. THESE SWITCHES ARE APPENDED TO THE LEGAL COMMANDS. ALL OF THE LEGAL SWITCHES ARE TABULATED BELOW WITH A BRIEF DESCRIPTION OF EACH. IN THE DESCRIPTIONS BELOW, A DECIMAL NUMBER IS DESIGNATED BY 'DDDDD'.

SWITCH	EFFECT
/TESTS:LIST	EXECUTE ONLY THOSE TESTS SPECIFIED IN THE LIST. LIST IS A STRING OF TEST NUMBERS, FOR EXAMPLE - /TESTS:1:5:7-10. THIS LIST WILL CAUSE TESTS 1,5,7,8,9,10 TO BE RUN. ALL OTHER TESTS WILL NOT BE RUN.
/PASS:DDDDD	EXECUTE DDDDD PASSES (DDDDD = 1 TO 64000)
/FLAGS:FLGS	SET SPECIFIED FLAGS. FLAGS ARE DESCRIBED IN SECTION 2.3.
/EOP:DDDDD	REPORT END OF PASS MESSAGE AFTER EVERY DDDDD PASSES ONLY. (DDDDD = 1 TO 64000)
/UNITS:LIST	TEST/ADD/DROP ONLY THOSE UNITS SPECIFIED IN THE LIST. LIST EXAMPLE - /UNITS:0:5:10-12 USE UNITS 0,5,10,11,12 (UNIT NUMBERS = 0-63)

EXAMPLE OF SWITCH USAGE:

```
START/TESTS:1-5/PASS:1000/EOP:100
```

THE EFFECT OF THIS COMMAND WILL BE: 1) TESTS 1 THROUGH 5 WILL BE EXECUTED, 2) ALL UNITS WILL TESTED 1000 TIMES AND 3) THE END OF PASS MESSAGES WILL BE PRINTED AFTER EACH 100 PASSES ONLY. A SWITCH CAN BE RECOGNIZED BY THE FIRST THREE CHARACTERS. YOU MAY, FOR EXAMPLE, TYPE "/TES:1-5" INSTEAD OF "/TESTS:1-5".

BELOW IS A TABLE THAT SPECIFIES WHICH SWITCHES CAN BE USED BY EACH COMMAND.

	TESTS	PASS	FLAGS	EOP	UNITS
START	X	X	X	X	X
RESTART	X	X	X	X	X
CONTINUE		X	X	X	
PROCEED			X		
DROP					X
ADD					X
PRINT					
DISPLAY					X
FLAGS					
ZFLAGS					
EXIT					

2.3 FLAGS

FLAGS ARE USED TO SET UP CERTAIN OPERATIONAL PARAMETERS SUCH AS LOOPING ON ERROR. ALL FLAGS ARE CLEARED AT STARTUP AND REMAIN CLEARED UNTIL EXPLICITLY SET USING THE FLAGS SWITCH. FLAGS

ARE ALSO CLEARED AFTER A START COMMAND UNLESS SET USING THE FLAG SWITCH. THE ZFLAGS COMMAND MAY ALSO BE USED TO CLEAR ALL FLAGS. WITH THE EXCEPTION OF THE START AND ZFLAGS COMMANDS, NO COMMANDS AFFECT THE STATE OF THE FLAGS; THEY REMAIN SET OR CLEARED AS SPECIFIED BY THE LAST FLAG SWITCH.

FLAG	EFFECT
HOE	HALT ON ERROR - CONTROL IS RETURNED TO RUNTIME SERVICES COMMAND MODE
LOE	LOOP ON ERROR
IER*	INHIBIT ALL ERROR REPORTS
IBE*	INHIBIT ALL ERROR REPORTS EXCEPT FIRST LEVEL (FIRST LEVEL CONTAINS ERROR TYPE, NUMBER, PC, TEST AND UNIT)
IXE*	INHIBIT EXTENDED ERROR REPORTS (THOSE CALLED BY PRINTX MACRO'S)
PRI	DIRECT MESSAGES TO LINE PRINTER
PNT	PRINT TEST NUMBER AS TEST EXECUTES
BOE	"BELL" ON ERROR
UAM	UNATTENDED MODE (NO MANUAL INTERVENTION)
ISR	INHIBIT STATISTICAL REPORTS (DOES NOT APPLY TO DIAGNOSTICS WHICH DO NOT SUPPORT STATISTICAL REPORTING)
IDU	INHIBIT PROGRAM DROPPING OF UNITS
ADR	EXECUTE AUTODROP CODE
LOT	LOOP ON TEST
EVL	EXECUTE EVALUATION (ON DIAGNOSTICS WHICH HAVE EVALUATION SUPPORT)

*ERROR MESSAGES ARE DESCRIBED IN SECTION 3.1

SEE THE XXDP+ USER'S MANUAL FOR MORE DETAILS ON FLAGS. YOU MAY SPECIFY MORE THAN ONE FLAG WITH THE FLAG SWITCH. FOR EXAMPLE, TO CAUSE THE PROGRAM TO LOOP ON ERROR, INHIBIT ERROR REPORTS AND TYPE A "BELL" ON ERROR, YOU MAY USE THE FOLLOWING STRING:

```
/FLAGS:LOE:IER:BOE
```

2.4 HARDWARE QUESTIONS

WHEN A DIAGNOSTIC IS STARTED, THE RUNTIME SERVICES WILL PROMPT THE USER FOR HARDWARE INFORMATION BY TYPING "CHANGE HW (L) ?" YOU MUST ANSWER "Y" AFTER A START COMMAND UNLESS THE HARDWARE INFORMATION HAS BEEN "PRELOADED" USING THE SETUP UTILITY (SEE CHAPTER 6 OF THE XXDP+ USER'S MANUAL). WHEN YOU ANSWER THIS QUESTION WITH A "Y", THE RUNTIME SERVICES WILL ASK FOR THE NUMBER OF UNITS (IN DECIMAL). YOU WILL THEN BE ASKED THE FOLLOWING QUESTIONS FOR EACH UNIT.

PARAMETER CODING CALLS

```
GPRMA   MSGH1,0,0,0,177777,YES          ;RH ADDRESS
```

```
GPRMD   MSGH2,2,0,77,11,70,YES          ;RH TYPE
GPRMD   MSGH3,4,0,777,0,777,YES         ;RH VECTOR ADDRESS
GPRMD   MSGH4,6,D,77,1,16.,YES          ;NUMBER FO ARRAYS
GPRML   MSGH5,10,1,YES                  ;DRIVE OPTIONS
GPRMD   MSGH6,12,0,7,0,7,YES            ;DRIVE NUMBER
GPRML   MSGH7,14,1,YES                  ;PARITY DISABLED

PARAMETER CODING MESSAGES

MSGH1:  .ASCIZ  /RH ADDRESS?/
MSGH2:  .ASCIZ  /IS RH AN '70' OR '11?/
MSGH3:  .ASCIZ  /RH VECTOR ADDRESS?/
MSGH4:  .ASCIZ  /NUMBER OF ARRAY MODULES?/
MSGH5:  .ASCIZ  /IS DRIVE OPTION AN ML11A?/
MSGH6:  .ASCIZ  /ML-11 DRIVE NUMBER?/
MSGH7:  .ASCIZ  /IS PARITY DISABLED?/

SAMPLE DIALOGE

DR> STA  <CR>

CHANGE HW <L>  ?  Y  <CR>

# UNITS <D>  ? 1  <CR>

UNIT 0
RH ADDRESS <O> 176400  ?  <CR>
IS RH AN '70' OR '11' <O>  ?  <CR>
RH VECTOR ADDRESS <O>  204  ?  <CR>
NUMBER OF ARRAYS MODULES  ? <D>  16  ?  14  <CR>
IS DRIVE OPTION AN ML11A ? <L>  Y  ?  <CR>
ML-11 DRIVE NUMBER ? <O>  0  ?  <CR>
IS PARITY DISABLED ? <L>  N  ?  <CR>
```

2.5 SOFTWARE QUESTIONS

AFTER YOU HAVE ANSWERED THE HARDWARE QUESTIONS OR AFTER A RESTART OR CONTINUE COMMAND, THE RUNTIME SERVICES WILL ASK FOR SOFTWARE PARAMETERS. THESE PARAMETERS WILL GOVERN SOME DIAGNOSTIC SPECIFIC OPERATION MODES. YOU WILL BE PROMPTED BY 'CHANGE SW (L) ?" IF YOU WISH TO CHANGE ANY PARAMETERS, ANSWER BY TYPING 'Y'. THE SOFTWARE QUESTIONS AND THE DEFAULT VALUES ARE DESCRIBED IN THE NEXT PARAGRAPH(S).

```
PARAMETER CODING CALLS

GPRML  MSGS1,0,1,NO                     ;PRINT THE DRIVE SERIAL NUMBER

PARAMETER CODING MESSAGES

MSG1:  .ASCIZ  /PRINT SERIAL NO.?/

SAMPLE DIALOGE
```

PRINT SERIAL NO. ? <L> N ? Y <CR>

2.6 EXTENDED P-TABLE DIALOGUE

WHEN YOU ANSWER THE HARDWARE QUESTIONS, YOU ARE BUILDING ENTRIES IN A TABLE THAT DESCRIBES THE DEVICES UNDER TEST. THE SIMPLEST WAY TO BUILD THIS TABLE IS TO ANSWER ALL QUESTIONS FOR EACH UNIT TO BE TESTED. IF YOU HAVE A MULTIPLEXED DEVICE SUCH AS A MASS STORAGE CONTROLLER WITH SEVERAL DRIVES OR A COMMUNICATION DEVICE WITH SEVERAL LINES, THIS BECOMES TEDIOUS SINCE MOST OF THE ANSWERS ARE REPETITIOUS.

TO ILLUSTRATE A MORE EFFICIENT METHOD, SUPPOSE YOU ARE TESTING A FICTIONAL DEVICE, THE XY11. SUPPOSE THIS DEVICE CONSISTS OF A CONTROL MODULE WITH EIGHT UNITS (SUB-DEVICES) ATTACHED TO IT. THESE UNITS ARE DESCRIBED BY THE OCTAL NUMBERS 0 THROUGH 7. THERE IS ONE HARDWARE PARAMETER THAT CAN VARY AMONG UNITS CALLED THE Q FACTOR. THIS Q-FACTOR MAY BE 0 OR 1. BELOW IS A SIMPLE WAY TO BUILD A TABLE FOR ONE XY11 WITH EIGHT UNITS.

```
# UNITS (D) ?  8<CR>

UNIT 1
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  0<CR>
Q-FACTOR (O) 0 ?  1<CR>

UNIT 2
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  1<CR>
Q-FACTOR (O) 1 ?  0<CR>

UNIT 3
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  2<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 4
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  3<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 5
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  4<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 6
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  5<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 7
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  6<CR>
```

```
        Q-FACTOR (O) 0 ?  1<CR>

        UNIT 8
        CSR ADDRESS (O)  160000<CR>
        SUB-DEVICE # (O) ?  7<CR>
        Q-FACTOR (O) 1 ?  <CR>
```

NOTICE THAT THE DEFAULT VALUE FOR THE Q-FACTOR CHANGES WHEN A NON-DEFAULT RESPONSE IS GIVEN. BE CAREFUL WHEN SPECIFYING MULTIPLE UNITS!

AS YOU CAN SEE FROM THE ABOVE EXAMPLE, THE HARDWARE PARAMETERS DO NOT VARY SIGNIFICANTLY FROM UNIT TO UNIT. THE PROCEDURE SHOWN IS NOT VERY EFFICIENT.

THE RUNTIME SERVICES CAN TAKE MULTIPLE UNIT SPECIFICATIONS HOWEVER. LET'S BUILD THE SAME TABLE USING THE MULTIPLE SPECIFICATION FEATURE.

```
        # UNITS (D) ?  8<CR>

        UNIT 1
        CSR ADDRESS (O) ?  160000<CR>
        SUB-DEVICE # (O) ?  0,1<CR>
        Q-FACTOR (O) 0 ?  1,0<CR>

        UNIT 3
        CSR ADDRESS (O) ?  160000<CR>
        SUB-DEVICE # (O) ?  2-5<CR>
        Q-FACTOR (O) 0 ?  0<CR>

        UNIT 7
        CSR ADDRESS (O) ?  160000<CR>
        SUB-DEVICE # (O) ?  6,7<CR>
        Q-FACTOR (O) 0 ?  1<CR>
```

AS YOU CAN SEE IN THE ABOVE DIALOGUE, THE RUNTIME SERVICES WILL BUILD AS MANY ENTRIES AS IT CAN WITH THE INFORMATION GIVEN IN ANY ONE PASS THROUGH THE QUESTIONS. IN THE FIRST PASS, TWO ENTRIES ARE BUILT SINCE TWO SUB-DEVICES AND Q-FACTORS WERE SPECIFIED. THE SERVICES ASSUME THAT THE CSR ADDRESS IS 160000 FOR BOTH SINCE IT WAS SPECIFIED ONLY ONCE. IN THE SECOND PASS, FOUR ENTRIES WERE BUILT. THIS IS BECAUSE FOUR SUB-DEVICES WERE SPECIFIED. THE "-" CONSTRUCT TELLS THE RUNTIME SERVICES TO INCREMENT THE DATA FROM THE FIRST NUMBER TO THE SECOND. IN THIS CASE, SUB-DEVICES 2, 3, 4 AND 5 WERE SPECIFIED. (IF THE SUB-DEVICE WERE SPECIFIED BY ADDRESSES, THE INCREMENT WOULD BE BY 2 SINCE ADDRESSES MUST BE ON AN EVEN BOUNDARY.) THE CSR ADDRESSES AND Q-FACTORS FOR THE FOUR ENTRIES ARE ASSUMED TO BE 160000 AND 0 RESPECTIVELY SINCE THEY WERE ONLY SPECIFIED ONCE. THE LAST TWO UNITS ARE SPECIFIED IN THE THIRD PASS.

THE WHOLE PROCESS COULD HAVE BEEN ACCOMPLISHED IN ONE PASS AS SHOWN BELOW.

```
        # UNITS (D) ?  8<CR>
```

```
UNIT 1
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  0-7<CR>
Q-FACTOR (O) 0 ?  0,1,0,,,,1,1<CR>
```

AS YOU CAN SEE FROM THIS EXAMPLE, NULL REPLIES (COMMAS ENCLOSING A NULL FIELD) TELL THE RUNTIME SERVICES TO REPEAT THE LAST REPLY.

2.7 QUICK START-UP PROCEDURE (XXDP+)

TO START-UP THIS PROGRAM:

1. BOOT XXDP+
2. GIVE THE DATE AND ANSWER THE LSI AND 50HZ (IF THERE IS A CLOCK) QUESTIONS
3. TYPE "R NAME", WHERE NAME IS THE NAME OF THE BIN OR BIC FILE FOR THIS PROGRAM
4. TYPE "START"
5. ANSWER THE "CHANGE HW" QUESTION WITH "Y"
6. ANSWER ALL THE HARDWARE QUESTIONS
7. ANSWER THE "CHANGE SW" QUESTION WITH "N"

WHEN YOU FOLLOW THIS PROCEDURE YOU WILL BE USING ONLY THE DEFAULTS FOR FLAGS AND SOFTWARE PARAMETERS. THESE DEFAULTS ARE DESCRIBED IN SECTIONS 2.3 AND 2.5.

3.0 ERROR INFORMATION

3.1 TYPES OF ERROR MESSAGES

THERE ARE THREE LEVELS OF ERROR MESSAGES THAT MAY BE ISSUED BY A DIAGNOSTIC: GENERAL, BASIC AND EXTENDED. GENERAL ERROR MESSAGES ARE ALWAYS PRINTED UNLESS THE "IER" FLAG IS SET (SECTION 2.3). THE GENERAL ERROR MESSAGE IS OF THE FORM:

```
NAME  TYPE  NUMBER  ON UNIT NUMBER  TST NUMBER PC:XXXXXX
ERROR MESSAGE
```

,WHERE; NAME = DIAGNOSTIC NAME
TYPE = ERROR TYPE (SYS FATAL, DEV FATAL, HARD OR SOFT)
NUMBER = ERROR NUMBER
UNIT NUMBER = 0 - N (N IS LAST UNIT IN PTABLE)
TST NUMBER = TEST AND SUBTEST WHERE ERROR OCCURRED
PC:XXXXXX = ADDRESS OF ERROR MESSAGE CALL

BASIC ERROR MESSAGES ARE MESSAGES THAT CONTAIN SOME ADDITIONAL INFORMATION ABOUT THE ERROR. THESE ARE ALWAYS PRINTED UNLESS THE "IER" OR "IBR" FLAGS ARE SET (SECTION 2.3). THESE MESSAGES ARE PRINTED AFTER THE ASSOCIATED GENERAL MESSAGE.

EXTENDED ERROR MESSAGES CONTAIN SUPPLEMENTARY ERROR INFORMATION

SUCH AS REGISTER CONTENTS OR GOOD/BAD DATA. THESE ARE ALWAYS PRINTED UNLESS THE "IER", "IBR" OR "IXR" FLAGS ARE SET (SECTION 2.3). THESE MESSAGES ARE PRINTED AFTER THE ASSOCIATED GENERAL ERROR MESSAGE AND ANY ASSOCIATED BASIC ERROR MESSAGES.

3.2 SPECIFIC ERROR MESSAGES

ERROR MESSAGES ARE HANDLED VIA A DICTIONARY STRUCTURE.

WORDS AND PHRASES ARE MULTIPLY REFERENCED USING ONLY ONE COPY OF THE WORD OR PHRASE IN CORE.

THIS PERMITS EXTENSIVE ERROR MESSAGE PRINTING AT MINIMAL STORAGE REQUIREMENTS.

THE FOLLOWING DEMONSTRATES TYPICAL ERROR MESSAGES:

```
ML11 DVC FTL ERR 00077 ON UNIT 07 TST 027 SUB 002 PC: 050432
ASYNCHRONOUS MODULE FAILURE
EXCESSIVE DATA ERRORS DURING INITIAL ARR RD_WRT

ML11 DVC FTL ERR  00112 ON UNIT 03 TST 037 SUB 000 PC: 056466
ASYNCHRONOUS MODULE FAILURE
ARRAY ADRS MULTIPLEXER FAILURE
FAILED AT DSA: 000000
```

3.2.1 ERROR NUMBER DEFINITION

ERROR NO.	FAILING LOGIC
1	DRIVE DID NOT RESPOND WITHIN 1.5 US
2	DSA REG READ/WRITE ERROR DURING DRIVE SEL TEST
3	UNIQUE DRIVE SELECTION ERROR
4	ML REGISTER READ WRITE ONES/ZEROES ERROR
5	ML REGISTER READ WRITE ONES/ZEROES ERROR
6	ML REGISTER INITIALIZATION ERROR
7	CONTROL BUS BAD PARITY NOT DETECTED
8	CONTROL BUS GOOD PARITY NOT DETECTED.
9	CONTROL BUS BAD PARITY

GENERATED.

10 ARRAY SIZING LOGIC ERROR

11 GO BIT NOT CLR AFTER NOOP FUNCTION

12 ILF BIT SET DURING NOOP FUNCTION

13 OPI BIT SET DURING NOOP FUNCTION

14 GO BIT NOT SET DURING WRITE CHECK FUNCTION

15 DRY BIT NOT CLEAR DURING WRITE CHECK FUNCTION

16 DRY BIT SET WHEN GO SET DURING WRITE CHECK FUNCTION

17 ILF SET DURING WRITE CHECK FUNCTION

18 OPI BIT SET DURING WRITE CHECK FUNCTION

19 GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'ASYNC FAILURE'

20 GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'SYNC FUNCTION'

21 DRY BIT NOT SET AFTER WRITE CHECK FUNCTION

22 GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'ASYNC FAILURE'

23 GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'SYNC FAILURE'

24 GO BIT NOT SET DURING WRITE FUNCTION

25 DRY BIT CLEAR WITH GO CLEAR DURING WRITE FUNCTION.

26 DRY BIT SET WITH GO BIT DURING WRITE FUNCTION.

27 ILF BIT SET DURING WRITE FUNCTION

28 OPI BIT SET DURING WRITE FUNCTION

29	GO BIT NOT CLEAR AFTER WRITE FUNCTION 'ASYNC FAILURE'
30	GO BIT NOT CLEAR AFTER WRITE FUNCTION 'SYNC FAILURE'
31	DRY BIT NOT SET AFTER WRITE FUNCTION.
32	GO BIT NOT CLEAR AFTER WRITE FUNCTION 'ASYNC FAILURE'
33	GO BIT NOT CLEAR AFTER WRITE FUNCTION 'ASYNC FAILURE'
34	GO BIT NOT SET DURING READ FUNCTION.
35	DRY BIT SET WHILE GO CLEAR DURING READ FUNCTION.
36	DRY BIT SET WHILE GO SET DURING READ FUNCTION.
37	ILF BIT SET DURING READ FUNCTION.
38	OPI BIT SET DURING READ FUNCTION
39	GO BIT NOT CLEAR AFTER READ FUNCTION 'ASYNC FAILURE'
40	GO BIT NOT CLEAR AFTER READ FUNCTION 'SYNC FAILURE'
41	DRY BIT NOT SET AFTER READ FUNCTION
42	GO BIT NOT CLEAR AFTER READ FUNCTION 'ASYNC FAILURE'
43	GO BIT NOT CLEAR AFTER READ FUNCTION 'SYNC FAILURE'
44	GO BIT NOT CLEAR AFTER CLEAR FUNCTION
45	DRY BIT SET WHILE GO SET DURING CLEAR FUNCTION
46	DRY BIT NOT SET AFTER CLEAR FUNCTION.
47	ILF BIT SET DURING CLEAR FUNCTION

48	OPI BIT SET DURING CLEAR FUNCTION
50	COMPOSITE ERROR BIT NOT SET AFTER MLER BITS SET
51	ATA BIT SETTING ERROR
52	ATTN BIT SETTING ERROR
53	ATTN BIT NOT CLEARED BY MLCS1 NOOP FUNCTION
54	ATA BIT NOT CLEAR AFTER WRITING A ONE TO IT
55	WRITING A ONE TO OTHER DRIVES ATA BIT CLEARED THIS DRIVES ATA BIT
56	GO BIT NOT CLEARED AFTER SEARCH FUNCTION
57	ILF BIT SET DURING SEARCH FUNCTION
58	NO-OP FUNCTION DID NOT CLEAR THE ATA BIT AFTER BEING SET
59	ATA BIT NOT SET AFTER SEARCH FUNCTION
60	OPI BIT SET DURING SEARCH FUNCTION AT PRESENT ARRAYS
61	ATA BIT SET AFTER SEARCH AT NOT PRESENT ARRAYS.
62	GO BIT NOT CLEAR AFTER READ-IN-PRESET FUNCTION
63	ILF BIT SET DURING READ-IN-SET FUNCTION
64	OPI BIT SET DURING READ-IN-PRESET FUNCTION
65	UV BIT NOT SET AFTER READ-IN-PRESET
66	GO BIT NOT CLEARED AFTER ILLEGAL FUNCTION
67	ILLEGAL FUNCTION NOT DETECTED

68	OPI BIT SET WITH ILLEGAL FUNCTION
69	RMR BIT NOT SET AFTER MODIFYING REG WITH FUNCTION IN PROGRESS.
70	MEMORY ARRAY PROM CHECK SUM ERRORS DURING INITIAL PROM READS
71	NIBBLE OFF SET COUNTS GREATER THAN 14 DETECTED.
72	UNS BIT SET WITH GOOD UV DATA
73	UNS BIT SET WITH GOOD UV DATA
74	UNS BIT NOT SET WITH BAD UV DATA
75	UNS BIT NOT SET WITH BAD UV DATA
76	MEMORY ARRAY PROM ROW/ COL DATA ORING ERROR
77	BAD NIBBLE THRESHOLD OF 36 EXCEEDED DURING INITIAL ARRAY READ/WRITE TEST
78	UNIQUE PROM SELECTION ERROR
79	FAILURE TO FIND GOOD ROW DURING READ WRITE ARRAY WITH PROM DATA
80	MEMORY ARRAY TIMING AND CONTROL FAILURE TO REFRESH MEMORY
81	DATA ERRORS DETECTED AT LAST BLOCK DURING ADDRESSES COUNTER TEST. (TEST ABORTED)
82	ADDRESS COUNTER ERROR
83	UNIQUE MEMORY ARRAY MODULE SELECTION FAILURE
84	ALL BITS IN ALL NIBBLES TESTED DURING SEQUENCER EXISTENCE TEST WERE IN

	ERROR (FAIL UNIT)
85	INTERMEDIATE FAILURE. SOME BITS IN NIBBLES TESTED WERE IN ERROR (CONTINUE TESTING)
86	SYNC BUS DATA BIT WRITE PATH CONTINUITY FAILURE
87	SYNC BUS DATA BIT READ PATH CONTINUITY FAILURE.
88	RAM BUS ADRS COUNTER FAILURE TO LOAD/UNLOAD SKIP RAM DURING WRITE FUNCTION
89	RAM BUS ADRS COUNTER FAILURE TO LOAD/UNLOAD SKIP RAM DURING READ FUNCTION.
90	SYNC DATA BUS WRITE PATH UNIQUE DATA BIT FAILURE (ALL ONES NIBBLE PATTERN)
91	SYNC DATA BUS WRITE PATH UNIQUE DATA BIT FAILURE (SHIFTED BIT NIBBLE PATTERN)
92	SYNC DATA BUS WRITE PATH UNIQUE DATA BIT FAILURE (ALL ONES NIBBLE PATTERN)
93	SYNC DATA BUS READ PATH UNIQUE DATA BIT FAILURE
94	NIBBLE OFF SET COUNTERS FAILURE
95	CS1 FUNCTION ABORT FAILURE DURING CLASS 'A' ERROR.
96	CS1 FUNCTION ABORT FAILURE DURING CLASS 'B' ERROR
97	LBT BIT SET BEFORE A LAST BLOCK TRANSFER
98	DSA REGISTER INCREMENT

	FAILURE DURING NON LAST BLOCK TRANSFERS.
99	LBT BIT NOT CLEAR AFTER LOADING DSA REG
100	LBT BIT NOT SET AFTER A LAST BLOCK TRANSFER
101	DSA REGISTER INCREMENT FAILURE AFTER A LAST BLOCK TRANSFER
102	IAE BIT NOT SET AT INVALID SECTOR ADDRESSES
103	AOE BIT NOT SET AFTER ADDRESS OVERFLOW
104	SC BIT NOT AFTER CS1 FUNCTION ADORT
105	GOOD DATA BUS PARITY NOT DETECTED
106	GOOD DATA BUS PARITY NOT GENERATED
107	UNS BIT SET AFTER WRITING TO A SECTOR DURING PROM DATA TEST
108	UNS BIT NOT SET WITH BAD UV DATA
109	WCE BIT SET DURING MBUS WRITE/READ FUNCTION TROUBLE SHOOTING LOOP TEST
110	UNIQUE REGISTER SELECTION TEST FAILURE
111	FAILURE TO FIND GOOD MOS RAM ROW DURING ARRAY ADRS MUX TEST (INTERMEDIATE DIAG MSG)
112	UNIQUE ARRAY MODULE ROW/COL ADDRESSING FAILURE
113	DRIVE TYPE REGISTER VALUE WAS NOT CORRECT

114	TRE BIT SET UNEXPECTEDLY DURING A WRITE CHECK TRANSFER (INTERMEDIATE DIAG ERROR)
115	TRE BIT SET UNEXPECTEDLY DURING A WRITE TRANSFER (INTERMEDIATE DIAG ERROR)
116	TRE BIT SET UNEXPECTEDLY DURING A READ TRANSFER (INTERMEDIATE DIAG ERROR)
117	TRE BIT DID NOT SET AFTER A REGISTER MODIFICATION ERROR (EXCEPTION WAS NOT ASSERTED)
118	DATA DIAGNOSTIC REGISTER D1 D2 E2 INITIALIZATION ERRORS
119	RH CONTROLLER FAILURE TO RESPOND TO EXISTANCE PROBE
120	NED BIT SET DURING MASS BUS TO UNIBUS COMMUNICATION PROBE
121	DATA DIAGNOSTIC REGISTER D1 D2 E2 ONE'S / ZEROE'S READ WRITE ERRORS
122	DATA DIAGNOSTIC REGISTER D1 D2 E2 SHIFTING 1'S AND 0'S READ WRITE ERRORS
123	ECC HARD ERROR BIT NOT SET WHEN UNCORRECTABLE ECC ERRORS WERE READ
124	ECC ERROR REGISTER FAILURE TO LATCH FAILING ERROR CORRECTION INFORMATION
125	ECC ERROR REGISTER FAILURE TO CLEAR
126	ECC ERROR LOCATION REGISTER FAILED TO CLOCK IN DSA ADDRESS
127	ECC ERROR LOCATION REGISTER DATA BIT ERRORS
128	ECC ERROR LOCATION REGISTER INITIALIZATION ERRORS
129	ECC HARD ERROR BIT FAILED TO SET NOT SET
130	DATA CHECK ERROR BIT FAILED TO SET / NOT SET
131	CRC DATA BUS FAILURE. BIT CONTINUITY / UNIQUENESS ERRORS

132 UNIQUE NIBBLE CRC GENERATION CODE FAILURES

133 UNIQUE WORD CRC GENERATION CODE FAILURES

134 CORRECTABLE ERROR SYNDRONE DECODE FAILURE. FAILURE TO COMPLIMENT EXPECTED FAILING BIT(S)

135 CORRECTABLE ERROR SYNDRONE DECODE FAILURE. UNEXPECTED BIT(S) FOUND COMPLIMENTED

136 ECH OR UNC BIT NOT SET DURING READS WITH ECC ERRORS IN CHANNEL > 35

137 ERROR CORRECTION WAS NOT INHIBITED DURING UNCORRECTABLE ECC ERRORS. UNEXPECTED BIT(S) WERE FOUND COMPLIMENTED

138 ECH OR UNC BIT NOT SET WHEN MULTIPLE CHANNEL ERRORS WERE READ

139 ERROR CORRECTION WAS NOT INHIBITED DURING UNCORRECTABLE ECC ERROR. UNEXPECTED BIT(S) WERE FOUND COMPLIMENTED

140 ECC FAILURE TO DETECT AND CORRECT SINGLE BIT CHANNEL ERRORS

141 ECC FAILURE TO DETECT AND CORRECT MULTIPLE BIT CHANNEL ERRORS

4.0 PERFORMANCE AND PROGRESS REPORTS

AT THE END OF EACH PASS, THE PASS COUNT IS GIVEN ALONG WITH THE TOTAL NUMBER OF ERRORS REPORTED SINCE THE DIAGNOSTIC WAS STARTED. THE 'EOP' SWITCH CAN BE USED TO CONTROL HOW OFTEN THE END OF PASS MESSAGE IS PRINTED. SECTION 2.2 DESCRIBES SWITCHES.

5.0 DEVICE INFORMATION TABLES

HARDWARE DEFAULT PTABLE

```
.WORD   176400          ;RH ADDRESS
.WORD   70              ;RH TYPE
.WORD   204             ;RH VECTOR ADDRESS
.WORD   16.             ;NUMBER OF ARRAY MODULES
.WORD   1               ;IS DRVE OPTION ML11A,  1=16K,  0=64K
.WORD   0               ;ML-11 DRIVE NUMBER
.WORD   0               ;IS PARITY DISABLED,  1=YES,  0=NO
```

SOFTWARE DEFAULT TABLE

```
PRSN:   .WORD   0               ;PRINT SERIAL NUMBER, 1=YES,  0=NO
```

6.0 TEST SUMMARIES

TST1. MASS BUS READY

TEST THE RH CONTROLLER FOR EXISTANCE

TST2. MASS BUS HANDSHAKE

TEST MASS BUS ---> UNIBUS COMMUNICATIONS

TST3. DRIVE PRESENT

TEST TO SEE IF THE DRIVE UNDER TEST EXIST.

TST4. DRIVE SELECTION

SEE IF SELECTING OTHER DRIVES ON RH EFFECTS DRIVE UNDER TEST.

TST5. READ WRITE REGISTER ONE'S ZERO'S TEST

TEST REGISTERS READ WRITE CAPABILITY AND UNIQUENESS

TST6. READ WRITE REGISTER SHIFTING ONE'S AND ZEROES

TEST REGISTERS FOR UNIQUE DATA BITS.

TST7. REGISTER INITIALIZATION

TEST REGISTERS FOR CORRECT INIT DATA.

TST8 REGISTER SELECTION TEST

TEST FOR UNIQUE REGISTER SELECTION

TST9. PRINT DRIVE SERIAL NUMBER

PRINT THE CONTENTS OF MLSN IF THE SOFTWARE QUESTION WAS ANSWERED 'YES'.

TST10. C-BUS PARITY

TEST IF DRIVE CAN DETECT BAD PARITY ON C-BUS AND GENERATE GOOD PARITY.

TST11. MEMORY SIZING

SEE IF MEMORY SIZING LOGIC DETECTS AND RECORD CORRECT NUMBER OF ARRAYS PRESENT.

TST12. NO-OP FUNCTION

SEE IF A NO-OP FUNCTION CAN BE EXECUTED.

TST13. WRITE CHECK FUNCTION

SEE IF A WRITE CHECK FUNCTION CAUSES THE DRIVE TO HANG.

TST14. WRITE FUNCTION

SEE IF A WRITE FUNCTION CAUSES THE DRIVE TO HANG.

TST15. READ FUNCTION

SEE IF A READ FUNCTION CAUSES THE DRIVE TO HANG.

TST16. CLEAR FUNCTION

SEE IF A CLEAR FUNCTION CAN BE EXECUTED.

TST17. DIAGNOSTIC REGISTER READ WRITE

TEST THE DIAGNOSTIC REGISTERS FOR
1'S/0'S , SHIFTING 1'S/0'S AND
INITIALIZATION

TST18. COMPOSITE ERROR BIT TEST

SEE IF EACH INDIVIDUAL ERROR BIT IN MLER CAUSES A COMPOSITE ERROR.

TST19. ATA BIT

TEST IF THE ATA BIT CAN BE SET AND CLEARED.

TST20. SEARCH FUNCTION

SEE IF A SEARCH FUNCTION CAN BE EXECUTED ON ALL PRESENT ARRAYS.

TST21. READ IN PRESET

TEST IF A READ IN PRESET FUNCTION SETS VOL V H.

TST22. ILLEGAL FUNCTION

SEE IF WRITING AN ILLEGAL FUNCTION TO CS1 CAN BE DETECTED AND THAT A TRANSFER IS NOT INITIATED.

TST23. REGISTER MODIFICATION REFUSED

TEST TO SEE IF WRITING TO SPECIFIC REGISTERS ARE ABORTED WHILE THE DRIVE IS ACTIVE. SEE IF WRITING TO NON-SPECIFIC REGISTERS ARE ALLOWED WHILE DRIVE IS ACTIVE.

TST24. INITIAL PROM TEST

TEST PROMS FOR EXISTENCE.

TST25. PROM 'OR' FUNCTION TEST

TEST THE PROM DATA ORING FUNC

TST26. UV ERROR TEST

TEST ABILITY OF UV ERR PROMS TO DETECT ALL POSSIBLE CHECK SUM ERRORS.

TST27. INITIAL ARRAY TEST

TEST ARRAY TIMING AND CONTROLFOR EXISTENCE.

TST28. PROM SELECTION TEST

TEST FOR UNIQUE PROM SELECTION.

TST29. READ WRITE MEMORY ARRAY WITH PROM DATA (DIAG MODE)

SEE IF MEMORY CAN BE WRITTEN AND READ.

ALSO FIND ERROR FREE BLOCK OF MEMORY FOR FUTURE TESTS.

TST30. REFRESH TIMING

TEST TO SEE IF MEMORY CAN BE REFRESHED.

TST31. ADDRESS COUNTER

TEST THE ADDRESS COUNTER FOR ABILITY TO COUNT THROUGH ALL POSSIBLE MEMORY ADDRESSES.

TST32. ARRAY MODULE SELECTION

TEST FOR UNIQUE ARRAY MODULE SELECTION

TST33. SEQUENCER EXISTENCE TEST

TEST TO SEE IF BASIC SEQUENCER TIMING EXISTS.

TST34. SYNC DATA BUS CONTINUITY/WRITE PATH

TEST SYNCHRONOUS DATA BUS WRITE PATH FOR CONTINUITY BY READ-ING WRITING ONE'S AND ZERO'S.

TST35. SYNC DATA BUS CONTINUITY/READ PATH

TEST SYNCHRONOUS DATA BUS READ PATH FOR CONTINUITY BY READING WRITING ONE'S AND ZEROES.

TST36. RAM-BUS ADDRESS COUNTER/WRITE PATH

TEST ABILITY OF THE RAM-BUS ADDRESS COUNTERS TO LOAD/UNLOAD THE SKIP DURING WRITE FUNCTIONS.

TST37. RAM BUS ADRS COUNTER/READ PATH

TEST ABILITY OF RAM/BUS ADRS COUNTERS TO LOAD/UNLOAD THE SKIP RAM DURING READ FUNCTIONS.

TST38. SYNC DATA BUS BIT UNIQUENESS/WRITE PATH

TEST SYNCHRONOUS DATA BUS FOR DATA BIT UNIQUENESS BY WRITING SHIFTING PATTERNS OF ONE'S AND ZERO'S TO THE ML.

TST39. SYNC DAT BUS BIT UNIQUENESS/READ PATH

TEST SYNCHRONOUS DATA BUS READ PATH FOR DATA BIT UNIQUENESS BY WRITING SHIFTING PATTERNS OF ONES AND ZEROES TO THE

TST40. ARRAY ADDRESS MUX

TEST FOR UNIQUE ROW AND COLUMN ADDRESSING

TST41. NIBBLE OFFSET

TEST NIBBLE OFFSET COUNTERS TO COUNT TO 14 NIBBLE DATA TO BE SHIFTED ON DETECTION OF BAD NIBBLES.

TST42. CS1 FUNCTION ABORT

SEE IF A CLASS 'B' ERROR ABORTS A FUNCTION WHILE IN PROGRESS.

SEE IF A CLASS'A' ERROR IS DETECTED BUT FUNCTION IS ALLOWED TO COMPLETE.

TST43. LAST BLOCK INDICATOR

TEST THE LAST BLOCK INDICATOR BIT FOR NOT SETTING BELOW THE LAST AND SETTING AND CLRING AT THE LAST BLOCK

TST44. INVALID ADDRESS TEST

FOR ALL ILLEGAL DSA ADDRESSES READ THE IAE BIT SET.

TST45. ADDRESS OVERFLOW

TEST FOR AOE ON TRANSFERS WHICH EXTEND BEYOND THE LAST BLOCK.

TST46. SYNC BUS PARITY

TEST FOR BAD PARITY DETECTION AND GOOD PARITY GENERATION.

TST47. WRITE READ MEMORY ARRAY (M-BUS BLOCK MODE)

WRITE READ MEMORY VIA M-BUS BLOCK WITH MINIMUM OVERHEAD

TST48. TEST THE CRC DATA BUS BETWEEN THE CRC GENERATORS AND THE CRC/MBUS DATA MUX FOR CONTINUITY AND BIT UNIQUENESS

TST49. TEST CRC CODES GENERATED FOR ONE CRC GROUP (52 UNIQUE NIBBLES)

TST50. TEST CRC CODES GENERATED FOR ONE

CRC GROUP (13 UNIBUS WORDS)

TST51. TEST SYNDRONE DECODE AND ERROR CORRECTION TO DECODE AND CORRECT SINGLE BIT AND MULTIPLE BIT CHANNEL ERRORS

TST52. TEST SYNDRONE DECODE TO DETECT BUT NOT CORRECT UNCORRECTABLE CHANNEL ERRORS

TST53. TEST SYNDRONE DECODE TO DETECT BUT NOT CORRECT UNCORRECTABLE MULTIPLE CHANNEL ERRORS

TST54. TEST SYNDRONE GENERATION, SYNDRONE DECODE AND ERROR CORRECTION FOR SIGLE BIT CHANNEL ERRORS

TST55. TEST SYNDRONE GENERATION, SYNDRONE DECODE AND ERROR CORRECTION FOR MULTIPLE BIT CHANNEL ERRORS

TST56. TEST THE ECC ERROR REGISTER FOR CLEARING AND LATCHING OF ECC ERROR INFORMATION ON DETECTION OF ECC ERRORS

TST57. TEST THE ECC ERROR LOCATION REGISTER FOR CLOCKING, BIT UNIQUENESS, CLEARING AND LATCHING

TST58. VIA ECC_DM AND ECC_DIS TEST THE ECH BIT FOR SETTING AND NOT SETTING

TST59. VIA ECC_EN, ECC_DM AND ECC_DIS TEST THE DCK BIT FOR SETTING AND NOT SETTING

TST60. PROM DATA TEST

VERIFY THAT CHECK SUM VALUES FOR ALL PROM LOCATIONS ARE CORRECT.

&

```
                                .SBTTL  PROGRAM HEADER AND TABLES

000000                                  .ENABL  ABS,AMA
002000                          .       =       2000

002000                                  BGNMOD

                                ;++
                                ; THE PROGRAM HEADER IS THE INTERFACE BETWEEN
                                ; THE DIAGNOSTIC PROGRAM AND THE SUPERVISOR.
                                ;--

002000                                  POINTER AL!.

002000                                  HEADER  ML11,A,0,1800.,0

                                ;
                                ;       NAMES OF DEVICES SUPPORTED BY THIS PROGRAM
                                ;
002122                                  DEVTYP <ML-11>


                                ;
                                ;       TEST DESCRIPTION
                                ;
002130                                  DESCRIPT <ML-11 LOGIC TEST>


                                ;
                                ;       THE GLOBAL ERROR TABLE (INFORMATION
                                ;       USED IN A CALL TO THE MACRO 'ERROR')
                                ;

002152                          ERRTBL
002152  000000                  ERRTYP::        .WORD   0
002154  000000                  ERRNBR::        .WORD   0
002156  000000                  ERRMSG::        .WORD   0
002160  000000                  ERRBLK::        .WORD   0

                                ;++
                                ; THE DISPATCH TABLE CONTAINS THE STARTING ADDRES OF EACH TEST.
                                ; IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
                                ;--

002162                                  DISPATCH 60


                                ;++
                                ; THE DEFAULT HARDWARE P-TABLE CONTAINS DEFAULT VALUES OF
                                ; THE TEST-DEVICE PARAMETERS.  THE STRUCTURE OF THIS TABLE
                                ; IS IDENTICAL TO THE STRUCTURE OF THE HARDWARE P-TABLES,
                                ; AND IS USED AS A 'TEMPLATE' FOR BUILDING THE P-TABLES.
                                ;--
```

```
                        BGNHW   DFPTBL
                        .WORD   176400          ;RH ADDRESS
                        .WORD   70              ;RH TYPE
                        .WORD   204             ;RH VECTOR ADDRESS
                        .WORD   16.             ;NUMBER OF ARRAY MODULES
                        .WORD   1               ;IS DRVE OPTION ML11A,  1=16K,  0=64K
                        .WORD   0               ;ML-11 DRIVE NUMBER
                        .WORD   0               ;IS PARITY DISABLED,  1=YES,  0=NO

                        ENDHW


                ;++
                ; THE DEFAULT SOFTWARE P-TABLE CONTAINS VARIOUS DATA USED BY THE
                ; PROGRAM AS OPERATIONAL PARAMETERS.  THESE PARAMETERS ARE SET
                ; UP AT ASSEMBLY TIME AND MAY BE VARIED BY THE OPERATOR AT RUN
                ; TIME.
                ;--

                        BGNSW   SFPTBL

002376  000000  PRSN:   .WORD   0               ;PRINT SERIAL NUMBER, 1=YES,  0=NO

                        ENDSW
```

```
                                ;++
                                ; THE HARDWARE PARAMETER CODING SECTION CONTAINS MACROS
                                ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
                                ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
                                ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
                                ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
                                ; WITH THE OPERATOR.
                                ;--

002400                                  BGNHRD

002402                                  GPRMA   MSGH1,0,0,0,177777,YES
002412                                  GPRMD   MSGH2,2,0,77,11,70,YES
002424                                  GPRMD   MSGH3,4,0,777,0,777,YES
002436                                  GPRMD   MSGH4,6,D,77,1,16.,YES
002450                                  GPRML   MSGH5,10,1,YES
002456                                  GPRMD   MSGH6,12,0,7,0,7,YES
002470                                  GPRML   MSGH7,14,1,YES

002476                                  ENDHRD

002476  122  110  040  MSGH1:  .ASCIZ  /RH ADDRESS?/
002512  111  123  040  MSGH2:  .ASCIZ  /IS RH AN '70' OR '11?/
002540  122  110  040  MSGH3:  .ASCIZ  /RH VECTOR ADDRESS?/
002563  116  125  115  MSGH4:  .ASCIZ  /NUMBER OF ARRAY MODULES?/
002614  111  123  040  MSGH5:  .ASCIZ  /IS DRIVE OPTION AN ML11A?/
002646  115  114  055  MSGH6:  .ASCIZ  /ML-11 DRIVE NUMBER?/
002672  111  123  040  MSGH7:  .ASCIZ  /IS PARITY DISABLED?/
                                .EVEN

                                ;++
                                ; THE SOFTWARE PARAMETER CODING SECTION CONTAINS MACROS
                                ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
                                ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
                                ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
                                ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
                                ; WITH THE OPERATOR.
                                ;--

002716                                  BGNSFT

002720                                  GPRML   MSGS1,0,1,YES
                                        .EVEN

002726                                  ENDSFT

002726  120  122  111  MSGS1:  .ASCIZ  /PRINT SERIAL NO.?/          ;PRINT DRIVE SERIAL NUMBER?
                                .EVEN
```

```
                                ;++
                                ; THIS TABLE IS USED BY THE RUNTIME SERVICES
                                ; TO PROTECT THE LOAD MEDIA.
                                ;--

002750                                  BGNPROT

002750  177777                         -1              ;OFFSET INTO P-TABLE FOR CSR ADDRESS
002752  177777                         -1              ;OFFSET INTO P-TABLE FOR MASSBUS ADDRESS
002754  177777                         -1              ;OFFSET INTO P-TABLE FOR DRIVE NUMBER

002756                                  ENDPROT

002756                          $PATCH::
002756                                  .BLKW   20

003016                                  ENDMOD
```

```
                                        .SBTTL MISCELLANEOUS CODING SECTION
;ML3                                                    17-Oct-1980 11:31:46    TOPS-20 Bliss-16 V2(206)
;                                                       29-Sep-1980 10:13:18    PA:<NEALE>ML3.BLI.2 (1)

;          0001  MODULE ML3 =
;          0002  BEGIN
;          0003
;          0004  REQUIRE 'MACRO.REQ';
;          0718

;          0719  !+
;          0720  !  THE REPORT CODING SECTION CONTAINS THE
;          0721  ! 'PRINTS'' CALLS THAT GENERATE STATISTICAL REPORTS.
;          0722  !-
;          0723
;          0724  BGNRPT;
;          0725  RETURN;
;          0726  ENDRPT;


004152  000207                  LRPT:   RTS     PC                              ;                       0716

                                ; Routine Size:  1 word
                                ; Maximum stack depth per invocation:  0 words


004154  004767  177772          L$RPT:: JSR     PC,LRPT                         ;                       0725
004160  104425                          TRAP    25
004162  000207                          RTS     PC

                                ; Routine Size:  4 words
                                ; Maximum stack depth per invocation:  0 words


;          0727

;          0728  !+
;          0729  ! THE AUTODROP CODE IS EXECUTED IMMEDIATELY AFTER THE INITIALIZE
;          0730  ! CODE IF THE 'ADR'' FLAG WAS SET.  THE UNIT(S) UNDER TEST ARE
;          0731  ! CHECKED TO SEE IF THEY WILL RESPOND.  THOSE THAT DON'T ARE IMMEDIATELY
;          0732  ! DROPPED FROM TESTING.  ISSUE A 'DODU'' FOR THOSE THAT DON'T RESPOND.
;          0733  !-
;          0734
;          0735  BGNAUTO;
;          0736  RETURN;
;          0737  ENDAUTO;

004164  000207                  LAUTO:  RTS     PC                              ;                       0726

                                ; Routine Size:  1 word
                                ; Maximum stack depth per invocation:  0 words


004166  004767  177772          L$AUTO::JSR     PC,LAUTO                        ;                       0736
```

```
                                        TRAP    61
                                        RTS     PC

                                ; Routine Size:  4 words
                                ; Maximum stack depth per invocation:  0 words

;               0738
;ML3                                                    17-Oct-1980 11:31:46    TOPS-20 Bliss-16 V2(206)
;                                                       29-Sep-1980 10:13:18    PA:<NEALE>ML3.BLI.2 (1)


;               0739    !+
;               0740    ! THE DROP-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
;               0741    ! TO NO LONGER BE TESTED.
;               0742    !-
;               0743
;               0744    BGNDU;
;               0745    RETURN;
;               0746    ENDDU;

004176  000207            LDU:    RTS     PC                              ;               0737

                                ; Routine Size:  1 word
                                ; Maximum stack depth per invocation:  0 words

004200  004767  177772          L$DU::  JSR     PC,LDU                          ;               0745
004204  104453                          TRAP    53
004206  000207                         RTS     PC

                                ; Routine Size:  4 words
                                ; Maximum stack depth per invocation:  0 words

;               0747

;               0748    !+
;               0749    ! THE ADD-UNIT SECTION CONTAINS ANY CODE THE PROGRAMMER WISHES
;               0750    ! TO BE EXECUTED IN CONJUNCTION WITH THE ADDING OF A UNIT BACK
;               0751    ! TO THE TEST CYCLE.
;               0752    !-
;ML3                                                    17-Oct-1980 11:31:46    TOPS-20 Bliss-16 V2(206)
;                                                       29-Sep-1980 10:13:18    PA:<NEALE>ML3.BLI.2 (1)

;               0753
;               0754    BGNAU;
;               0755    RETURN;
;               0756    ENDAU;

004210  000207            LAU:    RTS     PC                              ;               0746

                                ; Routine Size:  1 word
                                ; Maximum stack depth per invocation:  0 words
```

```
    198 004212  004767  177772          L$AU::  JSR     PC,LAU                  ;                                0755
    199 004216  104452                          TRAP    52
    200 004220  000207                          RTS     PC
    201
    202                                 ; Routine Size:  4 words
    203                                 ; Maximum stack depth per invocation:  0 words
    208
    209
    210 ;           0757  END
    211 ;           0758
    212 ;           0759  ELUDOM
    216
    217
    218
    219
    220                                 ;ML3                                    17-Oct-1980 11:31:46    TOPS
    221                                 ;                                       29-Sep-1980 10:13:18    PA:<
    222
    223
    224
    225                                 ; Size:         20 code + 0 data words
    226                                 ; Run Time:     00:01.9
    227                                 ; Elapsed Time: 00:07.1
    228                                 ; Memory Used:  12 pages
    229                                 ; Compilation Complete
    230
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (1)

;          0001  MODULE ML4 =
;          0002  BEGIN
;          0003  !
;          0004  ! PRETTY BLF COMMANDS
;          0005  !
;          0006  !<BLF/NOERROR>
;          0007  !<BLF/LOWERCASE_KEY>
;          0008  !
;          0009  ! REQUIRE
;          0010  !
;          0011
;          0012  require 'BLSMAC.REQ';                   !BLISS INTERFACE MODULE
;          1496
;          1497  !
;          1498  ! CONSTANT LITERALS
;          1499  !
;          1500
;          1501  literal
;          1502      ONE = 1,                            !DATA BIT OF ONE
;          1503      ONES = %o'177777',                  !DATA PATTERN OF ONES
;          1504      ZERO = 0,                           !DATA BIT OF ZERO
;          1505      ZEROES = 0,                         !DATA PATTERN OF ZEROES
;          1506      NUM_OF_REG = 22,                    !NUMBER OF BLOCKS IN GLOBAL STORAGE 'ML-REG'
;          1507      FIELD_SIZ = 4,                      !FIELD SIZ FOR FIELD DECLARATIONS 'WORD_MAP'
;          1508      !
;          1509      !MLCS1 FUNCTION CODES
;          1510      !
;          1511      NOOP = 1,                           !NOOP FUNCTION
;          1512      DRV_CLR = %o'11',                   !DRIVE CLEAR FUNCTION
;          1513      RD_IN_PRE = %o'21',                 !READ IN PRESET FUNCTION
;          1514      SEARCH = %o'31',                    !SEARCH FUNCTION
;          1515      WRT_CHK = %o'51',                   !WRITE CHECK FUNCTION
;          1516      write = %o'61',                     !WRITE FUNCTION
;          1517      read = %o'71',                      !READ FUNCTION
;          1518      !
;          1519      ! DELAY ARGUMENTS
;          1520      !
;          1521      ONE_US = 1,                         !ONE MICRO SECOND DELAY
;          1522      FRTY_US = 40,                       !FORTY MICRO SECOND DELAY
;          1523      TWO_TH_US = 2000;                   !TWO THOUSAND MICRO SECOND DELAY
;          1524
;          1525  !
;          1526  ! FIELD DECLARATIONS
;          1527  !
;          1528
;          1529  field
;          1530      WORD_MAP =                          !MAPS GLOBAL STORAGE 'ML_REG' INTO REGISTER PERSONALITIES
;          1531          set
;          1532          REGISTER_ADD = [0, 0, 16, 0],   !REGISTERS ADDRESS
;          1533          FORCE_HI = [1, 0, 16, 0],       !REGISTERS  FORCED HI BITS
;          1534          FORCE_LO = [2, 0, 16, 0],       !REGISTERS FORCED LO BITS
;          1535          DONT_CARE = [3, 0, 16, 0]       !REGISTERS IGNORE BITS
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (1)

;          1536          tes,
;          1537      NIB_MAP =                         !MAPS OWN STORAGE NIB_SAVE INTO TEN FOUR BIT NIBBLES
;          1538          set
;          1539              NIB_0 = [0, 0, 4, 0],     !NIBBLE 0 BITS <0:3>
;          1540              NIB_1 = [0, 4, 4, 0],     !NIBBLE 1 BITS <4:7>
;          1541              NIB_2 = [0, 8, 4, 0],     !NIBBLE 2 BITS <8:11>
;          1542              NIB_3 = [0, 12, 4, 0],    !NIBBLE 3 BITS <12:15>
;          1543              NIB_4 = [1, 0, 4, 0],     !NIBBLE 4 BITS <16:19>
;          1544              NIB_5 = [1, 4, 4, 0],     !NIBBLE 5 BITS <20:23>
;          1545              NIB_6 = [1, 8, 4, 0],     !NIBBLE 6 BITS <24:27>
;          1546              NIB_7 = [1, 12, 4, 0],    !NIBBLE 7 BITS <28:31>
;          1547              NIB_8 = [2, 8, 4, 0],     !NIBBLE 8 BITS <32:35>
;          1548              NIB_9 = [2, 12, 3, 0]     !NIBBLE 9 BITS <36:39>
;          1549          tes,
;          1550      DT1_FLD =
;          1551          set
;          1552              E0_5 = [0, 0, 6, 0],
;          1553              C0_5 = [0, 6, 6, 0],
;          1554              CRC_DATA = [0, 13, 1, 0],
;          1555              SGL_DATA = [0, 14, 1, 0],
;          1556              UNC_DATA = [0, 15, 1, 0],
;          1557              EE_DATA = [0, 0, 16, 0],
;          1558              A0_5 = [1, 0, 6, 0],
;          1559              P0_5 = [1, 6, 6, 0],
;          1560              ECR_DATA = [1, 12, 1, 0],
;          1561              B0_5 = [2, 0, 6, 0]
;          1562              tes;
;          1563
;          1564  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (2)

```
;ML4
;
;
;
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (2)

```
151 ;ML4
152 ;
153
154 ;          1617
155 ;          1618          [6,FORCE_LO]    = %o'014620',   !MLER
156 ;          1619
157 ;          1620          [7,DONT_CARE]   = %o'177400',   !MLAS
158 ;          1621
159 ;          1622          [8,FORCE_LO]    = %o'100000',   !MLPA
160 ;          1623
161 ;          1624          [10,FORCE_LO]   = %o'000020',   !MLMR
162 ;          1625          [10,DONT_CARE]  = %o'177400',
163 ;          1626
164 ;          1627          [11,FORCE_HI]   = %o'000110',   !MLDT
165 ;          1628          [11,FORCE_LO]   = %o'177666',
166 ;          1629          [11,DONT_CARE]  = %o'000001',
167 ;          1630
168 ;          1631          [13,FORCE_LO]   = %o'140300',   !MLE1
169 ;          1632
170 ;          1633          [14,FORCE_LO]   = %o'100300',   !MLE2
171 ;          1634
172 ;          1635          [17,FORCE_LO]   = %o'010000',   !MLEE
173 ;          1636          [21,DONT_CARE]  = %o'000000'    !MLCS2
174 ;          1637                  ) volatile,
175 ;          1638
176 ;          1639
177 ;          1640  REM_TBL:vector [63,byte]          !REMAINDER TABLE
178 ;          1641    preset (                        !STRUCTURE TO STORE PRECALCULATED
179 ;          1642            [0] = %b'000001',       !CRC REMAINDER VALUES FOR CRC CODE
180 ;          1643            [1] = %b'000010',       !GENERATION
181 ;          1644            [2] = %b'000100',
182 ;          1645            [3] = %b'001000',
183 ;          1646            [4] = %b'010000',
184 ;          1647            [5] = %b'100000',
185 ;          1648            [6] = %b'000011',
186 ;          1649            [7] = %b'000110',
187 ;          1650            [8] = %b'001100',
188 ;          1651            [9] = %b'011000',
189 ;          1652            [10] = %b'110000',
190 ;          1653            [11] = %b'100011',
191 ;          1654            [12] = %b'000101',
192 ;          1655            [13] = %b'001010',
193 ;          1656            [14] = %b'010100',
194 ;          1657            [15] = %b'101000',
195 ;          1658            [16] = %b'010011',
196 ;          1659            [17] = %b'100110',
197 ;          1660            [18] = %b'001111',
198 ;          1661            [19] = %b'011110',
199 ;          1662            [20] = %b'111100',
200 ;          1663            [21] = %b'111011',
201 ;          1664            [22] = %b'110101',
202 ;          1665            [23] = %b'101001',
203 ;          1666            [24] = %b'010001',
204 ;          1667            [25] = %b'100010',
205 ;          1668            [26] = %b'000111',
```

```
207 ;ML4
208 ;
209
210 ;          1669          [27] = %b'001110',
211 ;          1670          [28] = %b'011100',
212 ;          1671          [29] = %b'111000',
213 ;          1672          [30] = %b'110011',
214 ;          1673          [31] = %b'100101',
215 ;          1674          [32] = %b'001001',
216 ;          1675          [33] = %b'010010',
217 ;          1676          [34] = %b'100100',
218 ;          1677          [35] = %b'001011',
219 ;          1678          [36] = %b'010110',
220 ;          1679          [37] = %b'101100',
221 ;          1680          [38] = %b'011011',
222 ;          1681          [39] = %b'110110',
223 ;          1682          [40] = %b'101111',
224 ;          1683          [41] = %b'011101',
225 ;          1684          [42] = %b'111010',
226 ;          1685          [43] = %b'110111',
227 ;          1686          [44] = %b'101101',
228 ;          1687          [45] = %b'011001',
229 ;          1688          [46] = %b'110010',
230 ;          1689          [47] = %b'100111',
231 ;          1690          [48] = %b'001101',
232 ;          1691          [49] = %b'011010',
233 ;          1692          [50] = %b'110100',
234 ;          1693          [51] = %b'101011',
235 ;          1694          [52] = %b'010101',
236 ;          1695          [53] = %b'101010',
237 ;          1696          [54] = %b'010111',
238 ;          1697          [55] = %b'101110',
239 ;          1698          [56] = %b'011111',
240 ;          1699          [57] = %b'111110',
241 ;          1700          [58] = %b'111111',
242 ;          1701          [59] = %b'111101',
243 ;          1702          [60] = %b'111001',
244 ;          1703          [61] = %b'110001',
245 ;          1704          [62] = %b'100001'$volatile,
246 ;          1705
247 ;          1706  DT_1:blockvector[5,3] field (DT1_FLD)          !DATA TABLE 1
248 ;          1707  preset (                                       !STRUCTURE TO STORE TEST DATA
249 ;          1708          [0,E0_5] = %b'111111',                 !FOR TEST 56 'ECC ERROR LOCATION TEST'
250 ;          1709          [0,C0_5] = %b'100100',
251 ;          1710          [0,CRC_DATA] = %b'1',
252 ;          1711          [0,SGL_DATA] = %b'1',
253 ;          1712          [0,UNC_DATA] = %b'0',
254 ;          1713          [0,A0_5] = %b'000000',
255 ;          1714          [0,P0_5] = %b'111111',
256 ;          1715          [0,ECR_DATA] = %b'0',
257 ;          1716          [0,B0_5] = %b'000000',
258 ;          1717          [1,E0_5] = %b'111111',
259 ;          1718          [1,C0_5] = %b'100100',
260 ;          1719          [1,CRC_DATA] = %b'1',
261 ;          1720          [1,SGL_DATA] = %b'1',
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (2)

```
;ML4
;
;
;           1721        [1,UNC_DATA] = %b'0',
;           1722        [1,A0_5] = %b'111111',
;           1723        [1,P0_5] = %b'000000',
;           1724        [1,ECR_DATA] = %b'0'
;           1725        [1,B0_5] = %b'000000',
;           1726        [2,E0_5] = %b'111111',
;           1727        [2,C0_5] = %b'000101',
;           1728        [2,CRC_DATA] = %b'0',
;           1729        [2,SGL_DATA] = %b'0',
;           1730        [2,UNC_DATA] = %b'1',
;           1731        [2,A0_5] = %b'000000',
;           1732        [2,P0_5] = %b'111111',
;           1733        [2,ECR_DATA] = %b'1'
;           1734        [2,B0_5] = %b'111111',
;           1735        [3,E0_5] = %b'111111',
;           1736        [3,C0_5] = %b'000101',
;           1737        [3,CRC_DATA] = %b'0',
;           1738        [3,SGL_DATA] = %b'0',
;           1739        [3,UNC_DATA] = %b'1',
;           1740        [3,A0_5] = %b'000000',
;           1741        [3,P0_5] = %b'000000',
;           1742        [3,ECR_DATA] = %b'0'
;           1743        [3,B0_5] = %b'111111',
;           1744        [4,E0_5] = %b'111111',
;           1745        [4,C0_5] = %b'000101',
;           1746        [4,CRC_DATA] = %b'0',
;           1747        [4,SGL_DATA] = %b'0',
;           1748        [4,UNC_DATA] = %b'1',
;           1749        [4,A0_5] = %b'111111',
;           1750        [4,P0_5] = %b'000000',
;           1751        [4,ECR_DATA] = %b'1'
;           1752        [4,B0_5] = %b'111111')volatile,
;           1753
;           1754    !
;           1755    !<BLF/FORMAT>
;           1756    !
;           1757        RH_ADD : volatile,                  !RH CONTROLLER BASE ADDRESS
;           1758        RH_TYP : volatile,                  !RH CONTROLLER TYPE
;           1759        RH_VEC : volatile,                  !RH CONTROLLER VECTOR ADDRESS
;           1760        ML_LUN : volatile,                  !ML LOGICAL UNIT NO.
;           1761        ML_DUT : volatile;                  !ML DRIVE NUMBER
;           1762
;           1763    !
;           1764    !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (3)

```
311 ;ML4
312 ;
313 ;
314 ;          1765  !
315 ;          1766  EQUALS;
316 ;          1767  !
317 ;          1768  ! MACRO DEFINITIONS
318 ;          1769  !
319 ;          1770
320 ;          1771  macro
321 ;          1772  !
322 ;          1773  ! REGISTER NAMES:
323 ;          1774  !
324 ;        M 1775      MLCS1 =
325 ;          1776    .ML_REG [0,REGISTER_ADD]%,          !CONTROL AND STATUS REGISTER 1
326 ;        M 1777      MLWC =
327 ;          1778    .ML_REG [1,REGISTER_ADD]%,          !WORD COUNT REGISTER
328 ;        M 1779      MLBA =
329 ;          1780    .ML_REG [2,REGISTER_ADD]%,          !UNIBUS ADDRESS REGISTER
330 ;        M 1781      MLDA =
331 ;          1782    .ML_REG [3,REGISTER_ADD]%,          !DESIRED ADDRESS REGISTER
332 ;        M 1783      MLCS2 =
333 ;          1784    .ML_REG [4,REGISTER_ADD]%,          !CONTROL AND STATUS REGISTER 2
334 ;        M 1785      MLDS =
335 ;          1786    .ML_REG [5,REGISTER_ADD]%,          !DRIVE STATUS REGISTER
336 ;        M 1787      MLER =
337 ;          1788    .ML_REG [6,REGISTER_ADD]%,          !ERROR REGISTER
338 ;        M 1789      MLAS =
339 ;          1790    .ML_REG [7,REGISTER_ADD]%,          !ATTENTION SUMMARY REGISTER
340 ;        M 1791      MLLA =
341 ;          1792    .ML_REG [8,REGISTER_ADD]%,          !LOOK AHEAD REGISTER
342 ;        M 1793      MLPA =
343 ;          1794    .ML_REG [8,REGISTER_ADD]%,          !PROM ADDRESS REGISTER
344 ;        M 1795      MLDB =
345 ;          1796    .ML_REG [9,REGISTER_ADD]%,          !DATA BUFFER REGISTER
346 ;        M 1797      MLMR =
347 ;          1798    .ML_REG [10,REGISTER_ADD]%,         !MAINTENANCE REGISTER
348 ;        M 1799      MLDT =
349 ;          1800    .ML_REG [11,REGISTER_ADD]%,         !DRIVE TYPE REGISTER
350 ;        M 1801      MLSN =
351 ;          1802    .ML_REG [12,REGISTER_ADD]%,         !SERIAL NUMBER REGISTER
352 ;        M 1803      MLE1 =
353 ;          1804    .ML_REG [13,REGISTER_ADD]%,         !ECC CRC WORD REGISTER 1
354 ;        M 1805      MLE2 =
355 ;          1806    .ML_REG [14,REGISTER_ADD]%,         !ECC CRC WORD REGISTER 2
356 ;        M 1807      MLD1 =
357 ;          1808    .ML_REG [15,REGISTER_ADD]%,         !DATA DIAGNOSTIC REGISTER 1
358 ;        M 1809      MLD2 =
359 ;          1810    .ML_REG [16,REGISTER_ADD]%,         !DATA DIAGNOSTIC REGISTER 2
360 ;        M 1811      MLEE =
361 ;          1812    .ML_REG [17,REGISTER_ADD]%,         !ECC ERROR REGISTER
362 ;        M 1813      MLEL =
363 ;          1814    .ML_REG [18,REGISTER_ADD]%,         !ECC ERROR LCOATION REGISTER
364 ;        M 1815      MLPD =
365 ;          1816    .ML_REG [19,REGISTER_ADD]%,         !PROM DATA REGISTER
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (3)

;        M 1817      MLBAE =
;          1818    .ML_REG [20,REGISTER_ADD]%,          !BUS ADDRESS EXTENSION REGISTER
;        M 1819      MLCS3 =
;          1820    .ML_REG [21,REGISTER_ADD]%,          !CONTROL AND STATUS REGISTER 3
;          1821    !
;          1822    ! BIT ASSIGNMENTS:
;          1823    !
;        M 1824      SC =
;          1825    (MLCS1)<15,1>%,                      !MLCS1 BIT ASSIGNMENTS
;        M 1826      TRE =
;          1827    (MLCS1)<14,1>%,
;        M 1828      MCPE =
;          1829    (MLCS1)<13,1>%,
;        M 1830      DVA =
;          1831    (MLCS1)<11,1>%,
;        M 1832      RDY =
;          1833    (MLCS1)<7,1>%,
;        M 1834      IE =
;          1835    (MLCS1)<6,1>%,
;        M 1836      GO =
;          1837    (MLCS1)<0,1>%,
;        M 1838      ML_FUNC =
;          1839    (MLCS1)<0,6>%,
;        M 1840      DLT =
;          1841    (MLCS2)<15,1>%,                      !MLCS2 BIT ASSIGNMENTS
;        M 1842      WCE =
;          1843    (MLCS2)<14,1>%,
;        M 1844      PE =
;          1845    (MLCS2)<13,1>%,
;        M 1846      NED =
;          1847    (MLCS2)<12,1>%,
;        M 1848      NEM =
;          1849    (MLCS2)<11,1>%,
;        M 1850      PGE =
;          1851    (MLCS2)<10,1>%,
;        M 1852      MXF =
;          1853    (MLCS2)<9,1>%,
;        M 1854      MDPE =
;          1855    (MLCS2)<8,1>%,
;        M 1856      ORDY =
;          1857    (MLCS2)<7,1>%,
;        M 1858      IRDY =
;          1859    (MLCS2)<6,1>%,
;        M 1860      CLR =
;          1861    (MLCS2)<5,1>%,
;        M 1862      PAT =
;          1863    (MLCS2)<4,1>%,
;        M 1864      BAI =
;          1865    (MLCS2)<3,1>%,
;        M 1866      DRV_NUM =
;          1867    (MLCS2)<0,3>%,
;        M 1868      ATTN =
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (3)

```
423 ;ML4
424 ;
425
426 ;          1869     (MLDS)<15,1>%,                    !MLDS BIT ASSIGNMENTS
427 ;        M 1870       COMP_ERR =
428 ;          1871     (MLDS)<14,1>%,
429 ;        M 1872       MOL =
430 ;          1873     (MLDS)<12,1>%,
431 ;        M 1874       LBT =
432 ;          1875     (MLDS)<10,1>%,
433 ;        M 1876       DPR =
434 ;          1877     (MLDS)<8,1>%,
435 ;        M 1878       DRY =
436 ;          1879     (MLDS)<7,1>%,
437 ;        M 1880       VV =
438 ;          1881     (MLDS)<6,1>%,
439 ;        M 1882       DCK =
440 ;          1883     (MLER)<15,1>%,                    !MLER BIT ASSIGNMENTS
441 ;        M 1884       UNS =
442 ;          1885     (MLER)<14,1>%,
443 ;        M 1886       OPI =
444 ;          1887     (MLER)<13,1>%,
445 ;        M 1888       IAE =
446 ;          1889     (MLER)<10,1>%,
447 ;        M 1890       AOE =
448 ;          1891     (MLER)<9,1>%,
449 ;        M 1892       ECH_ERR =
450 ;          1893     (MLER)<6,1>%,
451 ;        M 1894       DPAR =
452 ;          1895     (MLER)<5,1>%,
453 ;        M 1896       CPAR =
454 ;          1897     (MLER)<3,1>%,
455 ;        M 1898       RMR =
456 ;          1899     (MLER)<2,1>%,
457 ;        M 1900       ILR =
458 ;          1901     (MLER)<1,1>%,
459 ;        M 1902       ILF =
460 ;          1903     (MLER)<0,1>%,
461 ;        M 1904       ARR_TYP =
462 ;          1905     (MLMR)<10,1>%,                    !MLMR BIT ASSIGNMENTS
463 ;        M 1906       ML_NUM_ARR =
464 ;          1907     (MLMR)<11,5>%,
465 ;        M 1908       REF_MAR =
466 ;          1909     (MLMR)<7,1>%,
467 ;        M 1910       PROM_RW =
468 ;          1911     (MLMR)<6,1>%,
469 ;        M 1912       PROM_DIS =
470 ;          1913     (MLMR)<5,1>%,
471 ;        M 1914       DAT_CLK =
472 ;          1915     (MLMR)<4,1>%,
473 ;        M 1916       DAT_DM =
474 ;          1917     (MLMR)<3,1>%,
475 ;        M 1918       DCK_EN =
476 ;          1919     (MLMR)<2,1>%,
477 ;        M 1920       ECC_DIS =
```

```
;ML4

;          1921    (MLMR)<1,1>%,
;        M 1922      ECC_DM =
;          1923     (MLMR)<0,1>%,
;        M 1924      DRV_TYP =
;          1925     (MLDT)<0,1>%,                          !MLDT BIT ASSIGNMENTS
;        M 1926      CRC_A =
;        M 1927                                  !MLE1 BIT ASSIGNMENTS
;          1928    (MLE1)<0,6>%,
;        M 1929      PAR_CRC_WRD =
;          1930    (MLE1)<8,6>%,
;        M 1931      CRC_B =
;        M 1932                                  !MLE2 BIT ASSIGNMENTS
;          1933    (MLE2)<0,6>%,
;        M 1934      UNC_ERR =
;          1935     (MLEE)<15,1>%,                         !MLEE BIT ASSIGNMENTS
;        M 1936      SGL_ERR =
;          1937     (MLEE)<14,1>%,
;        M 1938      CRC_ERR =
;          1939     (MLEE)<13,1>%,
;        M 1940      BIT_IN_ERR =
;          1941    (MLEE)<0,6>%,
;        M 1942      CHAN_IN_ERR =
;          1943    (MLEE)<8,6>%,
;          1944    !
;          1945    ! MISCELLANEOUS MACRO DEFINITIONS:
;          1946    !
;        M 1947      SN3 =
;          1948    (MLSN)<12,4>%,
;        M 1949      SN2 =
;          1950    (MLSN)<8,4>%,
;        M 1951      SN1 =
;          1952    (MLSN)<4,4>%,
;        M 1953      SN0 =
;          1954    (MLSN)<0,4>%,
;        M 1955      IS_SET =
;        M 1956                                  !TEST IF BIT IS EQUAL 1
;          1957    eql 1%,
;        M 1958      IS_NOT_SET =
;        M 1959                                  !TEST IF BIT IS EQUAL 0
;          1960    eql 0%,
;        M 1961      HI =
;        M 1962                                  !READS REGISTERS FORCED HI BITS FROM PERSONALITY TABLE
;          1963    ML_REG[.index,FORCE_HI]%,
;        M 1964      LO =
;        M 1965                                  !READS REGISTERS FORCED LO BITS FROM PERSONALITY TABLE
;          1966    ML_REG[.index,FORCE_LO]%,
;        M 1967      IGNORE =
;        M 1968                                  !READS REGISTERS DONT_CARE BITS FROM PERSONALITY TABLE
;          1969    ML_REG[.index,DONT_CARE]%,
;        M 1970      MLE2_MASK =
;        M 1971                                  !READS MLE2 DONT CARE MASK EITHER DATA DIAG OR ECC CIE REG
;          1972    ML_REG[14,DONT_CARE]%,
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (3)

;        M 1973      WRT_MASK =
;        M 1974                                                  !GENERATE MASK DATA PATTERN USING REGISTER FORCE LO, HI AND IGNORE B
;          1975    .IGNORE or ((not .LO) and (.HI or .TST_PAT))%,
;        M 1976      CLR_MBUS =
;        M 1977                                                  !CLEAR MASS BUS RESTORE DRIVE NUMBER
;          1978    CLR = ONE; DRV_NUM = .ML_DUT%,
;          1979    !<BLF/SYNONYM IS_SET = EQL 1 * >
;          1980    !<BLF/SYNONYM IS_NOT_SET = EQL 0 * >
;          1981    !
;          1982    ! DIAGNOSTIC DATA REGISTER MACROS
;          1983    !
;        M 1984      RD_LNG_WRD =
;        M 1985                                          !READ DATA DIAG REGS INTO BIND LOCATIONS
;        M 1986      D1_TEMP = .MLD1;
;        M 1987      D2_TEMP = .MLD2;
;          1988      E2_TEMP = .MLE2%,
;        M 1989      WRT_LNG_WRD =
;        M 1990                                          !LOADS DATA DIAG REG WITH CONTENTS OF BIND LOCATIONS
;        M 1991      MLD1 = .D1_TEMP;
;        M 1992      MLD2 = .D2_TEMP;
;          1993      MLE2 = .E2_TEMP%,
;        M 1994      TIME_OUT_LOOP =
;        M 1995                  !WAIT LOOP DIRING MASS BUS TRANSFER
;        M 1996          do
;        M 1997            0
;          1998          until .DRY;%;
;          1999
;          2000    !
;          2001    ! BIND DECLARATIONS
;          2002    !
;          2003
;          2004    bind
;          2005    !
;          2006    ! ERROR DATA MAPPING FORMATS
;          2007    !
;          2008        FMT_1 = uplit (%asciz'%AEXPECTED: %O6%A    READ: %O6%N%N'),
;          2009        FMT_2 = uplit (%asciz'%AGOOD DATA: %O6%A    BAD DATA: %O6%A    XOR: %O6%N%N'),
;          2010        FMT_3 = uplit (%asciz'%ADRIVE SN: %O6%N%N'),
;          2011        FMT_4 = uplit (%asciz'%ABIT IN ERROR: %O6%N%N'),
;          2012        FMT_5 = uplit (%asciz'%AGOOD NIB DATA: %O2%A    BAD NIB DATA: %O2%A    NIB POS: %O4%N%N'),
;          2013        FMT_6 = uplit (%asciz'%ANIB IN ERROR: %D4%N%N'),
;          2014        FMT_7 = uplit (%asciz'%AFAILED AT: %O6%N%N'),
;          2015        FMT_8 = uplit (%asciz'%AREPLACE ARR MOD: %D2%N%N'),
;          2016        FMT_9 = uplit (%asciz'%AFAILED AT DSA: %O6%N%N'),
;          2017        FMT_10 = uplit (%asciz'%ABIT<15:10>: %B6%A    BIT<9:0>: %B10%N%N'),
;          2018        FMT_11 = uplit (%asciz'%AFAILING REG ADRS: %O6%N%N'),
;          2019        FMT_12 = uplit (%asciz'%AFAILING FUNC: %O6%N%N'),
;          2020        FMT_13 = uplit (%asciz' %AOFF SET CNT FOR NIB : %D2 %A = %D2 %N%N'),
;          2021        FMT_14 = uplit (%asciz'%AROTE: %D2%A    READ: %D2%N%N'),
;          2022        FMT_15 = uplit (%asciz'%ANIBBLES XFERED BEFORE ERROR: %D3%N'),
;          2023        FMT_16 = uplit (%asciz'%AFAILING REG: %O6%A GOOD DATA: %O6%A BAD DATA: %O6%N%N'),
;          2024        FMT_17 = uplit (%asciz'%N%ADIAGNOSING UNIT %O1%N%N'),
```

```
;ML4
;
;
;          2025      FMT_18 = uplit (%asciz'%ATIMED OUT DURING MBUS %O2%A FUNC%N%N'),
;          2026      FMT_19 = uplit (%asciz'%ACRC GEN = B: %B6%A A: %B6%A P: %B6%N'),
;          2027      FMT_20 = uplit (%asciz'%ACRC CAL = B: %B6%A A: %B6%A P: %B6%N%N'),
;          2028      FMT_21 = uplit (%asciz'%AFAILED AT PLOG: %D2%A CHANNEL: %D2%N%N'),
;          2029      FMT_22 = uplit (%asciz'%AFAILED AT WRD: %D2%A BIT: %D2%N%N'),
;          2030      FMT_23 = uplit (%asciz'%AREGISTER%S3%AADDRESS%S7%ACONTENTS%N%N'),
;          2031      FMT_24 = uplit (%asciz'%S%T%S5%O6%S4%O16%N'),
;          2032      FMT_25 = uplit (%asciz'%S4%T%A:%S%O6'),
;          2033      FMT_26 = uplit (%asciz'%S4%T%A:%S%D1%3I%D1%D1%N'),
;          2034  !
;          2035  ! ERROR MESSAGE MAPPING FORMATS
;          2036  !
;          2037      ONE_FMT = uplit (%asciz'%T%N'),
;          2038      TWO_FMT = uplit (%asciz'%T%T%N'),
;          2039      THR_FMT = uplit (%asciz'%T%T%T%N'),
;          2040      FOR_FMT = uplit (%asciz'%T%T%T%T%N'),
;          2041      FIV_FMT = uplit (%asciz'%T%T%T%T%T%N'),
;          2042      SIX_FMT = uplit (%asciz'%T%T%T%T%T%T%N'),
;          2043      SEV_FMT = uplit (%asciz'%T%T%T%T%T%T%T%N'),
;          2044      EIG_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%N'),
;          2045      NIN_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%T%N'),
;          2046      TEN_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%T%T%N'),
;          2047      ELV_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%T%T%T%N'),
;          2048  !
;          2049  ! DIAGNOSTIC VOCABULARY
;          2050  !
;          2051      !
;          2052      ! WORDS
;          2053      !
;          2054      WRD_1 = uplit (%asciz' GO'),
;          2055      WRD_2 = uplit (%asciz' DRV_RDY'),
;          2056      WRD_3 = uplit (%asciz' ILF'),
;          2057      WRD_4 = uplit (%asciz' OPI'),
;          2058      WRD_5 = uplit (%asciz' BAD'),
;          2059      WRD_6 = uplit (%asciz' GOOD'),
;          2060      WRD_7 = uplit (%asciz' PARITY NOT'),
;          2061      WRD_8 = uplit (%asciz' GENERATED'),
;          2062      WRD_9 = uplit (%asciz' DETECTED'),
;          2063      WRD_10 = uplit (%asciz' ERROR'),
;          2064      WRD_11 = uplit (%asciz' AFTER'),
;          2065      WRD_12 = uplit (%asciz' DURING'),
;          2066      WRD_13 = uplit (%asciz' AT'),
;          2067      WRD_14 = uplit (%asciz' FAILURE'),
;          2068      WRD_15 = uplit (%asciz' ATA'),
;          2069      WRD_16 = uplit (%asciz' ATTN'),
;          2070      WRD_17 = uplit (%asciz' WRITING'),
;          2071      WRD_18 = uplit (%asciz' VV'),
;          2072      WRD_19 = uplit (%asciz' FUNC'),
;          2073      WRD_20 = uplit (%asciz' TRE'),
;          2074      WRD_21 = uplit (%asciz' RMR'),
;          2075      WRD_22 = uplit (%asciz' EXCESSIVE'),
;          2076      WRD_23 = uplit (%asciz' MBUS'),
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (3)

```
;ML4
;
;
;          2077      WRD_24 = uplit (%asciz' DATA'),
;          2078      WRD_25 = uplit (%asciz' CONTINUITY'),
;          2079      WRD_26 = uplit (%asciz' ADE'),
;          2080      WRD_27 = uplit (%asciz' LBT'),
;          2081      WRD_29 = uplit (%asciz' PREMATURLY'),
;          2082      WRD_30 = uplit (%asciz' IAE'),
;          2083      WRD_31 = uplit (%asciz' INCREMENT'),
;          2084      WRD_32 = uplit (%asciz' WITH'),
;          2085      WRD_33 = uplit (%asciz' UV'),
;          2086      WRD_34 = uplit (%asciz' UNS'),
;          2087      WRD_35 = uplit (%asciz' PROM'),
;          2088      WRD_36 = uplit (%asciz' OR'),
;          2089      WRD_37 = uplit (%asciz' SELECT'),
;          2090      WRD_38 = uplit (%asciz' REG'),
;          2091      WRD_39 = uplit (%asciz' UNIQUE'),
;          2092      WRD_40 = uplit (%asciz' 14'),
;          2093      WRD_41 = uplit (%asciz' NIBBLE CNT'),
;          2094      WRD_42 = uplit (%asciz' GTR'),
;          2095      WRD_43 = uplit (%asciz' WHILE'),
;          2096      WRD_44 = uplit (%asciz' TRE'),
;          2097      WRD_45 = uplit (%asciz' INITIAL'),
;          2098      WRD_46 = uplit (%asciz' OFF_SET'),
;          2099      WRD_47 = uplit (%asciz' COUNT'),
;          2100      WRD_48 = uplit (%asciz' DELAY'),
;          2101      WRD_49 = uplit (%asciz' TESTS'),
;          2102      WRD_50 = uplit (%asciz' ADRS'),
;          2103      WRD_51 = uplit (%asciz' COUNTER'),
;          2104      WRD_52 = uplit (%asciz' REG'),
;          2105      WRD_53 = uplit (%asciz' TESTED'),
;          2106      WRD_54 = uplit (%asciz' NIBBLE'),
;          2107      WRD_55 = uplit (%asciz' ALL'),
;          2108      WRD_56 = uplit (%asciz' TEST'),
;          2109      WRD_57 = uplit (%asciz' XFERED'),
;          2110      WRD_58 = uplit (%asciz' NIBBLES'),
;          2111      WRD_59 = uplit (%asciz' SC'),
;          2112      WRD_60 = uplit (%asciz' MULTIPLEXER'),
;          2113      WRD_61 = uplit (%asciz' UNEXPECTED'),
;          2114      WRD_62 = uplit (%asciz' NED'),
;          2115      WRD_63 = uplit (%asciz' ILR'),
;          2116      WRD_64 = uplit (%asciz' CRC'),
;          2117      WRD_65 = uplit (%asciz' SGL'),
;          2118      WRD_67 = uplit (%asciz' ECH'),
;          2119      WRD_68 = uplit (%asciz'UNC'),
;          2120      WRD_69 = uplit (%asciz' BIT'),
;          2121      WRD_70 = uplit (%asciz' CHANNEL'),
;          2122      WRD_71 = uplit (%asciz' LATCH'),
;          2123      WRD_72 = uplit (%asciz' DCK'),
;          2124      WRD_73 = uplit (%asciz' BUS'),
;          2125      WRD_74 = uplit (%asciz' SYNDROME'),
;          2126      WRD_75 = uplit (%asciz' DECODE'),
;          2127      WRD_76 = uplit (%asciz' NOT'),
;          2128      WRD_77 = uplit (%asciz' UNCORRECTABLE'),
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (3)

```
;ML4
;
;                2129      !
;                2130      ! PHRASES
;                2131      !
;                2132      PHR_1 = uplit (%asciz' BIT NOT SET'),
;                2133      PHR_2 = uplit (%asciz' BIT NOT CLR'),
;                2134      PHR_3 = uplit (%asciz' NO RESPONCE AFTER 1.5 US'),
;                2135      PHR_4 = uplit (%asciz' DATA ERRORS'),
;                2136      PHR_5 = uplit (%asciz' BIT SET'),
;                2137      PHR_6 = uplit (%asciz' BIT CLR'),
;                2138      PHR_7 = uplit (%asciz' OF OTHER DRIVES'),
;                2139      PHR_8 = uplit (%asciz' CLASS A'),
;                2140      PHR_9 = uplit (%asciz' CLASS B'),
;                2141      PHR_10 = uplit (%asciz' TO FIND'),
;                2142      PHR_11 = uplit (%asciz' NOT LATCHED'),
;                2143      PHR_12 = uplit (%asciz' SINGLE BIT ERROR'),
;                2144      PHR_13 = uplit (%asciz' MULTIPLE BIT ERROR'),
;                2145      PHR_14 = uplit (%asciz'        REGISTER   DUMP'),
;                2146      PHR_15 = uplit (%asciz'SERIAL #'),
;                2147      !
;                2148      ! FUNCTIONS
;                2149      !
;                2150      FNC_1 = uplit (%asciz' MEM SIZING'),
;                2151      FNC_2 = uplit (%asciz' NOOP'),
;                2152      FNC_3 = uplit (%asciz' DRV'),
;                2153      FNC_4 = uplit (%asciz' WRITE CHECK'),
;                2154      FNC_5 = uplit (%asciz' WRITE'),
;                2155      FNC_6 = uplit (%asciz' READ'),
;                2156      FNC_7 = uplit (%asciz' CLEAR'),
;                2157      FNC_8 = uplit (%asciz' COMP ERROR'),
;                2158      FNC_9 = uplit (%asciz' SYS CLR'),
;                2159      FNC_10 = uplit (%asciz' SEARCH'),
;                2160      FNC_11 = uplit (%asciz' READ-IN-PRESET'),
;                2161      FNC_12 = uplit (%asciz' ILLEGAL'),
;                2162      FNC_13 = uplit (%asciz' ABORT'),
;                2163      FNC_14 = uplit (%asciz' ARR RD WRT'),
;                2164      FNC_15 = uplit (%asciz' GOOD BLK'),
;                2165      FNC_16 = uplit (%asciz' REFRESH'),
;                2166      FNC_17 = uplit (%asciz' ARRAY'),
;                2167      FNC_18 = uplit (%asciz' RAM-BUS'),
;                2168      FNC_19 = uplit (%asciz' OVERFLOW'),
;                2169      FNC_21 = uplit (%asciz' CHK SUM'),
;                2170      FNC_22 = uplit (%asciz' LAST BLK'),
;                2171      FNC_23 = uplit (%asciz' INITIALIZE'),
;                2172      !
;                2173      ! REGISTERS
;                2174      !
;                2175      REG_1 = uplit (%asciz' MLCS1'),
;                2176      REG_2 = uplit (%asciz' MLDS'),
;                2177      REG_3 = uplit (%asciz' MLER'),
;                2178      REG_4 = uplit (%asciz' MLMR'),
;                2179      REG_5 = uplit (%asciz' MLAS'),
;                2180      REG_6 = uplit (%asciz' MLDA'),
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (3)

```
;ML4
;
;
;                2181        REG_7 = uplit (%asciz' MLDT'),
;                2182        REG_8 = uplit (%asciz' MLPA'),
;                2183        REG_9 = uplit (%asciz' MLSN'),
;                2184        REG_10 = uplit (%asciz' MLE1'),
;                2185        REG_11 = uplit (%asciz' MLE2'),
;                2186        REG_12 = uplit (%asciz' MLD1'),
;                2187        REG_13 = uplit (%asciz' MLD2'),
;                2188        REG_14 = uplit (%asciz' MLEE'),
;                2189        REG_15 = uplit (%asciz' MLEL'),
;                2190        REG_16 = uplit (%asciz' MLPD'),
;                2191        REG_17 = uplit (%asciz' MLCS2'),
;                2192        REG_18 = uplit (%asciz' MLWC'),
;                2193        REG_19 = uplit (%asciz' MLBA'),
;                2194        REG_20 = uplit (%asciz' MLBAI'),
;                2195        REG_21 = uplit (%asciz' MLCS3'),
;                2196        !
;                2197        ! MODULES IN ERROR MESSAGES
;                2198        !
;                2199        ASYNC = uplit (%asciz'ASYNCHRONOUS FAILURE MODULE 7361'),
;                2200        SYNC = uplit (%asciz'SYNCHRONOUS FAILURE MODULE 7362 '),
;                2201        ARR_DAT = uplit (%asciz'ARRAY DATA FAILURE MODULE 7363 '),
;                2202        MEM_ARR = uplit (%asciz'MEMORY ARRAY FAILURE MODULE 7357'),
;                2203        INTER = uplit (%asciz'INTERMEDIATE DIAGNOSTIC MESSAGE'),
;                2204        DATA_LATE = uplit (%asciz'DATA LATE ERROR DURING TRANSFER'),
;                2205        SC_SET = uplit (%asciz'SC BIT SET DURING TRANSFER'),
;                2206        TRBLE_LOOP = uplit (%asciz'TROUBLE SHOOT LOOP ERRORS'),
;                2207        RH_ERROR = uplit (%asciz'RH CONTROLLER ERRORS'),
;                2208        TIME_OUT = uplit (%asciz'DRIVE HUNG AFTER MASS BUS TRANSFER'),
;                2209    !
;                2210    ! DATA DIAGNOSTIC REGISTER SAVE LOCATIONS
;                2211    !
;                2212        D1_TEMP = NIB_SAVE,
;                2213        D2_TEMP = NIB_SAVE [1, 0, 16, 0],
;                2214        E2_TEMP = NIB_SAVE [2, 0, 16, 0];
;                2215
;                2216    !<BLF/PAGE>
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>3L3ML4.BLI.2 (5)

;          2217  routine LOAD_STACK (STK_PTR, NIB_PTR) : novalue =
;          2218      begin
;          2219
;          2220  !++
;          2221  ! FUNCTIONAL DESCRIPTION:
;          2222  !       LOAD STACK TAKES GOOD NIBBLE DATA
;          2223  !       FOUND IN THE STRUCTURE 'NIB_SAVE'
;          2224  !       AND STORES IT INTO THE STRUCTURE
;          2225  !       'STACK' REWRITING ANY BAD NIBBLE
;          2226  !       'STACK' LOCATIONS WITH GOOD NIBBLE
;          2227  !       DATA
;          2228  !
;          2229  ! FORMAL PARAMETERS:
;          2230  ! STK_PTR
;          2231  !       POINTS TO PRESENT DEPTH OF THE
;          2232  !       'STACK' WHERE PRESENT GOOD NIBBLE
;          2233  !       DATA IS TO BE STORED.
;          2234  !
;          2235  ! NIB_PTR
;          2236  !       POINTS TO CURRENT NIBBLE POSITION BEING
;          2237  !       MANIPULATED.
;          2238  !
;          2239  ! IMPLICIT INPUTS:
;          2240  ! STACK
;          2241  !       VECTOR OF 198 BYTE LOCATIONS WHERE
;          2242  !       GOOD NIBBLE DATA IS STORED
;          2243  !       DURING DIAGNOSTIC MODE READS, AFTER
;          2244  !       BAD NIBBLE LOCATIONS HAVE BEEN
;          2245  !       STRIPPED AWAY.
;          2246  !
;          2247  ! STK_OFF
;          2248  !
;          2249  !    vector of 9 byte LOCATIONS WHICH
;          2250  !       STORES AWAY A BAD NIBBLE OFF_SET
;          2251  !       COUNT FOR EACH NIBBLE POSITION
;          2252  !
;          2253  ! NIB_SAVE
;          2254  !       BLOCK OF 3 WORDS TO STORE THE
;          2255  !       DATA FOUND IN MLD1, MLD2 AND
;          2256  !       MLE2 AFTER A DIAGNOSTIC MODE READ.
;          2257  !
;          2258  ! IMPLICIT OUTPUTS:
;          2259  !       'STACK' LOADED WITH GOOD NIBBLE
;          2260  !       DATA
;          2261  !
;          2262  ! COMPLETETION CODES:   NONE
;          2263  !
;          2264  ! SIDE EFFECTS:         NONE
;          2265  !
;          2266  !--
;          2267
;          2268      case .NIB_PTR from 0 to 9 of                !SELECT NIBBLE DATA TO BE LOADED INTO THE STACK
```

22-Dec-1980 09:24:31 TOPS-20 Bl iss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (5)

```
855 ;ML4
856 ;
857
858 ;          2269          set
859 ;          2270
860 ;          2271          [0] :
861 ;          2272              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_0];
862 ;          2273                                                  !LOAD NIBBLE DATA 0 INTO SELECTED STACK LOCATION
863 ;          2274
864 ;          2275          [1] :
865 ;          2276              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_1];
866 ;          2277                                                  !LOAD NIBBLE DATA 1 INTO SELECTED STACK LOCATION
867 ;          2278
868 ;          2279          [2] :
869 ;          2280              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_2];
870 ;          2281                                                  !LOAD NIBBLE DATA 2 INTO SELECTED STACK LOCATION
871 ;          2282
872 ;          2283          [3] :
873 ;          2284              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_3];
874 ;          2285                                                  !LOAD NIBBLE DATA 3 INTO SELECTED STACK LOCATION
875 ;          2286
876 ;          2287          [4] :
877 ;          2288              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_4];
878 ;          2289                                                  !LOAD NIBBLE DATA 4 INTO SELECTED STACK LOCATION
879 ;          2290
880 ;          2291          [5] :
881 ;          2292              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_5];
882 ;          2293                                                  !LOAD NIBBLE DATA 5 INTO SELECTED STACK LOCATION
883 ;          2294
884 ;          2295          [6] :
885 ;          2296              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_6];
886 ;          2297                                                  !LOAD NIBBLE DATA 6 INTO SELECTED STACK LOCATION
887 ;          2298
888 ;          2299          [7] :
889 ;          2300              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_7];
890 ;          2301                                                  !LOAD NIBBLE DATA 7 INTO SELECTED STACK LOCATION
891 ;          2302
892 ;          2303          [8] :
893 ;          2304              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_8];
894 ;          2305                                                  !LOAD NIBBLE DATA 8 INTO SELECTED STACK LOCATION
895 ;          2306
896 ;          2307          [9] :
897 ;          2308              stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_9];
898 ;          2309                                                  !LOAD NIBBLE DATA 9 INTO SELECTED STACK LOCATION
899 ;          2310          tes;
900 ;          2311
901 ;          2312      end;
905
906
907
```

```
                                        ;ML4
                                        ;
004222  045  101  105  P.AAA:  .ASCII  /%AE/
004225  130  120  105          .ASCII  /XPE/
004230  103  124  105          .ASCII  /CTE/
004233  104  072  040          .ASCII  /D: /
004236  045  117  066          .ASCII  /%06/
004241  045  101  040          .ASCII  /%A /
004244  040  040  040          .ASCII  /   /
004247  122  105  101          .ASCII  /REA/
004252  104  072  040          .ASCII  /D: /
004255  045  117  066          .ASCII  /%06/
004260  045  116  045          .ASCII  /%N%/
004263  116  000  000          .ASCII  /N/<00><00>
004266  045  101  107  P.AAB:  .ASCII  /%AG/
004271  117  117  104          .ASCII  /OOD/
004274  040  104  101          .ASCII  / DA/
004277  124  101  072          .ASCII  /TA:/
004302  040  045  117          .ASCII  / %O/
004305  066  045  101          .ASCII  /6%A/
004310  040  040  040          .ASCII  /   /
004313  040  102  101          .ASCII  / BA/
004316  104  040  104          .ASCII  /D D/
004321  101  124  101          .ASCII  /ATA/
004324  072  040  045          .ASCII  /: %/
004327  117  066  045          .ASCII  /O6%/
004332  101  040  040          .ASCII  /A  /
004335  040  040  130          .ASCII  /  X/
004340  117  122  072          .ASCII  /OR:/
004343  040  045  117          .ASCII  / %O/
004346  066  045  116          .ASCII  /6%N/
004351  045  116  000          .ASCII  /%N/<00>
004354  045  101  104  P.AAC:  .ASCII  /%AD/
004357  122  111  126          .ASCII  /RIV/
004362  105  040  123          .ASCII  /E S/
004365  116  072  040          .ASCII  /N: /
004370  045  117  066          .ASCII  /%06/
004373  045  116  045          .ASCII  /%N%/
004376  116  000                .ASCII  /N/<00>
004400  045  101  102  P.AAD:  .ASCII  /%AB/
004403  111  124  040          .ASCII  /IT /
004406  111  116  040          .ASCII  /IN /
004411  105  122  122          .ASCII  /ERR/
004414  117  122  072          .ASCII  /OR:/
004417  040  045  117          .ASCII  / %O/
004422  066  045  116          .ASCII  /6%N/
004425  045  116  000          .ASCII  /%N/<00>
004430  045  101  107  P.AAE:  .ASCII  /%AG/
004433  117  117  104          .ASCII  /OOD/
004436  040  116  111          .ASCII  / NI/
004441  102  040  104          .ASCII  /B D/
004444  101  124  101          .ASCII  /ATA/
004447  072  040  045          .ASCII  /: %/
004452  117  062  045          .ASCII  /02%/
```

```
                                        ;ML_4
                                        ;
                                        ;
004455  101  040  040          .ASCII  /A  /
004460  040  040  102          .ASCII  /  B/
004463  101  104  040          .ASCII  /AD /
004466  116  111  102          .ASCII  /NIB/
004471  040  104  101          .ASCII  / DA/
004474  124  101  072          .ASCII  /TA:/
004477  040  045  117          .ASCII  / %O/
004502  062  045  101          .ASCII  /2%A/
004505  040  040  040          .ASCII  /   /
004510  040  116  111          .ASCII  / NI/
004513  102  040  120          .ASCII  /B P/
004516  117  123  072          .ASCII  /OS:/
004521  040  045  117          .ASCII  / %O/
004524  064  045  116          .ASCII  /4%N/
004527  045  116  000          .ASCII  /%N/<00>
004532  045  101  116  P.AAF:  .ASCII  /%AN/
004535  111  102  040          .ASCII  /IB /
004540  111  116  040          .ASCII  /IN /
004543  105  122  122          .ASCII  /ERR/
004546  117  122  072          .ASCII  /OR:/
004551  040  045  104          .ASCII  / %D/
004554  064  045  116          .ASCII  /4%N/
004557  045  116  000          .ASCII  /%N/<00>
004562  045  101  106  P.AAG:  .ASCII  /%AF/
004565  101  111  114          .ASCII  /AIL/
004570  105  104  040          .ASCII  /ED /
004573  101  124  072          .ASCII  /AT:/
004576  040  045  117          .ASCII  / %O/
004601  066  045  116          .ASCII  /6%N/
004604  045  116  000          .ASCII  /%N/<00>
004607  000                    .ASCII  <00>
004610  045  101  122  P.AAH:  .ASCII  /%AR/
004613  105  120  114          .ASCII  /EPL/
004616  101  103  105          .ASCII  /ACE/
004621  040  101  122          .ASCII  / AR/
004624  122  040  115          .ASCII  /R M/
004627  117  104  072          .ASCII  /OD:/
004632  040  045  104          .ASCII  / %D/
004635  062  045  116          .ASCII  /2%N/
004640  045  116  000          .ASCII  /%N/<00>
004643  000                    .ASCII  <00>
004644  045  101  106  P.AAI:  .ASCII  /%AF/
004647  101  111  114          .ASCII  /AIL/
004652  105  104  040          .ASCII  /ED /
004655  101  124  040          .ASCII  /AT /
004660  104  123  101          .ASCII  /DSA/
004663  072  040  045          .ASCII  /: %/
004666  117  066  045          .ASCII  /O6%/
004671  116  045  116          .ASCII  /N%N/
004674  000  000                .ASCII  <00><00>
004676  045  101  102  P.AAJ:  .ASCII  /%AB/
004701  111  124  074          .ASCII  /IT</
```

```
1021                                    ;ML4
1022                                    ;
1023
1024 004704    061     065     072             .ASCII  /15:/
1025 004707    061     060     076             .ASCII  /10>/
1026 004712    072     040     045             .ASCII  /: %/
1027 004715    102     066     045             .ASCII  /B6%/
1028 004720    101     040     040             .ASCII  /A  /
1029 004723    040     040     102             .ASCII  /  B/
1030 004726    111     124     074             .ASCII  /IT</
1031 004731    071     072     060             .ASCII  /9:0/
1032 004734    076     072     040             .ASCII  />: /
1033 004737    045     102     061             .ASCII  /%B1/
1034 004742    060     045     116             .ASCII  /0%N/
1035 004745    045     116     000             .ASCII  /%N/<00>
1036 004750    045     101     106     P.AAK:  .ASCII  /%AF/
1037 004753    101     111     114             .ASCII  /AIL/
1038 004756    111     116     107             .ASCII  /ING/
1039 004761    040     122     105             .ASCII  / RE/
1040 004764    107     040     101             .ASCII  /G A/
1041 004767    104     122     123             .ASCII  /DRS/
1042 004772    072     040     045             .ASCII  /: %/
1043 004775    117     066     045             .ASCII  /O6%/
1044 005000    116     045     116             .ASCII  /N%N/
1045 005003    000                             .ASCII  <00>
1046 005004    045     101     106     P.AAL:  .ASCII  /%AF/
1047 005007    101     111     114             .ASCII  /AIL/
1048 005012    111     116     107             .ASCII  /ING/
1049 005015    040     106     125             .ASCII  / FU/
1050 005020    116     103     072             .ASCII  /NC:/
1051 005023    040     045     117             .ASCII  / %O/
1052 005026    066     045     116             .ASCII  /6%N/
1053 005031    045     116     000             .ASCII  /%N/<00>
1054 005034    040     045     101     P.AAM:  .ASCII  / %A/
1055 005037    117     106     106             .ASCII  /OFF/
1056 005042    137     123     105             .ASCII  / SE/
1057 005045    124     040     103             .ASCII  /T C/
1058 005050    116     124     040             .ASCII  /NT /
1059 005053    106     117     122             .ASCII  /FOR/
1060 005056    040     116     111             .ASCII  / NI/
1061 005061    102     040     072             .ASCII  /B :/
1062 005064    040     045     104             .ASCII  / %D/
1063 005067    062     040     045             .ASCII  /2 %/
1064 005072    101     040     075             .ASCII  /A =/
1065 005075    040     045     104             .ASCII  / %D/
1066 005100    062     040     045             .ASCII  /2 %/
1067 005103    116     045     116             .ASCII  /N%N/
1068 005106    000     000                     .ASCII  <00><00>
1069 005110    045     101     127     P.AAN:  .ASCII  /%AW/
1070 005113    122     117     124             .ASCII  /ROT/
1071 005116    105     072     040             .ASCII  /E: /
1072 005121    045     104     062             .ASCII  /%D2/
1073 005124    045     101     040             .ASCII  /%A /
1074 005127    040     040     040             .ASCII  /   /
1075 005132    122     105     101             .ASCII  /REA/
```

```
1077                                    ;ML4
1078                                    ;
1079
1080 005135    104     072     040             .ASCII  /D: /
1081 005140    045     104     062             .ASCII  /%D2/
1082 005143    045     116     045             .ASCII  /%N%/
1083 005146    116     000                     .ASCII  /N/<00>
1084 005150    045     101     116     P.AAO:  .ASCII  /%AN/
1085 005153    111     102     102             .ASCII  /IBB/
1086 005156    114     105     123             .ASCII  /LES/
1087 005161    040     130     106             .ASCII  / XF/
1088 005164    105     122     105             .ASCII  /ERE/
1089 005167    104     040     102             .ASCII  /D B/
1090 005172    105     106     117             .ASCII  /EFO/
1091 005175    122     105     040             .ASCII  /RE /
1092 005200    105     122     122             .ASCII  /ERR/
1093 005203    117     122     072             .ASCII  /OR:/
1094 005206    040     045     104             .ASCII  / %D/
1095 005211    063     045     116             .ASCII  /3%N/
1096 005214    000     000                     .ASCII  <00><00>
1097 005216    045     101     106     P.AAP:  .ASCII  /%AF/
1098 005221    101     111     114             .ASCII  /AIL/
1099 005224    111     116     107             .ASCII  /ING/
1100 005227    040     122     105             .ASCII  / RE/
1101 005232    107     072     040             .ASCII  /G: /
1102 005235    045     117     066             .ASCII  /%O6/
1103 005240    045     101     040             .ASCII  /%A /
1104 005243    107     117     117             .ASCII  /GOO/
1105 005246    104     040     104             .ASCII  /D D/
1106 005251    101     124     101             .ASCII  /ATA/
1107 005254    072     040     045             .ASCII  /: %/
1108 005257    117     066     045             .ASCII  /O6%/
1109 005262    101     040     102             .ASCII  /A B/
1110 005265    101     104     040             .ASCII  /AD /
1111 005270    104     101     124             .ASCII  /DAT/
1112 005273    101     072     040             .ASCII  /A: /
1113 005276    045     117     066             .ASCII  /%O6/
1114 005301    045     116     045             .ASCII  /%N%/
1115 005304    116     000                     .ASCII  /N/<00>
1116 005306    045     116     045     P.AAQ:  .ASCII  /%N%/
1117 005311    101     104     111             .ASCII  /ADI/
1118 005314    101     107     116             .ASCII  /AGN/
1119 005317    117     123     111             .ASCII  /OSI/
1120 005322    116     107     040             .ASCII  /NG /
1121 005325    125     116     111             .ASCII  /UNI/
1122 005330    124     040     045             .ASCII  /T %/
1123 005333    117     061     045             .ASCII  /O1%/
1124 005336    116     045     116             .ASCII  /N%N/
1125 005341    000                             .ASCII  <00>
1126 005342    045     101     124     P.AAR:  .ASCII  /%AT/
1127 005345    111     115     105             .ASCII  /IME/
1128 005350    104     040     117             .ASCII  /D O/
1129 005353    125     124     040             .ASCII  /UT /
1130 005356    104     125     122             .ASCII  /DUR/
1131 005361    111     116     107             .ASCII  /ING/
```

```
1133                                    ;ML4
1134                                    ;
1135
1136 005364  040  115  102             .ASCII  / MB/
1137 005367  125  123  040             .ASCII  /US /
1138 005372  045  117  062             .ASCII  /%O2/
1139 005375  045  101  040             .ASCII  /%A /
1140 005400  106  125  116             .ASCII  /FUN/
1141 005403  103  045  116             .ASCII  /C%N/
1142 005406  045  116  000             .ASCII  /%N/<00>
1143 005411  000                       .ASCII  <00>
1144 005412  045  101  103  P.AAS:     .ASCII  /%AC/
1145 005415  122  103  040             .ASCII  /RC /
1146 005420  107  105  116             .ASCII  /GEN/
1147 005423  040  075  040             .ASCII  / = /
1148 005426  102  072  040             .ASCII  /B: /
1149 005431  045  102  066             .ASCII  /%B6/
1150 005434  045  101  040             .ASCII  /%A /
1151 005437  101  072  040             .ASCII  /A: /
1152 005442  045  102  066             .ASCII  /%B6/
1153 005445  045  101  040             .ASCII  /%A /
1154 005450  120  072  040             .ASCII  /P: /
1155 005453  045  102  066             .ASCII  /%B6/
1156 005456  045  116  000             .ASCII  /%N/<00>
1157 005461  000                       .ASCII  <00>
1158 005462  045  101  103  P.AAT:     .ASCII  /%AC/
1159 005465  122  103  040             .ASCII  /RC /
1160 005470  103  101  114             .ASCII  /CAL/
1161 005473  040  075  040             .ASCII  / = /
1162 005476  102  072  040             .ASCII  /B: /
1163 005501  045  102  066             .ASCII  /%B6/
1164 005504  045  101  040             .ASCII  /%A /
1165 005507  101  072  040             .ASCII  /A: /
1166 005512  045  102  066             .ASCII  /%B6/
1167 005515  045  101  040             .ASCII  /%A /
1168 005520  120  072  040             .ASCII  /P: /
1169 005523  045  102  066             .ASCII  /%B6/
1170 005526  045  116  045             .ASCII  /%N%/
1171 005531  116  000  000             .ASCII  /N/<00><00>
1172 005534  045  101  106  P.AAU:     .ASCII  /%AF/
1173 005537  101  111  114             .ASCII  /AIL/
1174 005542  105  104  040             .ASCII  /ED /
1175 005545  101  124  040             .ASCII  /AT /
1176 005550  120  114  117             .ASCII  /PLO/
1177 005553  107  072  040             .ASCII  /G: /
1178 005556  045  104  062             .ASCII  /%D2/
1179 005561  045  101  040             .ASCII  /%A /
1180 005564  103  110  101             .ASCII  /CHA/
1181 005567  116  116  105             .ASCII  /NNE/
1182 005572  114  072  040             .ASCII  /L: /
1183 005575  045  104  062             .ASCII  /%D2/
1184 005600  045  116  045             .ASCII  /%N%/
1185 005603  116  000  000             .ASCII  /N/<00><00>
1186 005606  045  101  106  P.AAV:     .ASCII  /%AF/
1187 005611  101  111  114             .ASCII  /AIL/
```

```
                                        ;ML4
                                        ;
1192 005614  105  104  040        .ASCII  /ED /
1193 005617  101  124  040        .ASCII  /AT /
1194 005622  127  122  104        .ASCII  /WRD/
1195 005625  072  040  045        .ASCII  /: %/
1196 005630  104  062  045        .ASCII  /D2%/
1197 005633  101  040  102        .ASCII  /A B/
1198 005636  111  124  072        .ASCII  /IT:/
1199 005641  040  045  104        .ASCII  / %D/
1200 005644  062  045  116        .ASCII  /2%N/
1201 005647  045  116  000        .ASCII  /%N/<00>
1202 005652  045  101  122  P.AAW: .ASCII  /%AR/
1203 005655  105  107  111        .ASCII  /EGI/
1204 005660  123  124  105        .ASCII  /STE/
1205 005663  122  045  123        .ASCII  /R%S/
1206 005666  063  045  101        .ASCII  /3%A/
1207 005671  101  104  104        .ASCII  /ADD/
1208 005674  122  105  123        .ASCII  /RES/
1209 005677  123  045  123        .ASCII  /S%S/
1210 005702  067  045  101        .ASCII  /7%A/
1211 005705  103  117  116        .ASCII  /CON/
1212 005710  124  105  116        .ASCII  /TEN/
1213 005713  124  123  045        .ASCII  /TS%/
1214 005716  116  045  116        .ASCII  /N%N/
1215 005721  000                  .ASCII  <00>
1216 005722  045  123  045  P.AAX: .ASCII  /%S%/
1217 005725  124  045  123        .ASCII  /T%S/
1218 005730  065  045  117        .ASCII  /5%O/
1219 005733  066  045  123        .ASCII  /6%S/
1220 005736  064  045  117        .ASCII  /4%O/
1221 005741  061  066  045        .ASCII  /16%/
1222 005744  116  000              .ASCII  /N/<00>
1223 005746  045  123  064  P.AAY: .ASCII  /%S4/
1224 005751  045  124  045        .ASCII  /%T%/
1225 005754  101  072  045        .ASCII  /A:%/
1226 005757  123  045  117        .ASCII  /S%O/
1227 005762  066  000              .ASCII  /6/<00>
1228 005764  045  123  064  P.AAZ: .ASCII  /%S4/
1229 005767  045  124  045        .ASCII  /%T%/
1230 005772  101  072  045        .ASCII  /A:%/
1231 005775  123  045  104        .ASCII  /S%D/
1232 006000  061  045  104        .ASCII  /1%D/
1233 006003  061  045  104        .ASCII  /1%D/
1234 006006  061  045  104        .ASCII  /1%D/
1235 006011  061  045  116        .ASCII  /1%N/
1236 006014  000  000              .ASCII  <00><00>
1237 006016  045  124  045  P.ABA: .ASCII  /%T%/
1238 006021  116  000  000        .ASCII  /N/<00><00>
1239 006024  045  124  045  P.ABB: .ASCII  /%T%/
1240 006027  124  045  116        .ASCII  /T%N/
1241 006032  000  000              .ASCII  <00><00>
1242 006034  045  124  045  P.ABC: .ASCII  /%T%/
1243 006037  124  045  124        .ASCII  /T%T/
```

```
1245                                    ;ML4
1246                                    ;
1247
1248 006042  045  116  000             .ASCII  /%N/<00>
1249 006045  000                        .ASCII  <00>
1250 006046  045  124  045  P.ABD:     .ASCII  /%T%/
1251 006051  124  045  124             .ASCII  /T%T/
1252 006054  045  124  045             .ASCII  /%T%/
1253 006057  116  000  000             .ASCII  /N/<00><00>
1254 006062  045  124  045  P.ABE:     .ASCII  /%T%/
1255 006065  124  045  124             .ASCII  /T%T/
1256 006070  045  124  045             .ASCII  /%T%/
1257 006073  124  045  116             .ASCII  /T%N/
1258 006076  000  000                   .ASCII  <00><00>
1259 006100  045  124  045  P.ABF:     .ASCII  /%T%/
1260 006103  124  045  124             .ASCII  /T%T/
1261 006106  045  124  045             .ASCII  /%T%/
1262 006111  124  045  124             .ASCII  /T%T/
1263 006114  045  116  000             .ASCII  /%N/<00>
1264 006117  000                       .ASCII  <00>
1265 006120  045  124  045  P.ABG:     .ASCII  /%T%/
1266 006123  124  045  124             .ASCII  /T%T/
1267 006126  045  124  045             .ASCII  /%T%/
1268 006131  124  045  124             .ASCII  /T%T/
1269 006134  045  124  045             .ASCII  /%T%/
1270 006137  116  000  000             .ASCII  /N/<00><00>
1271 006142  045  124  045  P.ABH:     .ASCII  /%T%/
1272 006145  124  045  124             .ASCII  /T%T/
1273 006150  045  124  045             .ASCII  /%T%/
1274 006153  124  045  124             .ASCII  /T%T/
1275 006156  045  124  045             .ASCII  /%T%/
1276 006161  124  045  116             .ASCII  /T%N/
1277 006164  000  000                   .ASCII  <00><00>
1278 006166  045  124  045  P.ABI:     .ASCII  /%T%/
1279 006171  124  045  124             .ASCII  /T%T/
1280 006174  045  124  045             .ASCII  /%T%/
1281 006177  124  045  124             .ASCII  /T%T/
1282 006202  045  124  045             .ASCII  /%T%/
1283 006205  124  045  124             .ASCII  /T%T/
1284 006210  045  116  000             .ASCII  /%N/<00>
1285 006213  000                       .ASCII  <00>
1286 006214  045  124  045  P.ABJ:     .ASCII  /%T%/
1287 006217  124  045  124             .ASCII  /T%T/
1288 006222  045  124  045             .ASCII  /%T%/
1289 006225  124  045  124             .ASCII  /T%T/
1290 006230  045  124  045             .ASCII  /%T%/
1291 006233  124  045  124             .ASCII  /T%T/
1292 006236  045  124  045             .ASCII  /%T%/
1293 006241  116  000  000             .ASCII  /N/<00><00>
1294 006244  045  124  045  P.ABK:     .ASCII  /%T%/
1295 006247  124  045  124             .ASCII  /T%T/
1296 006252  045  124  045             .ASCII  /%T%/
1297 006255  124  045  124             .ASCII  /T%T/
1298 006260  045  124  045             .ASCII  /%T%/
1299 006263  124  045  124             .ASCII  /T%T/
```

```
1301                                    ;ML4
1302                                    ;
1303
1304 006266  045  124  045             .ASCII  /%T%/
1305 006271  124  045  116             .ASCII  /T%N/
1306 006274  000  000                  .ASCII  <00><00>
1307 006276  040  107  117  P.ABL:     .ASCII  / GO/
1308 006301  000                       .ASCII  <00>
1309 006302  040  104  122  P.ABM:     .ASCII  / DR/
1310 006305  126  137  122             .ASCII  /V_R/
1311 006310  104  131  000             .ASCII  /DY/<00>
1312 006313  000                       .ASCII  <00>
1313 006314  040  111  114  P.ABN:     .ASCII  / IL/
1314 006317  106  000  000             .ASCII  /F/<00><00>
1315 006322  040  117  120  P.ABO:     .ASCII  / OP/
1316 006325  111  000  000             .ASCII  /I/<00><00>
1317 006330  040  102  101  P.ABP:     .ASCII  / BA/
1318 006333  104  000  000             .ASCII  /D/<00><00>
1319 006336  040  107  117  P.ABQ:     .ASCII  / GO/
1320 006341  117  104  000             .ASCII  /OD/<00>
1321 006344  040  120  101  P.ABR:     .ASCII  / PA/
1322 006347  122  111  124             .ASCII  /RIT/
1323 006352  131  040  116             .ASCII  /Y N/
1324 006355  117  124  000             .ASCII  /OT/<00>
1325 006360  040  107  105  P.ABS:     .ASCII  / GE/
1326 006363  116  105  122             .ASCII  /NER/
1327 006366  101  124  105             .ASCII  /ATE/
1328 006371  104  000  000             .ASCII  /D/<00><00>
1329 006374  040  104  105  P.ABT:     .ASCII  / DE/
1330 006377  124  105  103             .ASCII  /TEC/
1331 006402  124  105  104             .ASCII  /TED/
1332 006405  000                       .ASCII  <00>
1333 006406  040  105  122  P.ABU:     .ASCII  / ER/
1334 006411  122  117  122             .ASCII  /ROR/
1335 006414  000  000                  .ASCII  <00><00>
1336 006416  040  101  106  P.ABV:     .ASCII  / AF/
1337 006421  124  105  122             .ASCII  /TER/
1338 006424  000  000                  .ASCII  <00><00>
1339 006426  040  104  125  P.ABW:     .ASCII  / DU/
1340 006431  122  111  116             .ASCII  /RIN/
1341 006434  107  000                  .ASCII  /G/<00>
1342 006436  040  101  124  P.ABX:     .ASCII  / AT/
1343 006441  000                       .ASCII  <00>
1344 006442  040  106  101  P.ABY:     .ASCII  / FA/
1345 006445  111  114  125             .ASCII  /ILU/
1346 006450  122  105  000             .ASCII  /RE/<00>
1347 006453  000                       .ASCII  <00>
1348 006454  040  101  124  P.ABZ:     .ASCII  / AT/
1349 006457  101  000  000             .ASCII  /A/<00><00>
1350 006462  040  101  124  P.ACA:     .ASCII  / AT/
1351 006465  124  116  000             .ASCII  /TN/<00>
1352 006470  040  127  122  P.ACB:     .ASCII  / WR/
1353 006473  111  124  111             .ASCII  /ITI/
1354 006476  116  107  000             .ASCII  /NG/<00>
1355 006501  000                       .ASCII  <00>
```

22-Dec-1980 09:24:31 TOPS
22-Dec-1980 09:21:22 PA:<

```
1357                                    ;ML4
1358                                    ;
1359
1360 006502  040  126  126  P.ACC:  .ASCII  / VV/
1361 006505  000                    .ASCII  <00>
1362 006506  040  106  125  P.ACD:  .ASCII  / FU/
1363 006511  116  103  000          .ASCII  /NC/<00>
1364 006514  040  124  122  P.ACE:  .ASCII  / TR/
1365 006517  105  000  000          .ASCII  /E/<00><00>
1366 006522  040  122  115  P.ACF:  .ASCII  / RM/
1367 006525  122  000  000          .ASCII  /R/<00><00>
1368 006530  040  105  130  P.ACG:  .ASCII  / EX/
1369 006533  103  105  123          .ASCII  /CES/
1370 006536  123  111  126          .ASCII  /SIV/
1371 006541  105  000  000          .ASCII  /E/<00><00>
1372 006544  040  115  102  P.ACH:  .ASCII  / MB/
1373 006547  125  123  000          .ASCII  /US/<00>
1374 006552  040  104  101  P.ACI:  .ASCII  / DA/
1375 006555  124  101  000          .ASCII  /TA/<00>
1376 006560  040  103  117  P.ACJ:  .ASCII  / CO/
1377 006563  116  124  111          .ASCII  /NTI/
1378 006566  116  125  111          .ASCII  /NUI/
1379 006571  124  131  000          .ASCII  /TY/<00>
1380 006574  040  101  117  P.ACK:  .ASCII  / AO/
1381 006577  105  000  000          .ASCII  /E/<00><00>
1382 006602  040  114  102  P.ACL:  .ASCII  / LB/
1383 006605  124  000  000          .ASCII  /T/<00><00>
1384 006610  040  120  122  P.ACM:  .ASCII  / PR/
1385 006613  105  115  101          .ASCII  /EMA/
1386 006616  124  125  122          .ASCII  /TUR/
1387 006621  114  131  000          .ASCII  /LY/<00>
1388 006624  040  111  101  P.ACN:  .ASCII  / IA/
1389 006627  105  000  000          .ASCII  /E/<00><00>
1390 006632  040  111  116  P.ACO:  .ASCII  / IN/
1391 006635  103  122  105          .ASCII  /CRE/
1392 006640  115  105  116          .ASCII  /MEN/
1393 006643  124  000  000          .ASCII  /T/<00><00>
1394 006646  040  127  111  P.ACP:  .ASCII  / WI/
1395 006651  124  110  000          .ASCII  /TH/<00>
1396 006654  040  125  126  P.ACQ:  .ASCII  / UV/
1397 006657  000                    .ASCII  <00>
1398 006660  040  125  116  P.ACR:  .ASCII  / UN/
1399 006663  123  000  000          .ASCII  /S/<00><00>
1400 006666  040  120  122  P.ACS:  .ASCII  / PR/
1401 006671  117  115  000          .ASCII  /OM/<00>
1402 006674  040  117  122  P.ACT:  .ASCII  / OR/
1403 006677  000                    .ASCII  <00>
1404 006700  040  123  105  P.ACU:  .ASCII  / SE/
1405 006703  114  105  103          .ASCII  /LEC/
1406 006706  124  000                .ASCII  /T/<00>
1407 006710  040  122  105  P.ACV:  .ASCII  / RE/
1408 006713  107  000  000          .ASCII  /G/<00><00>
1409 006716  040  125  116  P.ACW:  .ASCII  / UN/
1410 006721  111  121  125          .ASCII  /IQU/
1411 006724  105  000                .ASCII  /E/<00>
```

```
1413                                    ;ML4                                    22-Dec-1980 09:24:31    TOPS
1414                                    ;                                       22-Dec-1980 09:21:22    PA:<
1415
1416 006726  040     061     064  P.ACX:  .ASCII  / 14/
1417 006731  000                          .ASCII  <00>
1418 006732  040     116     111  P.ACY:  .ASCII  / NI/
1419 006735  102     102     114          .ASCII  /BBL/
1420 006740  105     040     103          .ASCII  /E C/
1421 006743  116     124     000          .ASCII  /NT/<00>
1422 006746  040     107     124  P.ACZ:  .ASCII  / GT/
1423 006751  122     000     000          .ASCII  /R/<00><00>
1424 006754  040     127     110  P.ADA:  .ASCII  / WH/
1425 006757  111     114     105          .ASCII  /ILE/
1426 006762  000     000                  .ASCII  <00><00>
1427 006764  040     124     122  P.ADB:  .ASCII  / TR/
1428 006767  105     000     000          .ASCII  /E/<00><00>
1429 006772  040     111     116  P.ADC:  .ASCII  / IN/
1430 006775  111     124     111          .ASCII  /ITI/
1431 007000  101     114     000          .ASCII  /AL/<00>
1432 007003  000                          .ASCII  <00>
1433 007004  040     117     106  P.ADD:  .ASCII  / OF/
1434 007007  106     137     123          .ASCII  /F_S/
1435 007012  105     124     000          .ASCII  /ET/<00>
1436 007015  000                          .ASCII  <00>
1437 007016  040     103     117  P.ADE:  .ASCII  / CO/
1438 007021  125     116     124          .ASCII  /UNT/
1439 007024  000     000                  .ASCII  <00><00>
1440 007026  040     104     105  P.ADF:  .ASCII  / DE/
1441 007031  114     101     131          .ASCII  /LAY/
1442 007034  000     000                  .ASCII  <00><00>
1443 007036  040     124     105  P.ADG:  .ASCII  / TE/
1444 007041  123     124     123          .ASCII  /STS/
1445 007044  000     000                  .ASCII  <00><00>
1446 007046  040     101     104  P.ADH:  .ASCII  / AD/
1447 007051  122     123     000          .ASCII  /RS/<00>
1448 007054  040     103     117  P.ADI:  .ASCII  / CO/
1449 007057  125     116     124          .ASCII  /UNT/
1450 007062  105     122     000          .ASCII  /ER/<00>
1451 007065  000                          .ASCII  <00>
1452 007066  040     122     105  P.ADJ:  .ASCII  / RE/
1453 007071  107     000     000          .ASCII  /G/<00><00>
1454 007074  040     124     105  P.ADK:  .ASCII  / TE/
1455 007077  123     124     105          .ASCII  /STE/
1456 007102  104     000                  .ASCII  /D/<00>
1457 007104  040     116     111  P.ADL:  .ASCII  / NI/
1458 007107  102     102     114          .ASCII  /BBL/
1459 007112  105     000                  .ASCII  /E/<00>
1460 007114  040     101     114  P.ADM:  .ASCII  / AL/
1461 007117  114     000     000          .ASCII  /L/<00><00>
1462 007122  040     124     105  P.ADN:  .ASCII  / TE/
1463 007125  123     124     000          .ASCII  /ST/<00>
1464 007130  040     130     106  P.ADO:  .ASCII  / XF/
1465 007133  105     122     105          .ASCII  /ERE/
1466 007136  104     000                  .ASCII  /D/<00>
1467 007140  040     116     111  P.ADP:  .ASCII  / NI/
```

```
1469                                    ;ML4
1470                                    ;
1471
1472 007143  102  102  114             .ASCII  /BBL/
1473 007146  105  123  000             .ASCII  /ES/<00>
1474 007151  000                       .ASCII  <00>
1475 007152  040  123  103  P.ADQ:     .ASCII  / SC/
1476 007155  000                       .ASCII  <00>
1477 007156  040  115  125  P.ADR:     .ASCII  / MU/
1478 007161  114  124  111             .ASCII  /LTI/
1479 007164  120  114  105             .ASCII  /PLE/
1480 007167  130  105  122             .ASCII  /XER/
1481 007172  000  000                  .ASCII  <00><00>
1482 007174  040  125  116  P.ADS:     .ASCII  / UN/
1483 007177  105  130  120             .ASCII  /EXP/
1484 007202  105  103  124             .ASCII  /ECT/
1485 007205  105  104  000             .ASCII  /ED/<00>
1486 007210  040  116  105  P.ADT:     .ASCII  / NE/
1487 007213  104  000  000             .ASCII  /D/<00><00>
1488 007216  040  111  114  P.ADU:     .ASCII  / IL/
1489 007221  122  000  000             .ASCII  /R/<00><00>
1490 007224  040  103  122  P.ADV:     .ASCII  / CR/
1491 007227  103  000  000             .ASCII  /C/<00><00>
1492 007232  040  123  107  P.ADW:     .ASCII  / SG/
1493 007235  114  000  000             .ASCII  /L/<00><00>
1494 007240  040  105  103  P.ADX:     .ASCII  / EC/
1495 007243  110  000  000             .ASCII  /H/<00><00>
1496 007246  125  116  103  P.ADY:     .ASCII  /UNC/
1497 007251  000                       .ASCII  <00>
1498 007252  040  102  111  P.ADZ:     .ASCII  / BI/
1499 007255  124  000  000             .ASCII  /T/<00><00>
1500 007260  040  103  110  P.AEA:     .ASCII  / CH/
1501 007263  101  116  116             .ASCII  /ANN/
1502 007266  105  114  000             .ASCII  /EL/<00>
1503 007271  000                       .ASCII  <00>
1504 007272  040  114  101  P.AEB:     .ASCII  / LA/
1505 007275  124  103  110             .ASCII  /TCH/
1506 007300  000  000                  .ASCII  <00><00>
1507 007302  040  104  103  P.AEC:     .ASCII  / DC/
1508 007305  113  000  000             .ASCII  /K/<00><00>
1509 007310  040  102  125  P.AED:     .ASCII  / BU/
1510 007313  123  000  000             .ASCII  /S/<00><00>
1511 007316  040  123  131  P.AEE:     .ASCII  / SY/
1512 007321  116  104  122             .ASCII  /NDR/
1513 007324  117  116  105             .ASCII  /ONE/
1514 007327  000                       .ASCII  <00>
1515 007330  040  104  105  P.AEF:     .ASCII  / DE/
1516 007333  103  117  104             .ASCII  /COD/
1517 007336  105  000                  .ASCII  /E/<00>
1518 007340  040  116  117  P.AEG:     .ASCII  / NO/
1519 007343  124  000  000             .ASCII  /T/<00><00>
1520 007346  040  125  116  P.AEH:     .ASCII  / UN/
1521 007351  103  117  122             .ASCII  /COR/
1522 007354  122  105  103             .ASCII  /REC/
1523 007357  124  101  102             .ASCII  /TAB/
```

22-Dec-1980 09:24:31 TOPS
22-Dec-1980 09:21:22 PA:<

```
                                        ;ML4
                                        ;
007362  114  105  000          .ASCII  /LE/<00>
007365  000                    .ASCII  <00>
007366  040  102  111  P.AEI:  .ASCII  / BI/
007371  124  040  116          .ASCII  /T N/
007374  117  124  040          .ASCII  /OT /
007377  123  105  124          .ASCII  /SET/
007402  000  000              .ASCII  <00><00>
007404  040  102  111  P.AEJ:  .ASCII  / BI/
007407  124  040  116          .ASCII  /T N/
007412  117  124  040          .ASCII  /OT /
007415  103  114  122          .ASCII  /CLR/
007420  000  000              .ASCII  <00><00>
007422  040  116  117  P.AEK:  .ASCII  / NO/
007425  040  122  105          .ASCII  / RE/
007430  123  120  117          .ASCII  /SPO/
007433  116  103  105          .ASCII  /NCE/
007436  040  101  106          .ASCII  / AF/
007441  124  105  122          .ASCII  /TER/
007444  040  061  056          .ASCII  / 1./
007447  065  040  125          .ASCII  /5 U/
007452  123  000              .ASCII  /S/<00>
007454  040  104  101  P.AEL:  .ASCII  / DA/
007457  124  101  040          .ASCII  /TA /
007462  105  122  122          .ASCII  /ERR/
007465  117  122  123          .ASCII  /ORS/
007470  000  000              .ASCII  <00><00>
007472  040  102  111  P.AEM:  .ASCII  / BI/
007475  124  040  123          .ASCII  /T S/
007500  105  124  000          .ASCII  /ET/<00>
007503  000                    .ASCII  <00>
007504  040  102  111  P.AEN:  .ASCII  / BI/
007507  124  040  103          .ASCII  /T C/
007512  114  122  000          .ASCII  /LR/<00>
007515  000                    .ASCII  <00>
007516  040  117  106  P.AEO:  .ASCII  / OF/
007521  040  117  124          .ASCII  / OT/
007524  110  105  122          .ASCII  /HER/
007527  040  104  122          .ASCII  / DR/
007532  111  126  105          .ASCII  /IVE/
007535  123  000  000          .ASCII  /S/<00><00>
007540  040  103  114  P.AEP:  .ASCII  / CL/
007543  101  123  123          .ASCII  /ASS/
007546  040  101  000          .ASCII  / A/<00>
007551  000                    .ASCII  <00>
007552  040  103  114  P.AEQ:  .ASCII  / CL/
007555  101  123  123          .ASCII  /ASS/
007560  040  102  000          .ASCII  / B/<00>
007563  000                    .ASCII  <00>
007564  040  124  117  P.AER:  .ASCII  / TO/
007567  040  106  111          .ASCII  / FI/
007572  116  104  000          .ASCII  /ND/<00>
007575  000                    .ASCII  <00>
```

```
1581                                    ;ML4
1582                                    ;
1583
1584 007576  040  116  117  P.AES:  .ASCII  / NO/
1585 007601  124  040  114           .ASCII  /T L/
1586 007604  101  124  103           .ASCII  /ATC/
1587 007607  110  105  104           .ASCII  /HED/
1588 007612  000  000               .ASCII  <00><00>
1589 007614  040  123  111  P.AET:  .ASCII  / SI/
1590 007617  116  107  114           .ASCII  /NGL/
1591 007622  105  040  102           .ASCII  /E B/
1592 007625  111  124  040           .ASCII  /IT /
1593 007630  105  122  122           .ASCII  /ERR/
1594 007633  117  122  000           .ASCII  /OR/<00>
1595 007636  040  115  125  P.AEU:  .ASCII  / MU/
1596 007641  114  124  111           .ASCII  /LTI/
1597 007644  120  114  105           .ASCII  /PLE/
1598 007647  040  102  111           .ASCII  / BI/
1599 007652  124  040  105           .ASCII  /T E/
1600 007655  122  122  117           .ASCII  /RRO/
1601 007660  122  000               .ASCII  /R/<00>
1602 007662  040  040  040  P.AEV:  .ASCII  /   /
1603 007665  040  040  040           .ASCII  /   /
1604 007670  040  040  040           .ASCII  /   /
1605 007673  122  105  107           .ASCII  /REG/
1606 007676  111  123  124           .ASCII  /IST/
1607 007701  105  122  040           .ASCII  /ER /
1608 007704  040  040  104           .ASCII  /  D/
1609 007707  125  115  120           .ASCII  /UMP/
1610 007712  000  000               .ASCII  <00><00>
1611 007714  123  105  122  P.AEW:  .ASCII  /SER/
1612 007717  111  101  114           .ASCII  /IAL/
1613 007722  040  043  000           .ASCII  / #/<00>
1614 007725  000                    .ASCII  <00>
1615 007726  040  115  105  P.AEX:  .ASCII  / ME/
1616 007731  115  040  123           .ASCII  /M S/
1617 007734  111  132  111           .ASCII  /IZI/
1618 007737  116  107  000           .ASCII  /NG/<00>
1619 007742  040  116  117  P.AEY:  .ASCII  / NO/
1620 007745  117  120  000           .ASCII  /OP/<00>
1621 007750  040  104  122  P.AEZ:  .ASCII  / DR/
1622 007753  126  000  000           .ASCII  /V/<00><00>
1623 007756  040  127  122  P.AFA:  .ASCII  / WR/
1624 007761  111  124  105           .ASCII  /ITE/
1625 007764  040  103  110           .ASCII  / CH/
1626 007767  105  103  113           .ASCII  /ECK/
1627 007772  000  000               .ASCII  <00><00>
1628 007774  040  127  122  P.AFB:  .ASCII  / WR/
1629 007777  111  124  105           .ASCII  /ITE/
1630 010002  000  000               .ASCII  <00><00>
1631 010004  040  122  105  P.AFC:  .ASCII  / RE/
1632 010007  101  104  000           .ASCII  /AD/<00>
1633 010012  040  103  114  P.AFD:  .ASCII  / CL/
1634 010015  105  101  122           .ASCII  /EAR/
1635 010020  000  000               .ASCII  <00><00>
```

```
1637                                    ;ML4
1638                                    ;
1639
1640 010022  040  103  117  P.AFE:  .ASCII  / CO/
1641 010025  115  120  040           .ASCII  /MP /
1642 010030  105  122  122           .ASCII  /ERR/
1643 010033  117  122  000           .ASCII  /OR/<00>
1644 010036  040  123  131  P.AFF:  .ASCII  / SY/
1645 010041  123  040  103           .ASCII  /S C/
1646 010044  114  122  000           .ASCII  /LR/<00>
1647 010047  000                     .ASCII  <00>
1648 010050  040  123  105  P.AFG:  .ASCII  / SE/
1649 010053  101  122  103           .ASCII  /ARC/
1650 010056  110  000                .ASCII  /H/<00>
1651 010060  040  122  105  P.AFH:  .ASCII  / RE/
1652 010063  101  104  055           .ASCII  /AD-/
1653 010066  111  116  055           .ASCII  /IN-/
1654 010071  120  122  105           .ASCII  /PRE/
1655 010074  123  105  124           .ASCII  /SET/
1656 010077  000                     .ASCII  <00>
1657 010100  040  111  114  P.AFI:  .ASCII  / IL/
1658 010103  114  105  107           .ASCII  /LEG/
1659 010106  101  114  000           .ASCII  /AL/<00>
1660 010111  000                     .ASCII  <00>
1661 010112  040  101  102  P.AFJ:  .ASCII  / AB/
1662 010115  117  122  124           .ASCII  /ORT/
1663 010120  000  000                .ASCII  <00><00>
1664 010122  040  101  122  P.AFK:  .ASCII  / AR/
1665 010125  122  040  122           .ASCII  /R R/
1666 010130  104  137  127           .ASCII  /D W/
1667 010133  122  124  000           .ASCII  /RT/<00>
1668 010136  040  107  117  P.AFL:  .ASCII  / GO/
1669 010141  117  104  040           .ASCII  /OD /
1670 010144  102  114  113           .ASCII  /BLK/
1671 010147  000                     .ASCII  <00>
1672 010150  040  122  105  P.AFM:  .ASCII  / RE/
1673 010153  106  122  105           .ASCII  /FRE/
1674 010156  123  110  000           .ASCII  /SH/<00>
1675 010161  000                     .ASCII  <00>
1676 010162  040  101  122  P.AFN:  .ASCII  / AR/
1677 010165  122  101  131           .ASCII  /RAY/
1678 010170  000  000                .ASCII  <00><00>
1679 010172  040  122  101  P.AFO:  .ASCII  / RA/
1680 010175  115  055  102           .ASCII  /M-B/
1681 010200  125  123  000           .ASCII  /US/<00>
1682 010203  000                     .ASCII  <00>
1683 010204  040  117  126  P.AFP:  .ASCII  / OV/
1684 010207  105  122  106           .ASCII  /ERF/
1685 010212  114  117  127           .ASCII  /LOW/
1686 010215  000                     .ASCII  <00>
1687 010216  040  103  110  P.AFQ:  .ASCII  / CH/
1688 010221  113  137  123           .ASCII  /K S/
1689 010224  125  115  000           .ASCII  /UM/<00>
1690 010227  000                     .ASCII  <00>
1691 010230  040  114  101  P.AFR:  .ASCII  / LA/
```

```
                                        ;ML4
                                        ;
                                                .ASCII  /ST /
                                                .ASCII  /BLK/
                                                .ASCII  <00>
                                        P.AFS:  .ASCII  / IN/
                                                .ASCII  /ITI/
                                                .ASCII  /ALI/
                                                .ASCII  /ZE/<00>
                                        P.AFT:  .ASCII  / ML/
                                                .ASCII  /CS1/
                                                .ASCII  <00><00>
                                        P.AFU:  .ASCII  / ML/
                                                .ASCII  /DS/<00>
                                        P.AFV:  .ASCII  / ML/
                                                .ASCII  /ER/<00>
                                        P.AFW:  .ASCII  / ML/
                                                .ASCII  /MR/<00>
                                        P.AFX:  .ASCII  / ML/
                                                .ASCII  /AS/<00>
                                        P.AFY:  .ASCII  / ML/
                                                .ASCII  /DA/<00>
                                        P.AFZ:  .ASCII  / ML/
                                                .ASCII  /DT/<00>
                                        P.AGA:  .ASCII  / ML/
                                                .ASCII  /PA/<00>
                                        P.AGB:  .ASCII  / ML/
                                                .ASCII  /SN/<00>
                                        P.AGC:  .ASCII  / ML/
                                                .ASCII  /E1/<00>
                                        P.AGD:  .ASCII  / ML/
                                                .ASCII  /E2/<00>
                                        P.AGE:  .ASCII  / ML/
                                                .ASCII  /D1/<00>
                                        P.AGF:  .ASCII  / ML/
                                                .ASCII  /D2/<00>
                                        P.AGG:  .ASCII  / ML/
                                                .ASCII  /EE/<00>
                                        P.AGH:  .ASCII  / ML/
                                                .ASCII  /EL/<00>
                                        P.AGI:  .ASCII  / ML/
                                                .ASCII  /PD/<00>
                                        P.AGJ:  .ASCII  / ML/
                                                .ASCII  /CS2/
                                                .ASCII  <00><00>
                                        P.AGK:  .ASCII  / ML/
                                                .ASCII  /WC/<00>
                                        P.AGL:  .ASCII  / ML/
                                                .ASCII  /BA/<00>
                                        P.AGM:  .ASCII  / ML/
                                                .ASCII  /BAI/
                                                .ASCII  <00><00>
                                        P.AGN:  .ASCII  / ML/
                                                .ASCII  /CS3/
```

```
1749                                    ;ML4
1750                                    ;
1751
1752 010462    000     000                     .ASCII  <00><00>
1753 010464    101     123     131     P.AGO:  .ASCII  /ASY/
1754 010467    116     103     110             .ASCII  /NCH/
1755 010472    122     117     116             .ASCII  /RON/
1756 010475    117     125     123             .ASCII  /OUS/
1757 010500    040     106     101             .ASCII  / FA/
1758 010503    111     114     125             .ASCII  /ILU/
1759 010506    122     105     040             .ASCII  /RE /
1760 010511    115     117     104             .ASCII  /MOD/
1761 010514    125     114     105             .ASCII  /ULE/
1762 010517    040     067     063             .ASCII  / 73/
1763 010522    066     061     000             .ASCII  /61/<00>
1764 010525    000                             .ASCII  <00>
1765 010526    123     131     116     P.AGP:  .ASCII  /SYN/
1766 010531    103     110     122             .ASCII  /CHR/
1767 010534    117     116     117             .ASCII  /ONO/
1768 010537    125     123     040             .ASCII  /US /
1769 010542    106     101     111             .ASCII  /FAI/
1770 010545    114     125     122             .ASCII  /LUR/
1771 010550    105     040     115             .ASCII  /E M/
1772 010553    117     104     125             .ASCII  /ODU/
1773 010556    114     105     040             .ASCII  /LE /
1774 010561    067     063     066             .ASCII  /736/
1775 010564    062     040     000             .ASCII  /2 /<00>
1776 010567    000                             .ASCII  <00>
1777 010570    101     122     122     P.AGQ:  .ASCII  /ARR/
1778 010573    101     131     040             .ASCII  /AY /
1779 010576    104     101     124             .ASCII  /DAT/
1780 010601    101     040     106             .ASCII  /A F/
1781 010604    101     111     114             .ASCII  /AIL/
1782 010607    125     122     105             .ASCII  /URE/
1783 010612    040     115     117             .ASCII  / MO/
1784 010615    104     125     114             .ASCII  /DUL/
1785 010620    105     040     067             .ASCII  /E 7/
1786 010623    063     066     063             .ASCII  /363/
1787 010626    040     000                     .ASCII  / /<00>
1788 010630    115     105     115     P.AGR:  .ASCII  /MEM/
1789 010633    117     122     131             .ASCII  /ORY/
1790 010636    040     101     122             .ASCII  / AR/
1791 010641    122     101     131             .ASCII  /RAY/
1792 010644    040     106     101             .ASCII  / FA/
1793 010647    111     114     125             .ASCII  /ILU/
1794 010652    122     105     040             .ASCII  /RE /
1795 010655    115     117     104             .ASCII  /MOD/
1796 010660    125     114     105             .ASCII  /ULE/
1797 010663    040     067     063             .ASCII  / 73/
1798 010666    065     067     000             .ASCII  /57/<00>
1799 010671    000                             .ASCII  <00>
1800 010672    111     116     124     P.AGS:  .ASCII  /INT/
1801 010675    105     122     115             .ASCII  /ERM/
1802 010700    105     104     111             .ASCII  /EDI/
1803 010703    101     124     105             .ASCII  /ATE/
```

```
1805                                    ;ML4
1806                                    ;
1807
1808 010706    040     104     111             .ASCII  / DI/
1809 010711    101     107     116             .ASCII  /AGN/
1810 010714    117     123     124             .ASCII  /OST/
1811 010717    111     103     040             .ASCII  /IC /
1812 010722    115     105     123             .ASCII  /MES/
1813 010725    123     101     107             .ASCII  /SAG/
1814 010730    105     000                     .ASCII  /E/<00>
1815 010732    104     101     124     P.AGT:  .ASCII  /DAT/
1816 010735    101     040     114             .ASCII  /A L/
1817 010740    101     124     105             .ASCII  /ATE/
1818 010743    040     105     122             .ASCII  / ER/
1819 010746    122     117     122             .ASCII  /ROR/
1820 010751    040     104     125             .ASCII  / DU/
1821 010754    122     111     116             .ASCII  /RIN/
1822 010757    107     040     124             .ASCII  /G T/
1823 010762    122     101     116             .ASCII  /RAN/
1824 010765    123     106     105             .ASCII  /SFE/
1825 010770    122     000                     .ASCII  /R/<00>
1826 010772    123     103     040     P.AGU:  .ASCII  /SC /
1827 010775    102     111     124             .ASCII  /BIT/
1828 011000    040     123     105             .ASCII  / SE/
1829 011003    124     040     104             .ASCII  /T D/
1830 011006    125     122     111             .ASCII  /URI/
1831 011011    116     107     040             .ASCII  /NG /
1832 011014    124     122     101             .ASCII  /TRA/
1833 011017    116     123     106             .ASCII  /NSF/
1834 011022    105     122     000             .ASCII  /ER/<00>
1835 011025    000                             .ASCII  <00>
1836 011026    124     122     117     P.AGV:  .ASCII  /TRO/
1837 011031    125     102     114             .ASCII  /UBL/
1838 011034    105     040     123             .ASCII  /E S/
1839 011037    110     117     117             .ASCII  /HOO/
1840 011042    124     040     114             .ASCII  /T L/
1841 011045    117     117     120             .ASCII  /OOP/
1842 011050    040     105     122             .ASCII  / ER/
1843 011053    122     117     122             .ASCII  /ROR/
1844 011056    123     000                     .ASCII  /S/<00>
1845 011060    122     110     040     P.AGW:  .ASCII  /RH /
1846 011063    103     117     116             .ASCII  /CON/
1847 011066    124     122     117             .ASCII  /TRO/
1848 011071    114     114     105             .ASCII  /LLE/
1849 011074    122     040     105             .ASCII  /R E/
1850 011077    122     122     117             .ASCII  /RRO/
1851 011102    122     123     000             .ASCII  /RS/<00>
1852 011105    000                             .ASCII  <00>
1853 011106    104     122     111     P.AGX:  .ASCII  /DRI/
1854 011111    126     105     040             .ASCII  /VE /
1855 011114    110     125     116             .ASCII  /HUN/
1856 011117    107     040     101             .ASCII  /G A/
1857 011122    106     124     105             .ASCII  /FTE/
1858 011125    122     040     115             .ASCII  /R M/
1859 011130    101     123     123             .ASCII  /ASS/
```

22-Dec-1980 09:24:31 TOPS
22-Dec-1980 09:21:22 PA:<

```
                                        ;ML4
                                        ;
011133  040     102     125             .ASCII  / BU/
011136  123     040     124             .ASCII  /S T/
011141  122     101     116             .ASCII  /RAN/
011144  123     106     105             .ASCII  /SFE/
011147  122     000     000             .ASCII  /R/<00><00>


011152                          NIB.SAVE:
011152                                  .BLKW   3
011160                          HW.OR.TBL:
011160                                  .BLKW   177
011556                          PTBL.PTR:
011556                                  .BLKW   1
011560                          OP.NUM.ARR:
011560                                  .BLKW   1
011562                          ARR.INC:.BLKW   1
011564                          GOOD.BLK:
011564                                  .BLKW   1
011566                          PAR.DIS:.BLKW   1
011570                          CHIP.SIZ:
011570                                  .BLKW   1
011572                          LST.BLK:.BLKW   1
011574                          ARR.16: .BLKW   1
011576                          LST.ARR:.BLKW   1
011600                          IO.BUF: .BLKW   400
012600                          STK.OFF:.BLKW   5
012612                          STACK:  .BLKW   143
013120                          PD.TEMP:.BLKW   1
013122                          W.C.SIZE:
013122                                  .BLKW   1
013124                          RAS.INC:.BLKW   1
013126                          WT.DATA:.BLKW   1
013130                          RD.DATA:.BLKW   1
013132                          DRIVE.TYPE:
013132                                  .BLKW   1
013134                          LST.DUT.REG:
013134                                  .BLKW   1
013136                          REG.INIT.FLG:
013136  000000                          .WORD   0
013140                          A.CAL:  .BLKW   1
013142                          B.CAL:  .BLKW   1
013144                          P.CAL:  .BLKW   1
013146                          A.GEN:  .BLKW   1
013150                          B.GEN:  .BLKW   1
013152                          P.GEN:  .BLKW   1
013154  000                     ML.REG: .BYTE   0
013155  000                             .BYTE   0
013156  004000                          .WORD   4000
013160  173701                          .WORD   -4077
013162  160200                          .WORD   -17600
```

```
1916                                    ;ML4
1917                                    ;
1918
1919 013164  000                       .BYTE   0
1920 013165  000                       .BYTE   0
1921 013166  000                       .BYTE   0
1922 013167  000                       .BYTE   0
1923 013170  000                       .BYTE   0
1924 013171  000                       .BYTE   0
1925 013172  000                       .BYTE   0
1926 013173  000                       .BYTE   0
1927 013174  000                       .BYTE   0
1928 013175  000                       .BYTE   0
1929 013176  000                       .BYTE   0
1930 013177  000                       .BYTE   0
1931 013200  000                       .BYTE   0
1932 013201  000                       .BYTE   0
1933 013202  000                       .BYTE   0
1934 013203  000                       .BYTE   0
1935 013204  000                       .BYTE   0
1936 013205  000                       .BYTE   0
1937 013206  000                       .BYTE   0
1938 013207  000                       .BYTE   0
1939 013210  000                       .BYTE   0
1940 013211  000                       .BYTE   0
1941 013212  000                       .BYTE   0
1942 013213  000                       .BYTE   0
1943 013214  000                       .BYTE   0
1944 013215  000                       .BYTE   0
1945 013216  000                       .BYTE   0
1946 013217  000                       .BYTE   0
1947 013220  000                       .BYTE   0
1948 013221  000                       .BYTE   0
1949 013222  000                       .BYTE   0
1950 013223  000                       .BYTE   0
1951 013224  000                       .BYTE   0
1952 013225  000                       .BYTE   0
1953 013226  010600                    .WORD   10600
1954 013230  025077                    .WORD   25077
1955 013232  000100                    .WORD   100
1956 013234  000                       .BYTE   0
1957 013235  000                       .BYTE   0
1958 013236  000                       .BYTE   0
1959 013237  000                       .BYTE   0
1960 013240  014620                    .WORD   14620
1961 013242  000                       .BYTE   0
1962 013243  000                       .BYTE   0
1963 013244  000                       .BYTE   0
1964 013245  000                       .BYTE   0
1965 013246  000                       .BYTE   0
1966 013247  000                       .BYTE   0
1967 013250  000                       .BYTE   0
1968 013251  000                       .BYTE   0
1969 013252  177400                    .WORD   -400
1970 013254  000                       .BYTE   0
```

```
1972                                    ;ML4
1973                                    ;
1974
1975 013255      000                            .BYTE   0
1976 013256      000                            .BYTE   0
1977 013257      000                            .BYTE   0
1978 013260   100000                            .WORD   -100000
1979 013262      000                            .BYTE   0
1980 013263      000                            .BYTE   0
1981 013264      000                            .BYTE   0
1982 013265      000                            .BYTE   0
1983 013266      000                            .BYTE   0
1984 013267      000                            .BYTE   0
1985 013270      000                            .BYTE   0
1986 013271      000                            .BYTE   0
1987 013272      000                            .BYTE   0
1988 013273      000                            .BYTE   0
1989 013274      000                            .BYTE   0
1990 013275      000                            .BYTE   0
1991 013276      000                            .BYTE   0
1992 013277      000                            .BYTE   0
1993 013300   000020                            .WORD   20
1994 013302   177400                            .WORD   -400
1995 013304      000                            .BYTE   0
1996 013305      000                            .BYTE   0
1997 013306   000110                            .WORD   110
1998 013310   177666                            .WORD   -112
1999 013312   000001                            .WORD   1
2000 013314      000                            .BYTE   0
2001 013315      000                            .BYTE   0
2002 013316      000                            .BYTE   0
2003 013317      000                            .BYTE   0
2004 013320      000                            .BYTE   0
2005 013321      000                            .BYTE   0
2006 013322      000                            .BYTE   0
2007 013323      000                            .BYTE   0
2008 013324      000                            .BYTE   0
2009 013325      000                            .BYTE   0
2010 013326      000                            .BYTE   0
2011 013327      000                            .BYTE   0
2012 013330   140300                            .WORD   -37500
2013 013332      000                            .BYTE   0
2014 013333      000                            .BYTE   0
2015 013334      000                            .BYTE   0
2016 013335      000                            .BYTE   0
2017 013336      000                            .BYTE   0
2018 013337      000                            .BYTE   0
2019 013340   100300                            .WORD   -77500
2020 013342      000                            .BYTE   0
2021 013343      000                            .BYTE   0
2022 013344      000                            .BYTE   0
2023 013345      000                            .BYTE   0
2024 013346      000                            .BYTE   0
2025 013347      000                            .BYTE   0
2026 013350      000                            .BYTE   0
```

```
2028                                    ;ML4
2029                                    ;
2030
2031 013351    000                              .BYTE   0
2032 013352    000                              .BYTE   0
2033 013353    000                              .BYTE   0
2034 013354    000                              .BYTE   0
2035 013355    000                              .BYTE   0
2036 013356    000                              .BYTE   0
2037 013357    000                              .BYTE   0
2038 013360    000                              .BYTE   0
2039 013361    000                              .BYTE   0
2040 013362    000                              .BYTE   0
2041 013363    000                              .BYTE   0
2042 013364    000                              .BYTE   0
2043 013365    000                              .BYTE   0
2044 013366    000                              .BYTE   0
2045 013367    000                              .BYTE   0
2046 013370  010000                             .WORD   10000
2047 013372    000                              .BYTE   0
2048 013373    000                              .BYTE   0
2049 013374    000                              .BYTE   0
2050 013375    000                              .BYTE   0
2051 013376    000                              .BYTE   0
2052 013377    000                              .BYTE   0
2053 013400    000                              .BYTE   0
2054 013401    000                              .BYTE   0
2055 013402    000                              .BYTE   0
2056 013403    000                              .BYTE   0
2057 013404    000                              .BYTE   0
2058 013405    000                              .BYTE   0
2059 013406    000                              .BYTE   0
2060 013407    000                              .BYTE   0
2061 013410    000                              .BYTE   0
2062 013411    000                              .BYTE   0
2063 013412    000                              .BYTE   0
2064 013413    000                              .BYTE   0
2065 013414    000                              .BYTE   0
2066 013415    000                              .BYTE   0
2067 013416    000                              .BYTE   0
2068 013417    000                              .BYTE   0
2069 013420    000                              .BYTE   0
2070 013421    000                              .BYTE   0
2071 013422    000                              .BYTE   0
2072 013423    000                              .BYTE   0
2073 013424    000                              .BYTE   0
2074 013425    000                              .BYTE   0
2075 013426    000                              .BYTE   0
2076 013427    000                              .BYTE   0
2077 013430    000                              .BYTE   0
2078 013431    000                              .BYTE   0
2079 013432  000000                             .WORD   0
2080 013434  001001                 REM.TBL:    .WORD   1001
2081 013436  004004                             .WORD   4004
2082 013440  020020                             .WORD   20020
```

```
2084                                    ;ML4
2085                                    :
2086
2087 013442  003003                             .WORD   3003
2088 013444  014014                             .WORD   14014
2089 013446  021460                             .WORD   21460
2090 013450  005005                             .WORD   5005
2091 013452  024024                             .WORD   24024
2092 013454  023023                             .WORD   23023
2093 013456  017017                             .WORD   17017
2094 013460  035474                             .WORD   35474
2095 013462  024465                             .WORD   24465
2096 013464  021021                             .WORD   21021
2097 013466  007007                             .WORD   7007
2098 013470  034034                             .WORD   34034
2099 013472  022463                             .WORD   22463
2100 013474  011011                             .WORD   11011
2101 013476  005444                             .WORD   5444
2102 013500  026026                             .WORD   26026
2103 013502  033033                             .WORD   33033
2104 013504  016457                             .WORD   16457
2105 013506  033472                             .WORD   33472
2106 013510  014455                             .WORD   14455
2107 013512  023462                             .WORD   23462
2108 013514  015015                             .WORD   15015
2109 013516  025464                             .WORD   25464
2110 013520  025025                             .WORD   25025
2111 013522  027027                             .WORD   27027
2112 013524  037037                             .WORD   37037
2113 013526  036477                             .WORD   36477
2114 013530  030471                             .WORD   30471
2115 013532     041                             .BYTE   41
2116                                            .EVEN
2117 013534  064477                DT.1:        .WORD   64477
2118 013536  007700                             .WORD   7700
2119 013540     000                             .BYTE   0
2120 013541     000                             .BYTE   0
2121 013542  064477                             .WORD   64477
2122 013544  000077                             .WORD   77
2123 013546     000                             .BYTE   0
2124 013547     000                             .BYTE   0
2125 013550  100577                             .WORD   -77201
2126 013552  017700                             .WORD   17700
2127 013554     077                             .BYTE   77
2128 013555     000                             .BYTE   0
2129 013556  100577                             .WORD   -77201
2130 013560  000000                             .WORD   0
2131 013562     077                             .BYTE   77
2132 013563     000                             .BYTE   0
2133 013564  100577                             .WORD   -77201
2134 013566  010077                             .WORD   10077
2135 013570     077                             .BYTE   77
2136                                            .EVEN
2137 013572                        RH.ADD:      .BLKW   1
2138 013574                        RH.TYP:      .BLKW   1
```

```
2140                                    ;ML4
2141                                    ;
2142
2143 013576                             RH.VEC: .BLKW   1
2144 013600                             ML.LUN: .BLKW   1
2145 013602                             ML.DUT: .BLKW   1
2146
2147
2148            100000                  BIT15==             -100000
2149            040000                  BIT14==             40000
2150            020000                  BIT13==             20000
2151            010000                  BIT12==             10000
2152            004000                  BIT11==             4000
2153            002000                  BIT10==             2000
2154            001000                  BIT09==             1000
2155            000400                  BIT08==             400
2156            000200                  BIT07==             200
2157            000100                  BIT06==             100
2158            000040                  BIT05==             40
2159            000020                  BIT04==             20
2160            000010                  BIT03==             10
2161            000004                  BIT02==             4
2162            000002                  BIT01==             2
2163            000001                  BIT00==             1
2164            001000                  BIT9==              1000
2165            000400                  BIT8==              400
2166            000200                  BIT7==              200
2167            000100                  BIT6==              100
2168            000040                  BIT5==              40
2169            000020                  BIT4==              20
2170            000010                  BIT3==              10
2171            000004                  BIT2==              4
2172            000002                  BIT1==              2
2173            000001                  BIT0==              1
2174            000040                  EF.START==          40
2175            000037                  EF.RESTART==        37
2176            000036                  EF.CONTINUE==       36
2177            000035                  EF.NEW==            35
2178            000034                  EF.PWR==            34
2179            000340                  PRI07==             340
2180            000300                  PRI06==             300
2181            000240                  PRI05==             240
2182            000200                  PRI04==             200
2183            000140                  PRI03==             140
2184            000100                  PRI02==             100
2185            000040                  PRI01==             40
2186            000000                  PRI00==             0
2187            000004                  EVL==               4
2188            000010                  LOT==               10
2189            000020                  ADR==               20
2190            000040                  IDU==               40
2191            000100                  ISR==               100
2192            000200                  UAM==               200
2193            000400                  BOE==               400
2194            001000                  PNT==               1000
```

```
                        ;ML4
                        ;

002000                  PRI==           2000
004000                  IXE==           4000
010000                  IBE==           10000
020000                  IER==           20000
040000                  LOE==           40000
100000                  HOE==           -100000
004222                  FMT.1=          P.AAA
004266                  FMT.2=          P.AAB
004354                  FMT.3=          P.AAC
004400                  FMT.4=          P.AAD
004430                  FMT.5=          P.AAE
004532                  FMT.6=          P.AAF
004562                  FMT.7=          P.AAG
004610                  FMT.8=          P.AAH
004644                  FMT.9=          P.AAI
004676                  FMT.10=         P.AAJ
004750                  FMT.11=         P.AAK
005004                  FMT.12=         P.AAL
005034                  FMT.13=         P.AAM
005110                  FMT.14=         P.AAN
005150                  FMT.15=         P.AAO
005216                  FMT.16=         P.AAP
005306                  FMT.17=         P.AAQ
005342                  FMT.18=         P.AAR
005412                  FMT.19=         P.AAS
005462                  FMT.20=         P.AAT
005534                  FMT.21=         P.AAU
005606                  FMT.22=         P.AAV
005652                  FMT.23=         P.AAW
005722                  FMT.24=         P.AAX
005746                  FMT.25=         P.AAY
005764                  FMT.26=         P.AAZ
006016                  ONE.FMT=        P.ABA
006024                  TWO.FMT=        P.ABB
006034                  THR.FMT=        P.ABC
006046                  FOR.FMT=        P.ABD
006062                  FIV.FMT=        P.ABE
006100                  SIX.FMT=        P.ABF
006120                  SEV.FMT=        P.ABG
006142                  EIG.FMT=        P.ABH
006166                  NIN.FMT=        P.ABI
006214                  TEN.FMT=        P.ABJ
006244                  ELV.FMT=        P.ABK
006276                  WRD.1=          P.ABL
006302                  WRD.2=          P.ABM
006314                  WRD.3=          P.ABN
006322                  WRD.4=          P.ABO
006330                  WRD.5=          P.ABP
006336                  WRD.6=          P.ABQ
006344                  WRD.7=          P.ABR
006360                  WRD.8=          P.ABS
006374                  WRD.9=          P.ABT
```

```
2252                    ;ML4
2253                    ;
2254
2255    006406          WRD.10=         P.ABU
2256    006416          WRD.11=         P.ABV
2257    006426          WRD.12=         P.ABW
2258    006436          WRD.13=         P.ABX
2259    006442          WRD.14=         P.ABY
2260    006454          WRD.15=         P.ABZ
2261    006462          WRD.16=         P.ACA
2262    006470          WRD.17=         P.ACB
2263    006502          WRD.18=         P.ACC
2264    006506          WRD.19=         P.ACD
2265    006514          WRD.20=         P.ACE
2266    006522          WRD.21=         P.ACF
2267    006530          WRD.22=         P.ACG
2268    006544          WRD.23=         P.ACH
2269    006552          WRD.24=         P.ACI
2270    006560          WRD.25=         P.ACJ
2271    006574          WRD.26=         P.ACK
2272    006602          WRD.27=         P.ACL
2273    006610          WRD.29=         P.ACM
2274    006624          WRD.30=         P.ACN
2275    006632          WRD.31=         P.ACO
2276    006646          WRD.32=         P.ACP
2277    006654          WRD.33=         P.ACQ
2278    006660          WRD.34=         P.ACR
2279    006666          WRD.35=         P.ACS
2280    006674          WRD.36=         P.ACT
2281    006700          WRD.37=         P.ACU
2282    006710          WRD.38=         P.ACV
2283    006716          WRD.39=         P.ACW
2284    006726          WRD.40=         P.ACX
2285    006732          WRD.41=         P.ACY
2286    006746          WRD.42=         P.ACZ
2287    006754          WRD.43=         P.ADA
2288    006764          WRD.44=         P.ADB
2289    006772          WRD.45=         P.ADC
2290    007004          WRD.46=         P.ADD
2291    007016          WRD.47=         P.ADE
2292    007026          WRD.48=         P.ADF
2293    007036          WRD.49=         P.ADG
2294    007046          WRD.50=         P.ADH
2295    007054          WRD.51=         P.ADI
2296    007066          WRD.52=         P.ADJ
2297    007074          WRD.53=         P.ADK
2298    007104          WRD.54=         P.ADL
2299    007114          WRD.55=         P.ADM
2300    007122          WRD.56=         P.ADN
2301    007130          WRD.57=         P.ADO
2302    007140          WRD.58=         P.ADP
2303    007152          WRD.59=         P.ADQ
2304    007156          WRD.60=         P.ADR
2305    007174          WRD.61=         P.ADS
2306    007210          WRD.62=         P.ADT
```

```
2308                            ;ML4
2309                            ;
2310
2311        007216              WRD.63=         P.ADU
2312        007224              WRD.64=         P.ADV
2313        007232              WRD.65=         P.ADW
2314        007240              WRD.67=         P.ADX
2315        007246              WRD.68=         P.ADY
2316        007252              WRD.69=         P.ADZ
2317        007260              WRD.70=         P.AEA
2318        007272              WRD.71=         P.AEB
2319        007302              WRD.72=         P.AEC
2320        007310              WRD.73=         P.AED
2321        007316              WRD.74=         P.AEE
2322        007330              WRD.75=         P.AEF
2323        007340              WRD.76=         P.AEG
2324        007346              WRD.77=         P.AEH
2325        007366              PHR.1=          P.AEI
2326        007404              PHR.2=          P.AEJ
2327        007422              PHR.3=          P.AEK
2328        007454              PHR.4=          P.AEL
2329        007472              PHR.5=          P.AEM
2330        007504              PHR.6=          P.AEN
2331        007516              PHR.7=          P.AEO
2332        007540              PHR.8=          P.AEP
2333        007552              PHR.9=          P.AEQ
2334        007564              PHR.10=         P.AER
2335        007576              PHR.11=         P.AES
2336        007614              PHR.12=         P.AET
2337        007636              PHR.13=         P.AEU
2338        007662              PHR.14=         P.AEV
2339        007714              PHR.15=         P.AEW
2340        007726              FNC.1=          P.AEX
2341        007742              FNC.2=          P.AEY
2342        007750              FNC.3=          P.AEZ
2343        007756              FNC.4=          P.AFA
2344        007774              FNC.5=          P.AFB
2345        010004              FNC.6=          P.AFC
2346        010012              FNC.7=          P.AFD
2347        010022              FNC.8=          P.AFE
2348        010036              FNC.9=          P.AFF
2349        010050              FNC.10=         P.AFG
2350        010060              FNC.11=         P.AFH
2351        010100              FNC.12=         P.AFI
2352        010112              FNC.13=         P.AFJ
2353        010122              FNC.14=         P.AFK
2354        010136              FNC.15=         P.AFL
2355        010150              FNC.16=         P.AFM
2356        010162              FNC.17=         P.AFN
2357        010172              FNC.18=         P.AFO
2358        010204              FNC.19=         P.AFP
2359        010216              FNC.21=         P.AFQ
2360        010230              FNC.22=         P.AFR
2361        010242              FNC.23=         P.AFS
2362        010256              REG.1=          P.AFT
```

```
2364                                    ;ML4
2365                                    ;
2366
2367            010266                  REG.2=          P.AFU
2368            010274                  REG.3=          P.AFV
2369            010302                  REG.4=          P.AFW
2370            010310                  REG.5=          P.AFX
2371            010316                  REG.6=          P.AFY
2372            010324                  REG.7=          P.AFZ
2373            010332                  REG.8=          P.AGA
2374            010340                  REG.9=          P.AGB
2375            010346                  REG.10=         P.AGC
2376            010354                  REG.11=         P.AGD
2377            010362                  REG.12=         P.AGE
2378            010370                  REG.13=         P.AGF
2379            010376                  REG.14=         P.AGG
2380            010404                  REG.15=         P.AGH
2381            010412                  REG.16=         P.AGI
2382            010420                  REG.17=         P.AGJ
2383            010430                  REG.18=         P.AGK
2384            010436                  REG.19=         P.AGL
2385            010444                  REG.20=         P.AGM
2386            010454                  REG.21=         P.AGN
2387            010464                  ASYNC=          P.AGO
2388            010526                  SYNC=           P.AGP
2389            010570                  ARR.DAT=        P.AGQ
2390            010630                  MEM.ARR=        P.AGR
2391            010672                  INTER=          P.AGS
2392            010732                  DATA.LATE=      P.AGT
2393            010772                  SC.SET=         P.AGU
2394            011026                  TRBLE.LOOP=     P.AGV
2395            011060                  RH.ERROR=       P.AGW
2396            011106                  TIME.OUT=       P.AGX
2397            011152                  D1.TEMP=        NIB.SAVE
2398            011154                  D2.TEMP=        NIB.SAVE+2
2399            011156                  E2.TEMP=        NIB.SAVE+4
2400
2401
2402
2406  013604                            LOAD.STACK:
2407  013604    004167  170250                  JSR     R1,$SAVE3               ;                                       2217
2408  013610    016601  000012                  MOV     12(SP),R1               ; NIB.PTR,*                             2272
2409  013614    012702  012600                  MOV     #STK.OFF,R2
2410  013620    060102                          ADD     R1,R2
2411  013622    016601  000014                  MOV     14(SP),R1               ; STK.PTR,*
2412  013626    016600  000012                  MOV     12(SP),R0               ; NIB.PTR,*                             2268
2413  013632    006300                          ASL     R0
2414  013634    066007  013640                  ADD     1$(R0),PC
2415  013640    000024                  1$:     .WORD   2$-1$
2416  013642    000042                          .WORD   3$-1$
```

```
                                ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                ;                                                       22-Dec-1980 09:21:22    PA:<
                                
013644  000060                          .WORD   4$-1$
013646  000076                          .WORD   5$-1$
013650  000114                          .WORD   6$-1$
013652  000132                          .WORD   7$-1$
013654  000160                          .WORD   9$-1$
013656  000176                          .WORD   10$-1$
013660  000224                          .WORD   12$-1$
013662  000260                          .WORD   15$-1$
013664  005003                  2$:     CLR     R3                      ;               2272
013666  151203                          BISB    (R2),R3
013670  010100                          MOV     R1,R0
013672  160300                          SUB     R3,R0
013674  016703  175252                  MOV     NIB.SAVE,R3
013700  000500                          BR      14$
013702  005003                  3$:     CLR     R3                      ;               2276
013704  151203                          BISB    (R2),R3
013706  010100                          MOV     R1,R0
013710  160300                          SUB     R3,R0
013712  016703  175234                  MOV     NIB.SAVE,R3
013716  000433                          BR      8$
013720  005003                  4$:     CLR     R3                      ;               2280
013722  151203                          BISB    (R2),R3
013724  010100                          MOV     R1,R0
013726  160300                          SUB     R3,R0
013730  016703  175216                  MOV     NIB.SAVE,R3
013734  000461                          BR      13$
013736  005003                  5$:     CLR     R3                      ;               2284
013740  151203                          BISB    (R2),R3
013742  010100                          MOV     R1,R0
013744  160300                          SUB     R3,R0
013746  016703  175200                  MOV     NIB.SAVE,R3
013752  000437                          BR      11$
013754  005003                  6$:     CLR     R3                      ;               2288
013756  151203                          BISB    (R2),R3
013760  010100                          MOV     R1,R0
013762  160300                          SUB     R3,R0
013764  016703  175164                  MOV     NIB.SAVE+2,R3
013770  000444                          BR      14$
013772  005003                  7$:     CLR     R3                      ;               2292
013774  151203                          BISB    (R2),R3
013776  010100                          MOV     R1,R0
014000  160300                          SUB     R3,R0
014002  016703  175146                  MOV     NIB.SAVE+2,R3
014006  006203                  8$:     ASR     R3
014010  006203                          ASR     R3
014012  006203                          ASR     R3
014014  006203                          ASR     R3
014016  000431                          BR      14$
014020  005003                  9$:     CLR     R3                      ;               2296
014022  151203                          BISB    (R2),R3
014024  010100                          MOV     R1,R0
014026  160300                          SUB     R3,R0
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
                                                MOV     NIB.SAVE+2,R3
                                                BR      13$
                                        10$:    CLR     R3                      ;                                       2300
                                                BISB    (R2),R3
                                                MOV     R1,R0
                                                SUB     R3,R0
                                                MOV     NIB.SAVE+2,R3
                                        11$:    ASR     R3
                                                ASR     R3
                                                ASR     R3
                                                ASR     R3
                                                BR      13$
                                        12$:    CLR     R3                      ;                                       2304
                                                BISB    (R2),R3
                                                MOV     R1,R0
                                                SUB     R3,R0
                                                MOV     NIB.SAVE+4,R3
                                        13$:    SWAB    R3
                                        14$:    BIC     #177760,R3
                                                CLRB    STACK(R0)
                                                BISB    R3,STACK(R0)
                                                RTS     PC                      ;                                       2268
                                        15$:    CLR     R3                      ;                                       2308
                                                BISB    (R2),R3
                                                SUB     R3,R1
                                                MOV     NIB.SAVE+4,R3
                                                ASR     R3
                                                ASR     R3
                                                ASR     R3
                                                ASR     R3
                                                SWAB    R3
                                                BIC     #177770,R3
                                                CLRB    STACK(R1)
                                                BISB    R3,STACK(R1)
                                                RTS     PC                      ;                                       2217

                                        ; Routine Size:  119 words
                                        ; Maximum stack depth per invocation:  4 words
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (6)

```
2522 ;ML4
2523 ;
2524
2525 ;          2313  routine DAT_DM_XFER : novalue =
2526 ;          2314
2527 ;          2315  !++
2528 ;          2316  ! FUNCTIONAL DESCRIPTION:
2529 ;          2317  !
2530 ;          2318  !       A REPEATEDLY CALLED SEQUENCE
2531 ;          2319  !       OF ASSIGNMENT EXPRESSIONS TO
2532 ;          2320  !       LOAD THE DSA, BUS ADRS  AND WORD
2533 ;          2321  !       COUNT REGISTERS WITH APPROPRIATE
2534 ;          2322  !       INFORMATION BEFORE A MASS BUS
2535 ;          2323  !       TRANSFER CAN COMMENCE
2536 ;          2324  !
2537 ;          2325  !       LOADS A MASS BUS BLOCK TRANSFER,
2538 ;          2326  !       IN DIAGNOSTIC MODE, AT THE GOOD
2539 ;          2327  !       BLOCK ADRS.
2540 ;          2328  !
2541 ;          2329  !--
2542 ;          2330
2543 ;          2331      begin
2544 ;          2332      DAT_DM = ONE;                   !SET DATA DIAG MODE
2545 ;          2333      MLDA = .GOOD_BLK;               !LOAD DSA REG WITH THE GOOD BLOCK ADRS
2546 ;          2334      MLBA = IO_BUF;                  !LOAD BUS ADRS REG WITH THE IO_BUF ADRS
2547 ;          2335      MLWC = not 255;                 !LOAD WORD COUNT REG WITH COMPLIMENT 256
2548 ;          2336      end;
2552
2556 014162                        DAT.DM.XFER:
2557 014162 152777 000010 177104          BISB    #10,@ML.REG+120         ;                2332
2558 014170 016777 175370 177006          MOV     GOOD.BLK,@ML.REG+30     ;                2333
2559 014176 012777 011600 176770          MOV     #IO.BUF,@ML.REG+20      ;                2334
2560 014204 012777 177400 176752          MOV     #-400,@ML.REG+10        ;                2335
2561 014212 000207                        RTS     PC                      ;                2313
2562
2563                              ; Routine Size:  13 words
2564                              ; Maximum stack depth per invocation:  0 words
2569
2570
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (7)

;          2337  routine STRIPPER (WRD_CNT, NIB_CNT) : novalue =
;          2338      begin
;          2339
;          2340  !++
;          2341  ! FUNCTIONAL DESCRIPTION:
;          2342  !       STRIPPER RUNS IN DATA DIAG MODE AND STRIPS OUT
;          2343  !       A VARIABLE NUMBER OF GOOD NIBBLES FROM THE
;          2344  !       GOOD BLOCK AND STORES THEM INTO A CONTIGIOUS
;          2345  !       STACK FOR SEQUENTIAL ACCESSING
;          2346  !
;          2347  ! FORMAL PARAMETERS:
;          2348  !       WRD_CNT
;          2349  !       TELLS STRIPPER HOW MANY WORDS IN THE GOOD
;          2350  !       BLOCK TO READ OUT
;          2351  !
;          2352  !       NIB_CNT
;          2353  !       TELLS STRIPPER HOW MANY NIBBLES TO
;          2354  !       STRIP OUT OF EACH WORD.
;          2355  !
;          2356  ! IMPLICIT INPUTS:
;          2357  !--
;          2358
;          2359      local
;          2360          STK_PTR;                                !STACK POINTER
;          2361
;          2362      incr CNT from 0 to .NIB_CNT do              !CLEAR OUT THE STACK OFFSETS
;          2363          STK_OFF [.CNT] = ZEROES;
;          2364
;          2365      CLR_MBUS;
;          2366      STK_PTR = -1;                               !RESET THE STACK POINTER
;          2367      DAT_DM_XFER ();                             !SET UP A DATA XFER AT THE GOOD BLOCK
;          2368      MLCS1 = read;                               !DO A READ XFER
;          2369      DELAY (ONE_US);                             !ALLOW PROM DATA TO GET INTO THE MLPD REG
;          2370
;          2371      incr CNT from 0 to .WRD_CNT do              !LOAD THE STACK WITH ALL GOOD NIBBLE DATA
;          2372          begin
;          2373          PD_TEMP = .MLPD;                        !GET THE PROM DATA
;          2374          DAT_CLK = ONE;                          !CLOCK OUT THE DATA WORD
;          2375          DELAY (ONE_US);                         !
;          2376          RD_LNG_WRD;                             !READ DATA DIAG REGS INTO NIBBLE SAVE
;          2377
;          2378          incr NIB_PTR from 0 to .NIB_CNT do      !STRIP OUT X NUMBER OF NIBBLES
;          2379              begin
;          2380              STK_PTR = .STK_PTR + 1;             !INCREMENT THE STACK POINTER
;          2381
;          2382              if .PD_TEMP [.NIB_PTR] IS_SET       !SEE IF THIS A GOOD NIBBLE
;          2383              then
;          2384                  STK_OFF [.NIB_PTR] = (.STK_OFF [.NIB_PTR]) + (.NIB_CNT + 1)
;          2385                                                  !THEN INCREMENT IT'S STACK OFFSET
;          2386              else
;          2387                  LOAD_STACK (.STK_PTR, .NIB_PTR);        !ELSE LOAD THE NIBBLE IN THE STACK
;          2388
```

```
2628 ;ML4
2629 ;
2630
2631 ;          2389              end;
2632 ;          2390
2633 ;          2391          end;
2634 ;          2392
2635 ;          2393      CLR_MBUS;
2636 ;          2394      end;
2640
2641                                .GLOBL  L$DLY
2642
2643
2647 014214                    STRIPPER:
2648 014214  004167  167676            JSR     R1,$SAVE5                   ;                                   2337
2649 014220  005746                    TST     -(SP)
2650 014222  016604  000020            MOV     20(SP),R4                   ; NIB.CNT,*                         2362
2651 014226  005001                    CLR     R1                          ; CNT
2652 014230  000403                    BR      2$
2653 014232  105061  012600      1$:   CLRB    STK.OFF(R1)                 ; *(CNT)                            2363
2654 014236  005201                    INC     R1                          ; CNT                               2362
2655 014240  020104              2$:   CMP     R1,R4                       ; CNT,*
2656 014242  003773                    BLE     1$
2657 014244  152777  000040  176742    BISB    #40,@ML.REG+40              ;                                   2363
2658 014252  016705  177324            MOV     ML.DUT,R5
2659 014256  042705  177770            BIC     #177770,R5
2660 014262  142777  000007  176724    BICB    #7,@ML.REG+40
2661 014270  150577  176720            BISB    R5,@ML.REG+40
2662 014274  012705  177777            MOV     #-1,R5                      ; *,STK.PTR                         2366
2663 014300  004767  177656            JSR     PC,DAT.DM.XFER              ;                                   2367
2664 014304  012777  000071  176642    MOV     #71,@ML.REG                 ;                                   2368
2665 014312  012701  000001            MOV     #1,R1                       ; *,$$TMP2                          2369
2666 014316  001410              3$:   BEQ     6$
2667 014320  016702  165572            MOV     L$DLY,R2                    ; *,$$TMP1
2668 014324  001403                    BEQ     5$
2669 014326  005016              4$:   CLR     (SP)                        ; $$TMP
2670 014330  005302                    DEC     R2                          ; $$TMP1
2671 014332  001375                    BNE     4$
2672 014334  005301              5$:   DEC     R1                          ; $$TMP2
2673 014336  000767                    BR      3$
2674 014340  005003              6$:   CLR     R3                          ; CNT                               2371
2675 014342  000502                    BR      16$
2676 014344  017767  177034  176546  7$:   MOV     @ML.REG+230,PD.TEMP         ;                                   2373
2677 014352  152777  000020  176714        BISB    #20,@ML.REG+120             ;                                   2374
2678 014360  012701  000001            MOV     #1,R1                       ; *,$$TMP2                          2375
2679 014364  001410              8$:   BEQ     11$
2680 014366  016702  165524            MOV     L$DLY,R2                    ; *,$$TMP1
2681 014372  001403                    BEQ     10$
```

```
                                        ;ML4                                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                                       22-Dec-1980 09:21:22    PA:<
                                        9$:     CLR     (SP)                    ; $$TMP
                                                DEC     R2                      ; $$TMP1
                                                BNE     9$
                                        10$:    DEC     R1                      ; $$TMP2
                                                BR      8$
014406 017767 176732 174536             11$:    MOV     @ML.REG+170,D1.TEMP
014414 017767 176734 174532             MOV     @ML.REG+200,D2.TEMP
014422 017767 176706 174526             MOV     @ML.REG+160,E2.TEMP
014430 005002                           CLR     R2                      ; NIB.PTR                               2378
014432 000443                           BR      15$
014434 005205                           12$:    INC     R5              ; STK.PTR                               2380
014436 010201                           MOV     R2,R1                   ; NIB.PTR,*                             2382
014440 006201                           ASR     R1
014442 006201                           ASR     R1
014444 006201                           ASR     R1
014446 062701 013120                    ADD     #PD.TEMP,R1
014452 010146                           MOV     R1,-(SP)
014454 010246                           MOV     R2,-(SP)                ; NIB.PTR,*
014456 042716 177770                    BIC     #177770,(SP)
014462 012746 000001                    MOV     #1,-(SP)
014466 005046                           CLR     -(SP)
014470 004767 166444                    JSR     PC,BL$GT2
014474 062706 000010                    ADD     #10,SP
014500 005300                           DEC     R0
014502 001011                           BNE     13$
014504 005001                           CLR     R1                      ;                                       2384
014506 156201 012600                    BISB    STK.OFF(R2),R1          ; *(NIB.PTR),*
014512 060401                           ADD     R4,R1
014514 010100                           MOV     R1,R0
014516 005200                           INC     R0
014520 110062 012600                    MOVB    R0,STK.OFF(R2)          ; *,*(NIB.PTR)
014524 000405                           BR      14$                     ;                                       2382
014526 010546                   13$:    MOV     R5,-(SP)                ; STK.PTR,*                             2387
014530 010246                           MOV     R2,-(SP)                ; NIB.PTR,*
014532 004767 177046                    JSR     PC,LOAD.STACK
014536 022626                           CMP     (SP)+,(SP)+
014540 005202                   14$:    INC     R2                      ; NIB.PTR                               2378
014542 020204                   15$:    CMP     R2,R4                   ; NIB.PTR,*
014544 003733                           BLE     12$
014546 005203                           INC     R3                      ; CNT                                   2371
014550 020366 000022            16$:    CMP     R3,22(SP)               ; CNT,WRD.CNT
014554 003673                           BLE     7$
014556 152777 000040 176430             BISB    #40,@ML.REG+40          ;                                       2391
014564 016705 177012                    MOV     ML.DUT,R5
014570 042705 177770                    BIC     #177770,R5
014574 142777 000007 176412             BICB    #7,@ML.REG+40
014602 150577 176406                    BISB    R5,@ML.REG+40
014606 005726                           TST     (SP)+                   ;                                       2337
014610 000207                           RTS     PC

                                ; Routine Size:  127 words
                                ; Maximum stack depth per invocation:  11 words
```

```
2739                            ;ML4                                    22-Dec-1980 09:24:31    TOPS
2740                            ;                                       22-Dec-1980 09:21:22    PA:<
2741
2746
2747
```

```
;ML4
;
;
;          routine CAL_CRC : novalue =
;              begin
;
;          !++
;          ! FUNCTIONAL DESCRIPTION:
;          !       CALCULATE THE CRC CODE FOR THE GOOD BLOCKS
;          !       FIRST CRC GROUP (60 NIBBLES) BY STRIPPING
;          !       OUT GOOD NIBBLES AND MODULO 2 ADDING EACH
;          !       BITS WEIGHT RESULTING IN A_CAL,B_CAL,P_CAL.
;          !
;          ! IMPLICIT INPUTS:
;          !       P_CAL,A_CAL,B_CAL
;          !       GOLBAL STORAGE LOCATION WHERE CALCULATED
;          !       CRC CODES ARE STORED AND EXAMINED FROM
;          !
;          !       REM_TBL
;          !       TABLE CONTAINING PRECALCULATED BIT POSITION
;          !       WEIGHTS USED IN THE MODULO 2 CALCULATION OF THE
;          !       CRC CODE
;          !--
;
;              local
;                  CHANNEL,                        !CHANNEL POINTS TO THE BITS IN A WORD
;                  STK_PTR,                        !STACK POINTER
;                  NIB_SAV : bitvector [4],        !NIBBLE SAVE LOCATION
;                  ALOG,                           !INDEX INTO REMAINDER TABLE
;                  BLOG;                           !INDEX INTO REMAINDER TABLE
;
;              STRIPPER (12, 9);                   !STRIP OUT ALL 10 NIBBLE FROM 13 ARRAY WORDS
;              STK_PTR = -1;                       !RESET STACK POINTER
;
;              incr PLOG from 0 to 5 do            !PLOG POINTS TO ONE CRC GROUP '6 WORDS'
;                  begin
;                  CHANNEL = -1;                   !RESET CHANNEL FOR EACH WORD
;
;                  incr NIB_CNT from 0 to 8 do     !READ DATA NIBBLE 0-8 AND CALCULATE CRC
;                      begin
;                      STK_PTR = .STK_PTR + 1;     !INCREMENT THE STACK POINTER
;                      NIB_SAV = .stack [.STK_PTR]; !LOAD NIV_SAV WITH A STACK NIBBLE
;
;                      incr BIT_TST from 0 to 3 do !TEST THE BIT FOR BEING SET
;                          begin
;                          CHANNEL = .CHANNEL + 1; !CHANNEL POINTS TO THIS BIT
;
;                          if .NIB_SAV [.BIT_TST] IS_SET  !SEE IF THIS BIT IS SET
;                          then
;                              begin               !IF SET THEN MOD 2 ADD THE REMAINDER
;                              ALOG = .PLOG + .CHANNEL;  !CALCULATE THE ALOG
;                              BLOG = .PLOG + .CHANNEL*2;  !CALCULATE THE BLOG
;
;                              while .ALOG geq 63 do  !REDUCE ALOG UNTIL < 64
;                                  ALOG = .ALOG - 63;
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (8)

;          2447
;          2448                    while .BLOG geq 63 do       !REDUCE BLOG UNTIL <64
;          2449                        BLOG = .BLOG - 63;
;          2450
;          2451                    P_CAL = (.P_CAL) xor (.REM_TBL [.PLOG]);     !MOD 2 P_CAL WITH REM_TBL
;          2452                    A_CAL = (.A_CAL) xor (.REM_TBL [.ALOG]);     !MOD 2 A_CAL WITH REM_TBL
;          2453                    B_CAL = (.B_CAL) xor (.REM_TBL [.BLOG]);     !MOD 2 B_CAL WITH REM_TBL
;          2454                    end;
;          2455
;          2456                end;
;          2457
;          2458            end;
;          2459
;          2460            STK_PTR = .STK_PTR + 1;                 !SKIP OVER THE CRC NIB NT THE STACK
;          2461            end;
;          2462
;          2463        end;
;          2828

2832 014612  004167  167300          CAL.CRC:JSR     R1,$SAVE5                       ;                       2395
2833 014616  162706  000012                  SUB     #12,SP
2834 014622  012746  000014                  MOV     #14,-(SP)                       ;                       2423
2835 014626  012746  000011                  MOV     #11,-(SP)
2836 014632  004767  177356                  JSR     PC,STRIPPER
2837 014636  012766  177777  000006        MOV     #-1,6(SP)                       ; *,STK.PTR             2424
2838 014644  005066  000004                  CLR     4(SP)                           ; PLOG                  2426
2839 014650  012766  177777  000010  1$:     MOV     #-1,10(SP)                      ; *,CHANNEL             2428
2840 014656  005066  000012                  CLR     12(SP)                          ; NIB.CNT               2430
2841 014662  005266  000006          2$:     INC     6(SP)                           ; STK.PTR               2432
2842 014666  016605  000006                  MOV     6(SP),R5                        ; STK.PTR,*             2433
2843 014672  116566  012612  000014        MOVB    STACK(R5),14(SP)                ; *,NIB.SAV
2844 014700  105066  000015                  CLRB    15(SP)                          ; NIB.SAV
2845 014704  005003                          CLR     R3                              ; BIT.TST               2435
2846 014706  005266  000010          3$:     INC     10(SP)                          ; CHANNEL               2437
2847 014712  010305                          MOV     R3,R5                           ; BIT.TST,*             2439
2848 014714  006205                          ASR     R5
2849 014716  006205                          ASR     R5
2850 014720  006205                          ASR     R5
2851 014722  012704  000014                  MOV     #14,R4
2852 014726  060604                          ADD     SP,R4                           ; NIB.SAV,*
2853 014730  060405                          ADD     R4,R5
2854 014732  010546                          MOV     R5,-(SP)
2855 014734  010346                          MOV     R3,-(SP)                        ; BIT.TST,*
2856 014736  042716  177770                  BIC     #177770,(SP)
2857 014742  012746  000001                  MOV     #1,-(SP)
2858 014746  005046                          CLR     -(SP)
```

```
                                                                                                22-Dec-1980 09:24:31    TOPS
                                                                                                22-Dec-1980 09:21:22    PA:<
                                ;ML4
                                ;
                                
014750  004767  166164                JSR     PC,BLSGT2
014754  062706  000010                ADD     #10,SP
014760  005300                      DEC     R0
014762  001066                      BNE     7$
014764  016601  000004                MOV     4(SP),R1                ; PLOG,ALOG                             2442
014770  066601  000010                ADD     10(SP),R1               ; CHANNEL,ALOG
014774  016605  000010                MOV     10(SP),R5               ; CHANNEL,*                             2443
015000  006305                      ASL     R5
015002  066605  000004                ADD     4(SP),R5                ; PLOG,*
015006  010502                      MOV     R5,R2                   ; *,BLOG
015010  020127  000077        4$:     CMP     R1,#77                  ; ALOG,*                                2445
015014  002403                      BLT     5$
015016  162701  000077                SUB     #77,R1                  ; *,ALOG                                2446
015022  000772                      BR      4$                      ;                                       2445
015024  020227  000077        5$:     CMP     R2,#77                  ; BLOG,*                                2448
015030  002403                      BLT     6$
015032  162702  000077                SUB     #77,R2                  ; *,BLOG                                2449
015036  000772                      BR      5$                      ;                                       2448
015040  005005                6$:     CLR     R5                      ;                                       2451
015042  016604  000004                MOV     4(SP),R4                ; PLOG,*
015046  156405  013434                BISB    REM.TBL(R4),R5
015052  010546                      MOV     R5,-(SP)
015054  046716  176064                BIC     P.CAL,(SP)
015060  040567  176060                BIC     R5,P.CAL
015064  052667  176054                BIS     (SP)+,P.CAL
015070  005005                      CLR     R5                      ;                                       2452
015072  156105  013434                BISB    REM.TBL(R1),R5          ; *(ALOG),*
015076  010504                      MOV     R5,R4
015100  046704  176034                BIC     A.CAL,R4
015104  040567  176030                BIC     R5,A.CAL
015110  050467  176024                BIS     R4,A.CAL
015114  005005                      CLR     R5                      ;                                       2453
015116  156205  013434                BISB    REM.TBL(R2),R5          ; *(BLOG),*
015122  010504                      MOV     R5,R4
015124  046704  176012                BIC     B.CAL,R4
015130  040567  176006                BIC     R5,B.CAL
015134  050467  176002                BIS     R4,B.CAL
015140  005203                7$:     INC     R3                      ; BIT.TST                               2435
015142  020327  000003                CMP     R3,#3                   ; BIT.TST,*
015146  003657                      BLE     3$
015150  005266  000012                INC     12(SP)                  ; NIB.CNT                               2430
015154  026627  000012  000010        CMP     12(SP),#10              ; NIB.CNT,*
015162  003637                      BLE     2$
015164  005266  000006                INC     6(SP)                   ; STK.PTR                               2460
015170  005266  000004                INC     4(SP)                   ; PLOG                                  2426
015174  026627  000004  000005        CMP     4(SP),#5                ; PLOG,*
015202  003622                      BLE     1$
015204  062706  000016                ADD     #16,SP                  ;                                       2395
015210  000207                      RTS     PC

                                ; Routine Size:  128 words
                                ; Maximum stack depth per invocation:  17 words
```

```
2916                            ;ML4                                    22-Dec-1980 09:24:31    TOPS
2917                            ;                                       22-Dec-1980 09:21:22    PA:<
2918
2923
2924
```

```
;ML4
;
;
;          routine ERR_CHK_CRC =
;              begin
;
;          !++
;          ! FUNCTIONAL DESCRIPTION:
;          !       'ERROR CHECK CRC' COMPARES HARDWARE GENERATED CRC
;          !       CODES TO SOFTWARE CALCULATED CRC CODE FOR ONE
;          !       CRC GROUP AND RETURNS A ONE ON DETECTION OF ERRORS
;          !
;          ! IMPLICIT INPUTS:
;          !       P_CAL,A_CAL,B_CAL
;          !       GLOBAL STORAGE LOCATIONS WHERE CALCULATED
;          !       CRC CODES ARE STORED AND EXAMINED FROM
;          !
;          !       P_GEN,A_GEN,B_GEN
;          !       GLOBAL STROAGE LOCATIONS WHERE HARDWARE GENERATED
;          !       CRC CODES ARE STORED AND EXAMINED FROM
;          !--
;
;              local
;                  POS,                                    !VARIABLE FOR FIELD SELECTOR
;                  TEMP;                                   !TEMPORARY STORAGE LOCATION
;
;              POS = -1;                                   !RESET THE POS
;
;              incr STK_PTR from 9 to 59 by 10 do          !CONVERT VERTICAL STACK CRC TO HORIZONTAL REPRESENTATION
;                  begin
;                  POS = .POS + 1;                         !INCREMENT POS
;                  TEMP = .stack [.STK_PTR];               !READ CRC NIB FROM THE STACK
;                  (P_GEN)<.POS, 1> = .TEMP<0, 1>;         !CONVERT 1ST BIT
;                  (A_GEN)<.POS, 1> = not .TEMP<1, 1>;     !CONVERT 2ND BIT
;                  (B_GEN)<.POS, 1> = not .TEMP<2, 1>;     !CONVERT 3ED BIT
;                  end;
;
;              if (.P_GEN neq .P_CAL) or (.A_GEN neq .A_CAL) or (.B_GEN neq .B_CAL) then return ONE else return ZERO;
;
;                                                          !COMPARE GENERATED CRC CODE TO CALCULATED CRC CODE
;              end;

015212                          ERR.CHK.CRC:
015212  004167  166642                  JSR     R1,$SAVE3                       ;                               2464
015216  012701  177777                  MOV     #-1,R1                          ; *,POS                         2487
015222  012702  000011                  MOV     #11,R2                          ; *,STK.PTR                     2489
015226  005201                  1$:     INC     R1                              ; POS                           2491
015230  005003                          CLR     R3                              ; TEMP                          2492
```

```
                                ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                ;                                                       22-Dec-1980 09:21:22    PA:<
                                                BISB    STACK(R2),R3            ; *(STK.PTR),TEMP
                                                MOV     #P.GEN,-(SP)            ;                                2493
                                                MOV     R1,-(SP)                ; POS,*
                                                MOV     #1,-(SP)
                                                MOV     R3,-(SP)                ; TEMP,*
                                                BIC     #177776,(SP)
                                                JSR     PC,BL$PU2
                                                MOV     #A.GEN,(SP)             ;                                2494
                                                MOV     R1,-(SP)                ; POS,*
                                                MOV     #1,-(SP)
                                                CLR     -(SP)
                                                BIT     #2,R3                   ; *,TEMP
                                                BEQ     2$
                                                INC     (SP)
                                2$:             COM     (SP)
                                                JSR     PC,BL$PU2
                                                MOV     #B.GEN,(SP)             ;                                2495
                                                MOV     R1,-(SP)                ; POS,*
                                                MOV     #1,-(SP)
                                                CLR     -(SP)
                                                BIT     #4,R3                   ; *,TEMP
                                                BEQ     3$
                                                INC     (SP)
                                3$:             COM     (SP)
                                                JSR     PC,BL$PU2
                                                ADD     #24,SP                  ;                                2490
                                                ADD     #12,R2                  ; *,STK.PTR                      2489
                                                CMP     R2,#73                  ; STK.PTR,*
                                                BLE     1$
                                                CMP     P.GEN,P.CAL             ;                                2498
                                                BNE     4$
                                                CMP     A.GEN,A.CAL
                                                BNE     4$
                                                CMP     B.GEN,B.CAL
                                                BEQ     5$
                                4$:             MOV     #1,R1
                                                BR      6$
                                5$:             CLR     R1
                                6$:             MOV     R1,R0                   ;                                2465
                                                RTS     PC                      ;                                2464

                                ; Routine Size:  71 words
                                ; Maximum stack depth per invocation:  14 words
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (10)

;          2502  routine FIND_COMP_BIT (BITS_XFERED) =
;          2503      begin
;          2504
;          2505  !++
;          2506  ! FUNCTIONAL DESCRIPTION:
;          2507  !       'FIND COMPLIMENT'  BIT IS CALLED BY THE
;          2508  !       SYNDROME DECODE TESTS AND INDEXES INTO
;          2509  !       THE IO_BUF LOOKING FOR COMPLIMENTED
;          2510  !       BITS.  A COMPLIMENTED BIT IS BY DEF A ONE
;          2511  !
;          2512  !       A ONE IS RETURNED IF THE INDEXED BIT IS
;          2513  !       NOT SET
;          2514  !
;          2515  ! FORMAL PARAMETERS:
;          2516  !       BITS_XFERED
;          2517  !       REPRESENTS THE BIT BEING TESTED
;          2518  !       IN THE DRIVE AND FROM THIS THE
;          2519  !       WORD AND BIT INDEX INTO THE
;          2520  !       IO_BUF CAN BE CALCULATED
;          2521  !
;          2522  ! IMPLICIT INPUTS:
;          2523  !--
;          2524
;          2525      local
;          2526          COMP_WRD,                         !WORD WHERE COMPLINEMT BIT IS LOCATED
;          2527          COMP_BIT,                         !BIT THAT IS COMPLINEMTED
;          2528          BUF_SAV : bitvector [16];         !STORES THE WORD IN WHICH THE BIT IS COMPLIMENTED
;          2529
;          2530      COMP_WRD = .BITS_XFERED/16;           !CALCULATE THE COMP WORD
;          2531      COMP_BIT = .BITS_XFERED mod 16;       !CALCULATE THE COMP BIT
;          2532      BUF_SAV = .IO_BUF [.COMP_WRD];        !LOAD THE COMP WORD INTO BUF_SAV
;          2533      IO_BUF [.COMP_WRD] = ZEROES;          !ZERO THE COMP WORD
;          2534
;          2535      if .BUF_SAV [.COMP_BIT] IS_NOT_SET then return ZERO else return ONE;
;          2536
;          2537                                            !FIND COMPLIMENTED BIT AND RETURN ERROR STATUS
;          2538      end;

015430                          FIND.COMP.BIT:
015430  004167  166410                JSR     R1,$SAVE2                       ;                               2502
015434  005746                    TST     -(SP)
015436  016646  000012            MOV     12(SP),-(SP)                    ; BITS.XFERED,*                 2530
015442  012746  000020            MOV     #20,-(SP)
015446  004767  166300            JSR     PC,BL$DIV
015452  010001                    MOV     R0,R1                           ; *,COMP.WRD
```

```
                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                    22-Dec-1980 09:21:22    PA:<
                                ;ML4
                                ;
015454  016616  000016                MOV     16(SP),(SP)             ; BITS.XFERED,*                         2531
015460  012746  000020                MOV     #20,-(SP)
015464  004767  166274                JSR     PC,BL$MOD
015470  010002                      MOV     R0,R2                   ; *,COMP.BIT
015472  010100                      MOV     R1,R0                   ; COMP.WRD,*                            2532
015474  006300                      ASL     R0
015476  016066  011600  000006       MOV     IO.BUF(R0),6(SP)        ; *,BUF.SAV
015504  005060  011600                CLR     IO.BUF(R0)              ;                                       2533
015510  010200                      MOV     R2,R0                   ; COMP.BIT,*                            2535
015512  006200                      ASR     R0
015514  006200                      ASR     R0
015516  006200                      ASR     R0
015520  012701  000006              MOV     #6,R1
015524  060601                      ADD     SP,R1                   ; BUF.SAV,*
015526  060100                      ADD     R1,R0
015530  010046                      MOV     R0,-(SP)
015532  010246                      MOV     R2,-(SP)                ; COMP.BIT,*
015534  042716  177770              BIC     #177770,(SP)
015540  012746  000001              MOV     #1,-(SP)
015544  005046                      CLR     -(SP)
015546  004767  165366              JSR     PC,BL$GT2
015552  062706  000010              ADD     #10,SP
015556  005700                      TST     R0
015560  001002                      BNE     1$
015562  005001                      CLR     R1
015564  000402                      BR      2$
015566  012701  000001      1$:     MOV     #1,R1
015572  010100              2$:     MOV     R1,R0                   ;                                       2503
015574  062706  000010              ADD     #10,SP                  ;                                       2502
015600  000207                      RTS     PC

                                ; Routine Size:  53 words
                                ; Maximum stack depth per invocation:  11 words
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (11)

;          2539  routine FORCE_REM (PLOG, CHAN) : novalue =
;          2540      begin
;          2541
;          2542  !++
;          2543  ! FUNCTIONAL DESCRIPTION:
;          2544  !       VIA ECC_DM AND THE PRECALCULATED MODULO 2
;          2545  !       REMAINDERS STORED IN REM_TBL[], THE
;          2546  !       CRC_A,CRC_B AND PAR_CRC_WRD
;          2547  !       ARE FORCED WITH ERRONEOUS CRC DATA TO
;          2548  !       FORCE PERDICTABLE ECC ERRORS
;          2549  !
;          2550  ! FORMAL PARAMETERS:
;          2551  !       PLOG
;          2552  !       POINTS TO ONE OF THE SIX WORDS OF
;          2553  !       A CRC GROUP
;          2554  !
;          2555  !       CHAN
;          2556  !       POINTS TO ONE OF 36 CHANNELS IN
;          2557  !       A CRC GROUP
;          2558  !
;          2559  ! IMPLICIT INPUTS:
;          2560  !--
;          2561
;          2562      local
;          2563          ALOG,                                   !INDEX INTO REM_TBL
;          2564          BLOG;                                   !INDEX INTO REM_TBL
;          2565
;          2566      ALOG = .PLOG + .CHAN;                       !CALCULATE A_LOG
;          2567      BLOG = .PLOG + .CHAN*2;                     !CALCULATE B_LOG
;          2568
;          2569      while .ALOG geq 63 do                       !REDUCE A_LOG UNTIL < 64
;          2570          ALOG = .ALOG - 63;
;          2571
;          2572      while .BLOG geq 63 do                       !REDUCE B_LOG UNTIL < 64
;          2573          BLOG = .BLOG - 63;
;          2574
;          2575      ECC_DM = ONE;                               !SET ECC DIAG MODE
;          2576      PAR_CRC_WRD = .REM_TBL [.PLOG];             !LOAD PAR_CRC_WRD WITH REM_TBL
;          2577      CRC_A = .REM_TBL [.ALOG];                   !LOAD CRC_A WITH REM_TBL
;          2578      CRC_B = .REM_TBL [.BLOG];                   !LOAD CRC_B WITH REM_TBL
;          2579      end;
;          2579

015602                          FORCE.REM:
015602  004167  166252                 JSR     R1,$SAVE3                       ;                               2539
015606  016600  000014                 MOV     14(SP),R0                       ; PLOG,*                        2566
```

```
                                                                                22-Dec-1980 09:24:31    TOPS
                                                                                22-Dec-1980 09:21:22    PA:<
3187                            ;ML4
3188                            ;
3189
3190  015612  010002                        MOV     R0,R2                   ; *,ALOG
3191  015614  066602  000012                ADD     12(SP),R2               ; CHAN,ALOG
3192  015620  016601  000012                MOV     12(SP),R1               ; CHAN,*                        2567
3193  015624  006301                        ASL     R1
3194  015626  060001                        ADD     R0,R1
3195  015630  020227  000077        1$:     CMP     R2,#77                  ; ALOG,*                        2569
3196  015634  002403                        BLT     2$
3197  015636  162702  000077                SUB     #77,R2                  ; *,ALOG                        2570
3198  015642  000772                        BR      1$                      ;                               2569
3199  015644  020127  000077        2$:     CMP     R1,#77                  ; BLOG,*                        2572
3200  015650  002403                        BLT     3$
3201  015652  162701  000077                SUB     #77,R1                  ; *,BLOG                        2573
3202  015656  000772                        BR      2$                      ;                               2572
3203  015660  152777  000001  175406  3$:   BISB    #1,@ML.REG+120          ;                               2575
3204  015666  116003  013434                MOVB    REM.TBL(R0),R3          ;                               2576
3205  015672  000303                        SWAB    R3
3206  015674  042703  140377                BIC     #140377,R3
3207  015700  042777  037400  175416        BIC     #37400,@ML.REG+150
3208  015706  050377  175412                BIS     R3,@ML.REG+150
3209  015712  116203  013434                MOVB    REM.TBL(R2),R3          ; *(ALOG),*                     2577
3210  015716  042703  177700                BIC     #177700,R3
3211  015722  142777  000077  175374        BICB    #77,@ML.REG+150
3212  015730  150377  175370                BISB    R3,@ML.REG+150
3213  015734  116103  013434                MOVB    REM.TBL(R1),R3          ; *(BLOG),*                     2578
3214  015740  042703  177700                BIC     #177700,R3
3215  015744  142777  000077  175362        BICB    #77,@ML.REG+160
3216  015752  150377  175356                BISB    R3,@ML.REG+160
3217  015756  000207                        RTS     PC                      ;                               2539
3218
3219                            ; Routine Size:  55 words
3220                            ; Maximum stack depth per invocation:  4 words
3225
3226
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (12)

;          2580  routine FOR_ECC_ERR (SGL, UNC) : novalue =
;          2581      begin
;          2582
;          2583  !++
;          2584  ! FUNCTIONAL DESCRIPTION:
;          2585  !       'FORCE ECC ERROR' WHEN CALLED WILL FORCE
;          2586  !       VIA ECC DIAG MODE, SINGLE BIT ECC ERRORS
;          2587  !       OR UNCORRECTABLE ECC ERRORS INTO THE
;          2588  !       ECC DIAGNOSTIC REGISTERS
;          2589  !
;          2590  ! FORMAL PARAMETERS:
;          2591  !       SGL
;          2592  !       WHEN SET TO A ONE THIS
;          2593  !       ROUTINE WILL FORCE SINGLE BIT ERRORS
;          2594  !
;          2595  !       UNC
;          2596  !       WHEN SET TO A ONE THIS ROUTINE WILL
;          2597  !       FORCE UNCORRECTABLE ECC ERRORS
;          2598  !
;          2599  ! IMPLICIT INPUTS:
;          2600  !--
;          2601
;          2602      ECC_DM = ONE;                                 !SET ECC DIAG MODE
;          2603
;          2604      if .SGL                                       !IF SGL IS TRUE
;          2605      then
;          2606          begin                                     !THEN FORCE A SINGLE BIT ERROR
;          2607          PAR_CRC_WRD = %b'111111';
;          2608          CRC_A = %b'000000';
;          2609          CRC_B = %b'000000';
;          2610          end
;          2611      else
;          2612          begin                                     !ELSE FORCE A UNCORRECTABLE ERROR
;          2613          PAR_CRC_WRD = %b'111111';
;          2614          CRC_A = %b'111111';
;          2615          CRC_B = %b'000000';
;          2616          end;
;          2617
;          2618      end;
;3273
3277 015760                        FOR.ECC.ERR:
3278 015760  152777  000001  175306          BISB    #1,@ML.REG+120          ;                       2602
3279 015766  032766  000001  000004          BIT     #1,4(SP)                ; *,SGL                 2604
3280 015774  001407                          BEQ     1$
3281 015776  052777  037400  175320          BIS     #37400,@ML.REG+150      ;                       2607
```

```
3283                                    ;ML4                                                    22-Dec-1980 09:24:31    TOPS
3284                                    ;                                                       22-Dec-1980 09:21:22    PA:<
3285
3286 016004  142777  000077  175312          BICB    #77,@ML.REG+150                 ;                               2608
3287 016012  000406                          BR      2$                              ;                               2609
3288 016014  052777  037400  175302  1$:     BIS     #37400,@ML.REG+150              ;                               2613
3289 016022  152777  000077  175274          BISB    #77,@ML.REG+150                 ;                               2614
3290 016030  142777  000077  175276  2$:     BICB    #77,@ML.REG+160                 ;                               2615
3291 016036  000207                          RTS     PC                              ;                               2580
3292
3293                                    ; Routine Size:  24 words
3294                                    ; Maximum stack depth per invocation:  0 words
3299
3300
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (13)

;          2619  routine FIRST_BLK_XFER : novalue =
;          2620
;          2621  !++
;          2622  ! FUNCTIONAL DESCRIPTION:
;          2623  !       A REPEATEDLY CALLED SEQUENCE OF
;          2624  !       ASSIGNMENT EXPRESSION TO LOAD
;          2625  !       THE DSA, BUS ADRS AND WORD COUNT
;          2626  !       REGISTERS WITH APPROPRIATE INFORMATION
;          2627  !       BEFORE MASS BUS TRANSFERS CAN
;          2628  !       COMMENCE.
;          2629  !
;          2630  !       LOADS A MASS_BUS BLOCK XFERR AT
;          2631  !       BLOCK ZERO.
;          2632  !
;          2633  !--
;          2634
;          2635      begin
;          2636      MLDA = ZEROES;                    !LOAD THE DSA REG WITH SECTOR ZERO
;          2637      MLBA = IO_BUF;                    !LOAD THE BUS ADDRESS REG WITH IO_BUF ADRS
;          2638      MLWC = not 255;                   !LOAD WORD COUNT REG WITH COMPLIMENT 256
;          2639      end;

016040                          FIRST.BLK.XFER:
016040  005077  175140                  CLR     @ML.REG+30              ;                       2636
016044  012777  011600  175122          MOV     #IO.BUF,@ML.REG+20      ;                       2637
016052  012777  177400  175104          MOV     #-400,@ML.REG+10        ;                       2638
016060  000207                          RTS     PC                      ;                       2619

                                ; Routine Size:  9 words
                                ; Maximum stack depth per invocation:  0 words
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (14)
;
;          2640  routine GD_BLK_XFER : novalue =
;          2641
;          2642  !++
;          2643  ! FUNCTIONAL DESCRIPTION:
;          2644  !       A REPEATEDLY CALLED SEQUENCE OF
;          2645  !       ASSIGNMENT EXPRESSIONS TO LOAD
;          2646  !       THE DSA, BUS ADRS AND WORD
;          2647  !       COUNT REGISTERS WITH APPROPRIATE
;          2648  !       INFORMATION BEFORE A MASS BUS
;          2649  !       TRANSFERS CAN COMMENCE
;          2650  !
;          2651  !       LOADS A MASS_BUS BLOCK XFERR
;          2652  !       AT THE GOOD BLOCK ADRS FOUND
;          2653  !       BY THE READ WRITE ARRAYS WITH
;          2654  !       PROM DATA TEST
;          2655  !
;          2656  !--
;          2657
;          2658      begin
;          2659      ECC_DIS = ONE;                    !DISABLE ERROR CORRECTION
;          2660      MLDA = .GOOD_BLK;                 !LOAD DSA REG WITH THE GOOD BLOCK ADRS
;          2661      MLBA = IO_BUF;                    !LOAD BUS ADRS REG WITH IO_BUF ADRS
;          2662      MLWC = not 255;                   !LOAD WORD COUNT REG WITH COMPLIMENT 256
;          2663      end;
;
3382 016062                        GD.BLK.XFER:
3383 016062  152777  000002  175204          BISB    #2,@ML.REG+120          ;                2659
3384 016070  016777  173470  175106          MOV     GOOD.BLK,@ML.REG+30     ;                2660
3385 016076  012777  011600  175070          MOV     #IO.BUF,@ML.REG+20      ;                2661
3386 016104  012777  177400  175052          MOV     #-400,@ML.REG+10        ;                2662
3387 016112  000207                         RTS     PC                      ;                2640
3388
3389                               ; Routine Size:  13 words
3390                               ; Maximum stack depth per invocation:  0 words
3395
3396
```

```
3398 ;ML4
3399 ;
3400
3401 ;          2664  routine LAST_BLK_XFER : novalue =
3402 ;          2665
3403 ;          2666  !++
3404 ;          2667  ! FUNCTIONAL DESCRIPTION:
3405 ;          2668  !       A REPEATEDLY CALLED SEQUENCE OF
3406 ;          2669  !       ASSIGNMENT EXPRESSIONS TO LOAD
3407 ;          2670  !       THE DSA, BUS ADRS AND WORD
3408 ;          2671  !       COUNT REGISTERS WITH APPROPRIATE
3409 ;          2672  !       INFORMATION BEFORE A MBUS
3410 ;          2673  !       TRANSFER CAN COMMENCE
3411 ;          2674  !
3412 ;          2675  !       LOADS A MASS BUS BLOCK
3413 ;          2676  !       TRANSFER AT THE LAST BLOCK
3414 ;          2677  !       ADDRESS
3415 ;          2678  !
3416 ;          2679  !--
3417 ;          2680
3418 ;          2681      begin
3419 ;          2682      ECC_DIS = ONE;                  !DISABLE ERROR CORRECTION
3420 ;          2683      MLDA = .LST_BLK;                !LOAD DSA REG WITH THE LAST BLOCK ADRS
3421 ;          2684      MLBA = IO_BUF;                  !LOAD BUS ADRS REG WITH THE IO_BUF ADRS
3422 ;          2685      MLWC = not 255;                 !LOAD WORD COUNT REG WITH COMPLIMENT 256
3423 ;          2686      end;
3427
3431 016114                          LAST.BLK.XFER:
3432 016114  152777  000002  175152          BISB    #2,@ML.REG+120          ;                2682
3433 016122  016777  173444  175054          MOV     LST.BLK,@ML.REG+30      ;                2683
3434 016130  012777  011600  175036          MOV     #IO.BUF,@ML.REG+20      ;                2684
3435 016136  012777  177400  175020          MOV     #-400,@ML.REG+10        ;                2685
3436 016144  000207                          RTS     PC                      ;                2664
3437
3438                                 ; Routine Size:  13 words
3439                                 ; Maximum stack depth per invocation:  0 words
3444
3445
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (16)

;          2687  routine TST_LNG_WRD (NIB_NUM, NIB_PAT, ERR_FLG) : novalue =
;          2688      begin
;          2689
;          2690  !++
;          2691  ! FUNCTIONAL DESCRIPTION:
;          2692  !       COMPARES THE CURRENT NIBBLE
;          2693  !       POSITION IN 'NIB_SAVE' WITH THE
;          2694  !       CURRENT TEST PATTERN.  IF THE
;          2695  !       TWO VALUES ARE NOT EQUAL AN
;          2696  !       ERROR FLG IS SET WHICH THE
;          2697  !       CALLER CAN INTERIGATE
;          2698  !
;          2699  ! FORMAL PARAMETERS:
;          2700  !       NIB_NUM
;          2701  !       CASE SELECT EXPRESSION TO SELECT THE
;          2702  !       CURRENT NIBBLE TO BE EXAMINED
;          2703  !
;          2704  !       NIB_PAT
;          2705  !       CURRENT NIBBLE PATTERN TO BE
;          2706  !       COMPARED
;          2707  !
;          2708  !       ERR_FLG
;          2709  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          2710  !       OF THE CALLERS ERROR FLG
;          2711  !       TO ENABLE THE CALLER TO EXAMINE
;          2712  !       THE ERROR STATUS OF THE ROUTINE CALL
;          2713  !
;          2714  ! IMPLICIT INPUTS:
;          2715  !       NIB_SAVE
;          2716  !       BLOCK OF 3 WORDS TO STORE
;          2717  !       THE DATA FOUND IN MLD1, MLD2
;          2718  !       AND MLE2 AFTER A DIAGNOSTIC MODE
;          2719  !       READ
;          2720  !
;          2721  ! IMPLICIT OUTPUTS:     NONE
;          2722  !--
;          2723
;          2724      .ERR_FLG = ZERO;                          !CLEAR THE ERROR FLAG BACK IN THE CALLING ROUTINE
;          2725
;          2726      case .(NIB_NUM) from 0 to 9 of            !SELECT THE NIBBLE TO BE TESTED
;          2727          set
;          2728
;          2729          [0] :
;          2730
;          2731              if .NIB_SAVE [NIB_0] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2732
;          2733                                                !TEST NIBBLE 0 AND SET ERR FLG IF NEQ
;          2734
;          2735          [1] :
;          2736
;          2737              if .NIB_SAVE [NIB_1] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;          2738
```

```
3503 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
3504 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (16)
3505 ;
3506 ;          2739                                        !TEST NIBBLE 1 AND SET ERR FLG IF NEQ
3507 ;          2740
3508 ;          2741        [2] :
3509 ;          2742
3510 ;          2743            if .NIB_SAVE [NIB_2] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
3511 ;          2744
3512 ;          2745                                        !TEST NIBBLE 2 AND SET ERR FLG IF NEQ
3513 ;          2746
3514 ;          2747        [3] :
3515 ;          2748
3516 ;          2749            if .NIB_SAVE [NIB_3] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
3517 ;          2750
3518 ;          2751                                        !TEST NIBBLE 3 AND SET ERR FLG IF NEQ
3519 ;          2752
3520 ;          2753        [4] :
3521 ;          2754
3522 ;          2755            if .NIB_SAVE [NIB_4] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
3523 ;          2756
3524 ;          2757                                        !TEST NIBBLE 4 AND SET ERR FLG IF NEQ
3525 ;          2758
3526 ;          2759        [5] :
3527 ;          2760
3528 ;          2761            if .NIB_SAVE [NIB_5] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
3529 ;          2762
3530 ;          2763                                        !TEST NIBBLE 5 AND SET ERR FLG IF NEQ
3531 ;          2764
3532 ;          2765        [6] :
3533 ;          2766
3534 ;          2767            if .NIB_SAVE [NIB_6] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
3535 ;          2768
3536 ;          2769                                        !TEST NIBBLE 6 AND SET ERR FLG IF NEQ
3537 ;          2770
3538 ;          2771        [7] :
3539 ;          2772
3540 ;          2773            if .NIB_SAVE [NIB_7] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
3541 ;          2774
3542 ;          2775                                        !TEST NIBBLE 7 AND SET ERR FLG IF NEQ
3543 ;          2776
3544 ;          2777        [8] :
3545 ;          2778
3546 ;          2779            if .NIB_SAVE [NIB_8] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
3547 ;          2780
3548 ;          2781                                        !TEST NIBBLE 8 AND SET ERR FLG IF NEQ
3549 ;          2782
3550 ;          2783        [9] :
3551 ;          2784
3552 ;          2785            if .NIB_SAVE [NIB_9] neq .(NIB_PAT)<0, 3>
3553 ;          2786            then
3554 ;          2787                .ERR_FLG = ONE          !TEST NIBBLE 9 AND SET ERR FLG IF NEQ
3555 ;          2788        tes;
3556 ;          2789
3557 ;          2790    end;
```

```
                                                        22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
                                                        22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (16)

3559 :ML4
3560 ;
3561
3565
3569 016146                     TST.LNG.WRD:
3570 016146  004167  165672             JSR     R1,$SAVE2                ;                                       2687
3571 016152  016600  000010             MOV     10(SP),R0                ; ERR.FLG,*                             2724
3572 016156  005010                     CLR     (R0)
3573 016160  016601  000014             MOV     14(SP),R1                ; NIB.NUM,*                             2726
3574 016164  006301                     ASL     R1
3575 016166  066107  016172             ADD     1$(R1),PC
3576 016172  000024              1$:    .WORD   2$-1$
3577 016174  000052                     .WORD   3$-1$
3578 016176  000110                     .WORD   4$-1$
3579 016200  000140                     .WORD   5$-1$
3580 016202  000200                     .WORD   6$-1$
3581 016204  000226                     .WORD   7$-1$
3582 016206  000264                     .WORD   8$-1$
3583 016210  000314                     .WORD   9$-1$
3584 016212  000354                     .WORD   10$-1$
3585 016214  000404                     .WORD   11$-1$
3586 016216  016602  000012      2$:    MOV     12(SP),R2                ; NIB.PAT,*                             2731
3587 016222  042702  177760             BIC     #177760,R2
3588 016226  016701  172720             MOV     NIB.SAVE,R1
3589 016232  042701  177760             BIC     #177760,R1
3590 016236  020102                     CMP     R1,R2
3591 016240  001577                     BEQ     13$
3592 016242  000574                     BR      12$
3593 016244  016601  000012      3$:    MOV     12(SP),R1                ; NIB.PAT,*                             2737
3594 016250  042701  177760             BIC     #177760,R1
3595 016254  016702  172672             MOV     NIB.SAVE,R2
3596 016260  006202                     ASR     R2
3597 016262  006202                     ASR     R2
3598 016264  006202                     ASR     R2
3599 016266  006202                     ASR     R2
3600 016270  042702  177760             BIC     #177760,R2
3601 016274  020201                     CMP     R2,R1
3602 016276  001560                     BEQ     13$
3603 016300  000555                     BR      12$
3604 016302  016601  000012      4$:    MOV     12(SP),R1                ; NIB.PAT,*                             2743
3605 016306  042701  177760             BIC     #177760,R1
3606 016312  016702  172634             MOV     NIB.SAVE,R2
3607 016316  000302                     SWAB    R2
3608 016320  042702  177760             BIC     #177760,R2
3609 016324  020201                     CMP     R2,R1
3610 016326  001544                     BEQ     13$
3611 016330  000541                     BR      12$
3612 016332  016601  000012      5$:    MOV     12(SP),R1                ; NIB.PAT,*                             2749
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
016336  042701  177760                        BIC     #177760,R1
016342  016702  172604                        MOV     NIB.SAVE,R2
016346  006202                                ASR     R2
016350  006202                                ASR     R2
016352  006202                                ASR     R2
016354  006202                                ASR     R2
016356  000302                                SWAB    R2
016360  042702  177760                        BIC     #177760,R2
016364  020201                                CMP     R2,R1
016366  001524                                BEQ     13$
016370  000521                                BR      12$
016372  016601  000012                6$:     MOV     12(SP),R1               ; NIB.PAT,*             2755
016376  042701  177760                        BIC     #177760,R1
016402  016702  172546                        MOV     NIB.SAVE+2,R2
016406  042702  177760                        BIC     #177760,R2
016412  020201                                CMP     R2,R1
016414  001511                                BEQ     13$
016416  000506                                BR      12$
016420  016601  000012                7$:     MOV     12(SP),R1               ; NIB.PAT,*             2761
016424  042701  177760                        BIC     #177760,R1
016430  016702  172520                        MOV     NIB.SAVE+2,R2
016434  006202                                ASR     R2
016436  006202                                ASR     R2
016440  006202                                ASR     R2
016442  006202                                ASR     R2
016444  042702  177760                        BIC     #177760,R2
016450  020201                                CMP     R2,R1
016452  001472                                BEQ     13$
016454  000467                                BR      12$
016456  016601  000012                8$:     MOV     12(SP),R1               ; NIB.PAT,*             2767
016462  042701  177760                        BIC     #177760,R1
016466  016702  172462                        MOV     NIB.SAVE+2,R2
016472  000302                                SWAB    R2
016474  042702  177760                        BIC     #177760,R2
016500  020201                                CMP     R2,R1
016502  001456                                BEQ     13$
016504  000453                                BR      12$
016506  016601  000012                9$:     MOV     12(SP),R1               ; NIB.PAT,*             2773
016512  042701  177760                        BIC     #177760,R1
016516  016702  172432                        MOV     NIB.SAVE+2,R2
016522  006202                                ASR     R2
016524  006202                                ASR     R2
016526  006202                                ASR     R2
016530  006202                                ASR     R2
016532  000302                                SWAB    R2
016534  042702  177760                        BIC     #177760,R2
016540  020201                                CMP     R2,R1
016542  001436                                BEQ     13$
016544  000433                                BR      12$
016546  016601  000012                10$:    MOV     12(SP),R1               ; NIB.PAT,*             2779
016552  042701  177760                        BIC     #177760,R1
016556  016702  172374                        MOV     NIB.SAVE+4,R2
```

```
3670                                    ;ML4                                                    22-Dec-1980 09:24:31    TOPS
3671                                    ;                                                       22-Dec-1980 09:21:22    PA:<
3672
3673  016562  000302                            SWAB    R2
3674  016564  042702  177760                    BIC     #177760,R2
3675  016570  020201                            CMP     R2,R1
3676  016572  001422                            BEQ     13$
3677  016574  000417                            BR      12$
3678  016576  016601  000012            11$:    MOV     12(SP),R1               ; NIB.PAT,*                     2785
3679  016602  042701  177770                    BIC     #177770,R1
3680  016606  016702  172344                    MOV     NIB.SAVE+4,R2
3681  016612  006202                            ASR     R2
3682  016614  006202                            ASR     R2
3683  016616  006202                            ASR     R2
3684  016620  006202                            ASR     R2
3685  016622  000302                            SWAB    R2
3686  016624  042702  177770                    BIC     #177770,R2
3687  016630  020201                            CMP     R2,R1
3688  016632  001402                            BEQ     13$
3689  016634  012710  000001            12$:    MOV     #1,(R0)                 ;                               2787
3690  016640  000207                    13$:    RTS     PC                      ;                               2687
3691
3692                                    ; Routine Size:  158 words
3693                                    ; Maximum stack depth per invocation:  3 words
3698
3699
```

22-Dec-1980 09:24:31 TOPS-20 Blis-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (17)

```
;ML4
;
;                2791  routine XOR_LNG_WRD (NIB_NUM, NIB_PAT, RESULT) : novalue =
;                2792      begin
;                2793
;                2794  !++
;                2795  ! FUNCTIONAL DESCRIPTION:
;                2796  !       EXCLUSIVE ORS THE CURRENT
;                2797  !       NIBBLE POSITION IN 'NIB_SAVE'
;                2798  !       WITH THE CURRENT TEST PATTERN
;                2799  !       AND ASSIGNS THE RESULTS TO THE
;                2800  !       FORMAL PARAMETER 'RESULT'.
;                2801  !
;                2802  ! FORMAL PARAMETERS:
;                2803  !       NIB_NUM
;                2804  !       CASE SELECT EXPRESSION TO
;                2805  !       SELECT THE CURRENT NIBBLE TO BE
;                2806  !        EXAMINED
;                2807  !
;                2808  !       NIB_PAT
;                2809  !       CURRENT NIBBLE PATTERN TO BE
;                2810  !       XOR'ED
;                2811  !
;                2812  !       RESULT
;                2813  !       CONTAINS THE ADDRESS (PASSED BY REF)
;                2814  !       OF AN OWN STORAGE LOCATION TO
;                2815  !       ENABLE THE CALLER TO EXAMINE THE XOR RESULTS.
;                2816  !
;                2817  ! IMPLICIT INPUTS:
;                2818  !       NIB_SAVE
;                2819  !       BLOCK OF 3 WORDS TO STORE
;                2820  !       THE DATA FOUND IN MLD1
;                2821  !       MLD2 AND MLE2 AFTER A
;                2822  !       DIAGNOSTIC MODE READ.
;                2823  !
;                2824  ! IMPLICIT OUTPUTS:    NONE
;                2825  !--
;                2826
;                2827      case .(NIB_NUM) from 0 to 9 of              !SELECT THE NIBBLE TO BE XOR'ED
;                2828          set
;                2829
;                2830          [0] :
;                2831              .RESULT = .NIB_SAVE [NIB_0] xor .NIB_PAT;
;                2832                                              !XOR NIBBLE 0 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;                2833
;                2834          [1] :
;                2835              .RESULT = .NIB_SAVE [NIB_1] xor .NIB_PAT;
;                2836                                              !XOR NIBBLE 1 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;                2837
;                2838          [2] :
;                2839              .RESULT = .NIB_SAVE [NIB_2] xor .NIB_PAT;
;                2840                                              !XOR NIBBLE 2 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;                2841
;                2842          [3] :
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Blis-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (17)

;          2843              .RESULT = .NIB_SAVE [NIB_3] xor .NIB_PAT;
;          2844                                          !XOR NIBBLE 3 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;          2845
;          2846          [4] :
;          2847              .RESULT = .NIB_SAVE [NIB_4] xor .NIB_PAT;
;          2848                                          !XOR NIBBLE 4 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;          2849
;          2850          [5] :
;          2851              .RESULT = .NIB_SAVE [NIB_5] xor .NIB_PAT;
;          2852                                          !XOR NIBBLE 5 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;          2853
;          2854          [6] :
;          2855              .RESULT = .NIB_SAVE [NIB_6] xor .NIB_PAT;
;          2856                                          !XOR NIBBLE 6 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;          2857
;          2858          [7] :
;          2859              .RESULT = .NIB_SAVE [NIB_7] xor .NIB_PAT;
;          2860                                          !XOR NIBBLE 7 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;          2861
;          2862          [8] :
;          2863              .RESULT = .NIB_SAVE [NIB_8] xor .NIB_PAT;
;          2864                                          !XOR NIBBLE 8 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;          2865
;          2866          [9] :
;          2867              .RESULT = .NIB_SAVE [NIB_9] xor .NIB_PAT
;          2868                                          !XOR NIBBLE 9 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;          2869          tes;
;          2870
;          2871      end;
;
016642                          XOR.LNG.WRD:
016642 004167 165230                JSR     R1,$SAVE4                   ;                                   2791
016646 016601 000016                MOV     16(SP),R1                   ; NIB.PAT,*                         2831
016652 016602 000014                MOV     14(SP),R2                   ; RESULT,*
016656 016600 000020                MOV     20(SP),R0                   ; NIB.NUM,*                         2827
016662 006300                       ASL     R0
016664 066007 016670                ADD     1$(R0),PC
016670 000024                   1$: .WORD   2$-1$
016672 000036                       .WORD   3$-1$
016674 000062                       .WORD   4$-1$
016676 000070                       .WORD   5$-1$
016700 000076                       .WORD   6$-1$
016702 000120                       .WORD   8$-1$
016704 000136                       .WORD   9$-1$
016706 000144                       .WORD   10$-1$
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
                                                .WORD   12$-1$
                                                .WORD   15$-1$
016714  016712  172232        2$:     MOV     NIB.SAVE,(R2)           ;                                               2831
016720  042712  177760                BIC     #177760,(R2)
016724  000472                        BR      17$
016726  016703  172220        3$:     MOV     NIB.SAVE,R3             ;                                               2835
016732  006203                        ASR     R3
016734  006203                        ASR     R3
016736  006203                        ASR     R3
016740  006203                        ASR     R3
016742  042703  177760                BIC     #177760,R3
016746  010312                        MOV     R3,(R2)
016750  000412                        BR      7$
016752  016704  172174        4$:     MOV     NIB.SAVE,R4             ;                                               2839
016756  000437                        BR      13$
016760  016704  172166        5$:     MOV     NIB.SAVE,R4             ;                                               2843
016764  000425                        BR      11$
016766  016712  172162        6$:     MOV     NIB.SAVE+2,(R2)         ;                                               2847
016772  042712  177760                BIC     #177760,(R2)
016776  010104                7$:     MOV     R1,R4
017000  041204                        BIC     (R2),R4
017002  040112                        BIC     R1,(R2)
017004  050412                        BIS     R4,(R2)
017006  000207                        RTS     PC                      ;                                               2827
017010  016704  172140        8$:     MOV     NIB.SAVE+2,R4           ;                                               2851
017014  006204                        ASR     R4
017016  006204                        ASR     R4
017020  006204                        ASR     R4
017022  006204                        ASR     R4
017024  000415                        BR      14$
017026  016704  172122        9$:     MOV     NIB.SAVE+2,R4           ;                                               2855
017032  000411                        BR      13$
017034  016704  172114        10$:    MOV     NIB.SAVE+2,R4           ;                                               2859
017040  006204                11$:    ASR     R4
017042  006204                        ASR     R4
017044  006204                        ASR     R4
017046  006204                        ASR     R4
017050  000402                        BR      13$
017052  016704  172100        12$:    MOV     NIB.SAVE+4,R4           ;                                               2863
017056  000304                13$:    SWAB    R4
017060  042704  177760        14$:    BIC     #177760,R4
017064  000411                        BR      16$
017066  016704  172064        15$:    MOV     NIB.SAVE+4,R4           ;                                               2867
017072  006204                        ASR     R4
017074  006204                        ASR     R4
017076  006204                        ASR     R4
017100  006204                        ASR     R4
017102  000304                        SWAB    R4
017104  042704  177770                BIC     #177770,R4
017110  010412                16$:    MOV     R4,(R2)
017112  010103                17$:    MOV     R1,R3
017114  041203                        BIC     (R2),R3
```

```
3868                            ;ML4                                    22-Dec-1980 09:24:31    TOPS
3869                            ;                                       22-Dec-1980 09:21:22    PA:<
3870
3871 017116  040112                    BIC     R1,(R2)
3872 017120  050312                    BIS     R3,(R2)
3873 017122  000207                    RTS     PC                      ;                       2791
3874
3875                            ; Routine Size:  89 words
3876                            ; Maximum stack depth per invocation:  5 words
3881
3882
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (18)

;          2872  routine LD_LNG_WRD (NIB_NUM, NIB_PAT) : novalue =
;          2873      begin
;          2874
;          2875  !++
;          2876  ! FUNCTIONAL DESCRIPTION:
;          2877  !       LOADS 'NIB_SAVE' WITH UNIQUE
;          2878  !       NIBBLE PATTERNS PRIOR TO WRITING
;          2879  !       TO MLD1, MLD2 AND MLE2
;          2880  !       DATA DIAGNOSTIC REGISTERS.
;          2881  !
;          2882  ! FORMAL PARAMETERS:
;          2883  !       NIB_NUM
;          2884  !       CASE SELECT EXPRESSION TO SELECT
;          2885  !       THE CURRENT NIBBLE TO BE LOADED
;          2886  !
;          2887  !       NIB_PAT
;          2888  !       CURRENT NIBBLE PATTERN TO BE
;          2889  !       LOADED
;          2890  !
;          2891  ! IMPLICIT INPUTS:
;          2892  !       NIB_SAVE
;          2893  !       BLOCK OF 3 WORDS TO STORE
;          2894  !       THE DATA TO BE WRITTEN
;          2895  !       INTO MLD1 MLD2 MLE2
;          2896  !
;          2897  ! IMPLICIT OUTPUTS:
;          2898  !       NIB_SAVE IS LOADED WIH
;          2899  !       THE CURRENT NIBBLE PATTERN
;          2900  !--
;          2901
;          2902      case .(NIB_NUM) from 0 to 9 of          !SELECT THE NIBBLE LOCATION IN NIB_SAVE TO BE LOADED
;          2903          set
;          2904
;          2905          [0] :
;          2906              NIB_SAVE [NIB_0] = .NIB_PAT;    !LOAD NIBBLE 0 WITH NIB_PAT
;          2907
;          2908          [1] :
;          2909              NIB_SAVE [NIB_1] = .NIB_PAT;    !LOAD NIBBLE 1 WITH NIB_PAT
;          2910
;          2911          [2] :
;          2912              NIB_SAVE [NIB_2] = .NIB_PAT;    !LOAD NIBBLE 2 WITH NIB_PAT
;          2913
;          2914          [3] :
;          2915              NIB_SAVE [NIB_3] = .NIB_PAT;    !LOAD NIBBLE 3 WITH NIB_PAT
;          2916
;          2917          [4] :
;          2918              NIB_SAVE [NIB_4] = .NIB_PAT;    !LOAD NIBBLE 4 WITH NIB_PAT
;          2919
;          2920          [5] :
;          2921              NIB_SAVE [NIB_5] = .NIB_PAT;    !LOAD NIBBLE 5 WITH NIB_PAT
;          2922
;          2923          [6] :
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (18)
;
;          2924              NIB_SAVE [NIB_6] = .NIB_PAT;        !LOAD NIBBLE 6 WITH NIB_PAT
;          2925
;          2926          [7] :
;          2927              NIB_SAVE [NIB_7] = .NIB_PAT;        !LOAD NIBBLE 7 WITH NIB_PAT
;          2928
;          2929          [8] :
;          2930              NIB_SAVE [NIB_8] = .NIB_PAT;        !LOAD NIBBLE 8 WITH NIB_PAT
;          2931
;          2932          [9] :
;          2933              NIB_SAVE [NIB_9] = .NIB_PAT         !LOAD NIBBLE 9 WITH NIB_PAT
;          2934          tes;
;          2935
;          2936      end;
;
017124                          LD.LNG.WRD:
017124  010146                          MOV     R1,-(SP)                ;
017126  016600  000004                  MOV     4(SP),R0                ; NIB.PAT,*                     2872
017132  016601  000006                  MOV     6(SP),R1                ; NIB.NUM,*                     2906
017136  006301                          ASL     R1                      ; NIB.NUM,*                     2902
017140  066107  017144                  ADD     1$(R1),PC
017144  000024                  1$:     .WORD   2$-1$
017146  000040                          .WORD   3$-1$
017150  000064                          .WORD   4$-1$
017152  000102                          .WORD   5$-1$
017154  000134                          .WORD   7$-1$
017156  000150                          .WORD   8$-1$
017160  000174                          .WORD   9$-1$
017162  000212                          .WORD   10$-1$
017164  000244                          .WORD   12$-1$
017166  000262                          .WORD   13$-1$
017170  042700  177760          2$:     BIC     #177760,R0              ;                               2906
017174  142767  000017  171750          BICB    #17,NIB.SAVE
017202  000433                          BR      6$
017204  006300                  3$:     ASL     R0                      ;                               2909
017206  006300                          ASL     R0
017210  006300                          ASL     R0
017212  006300                          ASL     R0
017214  042700  177417                  BIC     #177417,R0
017220  142767  000360  171724          BICB    #360,NIB.SAVE
017226  000421                          BR      6$
017230  000300                  4$:     SWAB    R0                      ;                               2912
017232  042700  170377                  BIC     #170377,R0
017236  042767  007400  171706          BIC     #7400,NIB.SAVE
017244  000412                          BR      6$
017246  000300                  5$:     SWAB    R0                      ;                               2915
```

```
                                        ;ML4                                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                                       22-Dec-1980 09:21:22    PA:<
                                                ASL     R0
                                                ASL     R0
                                                ASL     R0
                                                ASL     R0
017250  006300                                  BIC     #7777,R0
017252  042700  007777                          BIC     #170000,NIB.SAVE
017256  042767  170000  171660                  BIS     R0,NIB.SAVE
017264  050067  171654                  6$:     BR      15$                             ;                       2902
017272  000467                                  BIC     #177760,R0                      ;                       2918
017276  042700  177760                  7$:     BICB    #17,NIB.SAVE+2
017300  142767  000017  171642                  BR      11$
017304  000433                                  ASL     R0                              ;                       2921
017312  006300                          8$:     ASL     R0
017314  006300                                  ASL     R0
017316  006300                                  ASL     R0
017320  006300                                  BIC     #177417,R0
017322  006300                                  BICB    #360,NIB.SAVE+2
017324  042700  177417                          BR      11$
017330  142767  000360  171616                  SWAB    R0                              ;                       2924
017336  000421                                  BIC     #170377,R0
017340  000300                          9$:     BIC     #7400,NIB.SAVE+2
017342  042700  170377                          BR      11$
017346  042767  007400  171600                  SWAB    R0                              ;                       2927
017354  000412                          10$:    ASL     R0
017356  000300                                  ASL     R0
017360  006300                                  ASL     R0
017362  006300                                  ASL     R0
017364  006300                                  BIC     #7777,R0
017366  006300                                  BIC     #170000,NIB.SAVE+2
017370  042700  007777                          BIS     R0,NIB.SAVE+2
017374  042767  170000  171552          11$:    BR      15$                             ;                       2902
017402  050067  171546                          SWAB    R0                              ;                       2930
017406  000423                          12$:    BIC     #170377,R0
017410  000300                                  BIC     #7400,NIB.SAVE+4
017412  042700  170377                          BR      14$
017416  042767  007400  171532                  SWAB    R0                              ;                       2933
017424  000412                          13$:    ASL     R0
017426  000300                                  ASL     R0
017430  006300                                  ASL     R0
017432  006300                                  ASL     R0
017434  006300                                  BIC     #107777,R0
017436  006300                                  BIC     #70000,NIB.SAVE+4
017440  042700  107777                          BIS     R0,NIB.SAVE+4
017444  042767  070000  171504          14$:    MOV     (SP)+,R1                        ;                       2872
017452  050067  171500                  15$:    RTS     PC
017456  012601
017460  000207

                                        ; Routine Size:  111 words
                                        ; Maximum stack depth per invocation:  2 words
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (19)

;          2937  routine WRT_CS1 (TST_PAT, index) : novalue =
;          2938      begin
;          2939
;          2940  !++
;          2941  ! FUNCTIONAL DESCRIPTION:
;          2942  !
;          2943  !       LOADS THE CONTROL & STATUS REGISTER 1 WITH A DATA PATTERN
;          2944  !       GENERATED BY THE MACRO WRT_MASK.
;          2945  !
;          2946  ! FORMAL PARAMETERS:
;          2947  !       TST_PAT
;          2948  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;          2949  !
;          2950  !       INDEX
;          2951  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;          2952  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;          2953  !
;          2954  !--
;          2955
;          2956      MLCS1 = WRT_MASK;                         !LOAD GENERATED WRT_MASK PATTERN INTO MLCS1
;          2957      end;
;
4082 017462 004167 164356          WRT.CS1:JSR     R1,$SAVE2                       ;                       2937
4083 017466 016600 000010                  MOV     10(SP),R0                       ; INDEX,*               2956
4084 017472 006300                         ASL     R0
4085 017474 006300                         ASL     R0
4086 017476 006300                         ASL     R0
4087 017500 010001                         MOV     R0,R1
4088 017502 016100 013156                  MOV     ML.REG+2(R1),R0
4089 017506 056600 000012                  BIS     12(SP),R0                       ; TST.PAT,*
4090 017512 046100 013160                  BIC     ML.REG+4(R1),R0
4091 017516 016102 013162                  MOV     ML.REG+6(R1),R2
4092 017522 050002                         BIS     R0,R2
4093 017524 010277 173424                  MOV     R2,@ML.REG
4094 017530 000207                         RTS     PC                              ;                       2937
4095
4096                                ; Routine Size:  20 words
4097                                ; Maximum stack depth per invocation:  3 words
4102
4103
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (20)

```
4105 ;ML4
4106 ;
4107
4108 ;          2958  routine RD_CS1 (TST_PAT, index, ERR_FLG) : novalue =
4109 ;          2959      begin
4110 ;          2960
4111 ;          2961  !++
4112 ;          2962  ! FUNCTIONAL DESCRIPTION:
4113 ;          2963  !
4114 ;          2964  !       COMPARES THE CONTENTS OF THE
4115 ;          2965  !       CONTROL & STATUS REGISTER 1
4116 ;          2966  !       WITH THE MASKED DATA PATTERN
4117 ;          2967  !       GENERATED BY THE MACRO 'WRT_MASK'
4118 ;          2968  !
4119 ;          2969  !       IF THE COMPARE IS NOT EQUAL THEN
4120 ;          2970  !       THE FORMAL PARAMETER 'ERR_FLG' IS
4121 ;          2971  !       ASSIGNED A ONE TO INDICATE THE
4122 ;          2972  !       ERROR.
4123 ;          2973  !
4124 ;          2974  ! FORMAL PARAMETERS:
4125 ;          2975  !
4126 ;          2976  !       TST_PAT
4127 ;          2977  !       DATA PATTERN TO BE MASKED AND
4128 ;          2978  !       COMPARED AGAINST THE CONTENTS
4129 ;          2979  !       OF THE REGISTER UNDER TEST.
4130 ;          2980  !
4131 ;          2981  !       INDEX
4132 ;          2982  !        USED BY THE MACRO WRT_MASK TO
4133 ;          2983  !       SELECT THE CURRENT REGISTERS ADDRESS,
4134 ;          2984  !       FORCED HI, FORCED LO AND DON'T CARE
4135 ;          2985  !       MASK INFORMATION.
4136 ;          2986  !
4137 ;          2987  !       ERR_FLG
4138 ;          2988  !       CONTAINS THE ADDRESS (PASSED BY REF)
4139 ;          2989  !       OF THE CALLERS ERROR FLG TO ENABLE THE
4140 ;          2990  !       CALLER TO EXAMINE THE ERROR STATUS
4141 ;          2991  !       OF THE ROUTINE CALL.
4142 ;          2992  !
4143 ;          2993  ! IMPLICIT INPUTS:
4144 ;          2994  !       WT_DATA
4145 ;          2995  !         GETS LOADED WITH THE GENERATED
4146 ;          2996  !         WRT_MASK DATA PATTERN THUS ALLOWING
4147 ;          2997  !         CALLER TO PRINT FAILING GOOD DATA.
4148 ;          2998  !
4149 ;          2999  !       RD_DATA
4150 ;          3000  !         GETS LOADED WITH DATA READ FROM THE
4151 ;          3001  !         REGISTER THUS ALLOWING CALLER
4152 ;          3002  !         TO PRINT FAILING BAD DATA.
4153 ;          3003  !
4154 ;          3004  ! IMPLICIT OUTPUTS:
4155 ;          3005  !       GLOBAL LOCATION WR_DATA
4156 ;          3006  !       AND RD_DATA LOADED WITH GOOD
4157 ;          3007  !       AND BAD REGISTER DATA
4158 ;          3008  !--
4159 ;          3009
```

```
4161  ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
4162  ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (20)
4163
4164  ;          3010      .ERR_FLG = ZERO;                  !CLEAR ERROR FLAG
4165  ;          3011      WT_DATA = WRT_MASK;               !SAVE THE DATA WRITTEN TO THE REGISTER
4166  ;          3012      RD_DATA = .ML_CS1 or .IGNORE;     !READ AND SAVE THE REGISTER
4167  ;          3013
4168  ;          3014      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
4169  ;          3015
4170  ;          3016                                        !SET ERROR FLAG IF NEQ
4171  ;          3017      end;
4175
4179  017532  004167  164306          RD.CS1: JSR     R1,$SAVE2                       ;                                2958
4180  017536  005076  000010                  CLR     @10(SP)                         ; ERR.FLG                        3010
4181  017542  016600  000012                  MOV     12(SP),R0                       ; INDEX,*                        3011
4182  017546  006300                          ASL     R0
4183  017550  006300                          ASL     R0
4184  017552  006300                          ASL     R0
4185  017554  010001                          MOV     R0,R1
4186  017556  016100  013156                  MOV     ML.REG+2(R1),R0
4187  017562  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
4188  017566  046100  013160                  BIC     ML.REG+4(R1),R0
4189  017572  016102  013162                  MOV     ML.REG+6(R1),R2
4190  017576  050002                          BIS     R0,R2
4191  017600  010267  173322                  MOV     R2,WT.DATA
4192  017604  017702  173344                  MOV     @ML.REG,R2                      ;                                3012
4193  017610  056102  013162                  BIS     ML.REG+6(R1),R2
4194  017614  010267  173310                  MOV     R2,RD.DATA
4195  017620  026767  173302  173302          CMP     WT.DATA,RD.DATA                 ;                                3014
4196  017626  001403                          BEQ     1$
4197  017630  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
4198  017636  000207                  1$:     RTS     PC                              ;                                2958
4199
4200                                  ; Routine Size:  35 words
4201                                  ; Maximum stack depth per invocation:  3 words
4206
4207
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (21)

;          3018  routine WRT_ER (TST_PAT, index) : novalue =
;          3019      begin
;          3020
;          3021  !++
;          3022  ! FUNCTIONAL DESCRIPTION:
;          3023  !
;          3024  !       LOADS THE ERROR REGISTER WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;          3025  !
;          3026  ! FORMAL PARAMETERS:
;          3027  !
;          3028  !       TST_PAT
;          3029  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;          3030  !
;          3031  !       INDEX
;          3032  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;          3033  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;          3034  !--
;          3035
;          3036      MLER = WRT_MASK;                          !LOAD GENERATE WRT_MASK PATTERN INTO MLER
;          3037      end;

017640  004167  164200          WRT.ER: JSR     R1,$SAVE2                       ;                       3018
017644  016600  000010                  MOV     10(SP),R0                       ; INDEX,*               3036
017650  006300                          ASL     R0
017652  006300                          ASL     R0
017654  006300                          ASL     R0
017656  010001                          MOV     R0,R1
017660  016100  013156                  MOV     ML.REG+2(R1),R0
017664  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
017670  046100  013160                  BIC     ML.REG+4(R1),R0
017674  016102  013162                  MOV     ML.REG+6(R1),R2
017700  050002                          BIS     R0,R2
017702  010277  173326                  MOV     R2,@ML.REG+60
017706  000207                          RTS     PC                              ;                       3018

                        ; Routine Size:  20 words
                        ; Maximum stack depth per invocation:  3 words
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (22)

```
;ML4
;
;          3038  routine RD_ER (TST_PAT, index, ERR_FLG) : novalue =
;          3039      begin
;          3040
;          3041  !++
;          3042  ! FUNCTIONAL DESCRIPTION:
;          3043  !
;          3044  !       COMPARES THE CONTENTS OF THE
;          3045  !       ERROR REGISTER WITH
;          3046  !       THE MASKED DATA PATTERN
;          3047  !       GENERATED BY THE MACRO 'WRT_MASK'.
;          3048  !
;          3049  !       IF THE COMPARE IS NOT EQUAL THEN
;          3050  !       THE FORMAL PARAMETER 'ERR_FLG' IS
;          3051  !       ASSIGNED A ONE TO INDICATE THE
;          3052  !       ERROR.
;          3053  !
;          3054  ! FORMAL PARAMETERS:
;          3055  !
;          3056  !       TST_PAT
;          3057  !       DATA PATTERN TO BE MASKED AND
;          3058  !       COMPARED AGAINST THE CONTENTS
;          3059  !       OF THE REGISTER UNDER TEST.
;          3060  !
;          3061  !       INDEX
;          3062  !       USED BY THE MACRO WRT_MASK TO
;          3063  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          3064  !       FORCED HI, FORCED LO AND DON'T CARE
;          3065  !       MASK INFORMATION.
;          3066  !
;          3067  !       ERR_FLG
;          3068  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          3069  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;          3070  !       CALLER TO EXAMINE THE ERROR STATUS
;          3071  !       OF THE ROUTINE CALL.
;          3072  !
;          3073  ! IMPLICIT INPUTS:
;          3074  !       WT_DATA
;          3075  !         GETS LOADED WITH THE GENERATED
;          3076  !         WRT_MASK DATA PATTERN THUS ALLOWING
;          3077  !         CALLER TO PRINT FAILING GOOD DATA.
;          3078  !
;          3079  !       RD_DATA
;          3080  !         GETS LOADED WITH DATA READ FROM THE
;          3081  !         REGISTER THUS ALLOWING CALLER
;          3082  !         TO PRINT FAILING BAD DATA.
;          3083  !
;          3084  ! IMPLICIT OUTPUTS:
;          3085  !       GLOBAL LOCATION WR_DATA
;          3086  !       AND RD_DATA LOADED WITH GOOD
;          3087  !       AND BAD REGISTER DATA
;          3088  !
;          3089  !--
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (22)

;          3090
;          3091        .ERR_FLG = ZERO;                          !CLEAR THE ERROR FLAG
;          3092        WT_DATA = WRT_MASK;                       !SAVE THE DATA WRITTEN TO THE REGISTER
;          3093        RD_DATA = .MLER or .IGNORE;               !READ AND SAVE THE REGISTER
;          3094
;          3095        if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          3096
;          3097                                                  !SET ERROR FLAG IF NEQ
;          3098        end;

017710  004167  164130          RD.ER:  JSR     R1,$SAVE2                       ;                       3038
017714  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               3091
017720  016600  000012                  MOV     12(SP),R0                       ; INDEX,*               3092
017724  006300                          ASL     R0
017726  006300                          ASL     R0
017730  006300                          ASL     R0
017732  010001                          MOV     R0,R1
017734  016100  013156                  MOV     ML.REG+2(R1),R0
017740  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
017744  046100  013160                  BIC     ML.REG+4(R1),R0
017750  016102  013162                  MOV     ML.REG+6(R1),R2
017754  050002                          BIS     R0,R2
017756  010267  173144                  MOV     R2,WT.DATA
017762  017702  173246                  MOV     @ML.REG+60,R2                   ;                       3093
017766  056102  013162                  BIS     ML.REG+6(R1),R2
017772  010267  173132                  MOV     R2,RD.DATA
017776  026767  173124  173124          CMP     WT.DATA,RD.DATA                 ;                       3095
020004  001403                          BEQ     1$
020006  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
020014  000207                  1$:     RTS     PC                              ;                       3038

                                ; Routine Size:  35 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4
;
;                3099  routine WRT_DA (TST_PAT, index) : novalue =
;                3100      begin
;                3101
;                3102  !++
;                3103  ! FUNCTIONAL DESCRIPTION:
;                3104  !
;                3105  !       LOADS THE DESIRED SECTOR WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;                3106  !
;                3107  ! FORMAL PARAMETERS:
;                3108  !
;                3109  !       TST_PAT
;                3110  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;                3111  !
;                3112  !       INDEX
;                3113  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;                3114  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;                3115  !--
;                3116
;                3117      MLDA = WRT_MASK;                          !LOAD MLDA WITH GENERATED WRT_MASK PATTERN
;                3118      end;
;
4397 020016 004167 164022          WRT.DA: JSR     R1,$SAVE2                 ;                                  3099
4398 020022 016600 000010                  MOV     10(SP),R0                 ; INDEX,*                          3117
4399 020026 006300                         ASL     R0
4400 020030 006300                         ASL     R0
4401 020032 006300                         ASL     R0
4402 020034 010001                         MOV     R0,R1
4403 020036 016100 013156                  MOV     ML.REG+2(R1),R0
4404 020042 056600 000012                  BIS     12(SP),R0                 ; TST.PAT,*
4405 020046 046100 013160                  BIC     ML.REG+4(R1),R0
4406 020052 016102 013162                  MOV     ML.REG+6(R1),R2
4407 020056 050002                         BIS     R0,R2
4408 020060 010277 173120                  MOV     R2,@ML.REG+30
4409 020064 000207                         RTS     PC                        ;                                  3099
4410
4411                                ; Routine Size:  20 words
4412                                ; Maximum stack depth per invocation:  3 words
4417
4418
```

```
;ML4
;
;          routine RD_DA (TST_PAT, index, ERR_FLG) : novalue =
;              begin
;
;          !++
;          ! FUNCTIONAL DESCRIPTION:
;          !
;          !       COMPARES THE CONTENTS OF THE
;          !       DESIRED SECTOR ADDRESS REGISTER
;          !       WITH THE MASKED DATA PATTERN
;          !       GENERATED BY THE MACRO 'WRT_MASK'
;          !
;          !       IF THE COMPARE IS NOT EQUAL THEN
;          !       THE FORMAL PARAMETER 'ERR_FLG' IS
;          !       ASSIGNED A ONE TO INDICATE THE
;          !       ERROR
;          !
;          ! FORMAL PARAMETERS:
;          !
;          !       TST_PAT
;          !       DATA PATTERN TO BE MASKED AND
;          !       COMPARED AGAINST THE CONTENTS
;          !       OF THE REGISTER UNDER TEST
;          !
;          !       INDEX
;          !       USED BY THE MACRO WRT_MASK TO
;          !       SELECT THE CURRENT REGISTERS ADDRESS,
;          !       FORCED HI, FORCED LO AND DON'T CARE
;          !       MASK INFORMATION
;          !
;          !       ERR_FLG
;          !       CONTAINS THE ADDRESS (PASSED BY REF)
;          !       OF THE CALLERS ERROR FLG TO ENABLE THE
;          !       CALLER TO EXAMINE THE ERROR STATUS
;          !       OF THE ROUTINE CALL.
;          ! IMPLICIT INPUTS:
;          !       WT_DATA
;          !         GETS LOADED WITH THE GENERATED
;          !         WRT_MASK DATA PATTERN THUS ALLOWING
;          !         CALLER TO PRINT FAILING GOOD DATA.
;          !
;          !       RD_DATA
;          !         GETS LOADED WITH DATA READ FROM THE
;          !         REGISTER THUS ALLOWING CALLER
;          !         TO PRINT FAILING BAD DATA.
;          !
;          ! IMPLICIT OUTPUTS:
;          !       GLOBAL LOCATION WR_DATA
;          !       AND RD_DATA LOADED WITH GOOD
;          !       AND BAD REGISTER DATA
;          !
;          !--
;
```

```
4476 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
4477 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (24)
4478
4479 ;          3171      .ERR_FLG = ZERO;                  !CLEAR THE ERROR FLAG
4480 ;          3172      WT_DATA = WRT_MASK;               !SAVE THE DATA WRITTEN TO THE REGISTER
4481 ;          3173      RD_DATA = .ML.DA or .IGNORE;      !READ AND SAVE THE REGISTER
4482 ;          3174
4483 ;          3175      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
4484 ;          3176
4485 ;          3177                                        !SET ERROR FLAG IF NEQ
4486 ;          3178      end;
4490
4494 020066  004167  163752          RD.DA:  JSR     R1,$SAVE2                       ;                       3119
4495 020072  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               3171
4496 020076  016600  000012                  MOV     12(SP),R0                       ; INDEX,*               3172
4497 020102  006300                          ASL     R0
4498 020104  006300                          ASL     R0
4499 020106  006300                          ASL     R0
4500 020110  010001                          MOV     R0,R1
4501 020112  016100  013156                  MOV     ML.REG+2(R1),R0
4502 020116  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
4503 020122  046100  013160                  BIC     ML.REG+4(R1),R0
4504 020126  016102  013162                  MOV     ML.REG+6(R1),R2
4505 020132  050002                         BIS     R0,R2
4506 020134  010267  172766                  MOV     R2,WT.DATA
4507 020140  017702  173040                  MOV     @ML.REG+30,R2                   ;                       3173
4508 020144  056102  013162                  BIS     ML.REG+6(R1),R2
4509 020150  010267  172754                  MOV     R2,RD.DATA
4510 020154  026767  172746  172746          CMP     WT.DATA,RD.DATA                 ;                       3175
4511 020162  001403                         BEQ     1$
4512 020164  012776  000001  000010         MOV     #1,@10(SP)                      ; *,ERR.FLG
4513 020172  000207                  1$:     RTS     PC                              ;                       3119
4514
4515                                 ; Routine Size:  35 words
4516                                 ; Maximum stack depth per invocation:  3 words
4521
4522
```

```
4524 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
4525 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (25)
4526
4527 ;          3179  routine WRT_MR (TST_PAT, index) : novalue =
4528 ;          3180      begin
4529 ;          3181
4530 ;          3182  !++
4531 ;          3183  ! FUNCTIONAL DESCRIPTION:
4532 ;          3184  !
4533 ;          3185  !       LOADS THE MAINTENANCE REGISTER WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
4534 ;          3186  !
4535 ;          3187  ! FORMAL PARAMETERS:
4536 ;          3188  !
4537 ;          3189  !       TST_PAT
4538 ;          3190  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
4539 ;          3191  !
4540 ;          3192  !       INDEX
4541 ;          3193  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
4542 ;          3194  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
4543 ;          3195  !--
4544 ;          3196
4545 ;          3197      ML.MR = WRT_MASK;                          !LOAD ML.MR WITH GENERATED WRT_MASK PATTERN
4546 ;          3198      end;
4550
4554 020174  004167  163644          WRT.MR: JSR     R1,$SAVE2                       ;                          3179
4555 020200  016600  000010                  MOV     10(SP),R0                       ; INDEX,*                  3197
4556 020204  006300                          ASL     R0
4557 020206  006300                          ASL     R0
4558 020210  006300                          ASL     R0
4559 020212  010001                          MOV     R0,R1
4560 020214  016100  013156                  MOV     ML.REG+2(R1),R0
4561 020220  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
4562 020224  046100  013160                  BIC     ML.REG+4(R1),R0
4563 020230  016102  013162                  MOV     ML.REG+6(R1),R2
4564 020234  050002                          BIS     R0,R2
4565 020236  010277  173032                  MOV     R2,@ML.REG+120
4566 020242  000207                          RTS     PC                              ;                          3179
4567
4568                                  ; Routine Size:  20 words
4569                                  ; Maximum stack depth per invocation:  3 words
4574
4575
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (26)

```
;ML4
;
routine RD_MR (TST_PAT, index, ERR_FLG) : novalue =
    begin

!++
! FUNCTIONAL DESCRIPTION:
!
!       COMPARES THE CONTENTS OF THE
!       MAINTENANCE REGISTER WITH THE
!       MASKED DATA PATTERN
!       GENERATED BY THE MACRO 'WRT_MASK'.
!
!       IF THE COMPARE IS NOT EQUAL THEN
!       THE FORMAL PARAMETER 'ERR_FLG' IS
!       ASSIGNED A ONE TO INDICATE THE
!       ERROR.
!
! FORMAL PARAMETERS:
!
!       TST_PAT
!       DATA PATTERN TO BE MASKED AND
!       COMPARED AGAINST THE CONTENTS
!       OF THE REGISTER UNDER TEST.
!
!       INDEX
!       USED BY THE MACRO WRT_MASK TO
!       SELECT THE CURRENT REGISTERS ADDRESS,
!       FORCED HI, FORCED LO AND DON'T CARE
!       MASK INFORMATION.
!
!       ERR_FLG
!       CONTAINS THE ADDRESS (PASSED BY REF)
!       OF THE CALLERS ERROR FLG TO ENABLE THE
!       CALLER TO EXAMINE THE ERROR STATUS
!       OF THE ROUTINE CALL.
!
! IMPLICIT INPUTS:
!       WT_DATA
!         GETS LOADED WITH THE GENERATED
!         WRT_MASK DATA PATTERN THUS ALLOWING
!         CALLER TO PRINT FAILING GOOD DATA.
!
!       RD_DATA
!         GETS LOADED WITH DATA READ FROM THE
!         REGISTER THUS ALLOWING CALLER
!         TO PRINT FAILING BAD DATA.
!
! IMPLICIT OUTPUTS:
!       GLOBAL LOCATION WR_DATA
!       AND RD_DATA LOADED WITH GOOD
!       AND BAD REGISTER DATA
!
!--
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (26)
;
;          3251
;          3252        .ERR_FLG = ZERO;                        !CLEAR THE ERROR FLAG
;          3253        WT_DATA = WRT_MASK;                     !SAVE THE DATA WRITTEN TO THE REGISTER
;          3254        RD_DATA = .ML_MR or .IGNORE;            !READ AND SAVE THE REGISTER
;          3255
;          3256        if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          3257
;          3258                                                !SET ERROR FLAG IF NEQ
;          3259        end;
;
020244  004167  163574          RD.MR:  JSR     R1,$SAVE2                       ;                       3199
020250  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               3252
020254  016600  000012                  MOV     12(SP),R0                       ; INDEX,*               3253
020260  006300                          ASL     R0
020262  006300                          ASL     R0
020264  006300                          ASL     R0
020266  010001                          MOV     R0,R1
020270  016100  013156                  MOV     ML.REG+2(R1),R0
020274  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
020300  046100  013160                  BIC     ML.REG+4(R1),R0
020304  016102  013162                  MOV     ML.REG+6(R1),R2
020310  050002                          BIS     R0,R2
020312  010267  172610                  MOV     R2,WT.DATA
020316  017702  172752                  MOV     @ML.REG+120,R2                  ;                       3254
020322  056102  013162                  BIS     ML.REG+6(R1),R2
020326  010267  172576                  MOV     R2,RD.DATA
020332  026767  172570  172570          CMP     WT.DATA,RD.DATA                 ;                       3256
020340  001403                          BEQ     1$
020342  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
020350  000207                  1$:     RTS     PC                              ;                       3199
;
;                               ; Routine Size:  35 words
;                               ; Maximum stack depth per invocation:  3 words
;
;
```

```
:ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
:                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (27)

:          3260  routine WRT_PA (TST_PAT, index) : novalue =
:          3261      begin
:          3262
:          3263  !++
:          3264  ! FUNCTIONAL DESCRIPTION:
:          3265  !       LOADS THE PROM ADDRESS REGISTER WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
:          3266  ! FORMAL PARAMETERS:
:          3267  !       TST_PAT
:          3268  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
:          3269  !       INDEX
:          3270  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
:          3271  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
:          3272  !--
:          3273
:          3274      PROM_DIS = ONE;                           !SET PROM DISABLE BIT
:          3275      MLPA = WRT_MASK;                          !LOAD MLPA WITH GENERATED WRT_MASK PATTERN
:          3276      PROM_DIS = ZERO;                          !CLEAR PROM DISABLE BIT
:          3277      end;
4706
4710 020352  004167  163466          WRT.PA: JSR     R1,$SAVE2                       ;                       3260
4711 020356  152777  000040  172710          BISB    #40,@ML.REG+120                 ;                       3274
4712 020364  016600  000010                  MOV     10(SP),R0                       ; INDEX,*               3275
4713 020370  006300                          ASL     R0
4714 020372  006300                          ASL     R0
4715 020374  006300                          ASL     R0
4716 020376  010001                          MOV     R0,R1
4717 020400  016100  013156                  MOV     ML.REG+2(R1),R0
4718 020404  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
4719 020410  046100  013160                  BIC     ML.REG+4(R1),R0
4720 020414  016102  013162                  MOV     ML.REG+6(R1),R2
4721 020420  050002                          BIS     R0,R2
4722 020422  010277  172626                  MOV     R2,@ML.REG+100
4723 020426  142777  000040  172640          BICB    #40,@ML.REG+120                 ;                       3276
4724 020434  000207                          RTS     PC                              ;                       3260
4725
4726                                ; Routine Size:  26 words
4727                                ; Maximum stack depth per invocation:  3 words
4732
4733
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (28)

```
;ML4
;
;                3278  routine RD_PA (TST_PAT, index, ERR_FLG) : novalue =
;                3279      begin
;                3280
;                3281  !++
;                3282  ! FUNCTIONAL DESCRIPTION:
;                3283  !
;                3284  !       COMPARES THE CONTENTS OF THE
;                3285  !       PROM ADDRESS REGISTER
;                3286  !       WITH THE MASKED DATA PATTERN
;                3287  !       GENERATED BY THE MACRO 'WRT_MASK'.
;                3288  !
;                3289  !       IF THE COMPARE IS NOT EQUAL THEN
;                3290  !       THE FORMAL PARAMETER 'ERR_FLG' IS
;                3291  !       ASSIGNED A ONE TO INDICATE THE
;                3292  !       ERROR.
;                3293  !
;                3294  ! FORMAL PARAMETERS:
;                3295  !       TST_PAT
;                3296  !       DATA PATTERN TO BE MASKED AND
;                3297  !       COMPARED AGAINST THE CONTENTS
;                3298  !       OF THE REGISTER UNDER TEST.
;                3299  !
;                3300  !       INDEX
;                3301  !       USED BY THE MACRO WRT_MASK TO
;                3302  !       SELECT THE CURRENT REGISTERS ADDRESS,
;                3303  !       FORCED HI, FORCED LO AND DON'T CARE
;                3304  !       MASK INFORMATION.
;                3305  !
;                3306  !       ERR_FLG
;                3307  !       CONTAINS THE ADDRESS (PASSED BY REF)
;                3308  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;                3309  !       CALLER TO EXAMINE THE ERROR STATUS
;                3310  !       OF THE ROUTINE CALL.
;                3311  !
;                3312  ! IMPLICIT INPUTS:
;                3313  !       WT_DATA
;                3314  !         GETS LOADED WITH THE GENERATED
;                3315  !         WRT_MASK DATA PATTERN THUS ALLOWING
;                3316  !         CALLER TO PRINT FAILING GOOD DATA.
;                3317  !
;                3318  !       RD_DATA
;                3319  !         GETS LOADED WITH DATA READ FROM THE
;                3320  !         REGISTER THUS ALLOWING CALLER
;                3321  !         TO PRINT FAILING BAD DATA.
;                3322  !
;                3323  ! IMPLICIT OUTPUTS:
;                3324  !       GLOBAL LOCATION WR_DATA
;                3325  !       AND RD_DATA LOADED WITH GOOD
;                3326  !       AND BAD REGISTER DATA
;                3327  !
;                3328  !--
;                3329
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (28)

;          3330      .ERR_FLG = ZERO;                   !CLEAR THE ERROR FLAG
;          3331      PROM_DIS = ONE;                    !SET THE PROM DISABLE BIT
;          3332      WT_DATA = WRT_MASK;                !SAVE THE DATA WRITTEN TO THE REGISTER
;          3333      RD_DATA = .ML_PA or .IGNORE;       !READ AND SAVE THE REGISTER
;          3334
;          3335      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          3336
;          3337      PROM_DIS = ZERO;                   !SET ERROR IF NEQ
;          3338      end;                               !CLEAR THE PROM DISABLE BIT

4806
4810 020436  004167  163402          RD.PA:  JSR     R1,$SAVE2                       ;                       3278
4811 020442  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               3330
4812 020446  152777  000040  172620          BISB    #40,@ML.REG+120                 ;                       3331
4813 020454  016600  000012                  MOV     12(SP),R0                       ; INDEX,*               3332
4814 020460  006300                          ASL     R0
4815 020462  006300                          ASL     R0
4816 020464  006300                          ASL     R0
4817 020466  010001                          MOV     R0,R1
4818 020470  016100  013156                  MOV     ML.REG+2(R1),R0
4819 020474  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
4820 020500  046100  013160                  BIC     ML.REG+4(R1),R0
4821 020504  016102  013162                  MOV     ML.REG+6(R1),R2
4822 020510  050002                          BIS     R0,R2
4823 020512  010267  172410                  MOV     R2,WT.DATA
4824 020516  017702  172532                  MOV     @ML.REG+100,R2                  ;                       3333
4825 020522  056102  013162                  BIS     ML.REG+6(R1),R2
4826 020526  010267  172376                  MOV     R2,RD.DATA
4827 020532  026767  172370  172370          CMP     WT.DATA,RD.DATA                 ;                       3335
4828 020540  001403                          BEQ     1$
4829 020542  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
4830 020550  142777  000040  172516  1$:     BICB    #40,@ML.REG+120                 ;                       3337
4831 020556  000207                          RTS     PC                              ;                       3278
4832
4833                                  ; Routine Size:  41 words
4834                                  ; Maximum stack depth per invocation:  3 words
4839
4840
```

```
;ML4
;
;                3339  routine WRT_E1 (TST_PAT, index) : novalue =
;                3340      begin
;                3341
;                3342  !++
;                3343  ! FUNCTIONAL DESCRIPTION:
;                3344  !       LOADS THE ECC CRC WORD REG 1 WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;                3345  ! FORMAL PARAMETERS:
;                3346  !       TST_PAT
;                3347  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;                3348  !       INDEX
;                3349  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;                3350  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;                3351  !--
;                3352
;                3353      ECC_DM = ONE;                           !SET ECC DIAG MODE
;                3354      MLE1 = WRT_MASK;                        !LOAD MLE1 WITH GENERATED WRT_MASK PATTERN
;                3355      ECC_DM = ZERO;                          !CLEAR ECC DIAG MODE
;                3356      end;
;
;020560  004167  163260          WRT.E1: JSR     R1,$SAVE2                       ;                       3339
;020564  152777  000001  172502          BISB    #1,@ML.REG+120                  ;                       3353
;020572  016600  000010                  MOV     10(SP),R0                       ; INDEX,*               3354
;020576  006300                          ASL     R0
;020600  006300                          ASL     R0
;020602  006300                          ASL     R0
;020604  010001                          MOV     R0,R1
;020606  016100  013156                  MOV     ML.REG+2(R1),R0
;020612  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
;020616  046100  013160                  BIC     ML.REG+4(R1),R0
;020622  016102  013162                  MOV     ML.REG+6(R1),R2
;020626  050002                          BIS     R0,R2
;020630  010277  172470                  MOV     R2,@ML.REG+150
;020634  142777  000001  172432          BICB    #1,@ML.REG+120                  ;                       3355
;020642  000207                          RTS     PC                              ;                       3339
;
;                                ; Routine Size:  26 words
;                                ; Maximum stack depth per invocation:  3 words
;
;
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (30)

;          3357  routine RD_E1 (TST_PAT, index, ERR_FLG) : novalue =
;          3358      begin
;          3359
;          3360  !++
;          3361  ! FUNCTIONAL DESCRIPTION:
;          3362  !
;          3363  !       COMPARES THE CONTENTS OF THE
;          3364  !       ECC CRC WORD REGISTER 1
;          3365  !       WITH THE MASKED DATA PATTERN
;          3366  !       GENERATED BY THE MACRO 'WRT_MASK'
;          3367  !
;          3368  !       IF THE COMPARE IS NOT EQUAL THEN
;          3369  !        THE FORMAL PARAMETER 'ERR_FLG' IS
;          3370  !       ASSIGNED A ONE TO INDICATE THE ERROR.
;          3371  !
;          3372  ! FORMAL PARAMETERS:
;          3373  !       TST_PAT
;          3374  !       DATA PATTERN TO BE MASKED AND
;          3375  !       COMPARED AGAINST THE CONTENTS
;          3376  !       OF THE REGISTER UNDER TEST.
;          3377  !
;          3378  !       INDEX
;          3379  !       USED BY THE MACRO WRT_MASK TO
;          3380  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          3381  !       FORCED HI, FORCED LO AND DON'T CARE
;          3382  !       MASK INFORMATION.
;          3383  !
;          3384  !       ERR_FLG
;          3385  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          3386  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;          3387  !       CALLER TO EXAMINE THE ERROR STATUS
;          3388  !       OF THE ROUTINE CALL.
;          3389  !
;          3390  ! IMPLICIT INPUTS:
;          3391  !       WT_DATA
;          3392  !         GETS LOADED WITH THE GENERATED
;          3393  !         WRT_MASK DATA PATTERN THUS ALLOWING
;          3394  !         CALLER TO PRINT FAILING GOOD DATA.
;          3395  !
;          3396  !       RD_DATA
;          3397  !         GETS LOADED WITH DATA READ FROM THE
;          3398  !         REGISTER THUS ALLOWING CALLER
;          3399  !         TO PRINT FAILING BAD DATA.
;          3400  !
;          3401  ! IMPLICIT OUTPUTS:
;          3402  !       GLOBAL LOCATION WR_DATA
;          3403  !       AND RD_DATA LOADED WITH GOOD
;          3404  !       AND BAD REGISTER DATA
;          3405  !
;          3406  !--
;          3407
;          3408      .ERR_FLG = ZERO;                          !CLEAR THE ERROR FLAG
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (30)

;          3409      ECC_DM = ONE;                      !SET ECC DIAG MODE
;          3410      WT_DATA = WRT_MASK;                !SAVE THE DATA WRITTEN TO THE REGISTER
;          3411      RD_DATA = .MLE1 or .IGNORE;        !READ AND SAVE THE REGISTER
;          3412
;          3413      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          3414
;          3415      ECC_DM = ZERO;                     !SET ERROR FLAG IF NEQ
;          3416                                         !CLEAR ECC DIAG MODE
;          3417      end;

4966
4970 020644  004167  163174          RD.E1:  JSR     R1,$SAVE2                       ;                       3357
4971 020650  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               3408
4972 020654  152777  000001  172412         BISB    #1,@ML.REG+120                  ;                       3409
4973 020662  016600  000012                  MOV     12(SP),R0                       ; INDEX,*               3410
4974 020666  006300                          ASL     R0
4975 020670  006300                          ASL     R0
4976 020672  006300                          ASL     R0
4977 020674  010001                          MOV     R0,R1
4978 020676  016100  013156                  MOV     ML.REG+2(R1),R0
4979 020702  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
4980 020706  046100  013160                  BIC     ML.REG+4(R1),R0
4981 020712  016102  013162                  MOV     ML.REG+6(R1),R2
4982 020716  050002                          BIS     R0,R2
4983 020720  010267  172202                  MOV     R2,WT.DATA
4984 020724  017702  172374                  MOV     @ML.REG+150,R2                  ;                       3411
4985 020730  056102  013162                  BIS     ML.REG+6(R1),R2
4986 020734  010267  172170                  MOV     R2,RD.DATA
4987 020740  026767  172162  172162         CMP     WT.DATA,RD.DATA                 ;                       3413
4988 020746  001403                          BEQ     1$
4989 020750  012776  000001  000010         MOV     #1,@10(SP)                      ; *,ERR.FLG
4990 020756  142777  000001  172310  1$:     BICB    #1,@ML.REG+120                  ;                       3415
4991 020764  000207                          RTS     PC                              ;                       3357
4992
4993                                 ; Routine Size:  41 words
4994                                 ; Maximum stack depth per invocation:  3 words
4999
5000
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (31)

;          3418  routine WRT_E2 (TST_PAT, index) : novalue =
;          3419      begin
;          3420
;          3421  !++
;          3422  ! FUNCTIONAL DESCRIPTION:
;          3423  !
;          3424  !       LOADS THE ECC CRC WORD
;          3425  !       REGISTER 2 WITH A DATA PATTERN
;          3426  !       GENERATED BY THE MACRO
;          3427  !       WRT_MASK
;          3428  !
;          3429  ! FORMAL PARAMETERS:
;          3430  !
;          3431  !       TST_PAT
;          3432  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;          3433  !
;          3434  !       INDEX
;          3435  !       USED BY THE MACRO WRT_MASK
;          3436  !       TO SELECT THE CURRENT REGISTERS
;          3437  !       ADDRESS, FORCED HI, FORCED
;          3438  !       LO AND DON'T CARE MASK
;          3439  !       INFORMATION.
;          3440  !
;          3441  !--
;          3442
;          3443      ECC_DM = ONE;                         !SET ECC DIAG MODE
;          3444      MLE2_MASK = %o'177700';               !MASK OUT DATA DIAG BITS
;          3445      MLE2 = WRT_MASK;                      !LOAD MLE2 WITH GENERATED WRT_MASK PATTERN
;          3446      MLE2_MASK = %o'000000';               !RESTORE MLE2_MASK
;          3447      ECC_DM = ZERO;                        !CLEAR ECC DIAG MODE
;          3448      end;
;
5043 020766  004167  163052            WRT.E2: JSR     R1,$SAVE2                       ;                       3418
5044 020772  152777  000001  172274            BISB    #1,@ML.REG+120                  ;                       3443
5045 021000  012767  177700  172334            MOV     #-100,ML.REG+166                ;                       3444
5046 021006  016600  000010                    MOV     10(SP),R0                       ; INDEX,*               3445
5047 021012  006300                            ASL     R0
5048 021014  006300                            ASL     R0
5049 021016  006300                            ASL     R0
5050 021020  010001                            MOV     R0,R1
5051 021022  016100  013156                    MOV     ML.REG+2(R1),R0
5052 021026  056600  000012                    BIS     12(SP),R0                       ; TST.PAT,*
5053 021032  046100  013160                    BIC     ML.REG+4(R1),R0
5054 021036  016102  013162                    MOV     ML.REG+6(R1),R2
5055 021042  050002                            BIS     R0,R2
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
                                                                                                                        
5060 021044  010277  172264                    MOV     R2,@ML.REG+160                                                  
5061 021050  005067  172266                    CLR     ML.REG+166                      ;                               3446
5062 021054  142777  000001  172212            BICB    #1,@ML.REG+120                  ;                               3447
5063 021062  000207                            RTS     PC                              ;                               3418
5064
5065                                    ; Routine Size:  31 words
5066                                    ; Maximum stack depth per invocation:  3 words
5071
5072
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (32)

```
5074 ;ML4
5075 ;
5076
5077 ;          3449  routine RD_E2 (TST_PAT, index, ERR_FLG) : novalue =
5078 ;          3450      begin
5079 ;          3451
5080 ;          3452  !++
5081 ;          3453  ! FUNCTIONAL DESCRIPTION:
5082 ;          3454  !
5083 ;          3455  !       COMPARES THE CONTENTS OF THE
5084 ;          3456  !       ECC CRC WORD REGISTER 2
5085 ;          3457  !       WITH THE MASKED DATA PATTERN
5086 ;          3458  !       GENERATED BY THE MACRO 'WRT_MASK'
5087 ;          3459  !
5088 ;          3460  !       IF THE COMPARE IS NOT EQUAL THEN
5089 ;          3461  !       THE FORMAL PARAMETER 'ERR_FLG' IS
5090 ;          3462  !       ASSIGNED A ONE TO INDICATE THE
5091 ;          3463  !       ERROR.
5092 ;          3464  !
5093 ;          3465  ! FORMAL PARAMETERS:
5094 ;          3466  !
5095 ;          3467  !       TST_PAT
5096 ;          3468  !       DATA PATTERN TO BE MASKED AND
5097 ;          3469  !       COMPARED AGAINST THE CONTENTS
5098 ;          3470  !       OF THE REGISTER UNDER TEST.
5099 ;          3471  !
5100 ;          3472  !       INDEX
5101 ;          3473  !       USED BY THE MACRO WRT_MASK TO
5102 ;          3474  !       SELECT THE CURRENT REGISTERS ADDRESS,
5103 ;          3475  !       FORCED HI, FORCED LO AND DON'T CARE
5104 ;          3476  !       MASK INFORMATION.
5105 ;          3477  !
5106 ;          3478  !       ERR_FLG
5107 ;          3479  !       CONTAINS THE ADDRESS (PASSED BY REF)
5108 ;          3480  !       OF THE CALLERS ERROR FLG TO ENABLE THE
5109 ;          3481  !       CALLER TO EXAMINE THE ERROR STATUS
5110 ;          3482  !       OF THE ROUTINE CALL.
5111 ;          3483  !
5112 ;          3484  ! IMPLICIT INPUTS:
5113 ;          3485  !       WT_DATA
5114 ;          3486  !         GETS LOADED WITH THE GENERATED
5115 ;          3487  !         WRT_MASK DATA PATTERN THUS ALLOWING
5116 ;          3488  !         CALLER TO PRINT FAILING GOOD DATA.
5117 ;          3489  !
5118 ;          3490  !       RD_DATA
5119 ;          3491  !         GETS LOADED WITH DATA READ FROM THE
5120 ;          3492  !         REGISTER THUS ALLOWING CALLER
5121 ;          3493  !         TO PRINT FAILING BAD DATA.
5122 ;          3494  !
5123 ;          3495  ! IMPLICIT OUTPUTS:
5124 ;          3496  !       GLOBAL LOCATION WR_DATA
5125 ;          3497  !       AND RD_DATA LOADED WITH GOOD
5126 ;          3498  !       AND BAD REGISTER DATA
5127 ;          3499  !
5128 ;          3500  !--
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (32)

;          3501
;          3502        .ERR_FLG = ZERO;                            !CLEAR ERROR FLAG
;          3503        ECC_DM = ONE;                               !SET ECC DIAG MODE
;          3504        MLE2_MASK = %o'177700';                     !MASK OUT DATA DIAG BITS
;          3505        WT_DATA = WRT_MASK;                         !SAVE THE DATA WRITTEN TO THE REGISTER
;          3506        RD_DATA = .MLE2 or .IGNORE;                 !READ AND SAVE THE REGISTER
;          3507
;          3508        if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;          3509
;          3510                                                    !SET ERROR FLG IF NEQ
;          3511        MLE2_MASK = %o'000000';                     !RESTORE MLE2 MASK
;          3512        ECC_DM = ZERO;                              !CLEAR ECC DIAG MODE
;          3513        end;
5149

5153 021064  004167  162754          RD.E2:  JSR     R1,$SAVE2                       ;                       3449
5154 021070  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               3502
5155 021074  152777  000001  172172         BISB    #1,@ML.REG+120                  ;                       3503
5156 021102  012767  177700  172232         MOV     #-100,ML.REG+166                ;                       3504
5157 021110  016600  000012                  MOV     12(SP),R0                       ; INDEX,*               3505
5158 021114  006300                          ASL     R0
5159 021116  006300                          ASL     R0
5160 021120  006300                          ASL     R0
5161 021122  010001                          MOV     R0,R1
5162 021124  016100  013156                  MOV     ML.REG+2(R1),R0
5163 021130  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
5164 021134  046100  013160                  BIC     ML.REG+4(R1),R0
5165 021140  016102  013162                  MOV     ML.REG+6(R1),R2
5166 021144  050002                          BIS     R0,R2
5167 021146  010267  171754                  MOV     R2,WT.DATA
5168 021152  017702  172156                  MOV     @ML.REG+160,R2                  ;                       3506
5169 021156  056102  013162                  BIS     ML.REG+6(R1),R2
5170 021162  010267  171742                  MOV     R2,RD.DATA
5171 021166  026767  171734  171734         CMP     WT.DATA,RD.DATA                 ;                       3508
5172 021174  001403                          BEQ     1$
5173 021176  012776  000001  000010         MOV     #1,@10(SP)                      ; *,ERR.FLG
5174 021204  005067  172132          1$:     CLR     ML.REG+166                      ;                       3511
5175 021210  142777  000001  172056         BICB    #1,@ML.REG+120                  ;                       3512
5176 021216  000207                          RTS     PC                              ;                       3449
5177
5178                        ; Routine Size:  46 words
5179                        ; Maximum stack depth per invocation:  3 words
```

```
5185 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
5186 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (33)
5187
5188 ;          3514  routine WRT_PD (TST_PAT, index) : novalue =
5189 ;          3515      begin
5190 ;          3516
5191 ;          3517  !++
5192 ;          3518  ! FUNCTIONAL DESCRIPTION:
5193 ;          3519  !
5194 ;          3520  !       LOADS THE PROM DATA
5195 ;          3521  !       REGISTER WITH A DATA PATTERN
5196 ;          3522  !       GENERATED BY THE MACRO
5197 ;          3523  !       WRT_MASK
5198 ;          3524  !
5199 ;          3525  ! FORMAL PARAMETERS:
5200 ;          3526  !
5201 ;          3527  !       TST_PAT
5202 ;          3528  !       CURRENT DATA PATTERN TO BE
5203 ;          3529  !       LOADED IN THE REGISTER.
5204 ;          3530  !
5205 ;          3531  !       INDEX
5206 ;          3532  !       USED BY THE MACRO WRT_MASK
5207 ;          3533  !       TO SELECT THE CURRENT REGISTERS
5208 ;          3534  !       ADDRESS, FORCED HI, FORCED
5209 ;          3535  !       LO AND DON'T CARE MASK
5210 ;          3536  !       INFORMATION
5211 ;          3537  !
5212 ;          3538  !--
5213 ;          3539
5214 ;          3540      PROM_RW = ONE;                     !SET PROM READ WRITE
5215 ;          3541      DAT_DM = ONE;                      !SET DATA DIAG MODE
5216 ;          3542      MLPD = WRT_MASK;                   !LOAD MLPD WITH GENERATED WRT_MASK PATTERN
5217 ;          3543      DAT_CLK = ONE;                     !DO A DATA CLK
5218 ;          3544      PROM_RW = ZERO;                    !CLEAR PROM READ WRITE
5219 ;          3545      DAT_DM = ZERO;                     !CLEAR DATA DIAG MODE
5220 ;          3546      end;
5224
5228 021220 004167 162620          WRT.PD: JSR   R1,$SAVE2                    ;                    3514
5229 021224 152777 000100 172042          BISB  #100,@ML.REG+120             ;                    3540
5230 021232 152777 000010 172034          BISB  #10,@ML.REG+120              ;                    3541
5231 021240 016600 000010                 MOV   10(SP),R0                    ; INDEX,*            3542
5232 021244 006300                        ASL   R0
5233 021246 006300                        ASL   R0
5234 021250 006300                        ASL   R0
5235 021252 010001                        MOV   R0,R1
5236 021254 016100 013156                 MOV   ML.REG+2(R1),R0
5237 021260 056600 000012                 BIS   12(SP),R0                    ; TST.PAT,*
5238 021264 046100 013160                 BIC   ML.REG+4(R1),R0
```

```
5240                                    ;ML4                                                    22-Dec-1980 09:24:31    TOPS
5241                                    ;                                                       22-Dec-1980 09:21:22    PA:<
5242
5243 021270  016102  013162                    MOV     ML.REG+6(R1),R2
5244 021274  050002                            BIS     R0,R2
5245 021276  010277  172102                    MOV     R2,@ML.REG+230
5246 021302  152777  000020  171764            BISB    #20,@ML.REG+120                 ;       3543
5247 021310  142777  000100  171756            BICB    #100,@ML.REG+120                ;       3544
5248 021316  142777  000010  171750            BICB    #10,@ML.REG+120                 ;       3545
5249 021324  000207                            RTS     PC                              ;       3514
5250
5251                                    ; Routine Size:  35 words
5252                                    ; Maximum stack depth per invocation:  3 words
5257
5258
```

```
5260 ;ML4
5261 :
5262
5263 ;          3547  routine RD_PD (TST_PAT, index, ERR_FLG) : novalue =
5264 ;          3548      begin
5265 ;          3549
5266 ;          3550  !++
5267 ;          3551  ! FUNCTIONAL DESCRIPTION:
5268 ;          3552  !
5269 ;          3553  !       COMPARES THE CONTENTS OF THE
5270 ;          3554  !       PROM DATA REGISTER
5271 ;          3555  !       WITH THE MASKED DATA PATTERN
5272 ;          3556  !       GENERATED BY THE MACRO 'WRT_MASK'
5273 ;          3557  !
5274 ;          3558  !       IF THE COMPARE IS NOT EQUAL THEN
5275 ;          3559  !       THE FORMAL PARAMETER 'ERR FLG' IS
5276 ;          3560  !       ASSIGNED A ONE TO INDICATE THE
5277 ;          3561  !       ERROR
5278 ;          3562  !
5279 ;          3563  ! FORMAL PARAMETERS:
5280 ;          3564  !
5281 ;          3565  !       TST_PAT
5282 ;          3566  !       DATA PATTERN TO BE MASKED AND
5283 ;          3567  !       COMPARED AGAINST THE CONTENTS
5284 ;          3568  !       OF THE REGISTER UNDER TEST
5285 ;          3569  !
5286 ;          3570  !       INDEX
5287 ;          3571  !       USED BY THE MACRO WRT_MASK TO
5288 ;          3572  !       SELECT THE CURRENT REGISTERS ADDRESS,
5289 ;          3573  !       FORCED HI, FORCED LO AND DON'T CARE
5290 ;          3574  !       MASK INFORMATION.
5291 ;          3575  !
5292 ;          3576  !       ERR_FLG
5293 ;          3577  !       CONTAINS THE ADDRESS (PASSED BY REF)
5294 ;          3578  !       OF THE CALLERS ERROR FLG TO ENABLE THE
5295 ;          3579  !       CALLER TO EXAMINE THE ERROR STATUS
5296 ;          3580  !       OF THE ROUTINE CALL.
5297 ;          3581  !
5298 ;          3582  ! IMPLICIT INPUTS:
5299 ;          3583  !       WT_DATA
5300 ;          3584  !         GETS LOADED WITH THE GENERATED
5301 ;          3585  !         WRT_MASK DATA PATTERN THUS ALLOWING
5302 ;          3586  !         CALLER TO PRINT FAILING GOOD DATA.
5303 ;          3587  !
5304 ;          3588  !       RD_DATA
5305 ;          3589  !         GETS LOADED WITH DATA READ FROM THE
5306 ;          3590  !         REGISTER THUS ALLOWING CALLER
5307 ;          3591  !         TO PRINT FAILING BAD DATA.
5308 ;          3592  !
5309 ;          3593  ! IMPLICIT OUTPUTS:
5310 ;          3594  !       GLOBAL LOCATION WR_DATA
5311 ;          3595  !       AND RD_DATA LOADED WITH GOOD
5312 ;          3596  !       AND BAD REGISTER DATA
5313 ;          3597  !
5314 ;          3598  !--
```

```
:ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
:                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (34)

:          3599
:          3600      .ERR_FLG = ZERO;                   !CLEAR ERROR FLG
:          3601      PROM_RW = ONE;                     !SET PROM READ WRITE
:          3602      DAT_DM = ONE;                      !SET DATA DIAG MODE
:          3603      WT_DATA = WRT_MASK;                !SAVE THE DATA WRITTEN TO THE REGISTER
:          3604      RD_DATA = .MLPD or .IGNORE;        !READ AND SAVE THE REGISTER
:          3605
:          3606      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
:          3607
:          3608                                         !SET ERROR FLAG IF NEQ
:          3609      PROM_RW = ZERO;                    !CLEAR PROM READ WRTE
:          3610      DAT_DM = ZERO;                     !CLEAR DATA DIAG MODE
:          3611      end;

5339 021326  004167  162512          RD.PD:  JSR     R1,$SAVE2                       ;                       3547
5340 021332  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               3600
5341 021336  152777  000100  171730          BISB    #100,@ML.REG+120                ;                       3601
5342 021344  152777  000010  171722          BISB    #10,@ML.REG+120                 ;                       3602
5343 021352  016600  000012                  MOV     12(SP),R0                       ; INDEX,*               3603
5344 021356  006300                          ASL     R0
5345 021360  006300                          ASL     R0
5346 021362  006300                          ASL     R0
5347 021364  010001                          MOV     R0,R1
5348 021366  016100  013156                  MOV     ML.REG+2(R1),R0
5349 021372  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
5350 021376  046100  013160                  BIC     ML.REG+4(R1),R0
5351 021402  016102  013162                  MOV     ML.REG+6(R1),R2
5352 021406  050002                          BIS     R0,R2
5353 021410  010267  171512                  MOV     R2,WT.DATA
5354 021414  017702  171764                  MOV     @ML.REG+230,R2                  ;                       3604
5355 021420  056102  013162                  BIS     ML.REG+6(R1),R2
5356 021424  010267  171500                  MOV     R2,RD.DATA
5357 021430  026767  171472  171472          CMP     WT.DATA,RD.DATA                 ;                       3606
5358 021436  001403                          BEQ     1$
5359 021440  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
5360 021446  142777  000100  171620  1$:     BICB    #100,@ML.REG+120                ;                       3609
5361 021454  142777  000010  171612          BICB    #10,@ML.REG+120                 ;                       3610
5362 021462  000207                          RTS     PC                              ;                       3547
5363
5364                                 ; Routine Size:  47 words
5365                                 ; Maximum stack depth per invocation:  3 words
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (35)

;          3612  routine WRT_EL (TST_PAT, index) : novalue =
;          3613      begin
;          3614
;          3615  !++
;          3616  ! FUNCTIONAL DESCRIPTION:
;          3617  !       DUMMY ROUTINE CALL TO ASSIST IN THE READ
;          3618  !       WRITE REGISTER ALGORITHEM
;          3619  !
;          3620  ! FORMAL PARAMETERS:
;          3621  !       TST_PAT
;          3622  !       DATA PATTERN TO BE MASKED AND
;          3623  !       COMPARED AGAINST THE CONTENTS
;          3624  !       OF THE REGISTER UNDER TEST
;          3625  !
;          3626  !       INDEX
;          3627  !       USED BY THE MACRO WRT_MASK TO
;          3628  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          3629  !       FORCED HI, FORCED LO AND DON'T CARE
;          3630  !       MASK INFORMATION.
;          3631  !
;          3632  !--
;          3633
;          3634  !
;          3635  !  ERROR LOCATION REG IS READ ONLY
;          3636      return;
;          3637      end;
5403
5407 021464  000207                WRT.EL: RTS     PC                              ;                       3612
5408
5409                                ; Routine Size:  1 word
5410                                ; Maximum stack depth per invocation:  0 words
5415
5416
```

```
5418 ;ML4
5419 ;
5420
5421 ;          3638  routine RD_EL (TST_PAT, index, ERR_FLG) : novalue =
5422 ;          3639      begin
5423 ;          3640
5424 ;          3641  !++
5425 ;          3642  ! FUNCTIONAL DESCRIPTION:
5426 ;          3643  !
5427 ;          3644  !       COMPARES THE CONTENTS OF THE
5428 ;          3645  !       ERROR LOCATION REGISTER
5429 ;          3646  !       WITH THE CONTENTS OF TST_PAT.
5430 ;          3647  !
5431 ;          3648  !       IF THE COMPARE IS NOT EQUAL THEN
5432 ;          3649  !       THE FORMAL PARAMETER 'ERR FLG' IS
5433 ;          3650  !       ASSIGNED A ONE TO INDICATE THE
5434 ;          3651  !       ERROR
5435 ;          3652  !
5436 ;          3653  ! FORMAL PARAMETERS:
5437 ;          3654  !       TST_PAT
5438 ;          3655  !       DATA PATTERN TO BE MASKED AND
5439 ;          3656  !       COMPARED AGAINST THE CONTENTS
5440 ;          3657  !       OF THE REGISTER UNDER TEST
5441 ;          3658  !
5442 ;          3659  !       INDEX
5443 ;          3660  !       USED BY THE MACRO WRT_MASK TO
5444 ;          3661  !       SELECT THE CURRENT REGISTERS ADDRESS,
5445 ;          3662  !       FORCED HI, FORCED LO AND DON'T CARE
5446 ;          3663  !       MASK INFORMATION.
5447 ;          3664  !
5448 ;          3665  !       ERR_FLG
5449 ;          3666  !       CONTAINS THE ADDRESS (PASSED BY REF)
5450 ;          3667  !       OF THE CALLERS ERROR FLG TO ENABLE THE
5451 ;          3668  !       CALLER TO EXAMINE THE ERROR STATUS
5452 ;          3669  !       OF THE ROUTINE CALL.
5453 ;          3670  !
5454 ;          3671  ! IMPLICIT INPUTS:
5455 ;          3672  !       WT_DATA
5456 ;          3673  !         GETS LOADED WITH THE GENERATED
5457 ;          3674  !         WRT_MASK DATA PATTERN THUS ALLOWING
5458 ;          3675  !         CALLER TO PRINT FAILING GOOD DATA.
5459 ;          3676  !
5460 ;          3677  !       RD_DATA
5461 ;          3678  !         GETS LOADED WITH DATA READ FROM THE
5462 ;          3679  !         REGISTER THUS ALLOWING CALLER
5463 ;          3680  !         TO PRINT FAILING BAD DATA.
5464 ;          3681  !
5465 ;          3682  ! IMPLICIT OUTPUTS:
5466 ;          3683  !       GLOBAL LOCATION WR_DATA
5467 ;          3684  !       AND RD_DATA LOADED WITH GOOD
5468 ;          3685  !       AND BAD REGISTER DATA
5469 ;          3686  !
5470 ;          3687  !--
5471 ;          3688
5472 ;          3689      .ERR_FLG = ZERO;
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (36)

;          3690      WT_DATA = .TST_PAT;                !SAVE THE DATA WRITTEN TO THE REGISTER
;          3691      RD_DATA = .MLEC;                   !READ AND SAVE THE REGISTER
;          3692
;          3693      if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;       !READ REGISTER FOR WT_DATA
;          3694
;          3695      end;

021466  005076  000002          RD.EL:  CLR     @2(SP)                          ; ERR.FLG                       3689
021472  016667  000006  171426          MOV     6(SP),WT.DATA                   ; TST.PAT,*                     3690
021500  017767  171670  171422          MOV     @#..REG+220,RD.DATA             ;                               3691
021506  026767  171416  171412          CMP     RD.DATA,WT.DATA                 ;                               3693
021514  001403                          BEQ     1$
021516  012776  000001  000002          MOV     #1,@2(SP)                       ; *,ERR.FLG
021524  000207                  1$:     RTS     PC                              ;                               3638

                                ; Routine Size:  16 words
                                ; Maximum stack depth per invocation:  0 words
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (37)

;          3696  routine WRT_EE (TST_PAT, index) : novalue =
;          3697      begin
;          3698
;          3699  !++
;          3700  ! FUNCTIONAL DESCRIPTION:
;          3701  !       DUMMY ROUTINE CALL TO ASSIST IN THE READ
;          3702  !       WRITE REGISTER ALGORITHEM
;          3703  !
;          3704  ! FORMAL PARAMETERS:
;          3705  !       TST_PAT
;          3706  !       DATA PATTERN TO BE MASKED AND
;          3707  !       COMPARED AGAINST THE CONTENTS
;          3708  !       OF THE REGISTER UNDER TEST
;          3709  !
;          3710  !       INDEX
;          3711  !       USED BY THE MACRO WRT_MASK TO
;          3712  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          3713  !       FORCED HI, FORCED LO AND DON'T CARE
;          3714  !       MASK INFORMATION.
;          3715  !
;          3716  !--
;          3717
;          3718  ! ECC ERROR REGISTER IS READ ONLY
;          3719      return;
;          3720      end;
;
5542 021526  000207                WRT.EE: RTS     PC                              ;                       3696
5543
5544                                ; Routine Size:  1 word
5545                                ; Maximum stack depth per invocation:  0 words
5550
5551
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (38)

```
;ML4

;                routine RD_EE (TST_PAT, index, ERR_FLG) : novalue =
;                    begin
;
;                !++
;                ! FUNCTIONAL DESCRIPTION:
;                !
;                !       COMPARES THE CONTENTS OF THE
;                !       ECC ERROR REGISTER WITH TST_PAT.
;                !
;                !       IF THE COMPARE IS NOT EQUAL THEN
;                !       THE FORMAL PARAMETER 'ERR_FLG' IS
;                !       ASSIGNED A ONE TO INDICATE THE
;                !       ERROR.
;                !
;                ! FORMAL PARAMETERS:
;                !       TST_PAT
;                !       DATA PATTERN TO BE
;                !       COMPARED AGAINST THE CONTENTS
;                !       OF THE REGISTER UNDER TEST.
;                !
;                !       INDEX
;                !       USED BY THE MACRO MLEE TO
;                !       SELECT THE CURRENT REGISTERS ADDRESS.
;                !
;                !       ERR_FLG
;                !       CONTAINS THE ADDRESS (PASSED
;                !       BY REF) OF THE CALLERS ERROR FLG TO ENABLE
;                !       THE CALLER TO EXAMINE THE ERROR STATUS
;                !       OF THE ROUTINE CALL.
;                !
;                ! IMPLICIT INPUTS:
;                !       WT_DATA
;                !         GETS LOADED WITH THE TST_PAT
;                !         THUS ALLOWING CALLER TO PRINT
;                !         THE FAILING DATA.
;                !
;                !       RD_DATA
;                !         GETS LOADED WITH DATA READ FROM THE
;                !         REGISTER THUS ALLOWING CALLER
;                !         TO PRINT FAILING BAD DATA.
;                !
;                ! IMPLICIT OUTPUTS:
;                !       GLOBAL LOCATION WR_DATA
;                !       AND RD_DATA LOADED WITH GOOD
;                !       AND BAD REGISTER DATA
;                !
;                !--
;
;                   .ERR_FLG = ZERO;                    !CLEAR THE ERROR FLAG
;                   WT_DATA = .TST_PAT;                 !SAVE DATA WRITTEN TO THE REGISTER
;                   RD_DATA = .MLEE;                    !READ AND SAVE THE REGISTER
;
```

```
5609 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
5610 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (38)
5611
5612 ;          3773      if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;       !READ MLEE FOR TST_PAT
5613 ;          3774
5614 ;          3775                                                          !SET THE ERROR FLAG IF NEQ
5615 ;          3776      end;
5619
5623 021530  005076  000002          RD.EE:  CLR     @2(SP)                          ; ERR.FLG                    3769
5624 021534  016667  000006  171364          MOV     6(SP),WT.DATA                   ; TST.PAT,*                  3770
5625 021542  017767  171616  171360          MOV     @ML.REG+210,RD.DATA             ;                            3771
5626 021550  026767  171354  171350          CMP     RD.DATA,WT.DATA                 ;                            3773
5627 021556  001403                        BEQ     1$
5628 021560  012776  000001  000002          MOV     #1,@2(SP)                       ; *,ERR.FLG
5629 021566  000207                  1$:     RTS     PC                              ;                            3721
5630
5631                                 ; Routine Size:  16 words
5632                                 ; Maximum stack depth per invocation:  0 words
5637
5638
```

```
5640 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
5641 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (39)
5642
5643 ;          3777  routine WRT_D1 (TST_PAT, index) : novalue =
5644 ;          3778      begin
5645 ;          3779
5646 ;          3780  !++
5647 ;          3781  ! FUNCTIONAL DESCRIPTION:
5648 ;          3782  !       LOADS THE DATA DIAG REG 1 WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
5649 ;          3783  ! FORMAL PARAMETERS:
5650 ;          3784  !       TST_PAT
5651 ;          3785  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
5652 ;          3786  !       INDEX
5653 ;          3787  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
5654 ;          3788  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
5655 ;          3789  !--
5656 ;          3790
5657 ;          3791      DAT_DM = ONE;                          !SET DATA DIAG MODE
5658 ;          3792      MLD1 = WRT_MASK;                       !LOAD MLD1 WITH GENERATED WRT_MASK PATTERN
5659 ;          3793      DAT_DM = ZERO;                         !CLEAR DATA DIAG MODE
5660 ;          3794      end;
5664
5668 021570  004167  162250          WRT.D1: JSR     R1,$SAVE2                       ;                    3777
5669 021574  152777  000010  171472          BISB    #10,@ML.REG+120                 ;                    3791
5670 021602  016600  000010                  MOV     10(SP),R0                       ; INDEX,*            3792
5671 021606  006300                          ASL     R0
5672 021610  006300                          ASL     R0
5673 021612  006300                          ASL     R0
5674 021614  010001                          MOV     R0,R1
5675 021616  016100  013156                  MOV     ML.REG+2(R1),R0
5676 021622  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
5677 021626  046100  013160                  BIC     ML.REG+4(R1),R0
5678 021632  016102  013162                  MOV     ML.REG+6(R1),R2
5679 021636  050002                          BIS     R0,R2
5680 021640  010277  171500                  MOV     R2,@ML.REG+170
5681 021644  142777  000010  171422          BICB    #10,@ML.REG+120                 ;                    3793
5682 021652  000207                          RTS     PC                              ;                    3777
5683
5684                                ; Routine Size:  26 words
5685                                ; Maximum stack depth per invocation:  3 words
5690
5691
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (40)

```
;ML4
;
;                3795  routine RD_D1 (TST_PAT, index, ERR_FLG) : novalue =
;                3796      begin
;                3797
;                3798  !++
;                3799  ! FUNCTIONAL DESCRIPTION:
;                3800  !
;                3801  !       COMPARES THE CONTENTS OF THE
;                3802  !       DATA DIAG REGISTER 1
;                3803  !       WITH THE MASKED DATA PATTERN
;                3804  !       GENERATED BY THE MACRO 'WRT_MASK''.
;                3805  !
;                3806  !       IF THE COMPARE IS NOT EQUAL THEN
;                3807  !       THE FORMAL PARAMETER 'ERR_FLG'' IS
;                3808  !       ASSIGNED A ONE TO INDICATE THE
;                3809  !       ERROR.
;                3810  !
;                3811  ! FORMAL PARAMETERS:
;                3812  !
;                3813  !       TST_PAT
;                3814  !       DATA PATTERN TO BE MASKED AND
;                3815  !       COMPARED AGAINST THE CONTENTS
;                3816  !       OF THE REGISTER UNDER TEST.
;                3817  !
;                3818  !       INDEX
;                3819  !       USED BY THE MACRO WRT_MASK TO
;                3820  !       SELECT THE CURRENT REGISTERS ADDRESS,
;                3821  !       FORCED HI, FORCED LO AND DON'T CARE
;                3822  !       MASK INFORMATION.
;                3823  !
;                3824  !       ERR_FLG
;                3825  !       CONTAINS THE ADDRESS (PASSED BY REF)
;                3826  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;                3827  !       CALLER TO EXAMINE THE ERROR STATUS
;                3828  !       OF THE ROUTINE CALL.
;                3829  !
;                3830  ! IMPLICIT INPUTS:
;                3831  !       WT_DATA
;                3832  !         GETS LOADED WITH THE GENERATED
;                3833  !         WRT_MASK DATA PATTERN THUS ALLOWING
;                3834  !         CALLER TO PRINT FAILING GOOD DATA.
;                3835  !
;                3836  !       RD_DATA
;                3837  !         GETS LOADED WITH DATA READ FROM THE
;                3838  !         REGISTER THUS ALLOWING CALLER
;                3839  !         TO PRINT FAILING BAD DATA.
;                3840  !
;                3841  ! IMPLICIT OUTPUTS:
;                3842  !       GLOBAL LOCATION WR_DATA
;                3843  !       AND RD_DATA LOADED WITH GOOD
;                3844  !       AND BAD REGISTER DATA
;                3845  !
;                3846  !--
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (40)

;           3847
;           3848        .ERR_FLG = ZERO;                        !CLEAR THE ERROR FLG
;           3849        DAT_DM = ONE;                           !SET DATA DIAG MODE
;           3850        ML_FUNC = write;                        !LOAD MLCS1 WITH WRITE FUNCTION
;           3851        DAT_CLK = ONE;                          !DO A DATA CLK
;           3852
;           3853        if .REG_INIT_FLG IS_SET                 !SEE IF CALLER IS REG INIT TEST
;           3854                                                !SET ERROR FLAG IF NEQ
;           3855        then
;           3856            begin
;           3857            CLR_MBUS;                           !CLEAR MBUS TO GENERATE INIT DATA
;           3858            DAT_DM = ONE;
;           3859            end;
;           3860
;           3861        WT_DATA = WRT_MASK;                     !SAVE THE DATA WRITTEN TO THE REGISTER
;           3862        RD_DATA = .MLD1;                        !READ AND SAVE THE REGISTER
;           3863
;           3864        if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;       !READ MLD1 FOR WRT_MASK
;           3865
;           3866                                                !SET ERR_FLG IF NEQ
;           3867        CLR_MBUS;                               !CLEAR THE MBUS
;           3868        end;
;
5781 021654  004167  162164          RD.D1:  JSR     R1,$SAVE2                       ;                       3795
5782 021660  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               3848
5783 021664  152777  000010  171402         BISB    #10,@ML.REG+120                 ;                       3849
5784 021672  142777  000077  171254         BICB    #77,@ML.REG                     ;                       3850
5785 021700  152777  000061  171246         BISB    #61,@ML.REG
5786 021706  152777  000020  171360         BISB    #20,@ML.REG+120                 ;                       3851
5787 021714  026727  171216  000001         CMP     REG.INIT.FLG,#1                 ;                       3853
5788 021722  001017                        BNE     1$
5789 021724  152777  000040  171262         BISB    #40,@ML.REG+40                  ;                       3856
5790 021732  016701  171644                MOV     ML.DUT,R1
5791 021736  042701  177770                BIC     #177770,R1
5792 021742  142777  000007  171244         BICB    #7,@ML.REG+40
5793 021750  150177  171240                BISB    R1,@ML.REG+40
5794 021754  152777  000010  171312         BISB    #10,@ML.REG+120                 ;                       3858
5795 021762  016600  000012          1$:     MOV     12(SP),R0                       ; INDEX,*               3861
5796 021766  006300                        ASL     R0
5797 021770  006300                        ASL     R0
5798 021772  006300                        ASL     R0
5799 021774  010001                        MOV     R0,R1
5800 021776  016100  013156                MOV     ML.REG+2(R1),R0
5801 022002  056600  000014                BIS     14(SP),R0                       ; TST.PAT,*
5802 022006  046100  013160                BIC     ML.REG+4(R1),R0
```

```
                                                                                                22-Dec-1980 09:24:31    TOPS
                                                                                                22-Dec-1980 09:21:22    PA:<
                                ;ML4
                                ;
                                
022012  016102  013162                MOV     ML.REG+6(R1),R2
022016  050002                        BIS     R0,R2
022020  010267  171102                MOV     R2,WT.DATA
022024  017767  171314  171076        MOV     @ML.REG+170,RD.DATA             ;                               3862
022032  026767  171072  171066        CMP     RD.DATA,WT.DATA                 ;                               3864
022040  001403                        BEQ     2$
022042  012776  000001  000010        MOV     #1,@10(SP)                      ; *,ERR.FLG
022050  152777  000040  171136  2$:   BISB    #40,@ML.REG+40
022056  016702  171520                MOV     ML.DUT,R2
022062  042702  177770                BIC     #177770,R2
022066  142777  000007  171120        BICB    #7,@ML.REG+40
022074  150277  171114                BISB    R2,@ML.REG+40
022100  000207                        RTS     PC                              ;                               3795

                                ; Routine Size:  75 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (41)

;          3869  routine WRT_D2 (TST_PAT, index) : novalue =
;          3870      begin
;          3871
;          3872  !++
;          3873  ! FUNCTIONAL DESCRIPTION:
;          3874  !       LOADS THE DATA DIAG REG 2 WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;          3875  ! FORMAL PARAMETERS:
;          3876  !       TST_PAT
;          3877  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;          3878  !       INDEX
;          3879  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;          3880  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;          3881  !--
;          3882
;          3883      DAT_DM = ONE;                                 !SET DATA DIAG MODE
;          3884      MLD2 = WRT_MASK;                              !LOAD MLD2 WITH GENERATED WRT_MASK PATTERN
;          3885      DAT_DM = ZERO;                                !CLEAR DATA DIAG MODE
;          3886      end;
;

022102  004167  161736          WRT.D2: JSR     R1,$SAVE2                       ;                       3869
022106  152777  000010  171160          BISB    #10,@ML.REG+120                 ;                       3883
022114  016600  000010                  MOV     10(SP),R0                       ; INDEX,*               3884
022120  006300                          ASL     R0
022122  006300                          ASL     R0
022124  006300                          ASL     R0
022126  010001                          MOV     R0,R1
022130  016100  013156                  MOV     ML.REG+2(R1),R0
022134  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
022140  046100  013160                  BIC     ML.REG+4(R1),R0
022144  016102  013162                  MOV     ML.REG+6(R1),R2
022150  050002                          BIS     R0,R2
022152  010277  171176                  MOV     R2,@ML.REG+200
022156  142777  000010  171110          BICB    #10,@ML.REG+120                 ;                       3885
022164  000207                          RTS     PC                              ;                       3869

                        ; Routine Size:  26 words
                        ; Maximum stack depth per invocation:  3 words
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (42)

                3887  routine RD_D2 (TST_PAT, index, ERR_FLG) : novalue =
                3888      begin
                3889
                3890  !++
                3891  ! FUNCTIONAL DESCRIPTION:
                3892  !
                3893  !       COMPARE THE CONTENTS OF THE
                3894  !       DATA DIAG REGISTER 2
                3895  !       WITH THE MASKED DATA PATTERN
                3896  !       GENERATED BY THE MACRO 'WRT_MASK''.
                3897  !       IF THE COMPARE IS NOT EQUAL THEN THE
                3898  !       FORMAL PARAMETER 'ERR_FLG'' IS
                3899  !       ASSIGNED A ONE TO INDICATE THE
                3900  !       ERROR.
                3901  !
                3902  ! FORMAL PARAMETERS:
                3903  !
                3904  !       TST_PAT
                3905  !       DATA PATTERN TO BE MASKED AND
                3906  !       COMPARED AGAINST THE CONTENTS
                3907  !       OF THE REGISTER UNDER TEST.
                3908  !
                3909  !       INDEX
                3910  !       USED BY THE MACRO WRT_MASK TO
                3911  !       SELECT THE CURRENT REGISTERS ADDRESS,
                3912  !       FORCED HI, FORCED LO AND DON'T CARE
                3913  !       MASK INFOMATION.
                3914  !
                3915  !       ERR_FLG
                3916  !       CONTAINS THE ADDRESS (PASSED BY REF)
                3917  !       OF THE CALLERS ERROR FLG TO ENABLE THE
                3918  !       CALLER TO EXAMINE THE ERROR STATUS
                3919  !       OF THE ROUTINE CALL.
                3920  !
                3921  ! IMPLICIT INPUTS:
                3922  !       WT_DATA
                3923  !         GETS LOADED WITH THE GENERATED
                3924  !         WRT_MASK DATA PATTERN THUS ALLOWING
                3925  !         CALLER TO PRINT FAILING GOOD DATA.
                3926  !
                3927  !       RD_DATA
                3928  !         GETS LOADED WITH DATA READ FROM THE
                3929  !         REGISTER THUS ALLOWING CALLER
                3930  !         TO PRINT FAILING BAD DATA.
                3931  !
                3932  ! IMPLICIT OUTPUTS:
                3933  !       GLOBAL LOCATION WR_DATA
                3934  !       AND RD_DATA LOADED WITH GOOD
                3935  !       AND BAD REGISTER DATA
                3936  !
                3937  !--
                3938
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (42)

;          3939      .ERR_FLG = ZERO;                   !CLEAR ERROR FLAG
;          3940      DAT_DM = ONE;                      !SET DATA DIAG MODE
;          3941      ML_FUNC = write;                   !LOAD WRITE FUNC TO CS1
;          3942      DAT_CLK = ONE;                     !DO A DATA CLOCK
;          3943
;          3944      if .REG_INIT_FLG IS_SET            !SEE IF CALLER IS REG INIT TEST
;          3945      then                               !CLEAR MBUS TO GENERATE INIT DATA
;          3946          begin
;          3947          CLR_MBUS;
;          3948          DAT_DM = ONE;
;          3949          end;
;          3950
;          3951      WT_DATA = WRT_MASK;                !SAVE THE DATA WRITTEN TO THE REGISTER
;          3952      RD_DATA = .MLD2;                   !READ AND SAVE THE REGISTER
;          3953
;          3954      if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;       !READ MLD2 FR WRT_MASK PATTERN
;          3955
;          3956                                         !SET ERROR FLAG IF NEQ
;          3957      CLR_MBUS;                          !CLR MASS BUSS
;          3958      end;
;
5969 022166  004167  161652          RD.D2:  JSR     R1,$SAVE2                       ;                       3887
5970 022172  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               3939
5971 022176  152777  000010  171070          BISB    #10,@ML.REG+120                 ;                       3940
5972 022204  142777  000077  170742          BICB    #77,@ML.REG                     ;                       3941
5973 022212  152777  000061  170734          BISB    #61,@ML.REG
5974 022220  152777  000020  171046          BISB    #20,@ML.REG+120                 ;                       3942
5975 022226  026727  170704  000001          CMP     REG.INIT.FLG,#1                 ;                       3944
5976 022234  001017                         BNE     1$
5977 022236  152777  000040  170750          BISB    #40,@ML.REG+40                  ;                       3946
5978 022244  016701  171332                  MOV     ML.DUT,R1
5979 022250  042701  177770                  BIC     #177770,R1
5980 022254  142777  000007  170732          BICB    #7,@ML.REG+40
5981 022262  150177  170726                  BISB    R1,@ML.REG+40
5982 022266  152777  000010  171000          BISB    #10,@ML.REG+120                 ;                       3948
5983 022274  016600  000012          1$:     MOV     12(SP),R0                       ; INDEX,*               3951
5984 022300  006300                         ASL     R0
5985 022302  006300                         ASL     R0
5986 022304  006300                         ASL     R0
5987 022306  010001                         MOV     R0,R1
5988 022310  016100  013156                  MOV     ML.REG+2(R1),R0
5989 022314  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
5990 022320  046100  013160                  BIC     ML.REG+4(R1),R0
5991 022324  016102  013162                  MOV     ML.REG+6(R1),R2
5992 022330  050002                         BIS     R0,R2
```

```
                                        ;ML4                                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                                       22-Dec-1980 09:21:22    PA:<
                                                                                                                                        
 022332  010267  170570                         MOV     R2,WT.DATA                                                                    
 022336  017767  171012  170564                 MOV     @ML.REG+200,RD.DATA             ;                                      3952
 022344  026767  170560  170554                 CMP     RD.DATA,WT.DATA                 ;                                      3954
 022352  001403                                 BEQ     2$                                                                            
 022354  012776  000001  000010                 MOV     #1,@10(SP)                      ; *,ERR.FLG                           
 022362  152777  000040  170624  2$:            BISB    #40,@ML.REG+40                                                                
 022370  016702  171206                         MOV     ML.DUT,R2                                                                     
 022374  042702  177770                         BIC     #177770,R2                                                                    
 022400  142777  000007  170606                 BICB    #7,@ML.REG+40                                                                 
 022406  150277  170602                         BISB    R2,@ML.REG+40                                                                 
 022412  000207                                 RTS     PC                              ;                                      3887
                                                                                                                                        
                                        ; Routine Size:  75 words                                                                       
                                        ; Maximum stack depth per invocation:  3 words                                                  
                                                                                                                                        
                                                                                                                                        
```

```
;6018 ;ML4
 6019 ;
 6020
 6021 ;          3959  routine WRT_D3 (TST_PAT, index) : novalue =
 6022 ;          3960      begin
 6023 ;          3961
 6024 ;          3962  !++
 6025 ;          3963  ! FUNCTIONAL DESCRIPTION:
 6026 ;          3964  !
 6027 ;          3965  !       LOADS THE DATA DIAG
 6028 ;          3966  !       REGISTER 3 WITH A DATA PATTERN
 6029 ;          3967  !       GENERATED BY THE MACRO
 6030 ;          3968  !       WRT_MASK.
 6031 ;          3969  !
 6032 ;          3970  ! FORMAL PARAMETERS:
 6033 ;          3971  !
 6034 ;          3972  !       TST_PAT
 6035 ;          3973  !       CURRENT DATA PATTERN TO BE
 6036 ;          3974  !       LOADED IN THE REGISTER.
 6037 ;          3975  !
 6038 ;          3976  !       INDEX
 6039 ;          3977  !       USE BY THE MACRO WRT_MASK
 6040 ;          3978  !       TO SELECT THE CURRENT REGISTERS
 6041 ;          3979  !       ADDRESS, FORCED HI, FORCED
 6042 ;          3980  !       LO AND DON'T CARE MASK
 6043 ;          3981  !       INFORMATION.
 6044 ;          3982  !
 6045 ;          3983  !--
 6046 ;          3984
 6047 ;          3985      DAT_DM = ONE;                    !SET DATA DIAG MODE
 6048 ;          3986      MLE2_MASK = %o'000377';          !MASK OUT ECC CRC WORD BITS
 6049 ;          3987      MLE2 = WRT_MASK;                 !LOAD MLE2 WITH GENERATED WRT_MASK PATTERN
 6050 ;          3988      MLE2_MASK = %o'100300';          !RESTORE MASK
 6051 ;          3989      DAT_DM = ZERO;                   !CLEAR DATA DIAG MODE.
 6052 ;          3990      end;
 6056
 6060 022414  004167  161424          WRT.D3: JSR     R1,$SAVE2                       ;                    3959
 6061 022420  152777  000010  170646          BISB    #10,@ML.REG+120                 ;                    3985
 6062 022426  012767  000377  170706          MOV     #377,ML.REG+166                 ;                    3986
 6063 022434  016600  000010                  MOV     10(SP),R0                       ; INDEX,*            3987
 6064 022440  006300                          ASL     R0
 6065 022442  006300                          ASL     R0
 6066 022444  006300                          ASL     R0
 6067 022446  010001                          MOV     R0,R1
 6068 022450  016100  013156                  MOV     ML.REG+2(R1),R0
 6069 022454  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
 6070 022460  046100  013160                  BIC     ML.REG+4(R1),R0
 6071 022464  016102  013162                  MOV     ML.REG+6(R1),R2
```

```
6073                                    ;ML4                                                    22-Dec-1980 09:24:31    TOPS
6074                                    :                                                       22-Dec-1980 09:21:22    PA:<
6075
6076 022470  050002                            BIS     R0,R2
6077 022472  010277  170636                    MOV     R2,@ML.REG+160
6078 022476  012767  100300  170636            MOV     #-77500,ML.REG+166              ;                       3988
6079 022504  142777  000010  170562            BICB    #10,@ML.REG+120                 ;                       3989
6080 022512  000207                            RTS     PC                              ;                       3959
6081
6082                                    ; Routine Size:  32 words
6083                                    ; Maximum stack depth per invocation:  3 words
6088
6089
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (44)

;          3991  routine RD_D3 (TST_PAT, index, ERR_FLG) : novalue =
;          3992      begin
;          3993
;          3994  !++
;          3995  ! FUNCTIONAL DESCRIPTION:
;          3996  !
;          3997  !       COMPARES THE CONTENTS OF THE
;          3998  !       DATA DIAG REGISTER 3
;          3999  !       WITH THE MASKED DATA PATTERN
;          4000  !       GENERATED BY THE MACRO 'WRT_MASK''.
;          4001  !
;          4002  !       IF THE COMPARE IS NOT EQUAL THE
;          4003  !       FORMAL PARAMETER 'ERR_FLG'' IS
;          4004  !       ASSIGNED A ONE TO INDICATE THE
;          4005  !       ERROR.
;          4006  !
;          4007  ! FORMAL PARAMETERS:
;          4008  !
;          4009  !       TST_PAT
;          4010  !       DATA PATTERN TO BE MASKED AND
;          4011  !       COMPARED AGAINST THE CONTENTS
;          4012  !       OF THE REGISTER UNDER TEST.
;          4013  !
;          4014  !       INDEX
;          4015  !       USED BY THE MACRO WRT_MASK TO
;          4016  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          4017  !       FORCED HI, FORCED LO AND DON'T CARE
;          4018  !       MASK INFORMATION
;          4019  !
;          4020  !       ERR_FLG
;          4021  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          4022  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;          4023  !       CALLER TO EXAMINE THE ERROR STATUS
;          4024  !       OF THE ROUTINE CALL.
;          4025  !
;          4026  ! IMPLICIT INPUTS:
;          4027  !       WT_DATA
;          4028  !         GETS LOADED WITH THE GENERATED
;          4029  !         WRT_MASK DATA PATTERN THUS ALLOWING
;          4030  !         CALLER TO PRINT FAILING GOOD DATA.
;          4031  !
;          4032  !       RD_DATA
;          4033  !         GETS LOADED WITH DATA READ FROM THE
;          4034  !         REGISTER THUS ALLOWING CALLER
;          4035  !         TO PRINT FAILING BAD DATA.
;          4036  !
;          4037  ! IMPLICIT OUTPUTS:
;          4038  !       GLOBAL LOCATION WR_DATA
;          4039  !       AND RD_DATA LOADED WITH GOOD
;          4040  !       AND BAD REGISTER DATA
;          4041  !
;          4042  !--
```

```
6147 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
6148 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (44)
6149
6150 ;          4043
6151 ;          4044        .ERR_FLG = ZERO;                        !CLEAR ERROR FLAG
6152 ;          4045        MLE2_MASK = %o'000377';                 !SET DATA DIAG MODE
6153 ;          4046        DAT_DM = ONE;
6154 ;          4047        ML_FUNC = write;                        !LOAD WRITE FUNCTION TO MLCS1
6155 ;          4048        DAT_CLK = ONE;                          !DO A DATA CLOCK
6156 ;          4049
6157 ;          4050        if .REG_INIT_FLG IS_SET                 !SEE IF CALLER IS  REG INIT TEST
6158 ;          4051        then                                    !CLEAR  MBUS TO GENERATE INIT DATA
6159 ;          4052            begin
6160 ;          4053            CLR_MBUS;
6161 ;          4054            DAT_DM = ONE;
6162 ;          4055            end;
6163 ;          4056
6164 ;          4057        WT_DATA = WRT_MASK;                     !SAVE THE DATA WRITTEN TO THE REGISTER
6165 ;          4058        RD_DATA = .MLE2 or .IGNORE;             !READ AND SAVE THE REGISTER
6166 ;          4059
6167 ;          4060        if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
6168 ;          4061
6169 ;          4062        MLE2_MASK = %o'100300';
6170 ;          4063        CLR_MBUS;                               !CLEAR THE MASS BUS
6171 ;          4064        end;
6175
6179 022514  004167  161324          RD.D3:  JSR     R1,$SAVE2                       ;                       3991
6180 022520  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               4044
6181 022524  012767  000377  170610          MOV     #377,ML.REG+166                 ;                       4045
6182 022532  152777  000010  170534          BISB    #10,@ML.REG+120                 ;                       4046
6183 022540  142777  000077  170406          BICB    #77,@ML.REG                     ;                       4047
6184 022546  152777  000061  170400          BISB    #61,@ML.REG
6185 022554  152777  000020  170512          BISB    #20,@ML.REG+120                 ;                       4048
6186 022562  026727  170350  000001          CMP     REG.INIT.FLG,#1                 ;                       4050
6187 022570  001017                          BNE     1$
6188 022572  152777  000040  170414          BISB    #40,@ML.REG+40                  ;                       4052
6189 022600  016701  170776                  MOV     ML.DUT,R1
6190 022604  042701  177770                  BIC     #177770,R1
6191 022610  142777  000007  170376          BICB    #7,@ML.REG+40
6192 022616  150177  170372                  BISB    R1,@ML.REG+40
6193 022622  152777  000010  170444          BISB    #10,@ML.REG+120                 ;                       4054
6194 022630  016600  000012          1$:     MOV     12(SP),R0                       ; INDEX,*               4057
6195 022634  006300                          ASL     R0
6196 022636  006300                          ASL     R0
6197 022640  006300                          ASL     R0
6198 022642  010001                          MOV     R0,R1
6199 022644  016100  013156                  MOV     ML.REG+2(R1),R0
6200 022650  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
```

```
6202                                    ;ML4                                                    22-Dec-1980 09:24:31    TOPS
6203                                    ;                                                       22-Dec-1980 09:21:22    PA:<
6204
6205  022654  046100  013160                    BIC     ML.REG+4(R1),R0
6206  022660  016102  013162                    MOV     ML.REG+6(R1),R2
6207  022664  050002                            BIS     R0,R2
6208  022666  010267  170234                    MOV     R2,WT.DATA
6209  022672  017702  170436                    MOV     @ML.REG+160,R2                  ;                       4058
6210  022676  056102  013162                    BIS     ML.REG+6(R1),R2
6211  022702  010267  170222                    MOV     R2,RD.DATA
6212  022706  026767  170214  170214            CMP     WT.DATA,RD.DATA                 ;                       4060
6213  022714  001403                            BEQ     2$
6214  022716  012776  000001  000010            MOV     #1,@10(SP)                      ; *,ERR.FLG
6215  022724  012767  100300  170410  2$:       MOV     #-77500,ML.REG+166              ;                       4062
6216  022732  152777  000040  170254            BISB    #40,@ML.REG+40
6217  022740  016702  170636                    MOV     ML.DUT,R2
6218  022744  042702  177770                    BIC     #177770,R2
6219  022750  142777  000007  170236            BICB    #7,@ML.REG+40
6220  022756  150277  170232                    BISB    R2,@ML.REG+40
6221  022762  000207                            RTS     PC                              ;                       3991
6222
6223                                    ; Routine Size:  84 words
6224                                    ; Maximum stack depth per invocation:  3 words
6229
6230
```

```
6232 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
6233 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (45)
6234
6235 ;          4065  routine WRT_DS (TST_PAT, index) : novalue =
6236 ;          4066      begin
6237 ;          4067
6238 ;          4068  !++
6239 ;          4069  ! FUNCTIONAL DESCRIPTION:
6240 ;          4070  !       DUMMY ROUTINE CALL TO ASSIST IN THE READ
6241 ;          4071  !       WRITE REGISTER ALGORITHEM
6242 ;          4072  !
6243 ;          4073  ! FORMAL PARAMETERS:
6244 ;          4074  !       TST_PAT
6245 ;          4075  !       DATA PATTERN TO BE MASKED AND
6246 ;          4076  !       COMPARED AGAINST THE CONTENTS
6247 ;          4077  !       OF THE REGISTER UNDER TEST
6248 ;          4078  !
6249 ;          4079  !       INDEX
6250 ;          4080  !       USED BY THE MACRO WRT_MASK TO
6251 ;          4081  !       SELECT THE CURRENT REGISTERS ADDRESS,
6252 ;          4082  !       FORCED HI, FORCED LO AND DON'T CARE
6253 ;          4083  !       MASK INFORMATION.
6254 ;          4084  !
6255 ;          4085  !--
6256 ;          4086
6257 ;          4087  !
6258 ;          4088  !  DRIVE STATUS REG IS READ ONLY
6259 ;          4089      return;
6260 ;          4090      end;
6264
6268 022764  000207                  WRT.DS: RTS     PC                              ;                    4065
6269
6270                                  ; Routine Size:  1 word
6271                                  ; Maximum stack depth per invocation:  0 words
6276
6277
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (46)

;          4091  routine RD_DS (TST_PAT, index, ERR_FLG) : novalue =
;          4092      begin
;          4093
;          4094  !++
;          4095  ! FUNCTIONAL DESCRIPTION:
;          4096  !
;          4097  !       COMPARES THE CONTENTS OF THE
;          4098  !       DRIVE STATUS REGISTER WITH THE
;          4099  !       MASKED DATA PATTERN
;          4100  !       GENERATED BY THE MACRO 'WRT_MASK'.
;          4101  !
;          4102  !       IF THE COMPARE IS NOT EQUAL THEN
;          4103  !       THE FORMAL PARAMETER 'ERR_FLG' IS
;          4104  !       ASSIGNED A ONE TO INDICATE THE
;          4105  !       ERROR.
;          4106  !
;          4107  ! FORMAL PARAMETERS:
;          4108  !
;          4109  !       TST_PAT
;          4110  !       DATA PATTERN TO BE MASKED AND
;          4111  !       COMPARED AGAINST THE CONTENTS
;          4112  !       OF THE REGISTER UNDER TEST.
;          4113  !
;          4114  !       INDEX
;          4115  !       USED BY THE MACRO WRT_MASK TO
;          4116  !       SELECT THE CURRENT REGISTERS ADDRESS,
;          4117  !       FORCED HI, FORCED LO AND DON'T CARE
;          4118  !       MASK INFORMATION.
;          4119  !
;          4120  !       ERR_FLG
;          4121  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          4122  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;          4123  !       CALLER TO EXAMINE THE ERROR STATUS
;          4124  !       OF THE ROUTINE CALL.
;          4125  !
;          4126  ! IMPLICIT INPUTS:
;          4127  !       WT_DATA
;          4128  !         GETS LOADED WITH THE GENERATED
;          4129  !         WRT_MASK DATA PATTERN THUS ALLOWING
;          4130  !         CALLER TO PRINT FAILING GOOD DATA.
;          4131  !
;          4132  !       RD_DATA
;          4133  !         GETS LOADED WITH DATA READ FROM THE
;          4134  !         REGISTER THUS ALLOWING CALLER
;          4135  !         TO PRINT FAILING BAD DATA.
;          4136  !
;          4137  ! IMPLICIT OUTPUTS:
;          4138  !       GLOBAL LOCATION WR_DATA
;          4139  !       AND RD_DATA LOADED WITH GOOD
;          4140  !       AND BAD REGISTER DATA
;          4141  !
;          4142  !--
```

```
6335 ;ML4.                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
6336 ;                                                        22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (46)
6337
6338 ;          4143
6339 ;          4144      .ERR_FLG = ZERO;                    !CLEAR THE ERROR FLAG
6340 ;          4145      WT_DATA = WRT_MASK;                 !SAVE THE DATA WRITTEN TO THE REGISTER
6341 ;          4146      RD_DATA = .MLDS or .IGNORE;         !READ AND SAVE THE REGISTER
6342 ;          4147
6343 ;          4148      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
6344 ;          4149
6345 ;          4150                                          !SET ERROR FLAG IF NEQ
6346 ;          4151      end;
6350
6354 022766  004167  161052          RD.DS:  JSR     R1,$SAVE2                       ;                       4091
6355 022772  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               4144
6356 022776  016600  000012                  MOV     12(SP),R0                       ; INDEX,*               4145
6357 023002  006300                          ASL     R0
6358 023004  006300                          ASL     R0
6359 023006  006300                          ASL     R0
6360 023010  010001                          MOV     R0,R1
6361 023012  016100  013156                  MOV     ML.REG+2(R1),R0
6362 023016  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
6363 023022  046100  013160                  BIC     ML.REG+4(R1),R0
6364 023026  016102  013162                  MOV     ML.REG+6(R1),R2
6365 023032  050002                          BIS     R0,R2
6366 023034  010267  170066                  MOV     R2,WT.DATA
6367 023040  017702  170160                  MOV     @ML.REG+50,R2                   ;                       4146
6368 023044  056102  013162                  BIS     ML.REG+6(R1),R2
6369 023050  010267  170054                  MOV     R2,RD.DATA
6370 023054  026767  170046  170046          CMP     WT.DATA,RD.DATA                 ;                       4148
6371 023062  001403                          BEQ     1$
6372 023064  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
6373 023072  000207                  1$:     RTS     PC                              ;                       4091
6374
6375                                  ; Routine Size:  35 words
6376                                  ; Maximum stack depth per invocation:  3 words
6381
6382
```

```
6384 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
6385 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (47)
6386
6387 ;          4152  routine WRT_REG (TST_PAT, REG_SEL, index) : novalue =
6388 ;          4153      begin
6389 ;          4154
6390 ;          4155  !++
6391 ;          4156  ! FUNCTIONAL DESCRIPTION:
6392 ;          4157  !       A ROUTINE TO SELECTIVELY
6393 ;          4158  !       CALLED ROUTINES WHICH
6394 ;          4159  !       WRITE TO INDIVIDUAL ML11
6395 ;          4160  !       REGISTERS
6396 ;          4161  !
6397 ;          4162  ! FORMAL PARAMETERS:
6398 ;          4163  !       REG_SEL
6399 ;          4164  !       CASE SELECT EXPRESSION TO
6400 ;          4165  !       SELECT THE WRITE REGISTER
6401 ;          4166  !       ROUTINE TO CALLED
6402 ;          4167  !
6403 ;          4168  !       TST_PAT
6404 ;          4169  !       DATA PATTERN WHICH THE SELECTED
6405 ;          4170  !       REGISTER WILL BE TESTED AGAINST
6406 ;          4171  !
6407 ;          4172  !       INDEX
6408 ;          4173  !       LOADED WITH THE ML_REG INDEX
6409 ;          4174  !       SELECT NUMBER OF THE REGISTER
6410 ;          4175  !       BEING TESTED
6411 ;          4176  !
6412 ;          4177  ! SIDE EFFECTS:'
6413 ;          4178  !       WHEN A WRITE REGISTER ROUTINE IS CALLED
6414 ;          4179  !       THE VARIABLE 'INDEX' FROM THE CALLING
6415 ;          4180  !       TEST IS LOADED WITH THE REGISTERS
6416 ;          4181  !       ML_REG INDEX NUMBER.
6417 ;          4182  !
6418 ;          4183  !       THIS ENABLES THE CALLING TEST JO FIND
6419 ;          4184  !       THE FAILING REGISTER ADDRESS.
6420 ;          4185  !
6421 ;          4186  !--
6422 ;          4187
6423 ;          4188      case .REG_SEL from 0 to 13 of          !SELECT THE WRITE REGISTER ROUTINE CALL
6424 ;          4189          set
6425 ;          4190
6426 ;          4191          [0] :
6427 ;          4192              WRT_CS1 (.TST_PAT, .index = 0);     !CALL ROUTINE TO LOAD MLCS1
6428 ;          4193
6429 ;          4194          [1] :
6430 ;          4195              WRT_ER (.TST_PAT, .index = 6);      !CALL ROUTINE TO LOAD MLER
6431 ;          4196
6432 ;          4197          [2] :
6433 ;          4198              WRT_DA (.TST_PAT, .index = 3);      !CALL ROUTINE TO LOAD MLDA
6434 ;          4199
6435 ;          4200          [3] :
6436 ;          4201              WRT_MR (.TST_PAT, .index = 10);     !CALL ROUTINE TO LOAD MLMR
6437 ;          4202
6438 ;          4203          [4] :
```

```
6440 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
6441 :                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (47)
6442
6443 :          4204          WRT_E1 (.TST_PAT, .index = 13);     !CALL ROUTINE TO LOAD MLE1
6444 :          4205
6445 :          4206      [5] :
6446 :          4207          WRT_E2 (.TST_PAT, .index = 14);     !CALL ROUTINE TO LOAD MLE2
6447 :          4208
6448 :          4209      [6] :
6449 :          4210          WRT_PA (.TST_PAT, .index = 8);      !CALL ROUTINE TO LOAD MLPA
6450 :          4211
6451 :          4212      [7] :
6452 :          4213          WRT_PD (.TST_PAT, .index = 19);     !CALL ROUTINE TO LOAD MLPD
6453 :          4214
6454 :          4215      [8] :
6455 :          4216          WRT_EE (.TST_PAT, .index = 17);     !CALL ROUTINE TO LOAD MLEE
6456 :          4217
6457 :          4218      [9] :
6458 :          4219          WRT_EL (.TST_PAT, .index = 18);     !CALL ROUTINE TO LOAD MLEL
6459 :          4220
6460 :          4221     [10] :
6461 :          4222          WRT_DS (.TST_PAT, .index = 5);      !CALL ROUTINE TO LOAD MLDS
6462 :          4223
6463 :          4224     [11] :
6464 :          4225          WRT_D1 (.TST_PAT, .index = 15);     !CALL ROUTINE TO LOAD MLD1
6465 :          4226
6466 :          4227     [12] :
6467 :          4228          WRT_D2 (.TST_PAT, .index = 16);     !CALL ROUTINE TO LOAD MLD2
6468 :          4229
6469 :          4230     [13] :
6470 :          4231          WRT_D3 (.TST_PAT, .index = 14);     !CALL ROUTINE TO LOAD MLE2
6471 :          4232      tes;
6472 :          4233
6473 :          4234  end;
6477
6481 023074  004167  160744          WRT.REG:JSR     R1,$SAVE2                       ;                          4152
6482 023100  016600  000010                  MOV     10(SP),R0                       ; INDEX,*                  4192
6483 023104  016601  000014                  MOV     14(SP),R1                       ; TST.PAT,*
6484 023110  016602  000012                  MOV     12(SP),R2                       ; REG.SEL,*                4188
6485 023114  006302                          ASL     R2
6486 023116  066207  023122                  ADD     1$(R2),PC
6487 023122  000034                  1$:     .WORD   2$-1$
6488 023124  000050                          .WORD   3$-1$
6489 023126  000066                          .WORD   4$-1$
6490 023130  000104                          .WORD   5$-1$
6491 023132  000122                          .WORD   6$-1$
6492 023134  000140                          .WORD   7$-1$
6493 023136  000156                          .WORD   8$-1$
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
                                                .WORD   9$-1$
                                                .WORD   10$-1$
                                                .WORD   11$-1$
                                                .WORD   12$-1$
                                                .WORD   13$-1$
                                                .WORD   14$-1$
                                                .WORD   15$-1$
                                        2$:     MOV     R1,-(SP)                ;               4192
                                                CLR     (R0)
                                                CLR     -(SP)
                                                JSR     PC,WRT.CS1
                                                BR      16$                     ;               4188
                                        3$:     MOV     R1,-(SP)                ;               4195
                                                MOV     #6,(R0)
                                                MOV     (R0),-(SP)
                                                JSR     PC,WRT.ER
                                                BR      16$                     ;               4188
                                        4$:     MOV     R1,-(SP)                ;               4198
                                                MOV     #3,(R0)
                                                MOV     (R0),-(SP)
                                                JSR     PC,WRT.DA
                                                BR      16$                     ;               4188
                                        5$:     MOV     R1,-(SP)                ;               4201
                                                MOV     #12,(R0)
                                                MOV     (R0),-(SP)
                                                JSR     PC,WRT.MR
                                                BR      16$                     ;               4188
                                        6$:     MOV     R1,-(SP)                ;               4204
                                                MOV     #15,(R0)
                                                MOV     (R0),-(SP)
                                                JSR     PC,WRT.E1
                                                BR      16$                     ;               4188
                                        7$:     MOV     R1,-(SP)                ;               4207
                                                MOV     #16,(R0)
                                                MOV     (R0),-(SP)
                                                JSR     PC,WRT.E2
                                                BR      16$                     ;               4188
                                        8$:     MOV     R1,-(SP)                ;               4210
                                                MOV     #10,(R0)
                                                MOV     (R0),-(SP)
                                                JSR     PC,WRT.PA
                                                BR      16$                     ;               4188
                                        9$:     MOV     R1,-(SP)                ;               4213
                                                MOV     #23,(R0)
                                                MOV     (R0),-(SP)
                                                JSR     PC,WRT.PD
                                                BR      16$                     ;               4188
                                        10$:    MOV     R1,-(SP)                ;               4216
                                                MOV     #21,(R0)
                                                MOV     (R0),-(SP)
                                                JSR     PC,WRT.EE
                                                BR      16$                     ;               4188
```

```
6551                                    ;ML4                                                    22-Dec-1980 09:24:31    TOPS
6552                                    ;                                                       22-Dec-1980 09:21:22    PA:<
6553
6554 023352  010146                     11$:    MOV     R1,-(SP)                ;                                       4219
6555 023354  012710  000022                     MOV     #22,(R0)
6556 023360  011046                             MOV     (R0),-(SP)
6557 023362  004767  176076                     JSR     PC,WRT.EL
6558 023366  000433                             BR      16$                     ;                                       4188
6559 023370  010146                     12$:    MOV     R1,-(SP)                ;                                       4222
6560 023372  012710  000005                     MOV     #5,(R0)
6561 023376  011046                             MOV     (R0),-(SP)
6562 023400  004767  177360                     JSR     PC,WRT.DS
6563 023404  000424                             BR      16$                     ;                                       4188
6564 023406  010146                     13$:    MOV     R1,-(SP)                ;                                       4225
6565 023410  012710  000017                     MOV     #17,(R0)
6566 023414  011046                             MOV     (R0),-(SP)
6567 023416  004767  176146                     JSR     PC,WRT.D1
6568 023422  000415                             BR      16$                     ;                                       4188
6569 023424  010146                     14$:    MOV     R1,-(SP)                ;                                       4228
6570 023426  012710  000020                     MOV     #20,(R0)
6571 023432  011046                             MOV     (R0),-(SP)
6572 023434  004767  176442                     JSR     PC,WRT.D2
6573 023440  000406                             BR      16$                     ;                                       4188
6574 023442  010146                     15$:    MOV     R1,-(SP)                ;                                       4231
6575 023444  012710  000016                     MOV     #16,(R0)
6576 023450  011046                             MOV     (R0),-(SP)
6577 023452  004767  176736                     JSR     PC,WRT.D3
6578 023456  022626                     16$:    CMP     (SP)+,(SP)+             ;                                       4153
6579 023460  000207                             RTS     PC                      ;                                       4152
6580
6581                                    ; Routine Size:  123 words
6582                                    ; Maximum stack depth per invocation:  5 words
6587
6588
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (48)

;          4235  routine RD_REG (TST_PAT, REG_SEL, ERR_FLG) : novalue =
;          4236      begin
;          4237
;          4238  !++
;          4239  ! FUNCTIONAL DESCRIPTION:
;          4240  !       A ROUTINE TO SELECTIVELY
;          4241  !       CALLED ROUTINES WHICH
;          4242  !       READ TO INDIVIDUAL ML11
;          4243  !       REGISTERS.
;          4244  !
;          4245  ! FORMAL PARAMETERS:
;          4246  !       ERR_FLG
;          4247  !       CONTAINS THE ADDRESS (PASSED BY REF)
;          4248  !       OF THE CALLERS ERROR FLG TO ENABLE THE
;          4249  !       CALLER TO EXAMINE THE ERROR STATUS
;          4250  !       OF THE ROUTINE CALL.
;          4251  !
;          4252  !       REG_SEL
;          4253  !       CASE SELECT EXPRESSION TO
;          4254  !       SELECT THE WRITE REGISTER
;          4255  !       ROUTINE TO CALLED
;          4256  !
;          4257  !       TST_PAT
;          4258  !       DATA PATTERN WHICH THE SELECTED
;          4259  !       REGISTER WILL BE TESTED AGAINST
;          4260  !
;          4261  !--
;          4262
;          4263      case .REG_SEL from 0 to 13 of                 !SELECT THE READ REGISTER ROUTINE CALL
;          4264          set
;          4265
;          4266          [0] :
;          4267              RD_CS1 (.TST_PAT, 0, .ERR_FLG);       !CALL ROOUTINE TO READ MLCS1
;          4268
;          4269          [1] :
;          4270              RD_ER (.TST_PAT, 6, .ERR_FLG);        !CALL ROUTINE TO READ MLER
;          4271
;          4272          [2] :
;          4273              RD_DA (.TST_PAT, 3, .ERR_FLG);        !CALL ROUTINE TO READ MLDA
;          4274
;          4275          [3] :
;          4276              RD_MR (.TST_PAT, 10, .ERR_FLG);       !CALL ROUTINE TO READ MLMR
;          4277
;          4278          [4] :
;          4279              RD_E1 (.TST_PAT, 13, .ERR_FLG);       !CALL ROUTINE TO READ MLE1
;          4280
;          4281          [5] :
;          4282              RD_E2 (.TST_PAT, 14, .ERR_FLG);       !CALL ROUTINE TO READ MLE2
;          4283
;          4284          [6] :
;          4285              RD_PA (.TST_PAT, 8, .ERR_FLG);        !CALL ROUTINE TO READ MLPA
;          4286
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (48)

;          4287          [7] :
;          4288              RD_PD (.TST_PAT, 19, .ERR_FLG);     !CALL ROUTINE TO READ MLPD
;          4289
;          4290          [8] :
;          4291              RD_EE (.TST_PAT, 17, .ERR_FLG);     !CALL ROUTINE TO READ MLEE
;          4292
;          4293          [9] :
;          4294              RD_EL (.TST_PAT, 18, .ERR_FLG);     !CALL ROUTINE TO READ MLEL
;          4295
;          4296          [10] :
;          4297              RD_DS (.TST_PAT, 5, .ERR_FLG);      !CALL ROUTINE TO READ MLDS
;          4298
;          4299          [11] :
;          4300              RD_D1 (.TST_PAT, 15, .ERR_FLG);     !CALL ROUTINE TO READ MLD1
;          4301
;          4302          [12] :
;          4303              RD_D2 (.TST_PAT, 16, .ERR_FLG);     !CALL ROUTINE TO READ MLD2
;          4304
;          4305          [13] :
;          4306              RD_D3 (.TST_PAT, 14, .ERR_FLG);     !CALL ROUTINE TO READ MLE2
;          4307          tes;
;          4308
;          4309      end;

023462  004167  160356          RD.REG: JSR     R1,$SAVE2                       ;                       4235
023466  016600  000010                  MOV     10(SP),R0                       ; ERR.FLG,*             4267
023472  016601  000014                  MOV     14(SP),R1                       ; TST.PAT,*
023476  016602  000012                  MOV     12(SP),R2                       ; REG.SEL,*             4263
023502  006302                          ASL     R2
023504  066207  023510                  ADD     1$(R2),PC
023510  000034                  1$:     .WORD   2$-1$
023512  000050                          .WORD   3$-1$
023514  000066                          .WORD   4$-1$
023516  000104                          .WORD   5$-1$
023520  000122                          .WORD   6$-1$
023522  000140                          .WORD   7$-1$
023524  000156                          .WORD   8$-1$
023526  000174                          .WORD   9$-1$
023530  000212                          .WORD   10$-1$
023532  000230                          .WORD   11$-1$
023534  000246                          .WORD   12$-1$
023536  000264                          .WORD   13$-1$
023540  000302                          .WORD   14$-1$
023542  000320                          .WORD   15$-1$
023544  010146                  2$:     MOV     R1,-(SP)                        ;                       4267
```

```
6701                                    ;ML4                                                    22-Dec-1980 09:24:31    TOPS
6702                                    ;                                                       22-Dec-1980 09:21:22    PA:<
6703
6704 023546  005046                            CLR     -(SP)
6705 023550  010046                            MOV     R0,-(SP)
6706 023552  004767  173754                    JSR     PC,RD.CS1
6707 023556  000532                            BR      16$                                                             4263
6708 023560  010146                    3$:     MOV     R1,-(SP)                ;                                       4270
6709 023562  012746  000006                    MOV     #6,-(SP)
6710 023566  010046                            MOV     R0,-(SP)
6711 023570  004767  174114                    JSR     PC,RD.ER
6712 023574  000523                            BR      16$                                                             4263
6713 023576  010146                    4$:     MOV     R1,-(SP)                ;                                       4273
6714 023600  012746  000003                    MOV     #3,-(SP)
6715 023604  010046                            MOV     R0,-(SP)
6716 023606  004767  174254                    JSR     PC,RD.DA
6717 023612  000514                            BR      16$                                                             4263
6718 023614  010146                    5$:     MOV     R1,-(SP)                ;                                       4276
6719 023616  012746  000012                    MOV     #12,-(SP)
6720 023622  010046                            MOV     R0,-(SP)
6721 023624  004767  174414                    JSR     PC,RD.MR
6722 023630  000505                            BR      16$                                                             4263
6723 023632  010146                    6$:     MOV     R1,-(SP)                ;                                       4279
6724 023634  012746  000015                    MOV     #15,-(SP)
6725 023640  010046                            MOV     R0,-(SP)
6726 023642  004767  174776                    JSR     PC,RD.E1
6727 023646  000476                            BR      16$                                                             4263
6728 023650  010146                    7$:     MOV     R1,-(SP)                ;                                       4282
6729 023652  012746  000016                    MOV     #16,-(SP)
6730 023656  010046                            MOV     R0,-(SP)
6731 023660  004767  175200                    JSR     PC,RD.E2
6732 023664  000467                            BR      16$                                                             4263
6733 023666  010146                    8$:     MOV     R1,-(SP)                ;                                       4285
6734 023670  012746  000010                    MOV     #10,-(SP)
6735 023674  010046                            MOV     R0,-(SP)
6736 023676  004767  174534                    JSR     PC,RD.PA
6737 023702  000460                            BR      16$                                                             4263
6738 023704  010146                    9$:     MOV     R1,-(SP)                ;                                       4288
6739 023706  012746  000023                    MOV     #23,-(SP)
6740 023712  010046                            MOV     R0,-(SP)
6741 023714  004767  175406                    JSR     PC,RD.PD
6742 023720  000451                            BR      16$                                                             4263
6743 023722  010146                    10$:    MOV     R1,-(SP)                ;                                       4291
6744 023724  012746  000021                    MOV     #21,-(SP)
6745 023730  010046                            MOV     R0,-(SP)
6746 023732  004767  175572                    JSR     PC,RD.EE
6747 023736  000442                            BR      16$                                                             4263
6748 023740  010146                    11$:    MOV     R1,-(SP)                ;                                       4294
6749 023742  012746  000022                    MOV     #22,-(SP)
6750 023746  010046                            MOV     R0,-(SP)
6751 023750  004767  175512                    JSR     PC,RD.EL
6752 023754  000433                            BR      16$                                                             4263
6753 023756  010146                    12$:    MOV     R1,-(SP)                ;                                       4297
6754 023760  012746  000005                    MOV     #5,-(SP)
6755 023764  010046                            MOV     R0,-(SP)
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
                                                                                                                        
023766  004767  176774                        JSR     PC,RD.DS                                                      
023772  000424                                BR      16$                                                           4263
                                        13$:    MOV     R1,-(SP)                ;                                     4300
023776  012746  000017                        MOV     #17,-(SP)                                                     
024002  010046                                MOV     R0,-(SP)                                                      
024004  004767  175644                        JSR     PC,RD.D1                                                      
024010  000415                                BR      16$                     ;                                     4263
                                        14$:    MOV     R1,-(SP)                ;                                     4303
024014  012746  000020                        MOV     #20,-(SP)                                                     
024020  010046                                MOV     R0,-(SP)                                                      
024022  004767  176140                        JSR     PC,RD.D2                                                      
024026  000406                                BR      16$                     ;                                     4263
                                        15$:    MOV     R1,-(SP)                ;                                     4306
024032  012746  000016                        MOV     #16,-(SP)                                                     
024036  010046                                MOV     R0,-(SP)                                                      
024040  004767  176450                        JSR     PC,RD.D3                                                      
024044  062706  000006                16$:    ADD     #6,SP                   ;                                     4236
024050  000207                                RTS     PC                      ;                                     4235
                                                                                                                        
                                        ; Routine Size:  124 words                                                      
                                        ; Maximum stack depth per invocation:  6 words                                  
                                                                                                                        
                                                                                                                        
;               4310  !<BLF/PAGE>
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (49)

;          4311  BGNMSG (DUMPER);

6800 024052  004767  000004          DUMPER::JSR     PC,MSDUMPER                     ;                       4311
6801 024056  104423                         TRAP    23
6802 024060  000207                         RTS     PC

                                    ; Routine Size:  4 words
                                    ; Maximum stack depth per invocation:  0 words

;          4312
;          4313  !++
;          4314  !       FUNCTIONAL DESCRIPTION
;          4315  !               UPON COMPLETION OF ERROR MESSAGES
;          4316  !               DUMP OUT ALL PERTINENT DRIVE AND
;          4317  !               RH REGISTERS
;          4318  !--
;          4319
;          4320  PRINTB (ONE_FMT, PHR_14);                    !PRINT REGISTER DUMP MESSAGE
;          4321  PRINTB (FMT_23);                             !PRINT DUMPER COLUMN HEADINGS
;          4322  PRINTB (FMT_24, REG_1, MLCS1, .MLCS1);       !PRINT OUT THE RH & ML11 REGISTER CONTENTS
;          4323  PRINTB (FMT_24, REG_18, MLWC, .MLWC);
;          4324  PRINTB (FMT_24, REG_19, MLBA, .MLBA);
;          4325  PRINTB (FMT_24, REG_6, MLDA, .MLDA);
;          4326  PRINTB (FMT_24, REG_17, MLCS2, .MLCS2);
;          4327  PRINTB (FMT_24, REG_2, MLDS, .MLDS);
;          4328  PRINTB (FMT_24, REG_3, MLER, .MLER);
;          4329  PRINTB (FMT_24, REG_5, MLAS, .MLAS);
;          4330  PRINTB (FMT_24, REG_4, MLMR, .MLMR);
;          4331  PRINTB (FMT_24, REG_7, MLDT, .MLDT);
;          4332  PRINTB (FMT_24, REG_9, MLSN, .MLSN);
;          4333  PRINTB (FMT_24, REG_14, MLEE, .MLEE);
;          4334  PRINTB (FMT_24, REG_15, MLEL, .MLEL);
;          4335
;          4336  if .LST_DUT_REG eql 21                    !SEE IF THIS IS A RH70
;          4337  then                                      !IF YES THEN PRINT RH70 REGISTERS
;          4338      begin
;          4339      PRINTB (FMT_24, REG_20, MLBAE, .MLBAE);
;          4340      PRINTB (FMT_24, REG_21, MLCS3, .MLCS3);
;          4341      end;
;          4342
```

```
6844 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
6845 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (49)
6846
6847 ;          4343  ENDMSG;
6851
6855 024062                          MSDUMPER:
6856 024062  012746  007662                  MOV     #PHR.14,-(SP)                   ;                       4320
6857 024066  012746  006016                  MOV     #ONE.FMT,-(SP)
6858 024072  012746  000002                  MOV     #2,-(SP)
6859 024076  010600                          MOV     SP,R0                           ; SP,*
6860 024100  104414                          TRAP    14
6861 024102  012716  005652                  MOV     #FMT.23,(SP)                    ;                       4321
6862 024106  012746  000001                  MOV     #1,-(SP)
6863 024112  010600                          MOV     SP,R0                           ; SP,*
6864 024114  104414                          TRAP    14
6865 024116  017716  167032                  MOV     @ML.REG,(SP)                    ;                       4322
6866 024122  016746  167026                  MOV     ML.REG,-(SP)
6867 024126  012746  010256                  MOV     #REG.1,-(SP)
6868 024132  012746  005722                  MOV     #FMT.24,-(SP)
6869 024136  012746  000004                  MOV     #4,-(SP)
6870 024142  010600                          MOV     SP,R0                           ; SP,*
6871 024144  104414                          TRAP    14
6872 024146  017716  167012                  MOV     @ML.REG+10,(SP)                 ;                       4323
6873 024152  016746  167006                  MOV     ML.REG+10,-(SP)
6874 024156  012746  010430                  MOV     #REG.18,-(SP)
6875 024162  012746  005722                  MOV     #FMT.24,-(SP)
6876 024166  012746  000004                  MOV     #4,-(SP)
6877 024172  010600                          MOV     SP,R0                           ; SP,*
6878 024174  104414                          TRAP    14
6879 024176  017716  166772                  MOV     @ML.REG+20,(SP)                 ;                       4324
6880 024202  016746  166766                  MOV     ML.REG+20,-(SP)
6881 024206  012746  010436                  MOV     #REG.19,-(SP)
6882 024212  012746  005722                  MOV     #FMT.24,-(SP)
6883 024216  012746  000004                  MOV     #4,-(SP)
6884 024222  010600                          MOV     SP,R0                           ; SP,*
6885 024224  104414                          TRAP    14
6886 024226  017716  166752                  MOV     @ML.REG+30,(SP)                 ;                       4325
6887 024232  016746  166746                  MOV     ML.REG+30,-(SP)
6888 024236  012746  010316                  MOV     #REG.6,-(SP)
6889 024242  012746  005722                  MOV     #FMT.24,-(SP)
6890 024246  012746  000004                  MOV     #4,-(SP)
6891 024252  010600                          MOV     SP,R0                           ; SP,*
6892 024254  104414                          TRAP    14
6893 024256  017716  166732                  MOV     @ML.REG+40,(SP)                 ;                       4326
6894 024262  016746  166726                  MOV     ML.REG+40,-(SP)
6895 024266  012746  010420                  MOV     #REG.17,-(SP)
6896 024272  012746  005722                  MOV     #FMT.24,-(SP)
6897 024276  012746  000004                  MOV     #4,-(SP)
```

```
                                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                                    22-Dec-1980 09:21:22    PA:<
 6899                                ;ML4
 6900                                ;
 6901
 6902 024302  010600                        MOV     SP,R0                           ; SP,*
 6903 024304  104414                        TRAP    14
 6904 024306  017716  166712                MOV     @ML.REG+50,(SP)                 ;                                       4327
 6905 024312  016746  166706                MOV     ML.REG+50,-(SP)
 6906 024316  012746  010266                MOV     #REG.2,-(SP)
 6907 024322  012746  005722                MOV     #FMT.24,-(SP)
 6908 024326  012746  000004                MOV     #4,-(SP)
 6909 024332  010600                        MOV     SP,R0                           ; SP,*
 6910 024334  104414                        TRAP    14
 6911 024336  017716  166672                MOV     @ML.REG+60,(SP)                 ;                                       4328
 6912 024342  016746  166666                MOV     ML.REG+60,-(SP)
 6913 024346  012746  010274                MOV     #REG.3,-(SP)
 6914 024352  012746  005722                MOV     #FMT.24,-(SP)
 6915 024356  012746  000004                MOV     #4,-(SP)
 6916 024362  010600                        MOV     SP,R0                           ; SP,*
 6917 024364  104414                        TRAP    14
 6918 024366  017716  166652                MOV     @ML.REG+70,(SP)                 ;                                       4329
 6919 024372  016746  166646                MOV     ML.REG+70,-(SP)
 6920 024376  012746  010310                MOV     #REG.5,-(SP)
 6921 024402  012746  005722                MOV     #FMT.24,-(SP)
 6922 024406  012746  000004                MOV     #4,-(SP)
 6923 024412  010600                        MOV     SP,R0                           ; SP,*
 6924 024414  104414                        TRAP    14
 6925 024416  017716  166652                MOV     @ML.REG+120,(SP)                ;                                       4330
 6926 024422  016746  166646                MOV     ML.REG+120,-(SP)
 6927 024426  012746  010302                MOV     #REG.4,-(SP)
 6928 024432  012746  005722                MOV     #FMT.24,-(SP)
 6929 024436  012746  000004                MOV     #4,-(SP)
 6930 024442  010600                        MOV     SP,R0                           ; SP,*
 6931 024444  104414                        TRAP    14
 6932 024446  017716  166632                MOV     @ML.REG+130,(SP)                ;                                       4331
 6933 024452  016746  166626                MOV     ML.REG+130,-(SP)
 6934 024456  012746  010324                MOV     #REG.7,-(SP)
 6935 024462  012746  005722                MOV     #FMT.24,-(SP)
 6936 024466  012746  000004                MOV     #4,-(SP)
 6937 024472  010600                        MOV     SP,R0                           ; SP,*
 6938 024474  104414                        TRAP    14
 6939 024476  017716  166612                MOV     @ML.REG+140,(SP)                ;                                       4332
 6940 024502  016746  166606                MOV     ML.REG+140,-(SP)
 6941 024506  012746  010340                MOV     #REG.9,-(SP)
 6942 024512  012746  005722                MOV     #FMT.24,-(SP)
 6943 024516  012746  000004                MOV     #4,-(SP)
 6944 024522  010600                        MOV     SP,R0                           ; SP,*
 6945 024524  104414                        TRAP    14
 6946 024526  017716  166632                MOV     @ML.REG+210,(SP)                ;                                       4333
 6947 024532  016746  166626                MOV     ML.REG+210,-(SP)
 6948 024536  012746  010376                MOV     #REG.14,-(SP)
 6949 024542  012746  005722                MOV     #FMT.24,-(SP)
 6950 024546  012746  000004                MOV     #4,-(SP)
 6951 024552  010600                        MOV     SP,R0                           ; SP,*
 6952 024554  104414                        TRAP    14
 6953 024556  062706  000146                ADD     #146,SP
```

```
                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                    22-Dec-1980 09:21:22    PA:<
                        ;ML4
                        ;
6958 024562 017716 166606       MOV     @ML.REG+220,(SP)                ;                               4334
6959 024566 016746 166602       MOV     ML.REG+220,-(SP)
6960 024572 012746 010404       MOV     #REG.15,-(SP)
6961 024576 012746 005722       MOV     #FMT.24,-(SP)
6962 024602 012746 000004       MOV     #4,-(SP)
6963 024606 010600              MOV     SP,R0                           ; SP,*
6964 024610 104414              TRAP    14
6965 024612 026727 166316 000025        CMP     LST.DUT.REG,#25         ;                               4336
6966 024620 001032              BNE     1$
6967 024622 017746 166566       MOV     @ML.REG+240,-(SP)               ;                               4339
6968 024626 016746 166562       MOV     ML.REG+240,-(SP)
6969 024632 012746 010444       MOV     #REG.20,-(SP)
6970 024636 012746 005722       MOV     #FMT.24,-(SP)
6971 024642 012746 000004       MOV     #4,-(SP)
6972 024646 010600              MOV     SP,R0                           ; SP,*
6973 024650 104414              TRAP    14
6974 024652 017716 166546       MOV     @ML.REG+250,(SP)                ;                               4340
6975 024656 016746 166542       MOV     ML.REG+250,-(SP)
6976 024662 012746 010454       MOV     #REG.21,-(SP)
6977 024666 012746 005722       MOV     #FMT.24,-(SP)
6978 024672 012746 000004       MOV     #4,-(SP)
6979 024676 010600              MOV     SP,R0                           ; SP,*
6980 024700 104414              TRAP    14
6981 024702 062706 000022       ADD     #22,SP                          ;                               4338
6982 024706 062706 000012 1$:   ADD     #12,SP                          ;                               4311
6983 024712 000207              RTS     PC
6984
6985                            ; Routine Size:  205 words
6986                            ; Maximum stack depth per invocation:  52 words
6991
6992
6993 ;           4344  !<BLF/PAGE>
```

```
6995 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
6996 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (50)
6997 ;
6998 ;          4345  !
6999 ;          4346  BGNINIT;
7000 ;          4347  !       INITIALIZATION CODE IS EXECUTED AT THE BEGINNING OF EACH
7001 ;          4348  !       PASS, WHEN POWER DOWN/POWER UP HAS OCCURRED, OR WHEN THE
7002 ;          4349  !       OPERATOR HAS ISSUED A START, RESTART OR CONTINUE COMMAND.
7003 ;          4350  !         DURING INITIALIZATION, THE 'GPHARD' MACRO IS USED TO GET
7004 ;          4351  !       P-TABLE INFORMATION FOR THE LOGICAL UNIT UNDER TEST. THE
7005 ;          4352  !       NUMBER OF UNITS  AVAILABLE FOR TESTING IS CONTAINED IN A
7006 ;          4353  !       HEADER LOCATION ('L$UNIT').
7007 ;          4354
7008 ;          4355  local
7009 ;          4356      OFFSET;
7010 ;          4357
7011 ;          4358  external
7012 ;          4359      L$UNIT;
7013 ;          4360
7014 ;          4361  if not READEF (EF_CONTINUE)                    !SKIP INIT CODE IF CONTINUE
7015 ;          4362  then
7016 ;          4363      begin                                      !START GPHARDS AT LUN 0 AND LOAD 'ML_REG'
7017 ;          4364
7018 ;          4365      if READEF (EF_START)                       !SEE IF THIS IS THE VERY FIRST PASS
7019 ;          4366      then
7020 ;          4367          begin                                  !THIS IS CATEGORY 1 CODE
7021 ;          4368          ML_LUN = -1;
7022 ;          4369
7023 ;          4370          do
7024 ;          4371              begin
7025 ;          4372              ML_LUN = .ML_LUN + 1;              !INCREMENT LOGICAL UNIT NUMBER
7026 ;          4373
7027 ;          4374              if .ML_LUN geq .L$UNIT then DOCLN; !START OVER IF ALL UNITS HAVE BEEN TESTED
7028 ;          4375
7029 ;          4376              end
7030 ;          4377          until (GPHARD (.ML_LUN, PTBL_PTR)) neq 0;      !REPEAT THE GPHARD UNTIL A 0 IS RETURNED
7031 ;          4378
7032 ;          4379          RH_ADD = .((.PTBL_PTR) + 0);           !GET BASE RH ADDRESS FOR THIS UNIT
7033 ;          4380          RH_TYP = .((.PTBL_PTR) + 2);           !GET RH TYPE FOR THIS UNIT
7034 ;          4381          RH_VEC = .((.PTBL_PTR) + 4);           !GET RH VECTOR FOR THIS UNIT
7035 ;          4382          OFFSET = 0;                            !INIT OFF SET COUNT
7036 ;          4383
7037 ;          4384          incr COUNT from 0 to 21 do             !LOAD THE REGISTER ADDRESS FOR THIS UNIT INTO ML_REG
7038 ;          4385              begin
7039 ;          4386              ML_REG [.COUNT, REGISTER_ADD] = .RH_ADD + .OFFSET;
7040 ;          4387              OFFSET = .OFFSET + 2;
7041 ;          4388              end;
7042 ;          4389
7043 ;          4390          end
7044 ;          4391      else                                       !IS THIS A NEW PASS
7045 ;          4392          begin
7046 ;          4393
7047 ;          4394          if READEF (EF_NEW) then ML_LUN = -1;   !IF NEW PASS START GPHARDS AT LUN 0
7048 ;          4395
7049 ;          4396          do
```

```
7051 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
7052 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (50)
7053
7054 ;          4397              begin
7055 ;          4398              ML_LUN = .ML_LUN + 1;                  !IF NOT GET NEXT LUN PTABLE
7056 ;          4399
7057 ;          4400              if .ML_LUN geq .LSUNIT then DOCLN;     !START OVER IF ALL UNITS ARE TESTED
7058 ;          4401
7059 ;          4402              end
7060 ;          4403          until (GPWARD (.ML_LUN, PTBL_PTR)) neq 0;
7061 ;          4404
7062 ;          4405          end;
7063 ;          4406
7064 ;          4407      PAR_DIS = .((.PTBL_PTR) + 12);             !GET PARITY DISABLE FLAG
7065 ;          4408      ML_DUT = .((.PTBL_PTR) + 10);              !GET DRIVE NUMBER
7066 ;          4409      OP_NUM_ARR = .((.PTBL_PTR) + 6) - 1;       !GET OPERATOR NUMBER OF ARRAYS
7067 ;          4410      GOOD_BLK = ZEROES;                         !INIT GOOD BLOCK TO BLOCK ZERO
7068 ;          4411      ARR_16 = ZEROES;                           !INIT ARRAY 16 TO ZERO
7069 ;          4412      LST_ARR = ZEROES;                          !INIT LAST ARRAY TO ZERO
7070 ;          4413      LST_BLK = ZEROES;                          !INIT LAST BLOCK TO ZERO
7071 ;          4414
7072 ;          4415      if .((.PTBL_PTR) + 8) IS_SET               !CALCULATE ML11 16K MOS RAM PARAMETERS
7073 ;          4416      then
7074 ;          4417          begin
7075 ;          4418          DRIVE_TYPE = %o'000110';               !EXPECTED DRIVE TYPE VALUE
7076 ;          4419          W_C_SIZE = %o'140000';                 !WORD COUNT SIZE FOR 16K WORD XFER
7077 ;          4420          RAS_INC = %o'200';                     !RAS INCREMENT FOR 16K RAMS
7078 ;          4421          CHIP_SIZ = 16;                         !CHIP SIZE
7079 ;          4422          ARR_INC = %o'1000';                    !ARRAY INCREMENT
7080 ;          4423          ARR_16<9, 4> = %o'17';                 !ARRAY 16
7081 ;          4424          LST_ARR<9, 4> = .OP_NUM_ARR;           !LAST ARRAY
7082 ;          4425          LST_BLK<9, 4> = .OP_NUM_ARR;           !LAST BLOCK
7083 ;          4426          LST_BLK = .LST_BLK or %o'777';
7084 ;          4427          end
7085 ;          4428      else                                       !CALCULATE ML11 64K MOS RAM PARAMETERS
7086 ;          4429          begin
7087 ;          4430          DRIVE_TYPE = %o'000111';               !EXPECTED DRIVE TYPE VALUE
7088 ;          4431          W_C_SIZE = %o'000000';                 !WORD COUNT SIZE FOR 64K WORD XFER
7089 ;          4432          RAS_INC = %o'1000';                    !RAS INCREMENT FOR 64K RAMS
7090 ;          4433          CHIP_SIZ = 64;                         !CHIP SIZE
7091 ;          4434          ARR_INC = %o'4000';                    !ARRAY INCREMENT
7092 ;          4435          ARR_16<11, 4> = %o'74';                !ARRAY 16
7093 ;          4436          LST_ARR<11, 4> = .OP_NUM_ARR;          !LAST ARRAY
7094 ;          4437          LST_BLK<11, 4> = .OP_NUM_ARR;          !LAST BLOCK
7095 ;          4438          LST_BLK = .LST_BLK or %o'3777';
7096 ;          4439          end;
7097 ;          4440
7098 ;          4441      if .((.PTBL_PTR) + 2) eql %o'70' then LST_DUT_REG = 21 else LST_DUT_REG = 19;
7099 ;          4442
7100 ;          4443      PRINTB (FMT_17, .ML_LUN);                  !TELL OPERATOR WHICH UNIT IS BEING TESTED
7101 ;          4444      CLR_MBUS;                                  !CLEAR MASS BUS
7102 ;          4445      end;
7103 ;          4446
7104 ;          4447  ENDINIT;
```

```
7112
7113                                        .GLOBL  L$UNIT
7114
7115
7119 024714 004167 157140          LINIT:   JSR     R1,$SAVE3          ;                    4343
7120 024720 012700 000036                   MOV     #36,R0             ;                    4361
7121 024724 104447                          TRAP    47                 ;
7122 024726 103001                          BHIS    1$
7123 024730 000207                          RTS     PC
7124 024732 012700 000040          1$:      MOV     #40,R0             ;                    4365
7125 024736 104447                          TRAP    47
7126 024740 103061                          BHIS    5$
7127 024742 012767 177777 166630            MOV     #-1,ML.LUN         ;                    4368
7128 024750 005267 166624          2$:      INC     ML.LUN             ;                    4372
7129 024754 026767 166620 155030            CMP     ML.LUN,L$UNIT      ;                    4374
7130 024762 002401                          BLT     3$
7131 024764 104444                          TRAP    44
7132 024766 016700 166606          3$:      MOV     ML.LUN,R0          ;                    4377
7133 024772 104442                          TRAP    42
7134 024774 010067 164556                   MOV     R0,PTBL.PTR
7135 025000 005767 164552                   TST     PTBL.PTR
7136 025004 001761                          BEQ     2$
7137 025006 017767 164544 166556            MOV     @PTBL.PTR,RH.ADD   ;                    4379
7138 025014 016701 164536                   MOV     PTBL.PTR,R1        ;                    4380
7139 025020 016167 000002 166546            MOV     2(R1),RH.TYP
7140 025026 016701 164524                   MOV     PTBL.PTR,R1        ;                    4381
7141 025032 016167 000004 166536            MOV     4(R1),RH.VEC
7142 025040 005002                          CLR     R2                 ; OFFSET             4382
7143 025042 005001                          CLR     R1                 ; COUNT              4384
7144 025044 010100                 4$:      MOV     R1,R0              ; COUNT,*            4386
7145 025046 006300                          ASL     R0
7146 025050 006300                          ASL     R0
7147 025052 006300                          ASL     R0
7148 025054 016703 166512                   MOV     RH.ADD,R3
7149 025060 060203                          ADD     R2,R3              ; OFFSET,*
7150 025062 010360 013154                   MOV     R3,ML.REG(R0)
7151 025066 062702 000002                   ADD     #2,R2              ; *,OFFSET           4387
7152 025072 005201                          INC     R1                 ; COUNT              4384
7153 025074 020127 000025                   CMP     R1,#25             ; COUNT,*
7154 025100 003761                          BLE     4$
7155 025102 000426                          BR      8$                 ;                    4365
7156 025104 012700 000035          5$:      MOV     #35,R0             ;                    4394
7157 025110 104447                          TRAP    47
7158 025112 103003                          BHIS    6$
7159 025114 012767 177777 166456            MOV     #-1,ML.LUN
7160 025122 005267 166452          6$:      INC     ML.LUN             ;                    4398
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
                                                                                                                        4400
025126  026767  166446  154656        CMP     ML.LUN,LSUNIT           ;
025134  002401                        BLT     7$
025136  104444                        TRAP    44
025140  016700  166434          7$:   MOV     ML.LUN,R0               ;                         4403
025144  104442                        TRAP    42
025146  010067  164404                MOV     R0,PTBL.PTR
025152  005767  164400                TST     PTBL.PTR
025156  001761                        BEQ     6$
025160  016701  164372          8$:   MOV     PTBL.PTR,R1             ;                         4407
025164  016167  000014  164374        MOV     14(R1),PAR.DIS
025172  016701  164360                MOV     PTBL.PTR,R1             ;                         4408
025176  016167  000012  166376        MOV     12(R1),ML.DUT
025204  016701  164346                MOV     PTBL.PTR,R1             ;                         4409
025210  016103  000006                MOV     6(R1),R3
025214  005303                        DEC     R3
025216  010367  164336                MOV     R3,OP.NUM.ARR
025222  005067  164336                CLR     GOOD.BLK                ;                         4410
025226  005067  164342                CLR     ARR.16                  ;                         4411
025232  005067  164340                CLR     LST.ARR                 ;                         4412
025236  005067  164330                CLR     LST.BLK                 ;                         4413
025242  016701  164310                MOV     PTBL.PTR,R1             ;                         4415
025246  026127  000010  000001        CMP     10(R1),#1
025254  001054                        BNE     9$
025256  012767  000110  165646        MOV     #110,DRIVE.TYPE         ;                         4418
025264  012767  140000  165630        MOV     #-40000,W.C.SIZE        ;                         4419
025272  012767  000200  165624        MOV     #200,RAS.INC            ;                         4420
025300  012767  000020  164262        MOV     #20,CHIP.SIZ            ;                         4421
025306  012767  001000  164246        MOV     #1000,ARR.INC           ;                         4422
025314  052767  017000  164252        BIS     #17000,ARR.16           ;                         4423
025322  016703  164232                MOV     OP.NUM.ARR,R3           ;                         4424
025326  000303                        SWAB    R3
025330  006303                        ASL     R3
025332  042703  160777                BIC     #160777,R3
025336  042767  017000  164232        BIC     #17000,LST.ARR
025344  050367  164226                BIS     R3,LST.ARR
025350  016703  164204                MOV     OP.NUM.ARR,R3           ;                         4425
025354  000303                        SWAB    R3
025356  006303                        ASL     R3
025360  042703  160777                BIC     #160777,R3
025364  042767  017000  164200        BIC     #17000,LST.BLK
025372  050367  164174                BIS     R3,LST.BLK
025376  052767  000777  164166        BIS     #777,LST.BLK            ;                         4426
025404  000461                        BR      10$                     ;                         4415
025406  012767  000111  165516    9$: MOV     #111,DRIVE.TYPE         ;                         4430
025414  005067  165502                CLR     W.C.SIZE                ;                         4431
025420  012767  001000  165476        MOV     #1000,RAS.INC           ;                         4432
025426  012767  000100  164134        MOV     #100,CHIP.SIZ           ;                         4433
025434  012767  004000  164120        MOV     #4000,ARR.INC           ;                         4434
025442  042767  074000  164124        BIC     #74000,ARR.16           ;                         4435
025450  052767  060000  164116        BIS     #60000,ARR.16
025456  016703  164076                MOV     OP.NUM.ARR,R3           ;                         4436
025462  000303                        SWAB    R3
```

```
                                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                                    22-Dec-1980 09:21:22    PA:<
                                ;ML4
                                ;
                                                                                                                            
025464  006303                          ASL     R3
025466  006303                          ASL     R3
025470  006303                          ASL     R3
025472  042703  103777                  BIC     #103777,R3
025476  042767  074000  164072          BIC     #74000,LST.ARR
025504  050367  164066                  BIS     R3,LST.ARR
025510  016703  164044                  MOV     OP.NUM.ARR,R3           ;                                           4437
025514  000303                          SWAB    R3
025516  006303                          ASL     R3
025520  006303                          ASL     R3
025522  006303                          ASL     R3
025524  042703  103777                  BIC     #103777,R3
025530  042767  074000  164034          BIC     #74000,LST.BLK
025536  050367  164030                  BIS     R3,LST.BLK
025542  052767  003777  164022          BIS     #3777,LST.BLK           ;                                           4438
025550  016701  164002          10$:    MOV     PTBL.PTR,R1             ;                                           4441
025554  026127  000002  000070          CMP     2(R1),#70
025562  001004                          BNE     11$
025564  012767  000025  165342          MOV     #25,LST.DUT.REG
025572  000403                          BR      12$
025574  012767  000023  165332  11$:    MOV     #23,LST.DUT.REG
025602  016746  165772          12$:    MOV     ML.LUN,-(SP)            ;                                           4443
025606  012746  005306                  MOV     #FMT.17,-(SP)
025612  012746  000002                  MOV     #2,-(SP)
025616  010600                          MOV     SP,R0                   ; SP,*
025620  104414                          TRAP    14
025622  152777  000040  165364          BISB    #40,@ML.REG+40
025630  016703  165746                  MOV     ML.DUT,R3
025634  042703  177770                  BIC     #177770,R3
025640  142777  000007  165346          BICB    #7,@ML.REG+40
025646  150377  165342                  BISB    R3,@ML.REG+40
025652  062706  000006                  ADD     #6,SP                   ;                                           4363
025656  000207                          RTS     PC                      ;                                           4343

                                ; Routine Size:  242 words
                                ; Maximum stack depth per invocation:  7 words

025660  004767  177030  L$INIT::JSR     PC,LINIT                        ;                                           4445
025664  104411                  TRAP    11
```

```
7273                                    ;ML4                                    22-Dec-1980 09:24:31    TOPS
7274                                    ;                                       22-Dec-1980 09:21:22    PA:<
7275
7276 025666  000207                            RTS     PC
7277
7278                                    ; Routine Size:  4 words
7279                                    ; Maximum stack depth per invocation:  0 words
7284
7285
7286 ;           4448  !<BLF/PAGE>
```

```
7288 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
7289 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (51)
7290
7291 ;          4449  !
7292 ;          4450  BGNTST;
7293 ;          4451
7294 ;          4452  !++
7295 ;          4453  ! TEST NUMBER:  TST 1
7296 ;          4454  !
7297 ;          4455  ! TEST NAME:              MASS BUS READY TEST
7298 ;          4456  !
7299 ;          4457  ! TEST DESCRIPTION:
7300 ;          4458  !       TEST THE RH CONTROLLER FOR EXISTANCE
7301 ;          4459  !       BY:
7302 ;          4460  !
7303 ;          4461  !       1.  WRITTING ONES TO THE RH CS2 REGISTER
7304 ;          4462  !           RESULTING IN A MASS BUS CLEAR
7305 ;          4463  !
7306 ;          4464  !       2.  THEN READ THE CS2 REGISTER FOR CLEAR DATA
7307 ;          4465  !
7308 ;          4466  !--
7309 ;          4467
7310 ;          4468  CLR_MBUS;
7311 ;          4469  MLCS1 = ZEROES;                          !CLEAR OUT CS1
7312 ;          4470  MLCS2 = %o'177770';                      !LOAD CS2 WITH ONES  AND FORCE A MBUS CLEAR
7313 ;          4471  DELAY (ONE_US);
7314 ;          4472
7315 ;          4473  if ((.MLCS2) and (%o'177670')) neq ZERO  !SEE IF CS2 GOT CLEARED
7316 ;          4474  then
7317 ;          4475      begin                                !REPORT ERROR IF NOT CLEARED
7318 ;          4476      ERRDF (119, RH_ERROR, DUMPER);
7319 ;          4477      PRINTB (THR_FMT, REG_17, FNC_23, PHR_4);
7320 ;          4478      DODU (.ML_LUN);
7321 ;          4479      DOCLN;
7322 ;          4480      end;
7323 ;          4481
7324 ;          4482  ENDTST;
7328
7332 025670  010146                  $T1:    MOV     R1,-(SP)                ;                       4447
7333 025672  005746                          TST     -(SP)
7334 025674  152777  000040  165312          BISB    #40,@ML.REG+40          ;                       4450
7335 025702  016701  165674                  MOV     ML.DUT,R1
7336 025706  042701  177770                  BIC     #177770,R1
7337 025712  142777  000007  165274          BICB    #7,@ML.REG+40
7338 025720  150177  165270                  BISB    R1,@ML.REG+40
7339 025724  005077  165224                  CLR     @ML.REG                 ;                       4469
7340 025730  012777  177770  165256          MOV     #-10,@ML.REG+40         ;                       4470
7341 025736  012700  000001                  MOV     #1,R0                   ; *,$$TMP2              4471
```

```
                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                    22-Dec-1980 09:21:22    PA:<
                                ;ML4
                                ;
                        1$:     BEQ     4$
                        154146  MOV     L$DLY,R1                ; *,$$TMP1
                                BEQ     3$
                        2$:     CLR     (SP)                    ; $$TMP
                                DEC     R1                      ; $$TMP1
                                BNE     2$
                        3$:     DEC     R0                      ; $$TMP2
                                BR      1$
                        177670  165222  4$:     BIT     #-110,@ML.REG+40        ;                       4473
                                BEQ     5$
                                TRAP    55                      ;               4476
                                .WORD   167
                                .WORD   RH.ERROR
                                .WORD   DUMPER
                        007454          MOV     #PHR.4,-(SP)            ;       4477
                        010242          MOV     #FNC.23,-(SP)
                        010420          MOV     #REG.17,-(SP)
                        006034          MOV     #THR.FMT,-(SP)
                        000004          MOV     #4,-(SP)
                                        MOV     SP,R0                   ; SP,*
                                        TRAP    14
                        165540          MOV     ML.LUN,R0               ;               4478
                                        TRAP    51
                                        TRAP    44
                        000012          ADD     #12,SP                  ;               4475
                        005726  5$:     TST     (SP)+                   ;               4447
                                        MOV     (SP)+,R1
                                        RTS     PC

                                ; Routine Size:  59 words
                                ; Maximum stack depth per invocation:  7 words


                        026056  T1::
                        004767  177606  1$:     JSR     PC,$T1                  ;               4480
                                        TRAP    66
                                        ROR     R0
                                        BLO     1$
                                        RTS     PC
```

```
7398                                    ;ML4                                    22-Dec-1980 09:24:31    TOPS
7399                                    ;                                       22-Dec-1980 09:21:22    PA:<
7400
7401                                    ; Routine Size:  6 words
7402                                    ; Maximum stack depth per invocation:  0 words
7407
7408
7409 ;          4483  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (52)

```
7411 ;ML4
7412 ;
7413
7414 ;          4484  !
7415 ;          4485  BGNTST;
7416 ;          4486
7417 ;          4487  !++
7418 ;          4488  ! TEST NUMBER:  TST 2
7419 ;          4489  !
7420 ;          4490  ! TEST NAME:    MASS BUS HANDSHAKE TEST
7421 ;          4491  !
7422 ;          4492  ! TEST DESCRIPTION:
7423 ;          4493  !       TEST MASS BUS TO UNIBUS COMMUMICATIONS
7424 ;          4494  !       VIA THE CONTROL BUS BY:
7425 ;          4495  !
7426 ;          4496  !       1.  READING RH AND DRIVE REGISTERS AND
7427 ;          4497  !           TEST THE NON EXISTANT DRIVE 'NED'
7428 ;          4498  !           BIT
7429 ;          4499  !
7430 ;          4500  !--
7431 ;          4501
7432 ;          4502  local
7433 ;          4503      SAVE,                                   !TEMPORARY SAVE LOCATION
7434 ;          4504      DODU_FLG;                               !DROP UNIT FLAG
7435 ;          4505
7436 ;          4506  DODU_FLG = ZERO;
7437 ;          4507
7438 ;          4508  incr REG_SEL from 0 to .LST_DUT_REG do      !TEST ALL PRESENT RH REGISTERS
7439 ;          4509      begin
7440 ;          4510      BGNSUB;                                 !START OF SCOPE LOOP
7441 ;          4511      CLR_MBUS;
7442 ;          4512      SAVE = ..ML_REG [.REG_SEL, REGISTER_ADD];   !READ THE REGISTER
7443 ;          4513
7444 ;          4514      if .NED IS_SET                          !DID READ CAUSE THE NED BIT TO SET
7445 ;          4515      then
7446 ;          4516          begin                               !REPORT AN ERROR IF SET
7447 ;          4517          ERRDF (120, RH_ERROR, DUMPER);
7448 ;          4518          PRINTB (FIV_FMT, WRD_62, PHR_5, WRD_12, WRD_52, FNC_6);
7449 ;          4519          PRINTB (FMT_11, .ML_REG [.REG_SEL, REGISTER_ADD]);
7450 ;          4520          DODU_FLG = ONE;
7451 ;          4521          end;
7452 ;          4522
7453 ;          4523      ENDSUB;                                 !END OF SCOPE LOOP
7454 ;          4524      end;
7455 ;          4525
7456 ;          4526  if .DODU_FLG IS_SET
7457 ;          4527  then
7458 ;          4528      begin
7459 ;          4529      DODU (.ML_LUN);
7460 ;          4530      DOCLN;
7461 ;          4531      end;
7462 ;          4532
7463 ;          4533  ENDTST;
```

```
7471
7475 026072 004167 156020          $T2:  JSR   R1,$SAVE5                ;                          4482
7476 026076 005001                       CLR   R1                       ; DODU.FLG                 4506
7477 026100 016704 165030                MOV   LST.DUT.REG,R4           ;                          4508
7478 026104 005002                       CLR   R2                       ; REG.SEL
7479 026106 000474                       BR    4$
7480 026110 010200                 1$:   MOV   R2,R0                    ; REG.SEL,*                4512
7481 026112 006300                       ASL   R0
7482 026114 006300                       ASL   R0
7483 026116 006300                       ASL   R0
7484 026120 010003                       MOV   R0,R3
7485 026122 104402                 2$:   TRAP  2                        ;                          4509
7486 026124 152777 000040 165062         BISB  #40,@ML.REG+40           ;                          4510
7487 026132 016700 165444                MOV   ML.DUT,R0
7488 026136 042700 177770                BIC   #177770,R0
7489 026142 142777 000007 165044         BICB  #7,@ML.REG+40
7490 026150 150077 165040                BISB  R0,@ML.REG+40
7491 026154 017305 013154                MOV   @ML.REG(R3),R5           ; *,SAVE                   4512
7492 026160 032777 010000 165026         BIT   #10000,@ML.REG+40        ;                          4514
7493 026166 001440                       BEQ   3$
7494 026170 104455                       TRAP  55                       ;                          4517
7495 026172 000170                       .WORD 170
7496 026174 011060                       .WORD RH.ERROR
7497 026176 024052                       .WORD DUMPER
7498 026200 012746 010004                MOV   #FNC.6,-(SP)             ;                          4518
7499 026204 012746 007066                MOV   #WRD.52,-(SP)
7500 026210 012746 006426                MOV   #WRD.12,-(SP)
7501 026214 012746 007472                MOV   #PHR.5,-(SP)
7502 026220 012746 007210                MOV   #WRD.62,-(SP)
7503 026224 012746 006062                MOV   #FIV.FMT,-(SP)
7504 026230 012746 000006                MOV   #6,-(SP)
7505 026234 010600                       MOV   SP,R0                    ; SP,*
7506 026236 104414                       TRAP  14
7507 026240 016316 013154                MOV   ML.REG(R3),(SP)          ;                          4519
7508 026244 012746 004750                MOV   #FMT.11,-(SP)
7509 026250 012746 000002                MOV   #2,-(SP)
7510 026254 010600                       MOV   SP,R0                    ; SP,*
7511 026256 104414                       TRAP  14
7512 026260 012701 000001                MOV   #1,R1                    ; *,DODU.FLG               4520
7513 026264 062706 000022                ADD   #22,SP                   ;                          4516
7514 026270 104467                 3$:   TRAP  67                       ;                          4521
7515 026272 006000                       ROR   R0
7516 026274 103712                       BLO   2$
7517 026276 005202                       INC   R2                       ; REG.SEL                  4508
7518 026300 020204                 4$:   CMP   R2,R4                    ; REG.SEL,*
7519 026302 003702                       BLE   1$
7520 026304 005301                       DEC   R1                       ; DODU.FLG                 4526
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
                                                BNE     5$
026310  016700  165264                        MOV     ML.LUN,R0                       ;                               4529
026314  104451                                TRAP    51
026316  104444                                TRAP    44
026320  000207                        5$:     RTS     PC                              ;                               4482

                                        ; Routine Size:  76 words
                                        ; Maximum stack depth per invocation:  15 words

026322                                  T2::
026322  004767  177544                1$:     JSR     PC,$T2                          ;                               4531
026326  104466                                TRAP    66
026330  006000                                ROR     R0
026332  103773                                BLO     1$
026334  000207                                RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words

;       4534    !<BLF/PAGE>
```

```
7563 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
7564 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (53)
7565
7566 ;          4535                                        !
7567 ;          4536  BGNTST;
7568 ;          4537
7569 ;          4538  !++
7570 ;          4539  ! TEST NUMBER:  TST 3
7571 ;          4540  !
7572 ;          4541  ! TEST NAME:    DRIVE PRESENT TEST
7573 ;          4542  !
7574 ;          4543  ! TEST DESCRIPTION:
7575 ;          4544  !       THIS TEST READS THE DESIRED SECTOR
7576 ;          4545  !       ADDRESS REGISTER OF THE DRIVE UNDER
7577 ;          4546  !       TEST, DELAYS 100 US, THEN
7578 ;          4547  !       READS THE  NED BIT OF MLCS2
7579 ;          4548  !
7580 ;          4549  !       IF SET, AN ERROR MESSAGE IS
7581 ;          4550  !       PRINTED AND THE UNIT IS DROPPED
7582 ;          4551  !
7583 ;          4552  !--
7584 ;          4553
7585 ;          4554  local
7586 ;          4555      DODU_FLG,                         !DROP UNIT FLAG
7587 ;          4556      SAVE;                             !TEMP STORAGE LOCATION
7588 ;          4557
7589 ;          4558  DODU_FLG = ZERO;
7590 ;          4559  BGNSUB;
7591 ;          4560  CLR_MBUS;
7592 ;          4561  SAVE = .MLDA;                         !READ A DRIVE REGISTER
7593 ;          4562  DELAY (ONE_US);                       !DELAY 1 US
7594 ;          4563
7595 ;          4564  if .NED IS_SET                        !TEST THE NED BIT
7596 ;          4565  then
7597 ;          4566      begin
7598 ;          4567      ERRDF (1, ASYNC, DUMPER);         !IF SET THEN REPORT ERROR AND SET DODU_FLG
7599 ;          4568      PRINTB (ONE_FMT, PHR_3);
7600 ;          4569      DODU_FLG = ONE;
7601 ;          4570      end;
7602 ;          4571
7603 ;          4572  ENDSUB;
7604 ;          4573
7605 ;          4574  if .DODU_FLG IS_SET                   !DROP THIS UNIT IF DODU IS_SET
7606 ;          4575  then
7607 ;          4576      begin
7608 ;          4577      DODU (.ML_LUN);
7609 ;          4578      DOCLN;
7610 ;          4579      end;
7611 ;          4580
7612 ;          4581  ENDTST;
7616
```

```
                                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                                    22-Dec-1980 09:21:22    PA:<
                                ;ML4
                                ;
                                
026336  004167  155534        $T3:    JSR     R1,$SAVE4                       ;                                       4533
026342  005746                        TST     -(SP)
026344  005003                        CLR     R3                              ; DODU.FLG                              4558
026346  104402                1$:     TRAP    2
026350  152777  000040  164636        BISB    #40,@ML.REG+40                  ;                                       4559
026356  016702  165220                MOV     ML.DUT,R2
026362  042702  177770                BIC     #177770,R2
026366  142777  000007  164620        BICB    #7,@ML.REG+40
026374  150277  164614                BISB    R2,@ML.REG+40
026400  017704  164600                MOV     @ML..REG+30,R4                  ; *,SAVE                                4561
026404  012701  000001                MOV     #1,R1                           ; *,$$TMP2                              4562
026410  001410                2$:     BEQ     5$
026412  016702  153500                MOV     L$DLY,R2                        ; *,$$TMP1
026416  001403                        BEQ     4$
026420  005016                3$:     CLR     (SP)                            ; $$TMP
026422  005302                        DEC     R2                              ; $$TMP1
026424  001375                        BNE     3$
026426  005301                4$:     DEC     R1                              ; $$TMP2
026430  000767                        BR      2$
026432  032777  010000  164554  5$:     BIT     #10000,@ML.REG+40               ;                                       4564
026440  001420                        BEQ     6$
026442  104455                        TRAP    55                              ;                                       4567
026444  000001                        .WORD   1
026446  010464                        .WORD   ASYNC
026450  024052                        .WORD   DUMPER
026452  012746  007422                MOV     #PHR.3,-(SP)                    ;                                       4568
026456  012746  006016                MOV     #ONE.FMT,-(SP)
026462  012746  000002                MOV     #2,-(SP)
026466  010600                        MOV     SP,R0                           ; SP,*
026470  104414                        TRAP    14
026472  012703  000001                MOV     #1,R3                           ; *,DODU.FLG                            4569
026476  062706  000006                ADD     #6,SP                           ;                                       4566
026502  104467                6$:     TRAP    67                              ;                                       4570
026504  006000                        ROR     R0
026506  103717                        BLO     1$
026510  005303                        DEC     R3                              ; DODU.FLG                              4574
026512  001004                        BNE     7$
026514  016700  165060                MOV     ML.LUN,R0                       ;                                       4577
026520  104451                        TRAP    51
026522  104444                        TRAP    44
026524  005726                7$:     TST     (SP)+                           ;                                       4533
026526  000207                        RTS     PC

                                ; Routine Size:  61 words
                                ; Maximum stack depth per invocation:  9 words
```

```
                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
                                                    22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (53)

7674 ;ML4
7675 ;
7676
7680
7684 026530                         T3::
7685 026530  004767  177602         1$:     JSR     PC,$T3                  ;                       4579
7686 026534  104466                         TRAP    66
7687 026536  006000                         ROR     R0
7688 026540  103773                         BLO     1$
7689 026542  000207                         RTS     PC
7690
7691                                ; Routine Size:  6 words
7692                                ; Maximum stack depth per invocation:  0 words
7697
7698
7699 ;          4582  !<BLF/PAGE>
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (54)

;          4583  !
;          4584  BGNTST;
;          4585
;          4586  !++
;          4587  ! TEST NUMBER:  TST 4
;          4588  !
;          4589  ! TEST NAME:    DRIVE SELECTION TEST
;          4590  !
;          4591  ! TEST DESCRIPTION:
;          4592  !       THIS TEST TESTS FOR UNIQUE DRIVE SELECTION BY WRITING THE DRIVE
;          4593  !       UNDER TEST (DUT) DRIVE NUMBER INTO ITS DSA REG.  THEN WRITING THE DRIVE
;          4594  !       NUMBERS OF OTHER DRIVES INTO THEIR RESPECTIVE DSA REGISTERS
;          4595  !       AND READING THE DUT DSA FOR ITS DRIVE NUMBER.
;          4596  !
;          4597  ! IMPLICIT INPUTS:
;          4598  !       ML_DUT
;          4599  !       LOADED DURING THE INITIALIZATION CODE AND CONTAINS THE DRIVE
;          4600  !       NUMBER OF THE DRIVE PRESENTLY BEING TESTED.
;          4601  !--
;          4602
;          4603  local
;          4604      DODU_FLG,                                 !DROP UNIT FLAG
;          4605      SAVE;                                     !TEMPORARY SAVE LOCATION
;          4606
;          4607  BGNSUB;
;          4608  CLR_MBUS;
;          4609  DODU_FLG = ZERO;
;          4610  MLDA = .ML_DUT;                               !LOAD THIS DRIVES DRIVE NO. INTO ITS DSA REG
;          4611  SAVE = .MLDA;                                 !READ THE REGISTER BACK
;          4612
;          4613  if .SAVE neq .ML_DUT                          !SEE IF DSA HAS DRIVE NUMBER
;          4614  then
;          4615      begin
;          4616      ERRDF (2, INTER, DUMPER);                 !ERROR AND EXIT TEST IF DSA NEQ DRIVE NUM
;          4617      PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_3, WRD_37, WRD_13, REG_6);
;          4618      PRINTB (FMT_2, .ML_DUT, .SAVE, (.ML_DUT xor .SAVE));
;          4619      EXIT_TST;
;          4620      end;
;          4621
;          4622  incr DRV_SEL from 0 to 7 do                   !WRITE DRV NO OF OTHER DRIVES INTO THEIR RESPECTIVE DSA REG.
;          4623
;          4624      if .DRV_SEL neq .ML_DUT                   !SKIP IF .DRV_SEL EQL TO THE DRIVE UNDER TEST (DUT)
;          4625      then
;          4626          begin
;          4627          DRV_NUM = .DRV_SEL;                   !SELECT DRIVE TO BE WRITTEN TO
;          4628          MLDA = .DRV_SEL;                      !WRITE DRIVE SEL NO. INTO ITS DSA REG
;          4629          DELAY (ONE_US);                       !DELAY 1 US
;          4630          end;
;          4631
;          4632  DRV_NUM = .ML_DUT;                           !SELECT THE DUT
;          4633  SAVE = .MLDA;                                 !READ ITS DSA REG
;          4634
```

```
                                                                                22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
                                                                                22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (54)

                        4635  if .SAVE neq .ML_DUT                              !SEE IF WRITTING TO OTHER DRIVES CHANGE ITS VALUE
                        4636  then
                        4637      begin
                        4638      ERRDF (3, ASYNC, DUMPER);                     !ERROR AND SET DODU_FLG IF CHANGED
                        4639      PRINTB (THR_FMT, FNC_3, WRD_37, WRD_14);
                        4640      PRINTB (FMT_1, .ML_DUT, .SAVE);
                        4641      DODU_FLG = ONE;
                        4642      end;
                        4643
                        4644  ENDSUB;
                        4645
                        4646  if .DODU_FLG IS_SET                               !DROP UNIT IF DODU_FLG IS_SET
                        4647  then
                        4648      begin
                        4649      DODU (.ML_LUN);
                        4650      DOCLN;
                        4651      end;
                        4652
                        4653  ENDTST;
7782
7786 026544  004167  155346          $T4:    JSR     R1,$SAVE5                       ;                                       4581
7787 026550  005746                  1$:     TST     -(SP)
7788 026552  104402                          TRAP    2                               ;                                       4605
7789 026554  152777  000040  164432          BISB    #40,@ML.REG+40                  ;                                       4607
7790 026562  016703  165014                  MOV     ML.DUT,R3
7791 026566  042703  177770                  BIC     #177770,R3
7792 026572  142777  000007  164414          BICB    #7,@ML.REG+40
7793 026600  150377  164410                  BISB    R3,@ML.REG+40
7794 026604  005005                          CLR     R5                              ; DODU.FLG                              4609
7795 026606  016777  164770  164370          MOV     ML.DUT,@ML.REG+30               ;                                       4610
7796 026614  017704  164364                  MOV     @ML.REG+30,R4                   ; *,SAVE                                4611
7797 026620  020467  164756                  CMP     R4,ML.DUT                       ; SAVE,*                                4613
7798 026624  001451                          BEQ     2$
7799 026626  104455                          TRAP    55                              ;                                       4616
7800 026630  000002                          .WORD   2
7801 026632  010672                          .WORD   INTER
7802 026634  024052                          .WORD   DUMPER
7803 026636  012746  010316                  MOV     #REG.6,-(SP)                    ;                                       4617
7804 026642  012746  006436                  MOV     #WRD.13,-(SP)
7805 026646  012746  006700                  MOV     #WRD.37,-(SP)
7806 026652  012746  007750                  MOV     #FNC.3,-(SP)
7807 026656  012746  006426                  MOV     #WRD.12,-(SP)
7808 026662  012746  007454                  MOV     #PHR.4,-(SP)
7809 026666  012746  006100                  MOV     #SIX.FMT,-(SP)
7810 026672  012746  000007                  MOV     #7,-(SP)
```

```
                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                    22-Dec-1980 09:21:22    PA:<
                                ;ML4
                                ;
                                
026676  010600                  MOV     SP,R0                   ; SP,*
026700  104414                  TRAP    14
026702  016716  164674          MOV     ML.DUT,(SP)             ;                                       4618
026706  010403                  MOV     R4,R3                   ; SAVE,*
026710  041603                  BIC     (SP),R3
026712  040416                  BIC     R4,(SP)                 ; SAVE,*
026714  050316                  BIS     R3,(SP)
026716  010446                  MOV     R4,-(SP)                ; SAVE,*
026720  016746  164656          MOV     ML.DUT,-(SP)
026724  012746  004266          MOV     #FMT.2,-(SP)
026730  012746  000004          MOV     #4,-(SP)
026734  010600                  MOV     SP,R0                   ; SP,*
026736  104414                  TRAP    14
026740  104463                  TRAP    63
026742  062706  000030          ADD     #30,SP                  ;                                       4613
026746  000523                  BR      10$                     ;                                       4615
026750  005003          2$:     CLR     R3                      ; DRV.SEL                               4622
026752  020367  164624  3$:     CMP     R3,ML.DUT               ; DRV.SEL,*                             4624
026756  001425                  BEQ     7$
026760  010302                  MOV     R3,R2                   ; DRV.SEL,*                             4627
026762  042702  177770          BIC     #177770,R2
026766  142777  000007  164220  BICB    #7,@ML.REG+40
026774  150277  164214          BISB    R2,@ML.REG+40
027000  010377  164200          MOV     R3,@ML.REG+30           ; DRV.SEL,*                             4628
027004  012701  000001          MOV     #1,R1                   ; *,$$TMP2                              4629
027010  001410          4$:     BEQ     7$
027012  016702  153100          MOV     L$DLY,R2                ; *,$$TMP1
027016  001403                  BEQ     6$
027020  005016          5$:     CLR     (SP)                    ; $$TMP
027022  005302                  DEC     R2                      ; $$TMP1
027024  001375                  BNE     5$
027026  005301          6$:     DEC     R1                      ; $$TMP2
027030  000767                  BR      4$
027032  005203          7$:     INC     R3                      ; DRV.SEL                               4622
027034  020327  000007          CMP     R3,#7                   ; DRV.SEL,*
027040  003744                  BLE     3$
027042  016703  164534          MOV     ML.DUT,R3               ;                                       4632
027046  042703  177770          BIC     #177770,R3
027052  142777  000007  164134  BICB    #7,@ML.REG+40
027060  150377  164130          BISB    R3,@ML.REG+40
027064  017704  164114          MOV     @ML.REG+30,R4           ; *,SAVE                                4633
027070  020467  164506          CMP     R4,ML.DUT               ; SAVE,*                                4635
027074  001435                  BEQ     8$
027076  104455                  TRAP    55                      ;                                       4638
027100  000003                  .WORD   3
027102  010464                  .WORD   ASYNC
027104  024052                  .WORD   DUMPER
027106  012746  006442          MOV     #WRD.14,-(SP)           ;                                       4639
027112  012746  006700          MOV     #WRD.37,-(SP)
027116  012746  007750          MOV     #FNC.3,-(SP)
027122  012746  006034          MOV     #THR.FMT,-(SP)
027126  012746  000004          MOV     #4,-(SP)
```

```
                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                    22-Dec-1980 09:21:22    PA:<
7868                            ;ML4
7869                            ;
7870
7871 027132  010600                    MOV     SP,R0                   ; SP,*
7872 027134  104414                    TRAP    14
7873 027136  010416                    MOV     R4,(SP)                 ; SAVE,*                                4640
7874 027140  016746  164436            MOV     ML.DUT,-(SP)
7875 027144  012746  004222            MOV     #FMT.1,-(SP)
7876 027150  012746  000003            MOV     #3,-(SP)
7877 027154  010600                    MOV     SP,R0                   ; SP,*
7878 027156  104414                    TRAP    14
7879 027160  012705  000001            MOV     #1,R5                   ; *,DODU.FLG                            4641
7880 027164  062706  000020            ADD     #20,SP                  ;                                       4637
7881 027170  104467            8$:     TRAP    67                      ;                                       4642
7882 027172  006000                    ROR     R0
7883 027174  103002                    BHIS    9$
7884 027176  000167  177350            JMP     1$
7885 027202  005305            9$:     DEC     R5                      ; DODU.FLG                              4646
7886 027204  001004                    BNE     10$
7887 027206  016700  164366            MOV     ML.LUN,R0               ;                                       4649
7888 027212  104451                    TRAP    51
7889 027214  104444                    TRAP    44
7890 027216  005726            10$:    TST     (SP)+                   ;                                       4581
7891 027220  000207                    RTS     PC
7892
7893                            ; Routine Size:  151 words
7894                            ; Maximum stack depth per invocation:  19 words
7899
7900
7904
7908 027222                     T4::
7909 027222  004767  177316    1$:     JSR     PC,$T4                  ;                                       4651
7910 027226  104466                    TRAP    66
7911 027230  006000                    ROR     R0
7912 027232  103773                    BLO     1$
7913 027234  000207                    RTS     PC
7914
7915                            ; Routine Size:  6 words
7916                            ; Maximum stack depth per invocation:  0 words
7921 ;          4654  !<BLF/PAGE>
```

```
7923 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
7924 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (55)
7925
7926 ;          4655  !
7927 ;          4656  BGNTST;
7928 ;          4657
7929 ;          4658  !++
7930 ;          4659  ! TEST NUMBER:  TST 5
7931 ;          4660  !
7932 ;          4661  ! TEST NAME:    READ WRITE REG ONES/ZEROES TEST
7933 ;          4662  !
7934 ;          4663  ! TEST DESCRIPTION:
7935 ;          4664  !       THIS TEST WRITES AND READS A DATA PATTERN OF ALL ONES AND ZEROES TO ALL
7936 ;          4665  !       OF THE ML11'S READ / WRITE REGISTERS.
7937 ;          4666  !
7938 ;          4667  !       ROUTINES WRT_REG AND RD_REG ACCEPT ARGUMENTS TO FURTHER SELECT ROUTINES
7939 ;          4668  !       WHICH ACTUALLY PERFORMS THE READING AND WRITING OF THE REGISTERS.
7940 ;          4669  !
7941 ;          4670  !       THE UNIT IS DROPPED ON DETECTED ERRORS.
7942 ;          4671  !
7943 ;          4672  ! IMPLICIT INPUTS:
7944 ;          4673  !       WT_DATA
7945 ;          4674  !       LOADED BY READ REGISTER ROUTINES AND CONTAINS THE DATA PATTERN WRITTEN
7946 ;          4675  !       TO THE REGISTERS (REPRESENTS GOOD DATA).
7947 ;          4676  !
7948 ;          4677  !       RD_DATA
7949 ;          4678  !       LOADED BY THE READ REGISTER ROUTINES AND CONTAINS THE DATA PATTERN
7950 ;          4679  !       READ FROM THE REGISTER (REPRESENTS BAD DATA).
7951 ;          4680  !--
7952 ;          4681
7953 ;          4682  local
7954 ;          4683      ERR_FLG,                          !ERROR FLAG PASSED TO ROUTINES
7955 ;          4684      TST_PAT,                          !TEST PATTERN
7956 ;          4685      index,                            !POINTS TO REGISTER PRESENTLY BEING TESTED
7957 ;          4686      DODU_FLG;                         !DROP UNIT FLAG
7958 ;          4687
7959 ;          4688  DODU_FLG = ZERO;
7960 ;          4689  TST_PAT = ONES;                       !LOAD TEST PAT WITH ONES
7961 ;          4690
7962 ;          4691  incr TWICE from 0 to 1 do             !REPEAT LOOP TWICE
7963 ;          4692      begin
7964 ;          4693
7965 ;          4694      incr REG_SEL from 0 to 7 do       !TEST ELEVEN WRITE/READ REGISTERS
7966 ;          4695          begin
7967 ;          4696          BGNSUB;
7968 ;          4697          CLR_MBUS;
7969 ;          4698          WRT_REG (.TST_PAT, .REG_SEL, index);   !WRITE TO THE REGISTER
7970 ;          4699          RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);  !READ THE REGISTER
7971 ;          4700
7972 ;          4701          if .ERR_FLG IS_SET                !SEE IF READ FOUND AN ERROR
7973 ;          4702          then
7974 ;          4703              begin                         !IF ERROR FLAG IS_SET THEN ERROR AND SET DODU_FLG
7975 ;          4704
7976 ;          4705              selectone .REG_SEL of         !SELECT WHICH MODULE FAILED
7977 ;          4706                  set
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (55)
;
;       4707
;       4708                [0 to 3] :
;       4709                    ERRDF (4, ASYNC, DUMPER);   !ASYNC MODULE FAILURE
;       4710
;       4711                [4 to 5] :
;       4712                    ERRDF (4, SYNC, DUMPER);    !SYNC MODULE FAILURE
;       4713
;       4714                [6 to 7] :
;       4715                    ERRDF (4, ARR_DAT, DUMPER); !ARRAY DATA MODULE FAILURE
;       4716                tes;
;       4717
;       4718            PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
;       4719            PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
;       4720            DODU_FLG = ONE;
;       4721            end;
;       4722
;       4723        ENDSUB;
;       4724        end;
;       4725
;       4726    TST_PAT = not .TST_PAT;                 !REPEAT AGAIN WITH COMPLIMENT DATA
;       4727    end;
;       4728
;       4729  if .DODU_FLG IS_SET                      !DROP THIS UNIT IF THE DODU_FLG IS_SET
;       4730  then
;       4731      begin
;       4732      DODU (.ML_LUN);
;       4733      DOCLN;
;       4734      end;
;       4735
;       4736  ENDTST;
;4015
8019 027236  004167  154634          $T5:    JSR     R1,$SAVE4                   ;                       4653
8020 027242  024646                          CMP     -(SP),-(SP)
8021 027244  005004                          CLR     R4                          ; DODU.FLG              4688
8022 027246  012702  177777                  MOV     #-1,R2                      ; *,TST.PAT             4689
8023 027252  005001                          CLR     R1                          ; TWICE                 4691
8024 027254  005003                  1$:     CLR     R3                          ; REG.SEL               4694
8025 027256  104402                  2$:     TRAP    2                           ;                       4695
8026 027260  152777  000040  163726          BISB    #40,@ML.REG+40              ;                       4696
8027 027266  016700  164310                  MOV     ML.DUT,R0
8028 027272  042700  177770                  BIC     #177770,R0
8029 027276  142777  000007  163710          BICB    #7,@ML.REG+40
8030 027304  150077  163704                  BISB    R0,@ML.REG+40
8031 027310  010246                          MOV     R2,-(SP)                    ; TST.PAT,*             4698
8032 027312  010346                          MOV     R3,-(SP)                    ; REG.SEL,*
```

```
8034                                    ;ML4                                                    22-Dec-1980 09:24:31    TOPS
8035                                    ;                                                       22-Dec-1980 09:21:22    PA:<
8036
8037 027314  012746  000010                    MOV     #10,-(SP)
8038 027320  060616                            ADD     SP,(SP)                 ; INDEX,*
8039 027322  004767  173546                    JSR     PC,WRT.REG
8040 027326  010216                            MOV     R2,(SP)                 ; TST.PAT,*                                     4699
8041 027330  010346                            MOV     R3,-(SP)                ; REG.SEL,*
8042 027332  012746  000012                    MOV     #12,-(SP)
8043 027336  060616                            ADD     SP,(SP)                 ; ERR.FLG,*
8044 027340  004767  174116                    JSR     PC,RD.REG
8045 027344  026627  000012  000001            CMP     12(SP),#1               ; ERR.FLG,*                                     4701
8046 027352  001106                            BNE     6$
8047 027354  005703                            TST     R3                      ; REG.SEL                                       4705
8048 027356  002410                            BLT     3$
8049 027360  020327  000003                    CMP     R3,#3                   ; REG.SEL,*
8050 027364  003005                            BGT     3$
8051 027366  104455                            TRAP    55                      ;                                               4709
8052 027370  000004                            .WORD   4
8053 027372  010464                            .WORD   ASYNC
8054 027374  024052                            .WORD   DUMPER
8055 027376  000425                            BR      5$                      ;                                               4705
8056 027400  020327  000004            3$:     CMP     R3,#4                   ; REG.SEL,*
8057 027404  002410                            BLT     4$
8058 027406  020327  000005                    CMP     R3,#5                   ; REG.SEL,*
8059 027412  003005                            BGT     4$
8060 027414  104455                            TRAP    55                      ;                                               4712
8061 027416  000004                            .WORD   4
8062 027420  010526                            .WORD   SYNC
8063 027422  024052                            .WORD   DUMPER
8064 027424  000412                            BR      5$                      ;                                               4705
8065 027426  020327  000006            4$:     CMP     R3,#6                   ; REG.SEL,*
8066 027432  002407                            BLT     5$
8067 027434  020327  000007                    CMP     R3,#7                   ; REG.SEL,*
8068 027440  003004                            BGT     5$
8069 027442  104455                            TRAP    55                      ;                                               4715
8070 027444  000004                            .WORD   4
8071 027446  010570                            .WORD   ARR.DAT
8072 027450  024052                            .WORD   DUMPER
8073 027452  012746  007122            5$:     MOV     #WRD.56,-(SP)           ;                                               4718
8074 027456  012746  007066                    MOV     #WRD.52,-(SP)
8075 027462  012746  010004                    MOV     #FNC.6,-(SP)
8076 027466  012746  007774                    MOV     #FNC.5,-(SP)
8077 027472  012746  006426                    MOV     #WRD.12,-(SP)
8078 027476  012746  007454                    MOV     #PHR.4,-(SP)
8079 027502  012746  006100                    MOV     #SIX.FMT,-(SP)
8080 027506  012746  000007                    MOV     #7,-(SP)
8081 027512  010600                            MOV     SP,R0                   ; SP,*
8082 027514  104414                            TRAP    14
8083 027516  016716  163406                    MOV     RD.DATA,(SP)            ;                                               4719
8084 027522  016746  163400                    MOV     WT.DATA,-(SP)
8085 027526  016600  000036                    MOV     36(SP),R0               ; INDEX,*
8086 027532  006300                            ASL     R0
8087 027534  006300                            ASL     R0
8088 027536  006300                            ASL     R0
```

```
                                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                                    22-Dec-1980 09:21:22    PA:<
8090                            ;ML4
8091                            ;
8092
8093  027540  016046  013154            MOV     ML.REG(R0),-(SP)
8094  027544  012746  005216            MOV     #FMT.16,-(SP)
8095  027550  012746  000004            MOV     #4,-(SP)
8096  027554  010600                    MOV     SP,R0                           ; SP,*
8097  027556  104414                    TRAP    14
8098  027560  012704  000001            MOV     #1,R4                           ; *,DODU.FLG                            4720
8099  027564  062706  000030            ADD     #30,SP                          ;                                       4703
8100  027570  062706  000012    6$:     ADD     #12,SP                          ;                                       4695
8101  027574  104467                    TRAP    67                              ;                                       4721
8102  027576  006000                    ROR     R0
8103  027600  103626                    BLO     2$
8104  027602  005203                    INC     R3                              ; REG.SEL                               4694
8105  027604  020327  000007            CMP     R3,#7                           ; REG.SEL,*
8106  027610  003622                    BLE     2$
8107  027612  005102                    COM     R2                              ; TST.PAT                               4726
8108  027614  005201                    INC     R1                              ; TWICE                                 4691
8109  027616  020127  000001            CMP     R1,#1                           ; TWICE,*
8110  027622  003614                    BLE     1$
8111  027624  005304                    DEC     R4                              ; DODU.FLG                              4729
8112  027626  001004                    BNE     7$
8113  027630  016700  163744            MOV     ML.LUN,R0                       ;                                       4732
8114  027634  104451                    TRAP    51
8115  027636  104444                    TRAP    44
8116  027640  022626            7$:     CMP     (SP)+,(SP)+                     ;                                       4653
8117  027642  000207                    RTS     PC
8118
8119                            ; Routine Size:  131 words
8120                            ; Maximum stack depth per invocation:  24 words
8125
8126
8130
8134  027644                    T5::
8135  027644  004767  177366    1$:     JSR     PC,$T5                          ;                                       4734
8136  027650  104466                    TRAP    66
8137  027652  006000                    ROR     R0
8138  027654  103773                    BLO     1$
8139  027656  000207                    RTS     PC
8140
8141                            ; Routine Size:  6 words
8142                            ; Maximum stack depth per invocation:  0 words
```

```
8151
8152
8153 ;          4737  !<BLF/PAGE>
```

```
8155 ;ML4
8156 ;
8157
8158 ;          4738  !
8159 ;          4739  BGNTST;
8160 ;          4740
8161 ;          4741  !++
8162 ;          4742  ! TEST NUMBER:  TST 6
8163 ;          4743  !
8164 ;          4744  ! TEST NAME:    READ WRITE REG SHIFTING ONES/ZEROES TEST
8165 ;          4745  !
8166 ;          4746  ! TEST DESCRIPTION:
8167 ;          4747  !       THIS TEST WRITES AND READS A
8168 ;          4748  !       SHIFTING ONE'S AND SHIFTING ZEROE'S
8169 ;          4749  !       PATTERN TO ALL THE ML11'S
8170 ;          4750  !       READ/WRITE REGISTERS
8171 ;          4751  !
8172 ;          4752  !       ROUTINES WRT_REG AND RD_REG
8173 ;          4753  !       ACCEPT ARGUMENTS TO FURTHER
8174 ;          4754  !       SELECT ROUTINES WHICH ACTUALLY
8175 ;          4755  !       PERFORMS THE READING AND
8176 ;          4756  !       WRITING OF THE REGISTERS.
8177 ;          4757  !
8178 ;          4758  !       THE DRIVE IS DROPPED ON DETECTED
8179 ;          4759  !       ERRORS.
8180 ;          4760  !
8181 ;          4761  ! IMPLICIT INPUTS:
8182 ;          4762  !       WT_DATA
8183 ;          4763  !         LOADED BY READ REGISTER ROUTINES AND
8184 ;          4764  !         CONTAINS THE DATA PATTERN WRITTEN TO THE
8185 ;          4765  !         REGISTERS (REPRESENTS GOOD DATA).
8186 ;          4766  !
8187 ;          4767  !       RD_DATA
8188 ;          4768  !         LOADED BY THE READ REGISTER ROUTINES AND
8189 ;          4769  !         CONTAINS THE DATA PATTERN READ FROM THE
8190 ;          4770  !         REGISTER (REPRESENTS BAD DATA).
8191 ;          4771  !
8192 ;          4772  !
8193 ;          4773  !--
8194 ;          4774
8195 ;          4775  local
8196 ;          4776      ERR_FLG,                    !ERROR FLAG PASSED TO ROUTINE
8197 ;          4777      TST_PAT,                    !TEST PATTERN
8198 ;          4778      index,                      !POINTS TO REG PRESENTLY BEING TESTED
8199 ;          4779      DODU_FLG;                   !DROP UNIT FLAG
8200 ;          4780
8201 ;          4781  DODU_FLG = ZERO;
8202 ;          4782  TST_PAT = ONE;                  !LOAD TST_PAT WITH A 1 IN A FILED OF 0'S
8203 ;          4783
8204 ;          4784  incr SHIFT from 0 to 15 do      !DO SHIFT 16 TIMES
8205 ;          4785      begin
8206 ;          4786
8207 ;          4787      incr TWICE from 0 to 1 do   !REPEAT LOOP TWICE
8208 ;          4788          begin
8209 ;          4789
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (56)

```
8211 ;ML4
8212 ;
8213
8214 ;          4790          incr REG_SEL from 0 to 7 do             !TEST ELEVEN READ/WRITE REGISTERS
8215 ;          4791              begin
8216 ;          4792              BGNSUB;
8217 ;          4793              CLR_MBUS;
8218 ;          4794              WRT_REG (.TST_PAT, .REG_SEL, index);        !WRITE TO THE REGISTER
8219 ;          4795              RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);       !READ THE REGISTER
8220 ;          4796
8221 ;          4797              if .ERR_FLG IS_SET                  !SEE IF THE READ FOUND AN ERROR
8222 ;          4798              then
8223 ;          4799                  begin                           !IF THE ERROR FLAG IS_SET THEN ERROR
8224 ;          4800
8225 ;          4801                  selectone .REG_SEL of           !FIND WHICH MODULE FAILED
8226 ;          4802                      set
8227 ;          4803
8228 ;          4804                      [0 to 3] :
8229 ;          4805                          ERRDF (5, ASYNC, DUMPER);       !ASYNC MODULE FAILURE
8230 ;          4806
8231 ;          4807                      [4 to 5] :
8232 ;          4808                          ERRDF (5, SYNC, DUMPER);        !SYNC MODULE FAILURE
8233 ;          4809
8234 ;          4810                      [6 to 7] :
8235 ;          4811                          ERRDF (5, ARR_DAT, DUMPER);     !ARRAY DATA MODULE FAILURE
8236 ;          4812                      tes;
8237 ;          4813
8238 ;          4814                  PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
8239 ;          4815                  PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
8240 ;          4816                  DODU_FLG = ONE;
8241 ;          4817                  end;
8242 ;          4818
8243 ;          4819              ENDSUB;
8244 ;          4820              end;
8245 ;          4821
8246 ;          4822          TST_PAT = not .TST_PAT;                 !REPEAT WITH A 0 IN A FIELD OF 1'S
8247 ;          4823          end;
8248 ;          4824
8249 ;          4825      TST_PAT = .TST_PAT^ONE;                     !SHIFT THE 1 IN THE FIELD OF 0'S
8250 ;          4826      end;
8251 ;          4827
8252 ;          4828  if .DODU_FLG IS_SET                             !DROP THIS UNIT IF DODU_FLG IS SET
8253 ;          4829  then
8254 ;          4830      begin
8255 ;          4831      DODU (.ML_LUN);
8256 ;          4832      DOCLN;
8257 ;          4833      end;
8258 ;          4834
8259 ;          4835  ENDTST;
8263
```

```
8271 027660 004167 154232          $T6:  JSR    R1,$SAVE5                ;                                    4736
8272 027664 024646                       CMP    -(SP),-(SP)
8273 027666 005005                       CLR    R5                       ; DODU.FLG                           4781
8274 027670 012703 000001                MOV    #1,R3                    ; *,TST.PAT                          4782
8275 027674 005001                       CLR    R1                       ; SHIFT                              4784
8276 027676 005002                 1$:   CLR    R2                       ; TWICE                              4787
8277 027700 005004                 2$:   CLR    R4                       ; REG.SEL                            4790
8278 027702 104402                 3$:   TRAP   2                        ;                                    4791
8279 027704 152777 000040 163302        BISB   #40,@ML.REG+40           ;                                    4792
8280 027712 016700 163664                MOV    ML.DUT,R0
8281 027716 042700 177770                BIC    #177770,R0
8282 027722 142777 000007 163264        BICB   #7,@ML.REG+40
8283 027730 150077 163260                BISB   R0,@ML.REG+40
8284 027734 010346                       MOV    R3,-(SP)                 ; TST.PAT,*                          4794
8285 027736 010446                       MOV    R4,-(SP)                 ; REG.SEL,*
8286 027740 012746 000010                MOV    #10,-(SP)
8287 027744 060616                       ADD    SP,(SP)                  ; INDEX,*
8288 027746 004767 173122                JSR    PC,WRT.REG
8289 027752 010316                       MOV    R3,(SP)                  ; TST.PAT,*                          4795
8290 027754 010446                       MOV    R4,-(SP)                 ; REG.SEL,*
8291 027756 012746 000012                MOV    #12,-(SP)
8292 027762 060616                       ADD    SP,(SP)                  ; ERR.FLG,*
8293 027764 004767 173472                JSR    PC,RD.REG
8294 027770 026627 000012 000001         CMP    12(SP),#1                ; ERR.FLG,*                          4797
8295 027776 001106                       BNE    7$
8296 030000 005704                       TST    R4                       ; REG.SEL                            4801
8297 030002 002410                       BLT    4$
8298 030004 020427 000003                CMP    R4,#3                    ; REG.SEL,*
8299 030010 003005                       BGT    4$
8300 030012 104455                       TRAP   55                       ;                                    4805
8301 030014 000005                       .WORD  5
8302 030016 010464                       .WORD  ASYNC
8303 030020 024052                       .WORD  DUMPER
8304 030022 000425                       BR     6$                       ;
8305 030024 020427 000004          4$:   CMP    R4,#4                    ; REG.SEL,*                          4801
8306 030030 002410                       BLT    5$
8307 030032 020427 000005                CMP    R4,#5                    ; REG.SEL,*
8308 030036 003005                       BGT    5$
8309 030040 104455                       TRAP   55                       ;                                    4808
8310 030042 000005                       .WORD  5
8311 030044 010526                       .WORD  SYNC
8312 030046 024052                       .WORD  DUMPER
8313 030050 000412                       BR     6$                       ;                                    4801
8314 030052 020427 000006          5$:   CMP    R4,#6                    ; REG.SEL,*
8315 030056 002407                       BLT    6$
8316 030060 020427 000007                CMP    R4,#7                    ; REG.SEL,*
8317 030064 003004                       BGT    6$
8318 030066 104455                       TRAP   55                       ;                                    4811
8319 030070 000005                       .WORD  5
8320 030072 010570                       .WORD  ARR.DAT
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
                                        .WORD   DUMPER
                                6$:     MOV     #WRD.56,-(SP)           ;                                               4814
                                        MOV     #WRD.52,-(SP)
                                        MOV     #FNC.6,-(SP)
                                        MOV     #FNC.5,-(SP)
                                        MOV     #WRD.12,-(SP)
                                        MOV     #PHR.4,-(SP)
                                        MOV     #SIX.FMT,-(SP)
                                        MOV     #7,-(SP)
                                        MOV     SP,R0                   ; SP,*
                                        TRAP    14
                                        MOV     RD.DATA,(SP)            ;                                               4815
                                        MOV     WT.DATA,-(SP)
                                        MOV     36(SP),R0               ; INDEX,*
                                        ASL     R0
                                        ASL     R0
                                        ASL     R0
                                        MOV     ML.REG(R0),-(SP)
                                        MOV     #FMT.16,-(SP)
                                        MOV     #4,-(SP)
                                        MOV     SP,R0                   ; SP,*
                                        TRAP    14
                                        MOV     #1,R5                   ; *,DODU.FLG                                    4816
                                        ADD     #30,SP                  ;                                               4799
                                7$:     ADD     #12,SP                  ;                                               4791
                                        TRAP    67                      ;                                               4817
                                        ROR     R0
                                        BLO     3$
                                        INC     R4                      ; REG.SEL                                       4790
                                        CMP     R4,#7                   ; REG.SEL,*
                                        BLE     3$
                                        COM     R3                      ; TST.PAT                                       4822
                                        INC     R2                      ; TWICE                                         4787
                                        CMP     R2,#1                   ; TWICE,*
                                        BLE     2$
                                        ASL     R3                      ; TST.PAT                                       4825
                                        INC     R1                      ; SHIFT                                         4784
                                        CMP     R1,#17                  ; SHIFT,*
                                        BLE     1$
                                        DEC     R5                      ; DODU.FLG                                      4828
                                        BNE     8$
                                        MOV     ML.LUN,R0               ;                                               4831
                                        TRAP    51
                                        TRAP    44
                                8$:     CMP     (SP)+,(SP)+             ;                                               4736
                                        RTS     PC

                                ; Routine Size:  137 words
                                ; Maximum stack depth per invocation:  25 words
```

```
 8382
 8383
 8387
 8391 030302                        T6::
 8392 030302  004767  177352        1$:     JSR     PC,$T6                  ;                4833
 8393 030306  104466                        TRAP    66
 8394 030310  006000                        ROR     R0
 8395 030312  103773                        BLO     1$
 8396 030314  000207                        RTS     PC
 8397
 8398                               ; Routine Size:  6 words
 8399                               ; Maximum stack depth per invocation:  0 words
 8404
 8405
 8406 ;          4836  !
 8407 ;          4837  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (57)

```
8409 ;ML4
8410 ;
8411
8412 ;          4838  !
8413 ;          4839  BGNTST;
8414 ;          4840
8415 ;          4841  !++
8416 ;          4842  ! TEST NUMBER:  TST 7
8417 ;          4843  !
8418 ;          4844  ! TEST NAME:    REGISTER INITIALIZATION TEST
8419 ;          4845  !
8420 ;          4846  ! TEST DESCRIPTION:
8421 ;          4847  !       THIS TEST TESTS THE ABILITY OF
8422 ;          4848  !       ALL ACCESSIBLE ML11 REGISTERS
8423 ;          4849  !       TO CLEAR OUT REGISTER DATA OF
8424 ;          4850  !       ONE'S AND ZEROES PATTERN.
8425 ;          4851  !
8426 ;          4852  !       ROUTINE WRT_REG WRITES A
8427 ;          4853  !       PATTERN TO THE SELECTED REGISTER.
8428 ;          4854  !
8429 ;          4855  !       A MASS BUS CLEAR IS DONE.
8430 ;          4856  !
8431 ;          4857  !       THEN ROUTINE RD_REG READS THE
8432 ;          4858  !       SELECTED REGISTER FOR CLEARED DATA
8433 ;          4859  !       THE DRIVE IS DROPPED ON DETECTED ERRORS.
8434 ;          4860  !
8435 ;          4861  !       THIS TEST WILL ALSO READ THE
8436 ;          4862  !       DRIVE TYPE REGISTER FOR ITS
8437 ;          4863  !       INITIAL REGISTER VALUE.
8438 ;          4864  !
8439 ;          4865  ! IMPLICIT INPUTS:
8440 ;          4866  !       THIS FLAG IS NEEDED DUE TO THE UNIQUE
8441 ;          4867  !       MANNER IN WHICH THESE REGISTERS
8442 ;          4868  !       MUST BE READ.
8443 ;          4869  !
8444 ;          4870  !       RD_DATA
8445 ;          4871  !       LOADED BY THE READ REGISTER ROUTINE
8446 ;          4872  !       AND CONTAINS THE DATA PATTERN READ FROM
8447 ;          4873  !       THE REGISTER (REPRESENTS BAD DATA).
8448 ;          4874  !
8449 ;          4875  !       DRIVE TYPE
8450 ;          4876  !       LOADED DURING THE INITIALIZATION CODE AND
8451 ;          4877  !       STORES THE EXPECTED CONTENTS OF THE DRIVE
8452 ;          4878  !       TYPE REGISTER.
8453 ;          4879  !--
8454 ;          4880
8455 ;          4881  local
8456 ;          4882      TST_PAT,                    !TEST PATTERN
8457 ;          4883      ERR_FLG,                    !ERROR FLAG PASSED TO ROUTINE
8458 ;          4884      index,                      !POINTS TO REG PRESENTLY BEING TESTED
8459 ;          4885      CLR_DATA,                   !STORES CALCULATED REGISTER CLEAR DATA
8460 ;          4886      SAVE,                       !TEMPORARY STORAGE LOCATION
8461 ;          4887      DODU_FLG;                   !DROP UNIT FLAG
8462 ;          4888
8463 ;          4889  ML_REG [19, FORCE_HI] = %o'177777';          !CLR DATA FOR MLPD IS ONES
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (57)

```
8465 ;ML4
8466 ;
8467
8468 ;          4890  DODU_FLG = ZERO;
8469 ;          4891  TST_PAT = ONES;                          !BACKGROUND PATTERN
8470 ;          4892
8471 ;          4893  incr TWICE from 0 to 1 do                !REPEAT LOOP TWICE
8472 ;          4894      begin
8473 ;          4895
8474 ;          4896      incr REG_SEL from 0 to 10 do         !TEST THIRTEEN REGISTERS
8475 ;          4897          begin
8476 ;          4898          BGNSUB;
8477 ;          4899          CLR_MBUS;
8478 ;          4900          WRT_REG (.TST_PAT, .REG_SEL, index);  !WRITE REGISTER WITH BACKGROUND
8479 ;          4901          CLR_DATA = (.AI) or (.IGNORE);        !CALCULATE THE CLEARED DATA PATTERN
8480 ;          4902          CLR_MBUS;                             !CLEAR THE REGISTER
8481 ;          4903          RD_REG (.CLR_DATA, .REG_SEL, ERR_FLG);!READ THE REGISTER FOR THE CLEARED DATA PAT
8482 ;          4904
8483 ;          4905          if .ERR_FLG IS_SET                    !SEE IF READ FOUND AN ERROR
8484 ;          4906          then
8485 ;          4907              begin                             !IF ERROR FLAG IS_SET THEN ERROR AND SET DODU_FLG
8486 ;          4908
8487 ;          4909              selectone .REG_SEL of             !FIND WHICH MODULE FAILED
8488 ;          4910                  set
8489 ;          4911
8490 ;          4912                  [0, 1, 2, 3, 9, 10] :
8491 ;          4913                      ERRDF (6, ASYNC, DUMPER);  !ASYNC MODULE FAILURE
8492 ;          4914
8493 ;          4915                  [4, 5, 8] :
8494 ;          4916                      ERRDF (6, SYNC, DUMPER);   !SYNC MODULE FAILURE
8495 ;          4917
8496 ;          4918                  [6 to 7] :
8497 ;          4919                      ERRDF (6, ARR_DAT, DUMPER); !ARRAY DATA MODULE
8498 ;          4920                  tes;
8499 ;          4921
8500 ;          4922              PRINTB (FIV_FMT, PHR_4, WRD_12, WRD_52, FNC_23, WRD_56);
8501 ;          4923              PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .CLR_DATA, .RD_DATA);
8502 ;          4924              DODU_FLG = ONE;
8503 ;          4925              end;
8504 ;          4926
8505 ;          4927          ENDSUB;
8506 ;          4928          end;
8507 ;          4929
8508 ;          4930      TST_PAT = not .TST_PAT;                   !REPEAT WITH COMPLIMENT BACKGROUND PAT
8509 ;          4931      end;
8510 ;          4932
8511 ;          4933  ML_REG [19, FORCE_HI] = ZEROES;             !RESTORE MLPD FORCED_HI
8512 ;          4934  !
8513 ;          4935  !
8514 ;          4936  !  NOW TEST THE DRIVE TYPE REGISTER
8515 ;          4937  !
8516 ;          4938  !
8517 ;          4939
8518 ;          4940  if .MLDT neq .DRIVE_TYPE                    !COMPARE REG CONTENTS TO CALCULATED VALUE
8519 ;          4941  then
```

```
8521 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
8522 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (57)
8523
8524 ;          4942      begin
8525 ;          4943      ERRDF (113, ASYNC, DUMPER);
8526 ;          4944      PRINTB (TWO_FMT, REG_7, PHR_4);
8527 ;          4945      PRINTB (FMT_2, .DRIVE_TYPE, .SAVE);
8528 ;          4946      end;
8529 ;          4947
8530 ;          4948  if .DODU_FLG IS_SET                    !DROP THIS UNIT IF DODU_FLG IS_SET
8531 ;          4949  then
8532 ;          4950      begin
8533 ;          4951      DODU (.ML_LUN);
8534 ;          4952      DOCLN;
8535 ;          4953      end;
8536 ;          4954
8537 ;          4955  ENDTST;
8541
8545 030316  004167  153574          $T7:   JSR     R1,$SAVE5                ;                                4835
8546 030322  162706  000006                 SUB     #6,SP
8547 030326  012767  177777  163052          MOV     #-1,ML.REG+232           ;                                4889
8548 030334  005005                         CLR     R5                       ; DODU.FLG                       4890
8549 030336  012702  177777                 MOV     #-1,R2                   ; *,TST.PAT                      4891
8550 030342  005001                         CLR     R1                       ; TWICE                          4893
8551 030344  005004                  1$:    CLR     R4                       ; REG.SEL                        4896
8552 030346  104402                  2$:    TRAP    2                        ;                                4897
8553 030350  152777  000040  162636          BISB    #40,@ML.REG+40           ;                                4898
8554 030356  016703  163220                 MOV     ML.DUT,R3
8555 030362  042703  177770                 BIC     #177770,R3
8556 030366  142777  000007  162620          BICB    #7,@ML.REG+40
8557 030374  150377  162614                 BISB    R3,@ML.REG+40
8558 030400  010246                         MOV     R2,-(SP)                 ; TST.PAT,*                      4900
8559 030402  010446                         MOV     R4,-(SP)                 ; REG.SEL,*
8560 030404  012746  000012                 MOV     #12,-(SP)
8561 030410  060616                         ADD     SP,(SP)                  ; INDEX,*
8562 030412  004767  172456                 JSR     PC,WRT.REG
8563 030416  016600  000012                 MOV     12(SP),R0                ; INDEX,*                        4901
8564 030422  006300                         ASL     R0
8565 030424  006300                         ASL     R0
8566 030426  006300                         ASL     R0
8567 030430  010003                         MOV     R0,R3
8568 030432  016300  013156                 MOV     ML.REG+2(R3),R0
8569 030436  056300  013162                 BIS     ML.REG+6(R3),R0
8570 030442  010066  000006                 MOV     R0,6(SP)                 ; *,CLR.DATA
8571 030446  152777  000040  162540          BISB    #40,@ML.REG+40
8572 030454  016700  163122                 MOV     ML.DUT,R0
8573 030460  042700  177770                 BIC     #177770,R0
8574 030464  142777  000007  162522          BICB    #7,@ML.REG+40
```

```
                                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                                    22-Dec-1980 09:21:22    PA:<
                                ;ML4
                                :
030472  150077  162516                BISB    R0,@ML.REG+40
030476  016616  000006                MOV     6(SP),(SP)          ; CLR.DATA,*                    4903
030502  010446                      MOV     R4,-(SP)            ; REG.SEL,*
030504  012746  000014                MOV     #14,-(SP)
030510  060616                      ADD     SP,(SP)             ; ERR.FLG,*
030512  004767  172744                JSR     PC,RD.REG
030516  026627  000014  000001        CMP     14(SP),#1           ; ERR.FLG,*                     4905
030524  001110                      BNE     10$
030526  005704                      TST     R4                  ; REG.SEL                       4909
030530  002403                      BLT     3$
030532  020427  000003                CMP     R4,#3               ; REG.SEL,*
030536  003406                      BLE     4$
030540  020427  000011        3$:     CMP     R4,#11              ; REG.SEL,*
030544  002410                      BLT     5$
030546  020427  000012                CMP     R4,#12              ; REG.SEL,*
030552  003005                      BGT     5$
030554  104455                4$:     TRAP    55                  ;                               4913
030556  000006                      .WORD   6
030560  010464                      .WORD   ASYNC
030562  024052                      .WORD   DUMPER
030564  000430                      BR      9$                  ;                               4909
030566  020427  000004        5$:     CMP     R4,#4               ; REG.SEL,*
030572  002403                      BLT     6$
030574  020427  000005                CMP     R4,#5               ; REG.SEL,*
030600  003403                      BLE     7$
030602  020427  000010        6$:     CMP     R4,#10              ; REG.SEL,*
030606  001005                      BNE     8$
030610  104455                7$:     TRAP    55                  ;                               4916
030612  000006                      .WORD   6
030614  010526                      .WORD   SYNC
030616  024052                      .WORD   DUMPER
030620  000412                      BR      9$                  ;                               4909
030622  020427  000006        8$:     CMP     R4,#6               ; REG.SEL,*
030626  002407                      BLT     9$
030630  020427  000007                CMP     R4,#7               ; REG.SEL,*
030634  003004                      BGT     9$
030636  104455                      TRAP    55                  ;                               4919
030640  000006                      .WORD   6
030642  010570                      .WORD   ARR.DAT
030644  024052                      .WORD   DUMPER
030646  012746  007122        9$:     MOV     #WRD.56,-(SP)       ;                               4922
030652  012746  010242                MOV     #FNC.23,-(SP)
030656  012746  007066                MOV     #WRD.52,-(SP)
030662  012746  006426                MOV     #WRD.12,-(SP)
030666  012746  007454                MOV     #PHR.4,-(SP)
030672  012746  006062                MOV     #FIV.FMT,-(SP)
030676  012746  000006                MOV     #6,-(SP)
030702  010600                      MOV     SP,R0               ; SP,*
030704  104414                      TRAP    14
030706  016716  162216                MOV     RD.DATA,(SP)        ;                               4923
030712  016646  000030                MOV     30(SP),-(SP)        ; CLR.DATA,*
030716  016346  013154                MOV     ML.REG(R3),-(SP)
```

```
                                                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                                                    22-Dec-1980 09:21:22    PA:<
                        ;ML4
                        ;
                                MOV     #FMT.16,-(SP)
                                MOV     #4,-(SP)
                                MOV     SP,R0                                   ; SP,*
                                TRAP    14
                                MOV     #1,R5                                   ; *,DODU.FLG                                    4924
                                ADD     #26,SP                                  ;                                               4907
                10$:            ADD     #12,SP                                  ;                                               4897
                                TRAP    67                                      ;                                               4925
                                ROR     R0
                                BHIS    12$
                11$:            JMP     2$
                12$:-           INC     R4                                      ; REG.SEL                                       4896
                                CMP     R4,#12                                  ; REG.SEL,*
                                BLE     11$
                                COM     R2                                      ; TST.PAT                                       4930
                                INC     R1                                      ; TWICE                                         4893
                                CMP     R1,#1                                   ; TWICE,*
                                BGT     13$
                                JMP     1$
                13$:            CLR     ML.REG+232                              ;                                               4933
                                CMP     @ML.REG+130,DRIVE.TYPE                  ;                                               4940
                                BEQ     14$
                                TRAP    55                                      ;                                               4943
                                .WORD   161
                                .WORD   ASYNC
                                .WORD   DUMPER
                                MOV     #PHR.4,-(SP)                            ;                                               4944
                                MOV     #REG.7,-(SP)
                                MOV     #TWO.FMT,-(SP)
                                MOV     #3,-(SP)
                                MOV     SP,R0                                   ; SP,*
                                TRAP    14
                                MOV     R4,(SP)                                 ; SAVE,*                                        4945
                                MOV     DRIVE.TYPE,-(SP)
                                MOV     #FMT.2,-(SP)
                                MOV     #3,-(SP)
                                MOV     SP,R0                                   ; SP,*
                                TRAP    14
                                ADD     #16,SP                                  ;                                               4942
                14$:            DEC     R5                                      ; DODU.FLG                                      4948
                                BNE     15$
                                MOV     ML.LUN,R0                               ;                                               4951
                                TRAP    51
                                TRAP    44
                15$:            ADD     #6,SP                                   ;                                               4835
                                RTS     PC

                ; Routine Size:  198 words
                ; Maximum stack depth per invocation:  25 words
```

```
 8692
 8693
 8697
 8701 031132                        T7::
 8702 031132  004767  177160        1$:     JSR     PC,$T7                  ;                4953
 8703 031136  104466                        TRAP    66
 8704 031140  006000                        ROR     R0
 8705 031142  103773                        BLO     1$
 8706 031144  000207                        RTS     PC
 8707
 8708                               ; Routine Size:  6 words
 8709                               ; Maximum stack depth per invocation:  0 words
 8714
 8715
 8716 ;          4956  !<BLF/PAGE>
```

```
8718 ;ML4
8719 ;
8720
8721 ;          4957  !
8722 ;          4958  !
8723 ;          4959  !
8724 ;          4960  BGNTST;
8725 ;          4961
8726 ;          4962  !++
8727 ;          4963  ! TEST NUMBER:  TST 8
8728 ;          4964  !
8729 ;          4965  ! TEST NAME:    REGISTER SELECTION TEST
8730 ;          4966  !
8731 ;          4967  ! TEST DESCRIPTION:
8732 ;          4968  !       THIS TEST TESTS FOR UNIQUE REGISTER
8733 ;          4969  !       SELECTION BY FIRST WRITING A BACKGROUND
8734 ;          4970  !       PATTERN INTO ALL READ/WRITE REGISTERS
8735 ;          4971  !
8736 ;          4972  !       IT THEN WRITES A COMPLIMENT
8737 ;          4973  !       BACKGROUND PATTERN INTO ONE REGISTER
8738 ;          4974  !       AND READS THE REMAINING UNWRITTEN
8739 ;          4975  !       REGISTERS FOR AN UNCHANGED BACKGROUND
8740 ;          4976  !       PAT
8741 ;          4977  !
8742 ;          4978  !       THIS PROCEDURE IS REPEATED UNTIL ALL
8743 ;          4979  !       REGISTERS HAVE BEEN WRITTEN WITH A
8744 ;          4980  !       COMPLIMENT BACKGROUND PATTERN.
8745 ;          4981  !
8746 ;          4982  !--
8747 ;          4983
8748 ;          4984  local
8749 ;          4985      DODU_FLG,                   !DROP UNIT FLAG
8750 ;          4986      TST_PAT,                    !TEST PATTERN
8751 ;          4987      ERR_FLG,                    !ERROR FLAG PASSED TO ROUTINE;
8752 ;          4988      index;                      !POINTS TO REGISTER PRESENTLY BEING TESTED.
8753 ;          4989
8754 ;          4990  BGNSUB;
8755 ;          4991  CLR_MBUS;
8756 ;          4992  DODU_FLG = ZERO;
8757 ;          4993  TST_PAT = %o'125252';           !LOAD TST_PAT WITH ALTERNATE 1'S & 0'S
8758 ;          4994  WRT_CS1 (.TST_PAT, 0);          !WRITE A BACKGROUND INTO ALL THE DIRECTLY
8759 ;          4995  WRT_ER (.TST_PAT, 6);           !ACCESSABLE READ WRITE REGISTERS
8760 ;          4996  WRT_DA (.TST_PAT, 3);
8761 ;          4997  WRT_PA (.TST_PAT, 8);
8762 ;          4998  WRT_E1 (.TST_PAT, 13);
8763 ;          4999  WRT_E2 (.TST_PAT, 14);
8764 ;          5000
8765 ;          5001  incr CNT_1 from 0 to 4 do      !WRITE A COMPLIMENT PATTERN INTO ONE REGISTER
8766 ;          5002      begin
8767 ;          5003      TST_PAT = not .TST_PAT;   !GENERATE THE COMPLIMENT PAT
8768 ;          5004
8769 ;          5005      case .CNT_1 from 0 to 4 of  !SELECT THE REGISTER TO WRITE INTO
8770 ;          5006          set
8771 ;          5007
8772 ;          5008              [0] :
```

```
8774 ;ML4
8775 ;
8776
8777 ;          5009              WRT_CS1 (.TST_PAT, 0);                !FIRST PASS WRITE COMP PAT TO MLCS1
8778 ;          5010
8779 ;          5011          [1] :
8780 ;          5012              WRT_ER (.TST_PAT, 6);                 !SECOND PASS WRITE COMP PAT TO MLER
8781 ;          5013
8782 ;          5014          [2] :
8783 ;          5015              WRT_DA (.TST_PAT, 3);                 !THIRD PASS WRITE COMP PAT TO MLDA
8784 ;          5016
8785 ;          5017          [3] :
8786 ;          5018              WRT_PA (.TST_PAT, 8);                 !FORTH PASS WRITE COMP PAT TO MLPA
8787 ;          5019
8788 ;          5020          [4] :
8789 ;          5021              WRT_E1 (.TST_PAT, 13);                !FIFTH PASS WRITE COMP PAT TO MLE1
8790 ;          5022          tes;
8791 ;          5023
8792 ;          5024      TST_PAT = not .TST_PAT;                       !COMPLIMENT TST_PAT BACK TO BACKGROUND
8793 ;          5025
8794 ;          5026      incr CNT_2 from .CNT_1 + 1 to 5 do            !NOW READ THE REMAINING UNWRITTEN REGISTERS FOR AN
8795 ;          5027          begin                                     !UNCHANGED BACKGROUND
8796 ;          5028
8797 ;          5029          case .CNT_2 from 0 to 5 of                !SELECT THE REGISTER TO READ
8798 ;          5030              set
8799 ;          5031
8800 ;          5032              [0] :
8801 ;          5033                  RD_CS1 (.TST_PAT, index = 0, ERR_FLG);  !READ MLCS1
8802 ;          5034
8803 ;          5035              [1] :
8804 ;          5036                  RD_ER (.TST_PAT, index = 6, ERR_FLG);   !READ MLER
8805 ;          5037
8806 ;          5038              [2] :
8807 ;          5039                  RD_DA (.TST_PAT, index = 3, ERR_FLG);   !READ MLDA
8808 ;          5040
8809 ;          5041              [3] :
8810 ;          5042                  RD_PA (.TST_PAT, index = 8, ERR_FLG);   !READ MLPA
8811 ;          5043
8812 ;          5044              [4] :
8813 ;          5045                  RD_E1 (.TST_PAT, index = 13, ERR_FLG);  !READ MLE1
8814 ;          5046
8815 ;          5047              [5] :
8816 ;          5048                  RD_E2 (.TST_PAT, index = 14, ERR_FLG);  !READ MLE2
8817 ;          5049          tes;
8818 ;          5050
8819 ;          5051      if .ERR_FLG IS_SET                            !SEE IF READ FOUND AN ERROR
8820 ;          5052      then
8821 ;          5053          begin
8822 ;          5054
8823 ;          5055          selectone .CNT_2 of
8824 ;          5056              set
8825 ;          5057
8826 ;          5058              [0 to 2] :
8827 ;          5059                  ERRDF (110, ASYNC, DUMPER); !ASYNC MODULE FAILURE
8828 ;          5060
```

```
8830 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
8831 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (58)
8832
8833 ;          5061                [3 to 5] :
8834 ;          5062                    ERRDF (110, ARR_DAT, DUMPER);       !ARRAY DATA MODULE FAILURE
8835 ;          5063                tes;
8836 ;          5064
8837 ;          5065            PRINTB (THR_FMT, WRD_38, WRD_37, WRD_10);
8838 ;          5066            PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
8839 ;          5067            DODU_FLG = ONE;
8840 ;          5068            end;
8841 ;          5069
8842 ;          5070        end;
8843 ;          5071
8844 ;          5072    end;
8845 ;          5073
8846 ;          5074    ENDSUB;
8847 ;          5075
8848 ;          5076    if .DODU_FLG IS_SET                          !DROP THIS UNIT IF DODU_FLG IS_SET
8849 ;          5077    then
8850 ;          5078        begin
8851 ;          5079        DODU (.ML_LUN);
8852 ;          5080        DOCLN;
8853 ;          5081        end;
8854 ;          5082
8855 ;          5083    ENDTST;
8859
8863 031146  004167  152744          $T8:    JSR     R1,$SAVE5                   ;                       4955
8864 031152  005746                  $T8:    TST     -(SP)
8865 031154  104402                  1$:     TRAP    2                           ;                       4988
8866 031156  152777  000040  162030          BISB    #40,@ML.REG+40              ;                       4990
8867 031164  016703  162412                  MOV     ML.DUT,R3
8868 031170  042703  177770                  BIC     #177770,R3
8869 031174  142777  000007  162012          BICB    #7,@ML.REG+40
8870 031202  150377  162006                  BISB    R3,@ML.REG+40
8871 031206  005005                          CLR     R5                          ; DODU.FLG              4992
8872 031210  012704  125252                  MOV     #-52526,R4                  ; *,TST.PAT             4993
8873 031214  010446                          MOV     R4,-(SP)                    ; TST.PAT,*             4994
8874 031216  005046                          CLR     -(SP)
8875 031220  004767  166236                  JSR     PC,WRT.CS1
8876 031224  010416                          MOV     R4,(SP)                     ; TST.PAT,*             4995
8877 031226  012746  000006                  MOV     #6,-(SP)
8878 031232  004767  166402                  JSR     PC,WRT.ER
8879 031236  010416                          MOV     R4,(SP)                     ; TST.PAT,*             4996
8880 031240  012746  000003                  MOV     #3,-(SP)
8881 031244  004767  166546                  JSR     PC,WRT.DA
8882 031250  010416                          MOV     R4,(SP)                     ; TST.PAT,*             4997
8883 031252  012746  000010                  MOV     #10,-(SP)
```

```
8885                                    ;ML4                                                    22-Dec-1980 09:24:31  TOPS
8886                                    ;                                                       22-Dec-1980 09:21:22  PA:<
8887
8888 031256  004767  167070                    JSR     PC,WRT.PA
8889 031262  010416                            MOV     R4,(SP)             ; TST.PAT,*                                 4998
8890 031264  012746  000015                    MOV     #15,-(SP)
8891 031270  004767  167264                    JSR     PC,WRT.E1
8892 031274  010416                            MOV     R4,(SP)             ; TST.PAT,*                                 4999
8893 031276  012746  000016                    MOV     #16,-(SP)
8894 031302  004767  167460                    JSR     PC,WRT.E2
8895 031306  005001                            CLR     R1                  ; CNT.1                                     5001
8896 031310  005104                    2$:     COM     R4                  ; TST.PAT                                   5003
8897 031312  010103                            MOV     R1,R3               ; CNT.1,*                                   5005
8898 031314  006303                            ASL     R3
8899 031316  066307  031322                    ADD     3$(R3),PC
8900 031322  000012                    3$:     .WORD   4$-3$
8901 031324  000024                            .WORD   5$-3$
8902 031326  000040                            .WORD   6$-3$
8903 031330  000054                            .WORD   7$-3$
8904 031332  000070                            .WORD   8$-3$
8905 031334  010446                    4$:     MOV     R4,-(SP)            ; TST.PAT,*                                 5009
8906 031336  005046                            CLR     -(SP)
8907 031340  004767  166116                    JSR     PC,WRT.CS1
8908 031344  000427                            BR      9$                  ;                                           5005
8909 031346  010446                    5$:     MOV     R4,-(SP)            ; TST.PAT,*                                 5012
8910 031350  012746  000006                    MOV     #6,-(SP)
8911 031354  004767  166260                    JSR     PC,WRT.ER
8912 031360  000421                            BR      9$                  ;                                           5005
8913 031362  010446                    6$:     MOV     R4,-(SP)            ; TST.PAT,*                                 5015
8914 031364  012746  000003                    MOV     #3,-(SP)
8915 031370  004767  166422                    JSR     PC,WRT.DA
8916 031374  000413                            BR      9$                  ;                                           5005
8917 031376  010446                    7$:     MOV     R4,-(SP)            ; TST.PAT,*                                 5018
8918 031400  012746  000010                    MOV     #10,-(SP)
8919 031404  004767  166742                    JSR     PC,WRT.PA
8920 031410  000405                            BR      9$                  ;                                           5005
8921 031412  010446                    8$:     MOV     R4,-(SP)            ; TST.PAT,*                                 5021
8922 031414  012746  000015                    MOV     #15,-(SP)
8923 031420  004767  167134                    JSR     PC,WRT.E1
8924 031424  005104                    9$:     COM     R4                  ; TST.PAT                                   5024
8925 031426  010103                            MOV     R1,R3               ; CNT.1,CNT.2                               5026
8926 031430  000576                            BR      22$
8927 031432  010300                    10$:    MOV     R3,R0               ; CNT.2,*                                   5029
8928 031434  006300                            ASL     R0
8929 031436  066007  031442                    ADD     11$(R0),PC
8930 031442  000014                    11$:    .WORD   12$-11$
8931 031444  000036                            .WORD   13$-11$
8932 031446  000062                            .WORD   14$-11$
8933 031450  000106                            .WORD   15$-11$
8934 031452  000132                            .WORD   16$-11$
8935 031454  000156                            .WORD   17$-11$
8936 031456  010446                    12$:    MOV     R4,-(SP)            ; TST.PAT,*                                 5033
8937 031460  005002                            CLR     R2                  ; INDEX
8938 031462  005046                            CLR     -(SP)
8939 031464  012746  000030                    MOV     #30,-(SP)
```

```
8941                                    ;ML4                                                    22-Dec-1980 09:24:31    TOPS
8942                                    ;                                                       22-Dec-1980 09:21:22    PA:<
8943
8944 031470 060616                              ADD     SP,(SP)                 ; ERR.FLG,*
8945 031472 004767 166034                       JSR     PC,RD.CS1
8946 031476 000461                              BR      18$                     ;                                       5029
8947 031500 010446                      13$:    MOV     R4,-(SP)                ; TST.PAT,*                             5036
8948 031502 012702 000006                       MOV     #6,R2                   ; *,INDEX
8949 031506 010246                              MOV     R2,-(SP)                ; INDEX,*
8950 031510 012746 000030                       MOV     #30,-(SP)
8951 031514 060616                              ADD     SP,(SP)                 ; ERR.FLG,*
8952 031516 004767 166166                       JSR     PC,RD.ER
8953 031522 000447                              BR      18$                     ;                                       5029
8954 031524 010446                      14$:    MOV     R4,-(SP)                ; TST.PAT,*                             5039
8955 031526 012702 000003                       MOV     #3,R2                   ; *,INDEX
8956 031532 010246                              MOV     R2,-(SP)                ; INDEX,*
8957 031534 012746 000030                       MOV     #30,-(SP)
8958 031540 060616                              ADD     SP,(SP)                 ; ERR.FLG,*
8959 031542 004767 166320                       JSR     PC,RD.DA
8960 031546 000435                              BR      18$                     ;                                       5029
8961 031550 010446                      15$:    MOV     R4,-(SP)                ; TST.PAT,*                             5042
8962 031552 012702 000010                       MOV     #10,R2                  ; *,INDEX
8963 031556 010246                              MOV     R2,-(SP)                ; INDEX,*
8964 031560 012746 000030                       MOV     #30,-(SP)
8965 031564 060616                              ADD     SP,(SP)                 ; ERR.FLG,*
8966 031566 004767 166644                       JSR     PC,RD.PA
8967 031572 000423                              BR      18$                     ;                                       5029
8968 031574 010446                      16$:    MOV     R4,-(SP)                ; TST.PAT,*                             5045
8969 031576 012702 000015                       MOV     #15,R2                  ; *,INDEX
8970 031602 010246                              MOV     R2,-(SP)                ; INDEX,*
8971 031604 012746 000030                       MOV     #30,-(SP)
8972 031610 060616                              ADD     SP,(SP)                 ; ERR.FLG,*
8973 031612 004767 167026                       JSR     PC,RD.E1
8974 031616 000411                              BR      18$                     ;                                       5029
8975 031620 010446                      17$:    MOV     R4,-(SP)                ; TST.PAT,*                             5048
8976 031622 012702 000016                       MOV     #16,R2                  ; *,INDEX
8977 031626 010246                              MOV     R2,-(SP)                ; INDEX,*
8978 031630 012746 000030                       MOV     #30,-(SP)
8979 031634 060616                              ADD     SP,(SP)                 ; ERR.FLG,*
8980 031636 004767 167222                       JSR     PC,RD.E2
8981 031642 026627 000030 000001        18$:    CMP     30(SP),#1               ; ERR.FLG,*                             5051
8982 031650 001064                              BNE     21$
8983 031652 005703                              TST     R3                      ; CNT.2                                 5055
8984 031654 002410                              BLT     19$
8985 031656 020327 000002                       CMP     R3,#2                   ; CNT.2,*
8986 031662 003005                              BGT     19$
8987 031664 104455                              TRAP    55                      ;                                       5059
8988 031666 000156                              .WORD   156
8989 031670 010464                              .WORD   ASYNC
8990 031672 024052                              .WORD   DUMPER
8991 031674 000412                              BR      20$                     ;                                       5055
8992 031676 020327 000003               19$:    CMP     R3,#3                   ; CNT.2,*
8993 031702 002407                              BLT     20$
8994 031704 020327 000005                       CMP     R3,#5                   ; CNT.2,*
8995 031710 003004                              BGT     20$
```

```
8997                                    ;ML4                                                    22-Dec-1980 09:24:31    TOPS
8998                                    ;                                                       22-Dec-1980 09:21:22    PA:<
8999
9000 031712  104455                            TRAP    55                      ;                                       5062
9001 031714  000156                            .WORD   156
9002 031716  010570                            .WORD   ARR.DAT
9003 031720  024052                            .WORD   DUMPER
9004 031722  012746  006406            20$:    MOV     #WRD.10,-(SP)           ;                                       5065
9005 031726  012746  006700                    MOV     #WRD.37,-(SP)
9006 031732  012746  006710                    MOV     #WRD.38,-(SP)
9007 031736  012746  006034                    MOV     #THR.FMT,-(SP)
9008 031742  012746  000004                    MOV     #4,-(SP)
9009 031746  010600                            MOV     SP,R0                   ; SP,*
9010 031750  104414                            TRAP    14
9011 031752  016716  161152                    MOV     RD.DATA,(SP)            ;                                       5066
9012 031756  016746  161144                    MOV     WT.DATA,-(SP)
9013 031762  010200                            MOV     R2,R0                   ; INDEX,*
9014 031764  006300                            ASL     R0
9015 031766  006300                            ASL     R0
9016 031770  006300                            ASL     R0
9017 031772  016046  013154                    MOV     ML.REG(R0),-(SP)
9018 031776  012746  005216                    MOV     #FMT.16,-(SP)
9019 032002  012746  000004                    MOV     #4,-(SP)
9020 032006  010600                            MOV     SP,R0                   ; SP,*
9021 032010  104414                            TRAP    14
9022 032012  012705  000001                    MOV     #1,R5                   ; *,DODU.FLG                            5067
9023 032016  062706  000022                    ADD     #22,SP                  ;                                       5053
9024 032022  062706  000006            21$:    ADD     #6,SP                   ;                                       5027
9025 032026  005203                    22$:    INC     R3                      ; CNT.2                                 5026
9026 032030  020327  000005                    CMP     R3,#5                   ; CNT.2,*
9027 032034  003002                            BGT     23$
9028 032036  000167  177370                    JMP     10$
9029 032042  022626                    23$:    CMP     (SP)+,(SP)+             ;                                       5002
9030 032044  005201                            INC     R1                      ; CNT.1                                 5001
9031 032046  020127  000004                    CMP     R1,#4                   ; CNT.1,*
9032 032052  003002                            BGT     24$
9033 032054  000167  177230                    JMP     2$
9034 032060  062706  000016            24$:    ADD     #16,SP                  ;                                       4988
9035 032064  104467                            TRAP    67                      ;                                       5072
9036 032066  006000                            ROR     R0
9037 032070  103002                            BHIS    25$
9038 032072  000167  177056                    JMP     1$
9039 032076  005305                    25$:    DEC     R5                      ; DODU.FLG                              5076
9040 032100  001004                            BNE     26$
9041 032102  016700  161472                    MOV     ML.LUN,R0               ;                                       5079
9042 032106  104451                            TRAP    51
9043 032110  104444                            TRAP    44
9044 032112  005726                    26$:    TST     (SP)+                   ;                                       4955
9045 032114  000207                            RTS     PC
9046
9047                                    ; Routine Size:  244 words
9048                                    ; Maximum stack depth per invocation:  28 words
```

```
9057
9058
9062
9066 032116                     T8::
9067 032116  004767  177024     1$:     JSR     PC,$T8                  ;                5081
9068 032122  104466                     TRAP    66
9069 032124  006000                     ROR     R0
9070 032126  103773                     BLO     1$
9071 032130  000207                     RTS     PC
9072
9073                            ; Routine Size:  6 words
9074                            ; Maximum stack depth per invocation:  0 words
9079
9080
9081 ;          5084  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (59)

```
9083 ;ML4
9084 ;
9085
9086 ;          5085  !
9087 ;          5086  !
9088 ;          5087  BGNTST;
9089 ;          5088
9090 ;          5089  !++
9091 ;          5090  ! TEST NUMBER:  TST 9
9092 ;          5091  !
9093 ;          5092  ! TEST NAME:    PRINT SERIAL NUMBER
9094 ;          5093  !
9095 ;          5094  ! TEST DESCRIPTION:
9096 ;          5095  !       UPON A YES RESPONSE TO THE
9097 ;          5096  !       SOFTWARE QUESTION 'PRINT SERIAL NO?
9098 ;          5097  !       PRINT OUT THE DRIVE UNDER TEST
9099 ;          5098  !       SERIAL NUMBER.
9100 ;          5099  !
9101 ;          5100  !--
9102 ;          5101
9103 ;          5102  external
9104 ;          5103      PRSN;                          !LOCATION WHERE ANSWER TO SW QUESTION IS STORED
9105 ;          5104
9106 ;          5105  local
9107 ;          5106      D3,                            !STORES DIGIT 3 OF SERIAL NUMBER
9108 ;          5107      D2,                            !STORES DIGIT 2 OF SERIAL NUMBER
9109 ;          5108      D1,                            !STORES DIGIT 1 OF SERIAL NUMBER
9110 ;          5109      D0;                            !STORES DIGIT 0 OF SERIAL NUMBER
9111 ;          5110
9112 ;          5111  if .PRSN IS_SET                    !SEE IF WE PRINT THE SERIAL NUMBER
9113 ;          5112  then
9114 ;          5113      begin                          !PRINT THE SERIAL NUMBER IF THE REPLY WAS YES
9115 ;          5114      D3 = .SN3;                     !LOAD DIGIT 3 OF SN INTO D3
9116 ;          5115      D2 = .SN2;                     !LOAD DIGIT 2 OF SN INTO D2
9117 ;          5116      D1 = .SN1;                     !LOAD DIGIT 1 OF SN INTO D1
9118 ;          5117      D0 = .SN0;                     !LOAD DIGIT 0 OF SN INTO D0
9119 ;          5118
9120 ;          5119      if ((.D3 gtr 9) or (.D2 gtr 9) or (.D1 gtr 9) or (.D0 gtr 9))
9121 ;          5120                                     !SEE IF DIGITS ARE TO BIG FOR COVERSION
9122 ;          5121      then
9123 ;          5122          PRINTB (FMT_25, PHR_15, .MLSN)      !PRINT OCTAL SN IF TO BIG
9124 ;          5123      else
9125 ;          5124          PRINTB (FMT_26, PHR_15, .D3, .D2, .D1, .D0);    !ELSE PRINT DECIMAL SERIAL NUMBER
9126 ;          5125
9127 ;          5126      end;
9128 ;          5127
9129 ;          5128  ENDTST;
9133
9134                                  .GLOBL  PRSN
9135
9136
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
                                ST9:    JSR     R1,$SAVE3               ;                                               5083
                        000001          CMP     PRSN,#1                 ;                                               5111
                                        BNE     4$
                                        MOV     @ML.REG+140,R3          ; *,D3                                          5114
                                        ASR     R3                      ; D3
                                        ASR     R3                      ; D3
                                        ASR     R3                      ; D3
                                        ASR     R3                      ; D3
                                        SWAB    R3                      ; D3
                                        BIC     #177760,R3              ; *,D3
                                        MOV     @ML.REG+140,R0          ; *,D2                                          5115
                                        SWAB    R0                      ; D2
                                        BIC     #177760,R0              ; *,D2
                                        MOVB    @ML.REG+140,R1          ; *,D1                                          5116
                                        ASR     R1                      ; D1
                                        ASR     R1                      ; D1
                                        ASR     R1                      ; D1
                                        ASR     R1                      ; D1
                                        BIC     #177760,R1              ; *,D1
                                        MOVB    @ML.REG+140,R2          ; *,D0                                          5117
                                        BIC     #177760,R2              ; *,D0
                                        CMP     R3,#11                  ; D3,*                                          5119
                                        BGT     1$
                                        CMP     R0,#11                  ; D2,*
                                        BGT     1$
                                        CMP     R1,#11                  ; D1,*
                                        BGT     1$
                                        CMP     R2,#11                  ; D0,*
                                        BLE     2$
                                1$:     MOV     @ML.REG+140,-(SP)       ;                                               5122
                                        MOV     #PHR.15,-(SP)
                                        MOV     #FMT.25,-(SP)
                                        MOV     #3,-(SP)
                                        MOV     SP,R0                   ; SP,*
                                        TRAP    14
                                        BR      3$                      ;                                               5119
                                2$:     MOV     R2,-(SP)                ; D0,*                                          5124
                                        MOV     R1,-(SP)                ; D1,*
                                        MOV     R0,-(SP)                ; D2,*
                                        MOV     R3,-(SP)                ; D3,*
                                        MOV     #PHR.15,-(SP)
                                        MOV     #FMT.26,-(SP)
                                        MOV     #6,-(SP)
                                        MOV     SP,R0                   ; SP,*
                                        TRAP    14
                                        ADD     #6,SP
                                3$:     ADD     #10,SP                  ;                                               5113
                                4$:     RTS     PC                      ;                                               5083
```

```
                                ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                ;                                                       22-Dec-1980 09:21:22    PA:<

                                ; Routine Size:  72 words
                                ; Maximum stack depth per invocation:  11 words


032352                          T9::
032352  004767  177554          1$:     JSR     PC,$T9                          ;       5126
032356  104466                          TRAP    66
032360  006000                          ROR     R0
032362  103773                          BLO     1$
032364  000207                          RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words


;       5129  !<BLF/PAGE>
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (60)

;          5130  !
;          5131  !
;          5132  BGNTST;
;          5133
;          5134  !++
;          5135  ! TEST NUMBER:  TST 10
;          5136  !
;          5137  ! TEST NAME:    C-BUS PARITY TEST
;          5138  !
;          5139  ! TEST DESCRIPTION:
;          5140  !       TEST THE CONTROL BUS PARITY
;          5141  !       DETECTION AND GENERATING BY:
;          5142  !
;          5143  !       1.  WRITING BAD PARITY TO DEVICE
;          5144  !           AND TEST CPAR SET.
;          5145  !
;          5146  !       2.  WRITING GOOD PARITY TO DEVICE
;          5147  !           AND TEST CPAR CLR.
;          5148  !
;          5149  !       3.  READING DEVICE AND TEST GOOD
;          5150  !           PARITY GENERATION BY READING
;          5151  !           MCPE CLR.
;          5152  !
;          5153  !--
;          5154
;          5155  local
;          5156      SAVE,                                 !TEMPORARY SAVE LOCATION
;          5157      TST_PAT;                              !TEST PATTERN
;          5158
;          5159  if .PAR_DIS IS_NOT_SET                   !SEE IF PARITY IS DISABLED
;          5160  then
;          5161      begin                                 !BEGIN IF PARITY IS ENABLE
;          5162      TST_PAT = %o'125252';                 !ALTERNATING 1, 0 PATTERN
;          5163
;          5164      incr TWICE from 1 to 2 do             !REPEAT LOOP TWICE
;          5165          begin
;          5166          CLR_MBUS;
;          5167          PAT = ONE;                        !GENERATE EVEN PARITY BY SETTING THE PAT BIT
;          5168          MLDA = .TST_PAT;                  !WRITE BAD PARITY ON CONTROL BUS
;          5169
;          5170          if .CPAR IS_NOT_SET               !READ CPAR BIT SET
;          5171          then
;          5172              begin
;          5173              ERRDF (7, ASYNC, DUMPER);     !ERROR IF NOT SET
;          5174              PRINTB (THR_FMT, WRD_5, WRD_7, WRD_9);
;          5175              end;
;          5176
;          5177          CLR_MBUS;                         !CLEAR OUT PAT BIT
;          5178          MLDA = .TST_PAT;                  !WRITE ODD PARITY CONTROL BUS
;          5179
;          5180          if .CPAR IS_SET                   !READ CPAR BIT CLEARED
;          5181          then
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (60)

;          5182              begin
;          5183              ERRDF (8, ASYNC, DUMPER);           !ERROR IF SET
;          5184              PRINTB (THR_FMT, WRD_6, WRD_7, WRD_9);
;          5185              end;
;          5186
;          5187          CLR_MBUS;
;          5188          SAVE = .MLDA;                           !READ A REGISTER FROM DUT
;          5189
;          5190          if .MCPE IS_SET                         !SEE IF GENERATED GOOD PARITY
;          5191          then
;          5192              begin
;          5193              ERRDF (9, ASYNC, DUMPER);           !ERROR IF MCPE IS_SET
;          5194              PRINTB (THR_FMT, WRD_6, WRD_7, WRD_8);
;          5195              end;
;          5196
;          5197          TST_PAT = .TST_PAT^ONE;                 !REPEAT WITH SHIFTED DATA
;          5198          end;
;          5199
;          5200      end
;          5201  else
;          5202      PRINTB (TWO_FMT, WRD_7, WRD_53);            !JUST PRINT MESSAGE IF PARITY IS DISABLED
;          5203
;          5204  ENDTST;
;
9318 032366  004167  151466          $T10:   JSR     R1,$SAVE3                       ;                       5128
9319 032372  005767  157170                  TST     PAR.DIS                         ;                       5159
9320 032376  001171                          BNE     5$
9321 032400  012701  125252                  MOV     #-52526,R1                      ; *,TST.PAT             5162
9322 032404  012702  000001                  MOV     #1,R2                           ; *,TWICE               5164
9323 032410  152777  000040  160576  1$:     BISB    #40,@ML.REG+40                  ;                       5165
9324 032416  016700  161160                  MOV     ML.DUT,R0
9325 032422  042700  177770                  BIC     #177770,R0
9326 032426  142777  000007  160560          BICB    #7,@ML.REG+40
9327 032434  150077  160554                  BISB    R0,@ML.REG+40
9328 032440  152777  000020  160546          BISB    #20,@ML.REG+40                  ;                       5167
9329 032446  010177  160532                  MOV     R1,@ML.REG+30                   ; TST.PAT,*             5168
9330 032452  132777  000010  160554          BITB    #10,@ML.REG+60                  ;                       5170
9331 032460  001022                          BNE     2$
9332 032462  104455                          TRAP    55                              ;                       5173
9333 032464  000007                          .WORD   7
9334 032466  010464                          .WORD   ASYNC
9335 032470  024052                          .WORD   DUMPER
9336 032472  012746  006374                  MOV     #WRD.9,-(SP)                    ;                       5174
9337 032476  012746  006344                  MOV     #WRD.7,-(SP)
9338 032502  012746  006330                  MOV     #WRD.5,-(SP)
```

```
                                        ;ML4                                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                                       22-Dec-1980 09:21:22    PA:<
                                                MOV     #THR.FMT,-(SP)
032512  012746  000004                        MOV     #4,-(SP)
032516  010600                                MOV     SP,R0                           ; SP,*
032520  104414                                TRAP    14
032522  062706  000012                        ADD     #12,SP                          ;                                                       5172
032526  152777  000040  160460  2$:           BISB    #40,@ML.REG+40                  ;                                                       5175
032534  016700  161042                        MOV     ML,DUT,R0
032540  042700  177770                        BIC     #177770,R0
032544  142777  000007  160442                BICB    #7,@ML.REG+40
032552  150077  160436                        BISB    R0,@ML.REG+40
032556  010177  160422                        MOV     R1,@ML.REG+30                   ; TST.PAT,*                                             5178
032562  132777  000010  160444                BITB    #10,@ML.REG+60                  ;                                                       5180
032570  001422                                BEQ     3$
032572  104455                                TRAP    55                              ;                                                       5183
032574  000010                                .WORD   10
032576  010464                                .WORD   ASYNC
032600  024052                                .WORD   DUMPER
032602  012746  006374                        MOV     #WRD.9,-(SP)                    ;                                                       5184
032606  012746  006344                        MOV     #WRD.7,-(SP)
032612  012746  006336                        MOV     #WRD.6,-(SP)
032616  012746  006034                        MOV     #THR.FMT,-(SP)
032622  012746  000004                        MOV     #4,-(SP)
032626  010600                                MOV     SP,R0                           ; SP,*
032630  104414                                TRAP    14
032632  062706  000012                        ADD     #12,SP                          ;                                                       5182
032636  152777  000040  160350  3$:           BISB    #40,@ML.REG+40                  ;                                                       5185
032644  016700  160732                        MOV     ML,DUT,R0
032650  042700  177770                        BIC     #177770,R0
032654  142777  000007  160332                BICB    #7,@ML.REG+40
032662  150077  160326                        BISB    R0,@ML.REG+40
032666  017703  160312                        MOV     @ML.REG+30,R3                   ; *,SAVE                                                5188
032672  032777  020000  160254                BIT     #20000,@ML.REG                  ;                                                       5190
032700  001422                                BEQ     4$
032702  104455                                TRAP    55                              ;                                                       5193
032704  000011                                .WORD   11
032706  010464                                .WORD   ASYNC
032710  024052                                .WORD   DUMPER
032712  012746  006360                        MOV     #WRD.8,-(SP)                    ;                                                       5194
032716  012746  006344                        MOV     #WRD.7,-(SP)
032722  012746  006336                        MOV     #WRD.6,-(SP)
032726  012746  006034                        MOV     #THR.FMT,-(SP)
032732  012746  000004                        MOV     #4,-(SP)
032736  010600                                MOV     SP,R0                           ; SP,*
032740  104414                                TRAP    14
032742  062706  000012                        ADD     #12,SP                          ;                                                       5192
032746  006301                        4$:     ASL     R1                              ; TST.PAT                                               5197
032750  005202                                INC     R2                              ; TWICE                                                 5164
032752  020227  000002                        CMP     R2,#2                           ; TWICE,*
032756  003614                                BLE     1$
032760  000207                                RTS     PC                              ;                                                       5159
032762  012746  007074                5$:     MOV     #WRD.53,-(SP)                   ;                                                       5202
032766  012746  006344                        MOV     #WRD.7,-(SP)
```

```
 9396                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
 9397                                   ;                                                       22-Dec-1980 09:21:22    PA:<
 9398
 9399 032772  012746  006024                      MOV     #TWO.FMT,-(SP)
 9400 032776  012746  000003                      MOV     #3,-(SP)
 9401 033002  010600                              MOV     SP,R0                          ; SP,*
 9402 033004  104414                              TRAP    14
 9403 033006  062706  000010                      ADD     #10,SP
 9404 033012  000207                              RTS     PC                             ;                        5128
 9405
 9406                                   ; Routine Size:  139 words
 9407                                   ; Maximum stack depth per invocation:  9 words
 9412
 9413
 9417
 9421 033014                            T10::
 9422 033014  004767  177346            1$:     JSR     PC,$T10                        ;                        5202
 9423 033020  104466                              TRAP    66
 9424 033022  006000                              ROR     R0
 9425 033024  103773                              BLO     1$
 9426 033026  000207                              RTS     PC
 9427
 9428                                   ; Routine Size:  6 words
 9429                                   ; Maximum stack depth per invocation:  0 words
 9434
 9435
 9436 ;          5205  !<BLF/PAGE>
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (61)

                5206  !
                5207  !
                5208  BGNTST;
                5209
                5210  !++
                5211  ! TEST NUMBER:  TST 11
                5212  !
                5213  ! TEST NAME:    MEMORY SIZING TEST
                5214  !
                5215  ! TEST DESCRIPTION:
                5216  !
                5217  !       THIS TESTS THE ML11'S SIZING
                5218  !       LOGIC BY COMPARING THE
                5219  !       OPERATORS INPUTED NUMBER OF ARRAYS
                5220  !       PRESENT TO THE ML11 SIZING
                5221  !       NUMBER OF ARRAYS PRESENT
                5222  !       THE DRIVE IS DROPPED ON DETECTED ERRORS.
                5223  ! IMPLICIT INPUTS:
                5224  !
                5225  !       OP_NUM_ARR:
                5226  !       LOADED DURING INIT CODE AND
                5227  !       STORES OPERATORS INPUT TO THE
                5228  !       SOFTWARE QUESTION:
                5229  !       NUMBER OF ARRAYS PRESENT?
                5230  !
                5231  !
                5232  !--
                5233
                5234  local
                5235      DODU_FLG;                                   !DROP UNIT FLAG
                5236
                5237  BGNSUB;
                5238  CLR_MBUS;
                5239  DODU_FLG = ZERO;
                5240
                5241  if (.OP_NUM_ARR + 1) neq .ML_NUM_ARR            !SEE IF DRIVE SIZED SAME NO. OF ARRAYS AS OP INPUTED
                5242  then
                5243      begin
                5244      ERRDF (10, ASYNC, DUMPER);                  !IF NOT EQL THEN ERROR AND SET DODU_FLG
                5245      PRINTB (TWO_FMT, FNC_1, WRD_14);
                5246      PRINTB (FMT_2, (.OP_NUM_ARR + 1), .ML_NUM_ARR);
                5247      DODU_FLG = ONE;
                5248      end;
                5249
                5250  ENDSUB;
                5251
                5252  if .DODU_FLG IS_SET                             !DROP THIS UNIT IF DODU_FLG IS_SET
                5253  then
                5254      begin
                5255      DODU (.ML_LUN);
                5256      DOCLN;
                5257      end;
```

```
9494 ;ML4                                                    22-Dec-1980 09:24:31   TOPS-20 Bliss-16 V2(212)
9495 ;                                                       22-Dec-1980 09:21:22   PA:<NEALE>BL3ML4.BLI.2 (61)
9496
9497 ;          5258
9498 ;          5259  ENDTST;
9502
9506 033030  004167  151024          $T11:  JSR     R1,$SAVE3                ;                              5204
9507 033034  104402                 1$:    TRAP    2                        ;                              5235
9508 033036  152777  000040  160150         BISB    #40,@ML.REG+40           ;                              5237
9509 033044  016701  160532                 MOV     ML.DUT,R1
9510 033050  042701  177770                 BIC     #177770,R1
9511 033054  142777  000007  160132         BICB    #7,@ML.REG+40
9512 033062  150177  160126                 BISB    R1,@ML.REG+40
9513 033066  005002                         CLR     R2                       ; DODU.FLG                     5239
9514 033070  016701  156464                 MOV     OP.NUM.ARR,R1            ;                              5241
9515 033074  005201                         INC     R1
9516 033076  017703  160172                 MOV     @ML.REG+120,R3
9517 033102  006203                         ASR     R3
9518 033104  006203                         ASR     R3
9519 033106  006203                         ASR     R3
9520 033110  000303                         SWAB    R3
9521 033112  042703  177740                 BIC     #177740,R3
9522 033116  010100                         MOV     R1,R0
9523 033120  020003                         CMP     R0,R3
9524 033122  001444                         BEQ     2$
9525 033124  104455                         TRAP    55                       ;                              5244
9526 033126  000012                         .WORD   12
9527 033130  010464                         .WORD   ASYNC
9528 033132  024052                         .WORD   DUMPER
9529 033134  012746  006442                 MOV     #WRD.14,-(SP)            ;                              5245
9530 033140  012746  007726                 MOV     #FNC.1,-(SP)
9531 033144  012746  006024                 MOV     #TWO.FMT,-(SP)
9532 033150  012746  000003                 MOV     #3,-(SP)
9533 033154  010600                         MOV     SP,R0                    ; SP,*
9534 033156  104414                         TRAP    14
9535 033160  017703  160110                 MOV     @ML.REG+120,R3           ;                              5246
9536 033164  006203                         ASR     R3
9537 033166  006203                         ASR     R3
9538 033170  006203                         ASR     R3
9539 033172  000303                         SWAB    R3
9540 033174  042703  177740                 BIC     #177740,R3
9541 033200  010316                         MOV     R3,(SP)
9542 033202  016746  156352                 MOV     OP.NUM.ARR,-(SP)
9543 033206  005216                         INC     (SP)
9544 033210  012746  004266                 MOV     #FMT.2,-(SP)
9545 033214  012746  000003                 MOV     #3,-(SP)
9546 033220  010600                         MOV     SP,R0                    ; SP,*
9547 033222  104414                         TRAP    14
```

```
                                ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                ;                                                       22-Dec-1980 09:21:22    PA:<
                                
033224  012702  000001                MOV     #1,R2                           ; *,DODU.FLG                    5247
033230  062706  000016                ADD     #16,SP                          ;                               5243
033234  104467                2$:     TRAP    67                              ;                               5248
033236  006000                        ROR     R0
033240  103675                        BLO     1$
033242  005302                        DEC     R2                              ; DODU.FLG                      5252
033244  001004                        BNE     3$
033246  016700  160326                MOV     ML.LUN,R0                       ;                               5255
033252  104451                        TRAP    51
033254  104444                        TRAP    44
033256  000207                3$:     RTS     PC                              ;                               5204
                                
                                ; Routine Size:  76 words
                                ; Maximum stack depth per invocation:  11 words
                                
                                
033260                          T11::
033260  004767  177544        1$:     JSR     PC,$T11                         ;                               5257
033264  104466                        TRAP    66
033266  006000                        ROR     R0
033270  103773                        BLO     1$
033272  000207                        RTS     PC
                                
                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words
                                
                                
;               5260  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (62)

```
;ML4
;
;
;                5261  !
;                5262  !
;                5263  BGNTST;
;                5264
;                5265  !++
;                5266  ! TEST NUMBER:  TST 12
;                5267  !
;                5268  ! TEST NAME:    NO-OP FUNCTION TEST
;                5269  !
;                5270  ! TEST DESCRIPTION:
;                5271  !
;                5272  !       TEST IF THE DRIVE CAN PERFORM
;                5273  !       A NO_OP FUNCTION WITH OUT
;                5274  !       HANGING THE DRIVE.
;                5275  !
;                5276  !       A NO_OP FUNCTION IS WRITTEN
;                5277  !       INTO MLCS1.
;                5278  !       THEN GO AND ERROR BITS ARE
;                5279  !       CHECKED FOR CORRECT STATES.
;                5280  !
;                5281  !       THIS UNIT IS DROPPED ON DETECTED
;                5282  !       ERRORS.
;                5283  !
;                5284  ! IMPLICIT INPUTS:      NONE
;                5285  !
;                5286  !
;                5287  !--
;                5288
;                5289  local
;                5290      DODU_FLG;                                   !DROP UNIT FLAG
;                5291
;                5292  BGNSUB;
;                5293  CLR_MBUS;
;                5294  DODU_FLG = ZERO;
;                5295  MLCST = NOOP;                                   !DO A NOOP FUNCTION
;                5296  DELAY (ONE_US);                                 !DELAY 1 US
;                5297
;                5298  if .GO IS_SET                                   !SEE IF GO STILL SET
;                5299  then
;                5300      begin
;                5301      ERRDF (11, ASYNC, DUMPER);                  !ERROR AND SET DODU_FLG IF STILL SET
;                5302      PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_2, WRD_19);
;                5303      DODU_FLG = ONE;
;                5304      end;
;                5305
;                5306  if .ILF IS_SET                                  !SEE ILF SET
;                5307  then
;                5308      begin
;                5309      ERRDF (12, ASYNC, DUMPER);                  !ERROR AND SET DODU_FLG IF SET
;                5310      PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_11, FNC_2, WRD_19);
;                5311      DODU_FLG = ONE;
;                5312      end;
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (62)

;          5313
;          5314  if .OPI IS_SET                                    !SEE IF CPI SET
;          5315  then
;          5316      begin
;          5317      ERRDF (13, ASYNC, DUMPER);                    !ERROR AND SET DODU_FLG IF SET
;          5318      PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_11, FNC_2, WRD_19);
;          5319      DODU_FLG = ONE;
;          5320      end;
;          5321
;          5322  ENDSUB;
;          5323
;          5324  if .DODU_FLG IS_SET                               !DROP THIS UNIT IF DODU_FLG IS_SET
;          5325  then
;          5326      begin
;          5327      DODU (.ML_LUN);
;          5328      DOCLN;
;          5329      end;
;          5330
;          5331  ENDTST;
;

033274  004167  150544          $T12:   JSR     R1,$SAVE2                       ;                       5259
033300  005746                  TST     -(SP)
033302  104402          1$:     TRAP    2                               ;                       5290
033304  152777  000040  157702          BISB    #40,@ML.REG+40                  ;                       5292
033312  016701  160264          MOV     ML.DUT,R1
033316  042701  177770          BIC     #177770,R1
033322  142777  000007  157664          BICB    #7,@ML.REG+40
033330  150177  157660          BISB    R1,@ML.REG+40
033334  005002                  CLR     R2                              ; DODU.FLG              5294
033336  012777  000001  157610          MOV     #1,@ML.REG                      ;                       5295
033344  012700  000001          MOV     #1,R0                           ; *,$STMP2              5296
033350  001410                  BEQ     5$
033352  016701  146540          MOV     L$DLY,R1                        ; *,$STMP1
033356  001403                  BEQ     4$
033360  005016          3$:     CLR     (SP)                            ; $STMP
033362  005301                  DEC     R1                              ; $STMP1
033364  001375                  BNE     3$
033366  005300          4$:     DEC     R0                              ; $STMP2
033370  000767                  BR      2$
033372  132777  000001  157554  5$:     BITB    #1,@ML.REG                      ;                       5298
033400  001430                  BEQ     6$
033402  104455                  TRAP    55                              ;                       5301
033404  000013                  .WORD   13
033406  010464                  .WORD   ASYNC
033410  024052                  .WORD   DUMPER
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
                                                MOV     #WRD.19,-(SP)           ;                                       5302
                                                MOV     #FNC.2,-(SP)
                                                MOV     #WRD.11,-(SP)
                                                MOV     #PHR.2,-(SP)
                                                MOV     #WRD.1,-(SP)
                                                MOV     #FIV.FMT,-(SP)
                                                MOV     #6,-(SP)
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                                MOV     #1,R2                   ; *,DODU.FLG                            5303
                                                ADD     #16,SP                  ;                                       5300
                                        6$:     BITB    #1,@ML.REG+60           ;                                       5306
                                                BEQ     7$
                                                TRAP    55                      ;                                       5309
                                                .WORD   14
                                                .WORD   ASYNC
                                                .WORD   DUMPER
                                                MOV     #WRD.19,-(SP)           ;                                       5310
                                                MOV     #FNC.2,-(SP)
                                                MOV     #WRD.11,-(SP)
                                                MOV     #PHR.5,-(SP)
                                                MOV     #WRD.3,-(SP)
                                                MOV     #FIV.FMT,-(SP)
                                                MOV     #6,-(SP)
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                                MOV     #1,R2                   ; *,DODU.FLG                            5311
                                                ADD     #16,SP                  ;                                       5308
                                        7$:     BIT     #20000,@ML.REG+60       ;                                       5314
                                                BEQ     8$
                                                TRAP    55                      ;                                       5317
                                                .WORD   15
                                                .WORD   ASYNC
                                                .WORD   DUMPER
                                                MOV     #WRD.19,-(SP)           ;                                       5318
                                                MOV     #FNC.2,-(SP)
                                                MOV     #WRD.11,-(SP)
                                                MOV     #PHR.5,-(SP)
                                                MOV     #WRD.4,-(SP)
                                                MOV     #FIV.FMT,-(SP)
                                                MOV     #6,-(SP)
                                                MOV     SP,R0                   ; SP,*
                                                TRAP    14
                                                MOV     #1,R2                   ; *,DODU.FLG                            5319
                                                ADD     #16,SP                  ;                                       5316
                                        8$:     TRAP    67                      ;                                       5320
                                                ROR     R0
                                                BLO     1$
                                                DEC     R2                      ; DODU.FLG                              5324
                                                BNE     9$
                                                MOV     ML.LUN,R0               ;                                       5327
                                                TRAP    51
```

```
                                ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                ;                                                       22-Dec-1980 09:21:22    PA:<

033662  104444                          TRAP    44
033664  005726                  9$:     TST     (SP)+                   ;                                       5259
033666  000207                          RTS     PC

                                ; Routine Size:  126 words
                                ; Maximum stack depth per invocation:  11 words


033670                          T12::
033670  004767  177400          1$:     JSR     PC,$T12                 ;                                       5329
033674  104466                          TRAP    66
033676  006000                          ROR     R0
033700  103773                          BLO     1$
033702  000207                          RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words


;       5332  !<BLF/PAGE>
```

```
9802 ;ML4
9803 ;
9804
9805 ;          5333  !
9806 ;          5334  !
9807 ;          5335  BGNTST;
9808 ;          5336
9809 ;          5337  !++
9810 ;          5338  ! TEST NUMBER:  TST 13
9811 ;          5339  !
9812 ;          5340  ! TEST NAME:    WRITE CHECK FUNCTION TEST
9813 ;          5341  !
9814 ;          5342  ! TEST DESCRIPTION:
9815 ;          5343  !
9816 ;          5344  !       TEST IF THE DRIVE CAN PERFORM
9817 ;          5345  !       A WRITE CHECK FUNCTION WITHOUT
9818 ;          5346  !       HANGING THE DRIVE.
9819 ;          5347  !
9820 ;          5348  !       A WRITE CHECK FUNCTION IS WRITTEN
9821 ;          5349  !       INTO MLCS1.
9822 ;          5350  !       THEN GO AND ERROR BITS ARE
9823 ;          5351  !       CHECKED FOR CORRECT STATES
9824 ;          5352  !
9825 ;          5353  !--
9826 ;          5354
9827 ;          5355  local
9828 ;          5356      DODU_FLG;                           !DROP UNIT FLAG
9829 ;          5357
9830 ;          5358  BGNSUB;
9831 ;          5359  CLR_MBUS;
9832 ;          5360  DODU_FLG = ZERO;
9833 ;          5361  FIRST_BLK_XFER ();                      !SET UP A FIRST BLK XFERR
9834 ;          5362  MLCS1 = WRT_CHK;                        !DO A WRITE CHECK FUNCTION
9835 ;          5363
9836 ;          5364  if .GO IS_NOT_SET                       !SEE IF THE GO BIT GOT SET
9837 ;          5365  then
9838 ;          5366      begin
9839 ;          5367      ERRDF (14, ASYNC, DUMPER);          !ERROR IF NOT SET
9840 ;          5368      PRINTB (FIV_FMT, WRD_1, PHR_1, WRD_12, FNC_4, WRD_19);
9841 ;          5369
9842 ;          5370      if .DRY IS_NOT_SET                  !SEE IF THE DRY IS SET WHILE GO IS CLEARED
9843 ;          5371      then
9844 ;          5372          begin
9845 ;          5373          ERRDF (15, ASYNC, DUMPER);      !ERROR IF CLEARED
9846 ;          5374          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
9847 ;          5375          end;
9848 ;          5376
9849 ;          5377      DODU_FLG = ONE;                     !SET DODU_FLG
9850 ;          5378      end
9851 ;          5379  else
9852 ;          5380
9853 ;          5381      if .DRY IS_SET                      !THE GO IS SET SO SEE IF DRY IS CLEARED
9854 ;          5382      then
9855 ;          5383          begin
9856 ;          5384          ERRDF (16, ASYNC, DUMPER);      !ERROR IF DRY IS SET
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (63)

;          5385          PRINTB (FIV_FMT, WRD_2, PHR_2, WRD_43, WRD_1, PHR_5);
;          5386          DODU_FLG = ONE;
;          5387          end;
;          5388
;          5389     if .ILF IS_SET                                  !SEE IF ILF IS SET
;          5390     then
;          5391          begin
;          5392          ERRDF (17, ASYNC, DUMPER);                 !ERROR IF SET
;          5393          PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_4, WRD_19);
;          5394          DODU_FLG = ONE;
;          5395          end;
;          5396
;          5397     if .OPI IS_SET                                  !SEE IF OPI IS SET
;          5398     then
;          5399          begin
;          5400          ERRDF (18, ASYNC, DUMPER);                 !ERROR IF SET
;          5401          PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_4, WRD_19);
;          5402          DODU_FLG = ONE;
;          5403          end;
;          5404
;          5405     DELAY (FRTY_US);                                !WAIT FO XFERR TO COMPLTE
;          5406
;          5407     if .DRY IS_NOT_SET                              !SEE IF DRY IS SETS AFTER XFERR
;          5408     then
;          5409          begin
;          5410
;          5411          if .GO IS_SET                              !IF DRY IS NOT SET THEN SEE IF GO IS SET
;          5412          then
;          5413               begin
;          5414               CLR_MBUS;                             !IF THE GO IS SET THEN TRY TO CLR GO
;          5415
;          5416               if .GO IS_SET then ERRDF (19, ASYNC, DUMPER) else ERRDF (20, SYNC, DUMPER);
;          5417
;          5418                                                     !IF GO IS STILL SET THEN ASYNC FAILURE
;          5419               PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_4, WRD_19);  !ELSE SYNC MODLE FAILURE
;          5420               end
;          5421          else
;          5422               begin
;          5423               ERRDF (21, ASYNC, DUMPER);            !ERROR GO AND DRY BOTH CLEARED
;          5424               PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_11, FNC_4, WRD_19);
;          5425               end;
;          5426
;          5427          DODU_FLG = ONE;                            !SET THE DODU_FLG
;          5428          end;
;          5429
;          5430     if .GO IS_SET                                   !SEE IF THE GO IS STILL SET
;          5431     then
;          5432          begin
;          5433          CLR_MBUS;                                  !TRY TO CLR GO IF STILL SET
;          5434
;          5435          if .GO IS_SET then ERRDF (22, ASYNC, DUMPER) else ERRDF (23, SYNC, DUMPER);
;          5436
```

```
                                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
                                                                    22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (63)
                                                                    !IF GO IS STILL SET THE ASYNC FAILURE
                    PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_4, WRD_19);      !ELSE SYNC MODULE FAILURE
                    DODU_FLG = ONE;
                    end;

                ENDSUB;

                if .DODU_FLG IS_SET                                 !DROP THIS UNIT IF DODU_FLG IS_SET
                then
                    begin
                    DODU (.ML_LUN);
                    DOCLN;
                    end;

                ENDTST;

033704 004167 150134        $T13:   JSR     R1,$SAVE2                       ;                               5331
033710 005746                       TST     -(SP)
033712 104402               1$:     TRAP    2                               ;                               5356
033714 152777 000040 157272         BISB    #40,@ML.REG+40                  ;                               5358
033722 016701 157654                MOV     ML.DUT,R1
033726 042701 177770                BIC     #177770,R1
033732 142777 000007 157254         BICB    #7,@ML.REG+40
033740 150177 157250                BISB    R1,@ML.REG+40
033744 005002                       CLR     R2                              ; DODU.FLG                      5360
033746 004767 162066                JSR     PC,FIRST.BLK.XFER               ;                               5361
033752 012777 000051 157174         MOV     #51,@ML.REG                     ;                               5362
033760 132777 000001 157166         BITB    #1,@ML.REG                      ;                               5364
033766 001057                       BNE     2$
033770 104455                       TRAP    55                              ;                               5367
033772 000016                       .WORD   16
033774 010464                       .WORD   ASYNC
033776 024052                       .WORD   DUMPER
034000 012746 006506                MOV     #WRD.19,-(SP)                   ;                               5368
034004 012746 007756                MOV     #FNC.4,-(SP)
034010 012746 006426                MOV     #WRD.12,-(SP)
034014 012746 007366                MOV     #PHR.1,-(SP)
034020 012746 006276                MOV     #WRD.1,-(SP)
034024 012746 006062                MOV     #FIV.FMT,-(SP)
034030 012746 000006                MOV     #6,-(SP)
034034 010600                       MOV     SP,R0                           ; SP,*
034036 104414                       TRAP    14
034040 132777 000200 157156         BITB    #200,@ML.REG+50                 ;                               5370
034046 001056                       BNE     3$
034050 104455                       TRAP    55                              ;                               5373
```

```
 9969                                   ;ML4                                                                    22-Dec-1980 09:24:31    TOPS
 9970                                   ;                                                                       22-Dec-1980 09:21:22    PA:<
 9971
 9972 034052  000017                            .WORD   17
 9973 034054  010464                            .WORD   ASYNC
 9974 034056  024052                            .WORD   DUMPER
 9975 034060  012746  007504                    MOV     #PHR.6,-(SP)                    ;                                       5374
 9976 034064  012746  006276                    MOV     #WRD.1,-(SP)
 9977 034070  012746  006754                    MOV     #WRD.43,-(SP)
 9978 034074  012746  007366                    MOV     #PHR.1,-(SP)
 9979 034100  012746  006302                    MOV     #WRD.2,-(SP)
 9980 034104  012746  006062                    MOV     #FIV.FMT,-(SP)
 9981 034110  012746  000006                    MOV     #6,-(SP)
 9982 034114  010600                           MOV     SP,R0                           ; SP,*
 9983 034116  104414                           TRAP    14
 9984 034120  062706  000016                    ADD     #16,SP                          ;                                       5372
 9985 034124  000427                            BR      3$                              ;                                       5377
 9986 034126  105777  157072          2$:       TSTB    @ML.REG+50                      ;                                       5381
 9987 034132  100030                           BPL     4$
 9988 034134  104455                           TRAP    55                              ;                                       5384
 9989 034136  000020                            .WORD   20
 9990 034140  010464                            .WORD   ASYNC
 9991 034142  024052                            .WORD   DUMPER
 9992 034144  012746  007472                    MOV     #PHR.5,-(SP)                    ;                                       5385
 9993 034150  012746  006276                    MOV     #WRD.1,-(SP)
 9994 034154  012746  006754                    MOV     #WRD.43,-(SP)
 9995 034160  012746  007404                    MOV     #PHR.2,-(SP)
 9996 034164  012746  006302                    MOV     #WRD.2,-(SP)
 9997 034170  012746  006062                    MOV     #FIV.FMT,-(SP)
 9998 034174  012746  000006                    MOV     #6,-(SP)
 9999 034200  010600                           MOV     SP,R0                           ; SP,*
10000 034202  104414                           TRAP    14
10001 034204  012702  000001          3$:       MOV     #1,R2                           ; *,DODU.FLG                            5386
10002 034210  062706  000016                    ADD     #16,SP                          ;                                       5383
10003 034214  132777  000001  157012  4$:       BITB    #1,@ML.REG+60                   ;                                       5389
10004 034222  001430                           BEQ     5$
10005 034224  104455                           TRAP    55                              ;                                       5392
10006 034226  000021                            .WORD   21
10007 034230  010464                            .WORD   ASYNC
10008 034232  024052                            .WORD   DUMPER
10009 034234  012746  006506                    MOV     #WRD.19,-(SP)                   ;                                       5393
10010 034240  012746  007756                    MOV     #FNC.4,-(SP)
10011 034244  012746  006426                    MOV     #WRD.12,-(SP)
10012 034250  012746  007472                    MOV     #PHR.5,-(SP)
10013 034254  012746  006314                    MOV     #WRD.3,-(SP)
10014 034260  012746  006062                    MOV     #FIV.FMT,-(SP)
10015 034264  012746  000006                    MOV     #6,-(SP)
10016 034270  010600                           MOV     SP,R0                           ; SP,*
10017 034272  104414                           TRAP    14
10018 034274  012702  000001                    MOV     #1,R2                           ; *,DODU.FLG                            5394
10019 034300  062706  000016                    ADD     #16,SP                          ;                                       5391
10020 034304  032777  020000  156722  5$:       BIT     #20000,@ML.REG+60               ;                                       5397
10021 034312  001430                           BEQ     6$
10022 034314  104455                           TRAP    55                              ;                                       5400
10023 034316  000022                            .WORD   22
```

```
10025                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
10026                                   ;                                                       22-Dec-1980 09:21:22    PA:<
10027
10028 034320 010464                             .WORD   ASYNC
10029 034322 024052                             .WORD   DUMPER
10030 034324 012746 006506                      MOV     #WRD.19,-(SP)           ;                               5401
10031 034330 012746 007756                      MOV     #FNC.4,-(SP)
10032 034334 012746 006426                      MOV     #WRD.12,-(SP)
10033 034340 012746 007472                      MOV     #PHR.5,-(SP)
10034 034344 012746 006322                      MOV     #WRD.4,-(SP)
10035 034350 012746 006062                      MOV     #FIV.FMT,-(SP)
10036 034354 012746 000006                      MOV     #6,-(SP)
10037 034360 010600                             MOV     SP,R0                   ; SP,*
10038 034362 104414                             TRAP    14
10039 034364 012702 000001                      MOV     #1,R2                   ; *,DODU.FLG                    5402
10040 034370 062706 000016                      ADD     #16,SP                  ;                               5399
10041 034374 012700 000050              6$:     MOV     #50,R0                  ; *,$$TMP2                      5405
10042 034400 001410                     7$:     BEQ     10$
10043 034402 016701 145510                      MOV     L$DLY,R1                ; *,$$TMP1
10044 034406 001403                             BEQ     9$
10045 034410 005016                     8$:     CLR     (SP)                    ; $$TMP
10046 034412 005301                             DEC     R1                      ; $$TMP1
10047 034414 001375                             BNE     8$
10048 034416 005300                     9$:     DEC     R0                      ; $$TMP2
10049 034420 000767                             BR      7$
10050 034422 132777 000200 156574       10$:    BITB    #200,@ML.REG+50         ;                               5407
10051 034430 001106                             BNE     15$
10052 034432 132777 000001 156514               BITB    #1,@ML.REG              ;                               5411
10053 034440 001452                             BEQ     13$
10054 034442 152777 000040 156544               BISB    #40,@ML.REG+40          ;                               5413
10055 034450 016701 157126                      MOV     ML.DUT,R1
10056 034454 042701 177770                      BIC     #177770,R1
10057 034460 142777 000007 156526               BICB    #7,@ML.REG+40
10058 034466 150177 156522                      BISB    R1,@ML.REG+40
10059 034472 132777 000001 156454               BITB    #1,@ML.REG              ;                               5416
10060 034500 001405                             BEQ     11$
10061 034502 104455                             TRAP    55
10062 034504 000023                             .WORD   23
10063 034506 010464                             .WORD   ASYNC
10064 034510 024052                             .WORD   DUMPER
10065 034512 000404                             BR      12$
10066 034514 104455                     11$:    TRAP    55
10067 034516 000024                             .WORD   24
10068 034520 010526                             .WORD   SYNC
10069 034522 024052                             .WORD   DUMPER
10070 034524 012746 006506              12$:    MOV     #WRD.19,-(SP)           ;                               5419
10071 034530 012746 007756                      MOV     #FNC.4,-(SP)
10072 034534 012746 006416                      MOV     #WRD.11,-(SP)
10073 034540 012746 007404                      MOV     #PHR.2,-(SP)
10074 034544 012746 006276                      MOV     #WRD.1,-(SP)
10075 034550 012746 006062                      MOV     #FIV.FMT,-(SP)
10076 034554 012746 000006                      MOV     #6,-(SP)
10077 034560 010600                             MOV     SP,R0                   ; SP,*
10078 034562 104414                             TRAP    14
10079 034564 000424                             BR      14$                     ;                               5411
```

```
10081                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
10082                                   ;                                                       22-Dec-1980 09:21:22    PA:<
10083
10084 034566  104455                    13$:    TRAP    55                      ;                                       5423
10085 034570  000025                            .WORD   25
10086 034572  010464                            .WORD   ASYNC
10087 034574  024052                            .WORD   DUMPER
10088 034576  012746  006506                    MOV     #WRD.19,-(SP)           ;                                       5424
10089 034602  012746  007756                    MOV     #FNC.4,-(SP)
10090 034606  012746  006416                    MOV     #WRD.11,-(SP)
10091 034612  012746  007366                    MOV     #PHR.1,-(SP)
10092 034616  012746  006302                    MOV     #WRD.2,-(SP)
10093 034622  012746  006062                    MOV     #FIV.FMT,-(SP)
10094 034626  012746  000006                    MOV     #6,-(SP)
10095 034632  010600                            MOV     SP,R0                   ; SP,*
10096 034634  104414                            TRAP    14
10097 034636  012702  000001            14$:    MOV     #1,R2                   ; *,DODU.FLG                            5427
10098 034642  062706  000016                    ADD     #16,SP                  ;                                       5409
10099 034646  132777  000001  156300    15$:    BITB    #1,@ML.REG              ;                                       5430
10100 034654  001455                            BEQ     18$
10101 034656  152777  000040  156330            BISB    #40,@ML.REG+40          ;                                       5432
10102 034664  016701  156712                    MOV     ML.DUT,R1
10103 034670  042701  177770                    BIC     #177770,R1
10104 034674  142777  000007  156312            BICB    #7,@ML.REG+40
10105 034702  150177  156306                    BISB    R1,@ML.REG+40
10106 034706  132777  000001  156240            BITB    #1,@ML.REG              ;                                       5435
10107 034714  001405                            BEQ     16$
10108 034716  104455                            TRAP    55
10109 034720  000026                            .WORD   26
10110 034722  010464                            .WORD   ASYNC
10111 034724  024052                            .WORD   DUMPER
10112 034726  000404                            BR      17$
10113 034730  104455                    16$:    TRAP    55
10114 034732  000027                            .WORD   27
10115 034734  010526                            .WORD   SYNC
10116 034736  024052                            .WORD   DUMPER
10117 034740  012746  006506            17$:    MOV     #WRD.19,-(SP)           ;                                       5438
10118 034744  012746  007756                    MOV     #FNC.4,-(SP)
10119 034750  012746  006416                    MOV     #WRD.11,-(SP)
10120 034754  012746  007404                    MOV     #PHR.2,-(SP)
10121 034760  012746  006276                    MOV     #WRD.1,-(SP)
10122 034764  012746  006062                    MOV     #FIV.FMT,-(SP)
10123 034770  012746  000006                    MOV     #6,-(SP)
10124 034774  010600                            MOV     SP,R0                   ; SP,*
10125 034776  104414                            TRAP    14
10126 035000  012702  000001                    MOV     #1,R2                   ; *,DODU.FLG                            5439
10127 035004  062706  000016                    ADD     #16,SP                  ;                                       5432
10128 035010  104467                    18$:    TRAP    67                      ;                                       5440
10129 035012  006000                            ROR     R0
10130 035014  103002                            BHIS    19$
10131 035016  000167  176670                    JMP     1$
10132 035022  005302                    19$:    DEC     R2                      ; DODU.FLG                              5444
10133 035024  001004                            BNE     20$
10134 035026  016700  156546                    MOV     ML.LUN,R0               ;                                       5447
10135 035032  104451                            TRAP    51
```

```
10137                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
10138                                   ;                                                       22-Dec-1980 09:21:22    PA:<
10139
10140 035034  104444                            TRAP    44
10141 035036  005726                    20$:    TST     (SP)+                   ;                               5331
10142 035040  000207                            RTS     PC
10143
10144                                   ; Routine Size:  303 words
10145                                   ; Maximum stack depth per invocation:  18 words
10150
10151
10155
10159 035042                            T13::
10160 035042  004767  176636            1$:     JSR     PC,$T13                 ;                               5449
10161 035046  104466                            TRAP    66
10162 035050  006000                            ROR     R0
10163 035052  103773                            BLO     1$
10164 035054  000207                            RTS     PC
10165
10166                                   ; Routine Size:  6 words
10167                                   ; Maximum stack depth per invocation:  0 words
10172
10173
10174 ;          5452  !<BLF/PAGE>
```

```
10176 ;ML4
10177 ;
10178 ;
10179 ;          5453  !
10180 ;          5454  BGNTST;
10181 ;          5455
10182 ;          5456  !++
10183 ;          5457  ! TEST NUMBER:  TST 14
10184 ;          5458  !
10185 ;          5459  ! TEST NAME:    WRITE FUNCTION TEST
10186 ;          5460  !
10187 ;          5461  ! TEST DESCRIPTION:
10188 ;          5462  !       TEST IF THE DRIVE CAN PERFORM A WRITE FUNCTION WITHOUT
10189 ;          5463  !       HANGING THE DRIVE.
10190 ;          5464  !
10191 ;          5465  !       A WRITE FUNCTION IS WRITTEN INTO MLCS1.  THEN GO AND ERROR BITS ARE
10192 ;          5466  !       CHECKED FOR CORRECT STATUS.  THIS UNIT IS DROPPED ON DETECTED ERRORS.
10193 ;          5467  !--
10194 ;          5468
10195 ;          5469  local
10196 ;          5470      DODU_FLG;                                   !DROP UNIT FLAG
10197 ;          5471
10198 ;          5472  BGNSUB;
10199 ;          5473  CLR_MBUS;
10200 ;          5474  DODU_FLG = ZERO;
10201 ;          5475  FIRST_BLK_XFER ();                            !SET UP A FIRST BLOCK XFERR
10202 ;          5476  MLCS1 = write;                                !DO A WRITE FUNCTION
10203 ;          5477
10204 ;          5478  if .GO IS_NOT_SET                             !SEE IF THE GO IS SET
10205 ;          5479  then
10206 ;          5480      begin                                     !ERROR IF NOT SET
10207 ;          5481      ERRDF (24, ASYNC, DUMPER);
10208 ;          5482      PRINTB (FIV_FMT, WRD_1, PHR_1, WRD_12, FNC_5, WRD_19);
10209 ;          5483
10210 ;          5484      if .DRY IS_NOT_SET                        !SEE IF DRY SET WITH GO CLEAR
10211 ;          5485      then
10212 ;          5486          begin
10213 ;          5487          ERRDF (25, ASYNC, DUMPER);
10214 ;          5488          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
10215 ;          5489          end;
10216 ;          5490
10217 ;          5491      DODU_FLG = ONE;                           !SET DODU_FLG
10218 ;          5492      end
10219 ;          5493  else                                          !GO IS SET DURING FUNCTION
10220 ;          5494
10221 ;          5495      if .DRY IS_SET                            !SEE IF DRY CLEAR WITH GO SET
10222 ;          5496      then
10223 ;          5497          begin                                 !ERROR IF SET
10224 ;          5498          ERRDF (26, ASYNC, DUMPER);
10225 ;          5499          PRINTB (FIV_FMT, WRD_2, PHR_2, WRD_43, WRD_1, PHR_5);
10226 ;          5500          DODU_FLG = ONE;
10227 ;          5501          end;
10228 ;          5502
10229 ;          5503  if .ILF IS_SET                               !DID FUNCTION CAUSE ILF
10230 ;          5504  then
```

```
10232 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
10233 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (64)
10234 ;
10235 ;          5505      begin                                                      !ERROR IF YES
10236 ;          5506      ERRDF (27, ASYNC, DUMPER);
10237 ;          5507      PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_5, WRD_19);
10238 ;          5508      DODU_FLG = ONE;
10239 ;          5509      end;
10240 ;          5510
10241 ;          5511  if .OPI IS_SET                                                 !DID FUNCTION CAUSE OPI
10242 ;          5512  then
10243 ;          5513      begin                                                      !ERROR IF YES
10244 ;          5514      ERRDF (28, ASYNC, DUMPER);
10245 ;          5515      PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_5, WRD_19);
10246 ;          5516      DODU_FLG = ONE;
10247 ;          5517      end;
10248 ;          5518
10249 ;          5519  DELAY (FRTY_US);                                              !WAIT FOR XFERR TO COMPLETE
10250 ;          5520
10251 ;          5521  if .DRY IS_NOT_SET                                            !SEE IF DRY CLEARED AFTER XFERR
10252 ;          5522  then
10253 ;          5523      begin
10254 ;          5524
10255 ;          5525      if .GO IS_SET                                              !TST GO CLR IF DRY NOT SET
10256 ;          5526      then
10257 ;          5527          begin
10258 ;          5528          CLR_MBUS;                                              !CLEAR GO IF STILL SET
10259 ;          5529
10260 ;          5530          if .GO IS_SET then ERRDF (29, ASYNC, DUMPER) else ERRDF (30, SYNC, DUMPER);
10261 ;          5531
10262 ;          5532                                                                 !TST GO TO DETERMINE FAILING MOD
10263 ;          5533          PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_5, WRD_19);
10264 ;          5534          end
10265 ;          5535      else                                                       !DRY NOT SET AND GO CLEARED
10266 ;          5536          begin                                                  !REPORT ERROR
10267 ;          5537          ERRDF (31, ASYNC, DUMPER);
10268 ;          5538          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_11, FNC_5, WRD_19);
10269 ;          5539          end;
10270 ;          5540
10271 ;          5541      DODU_FLG = ONE;                                            !SET DODU_FLG
10272 ;          5542      end;
10273 ;          5543
10274 ;          5544  if .GO IS_SET                                                 !SEE IF GO CLEARED AFTER XFERR.
10275 ;          5545  then
10276 ;          5546      begin
10277 ;          5547      CLR_MBUS;                                                  !CLEAR GO IF STILL SET
10278 ;          5548
10279 ;          5549      if .GO IS_SET then ERRDF (32, ASYNC, DUMPER) else ERRDF (33, SYNC, DUMPER);
10280 ;          5550
10281 ;          5551                                                                 !TST GO TO DETERMINE FAILING MOD
10282 ;          5552      PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_5, WRD_19);
10283 ;          5553      DODU_FLG = ONE;
10284 ;          5554      end;
10285 ;          5555
10286 ;          5556  ENDSUB;
```

```
10288 :ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
10289 :                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (64)
10290
10291 :          5557
10292 :          5558  if .TRE IS_SET                         !SEE IF XFERR CAUSED A TRANSFER ERROR
10293 :          5559  then
10294 :          5560      begin                              !REPORT ERROR IF SET AND CONTINUE TESTING
10295 :          5561      ERRDF (115, INTER, DUMPER);
10296 :          5562      PRINTB (SIX_FMT, WRD_61, WRD_20, PHR_5, WRD_12, FNC_5, WRD_19);
10297 :          5563      DODU_FLG = ONE;
10298 :          5564      end;
10299 :          5565
10300 :          5566  if .DODU_FLG IS_SET                    !DROP THIS UNIT IF DODU_FLG SET
10301 :          5567  then
10302 :          5568      begin
10303 :          5569      DODU (.ML_LUN);
10304 :          5570      DOCLN;
10305 :          5571      end;
10306 :          5572
10307 :          5573  ENDTST;
10311
10315 035056  004167  146762          $T14:   JSR     R1,$SAVE2                       ;                       5451
10316 035062  005746                  TST     -(SP)
10317 035064  104402                  1$:     TRAP    2                               ;                       5470
10318 035066  152777  000040  156120          BISB    #40,@ML.REG+40                  ;                       5472
10319 035074  016701  156502                  MOV     ML.DUT,R1
10320 035100  042701  177770                  BIC     #177770,R1
10321 035104  142777  000007  156102          BICB    #7,@ML.REG+40
10322 035112  150177  156076                  BISB    R1,@ML.REG+40
10323 035116  005002                          CLR     R2                              ; DODU.FLG              5474
10324 035120  004767  160714                  JSR     PC,FIRST.BLK.XFER               ;                       5475
10325 035124  012777  000061  156022          MOV     #61,@ML.REG                     ;                       5476
10326 035132  132777  000001  156014          BITB    #1,@ML.REG                      ;                       5478
10327 035140  001057                          BNE     2$
10328 035142  104455                          TRAP    55                              ;                       5481
10329 035144  000030                          .WORD   30
10330 035146  010464                          .WORD   ASYNC
10331 035150  024052                          .WORD   DUMPER
10332 035152  012746  006506                  MOV     #WRD.19,-(SP)                   ;                       5482
10333 035156  012746  007774                  MOV     #FNC.5,-(SP)
10334 035162  012746  006426                  MOV     #WRD.12,-(SP)
10335 035166  012746  007366                  MOV     #PHR.1,-(SP)
10336 035172  012746  006276                  MOV     #WRD.1,-(SP)
10337 035176  012746  006062                  MOV     #FIV.FMT,-(SP)
10338 035202  012746  000006                  MOV     #6,-(SP)
10339 035206  010600                          MOV     SP,R0                           ; SP,*
10340 035210  104414                          TRAP    14
10341 035212  132777  000200  156004          BITB    #200,@ML.REG+50                 ;                       5484
```

```
10343                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
10344                                   ;                                                       22-Dec-1980 09:21:22    PA:<
10345
10346 035220 001056                             BNE     3$
10347 035222 104455                             TRAP    55                              ;                               5487
10348 035224 000031                             .WORD   31
10349 035226 010464                             .WORD   ASYNC
10350 035230 024052                             .WORD   DUMPER
10351 035232 012746 007504                      MOV     #PHR.6,-(SP)                    ;                               5488
10352 035236 012746 006276                      MOV     #WRD.1,-(SP)
10353 035242 012746 006754                      MOV     #WRD.43,-(SP)
10354 035246 012746 007366                      MOV     #PHR.1,-(SP)
10355 035252 012746 006302                      MOV     #WRD.2,-(SP)
10356 035256 012746 006062                      MOV     #FIV.FMT,-(SP)
10357 035262 012746 000006                      MOV     #6,-(SP)
10358 035266 010600                             MOV     SP,R0                           ; SP,*
10359 035270 104414                             TRAP    14
10360 035272 062706 000016                      ADD     #16,SP                          ;                               5486
10361 035276 000427                             BR      3$                              ;                               5491
10362 035300 105777 155720              2$:     TSTB    @ML.REG+50                      ;                               5495
10363 035304 100030                             BPL     4$
10364 035306 104455                             TRAP    55                              ;                               5498
10365 035310 000032                             .WORD   32
10366 035312 010464                             .WORD   ASYNC
10367 035314 024052                             .WORD   DUMPER
10368 035316 012746 007472                      MOV     #PHR.5,-(SP)                    ;                               5499
10369 035322 012746 006276                      MOV     #WRD.1,-(SP)
10370 035326 012746 006754                      MOV     #WRD.43,-(SP)
10371 035332 012746 007404                      MOV     #PHR.2,-(SP)
10372 035336 012746 006302                      MOV     #WRD.2,-(SP)
10373 035342 012746 006062                      MOV     #FIV.FMT,-(SP)
10374 035346 012746 000006                      MOV     #6,-(SP)
10375 035352 010600                             MOV     SP,R0                           ; SP,*
10376 035354 104414                             TRAP    14
10377 035356 012702 000001              3$:     MOV     #1,R2                           ; *,DODU.FLG                    5500
10378 035362 062706 000016                      ADD     #16,SP                          ;                               5497
10379 035366 132777 000001 155640       4$:     BITB    #1,@ML.REG+60                   ;                               5503
10380 035374 001430                             BEQ     5$
10381 035376 104455                             TRAP    55                              ;                               5506
10382 035400 000033                             .WORD   33
10383 035402 010464                             .WORD   ASYNC
10384 035404 024052                             .WORD   DUMPER
10385 035406 012746 006506                      MOV     #WRD.19,-(SP)                   ;                               5507
10386 035412 012746 007774                      MOV     #FNC.5,-(SP)
10387 035416 012746 006426                      MOV     #WRD.12,-(SP)
10388 035422 012746 007472                      MOV     #PHR.5,-(SP)
10389 035426 012746 006314                      MOV     #WRD.3,-(SP)
10390 035432 012746 006062                      MOV     #FIV.FMT,-(SP)
10391 035436 012746 000006                      MOV     #6,-(SP)
10392 035442 010600                             MOV     SP,R0                           ; SP,*
10393 035444 104414                             TRAP    14
10394 035446 012702 000001                      MOV     #1,R2                           ; *,DODU.FLG                    5508
10395 035452 062706 000016                      ADD     #16,SP                          ;                               5505
10396 035456 032777 020000 155550       5$:     BIT     #20000,@ML.REG+60               ;                               5511
10397 035464 001430                             BEQ     6$
```

```
10399                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
10400                                   ;                                                       22-Dec-1980 09:21:22    PA:<
10401
10402 035466  104455                             TRAP    55                      ;                                       5514
10403 035470  000034                             .WORD   34
10404 035472  010464                             .WORD   ASYNC
10405 035474  024052                             .WORD   DUMPER
10406 035476  012746  006506                     MOV     #WRD.19,-(SP)           ;                                       5515
10407 035502  012746  007774                     MOV     #FNC.5,-(SP)
10408 035506  012746  006426                     MOV     #WRD.12,-(SP)
10409 035512  012746  007472                     MOV     #PHR.5,-(SP)
10410 035516  012746  006322                     MOV     #WRD.4,-(SP)
10411 035522  012746  006062                     MOV     #FIV.FMT,-(SP)
10412 035526  012746  000006                     MOV     #6,-(SP)
10413 035532  010600                             MOV     SP,R0                   ; SP,*
10414 035534  104414                             TRAP    14
10415 035536  012702  000001                     MOV     #1,R2                   ; *,DODU.FLG                            5516
10416 035542  062706  000016                     ADD     #16,SP                  ;                                       5513
10417 035546  012700  000050             6$:     MOV     #50,R0                  ; *,$$TMP2                              5519
10418 035552  001410             7$:     BEQ     10$
10419 035554  016701  144336                     MOV     L$DLY,R1                ; *,$$TMP1
10420 035560  001403                             BEQ     9$
10421 035562  005016             8$:     CLR     (SP)                    ; $$TMP
10422 035564  005301                             DEC     R1                      ; $$TMP1
10423 035566  001375                             BNE     8$
10424 035570  005300             9$:     DEC     R0                      ; $$TMP2
10425 035572  000767                             BR      7$
10426 035574  132777  000200  155422 10$:     BITB    #200,@ML.REG+50         ;                                       5521
10427 035602  001106                             BNE     15$
10428 035604  132777  000001  155342             BITB    #1,@ML.REG              ;                                       5525
10429 035612  001452                             BEQ     13$
10430 035614  152777  000040  155372             BISB    #40,@ML.REG+40          ;                                       5527
10431 035622  016701  155754                     MOV     ML.DUT,R1
10432 035626  042701  177770                     BIC     #177770,R1
10433 035632  142777  000007  155354             BICB    #7,@ML.REG+40
10434 035640  150177  155350                     BISB    R1,@ML.REG+40
10435 035644  132777  000001  155302             BITB    #1,@ML.REG              ;                                       5530
10436 035652  001405                             BEQ     11$
10437 035654  104455                             TRAP    55
10438 035656  000035                             .WORD   35
10439 035660  010464                             .WORD   ASYNC
10440 035662  024052                             .WORD   DUMPER
10441 035664  000404                             BR      12$
10442 035666  104455             11$:    TRAP    55
10443 035670  000036                             .WORD   36
10444 035672  010526                             .WORD   SYNC
10445 035674  024052                             .WORD   DUMPER
10446 035676  012746  006506             12$:    MOV     #WRD.19,-(SP)           ;                                       5533
10447 035702  012746  007774                     MOV     #FNC.5,-(SP)
10448 035706  012746  006416                     MOV     #WRD.11,-(SP)
10449 035712  012746  007404                     MOV     #PHR.2,-(SP)
10450 035716  012746  006276                     MOV     #WRD.1,-(SP)
10451 035722  012746  006062                     MOV     #FIV.FMT,-(SP)
10452 035726  012746  000006                     MOV     #6,-(SP)
10453 035732  010600                             MOV     SP,R0                   ; SP,*
```

```
10455                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
10456                                   ;                                                       22-Dec-1980 09:21:22    PA:<
10457
10458 035734  104414                            TRAP    14
10459 035736  000424                            BR      14$                             ;                               5525
10460 035740  104455                    13$:    TRAP    55                              ;                               5537
10461 035742  000037                            .WORD   37
10462 035744  010464                            .WORD   ASYNC
10463 035746  024052                            .WORD   DUMPER
10464 035750  012746  006506                    MOV     #WRD.19,-(SP)                   ;                               5538
10465 035754  012746  007774                    MOV     #FNC.5,-(SP)
10466 035760  012746  006416                    MOV     #WRD.11,-(SP)
10467 035764  012746  007366                    MOV     #PHR.1,-(SP)
10468 035770  012746  006302                    MOV     #WRD.2,-(SP)
10469 035774  012746  006062                    MOV     #FIV.FMT,-(SP)
10470 036000  012746  000006                    MOV     #6,-(SP)
10471 036004  010600                            MOV     SP,R0                           ; SP,*
10472 036006  104414                            TRAP    14
10473 036010  012702  000001            14$:    MOV     #1,R2                           ; *,DODU.FLG                    5541
10474 036014  062706  000016                    ADD     #16,SP                          ;                               5523
10475 036020  132777  000001  155126    15$:    BITB    #1,@ML.REG                      ;                               5544
10476 036026  001455                            BEQ     18$
10477 036030  152777  000040  155156            BISB    #40,@ML.REG+40                  ;                               5546
10478 036036  016701  155540                    MOV     ML.DUT,R1
10479 036042  042701  177770                    BIC     #177770,R1
10480 036046  142777  000007  155140            BICB    #7,@ML.REG+40
10481 036054  150177  155134                    BISB    R1,@ML.REG+40
10482 036060  132777  000001  155066            BITB    #1,@ML.REG                      ;                               5549
10483 036066  001405                            BEQ     16$
10484 036070  104455                            TRAP    55
10485 036072  000040                            .WORD   40
10486 036074  010464                            .WORD   ASYNC
10487 036076  024052                            .WORD   DUMPER
10488 036100  000404                            BR      17$
10489 036102  104455                    16$:    TRAP    55
10490 036104  000041                            .WORD   41
10491 036106  010526                            .WORD   SYNC
10492 036110  024052                            .WORD   DUMPER
10493 036112  012746  006506                    MOV     #WRD.19,-(SP)                   ;                               5552
10494 036116  012746  007774                    MOV     #FNC.5,-(SP)
10495 036122  012746  006416                    MOV     #WRD.11,-(SP)
10496 036126  012746  007404                    MOV     #PHR.2,-(SP)
10497 036132  012746  006276                    MOV     #WRD.1,-(SP)
10498 036136  012746  006062                    MOV     #FIV.FMT,-(SP)
10499 036142  012746  000006                    MOV     #6,-(SP)
10500 036146  010600                            MOV     SP,R0                           ; SP,*
10501 036150  104414                            TRAP    14
10502 036152  012702  000001                    MOV     #1,R2                           ; *,DODU.FLG                    5553
10503 036156  062706  000016                    ADD     #16,SP                          ;                               5546
10504 036162  104467                    18$:    TRAP    67                              ;                               5554
10505 036164  006000                            ROR     R0
10506 036166  103002                            BHIS    19$
10507 036170  000167  176670                    JMP     1$
10508 036174  032777  040000  154752    19$:    BIT     #40000,@ML.REG                  ;                               5558
10509 036202  001432                            BEQ     20$
```

```
10511                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
10512                                   ;                                                       22-Dec-1980 09:21:22    PA:<
10513
10514 036204  104455                             TRAP    55                      ;                                       5561
10515 036206  000163                             .WORD   163
10516 036210  010672                             .WORD   INTER
10517 036212  024052                             .WORD   DUMPER
10518 036214  012746  006506                     MOV     #WRD.19,-(SP)           ;                                       5562
10519 036220  012746  007774                     MOV     #FNC.5,-(SP)
10520 036224  012746  006426                     MOV     #WRD.12,-(SP)
10521 036230  012746  007472                     MOV     #PHR.5,-(SP)
10522 036234  012746  006514                     MOV     #WRD.20,-(SP)
10523 036240  012746  007174                     MOV     #WRD.61,-(SP)
10524 036244  012746  006100                     MOV     #SIX.FMT,-(SP)
10525 036250  012746  000007                     MOV     #7,-(SP)
10526 036254  010600                             MOV     SP,R0                   ; SP,*
10527 036256  104414                             TRAP    14
10528 036260  012702  000001                     MOV     #1,R2                   ; *,DODU.FLG                            5563
10529 036264  062706  000020                     ADD     #20,SP                  ;                                       5560
10530 036270  005302              20$:           DEC     R2                      ; DODU.FLG                              5566
10531 036272  001004                             BNE     21$
10532 036274  016700  155300                     MOV     ML.LUN,R0               ;                                       5569
10533 036300  104451                             TRAP    51
10534 036302  104444                             TRAP    44
10535 036304  005726              21$:           TST     (SP)+                   ;                                       5451
10536 036306  000207                             RTS     PC
10537
10538                                   ; Routine Size:  333 words
10539                                   ; Maximum stack depth per invocation:  18 words
10544
10545
10549
10553 036310                            T14::
10554 036310  004767  176542              1$:           JSR     PC,$T14         ;                                       5571
10555 036314  104466                             TRAP    66
10556 036316  006000                             ROR     R0
10557 036320  103773                             BLO     1$
10558 036322  000207                             RTS     PC
10559
10560                                   ; Routine Size:  6 words
10561                                   ; Maximum stack depth per invocation:  0 words
```

```
10570
10571
10572 ;          5574  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (65)

```
10574 ;ML4
10575 ;
10576
10577 ;          5575  !
10578 ;          5576  !
10579 ;          5577  BGNTST;
10580 ;          5578
10581 ;          5579  !++
10582 ;          5580  ! TEST NUMBER:  TST 15
10583 ;          5581  !
10584 ;          5582  ! TEST NAME:    READ FUNCTION TEST
10585 ;          5583  !
10586 ;          5584  ! TEST DESCRIPTION:
10587 ;          5585  !
10588 ;          5586  !       TEST IF THE DRIVE CAN PERFORM
10589 ;          5587  !       A READ FUNCTION WITHOUT
10590 ;          5588  !       HANGING THE DRIVE.
10591 ;          5589  !
10592 ;          5590  !       A READ FUNCTION IS WRITTEN
10593 ;          5591  !       INTO MLCS1
10594 ;          5592  !
10595 ;          5593  !       THEN GO AND ERROR BITS ARE
10596 ;          5594  !       CHECKED FOR CORRECT STATES.
10597 ;          5595  !
10598 ;          5596  !--
10599 ;          5597
10600 ;          5598  local
10601 ;          5599      DODU_FLG;                                   !DROP UNIT FLAG
10602 ;          5600
10603 ;          5601  BGNSUB;
10604 ;          5602  CLR_MBUS;
10605 ;          5603  DODU_FLG = ZERO;
10606 ;          5604  FIRST_BLK_XFER ();                            !SET UP A FIRST BLK XFERR
10607 ;          5605  MLCS1 = read;                                 !DO A READ FUNCTION
10608 ;          5606
10609 ;          5607  if .GO IS_NOT_SET                            !SEE IF GO GOT SET
10610 ;          5608  then
10611 ;          5609      begin                                     !ERROR IF CLEAR
10612 ;          5610      ERRDF (34, ASYNC, DUMPER);
10613 ;          5611      PRINTB (FIV_FMT, WRD_1, PHR_1, WRD_12, FNC_6, WRD_19);
10614 ;          5612
10615 ;          5613      if .DRY IS_NOT_SET                        !TST DRY SET WITH GO CLEAR
10616 ;          5614      then
10617 ;          5615          begin                                 !ERROR IF NOT SET
10618 ;          5616          ERRDF (35, ASYNC, DUMPER);
10619 ;          5617          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
10620 ;          5618          end;
10621 ;          5619
10622 ;          5620      DODU_FLG = ONE;                           !SET DODU_FLG
10623 ;          5621      end
10624 ;          5622  else                                          !GO BIT GOT SET
10625 ;          5623
10626 ;          5624      if .DRY IS_SET                            !SEE IF DRY IS CLEAR
10627 ;          5625      then
10628 ;          5626          begin                                 !ERROR IF SET
```

```
10630 ;ML4                                                          22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
10631 ;                                                             22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (65)
10632 ;
10633 ;          5627          ERRDF (36, ASYNC, DUMPER);
10634 ;          5628          PRINTB (FIV_FMT, WRD_2, PHR_2, WRD_43, WRD_1, PHR_5);
10635 ;          5629          DODU_FLG = ONE;
10636 ;          5630          end;
10637 ;          5631
10638 ;          5632      if .ILF IS_SET                                !DID FUNCTION CAUSE ILF
10639 ;          5633      then
10640 ;          5634          begin                                     !ERROR IF YES
10641 ;          5635          ERRDF (37, ASYNC, DUMPER);
10642 ;          5636          PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_5, WRD_19);
10643 ;          5637          DODU_FLG = ONE;
10644 ;          5638          end;
10645 ;          5639
10646 ;          5640      if .OPI IS_SET                                !DID FUNCTION CAUSE OPI
10647 ;          5641      then
10648 ;          5642          begin                                     !ERROR IF YES
10649 ;          5643          ERRDF (38, ASYNC, DUMPER);
10650 ;          5644          PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_5, WRD_19);
10651 ;          5645          DODU_FLG = ONE;
10652 ;          5646          end;
10653 ;          5647
10654 ;          5648      DELAY (FRTY_US);                              !WAIT FOR XFERR TO COMPLETE
10655 ;          5649
10656 ;          5650      if .DRY IS_NOT_SET                            !IS DRY SET AFTER XFERR
10657 ;          5651      then
10658 ;          5652          begin
10659 ;          5653
10660 ;          5654          if .GO IS_SET                             !TEST GO CLEAR WITH DRY NOT SET
10661 ;          5655          then
10662 ;          5656              begin
10663 ;          5657              CLR_MBUS;                             !CLEAR GO
10664 ;          5658
10665 ;          5659              if .GO IS_SET then ERRDF (39, ASYNC, DUMPER) else ERRDF (40, SYNC, DUMPER);
10666 ;          5660
10667 ;          5661                                                    !TST GO TO DETERMINE FAILING MOD
10668 ;          5662              PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_5, WRD_19);
10669 ;          5663              end
10670 ;          5664          else                                      !GO BIT CLEAR WITH DRY NOT SET
10671 ;          5665              begin                                 !REPORT ERROR
10672 ;          5666              ERRDF (41, ASYNC, DUMPER);
10673 ;          5667              PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_11, FNC_5, WRD_19);
10674 ;          5668              end;
10675 ;          5669
10676 ;          5670          DODU_FLG = ONE;                           !SET DODU_FLG
10677 ;          5671          end;
10678 ;          5672
10679 ;          5673      if .GO IS_SET                                 !SEE IF GO CLEAR AFTER XFERR
10680 ;          5674      then
10681 ;          5675          begin
10682 ;          5676          CLR_MBUS;                                 !CLEAR GO IF STILL SET
10683 ;          5677
10684 ;          5678          if .GO IS_SET then ERRDF (42, ASYNC, DUMPER) else ERRDF (43, SYNC, DUMPER);
```

```
10686 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
10687 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (65)
10688
10689 ;          5679
10690 ;          5680                                         !TST GO TO DETERMINE FAILING MOD
10691 ;          5681      PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_5, WRD_19);
10692 ;          5682      DODU_FLG = ONE;
10693 ;          5683      end;
10694 ;          5684
10695 ;          5685  ENDSUB;
10696 ;          5686
10697 ;          5687  if .TRE IS_SET                          !SEE IF XFERR CAUSED A TRANSFER ERROR
10698 ;          5688  then
10699 ;          5689      begin                              !REPORT ERROR IF SET AND CONTINUE TESTING
10700 ;          5690      ERRDF (116, INTER, DUMPER);
10701 ;          5691      PRINTB (SIX_FMT, WRD_61, WRD_20, PHR_5, WRD_12, FNC_6, WRD_19);
10702 ;          5692      DODU_FLG = ONE;
10703 ;          5693      end;
10704 ;          5694
10705 ;          5695  if .DODU_FLG IS_SET                     !DROP THIS UNIT IF DODU_FLG SET
10706 ;          5696  then
10707 ;          5697      begin
10708 ;          5698      DODU (.ML_LUN);
10709 ;          5699      DOCLN;
10710 ;          5700      end;
10711 ;          5701
10712 ;          5702  ENDTST;
10716
10720 036324  004167  145514          $T15:   JSR     R1,$SAVE2                       ;                       5573
10721 036330  005746                  TST     -(SP)
10722 036332  104402                  1$:     TRAP    2                               ;                       5599
10723 036334  152777  000040  154652          BISB    #40,@ML.REG+40                  ;                       5601
10724 036342  016701  155234                  MOV     ML.DUT,R1
10725 036346  042701  177770                  BIC     #177770,R1
10726 036352  142777  000007  154634          BICB    #7,@ML.REG+40
10727 036360  150177  154630                  BISB    R1,@ML.REG+40
10728 036364  005002                          CLR     R2                              ; DODU.FLG              5603
10729 036366  004767  157446                  JSR     PC,FIRST.BLK.XFER               ;                       5604
10730 036372  012777  000071  154554          MOV     #71,@ML.REG                     ;                       5605
10731 036400  132777  000001  154546          BITB    #1,@ML.REG                      ;                       5607
10732 036406  001057                          BNE     2$
10733 036410  104455                          TRAP    55                              ;                       5610
10734 036412  000042                          .WORD   42
10735 036414  010464                          .WORD   ASYNC
10736 036416  024052                          .WORD   DUMPER
10737 036420  012746  006506                  MOV     #WRD.19,-(SP)                   ;                       5611
10738 036424  012746  010004                  MOV     #FNC.6,-(SP)
10739 036430  012746  006426                  MOV     #WRD.12,-(SP)
```

```
10741                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
10742                                   ;                                                       22-Dec-1980 09:21:22    PA:<
10743
10744 036434  012746  007366                    MOV     #PHR.1,-(SP)
10745 036440  012746  006276                    MOV     #WRD.1,-(SP)
10746 036444  012746  006062                    MOV     #FIV.FMT,-(SP)
10747 036450  012746  000006                    MOV     #6,-(SP)
10748 036454  010600                            MOV     SP,R0                           ; SP,*
10749 036456  104414                            TRAP    14
10750 036460  132777  000200  154536            BITB    #200,@ML.REG+50                 ;                                       5613
10751 036466  001056                            BNE     3$
10752 036470  104455                            TRAP    55                              ;                                       5616
10753 036472  000043                            .WORD   43
10754 036474  010464                            .WORD   ASYNC
10755 036476  024052                            .WORD   DUMPER
10756 036500  012746  007504                    MOV     #PHR.6,-(SP)                    ;                                       5617
10757 036504  012746  006276                    MOV     #WRD.1,-(SP)
10758 036510  012746  006754                    MOV     #WRD.43,-(SP)
10759 036514  012746  007366                    MOV     #PHR.1,-(SP)
10760 036520  012746  006302                    MOV     #WRD.2,-(SP)
10761 036524  012746  006062                    MOV     #FIV.FMT,-(SP)
10762 036530  012746  000006                    MOV     #6,-(SP)
10763 036534  010600                            MOV     SP,R0                           ; SP,*
10764 036536  104414                            TRAP    14
10765 036540  062706  000016                    ADD     #16,SP                          ;                                       5615
10766 036544  000427                            BR      3$                              ;                                       5620
10767 036546  105777  154452            2$:     TSTB    @ML.REG+50                      ;                                       5624
10768 036552  100030                            BPL     4$
10769 036554  104455                            TRAP    55                              ;                                       5627
10770 036556  000044                            .WORD   44
10771 036560  010464                            .WORD   ASYNC
10772 036562  024052                            .WORD   DUMPER
10773 036564  012746  007472                    MOV     #PHR.5,-(SP)                    ;                                       5628
10774 036570  012746  006276                    MOV     #WRD.1,-(SP)
10775 036574  012746  006754                    MOV     #WRD.43,-(SP)
10776 036600  012746  007404                    MOV     #PHR.2,-(SP)
10777 036604  012746  006302                    MOV     #WRD.2,-(SP)
10778 036610  012746  006062                    MOV     #FIV.FMT,-(SP)
10779 036614  012746  000006                    MOV     #6,-(SP)
10780 036620  010600                            MOV     SP,R0                           ; SP,*
10781 036622  104414                            TRAP    14
10782 036624  012702  000001            3$:     MOV     #1,R2                           ; *,DODU.FLG                            5629
10783 036630  062706  000016                    ADD     #16,SP                          ;                                       5626
10784 036634  132777  000001  154372    4$:     BITB    #1,@ML.REG+60                   ;                                       5632
10785 036642  001430                            BEQ     5$
10786 036644  104455                            TRAP    55                              ;                                       5635
10787 036646  000045                            .WORD   45
10788 036650  010464                            .WORD   ASYNC
10789 036652  024052                            .WORD   DUMPER
10790 036654  012746  006506                    MOV     #WRD.19,-(SP)                   ;                                       5636
10791 036660  012746  007774                    MOV     #FNC.5,-(SP)
10792 036664  012746  006426                    MOV     #WRD.12,-(SP)
10793 036670  012746  007472                    MOV     #PHR.5,-(SP)
10794 036674  012746  006314                    MOV     #WRD.3,-(SP)
10795 036700  012746  006062                    MOV     #FIV.FMT,-(SP)
```

```
10797                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
10798                                   ;                                                       22-Dec-1980 09:21:22    PA:<
10799
10800 036704 012746 000006                      MOV     #6,-(SP)
10801 036710 010600                             MOV     SP,R0                   ; SP,*
10802 036712 104414                             TRAP    14
10803 036714 012702 000001                      MOV     #1,R2                   ; *,DODU.FLG                            5637
10804 036720 062706 000016                      ADD     #16,SP                  ;                                       5634
10805 036724 032777 020000 154302       5$:     BIT     #20000,@ML.REG+60       ;                                       5640
10806 036732 001430                             BEQ     6$                                                              5641
10807 036734 104455                             TRAP    55                      ;                                       5643
10808 036736 000046                             .WORD   46
10809 036740 010464                             .WORD   ASYNC
10810 036742 024052                             .WORD   DUMPER
10811 036744 012746 006506                      MOV     #WRD.19,-(SP)           ;                                       5644
10812 036750 012746 007774                      MOV     #FNC.5,-(SP)
10813 036754 012746 006426                      MOV     #WRD.12,-(SP)
10814 036760 012746 007472                      MOV     #PHR.5,-(SP)
10815 036764 012746 006322                      MOV     #WRD.4,-(SP)
10816 036770 012746 006062                      MOV     #FIV.FMT,-(SP)
10817 036774 012746 000006                      MOV     #6,-(SP)
10818 037000 010600                             MOV     SP,R0                   ; SP,*
10819 037002 104414                             TRAP    14
10820 037004 012702 000001                      MOV     #1,R2                   ; *,DODU.FLG                            5645
10821 037010 062706 000016                      ADD     #16,SP                  ;                                       5642
10822 037014 012700 000050              6$:     MOV     #50,R0                  ; *,$STMP2                              5648
10823 037020 001410                     7$:     BEQ     10$                                                             5649
10824 037022 016701 143070                      MOV     L$DLY,R1                ; *,$STMP1
10825 037026 001403                             BEQ     9$                                                              5651
10826 037030 005016                     8$:     CLR     (SP)                    ; $STMP                                 5652
10827 037032 005301                             DEC     R1                      ; $STMP1                                5653
10828 037034 001375                             BNE     8$                                                              5654
10829 037036 005300                     9$:     DEC     R0                      ; $STMP2                                5655
10830 037040 000767                             BR      7$                                                              5656
10831 037042 132777 000200 154154       10$:    BITB    #200,@ML.REG+50         ;                                       5650
10832 037050 001106                             BNE     15$                                                             5651
10833 037052 132777 000001 154074               BITB    #1,@ML.REG              ;                                       5654
10834 037060 001452                             BEQ     13$                                                             5655
10835 037062 152777 000040 154124               BISB    #40,@ML.REG+40          ;                                       5656
10836 037070 016701 154506                      MOV     ML.DUT,R1
10837 037074 042701 177770                      BIC     #177770,R1
10838 037100 142777 000007 154106               BICB    #7,@ML.REG+40
10839 037106 150177 154102                      BISB    R1,@ML.REG+40
10840 037112 132777 000001 154034               BITB    #1,@ML.REG              ;                                       5659
10841 037120 001405                             BEQ     11$                                                             5660
10842 037122 104455                             TRAP    55
10843 037124 000047                             .WORD   47
10844 037126 010464                             .WORD   ASYNC
10845 037130 024052                             .WORD   DUMPER
10846 037132 000404                             BR      12$                                                             5661
10847 037134 104455                     11$:    TRAP    55
10848 037136 000050                             .WORD   50
10849 037140 010526                             .WORD   SYNC
10850 037142 024052                             .WORD   DUMPER
10851 037144 012746 006506              12$:    MOV     #WRD.19,-(SP)           ;                                       5662
```

```
10853                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
10854                                   ;                                                       22-Dec-1980 09:21:22    PA:<
10855
10856 037150  012746  007774                    MOV     #FNC.5,-(SP)
10857 037154  012746  006416                    MOV     #WRD.11,-(SP)
10858 037160  012746  007404                    MOV     #PHR.2,-(SP)
10859 037164  012746  006276                    MOV     #WRD.1,-(SP)
10860 037170  012746  006062                    MOV     #FIV.FMT,-(SP)
10861 037174  012746  000006                    MOV     #6,-(SP)
10862 037200  010600                            MOV     SP,R0                           ; SP,*
10863 037202  104414                            TRAP    14
10864 037204  000424                            BR      14$                             ;                                       5654
10865 037206  104455                    13$:    TRAP    55                              ;                                       5666
10866 037210  000051                            .WORD   51
10867 037212  010464                            .WORD   ASYNC
10868 037214  024052                            .WORD   DUMPER
10869 037216  012746  006506                    MOV     #WRD.19,-(SP)                   ;                                       5667
10870 037222  012746  007774                    MOV     #FNC.5,-(SP)
10871 037226  012746  006416                    MOV     #WRD.11,-(SP)
10872 037232  012746  007366                    MOV     #PHR.1,-(SP)
10873 037236  012746  006302                    MOV     #WRD.2,-(SP)
10874 037242  012746  006062                    MOV     #FIV.FMT,-(SP)
10875 037246  012746  000006                    MOV     #6,-(SP)
10876 037252  010600                            MOV     SP,R0                           ; SP,*
10877 037254  104414                            TRAP    14
10878 037256  012702  000001            14$:    MOV     #1,R2                           ; *,DODU.FLG                            5670
10879 037262  062706  000016                    ADD     #16,SP                          ;                                       5652
10880 037266  132777  000001  153660    15$:    BITB    #1,@ML.REG                      ;                                       5673
10881 037274  001455                            BEQ     18$
10882 037276  152777  000040  153710            BISB    #40,@ML.REG+40                  ;                                       5675
10883 037304  016701  154272                    MOV     ML.DUT,R1
10884 037310  042701  177770                    BIC     #177770,R1
10885 037314  142777  000007  153672            BICB    #7,@ML.REG+40
10886 037322  150177  153666                    BISB    R1,@ML.REG+40
10887 037326  132777  000001  153620            BITB    #1,@ML.REG                      ;                                       5678
10888 037334  001405                            BEQ     16$
10889 037336  104455                            TRAP    55
10890 037340  000052                            .WORD   52
10891 037342  010464                            .WORD   ASYNC
10892 037344  024052                            .WORD   DUMPER
10893 037346  000404                            BR      17$
10894 037350  104455                    16$:    TRAP    55
10895 037352  000053                            .WORD   53
10896 037354  010526                            .WORD   SYNC
10897 037356  024052                            .WORD   DUMPER
10898 037360  012746  006506            17$:    MOV     #WRD.19,-(SP)                   ;                                       5681
10899 037364  012746  007774                    MOV     #FNC.5,-(SP)
10900 037370  012746  006416                    MOV     #WRD.11,-(SP)
10901 037374  012746  007404                    MOV     #PHR.2,-(SP)
10902 037400  012746  006276                    MOV     #WRD.1,-(SP)
10903 037404  012746  006062                    MOV     #FIV.FMT,-(SP)
10904 037410  012746  000006                    MOV     #6,-(SP)
10905 037414  010600                            MOV     SP,R0                           ; SP,*
10906 037416  104414                            TRAP    14
10907 037420  012702  000001                    MOV     #1,R2                           ; *,DODU.FLG                            5682
```

```
10909                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
10910                                   ;                                                       22-Dec-1980 09:21:22    PA:<
10911
10912 037424  062706  000016                    ADD     #16,SP                  ;                                       5675
10913 037430  104467                    18$:    TRAP    67                      ;                                       5683
10914 037432  006000                            ROR     R0
10915 037434  103002                            BHIS    19$
10916 037436  000167  176670                    JMP     1$
10917 037442  032777  040000  153504    19$:    BIT     #40000,@ML.REG          ;                                       5687
10918 037450  001432                            BEQ     20$
10919 037452  104455                            TRAP    55                      ;                                       5690
10920 037454  000164                            .WORD   164
10921 037456  010672                            .WORD   INTER
10922 037460  024052                            .WORD   DUMPER
10923 037462  012746  006506                    MOV     #WRD.19,-(SP)           ;                                       5691
10924 037466  012746  010004                    MOV     #FNC.6,-(SP)
10925 037472  012746  006426                    MOV     #WRD.12,-(SP)
10926 037476  012746  007472                    MOV     #PHR.5,-(SP)
10927 037502  012746  006514                    MOV     #WRD.20,-(SP)
10928 037506  012746  007174                    MOV     #WRD.61,-(SP)
10929 037512  012746  006100                    MOV     #SIX.FMT,-(SP)
10930 037516  012746  000007                    MOV     #7,-(SP)
10931 037522  010600                            MOV     SP,R0                   ; SP,*
10932 037524  104414                            TRAP    14
10933 037526  012702  000001                    MOV     #1,R2                   ; *,DODU.FLG                            5692
10934 037532  062706  000020                    ADD     #20,SP                  ;                                       5689
10935 037536  005302                    20$:    DEC     R2                      ; DODU.FLG                              5695
10936 037540  001004                            BNE     21$
10937 037542  016700  154032                    MOV     ML.LUN,R0               ;                                       5698
10938 037546  104451                            TRAP    51
10939 037550  104444                            TRAP    44
10940 037552  005726                    21$:    TST     (SP)+                   ;                                       5573
10941 037554  000207                            RTS     PC
10942
10943                                   ; Routine Size:  333 words
10944                                   ; Maximum stack depth per invocation:  18 words
10949
10950
10954
10958 037556                            T15::
10959 037556  004767  176542            1$:     JSR     PC,$T15                 ;                                       5700
10960 037562  104466                            TRAP    66
10961 037564  006000                            ROR     R0
10962 037566  103773                            BLO     1$
```

```
10964                                   ;ML4                                    22-Dec-1980 09:24:31    TOPS
10965                                   ;                                       22-Dec-1980 09:21:22    PA:<
10966
10967 037570  000207                            RTS     PC
10968
10969                                   ; Routine Size:  6 words
10970                                   ; Maximum stack depth per invocation:  0 words
10975
10976
10977 ;          5703  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (66)

```
10979 ;ML4
10980 ;
10981
10982 ;          5704  !
10983 ;          5705  BGNTST;
10984 ;          5706
10985 ;          5707  !++
10986 ;          5708  ! TEST NUMBER:  TST 16
10987 ;          5709  !
10988 ;          5710  ! TEST NAME:    CLEAR FUNCTION TEST
10989 ;          5711  !
10990 ;          5712  ! TEST DESCRIPTION:
10991 ;          5713  !       TEST IF THE DRIVE CAN PERFORM A CLEAR FUNCTION WITHOUT HANGING THE DRIVE.
10992 ;          5714  !
10993 ;          5715  !       A CLEAR FUNCTION IS WRITTEN INTO MLCS1.
10994 ;          5716  !
10995 ;          5717  !       THEN GO AND ERROR BITS ARE CHECKED FOR CORRECT STATUS.
10996 ;          5718  !       THIS DRIVE IS DROPPED ON DETECTED ERRORS.
10997 ;          5719  !
10998 ;          5720  !--
10999 ;          5721
11000 ;          5722  local
11001 ;          5723      DODU_FLG;                                   !DROP UNIT FLAG
11002 ;          5724
11003 ;          5725  BGNSUB;
11004 ;          5726  CLR_MBUS;
11005 ;          5727  DODU_FLG = ZERO;
11006 ;          5728  MLER = ONES;                                    !SET BITS IN ERROR REGISTER
11007 ;          5729  MLCS1 = DRV_CLR;                                !DO A CLEAR FUNCTION
11008 ;          5730  DELAY (ONE_05);                                 !DELAY
11009 ;          5731
11010 ;          5732  if .GO IS_SET                                   !SEE IF GO CLEARED AFTER FUNCTION
11011 ;          5733  then
11012 ;          5734      begin                                       !ERROR IF SET
11013 ;          5735      ERRDF (44, ASYNC, DUMPER);
11014 ;          5736      PRINTB (FIV_FMT, WRD_1, PHR_5, WRD_11, FNC_3, FNC_7, WRD_19);
11015 ;          5737
11016 ;          5738      if .DRY IS_SET                              !TST DRY CLEAR WITH GO SET
11017 ;          5739      then
11018 ;          5740          begin                                   !ERROR IF SET
11019 ;          5741          ERRDF (45, ASYNC, DUMPER);
11020 ;          5742          PRINTB (FIV_FMT, WRD_2, PHR_5, WRD_43, WRD_1, PHR_5);
11021 ;          5743          end;
11022 ;          5744
11023 ;          5745      DODU_FLG = ONE;                             !SET DODU_FLG
11024 ;          5746      end
11025 ;          5747  else                                            !GO CLEARED AFTER FUNCTION
11026 ;          5748
11027 ;          5749      if .DRY IS_NOT_SET                          !TST DRY SET WITH GO CLEAR
11028 ;          5750      then
11029 ;          5751          begin                                   !ERROR IF NOT SET
11030 ;          5752          ERRDF (46, ASYNC, DUMPER);
11031 ;          5753          PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
11032 ;          5754          DODU_FLG = ONE;
11033 ;          5755          end;
```

```
11035 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
11036 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (66)
11037
11038 ;          5756
11039 ;          5757  if .ILF IS_SET                                 !DID FUNCTION CAUSE ILF
11040 ;          5758  then
11041 ;          5759      begin                                      !ERROR IF YES
11042 ;          5760      ERRDF (47, ASYNC, DUMPER);
11043 ;          5761      PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_3, FNC_7, WRD_19);
11044 ;          5762      DODU_FLG = ONE;
11045 ;          5763      end;
11046 ;          5764
11047 ;          5765  if .OPI IS_SET                                 !DID FUNCTION CAUSE OPI
11048 ;          5766  then
11049 ;          5767      begin                                      !ERROR IF YES
11050 ;          5768      ERRDF (48, ASYNC, DUMPER);
11051 ;          5769      PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_3, FNC_7, WRD_19);
11052 ;          5770      DODU_FLG = ONE;
11053 ;          5771      end;
11054 ;          5772
11055 ;          5773  if .MLER neq ZERO                              !TEST ERROR REGISTER FOR CLEAR
11056 ;          5774  then
11057 ;          5775      begin                                      !ERROR IF NOT CLEAR
11058 ;          5776      ERRDF (49, ASYNC, DUMPER);
11059 ;          5777      PRINTB (SIX_FMT, FNC_3, FNC_7, WRD_19, WRD_14, WRD_13, REG_3);
11060 ;          5778      end;
11061 ;          5779
11062 ;          5780  ENDSUB;
11063 ;          5781
11064 ;          5782  if .DODU_FLG IS_SET                            !DROP THIS UNIT IF DODU_FLG SET
11065 ;          5783  then
11066 ;          5784      begin
11067 ;          5785      DODU (.ML_LUN);
11068 ;          5786      DOCLN;
11069 ;          5787      end;
11070 ;          5788
11071 ;          5789  ENDTST;
11075
11079 037572  004167  144246          $T16:  JSR     R1,$SAVE2                ;                          5702
11080 037576  005746                        TST     -(SP)
11081 037600  104402                  1$:   TRAP    2                        ;                          5723
11082 037602  152777  000040  153404        BISB    #40,@ML.REG+40           ;                          5725
11083 037610  016701  153766              MOV     ML.DUT,R1
11084 037614  042701  177770              BIC     #177770,R1
11085 037620  142777  000007  153366        BICB    #7,@ML.REG+40
11086 037626  150177  153362              BISB    R1,@ML.REG+40
11087 037632  005002                      CLR     R2                       ; DODU.FLG                 5727
11088 037634  012777  177777  153372      MOV     #-1,@ML.REG+60           ;                          5728
```

```
11090                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
11091                                   ;                                                       22-Dec-1980 09:21:22    PA:<
11092
11093 037642  012777  000011  153304            MOV     #11,@ML.REG             ;                                       5729
11094 037650  012700  000001                    MOV     #1,R0                   ; *,$$TMP2                              5730
11095 037654  001410                    2$:     BEQ     5$
11096 037656  016701  142234                    MOV     L$DLY,R1                ; *,$$TMP1
11097 037662  001403                            BEQ     4$
11098 037664  005016                    3$:     CLR     (SP)                    ; $$TMP
11099 037666  005301                            DEC     R1                      ; $$TMP1
11100 037670  001375                            BNE     3$
11101 037672  005300                    4$:     DEC     R0                      ; $$TMP2
11102 037674  000767                            BR      2$
11103 037676  132777  000001  153250    5$:     BITB    #1,@ML.REG              ;                                       5732
11104 037704  001464                            BEQ     7$
11105 037706  104455                            TRAP    55                      ;                                       5735
11106 037710  000054                            .WORD   54
11107 037712  010464                            .WORD   ASYNC
11108 037714  024052                            .WORD   DUMPER
11109 037716  012746  006506                    MOV     #WRD.19,-(SP)           ;                                       5736
11110 037722  012746  010012                    MOV     #FNC.7,-(SP)
11111 037726  012746  007750                    MOV     #FNC.3,-(SP)
11112 037732  012746  006416                    MOV     #WRD.11,-(SP)
11113 037736  012746  007472                    MOV     #PHR.5,-(SP)
11114 037742  012746  006276                    MOV     #WRD.1,-(SP)
11115 037746  012746  006062                    MOV     #FIV.FMT,-(SP)
11116 037752  012746  000007                    MOV     #7,-(SP)
11117 037756  010600                            MOV     SP,R0                   ; SP,*
11118 037760  104414                            TRAP    14
11119 037762  105777  153236                    TSTB    @ML.REG+50              ;                                       5738
11120 037766  100026                            BPL     6$
11121 037770  104455                            TRAP    55                      ;                                       5741
11122 037772  000055                            .WORD   55
11123 037774  010464                            .WORD   ASYNC
11124 037776  024052                            .WORD   DUMPER
11125 040000  012746  007472                    MOV     #PHR.5,-(SP)            ;                                       5742
11126 040004  012746  006276                    MOV     #WRD.1,-(SP)
11127 040010  012746  006754                    MOV     #WRD.43,-(SP)
11128 040014  012746  007472                    MOV     #PHR.5,-(SP)
11129 040020  012746  006302                    MOV     #WRD.2,-(SP)
11130 040024  012746  006062                    MOV     #FIV.FMT,-(SP)
11131 040030  012746  000006                    MOV     #6,-(SP)
11132 040034  010600                            MOV     SP,R0                   ; SP,*
11133 040036  104414                            TRAP    14
11134 040040  062706  000016                    ADD     #16,SP                  ;                                       5740
11135 040044  012702  000001            6$:     MOV     #1,R2                   ; *,DODU.FLG                            5745
11136 040050  062706  000020                    ADD     #20,SP                  ;                                       5734
11137 040054  000434                            BR      8$                      ;                                       5732
11138 040056  132777  000200  153140    7$:     BITB    #200,@ML.REG+50         ;                                       5749
11139 040064  001030                            BNE     8$
11140 040066  104455                            TRAP    55                      ;                                       5752
11141 040070  000056                            .WORD   56
11142 040072  010464                            .WORD   ASYNC
11143 040074  024052                            .WORD   DUMPER
11144 040076  012746  007504                    MOV     #PHR.6,-(SP)            ;                                       5753
```

```
11146                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
11147                                   ;                                                       22-Dec-1980 09:21:22    PA:<
11148
11149 040102  012746  006276                     MOV     #WRD.1,-(SP)
11150 040106  012746  006754                     MOV     #WRD.43,-(SP)
11151 040112  012746  007366                     MOV     #PHR.1,-(SP)
11152 040116  012746  006302                     MOV     #WRD.2,-(SP)
11153 040122  012746  006062                     MOV     #FIV.FMT,-(SP)
11154 040126  012746  000006                     MOV     #6,-(SP)
11155 040132  010600                             MOV     SP,R0                           ; SP,*
11156 040134  104414                             TRAP    14
11157 040136  012702  000001                     MOV     #1,R2                           ; *,DODU.FLG                    5754
11158 040142  062706  000016                     ADD     #16,SP                          ;                               5751
11159 040146  132777  000001  153060  8$:        BITB    #1,@ML.REG+60                   ;                               5757
11160 040154  001432                             BEQ     9$
11161 040156  104455                             TRAP    55                              ;                               5760
11162 040160  000057                             .WORD   57
11163 040162  010464                             .WORD   ASYNC
11164 040164  024052                             .WORD   DUMPER
11165 040166  012746  006506                     MOV     #WRD.19,-(SP)                   ;                               5761
11166 040172  012746  010012                     MOV     #FNC.7,-(SP)
11167 040176  012746  007750                     MOV     #FNC.3,-(SP)
11168 040202  012746  006426                     MOV     #WRD.12,-(SP)
11169 040206  012746  007472                     MOV     #PHR.5,-(SP)
11170 040212  012746  006314                     MOV     #WRD.3,-(SP)
11171 040216  012746  006062                     MOV     #FIV.FMT,-(SP)
11172 040222  012746  000007                     MOV     #7,-(SP)
11173 040226  010600                             MOV     SP,R0                           ; SP,*
11174 040230  104414                             TRAP    14
11175 040232  012702  000001                     MOV     #1,R2                           ; *,DODU.FLG                    5762
11176 040236  062706  000020                     ADD     #20,SP                          ;                               5759
11177 040242  032777  020000  152764  9$:        BIT     #20000,@ML.REG+60               ;                               5765
11178 040250  001432                             BEQ     10$
11179 040252  104455                             TRAP    55                              ;                               5768
11180 040254  000060                             .WORD   60
11181 040256  010464                             .WORD   ASYNC
11182 040260  024052                             .WORD   DUMPER
11183 040262  012746  006506                     MOV     #WRD.19,-(SP)                   ;                               5769
11184 040266  012746  010012                     MOV     #FNC.7,-(SP)
11185 040272  012746  007750                     MOV     #FNC.3,-(SP)
11186 040276  012746  006426                     MOV     #WRD.12,-(SP)
11187 040302  012746  007472                     MOV     #PHR.5,-(SP)
11188 040306  012746  006322                     MOV     #WRD.4,-(SP)
11189 040312  012746  006062                     MOV     #FIV.FMT,-(SP)
11190 040316  012746  000007                     MOV     #7,-(SP)
11191 040322  010600                             MOV     SP,R0                           ; SP,*
11192 040324  104414                             TRAP    14
11193 040326  012702  000001                     MOV     #1,R2                           ; *,DODU.FLG                    5770
11194 040332  062706  000020                     ADD     #20,SP                          ;                               5767
11195 040336  005777  152672            10$:     TST     @ML.REG+60                      ;                               5773
11196 040342  001430                             BEQ     11$
11197 040344  104455                             TRAP    55                              ;                               5776
11198 040346  000061                             .WORD   61
11199 040350  010464                             .WORD   ASYNC
11200 040352  024052                             .WORD   DUMPER
```

```
11202                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
11203                                   ;                                                       22-Dec-1980 09:21:22    PA:<
11204
11205 040354  012746  010274                     MOV     #REG.3,-(SP)                ;                                   5777
11206 040360  012746  006436                     MOV     #URD.13,-(SP)
11207 040364  012746  006442                     MOV     #URD.14,-(SP)
11208 040370  012746  006506                     MOV     #URD.19,-(SP)
11209 040374  012746  010012                     MOV     #FNC.7,-(SP)
11210 040400  012746  007750                     MOV     #FNC.3,-(SP)
11211 040404  012746  006100                     MOV     #SIX.FMT,-(SP)
11212 040410  012746  000007                     MOV     #7,-(SP)
11213 040414  010600                            MOV     SP,R0                       ; SP,*
11214 040416  104414                            TRAP    14
11215 040420  062706  000020                     ADD     #20,SP                      ;                                   5775
11216 040424  104467                  11$:      TRAP    67                          ;                                   5778
11217 040426  006000                            ROR     R0
11218 040430  103002                            BHIS    12$
11219 040432  000167  177142                     JMP     1$
11220 040436  005302                  12$:      DEC     R2                          ; DODU.FLG                          5782
11221 040440  001004                            BNE     13$
11222 040442  016700  153132                     MOV     ML.LUN,R0                   ;                                   5785
11223 040446  104451                            TRAP    51
11224 040450  104444                            TRAP    44
11225 040452  005726                  13$:      TST     (SP)+                       ;                                   5702
11226 040454  000207                            RTS     PC
11227
11228                                   ; Routine Size:  218 words
11229                                   ; Maximum stack depth per invocation:  19 words
11234
11235
11239
11243 040456                            T16::
11244 040456  004767  177110            1$:       JSR     PC,$T16                     ;                                   5787
11245 040462  104466                              TRAP    66
11246 040464  006000                              ROR     R0
11247 040466  103773                              BLO     1$
11248 040470  000207                              RTS     PC
11249
11250                                   ; Routine Size:  6 words
11251                                   ; Maximum stack depth per invocation:  0 words
```

```
11257 ;ML4                                          22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
11258 ;                                             22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (66)
11259
11260 ;         5790  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (67)

```
11262 ;ML4
11263 :
11264
11265 :          5791  !
11266 :          5792  BGNTST
11267 :          5793
11268 :          5794  !++
11269 :          5795  ! TEST NUMBER:  TST 17
11270 :          5796  !
11271 :          5797  ! TEST NAME: DIAGNOSTIC REGISTER TESTS
11272 :          5798  !
11273 :          5799  ! TEST DESCRIPTION:
11274 :          5800  !       TEST THE DATA DIAG REGISTERS MLD1, MLD2, MLE2
11275 :          5801  !       FOR 1'S/0'S, SHIFTING 1'S/0'S AND INITIALIZATION
11276 :          5802  !
11277 :          5803  !--
11278 :          5804
11279 :          5805  local
11280 :          5806  CLR_DATA ,                              !CLEAR DATA FOR INIT TEST
11281 :          5807  SAVE ,                                  !TEMPORARY SAVE LOCATION
11282 :          5808  ERR_FLG ,                               !ERROR FLAG
11283 :          5809  TST_PAT ,                               !TEST PATTERN
11284 :          5810  index ,                                 !POINTS TO REGISTER PRESENTLY BEING TESTED
11285 :          5811  DODU_FLG;                               !DROP UNIT FLAG
11286 :          5812  DODU_FLG = ZERO;
11287 :          5813  !
11288 :          5814  !
11289 :          5815  !       FIRST TEST THE REGISTERS FOR ONES AND ZEROES
11290 :          5816  !
11291 :          5817  !
11292 :          5818  TST_PAT = ONES;                         !LOAD TEST PAT WITH ONES
11293 :          5819
11294 :          5820  incr TWICE from 0 to 1 do               !REPEAT LOOP TWICE
11295 :          5821      begin
11296 :          5822
11297 :          5823      incr REG_SEL from 11 to 13 do       !TEST ELEVEN WRITE/READ REGISTERS
11298 :          5824          begin
11299 :          5825          BGNSUB;
11300 :          5826          CLR_MBUS;
11301 :          5827          WRT_REG (.TST_PAT, .REG_SEL, index);    !WRITE TO THE REGISTER
11302 :          5828          RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);   !READ THE REGISTER
11303 :          5829
11304 :          5830          if .ERR_FLG IS_SET                      !SEE IF READ FOUND AN ERROR
11305 :          5831          then
11306 :          5832              begin                               !IF ERROR FLAG IS SET THEN ERROR AND SET DODU_FLG
11307 :          5833              ERRDF (121, ARR_DAT, DUMPER);       !ARRAY DATA MODULE FAILURE
11308 :          5834              PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
11309 :          5835              PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
11310 :          5836              DODU_FLG = ONE;
11311 :          5837              end;
11312 :          5838
11313 :          5839          ENDSUB;
11314 :          5840          end;
11315 :          5841
11316 :          5842      TST_PAT = not .TST_PAT;                 !REPEAT AGAIN WITH COMPLIMENT DATA
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (67)

```
11318 ;ML4
11319 ;
11320
11321 ;          5843      end;
11322 ;          5844
11323 ;          5845  !
11324 ;          5846  !
11325 ;          5847  !       TEST THE REGISTERS FOR SHIFTING ONES AND ZEROES
11326 ;          5848  !
11327 ;          5849  !
11328 ;          5850  TST_PAT = ONE;                          !LOAD TST_PAT WITH A 1 IN A FILED OF 0'S
11329 ;          5851
11330 ;          5852  incr SHIFT from 0 to 15 do              !DO SHIFT 16 TIMES
11331 ;          5853      begin
11332 ;          5854
11333 ;          5855      incr TWICE from 0 to 1 do          !REPEAT LOOP TWICE
11334 ;          5856          begin
11335 ;          5857
11336 ;          5858          incr REG_SEL from 11 to 13 do  !TEST ELEVEN READ/WRITE REGISTERS
11337 ;          5859              begin
11338 ;          5860              BGNSUB;
11339 ;          5861              CLR_MBUS;
11340 ;          5862              WRT_REG (.TST_PAT, .REG_SEL, index);      !WRITE TO THE REGISTER
11341 ;          5863              RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);     !READ THE REGISTER
11342 ;          5864
11343 ;          5865              if .ERR_FLG IS_SET             !SEE IF THE READ FOUND AN ERROR
11344 ;          5866              then
11345 ;          5867                  begin                      !IF THE ERROR FLAG IS_SET THEN ERROR
11346 ;          5868                  ERRDF (122, ARR_DAT, DUMPER);  !ARRAY DATA MODULE FAILURE
11347 ;          5869                  PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
11348 ;          5870                  PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .DT_DATA, .RD_DATA);
11349 ;          5871                  DODU_FLG = ONE;
11350 ;          5872                  end;
11351 ;          5873
11352 ;          5874              ENDSUB;
11353 ;          5875              end;
11354 ;          5876
11355 ;          5877          TST_PAT = not .TST_PAT;        !REPEAT WITH A 0 IN A FIELD OF 1'S
11356 ;          5878          end;
11357 ;          5879
11358 ;          5880      TST_PAT = .TST_PAT^ONE;            !SHIFT THE 1 IN THE FIELD OF 0'S
11359 ;          5881      end;
11360 ;          5882
11361 ;          5883  !
11362 ;          5884  !
11363 ;          5885  !       NOW TEST THE REGISTERS FOR INITIALIZATION
11364 ;          5886  !
11365 ;          5887  !
11366 ;          5888  REG_INIT_FLG = ONE;
11367 ;          5889  TST_PAT = ONES;                          !BACKGROUND PATTERN
11368 ;          5890
11369 ;          5891  incr TWICE from 0 to 1 do               !REPEAT LOOP TWICE
11370 ;          5892      begin
11371 ;          5893
11372 ;          5894      incr REG_SEL from 11 to 13 do      !TEST THIRTEEN REGISTERS
```

```
11374 ;ML4                                                          22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
11375 ;                                                             22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (67)
11376
11377 ;          5895          begin
11378 ;          5896          BGNSUB;
11379 ;          5897          CLR_MBUS;
11380 ;          5898          WRT_REG (.TST_PAT, .REG_SEL, index);    !WRITE REGISTER WITH BACKGROUND
11381 ;          5899          CLR_DATA = (.AI) or (.IGNORE);          !CALCULATE THE CLEARED DATA PATTERN
11382 ;          5900          REG_INIT_FLG = ONE;
11383 ;          5901          RD_REG (.CLR_DATA, .REG_SEL, ERR_FLG);  !READ THE REGISTER FOR THE CLEARED DATA PAT
11384 ;          5902
11385 ;          5903          if .ERR_FLG IS_SET                      !SEE IF READ FOUND AN ERROR
11386 ;          5904          then
11387 ;          5905              begin                               !IF ERROR FLAG IS_SET THEN ERROR AND SET DODU_FLG
11388 ;          5906              ERRDF (118, ARR_DAT, DUMPER);       !ARRAY DATA MODULE
11389 ;          5907              PRINTB (FIV_FMT, PHR_4, WRD_12, WRD_52, FNC_23, WRD_56);
11390 ;          5908              PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .CLR_DATA, .RD_DATA);
11391 ;          5909              DODU_FLG = ONE;
11392 ;          5910              end;
11393 ;          5911
11394 ;          5912          ENDSUB;
11395 ;          5913          end;
11396 ;          5914
11397 ;          5915      TST_PAT = not .TST_PAT;                     !REPEAT WITH COMPLIMENT BACKGROUND PAT
11398 ;          5916      end;
11399 ;          5917
11400 ;          5918  REG_INIT_FLG = ZERO;                           !CLEAR THE FLAG
11401 ;          5919
11402 ;          5920  if .DODU_FLG IS_SET                             !DROP THIS UNIT IF DODU_FLG SET
11403 ;          5921  then
11404 ;          5922      begin
11405 ;          5923      DODU (.ML_LUN);
11406 ;          5924      DOCLN;
11407 ;          5925      end;
11408 ;          5926
11409 ;          5927  ENDTST;
11413
11417 040472  004167  143420            $T17:   JSR     R1,$SAVE5                       ;                       5789
11418 040476  024646                            CMP     -(SP),-(SP)
11419 040500  005046                            CLR     -(SP)                           ; DODU.FLG              5812
11420 040502  012703  177777                    MOV     #-1,R3                          ; *,TST.PAT             5818
11421 040506  005001                            CLR     R1                              ; TWICE                 5820
11422 040510  012702  000013            1$:     MOV     #13,R2                          ; *,REG.SEL             5823
11423 040514  104402                    2$:     TRAP    2                               ;                       5824
11424 040516  152777  000040  152470            BISB    #40,@ML.REG+40                  ;                       5825
11425 040524  016705  153052                    MOV     ML.DUT,R5
11426 040530  042705  177770                    BIC     #177770,R5
11427 040534  142777  000007  152452            BICB    #7,@ML.REG+40
```

```
11429                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
11430                                   ;                                                       22-Dec-1980 09:21:22    PA:<
11431
11432 040542  150577  152446                    BISB    R5,@ML.REG+40
11433 040546  010346                    MOV     R3,-(SP)            ; TST.PAT,*                                     5827
11434 040550  010246                    MOV     R2,-(SP)            ; REG.SEL,*
11435 040552  012746  000012            MOV     #12,-(SP)
11436 040556  060616                    ADD     SP,(SP)             ; INDEX,*
11437 040560  004767  162310            JSR     PC,WRT.REG
11438 040564  010316                    MOV     R3,(SP)             ; TST.PAT,*                                     5828
11439 040566  010246                    MOV     R2,-(SP)            ; REG.SEL,*
11440 040570  012746  000014            MOV     #14,-(SP)
11441 040574  060616                    ADD     SP,(SP)             ; ERR.FLG,*
11442 040576  004767  162660            JSR     PC,RD.REG
11443 040602  026627  000014  000001      CMP     14(SP),#1           ; ERR.FLG,*                                     5830
11444 040610  001054                    BNE     3$
11445 040612  104455                    TRAP    55                  ;                                               5833
11446 040614  000171                    .WORD   171
11447 040616  010570                    .WORD   ARR.DAT
11448 040620  024052                    .WORD   DUMPER
11449 040622  012746  007122            MOV     #WRD.56,-(SP)       ;                                               5834
11450 040626  012746  007066            MOV     #WRD.52,-(SP)
11451 040632  012746  010004            MOV     #FNC.6,-(SP)
11452 040636  012746  007774            MOV     #FNC.5,-(SP)
11453 040642  012746  006426            MOV     #WRD.12,-(SP)
11454 040646  012746  007454            MOV     #PHR.4,-(SP)
11455 040652  012746  006100            MOV     #SIX.FMT,-(SP)
11456 040656  012746  000007            MOV     #7,-(SP)
11457 040662  010600                    MOV     SP,R0               ; SP,*
11458 040664  104414                    TRAP    14
11459 040666  016716  152236            MOV     RD.DATA,(SP)        ;                                               5835
11460 040672  016746  152230            MOV     WT.DATA,-(SP)
11461 040676  016600  000040            MOV     40(SP),R0           ; INDEX,*
11462 040702  006300                    ASL     R0
11463 040704  006300                    ASL     R0
11464 040706  006300                    ASL     R0
11465 040710  016046  013154            MOV     ML.REG(R0),-(SP)
11466 040714  012746  005216            MOV     #FMT.16,-(SP)
11467 040720  012746  000004            MOV     #4,-(SP)
11468 040724  010600                    MOV     SP,R0               ; SP,*
11469 040726  104414                    TRAP    14
11470 040730  012766  000001  000042      MOV     #1,42(SP)           ; *,DODU.FLG                                    5836
11471 040736  062706  000030            ADD     #30,SP              ;                                               5832
11472 040742  062706  000012      3$:   ADD     #12,SP              ;                                               5824
11473 040746  104467                    TRAP    67                  ;                                               5837
11474 040750  006000                    ROR     R0
11475 040752  103660                    BLO     2$
11476 040754  005202                    INC     R2                  ; REG.SEL                                       5823
11477 040756  020227  000015            CMP     R2,#15              ; REG.SEL,*
11478 040762  003654                    BLE     2$
11479 040764  005103                    COM     R3                  ; TST.PAT                                       5842
11480 040766  005201                    INC     R1                  ; TWICE                                         5820
11481 040770  020127  000001            CMP     R1,#1               ; TWICE,*
11482 040774  003645                    BLE     1$
11483 040776  012703  000001            MOV     #1,R3               ; *,TST.PAT                                     5850
```

```
11485                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
11486                                   ;                                                       22-Dec-1980 09:21:22    PA:<
11487
11488 041002  005004                          CLR     R4                      ; SHIFT                                 5852
11489 041004  005001                    4$:   CLR     R1                      ; TWICE                                 5855
11490 041006  012702  000013            5$:   MOV     #13,R2                  ; *,REG.SEL                             5858
11491 041012  104402                    6$:   TRAP    2                       ;                                       5859
11492 041014  152777  000040  152172          BISB    #40,@ML.REG+40          ;                                       5860
11493 041022  016705  152554                  MOV     ML.DUT,R5
11494 041026  042705  177770                  BIC     #177770,R5
11495 041032  142777  000007  152154          BICB    #7,@ML.REG+40
11496 041040  150577  152150                  BISB    R5,@ML.REG+40
11497 041044  010346                          MOV     R3,-(SP)                ; TST.PAT,*                             5862
11498 041046  010246                          MOV     R2,-(SP)                ; REG.SEL,*
11499 041050  012746  000012                  MOV     #12,-(SP)
11500 041054  060616                          ADD     SP,(SP)                 ; INDEX,*
11501 041056  004767  162012                  JSR     PC,WRT.REG
11502 041062  010316                          MOV     R3,(SP)                 ; TST.PAT,*                             5863
11503 041064  010246                          MOV     R2,-(SP)                ; REG.SEL,*
11504 041066  012746  000014                  MOV     #14,-(SP)
11505 041072  060616                          ADD     SP,(SP)                 ; ERR.FLG,*
11506 041074  004767  162362                  JSR     PC,RD.REG
11507 041100  026627  000014  000001          CMP     14(SP),#1               ; ERR.FLG,*                             5865
11508 041106  001054                          BNE     7$
11509 041110  104455                          TRAP    55                      ;                                       5868
11510 041112  000172                          .WORD   172
11511 041114  010570                          .WORD   ARR.DAT
11512 041116  024052                          .WORD   DUMPER
11513 041120  012746  007122                  MOV     #WRD.56,-(SP)           ;                                       5869
11514 041124  012746  007066                  MOV     #WRD.52,-(SP)
11515 041130  012746  010004                  MOV     #FNC.6,-(SP)
11516 041134  012746  007774                  MOV     #FNC.5,-(SP)
11517 041140  012746  006426                  MOV     #WRD.12,-(SP)
11518 041144  012746  007454                  MOV     #PHR.4,-(SP)
11519 041150  012746  006100                  MOV     #SIX.FMT,-(SP)
11520 041154  012746  000007                  MOV     #7,-(SP)
11521 041160  010600                          MOV     SP,R0                   ; SP,*
11522 041162  104414                          TRAP    14
11523 041164  016716  151740                  MOV     RD.DATA,(SP)            ;                                       5870
11524 041170  016746  151732                  MOV     WT.DATA,-(SP)
11525 041174  016600  000040                  MOV     40(SP),R0               ; INDEX,*
11526 041200  006300                          ASL     R0
11527 041202  006300                          ASL     R0
11528 041204  006300                          ASL     R0
11529 041206  016046  013154                  MOV     ML.REG(R0),-(SP)
11530 041212  012746  005216                  MOV     #FMT.16,-(SP)
11531 041216  012746  000004                  MOV     #4,-(SP)
11532 041222  010600                          MOV     SP,R0                   ; SP,*
11533 041224  104414                          TRAP    14
11534 041226  012766  000001  000042          MOV     #1,42(SP)               ; *,DODU.FLG                            5871
11535 041234  062706  000030                  ADD     #30,SP                  ;                                       5867
11536 041240  062706  000012            7$:   ADD     #12,SP                  ;                                       5859
11537 041244  104467                          TRAP    67                      ;                                       5872
11538 041246  006000                          ROR     R0
11539 041250  103660                          BLO     6$
```

```
11541                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
11542                                   ;                                                       22-Dec-1980 09:21:22    PA:<
11543
11544 041252 005202                             INC     R2                      ; REG.SEL                                       5858
11545 041254 020227 000015                      CMP     R2,#15                  ; REG.SEL,*
11546 041260 003654                             BLE     6$
11547 041262 005103                             COM     R3                      ; TST.PAT                                       5877
11548 041264 005201                             INC     R1                      ; TWICE                                         5855
11549 041266 020127 000001                      CMP     R1,#1                   ; TWICE,*
11550 041272 003645                             BLE     5$
11551 041274 006303                             ASL     R3                      ; TST.PAT                                       5880
11552 041276 005204                             INC     R4                      ; SHIFT                                         5852
11553 041300 020427 000017                      CMP     R4,#17                  ; SHIFT,*
11554 041304 003637                             BLE     4$
11555 041306 012767 000001 151622               MOV     #1,REG.INIT.FLG         ;                                               5888
11556 041314 012703 177777                      MOV     #-1,R3                  ; *,TST.PAT                                     5889
11557 041320 005004                             CLR     R4                      ; TWICE                                         5891
11558 041322 012702 000013              8$:     MOV     #13,R2                  ; *,REG.SEL                                     5894
11559 041326 104402                     9$:     TRAP    2                       ;                                               5895
11560 041330 152777 000040 151656               BISB    #40,@ML.REG+40          ;                                               5896
11561 041336 016701 152240                      MOV     ML.DUT,R1
11562 041342 042701 177770                      BIC     #177770,R1
11563 041346 142777 000007 151640               BICB    #7,@ML.REG+40
11564 041354 150177 151634                      BISB    R1,@ML.REG+40
11565 041360 010346                             MOV     R3,-(SP)                ; TST.PAT,*                                     5898
11566 041362 010246                             MOV     R2,-(SP)                ; REG.SEL,*
11567 041364 012746 000012                      MOV     #12,-(SP)
11568 041370 060616                             ADD     SP,(SP)                 ; INDEX,*
11569 041372 004767 161476                      JSR     PC,WRT.REG
11570 041376 016600 000012                      MOV     12(SP),R0               ; INDEX,*                                       5899
11571 041402 006300                             ASL     R0
11572 041404 006300                             ASL     R0
11573 041406 006300                             ASL     R0
11574 041410 010001                             MOV     R0,R1
11575 041412 016105 013156                      MOV     ML.REG+2(R1),R5         ; *,CLR.DATA
11576 041416 056105 013162                      BIS     ML.REG+6(R1),R5         ; *,CLR.DATA
11577 041422 012767 000001 151506               MOV     #1,REG.INIT.FLG         ;                                               5900
11578 041430 010516                             MOV     R5,(SP)                 ; CLR.DATA,*                                    5901
11579 041432 010246                             MOV     R2,-(SP)                ; REG.SEL,*
11580 041434 012746 000014                      MOV     #14,-(SP)
11581 041440 060616                             ADD     SP,(SP)                 ; ERR.FLG,*
11582 041442 004767 162014                      JSR     PC,RD.REG
11583 041446 026627 000014 000001               CMP     14(SP),#1               ; ERR.FLG,*                                     5903
11584 041454 001044                             BNE     10$
11585 041456 104455                             TRAP    55                      ;                                               5906
11586 041460 000166                             .WORD   166
11587 041462 010570                             .WORD   ARR.DAT
11588 041464 024052                             .WORD   DUMPER
11589 041466 012746 007122                      MOV     #WRD.56,-(SP)           ;                                               5907
11590 041472 012746 010242                      MOV     #FNC.23,-(SP)
11591 041476 012746 007066                      MOV     #WRD.52,-(SP)
11592 041502 012746 006426                      MOV     #WRD.12,-(SP)
11593 041506 012746 007454                      MOV     #PHR.4,-(SP)
11594 041512 012746 006062                      MOV     #FIV.FMT,-(SP)
11595 041516 012746 000006                      MOV     #6,-(SP)
```

```
11597                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
11598                                   ;                                                       22-Dec-1980 09:21:22    PA:<
11599
11600 041522  010600                            MOV     SP,R0                   ; SP,*
11601 041524  104414                            TRAP    14
11602 041526  016716  151376                    MOV     RD.DATA,(SP)            ;                                       5908
11603 041532  010546                            MOV     R5,-(SP)                ; CLR.DATA,*
11604 041534  016146  013154                    MOV     ML.REG(R1),-(SP)
11605 041540  012746  005216                    MOV     #FMT.16,-(SP)
11606 041544  012746  000004                    MOV     #4,-(SP)
11607 041550  010600                            MOV     SP,R0                   ; SP,*
11608 041552  104414                            TRAP    14
11609 041554  012766  000001  000040            MOV     #1,40(SP)               ; *,DODU.FLG                            5909
11610 041562  062706  000026                    ADD     #26,SP                  ;                                       5905
11611 041566  062706  000012          10$:      ADD     #12,SP                  ;                                       5895
11612 041572  104467                            TRAP    67                      ;                                       5910
11613 041574  006000                            ROR     R0
11614 041576  103653                            BLO     9$
11615 041600  005202                            INC     R2                      ; REG.SEL                               5894
11616 041602  020227  000015                    CMP     R2,#15                  ; REG.SEL,*
11617 041606  003647                            BLE     9$
11618 041610  005103                            COM     R3                      ; TST.PAT                               5915
11619 041612  005204                            INC     R4                      ; TWICE                                 5891
11620 041614  020427  000001                    CMP     R4,#1                   ; TWICE,*
11621 041620  003640                            BLE     8$
11622 041622  005067  151310                    CLR     REG.INIT.FLG            ;                                       5918
11623 041626  021627  000001                    CMP     (SP),#1                 ; DODU.FLG,*                            5920
11624 041632  001004                            BNE     11$
11625 041634  016700  151740                    MOV     ML.LUN,R0               ;                                       5923
11626 041640  104451                            TRAP    51
11627 041642  104444                            TRAP    44
11628 041644  062706  000006          11$:      ADD     #6,SP                   ;                                       5789
11629 041650  000207                            RTS     PC
11630
11631                                   ; Routine Size:  312 words
11632                                   ; Maximum stack depth per invocation:  26 words
11637
11638
11642
11646 041652                            T17::
11647 041652  004767  176614          1$:       JSR     PC,$T17                 ;                                       5925
11648 041656  104466                            TRAP    66
11649 041660  006000                            ROR     R0
11650 041662  103773                            BLO     1$
```

```
11652                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
11653                                   ;                                                       22-Dec-1980 09:21:22    PA:<
11654
11655 041664  000207                            RTS     PC
11656
11657                                   ; Routine Size:  6 words
11658                                   ; Maximum stack depth per invocation:  0 words
11663
11664
11665 ;         5928  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (68)

```
11667 ;ML4
11668 ;
11669
11670 ;          5929  !
11671 ;          5930  !
11672 ;          5931  BGNTST;
11673 ;          5932
11674 ;          5933  !++
11675 ;          5934  ! TEST NUMBER:  TST 18
11676 ;          5935  !
11677 ;          5936  ! TEST NAME:    COMPOSIT ERROR TEST
11678 ;          5937  !
11679 ;          5938  ! TEST DESCRIPTION:
11680 ;          5939  !       TEST TO SEE IF SETTING EACH
11681 ;          5940  !       BIT IN THE ERROR REGISTER
11682 ;          5941  !       CAUSES A COMPOSIT ERROR BY:
11683 ;          5942  !
11684 ;          5943  !       WRITING A SHIFTING ONE THROUGH
11685 ;          5944  !       THE ERROR REGISTER (SKIPPING THE
11686 ;          5945  !       READ ONLY BITS) AND TESTING THE
11687 ;          5946  !       COMPOSIT ERROR BIT IN MLDS
11688 ;          5947  !       FOR BEING SET AFTER EACH
11689 ;          5948  !       WRITE.
11690 ;          5949  !
11691 ;          5950  !--
11692 ;          5951
11693 ;          5952  local
11694 ;          5953      DODU_FLG,                       !DROP UNIT FLAG
11695 ;          5954      DAT_PAT,                        !DATA PATTERN
11696 ;          5955      SKIP_MASK;                      !POINTS TO MLER READ ONLY BITS
11697 ;          5956
11698 ;          5957  CLR_MBUS;
11699 ;          5958  DODU_FLG = ZERO;
11700 ;          5959  SKIP_MASK = %o'163157';             !LOAD SKIP MASK
11701 ;          5960  DAT_PAT = ONE;                      !DATA PATTERN SET BIT 0 IN MLER
11702 ;          5961  DODU_FLG = ZERO;
11703 ;          5962
11704 ;          5963  incr COUNT from 0 to 15 do          !WRITE AND SHIFT DATA PAT TO MLER 16 TIMES
11705 ;          5964      begin
11706 ;          5965
11707 ;          5966      if (.DAT_PAT and .SKIP_MASK) neq ZERO   !SKIP IF DAT_PAT FALLS ON READ ONLY BIT
11708 ;          5967      then
11709 ;          5968          begin
11710 ;          5969          BGNSUB;
11711 ;          5970          MLER = .DAT_PAT;            !WRITE DATA_PAT TO MLER
11712 ;          5971
11713 ;          5972          if .COMP_ERR IS_NOT_SET     !SEE IF DAT_PAT CAUSED A COMP ERROR
11714 ;          5973          then
11715 ;          5974              begin
11716 ;          5975              ERRDF (50, ASYNC, DUMPER);      !ERROR IF NO COMP ERROR
11717 ;          5976              PRINTB (FOR_FMT, FNC_8, PHR_1, WRD_12, FNC_8);
11718 ;          5977              PRINTB (FMT_4, .DAT_PAT);
11719 ;          5978              DODU_FLG = ONE;
11720 ;          5979              end;
11721 ;          5980
```

```
11723 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
11724 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (68)
11725
11726 ;          5981          ENDSUB;
11727 ;          5982          end;
11728 ;          5983
11729 ;          5984      DAT_PAT = .DAT_PAT^ONE;                !SHIFT DAT_PAT TO NEXT BIT AND REPEAT
11730 ;          5985      end;
11731 ;          5986
11732 ;          5987  if .DODU_FLG IS_SET                        !DROP UNIT IF DODU_FLG IS_SET
11733 ;          5988  then
11734 ;          5989      begin
11735 ;          5990      DODU (.ML_LUN);
11736 ;          5991      DOCLN;
11737 ;          5992      end;
11738 ;          5993
11739 ;          5994  ENDTST;
11743
11747 041666  004167  142204            $T18:   JSR     R1,$SAVE4                       ;                       5927
11748 041672  152777  000040  151314            BISB    #40,@ML.REG+40                  ;                       5955
11749 041700  016704  151676                    MOV     ML.DUT,R4
11750 041704  042704  177770                    BIC     #177770,R4
11751 041710  142777  000007  151276            BICB    #7,@ML.REG+40
11752 041716  150477  151272                    BISB    R4,@ML.REG+40
11753 041722  005001                            CLR     R1                              ; DODU.FLG              5958
11754 041724  012704  163157                    MOV     #-14621,R4                      ; *,SKIP.MASK           5959
11755 041730  012702  000001                    MOV     #1,R2                           ; *,DAT.PAT             5960
11756 041734  005003                            CLR     R3                              ; COUNT                 5963
11757 041736  030204                    1$:     BIT     R2,R4                           ; DAT.PAT,SKIP.MASK     5966
11758 041740  001447                            BEQ     4$
11759 041742  104402                    2$:     TRAP    2                               ;                       5968
11760 041744  010277  151264                    MOV     R2,@ML.REG+60                   ; DAT.PAT,*             5970
11761 041750  032777  040000  151246            BIT     #40000,@ML.REG+50               ;                       5972
11762 041756  001035                            BNE     3$
11763 041760  104455                            TRAP    55                              ;                       5975
11764 041762  000062                            .WORD   62
11765 041764  010464                            .WORD   ASYNC
11766 041766  024052                            .WORD   DUMPER
11767 041770  012746  010022                    MOV     #FNC.8,-(SP)                    ;                       5976
11768 041774  012746  006426                    MOV     #WRD.12,-(SP)
11769 042000  012746  007366                    MOV     #PHR.1,-(SP)
11770 042004  012746  010022                    MOV     #FNC.8,-(SP)
11771 042010  012746  006046                    MOV     #FOR.FMT,-(SP)
11772 042014  012746  000005                    MOV     #5,-(SP)
11773 042020  010600                            MOV     SP,R0                           ; SP,*
11774 042022  104414                            TRAP    14
11775 042024  010216                            MOV     R2,(SP)                         ; DAT.PAT,*             5977
11776 042026  012746  004400                    MOV     #FMT.4,-(SP)
```

```
                                        ;ML4                                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                                       22-Dec-1980 09:21:22    PA:<
11780
11781 042032  012746  000002                    MOV     #2,-(SP)
11782 042036  010600                            MOV     SP,R0                           ; SP,*
11783 042040  104414                            TRAP    14
11784 042042  012701  000001                    MOV     #1,R1                           ; *,DODU.FLG                                    5978
11785 042046  062706  000020                    ADD     #20,SP                          ;                                               5974
11786 042052  104467                    3$:     TRAP    67                              ;                                               5979
11787 042054  006000                            ROR     R0
11788 042056  103731                            BLO     2$
11789 042060  006302                    4$:     ASL     R2                              ; DAT.PAT                                       5984
11790 042062  005203                            INC     R3                              ; COUNT                                         5963
11791 042064  020327  000017                    CMP     R3,#17                          ; COUNT,*
11792 042070  003722                            BLE     1$
11793 042072  005301                            DEC     R1                              ; DODU.FLG                                      5987
11794 042074  001004                            BNE     5$
11795 042076  016700  151476                    MOV     ML.LUN,R0                       ;                                               5990
11796 042102  104451                            TRAP    51
11797 042104  104444                            TRAP    44
11798 042106  000207                    5$:     RTS     PC                              ;                                               5927
11799
11800                                   ; Routine Size:  73 words
11801                                   ; Maximum stack depth per invocation:  13 words
11806
11807
11811
11815 042110                            T18::
11816 042110  004767  177552            1$:     JSR     PC,$T18                         ;                                               5992
11817 042114  104466                            TRAP    66
11818 042116  006000                            ROR     R0
11819 042120  103773                            BLO     1$
11820 042122  000207                            RTS     PC
11821
11822                                   ; Routine Size:  6 words
11823                                   ; Maximum stack depth per invocation:  0 words
11828
11829
11830 ;          5995  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (69)

```
11832 ;ML4
11833 ;
11834
11835 ;          5996  !
11836 ;          5997  !
11837 ;          5998  BGNTST;
11838 ;          5999
11839 ;          6000  !++
11840 ;          6001  ! TEST NUMBER:  TST 19
11841 ;          6002  !
11842 ;          6003  ! TEST NAME:    ATA BIT TEST
11843 ;          6004  !
11844 ;          6005  ! TEST DESCRIPTION:
11845 ;          6006  !
11846 ;          6007  !       TEST THE ATA BIT FOR SETTING
11847 ;          6008  !       BY:
11848 ;          6009  !
11849 ;          6010  !       1.  SETTING A BIT IN THE ERROR
11850 ;          6011  !           REGISTER.
11851 ;          6012  !
11852 ;          6013  !           TEST THE ATA BIT FOR CLEARING
11853 ;          6014  !           AFTER BEING SET BY:
11854 ;          6015  !           1.  WRITING A FUNCTION TO MLCS1.
11855 ;          6016  !           2.  WRITING A ONE INTO THIS
11856 ;          6017  !               UNITS ATA BIT
11857 ;          6018  !
11858 ;          6019  !       TEST THE ATA BIT FOR NOT CLEARING
11859 ;          6020  !       AFTER BEING SET BY:
11860 ;          6021  !
11861 ;          6022  !       1.  WRITING A ONE INTO THE
11862 ;          6023  !           ATA BIT OF THE OTHER
11863 ;          6024  !           UNITS.
11864 ;          6025  !
11865 ;          6026  !--
11866 ;          6027
11867 ;          6028  local
11868 ;          6029      ATA_SAVE : bitvector [8],          !STORES ALL 8 ATA BITS ON READS AND WRITES
11869 ;          6030      DAT_PAT;                           !DATA PATTERN
11870 ;          6031
11871 ;          6032  CLR_MBUS;
11872 ;          6033  MLER = ONE;                            !SET THE ATA BIT
11873 ;          6034  MLER = ZERO;
11874 ;          6035  ATA_SAVE = .MLAS;                      !READ THE ATTN REGISTER
11875 ;          6036
11876 ;          6037  if .ATA_SAVE [.ML_DUT] IS_NOT_SET      !SEE IF THIS DRIVES ATA BIT IS SET
11877 ;          6038  then
11878 ;          6039      begin
11879 ;          6040      ERRDF (51, ASYNC, DUMPER);         !ERROR AND EXIT_TST IF NOT SET
11880 ;          6041      PRINTB (FOR_FMT, WRD_15, PHR_1, WRD_11, FNC_8);
11881 ;          6042      EXIT_TST;
11882 ;          6043      end;
11883 ;          6044
11884 ;          6045  if .ATTN IS_NOT_SET                    !SEE IF THE ATTN BIT IS SET
11885 ;          6046  then
11886 ;          6047      begin
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (69)

;          6048      ERRDF (52, ASYNC, DUMPER);                    !ERROR AND EXIT_TST IF NOT SET
;          6049      PRINTB (FIV_FMT, REG_2, WRD_16, PHR_1, WRD_11, FNC_8);
;          6050      EXIT_TST;
;          6051      end;
;          6052
;          6053  MLCS1 = NOOP;                                     !TRY TO CLEAR THE ATA BIT WITH NOOP FUNC
;          6054
;          6055  if .ATTN IS_SET                                   !SEE IF ATA GOT CLEARED
;          6056  then
;          6057      begin
;          6058      ERRDF (53, ASYNC, DUMPER);                    !ERROR AND EXIT_TST IF SET
;          6059      PRINTB (FOR_FMT, WRD_15, PHR_2, WRD_11, FNC_2, WRD_19);
;          6060      EXIT_TST;
;          6061      end;
;          6062
;          6063  ATA_SAVE = .MLAS;                                 !READ THE ATTENTION REGISTER
;          6064
;          6065  if .ATA_SAVE [.ML_DUT] IS_SET                     !SEE IF THE ATA REG GOT CLEARED BY NO-OP
;          6066  then
;          6067      begin
;          6068      ERRDF (58, ASYNC, DUMPER);
;          6069      PRINTB (FIV_FMT, WRD_15, PHR_2, WRD_11, FNC_2, WRD_19);
;          6070      end;
;          6071
;          6072  BGNSUB;
;          6073  MLER = ONE;                                       !SET THE ATA BIT
;          6074  MLER = ZERO;
;          6075  ATA_SAVE = ZEROES;                                !CLEAR ATA_SAVE
;          6076  ATA_SAVE [.ML_DUT] = ONE;                        !SET ATA_SAVE FOR THIS DRIVE
;          6077  MLAS = .ATA_SAVE;                                !TRY TO CLEAR THE ATA BY WRITING TO IT.
;          6078
;          6079  if .ATTN IS_SET                                   !SEE IF THE ATA GOT CLEARED
;          6080  then
;          6081      begin
;          6082      ERRDF (54, ASYNC, DUMPER);                    !ERROR IF NOT CLEARED
;          6083      PRINTB (FIV_FMT, WRD_15, PHR_2, WRD_11, WRD_17, REG_5);
;          6084      end;
;          6085
;          6086  ENDSUB;
;          6087  BGNSUB;
;          6088  MLER = ONE;                                       !SET THE ATA BIT
;          6089  MLER = ZERO;
;          6090  DAT_PAT = ONE;                                    !DATA PATTERN OF ONE IN FIELD OF ZEROES
;          6091
;          6092  incr ATA_SEL from 0 to 7 do                       !REPEAT LOOP 8 TIMES
;          6093      begin
;          6094
;          6095      if .ATA_SEL neq .ML_DUT                       !SKIP IF ATA_SEL EQLS THIS DRIVE NO.
;          6096      then
;          6097          begin
;          6098          MLAS = .DAT_PAT;                          !WRITE DAT PAT TO ATA REGISTER
;          6099          ATA_SAVE = .MLAS;                         !READ ATA REG BACK
```

```
                                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
                                                                    22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (69)
;ML4
;
;                6100
;                6101            if .ATA_SAVE [.ML_DUT] IS_NOT_SET       !SEE IF THIS DRIVE ATA IS CLEARED
;                6102            then
;                6103                begin
;                6104                ERRDF (55, ASYNC, DUMPER);          !ERROR AND EXIT LOOP IF CLEARED
;                6105                PRINTB (SIX_FMT, WRD_15, PHR_6, WRD_11, WRD_17, REG_5, PHR_7);
;                6106                PRINTB (FMT_7, .DAT_PAT);
;                6107                exitloop;
;                6108                end;
;                6109
;                6110            end;
;                6111
;                6112        DAT_PAT = .DAT_PAT^ONE;                     !SHIFT DAT_PAT AND REPEAT
;                6113        end;
;                6114
;                6115    ENDSUB;
;                6116    ENDTST;
;
042124  004167  141730          $T19:   JSR     R1,$SAVE3                       ;                       5994
042130  152777  000040  151056          BISB    #40,@ML.REG+40                  ;                       6030
042136  016703  151440                  MOV     ML.DUT,R3
042142  042703  177770                  BIC     #177770,R3
042146  142777  000007  151040          BICB    #7,@ML.REG+40
042154  150377  151034                  BISB    R3,@ML.REG+40
042160  012777  000001  151046          MOV     #1,@ML.REG+60                   ;                       6033
042166  005077  151042                  CLR     @ML.REG+60                      ;                       6034
042172  017746  151046                  MOV     @ML.REG+70,-(SP)                ; *,ATA.SAVE            6035
042176  016701  151400                  MOV     ML.DUT,R1                       ;                       6037
042202  006201                          ASR     R1
042204  006201                          ASR     R1
042206  006201                          ASR     R1
042210  010600                          MOV     SP,R0                           ; ATA.SAVE,*
042212  060001                          ADD     R0,R1
042214  010146                          MOV     R1,-(SP)
042216  016746  151360                  MOV     ML.DUT,-(SP)
042222  042716  177770                  BIC     #177770,(SP)
042226  012746  000001                  MOV     #1,-(SP)
042232  005046                          CLR     -(SP)
042234  004767  140700                  JSR     PC,BL$GT2
042240  062706  000010                  ADD     #10,SP
042244  005700                          TST     R0
042246  001026                          BNE     1$
042250  104455                          TRAP    55                              ;                       6040
042252  000063                          .WORD   63
042254  010464                          .WORD   ASYNC
```

```
11999                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
12000                                   ;                                                       22-Dec-1980 09:21:22    PA:<
12001
12002 042256  024052                          .WORD   DUMPER
12003 042260  012746  010022                    MOV     #FNC.8,-(SP)            ;                               6041
12004 042264  012746  006416                    MOV     #WRD.11,-(SP)
12005 042270  012746  007366                    MOV     #PHR.1,-(SP)
12006 042274  012746  006454                    MOV     #WRD.15,-(SP)
12007 042300  012746  006046                    MOV     #FOR.FMT,-(SP)
12008 042304  012746  000005                    MOV     #5,-(SP)
12009 042310  010600                            MOV     SP,R0                   ; SP,*
12010 042312  104414                            TRAP    14
12011 042314  104463                            TRAP    63
12012 042316  062706  000014                    ADD     #14,SP                  ;                               6037
12013 042322  000467                            BR      4$                      ;                               6039
12014 042324  032777  100000  150672  1$:       BIT     #100000,@ML.REG+50      ;                               6045
12015 042332  001026                            BNE     2$
12016 042334  104455                            TRAP    55                      ;                               6048
12017 042336  000064                          .WORD   64
12018 042340  010464                          .WORD   ASYNC
12019 042342  024052                          .WORD   DUMPER
12020 042344  012746  010022                    MOV     #FNC.8,-(SP)            ;                               6049
12021 042350  012746  006416                    MOV     #WRD.11,-(SP)
12022 042354  012746  007366                    MOV     #PHR.1,-(SP)
12023 042360  012746  006462                    MOV     #WRD.16,-(SP)
12024 042364  012746  010266                    MOV     #REG.2,-(SP)
12025 042370  012746  006062                    MOV     #FIV.FMT,-(SP)
12026 042374  012746  000006                    MOV     #6,-(SP)
12027 042400  010600                            MOV     SP,R0                   ; SP,*
12028 042402  104414                            TRAP    14
12029 042404  104463                            TRAP    63
12030 042406  000433                            BR      3$                      ;                               6045
12031 042410  012777  000001  150536  2$:       MOV     #1,@ML.REG              ;                               6053
12032 042416  005777  150602                    TST     @ML.REG+50              ;                               6055
12033 042422  100031                            BPL     5$
12034 042424  104455                            TRAP    55                      ;                               6058
12035 042426  000065                          .WORD   65
12036 042430  010464                          .WORD   ASYNC
12037 042432  024052                          .WORD   DUMPER
12038 042434  012746  006506                    MOV     #WRD.19,-(SP)           ;                               6059
12039 042440  012746  007742                    MOV     #FNC.2,-(SP)
12040 042444  012746  006416                    MOV     #WRD.11,-(SP)
12041 042450  012746  007404                    MOV     #PHR.2,-(SP)
12042 042454  012746  006454                    MOV     #WRD.15,-(SP)
12043 042460  012746  006046                    MOV     #FOR.FMT,-(SP)
12044 042464  012746  000006                    MOV     #6,-(SP)
12045 042470  010600                            MOV     SP,R0                   ; SP,*
12046 042472  104414                            TRAP    14
12047 042474  104463                            TRAP    63
12048 042476  062706  000016            3$:     ADD     #16,SP                  ;                               6055
12049 042502  000167  000546            4$:     JMP     12$                     ;                               6057
12050 042506  017716  150532            5$:     MOV     @ML.REG+70,(SP)         ; *,ATA.SAVE                    6063
12051 042512  016701  151064                    MOV     ML.DUT,R1               ;                               6065
12052 042516  006201                            ASR     R1
12053 042520  006201                            ASR     R1
```

```
12055                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
12056                                   ;                                                       22-Dec-1980 09:21:22    PA:<
12057
12058 042522 006201                             ASR     R1
12059 042524 010600                             MOV     SP,R0                   ; ATA.SAVE,*
12060 042526 060001                             ADD     R0,R1
12061 042530 010146                             MOV     R1,-(SP)
12062 042532 016746 151044                      MOV     ML.DUT,-(SP)
12063 042536 042716 177770                      BIC     #177770,(SP)
12064 042542 012746 000001                      MOV     #1,-(SP)
12065 042546 005046                             CLR     -(SP)
12066 042550 004767 140364                      JSR     PC,BL$GT2
12067 042554 062706 000010                      ADD     #10,SP
12068 042560 005300                             DEC     R0
12069 042562 001026                             BNE     6$
12070 042564 104455                             TRAP    55                      ;                       6068
12071 042566 000072                             .WORD   72
12072 042570 010464                             .WORD   ASYNC
12073 042572 024052                             .WORD   DUMPER
12074 042574 012746 006506                      MOV     #WRD.19,-(SP)           ;                       6069
12075 042600 012746 007742                      MOV     #FNC.2,-(SP)
12076 042604 012746 006416                      MOV     #WRD.11,-(SP)
12077 042610 012746 007404                      MOV     #PHR.2,-(SP)
12078 042614 012746 006454                      MOV     #WRD.15,-(SP)
12079 042620 012746 006062                      MOV     #FIV.FMT,-(SP)
12080 042624 012746 000006                      MOV     #6,-(SP)
12081 042630 010600                             MOV     SP,R0                   ; SP,*
12082 042632 104414                             TRAP    14
12083 042634 062706 000016                      ADD     #16,SP                  ;                       6067
12084 042640 104402                     6$:     TRAP    2                       ;                       6070
12085 042642 012777 000001 150364               MOV     #1,@ML.REG+60           ;                       6073
12086 042650 005077 150360                      CLR     @ML.REG+60              ;                       6074
12087 042654 005016                             CLR     (SP)                    ; ATA.SAVE              6075
12088 042656 016701 150720                      MOV     ML.DUT,R1               ;                       6076
12089 042662 006201                             ASR     R1
12090 042664 006201                             ASR     R1
12091 042666 006201                             ASR     R1
12092 042670 010600                             MOV     SP,R0                   ; ATA.SAVE,*
12093 042672 060001                             ADD     R0,R1
12094 042674 010146                             MOV     R1,-(SP)
12095 042676 016746 150700                      MOV     ML.DUT,-(SP)
12096 042702 042716 177770                      BIC     #177770,(SP)
12097 042706 012746 000001                      MOV     #1,-(SP)
12098 042712 011646                             MOV     (SP),-(SP)
12099 042714 004767 140456                      JSR     PC,BL$PU2
12100 042720 016677 000010 150316               MOV     10(SP),@ML.REG+70       ; ATA.SAVE,*            6077
12101 042726 005777 150272                      TST     @ML.REG+50              ;                       6079
12102 042732 100026                             BPL     7$
12103 042734 104455                             TRAP    55                      ;                       6082
12104 042736 000066                             .WORD   66
12105 042740 010464                             .WORD   ASYNC
12106 042742 024052                             .WORD   DUMPER
12107 042744 012746 010310                      MOV     #REG.5,-(SP)            ;                       6083
12108 042750 012746 006470                      MOV     #WRD.17,-(SP)
12109 042754 012746 006416                      MOV     #WRD.11,-(SP)
```

```
12111                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
12112                                   ;                                                       22-Dec-1980 09:21:22    PA:<
12113
12114 042760 012746 007404                      MOV     #PHR.2,-(SP)
12115 042764 012746 006454                      MOV     #WRD.15,-(SP)
12116 042770 012746 006062                      MOV     #FIV.FMT,-(SP)
12117 042774 012746 000006                      MOV     #6,-(SP)
12118 043000 010600                             MOV     SP,R0                   ; SP,*
12119 043002 104414                             TRAP    14
12120 043004 062706 000016                      ADD     #16,SP                  ;                                       6081
12121 043010 062706 000010              7$:     ADD     #10,SP                  ;                                       6070
12122 043014 104467                             TRAP    67                      ;                                       6084
12123 043016 006000                             ROR     R0
12124 043020 103707                             BLO     6$
12125 043022 104402                     8$:     TRAP    2                       ;                                       6086
12126 043024 012777 000001 150202               MOV     #1,@ML.REG+60           ;                                       6088
12127 043032 005077 150176                      CLR     @ML.REG+60              ;                                       6089
12128 043036 012703 000001                      MOV     #1,R3                   ; *,DAT.PAT                             6090
12129 043042 005002                             CLR     R2                      ; ATA.SEL                               6092
12130 043044 020267 150532              9$:     CMP     R2,ML.DUT               ; ATA.SEL,*                             6095
12131 043050 001471                             BEQ     10$
12132 043052 010377 150166                      MOV     R3,@ML.REG+70           ; DAT.PAT,*                             6098
12133 043056 017716 150162                      MOV     @ML.REG+70,(SP)         ; *,ATA.SAVE                            6099
12134 043062 016701 150514                      MOV     ML.DUT,R1               ;                                       6101
12135 043066 006201                             ASR     R1
12136 043070 006201                             ASR     R1
12137 043072 006201                             ASR     R1
12138 043074 010600                             MOV     SP,R0                   ; ATA.SAVE,*
12139 043076 060001                             ADD     R0,R1
12140 043100 010146                             MOV     R1,-(SP)
12141 043102 016746 150474                      MOV     ML.DUT,-(SP)
12142 043106 042716 177770                      BIC     #177770,(SP)
12143 043112 012746 000001                      MOV     #1,-(SP)
12144 043116 005046                             CLR     -(SP)
12145 043120 004767 140014                      JSR     PC,BL$GT2
12146 043124 062706 000010                      ADD     #10,SP
12147 043130 005700                             TST     R0
12148 043132 001040                             BNE     10$
12149 043134 104455                             TRAP    55                      ;                                       6104
12150 043136 000067                             .WORD   67
12151 043140 010464                             .WORD   ASYNC
12152 043142 024052                             .WORD   DUMPER
12153 043144 012746 007516                      MOV     #PHR.7,-(SP)            ;                                       6105
12154 043150 012746 010310                      MOV     #REG.5,-(SP)
12155 043154 012746 006470                      MOV     #WRD.17,-(SP)
12156 043160 012746 006416                      MOV     #WRD.11,-(SP)
12157 043164 012746 007504                      MOV     #PHR.6,-(SP)
12158 043170 012746 006454                      MOV     #WRD.15,-(SP)
12159 043174 012746 006100                      MOV     #SIX.FMT,-(SP)
12160 043200 012746 000007                      MOV     #7,-(SP)
12161 043204 010600                             MOV     SP,R0                   ; SP,*
12162 043206 104414                             TRAP    14
12163 043210 010316                             MOV     R3,(SP)                 ; DAT.PAT,*                             6106
12164 043212 012746 004562                      MOV     #FMT.7,-(SP)
12165 043216 012746 000002                      MOV     #2,-(SP)
```

```
12167                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
12168                                   ;                                                       22-Dec-1980 09:21:22    PA:<
12169
12170 043222  010600                            MOV     SP,R0                   ; SP,*
12171 043224  104414                            TRAP    14
12172 043226  062706  000024                    ADD     #24,SP                  ;                                       6107
12173 043232  000405                            BR      11$
12174 043234  006303                    10$:    ASL     R3                      ; DAT.PAT                               6112
12175 043236  005202                            INC     R2                      ; ATA.SEL                               6092
12176 043240  020227  000007                    CMP     R2,#7                   ; ATA.SEL,*
12177 043244  003677                            BLE     9$
12178 043246  104467                    11$:    TRAP    67                      ;                                       6113
12179 043250  006000                            ROR     R0
12180 043252  103663                            BLO     8$
12181 043254  005726                    12$:    TST     (SP)+                   ;                                       5994
12182 043256  000207                            RTS     PC
12183
12184                                   ; Routine Size:  302 words
12185                                   ; Maximum stack depth per invocation:  16 words
12190
12191
12195
12199 043260                            T19::
12200 043260  004767  176640            1$:     JSR     PC,$T19                 ;                                       6115
12201 043264  104466                            TRAP    66
12202 043266  006000                            ROR     R0
12203 043270  103773                            BLO     1$
12204 043272  000207                            RTS     PC
12205
12206                                   ; Routine Size:  6 words
12207                                   ; Maximum stack depth per invocation:  0 words
12212
12213
12214 ;         6117  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (70)

```
12216 ;ML4
12217 ;
12218
12219 ;          6118  !
12220 ;          6119  !
12221 ;          6120  BGNTST;
12222 ;          6121
12223 ;          6122  !++
12224 ;          6123  ! TEST NUMBER:  TST 20
12225 ;          6124  !
12226 ;          6125  ! TEST NAME:    SEARCH FUNCTION TEST
12227 ;          6126  !
12228 ;          6127  ! TEST DESCRIPTION:
12229 ;          6128  !
12230 ;          6129  !       TEST THE SEARCH FUNCTION BY:
12231 ;          6130  !
12232 ;          6131  !       1.  DOING A SEARCH FUNCTION AT
12233 ;          6132  !           ARRAY ZERO AND TEST GO,
12234 ;          6133  !           ERROR BITS AND ATTN FOR
12235 ;          6134  !           SETTING/NOT SETTING.
12236 ;          6135  !
12237 ;          6136  !       2.  DOING SEARCH FUNCTIONS AT ALL
12238 ;          6137  !           PRESENT ARRAYS' AND TEST ATTN
12239 ;          6138  !           SET
12240 ;          6139  !
12241 ;          6140  !       3.  DOING SEARCH FUNCTIONS AT ALL
12242 ;          6141  !           NOT PRESENT ARRAYS' AND TEST
12243 ;          6142  !           ATTN CLEARED.
12244 ;          6143  !
12245 ;          6144  !--
12246 ;          6145
12247 ;          6146  CLR_MBUS;
12248 ;          6147  MLDA = ZEROES;
12249 ;          6148  MLCS1 = SEARCH;                          !DO A SEARCH FUNCTION
12250 ;          6149
12251 ;          6150  if .GO IS_SET                            !SEE IF GO IS SET
12252 ;          6151  then
12253 ;          6152      begin
12254 ;          6153      ERRDF (56, ASYNC, DUMPER);           !ERROR IF NOT SET
12255 ;          6154      PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_10, WRD_19);
12256 ;          6155      end;
12257 ;          6156
12258 ;          6157  if .ILF IS_SET                           !SEE IF ILF IS SET
12259 ;          6158  then
12260 ;          6159      begin
12261 ;          6160      ERRDF (57, ASYNC, DUMPER);           !ERROR IF SET
12262 ;          6161      PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_11, FNC_11, FNC_10, WRD_19);
12263 ;          6162      end;
12264 ;          6163
12265 ;          6164  if .ATTN IS_NOT_SET                      !SEE IF ATTN IS SET
12266 ;          6165  then
12267 ;          6166      begin
12268 ;          6167      ERRDF (59, ASYNC, DUMPER);           !ERROR IF NOT SET
12269 ;          6168      PRINTB (FIV_FMT, WRD_16, PHR_1, WRD_12, FNC_10, WRD_19);
12270 ;          6169      end
```

```
12272 ;ML4
12273 ;
12274
12275 ;          6170  else
12276 ;          6171      begin
12277 ;          6172
12278 ;          6173      incr ARR_SEL from 0 to .LST_ARR by .ARR_INC do      !DO SEARCH AT ALL PRESENT ARRAYS
12279 ;          6174          begin
12280 ;          6175          BGNSUB;
12281 ;          6176          CLR_MBUS;
12282 ;          6177          MLDA = .ARR_SEL;                                !LOAD DSA REG WITH ARR_SEL
12283 ;          6178          MLCS1 = SEARCH;                                 !DO A SEARCH FUNCTION
12284 ;          6179
12285 ;          6180          if .OPI IS_SET                                  !READ ATTN
12286 ;          6181          then
12287 ;          6182              begin
12288 ;          6183              ERRDF (60, ASYNC, DUMPER);                  !ERROR IF NOT SET
12289 ;          6184              PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_10, WRD_19);
12290 ;          6185              PRINTB (FMT_9, .ARR_SEL);
12291 ;          6186              end;
12292 ;          6187
12293 ;          6188          ENDSUB;
12294 ;          6189          end;
12295 ;          6190
12296 ;          6191      if .OP_NUM_ARR lss %o'000017'                       !SEE IF LSS 17 ARRAYS ARE PRESENT
12297 ;          6192      then
12298 ;          6193
12299 ;          6194          incr ARR_SEL from .LST_ARR + .ARR_INC to .ARR_16 by .ARR_INC do
12300 ;          6195                                                          !DO A SEARCH AT ALL NOT PRESENT
12301 ;          6196              begin                                       !ARRAYS IF LSS 17
12302 ;          6197              BGNSUB;
12303 ;          6198              CLR_MBUS;
12304 ;          6199              MLDA = .ARR_SEL;                            !LOAD DSA REG WITH ARR_SEL
12305 ;          6200              MLCS1 = SEARCH;                             !DO A SEARCH FUNCTION
12306 ;          6201
12307 ;          6202              if .OPI IS_NOT_SET                          !SEE IF OPI IS SET
12308 ;          6203              then
12309 ;          6204                  begin
12310 ;          6205                  ERRDF (61, ASYNC, DUMPER);              !ERROR IF NOT SET
12311 ;          6206                  PRINTB (FIV_FMT, WRD_4, PHR_1, WRD_12, FNC_10, WRD_19);
12312 ;          6207                  PRINTB (FMT_9, .ARR_SEL);
12313 ;          6208                  end;
12314 ;          6209
12315 ;          6210              ENDSUB;
12316 ;          6211              end;
12317 ;          6212
12318 ;          6213      end;
12319 ;          6214
12320 ;          6215  ENDTST;
12324
```

```
12332 043274 004167 140560           $T20:  JSR     R1,$SAVE3                          ;                    6116
12333 043300 152777 000040 147706           BISB    #40,@ML.REG+40                     ;                    6120
12334 043306 016703 150270                  MOV     ML.OUT,R3
12335 043312 042703 177770                  BIC     #177770,R3
12336 043316 142777 000007 147670           BICB    #7,@ML.REG+40
12337 043324 150377 147664                  BISB    R3,@ML.REG+40
12338 043330 005077 147650                  CLR     @ML.REG+30                         ;                    6147
12339 043334 012777 000031 147612           MOV     #31,@ML.REG                        ;                    6148
12340 043342 132777 000001 147604           BITB    #1,@ML.REG                         ;                    6150
12341 043350 001426                         BEQ     1$
12342 043352 104455                         TRAP    55                                 ;                    6153
12343 043354 000070                         .WORD   70
12344 043356 010464                         .WORD   ASYNC
12345 043360 024052                         .WORD   DUMPER
12346 043362 012746 006506                  MOV     #WRD.19,-(SP)                      ;                    6154
12347 043366 012746 010050                  MOV     #FNC.10,-(SP)
12348 043372 012746 006416                  MOV     #WRD.11,-(SP)
12349 043376 012746 007404                  MOV     #PHR.2,-(SP)
12350 043402 012746 006276                  MOV     #WRD.1,-(SP)
12351 043406 012746 006062                  MOV     #FIV.FMT,-(SP)
12352 043412 012746 000006                  MOV     #6,-(SP)
12353 043416 010600                         MOV     SP,R0                              ; SP,*
12354 043420 104414                         TRAP    14
12355 043422 062706 000016                  ADD     #16,SP                             ;                    6152
12356 043426 132777 000001 147600    1$:    BITB    #1,@ML.REG+60                      ;                    6157
12357 043434 001430                         BEQ     2$
12358 043436 104455                         TRAP    55                                 ;                    6160
12359 043440 000071                         .WORD   71
12360 043442 010464                         .WORD   ASYNC
12361 043444 024052                         .WORD   DUMPER
12362 043446 012746 006506                  MOV     #WRD.19,-(SP)                      ;                    6161
12363 043452 012746 010050                  MOV     #FNC.10,-(SP)
12364 043456 012746 010060                  MOV     #FNC.11,-(SP)
12365 043462 012746 006416                  MOV     #WRD.11,-(SP)
12366 043466 012746 007472                  MOV     #PHR.5,-(SP)
12367 043472 012746 006314                  MOV     #WRD.3,-(SP)
12368 043476 012746 006062                  MOV     #FIV.FMT,-(SP)
12369 043502 012746 000007                  MOV     #7,-(SP)
12370 043506 010600                         MOV     SP,R0                              ; SP,*
12371 043510 104414                         TRAP    14
12372 043512 062706 000020                  ADD     #20,SP                             ;                    6159
12373 043516 032777 100000 147500    2$:    BIT     #100000,@ML.REG+50                 ;                    6164
12374 043524 001027                         BNE     3$
12375 043526 104455                         TRAP    55                                 ;                    6167
12376 043530 000073                         .WORD   73
12377 043532 010464                         .WORD   ASYNC
12378 043534 024052                         .WORD   DUMPER
12379 043536 012746 006506                  MOV     #WRD.19,-(SP)                      ;                    6168
12380 043542 012746 010050                  MOV     #FNC.10,-(SP)
12381 043546 012746 006426                  MOV     #WRD.12,-(SP)
```

```
12383                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
12384                                   ;                                                       22-Dec-1980 09:21:22    PA:<
12385
12386 043552  012746  007366                    MOV     #PHR.1,-(SP)
12387 043556  012746  006462                    MOV     #WRD.16,-(SP)
12388 043562  012746  006062                    MOV     #FIV.FMT,-(SP)
12389 043566  012746  000006                    MOV     #6,-(SP)
12390 043572  010600                            MOV     SP,R0                   ; SP,*
12391 043574  104414                            TRAP    14
12392 043576  062706  000016                    ADD     #16,SP                  ;                                       6166
12393 043602  000207                            RTS     PC                      ;                                       6164
12394 043604  016702  145766            3$:     MOV     LST.ARR,R2              ;                                       6173
12395 043610  016703  145746                    MOV     ARR.INC,R3
12396 043614  005001                            CLR     R1                      ; ARR.SEL
12397 043616  000467                            BR      6$
12398 043620  104402            4$:     TRAP    2                               ;                                       6174
12399 043622  152777  000040  147364            BISB    #40,@ML.REG+40          ;                                       6175
12400 043630  016700  147746                    MOV     ML.DUT,R0
12401 043634  042700  177770                    BIC     #177770,R0
12402 043640  142777  000007  147346            BICB    #7,@ML.REG+40
12403 043646  150077  147342                    BISB    R0,@ML.REG+40
12404 043652  010177  147326                    MOV     R1,@ML.REG+30           ; ARR.SEL,*                             6177
12405 043656  012777  000031  147270            MOV     #31,@ML.REG             ;                                       6178
12406 043664  032777  020000  147342            BIT     #20000,@ML.REG+60       ;                                       6180
12407 043672  001435                            BEQ     5$
12408 043674  104455                            TRAP    55                      ;                                       6183
12409 043676  000074                            .WORD   74
12410 043700  010464                            .WORD   ASYNC
12411 043702  024052                            .WORD   DUMPER
12412 043704  012746  006506                    MOV     #WRD.19,-(SP)           ;                                       6184
12413 043710  012746  010050                    MOV     #FNC.10,-(SP)
12414 043714  012746  006426                    MOV     #WRD.12,-(SP)
12415 043720  012746  007472                    MOV     #PHR.5,-(SP)
12416 043724  012746  006322                    MOV     #WRD.4,-(SP)
12417 043730  012746  006062                    MOV     #FIV.FMT,-(SP)
12418 043734  012746  000006                    MOV     #6,-(SP)
12419 043740  010600                            MOV     SP,R0                   ; SP,*
12420 043742  104414                            TRAP    14
12421 043744  010116                            MOV     R1,(SP)                 ; ARR.SEL,*                             6185
12422 043746  012746  004644                    MOV     #FMT.9,-(SP)
12423 043752  012746  000002                    MOV     #2,-(SP)
12424 043756  010600                            MOV     SP,R0                   ; SP,*
12425 043760  104414                            TRAP    14
12426 043762  062706  000022                    ADD     #22,SP                  ;                                       6182
12427 043766  104467            5$:     TRAP    67                              ;                                       6186
12428 043770  006000                            ROR     R0
12429 043772  103712                            BLO     4$
12430 043774  060301                            ADD     R3,R1                   ; *,ARR.SEL                             6173
12431 043776  020102            6$:     CMP     R1,R2                   ; ARR.SEL,*
12432 044000  003707                            BLE     4$
12433 044002  026727  145552  000017            CMP     OP.NUM.ARR,#17          ;                                       6191
12434 044010  002102                            BGE     10$
12435 044012  016701  145560                    MOV     LST.ARR,R1              ;                                       6194
12436 044016  066701  145540                    ADD     ARR.INC,R1
12437 044022  016703  145546                    MOV     ARR.16,R3
```

```
12439                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
12440                                   ;                                                       22-Dec-1980 09:21:22    PA:<
12441
12442 044026  016702  145530                    MOV     ARR.INC,R2
12443 044032  000467                            BR      9$
12444 044034  104402                    7$:     TRAP    2                               ;                               6196
12445 044036  152777  000040  147150            BISB    #40,@ML.REG+40                  ;                               6197
12446 044044  016700  147532                    MOV     ML.DUT,R0
12447 044050  042700  177770                    BIC     #177770,R0
12448 044054  142777  000007  147132            BICB    #7,@ML.REG+40
12449 044062  150077  147126                    BISB    R0,@ML.REG+40
12450 044066  010177  147112                    MOV     R1,@ML.REG+30                   ; ARR.SEL,*                     6199
12451 044072  012777  000031  147054            MOV     #31,@ML.REG                     ;                               6200
12452 044100  032777  020000  147126            BIT     #20000,@ML.REG+60               ;                               6202
12453 044106  001035                            BNE     8$
12454 044110  104455                            TRAP    55                              ;                               6205
12455 044112  000075                            .WORD   75
12456 044114  010464                            .WORD   ASYNC
12457 044116  024052                            .WORD   DUMPER
12458 044120  012746  006506                    MOV     #WRD.19,-(SP)                   ;                               6206
12459 044124  012746  010050                    MOV     #FNC.10,-(SP)
12460 044130  012746  006426                    MOV     #WRD.12,-(SP)
12461 044134  012746  007366                    MOV     #PHR.1,-(SP)
12462 044140  012746  006322                    MOV     #WRD.4,-(SP)
12463 044144  012746  006062                    MOV     #FIV.FMT,-(SP)
12464 044150  012746  000006                    MOV     #6,-(SP)
12465 044154  010600                            MOV     SP,R0                           ; SP,*
12466 044156  104414                            TRAP    14
12467 044160  010116                            MOV     R1,(SP)                         ; ARR.SEL,*                     6207
12468 044162  012746  004644                    MOV     #FMT.9,-(SP)
12469 044166  012746  000002                    MOV     #2,-(SP)
12470 044172  010600                            MOV     SP,R0                           ; SP,*
12471 044174  104414                            TRAP    14
12472 044176  062706  000022                    ADD     #22,SP                          ;                               6204
12473 044202  104467                    8$:     TRAP    67                              ;                               6208
12474 044204  006000                            ROR     R0
12475 044206  103712                            BLO     7$
12476 044210  060201                            ADD     R2,R1                           ; *,ARR.SEL                     6194
12477 044212  020103                    9$:     CMP     R1,R3                           ; ARR.SEL,*
12478 044214  003707                            BLE     7$
12479 044216  000207                    10$:    RTS     PC                              ;                               6116
12480
12481                                   ; Routine Size:  234 words
12482                                   ; Maximum stack depth per invocation:  13 words
12487
12488
12492
```

```
12494                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
12495                                   ;                                                       22-Dec-1980 09:21:22    PA:<
12496
12500 044220                            T20::
12501 044220  004767  177050             1$:     JSR     PC,$T20                 ;                                       6213
12502 044224  104466                             TRAP    66
12503 044226  006000                             ROR     R0
12504 044230  103773                             BLO     1$
12505 044232  000207                             RTS     PC
12506
12507                                   ; Routine Size:  6 words
12508                                   ; Maximum stack depth per invocation:  0 words
12513
12514
12515 ;         6216  !<BLF/PAGE>
```

```
12517 ;ML4
12518 ;
12519
12520 ;          6217  !
12521 ;          6218  BGNTST;
12522 ;          6219
12523 ;          6220  !++
12524 ;          6221  ! TEST NUMBER:  TST 21
12525 ;          6222  !
12526 ;          6223  ! TEST NAME:    READ IN PRESET TEST
12527 ;          6224  !
12528 ;          6225  ! TEST DESCRIPTION:
12529 ;          6226  !       TEST THE READ IN PRESET FUNCTION BY:
12530 ;          6227  !
12531 ;          6228  !       1.  PERFORMING A READ-IN-PRESET FUNCTION AND TESTING GO, ERROR BITS
12532 ;          6229  !           AND VV FOR SET / NOT SET.
12533 ;          6230  !
12534 ;          6231  !--
12535 ;          6232
12536 ;          6233  CLR_MBUS;
12537 ;          6234  MLCS1 = RD_IN_PRE;                          !DO A READ IN PRESET FUNCTION
12538 ;          6235
12539 ;          6236  if .GO IS_SET                               !SEE IF GO IS NOT SET
12540 ;          6237  then
12541 ;          6238      begin
12542 ;          6239      ERRDF (62, ASYNC, DUMPER);              !ERROR IF SET
12543 ;          6240      PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_11, WRD_19);
12544 ;          6241      end;
12545 ;          6242
12546 ;          6243  if .ILF IS_SET                              !SEE IF ILF IS NOT SET
12547 ;          6244  then
12548 ;          6245      begin
12549 ;          6246      ERRDF (63, ASYNC, DUMPER);              !ERROR IF SET
12550 ;          6247      PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_11, FNC_11, WRD_19);
12551 ;          6248      end;
12552 ;          6249
12553 ;          6250  if .OPI IS_SET                              !SEE IF OPI IS NOT SET
12554 ;          6251  then
12555 ;          6252      begin
12556 ;          6253      ERRDF (64, ASYNC, DUMPER);              !ERROR IF SET
12557 ;          6254      PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_11, FNC_11, WRD_19);
12558 ;          6255      end;
12559 ;          6256
12560 ;          6257  if .VV IS_NOT_SET                           !SEE IF VV IS SET
12561 ;          6258  then
12562 ;          6259      begin
12563 ;          6260      ERRDF (65, ASYNC, DUMPER);              !ERROR IF NOT SET
12564 ;          6261      PRINTB (FIV_FMT, WRD_18, PHR_1, WRD_11, FNC_11, WRD_19);
12565 ;          6262      end;
12566 ;          6263
12567 ;          6264  ENDTST;
12571
```

```
12573                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
12574                                   ;                                                       22-Dec-1980 09:21:22    PA:<
12575
12579 044234  152777  000040  146752  $T21:   BISB    #40,@ML.REG+40          ;                                       6218
12580 044242  016700  147334                  MOV     ML.DUT,R0
12581 044246  042700  177770                  BIC     #177770,R0
12582 044252  142777  000007  146734          BICB    #7,@ML.REG+40
12583 044260  150077  146730                  BISB    R0,@ML.REG+40
12584 044264  012777  000021  146662          MOV     #21,@ML.REG             ;                                       6234
12585 044272  132777  000001  146654          BITB    #1,@ML.REG              ;                                       6236
12586 044300  001426                          BEQ     1$
12587 044302  104455                          TRAP    55                      ;                                       6239
12588 044304  000076                          .WORD   76
12589 044306  010464                          .WORD   ASYNC
12590 044310  024052                          .WORD   DUMPER
12591 044312  012746  006506                  MOV     #WRD.19,-(SP)           ;                                       6240
12592 044316  012746  010060                  MOV     #FNC.11,-(SP)
12593 044322  012746  006416                  MOV     #WRD.11,-(SP)
12594 044326  012746  007404                  MOV     #PHR.2,-(SP)
12595 044332  012746  006276                  MOV     #WRD.1,-(SP)
12596 044336  012746  006062                  MOV     #FIV.FMT,-(SP)
12597 044342  012746  000006                  MOV     #6,-(SP)
12598 044346  010600                          MOV     SP,R0                   ; SP,*
12599 044350  104414                          TRAP    14
12600 044352  062706  000016                  ADD     #16,SP                  ;                                       6238
12601 044356  132777  000001  146650  1$:     BITB    #1,@ML.REG+60           ;                                       6243
12602 044364  001426                          BEQ     2$
12603 044366  104455                          TRAP    55                      ;                                       6246
12604 044370  000077                          .WORD   77
12605 044372  010464                          .WORD   ASYNC
12606 044374  024052                          .WORD   DUMPER
12607 044376  012746  006506                  MOV     #WRD.19,-(SP)           ;                                       6247
12608 044402  012746  010060                  MOV     #FNC.11,-(SP)
12609 044406  012746  006416                  MOV     #WRD.11,-(SP)
12610 044412  012746  007472                  MOV     #PHR.5,-(SP)
12611 044416  012746  006314                  MOV     #WRD.3,-(SP)
12612 044422  012746  006062                  MOV     #FIV.FMT,-(SP)
12613 044426  012746  000006                  MOV     #6,-(SP)
12614 044432  010600                          MOV     SP,R0                   ; SP,*
12615 044434  104414                          TRAP    14
12616 044436  062706  000016                  ADD     #16,SP                  ;                                       6245
12617 044442  032777  020000  146564  2$:     BIT     #20000,@ML.REG+60       ;                                       6250
12618 044450  001426                          BEQ     3$
12619 044452  104455                          TRAP    55                      ;                                       6253
12620 044454  000100                          .WORD   100
12621 044456  010464                          .WORD   ASYNC
12622 044460  024052                          .WORD   DUMPER
12623 044462  012746  006506                  MOV     #WRD.19,-(SP)           ;                                       6254
12624 044466  012746  010060                  MOV     #FNC.11,-(SP)
12625 044472  012746  006416                  MOV     #WRD.11,-(SP)
12626 044476  012746  007472                  MOV     #PHR.5,-(SP)
```

```
12628                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
12629                                   ;                                                       22-Dec-1980 09:21:22    PA:<
12630
12631 044502  012746  006322                    MOV     #WRD.4,-(SP)
12632 044506  012746  006062                    MOV     #FIV.FMT,-(SP)
12633 044512  012746  000006                    MOV     #6,-(SP)
12634 044516  010600                            MOV     SP,R0                           ; SP,*
12635 044520  104414                            TRAP    14
12636 044522  062706  000016                    ADD     #16,SP                          ;                               6252
12637 044526  132777  000100  146470  3$:       BITB    #100,@#ML.REG+50                ;                               6257
12638 044534  001026                            BNE     4$
12639 044536  104455                            TRAP    55                              ;                               6260
12640 044540  000101                            .WORD   101
12641 044542  010464                            .WORD   ASYNC
12642 044544  024052                            .WORD   DUMPER
12643 044546  012746  006506                    MOV     #WRD.19,-(SP)                   ;                               6261
12644 044552  012746  010060                    MOV     #FNC.11,-(SP)
12645 044556  012746  006416                    MOV     #WRD.11,-(SP)
12646 044562  012746  007366                    MOV     #PHR.1,-(SP)
12647 044566  012746  006502                    MOV     #WRD.18,-(SP)
12648 044572  012746  006062                    MOV     #FIV.FMT,-(SP)
12649 044576  012746  000006                    MOV     #6,-(SP)
12650 044602  010600                            MOV     SP,R0                           ; SP,*
12651 044604  104414                            TRAP    14
12652 044606  062706  000016                    ADD     #16,SP                          ;                               6259
12653 044612  000207                  4$:       RTS     PC                              ;                               6215
12654
12655                                   ; Routine Size:  120 words
12656                                   ; Maximum stack depth per invocation:  7 words
12661
12662
12666
12670 044614                            T21::
12671 044614  004767  177414            1$:     JSR     PC,$T21                         ;                               6262
12672 044620  104466                            TRAP    66
12673 044622  006000                            ROR     R0
12674 044624  103773                            BLO     1$
12675 044626  000207                            RTS     PC
12676
12677                                   ; Routine Size:  6 words
12678                                   ; Maximum stack depth per invocation:  0 words
```

```
12687
12688
12689 ;        6265  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (72)

```
12691 ;ML4
12692 ;
12693
12694 ;          6266  !
12695 ;          6267  !
12696 ;          6268  BGNTST;
12697 ;          6269
12698 ;          6270  !++
12699 ;          6271  ! TEST NUMBER:  TST 22
12700 ;          6272  !
12701 ;          6273  ! TEST NAME:    ILLEGAL FUNCTION TEST
12702 ;          6274  !
12703 ;          6275  ! TEST DESCRIPTION:
12704 ;          6276  !
12705 ;          6277  !       TEST THE DETECTION OF ILLEGAL
12706 ;          6278  !       FUNCTIONS WRITTEN TO MLCS1
12707 ;          6279  !       BY:
12708 ;          6280  !
12709 ;          6281  !       WRITING ALL POSSIBLE ILLEGAL
12710 ;          6282  !       FUNCTIONS TO MLCS1.  THEN
12711 ;          6283  !       TEST GO AND ERROR BITS CLEARED.
12712 ;          6284  !
12713 ;          6285  !--
12714 ;          6286
12715 ;          6287  local
12716 ;          6288      BAD_BITS,                       !STORES A COUNT TO GENERATE BAD FUNCTIONS
12717 ;          6289      BAD_FUNC;                       !STORES GENERATED BAD FUNCTION
12718 ;          6290
12719 ;          6291  BAD_BITS = ZEROES;                  !CLEAR BAD BITS
12720 ;          6292
12721 ;          6293  incr CNT_1 from 0 to 2 do           !REPEAT LOOP 3 TIMES
12722 ;          6294      begin
12723 ;          6295      BAD_BITS = .BAD_BITS + %o'2';   !ADD 2 TO BAD_BITS
12724 ;          6296
12725 ;          6297      incr CNT_2 from %o'1' to %o'71' by %o'10' do      !REPEAT LOOP GENERATING 'GOOD' FUNCTIONS
12726 ;          6298          begin
12727 ;          6299          BGNSUB;
12728 ;          6300          CLR_MBUS;
12729 ;          6301          BAD_FUNC = .CNT_2 + .BAD_BITS;    !ADD BAD_BITS TO CNT_2 GENERATING BAD FUNCTIONS
12730 ;          6302          FIRST_BLK_XFER ();                !SET UP A FIRST BLOCK XFERR
12731 ;          6303          MLCS1 = .BAD_FUNC;                !LOAD MLCS1 WITH TWO BAD FUNCTIONS
12732 ;          6304
12733 ;          6305          if .ILF IS_SET                    !SEE IF ILF IS SET
12734 ;          6306          then
12735 ;          6307              begin
12736 ;          6308
12737 ;          6309              if .GO IS_SET                 !IF ILF IS SET THEN SEE IF GO IS SET
12738 ;          6310              then
12739 ;          6311                  begin
12740 ;          6312                  ERRDF (66, ASYNC, DUMPER);    !ERROR IF GO SET WITH BAD FUNCTION
12741 ;          6313                  PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_12, WRD_19);
12742 ;          6314                  PRINTB (FMT_12, .BAD_FUNC);
12743 ;          6315                  end;
12744 ;          6316
12745 ;          6317              end
```

```
:ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
:                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (72)

;          6318          else
;          6319              begin
;          6320              ERRDF (67, ASYNC, DUMPER);          !ERROR BAD FUNCTION DON'T CAUSE ILF
;          6321              PRINTB (FIV_FMT, WRD_3, PHR_1, WRD_11, FNC_12, WRD_19);
;          6322              PRINTB (FMT_12, .BAD_FUNC);
;          6323              end;
;          6324
;          6325          if .OPI IS_SET                      !SEE IF OPI IS SET
;          6326          then
;          6327              begin
;          6328              ERRDF (68, ASYNC, DUMPER);          !ERROR IF SET
;          6329              PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_12, WRD_19);
;          6330              PRINTB (FMT_12, .BAD_FUNC);
;          6331              end;
;          6332
;          6333          ENDSUB;
;          6334          end;
;          6335
;          6336      end;
;          6337
;          6338  ENDTST;
;
044630  004167  137262          $T22:   JSR     R1,$SAVE5                       ;                               6264
044634  005004                  CLR     R4                              ; BAD.BITS                      6291
044636  005001                  CLR     R1                              ; CNT.1                         6293
044640  062704  000002          1$:     ADD     #2,R4                           ; *,BAD.BITS                    6295
044644  012702  000001                  MOV     #1,R2                           ; *,CNT.2                       6297
044650  010405                  2$:     MOV     R4,R5                           ; BAD.BITS,*                    6301
044652  060205                          ADD     R2,R5                           ; CNT.2,*
044654  104402                  3$:     TRAP    2                               ;                               6298
044656  152777  000040  146330          BISB    #40,@ML.REG+40                  ;                               6299
044664  016700  146712                  MOV     ML.DUT,R0
044670  042700  177770                  BIC     #177770,R0
044674  142777  000007  146312          BICB    #7,@ML.REG+40
044702  150077  146306                  BISB    R0,@ML.REG+40
044706  010503                          MOV     R5,R3                           ; *,BAD.FUNC                    6301
044710  004767  151124                  JSR     PC,FIRST.BLK.XFER               ;                               6302
044714  010377  146234                  MOV     R3,@ML.REG                      ; BAD.FUNC,*                    6303
044720  132777  000001  146306          BITB    #1,@ML.REG+60                   ;                               6305
044726  001440                          BEQ     4$
044730  132777  000001  146216          BITB    #1,@ML.REG                      ;                               6309
044736  001471                          BEQ     6$
044740  104455                          TRAP    55                              ;                               6312
044742  000102                          .WORD   102
044744  010464                          .WORD   ASYNC
```

```
12802                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
12803                                   ;                                                       22-Dec-1980 09:21:22    PA:<
12804
12805 044746 024052                             .WORD   DUMPER
12806 044750 012746 006506                      MOV     #WRD.19,-(SP)           ;                                       6313
12807 044754 012746 010100                      MOV     #FNC.12,-(SP)
12808 044760 012746 006416                      MOV     #WRD.11,-(SP)
12809 044764 012746 007404                      MOV     #PHR.2,-(SP)
12810 044770 012746 006276                      MOV     #WRD.1,-(SP)
12811 044774 012746 006062                      MOV     #FIV.FMT,-(SP)
12812 045000 012746 000006                      MOV     #6,-(SP)
12813 045004 010600                             MOV     SP,R0                   ; SP,*
12814 045006 104414                             TRAP    14
12815 045010 010316                             MOV     R3,(SP)                 ; BAD.FUNC,*                            6314
12816 045012 012746 005004                      MOV     #FMT.12,-(SP)
12817 045016 012746 000002                      MOV     #2,-(SP)
12818 045022 010600                             MOV     SP,R0                   ; SP,*
12819 045024 104414                             TRAP    14
12820 045026 000433                             BR      5$                      ;                                       6311
12821 045030 104455                     4$:     TRAP    55                      ;                                       6320
12822 045032 000103                             .WORD   103
12823 045034 010464                             .WORD   ASYNC
12824 045036 024052                             .WORD   DUMPER
12825 045040 012746 006506                      MOV     #WRD.19,-(SP)           ;                                       6321
12826 045044 012746 010100                      MOV     #FNC.12,-(SP)
12827 045050 012746 006416                      MOV     #WRD.11,-(SP)
12828 045054 012746 007366                      MOV     #PHR.1,-(SP)
12829 045060 012746 006314                      MOV     #WRD.3,-(SP)
12830 045064 012746 006062                      MOV     #FIV.FMT,-(SP)
12831 045070 012746 000006                      MOV     #6,-(SP)
12832 045074 010600                             MOV     SP,R0                   ; SP,*
12833 045076 104414                             TRAP    14
12834 045100 010316                             MOV     R3,(SP)                 ; BAD.FUNC,*                            6322
12835 045102 012746 005004                      MOV     #FMT.12,-(SP)
12836 045106 012746 000002                      MOV     #2,-(SP)
12837 045112 010600                             MOV     SP,R0                   ; SP,*
12838 045114 104414                             TRAP    14
12839 045116 062706 000022              5$:     ADD     #22,SP                  ;                                       6319
12840 045122 032777 020000 146104       6$:     BIT     #20000,@#ML.REG+60      ;                                       6325
12841 045130 001435                             BEQ     7$
12842 045132 104455                             TRAP    55                      ;                                       6328
12843 045134 000104                             .WORD   104
12844 045136 010464                             .WORD   ASYNC
12845 045140 024052                             .WORD   DUMPER
12846 045142 012746 006506                      MOV     #WRD.19,-(SP)           ;                                       6329
12847 045146 012746 010100                      MOV     #FNC.12,-(SP)
12848 045152 012746 006426                      MOV     #WRD.12,-(SP)
12849 045156 012746 007472                      MOV     #PHR.5,-(SP)
12850 045162 012746 006322                      MOV     #WRD.4,-(SP)
12851 045166 012746 006062                      MOV     #FIV.FMT,-(SP)
12852 045172 012746 000006                      MOV     #6,-(SP)
12853 045176 010600                             MOV     SP,R0                   ; SP,*
12854 045200 104414                             TRAP    14
12855 045202 010316                             MOV     R3,(SP)                 ; BAD.FUNC,*                            6330
12856 045204 012746 005004                      MOV     #FMT.12,-(SP)
```

```
12858                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
12859                                   ;                                                       22-Dec-1980 09:21:22    PA:<
12860
12861 045210  012746  000002                    MOV     #2,-(SP)
12862 045214  010600                            MOV     SP,R0                   ; SP,*
12863 045216  104414                            TRAP    14
12864 045220  062706  000022                    ADD     #22,SP                  ;                                       6327
12865 045224  104467                    7$:     TRAP    67                      ;                                       6331
12866 045226  006000                            ROR     R0
12867 045230  103611                            BLO     3$
12868 045232  062702  000010                    ADD     #10,R2                  ; *,CNT.2                               6297
12869 045236  020227  000071                    CMP     R2,#71                  ; CNT.2,*
12870 045242  003602                            BLE     2$
12871 045244  005201                            INC     R1                      ; CNT.1                                 6293
12872 045246  020127  000002                    CMP     R1,#2                   ; CNT.1,*
12873 045252  003002                            BGT     8$
12874 045254  000167  177360                    JMP     1$
12875 045260  000207                    8$:     RTS     PC                      ;                                       6264
12876
12877                                   ; Routine Size:  141 words
12878                                   ; Maximum stack depth per invocation:  15 words
12883
12884
12888
12892 045262                            T22::
12893 045262  004767  177342            1$:     JSR     PC,$T22                 ;                                       6336
12894 045266  104466                            TRAP    66
12895 045270  006000                            ROR     R0
12896 045272  103773                            BLO     1$
12897 045274  000207                            RTS     PC
12898
12899                                   ; Routine Size:  6 words
12900                                   ; Maximum stack depth per invocation:  0 words
12905
12906
12907 ;          6339  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (73)

```
12909 ;ML4
12910 ;
12911
12912 ;          6340  !
12913 ;          6341  !
12914 ;          6342  BGNTST;
12915 ;          6343
12916 ;          6344  !++
12917 ;          6345  ! TEST NUMBER:  TST 23
12918 ;          6346  !
12919 ;          6347  ! TEST NAME:    REGISTER MODIFICATION REFUSED TEST
12920 ;          6348  !
12921 ;          6349  ! TEST DESCRIPTION:
12922 ;          6350  !
12923 ;          6351  !       TEST THE DETECTION OF A
12924 ;          6352  !       REGISTER MODIFICATION REFUSED
12925 ;          6353  !       BY:
12926 ;          6354  !
12927 ;          6355  !       1.  WRITTING TO MLCS1, MLDA
12928 ;          6356  !           AND MLER WHILE THE DRIVE
12929 ;          6357  !           IS BUSY AND TEST RMR
12930 ;          6358  !           BIT SET.
12931 ;          6359  !
12932 ;          6360  !       ALSO SEE IF THE DRIVE ASSERTED
12933 ;          6361  !       EXCEPTION BY TESTING THE TRE BIT SET.
12934 ;          6362  !
12935 ;          6363  !--
12936 ;          6364
12937 ;          6365  incr CNT from 0 to 2 do                    !REPEAT LOOP 3 TIMES
12938 ;          6366      begin
12939 ;          6367      BGNSUB;
12940 ;          6368      CLR_MBUS;
12941 ;          6369      MLCS1 = write;                         !DO A WRITE FUNCTION
12942 ;          6370
12943 ;          6371      case .CNT from 0 to 2 of               !WRITE TO SELECTED REGISTERS FORCING RMR
12944 ;          6372          set
12945 ;          6373
12946 ;          6374          [0] :
12947 ;          6375              MLCS1 = %o'000000';
12948 ;          6376
12949 ;          6377          [1] :
12950 ;          6378              MLDA = ONES;
12951 ;          6379
12952 ;          6380          [2] :
12953 ;          6381              MLER = ONES
12954 ;          6382          tes;
12955 ;          6383
12956 ;          6384      DELAY (FRTY_US);
12957 ;          6385
12958 ;          6386      if .RMR IS_NOT_SET                     !SEE IF RMR GOT SET
12959 ;          6387      then
12960 ;          6388          begin
12961 ;          6389          ERRDF (69, ASYNC, DUMPER);         !ERROR IF NOT SET
12962 ;          6390          PRINTB (FOR_FMT, WRD_21, PHR_1, WRD_11, WRD_21);
12963 ;          6391          end;
```

```
12965 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
12966 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (73)
12967
12968 ;          6392
12969 ;          6393        if .TRE IS_NOT_SET                !SEE IF DRIVE ASSERTED EXCEPTION BY TESTING TRE
12970 ;          6394        then
12971 ;          6395            begin
12972 ;          6396            ERRDF (117, SYNC, DUMPER);
12973 ;          6397            PRINTB (FOR_FMT, WRD_20, PHR_1, WRD_11, WRD_21);
12974 ;          6398            end;
12975 ;          6399
12976 ;          6400        ENDSUB;
12977 ;          6401        end;
12978 ;          6402
12979 ;          6403    ENDTST;
12983
12987 045276  004167  136542          $T23:   JSR     R1,$SAVE2                       ;                                6338
12988 045302  005746                          TST     -(SP)
12989 045304  005002                          CLR     R2                              ; CNT                            6365
12990 045306  104402                  1$:     TRAP    2                               ;                                6366
12991 045310  152777  000040  145676          BISB    #40,@ML.REG+40                  ;                                6367
12992 045316  016701  146260                  MOV     ML.DUT,R1
12993 045322  042701  177770                  BIC     #177770,R1
12994 045326  142777  000007  145660          BICB    #7,@ML.REG+40
12995 045334  150177  145654                  BISB    R1,@ML.REG+40
12996 045340  012777  000061  145606          MOV     #61,@ML.REG                     ;                                6369
12997 045346  010201                          MOV     R2,R1                           ; CNT,*                          6371
12998 045350  006301                          ASL     R1
12999 045352  066107  045356                  ADD     2$(R1),PC
13000 045356  000006                  2$:     .WORD   3$-2$
13001 045360  000014                          .WORD   4$-2$
13002 045362  000024                          .WORD   5$-2$
13003 045364  005077  145564          3$:     CLR     @ML.REG                         ;                                6375
13004 045370  000407                          BR      6$                              ;                                6371
13005 045372  012777  177777  145604  4$:     MOV     #-1,@ML.REG+30                  ;                                6378
13006 045400  000403                          BR      6$                              ;                                6371
13007 045402  012777  177777  145624  5$:     MOV     #-1,@ML.REG+60                  ;                                6381
13008 045410  012700  000050          6$:     MOV     #50,R0                          ; *,$$TMP2                       6384
13009 045414  001410                  7$:     BEQ     10$
13010 045416  016701  134474                  MOV     LSDLY,R1                        ; *,$$TMP1
13011 045422  001403                          BEQ     9$
13012 045424  005016                  8$:     CLR     (SP)                            ; $$TMP
13013 045426  005301                          DEC     R1                              ; $$TMP1
13014 045430  001375                          BNE     8$
13015 045432  005300                  9$:     DEC     R0                              ; $$TMP2
13016 045434  000767                          BR      7$
13017 045436  132777  000004  145570  10$:    BITB    #4,@ML.REG+60                   ;                                6386
13018 045444  001024                          BNE     11$
```

```
13020                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
13021                                   ;                                                       22-Dec-1980 09:21:22    PA:<
13022
13023 045446  104455                          TRAP    55                              ;                               6389
13024 045450  000105                          .WORD   105
13025 045452  010464                          .WORD   ASYNC
13026 045454  024052                          .WORD   DUMPER
13027 045456  012746  006522                  MOV     #WRD.21,-(SP)                   ;                               6390
13028 045462  012746  006416                  MOV     #WRD.11,-(SP)
13029 045466  012746  007366                  MOV     #PHR.1,-(SP)
13030 045472  012746  006522                  MOV     #WRD.21,-(SP)
13031 045476  012746  006046                  MOV     #FOR.FMT,-(SP)
13032 045502  012746  000005                  MOV     #5,-(SP)
13033 045506  010600                          MOV     SP,R0                           ; SP,*
13034 045510  104414                          TRAP    14
13035 045512  062706  000014                  ADD     #14,SP                          ;                               6388
13036 045516  032777  040000  145430  11$:    BIT     #40000,@ML.REG                  ;                               6393
13037 045524  001024                          BNE     12$
13038 045526  104455                          TRAP    55                              ;                               6396
13039 045530  000165                          .WORD   165
13040 045532  010526                          .WORD   SYNC
13041 045534  024052                          .WORD   DUMPER
13042 045536  012746  006522                  MOV     #WRD.21,-(SP)                   ;                               6397
13043 045542  012746  006416                  MOV     #WRD.11,-(SP)
13044 045546  012746  007366                  MOV     #PHR.1,-(SP)
13045 045552  012746  006514                  MOV     #WRD.20,-(SP)
13046 045556  012746  006046                  MOV     #FOR.FMT,-(SP)
13047 045562  012746  000005                  MOV     #5,-(SP)
13048 045566  010600                          MOV     SP,R0                           ; SP,*
13049 045570  104414                          TRAP    14
13050 045572  062706  000014                  ADD     #14,SP                          ;                               6395
13051 045576  104467                  12$:    TRAP    67                              ;                               6398
13052 045600  006000                          ROR     R0
13053 045602  103641                          BLO     1$
13054 045604  005202                          INC     R2                              ; CNT                           6365
13055 045606  020227  000002                  CMP     R2,#2                           ; CNT,*
13056 045612  003635                          BLE     1$
13057 045614  005726                          TST     (SP)+                           ;                               6338
13058 045616  000207                          RTS     PC
13059
13060                                   ; Routine Size:  105 words
13061                                   ; Maximum stack depth per invocation:  10 words
13066
13067
13071
```

```
13079 045620                            T23::
13080 045620  004767  177452            1$:     JSR     PC,$T23                 ;                       6401
13081 045624  104466                            TRAP    66
13082 045626  006000                            ROR     R0
13083 045630  103773                            BLO     1$
13084 045632  000207                            RTS     PC
13085
13086                                   ; Routine Size:  6 words
13087                                   ; Maximum stack depth per invocation:  0 words
13092
13093
13094 ;         6404  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (74)

```
;ML4
;
;                6405  !
;                6406  !
;                6407  BGNTST;
;                6408
;                6409  !++
;                6410  ! TEST NUMBER:  TST 24
;                6411  !
;                6412  ! TEST NAME : initial PROM TEST
;                6413  !
;                6414  ! TEST DESCRIPTION:
;                6415  !
;                6416  !       TEST THE MEMORY ARRAYS' PROM
;                6417  !       TIMING AND CONTROL LOGIC FOR
;                6418  !       INITIAL PROM READS BY:
;                6419  !
;                6420  !       1.  READING 14 PROM LOCATIONS
;                6421  !           AND TESTING FOR:
;                6422  !
;                6423  !           A. CHECK SUM ERRORS AT
;                6424  !              EACH ROW COLUMN ADRS
;                6425  !
;                6426  !           B. SUM OF EACH PROM BIT SET
;                6427  !              <9,0> GTR 14.
;                6428  !
;                6429  !--
;                6430
;                6431  local
;                6432      OFF_SET_CNT : vector [10, byte],      !COUNTS EACH NIBBLE OFFSET
;                6433      ROW_ORED_COL : bitvector [16],        !SAVES ROW DATA OR'ED WITH COL DATA
;                6434      R_C_SAV : bitvector [16],             !TEMP LOCATION FOR ROW COL DATA
;                6435      PROM_ADRS,                            !PROM ADDRESS
;                6436      CHK_SUM,                              !CHECK SUM DATA
;                6437      CHK_SUM_ERR,                          !CHECK SUM ERROR
;                6438      BAD_NIB_CNT,                          !COUNTS BAD NIBBLES
;                6439      CNT_14_BAD,                           !COUNTS BAD NIBBLE POSITION EQL 14
;                6440      DODO_FLG,                             !DROP UNIT FLAG
;                6441      ERR_FLG;                              !ERROR FLAG
;                6442
;                6443  CLR_MBUS;
;                6444  DODO_FLG = ZERO;
;                6445  PROM_DIS = ONE;                           !SET PROM DISABLE MODE
;                6446  CHK_SUM_ERR = ZEROES;
;                6447
;                6448  incr CNT from 0 to 9 do                   !CLEAR OFFSET COUNTS
;                6449      OFF_SET_CNT [.CNT] = ZEROES;
;                6450
;                6451  incr ADRS_CNT from 0 to 14 do             !READ PROM DATA FROM 15 ARRAY WORDS
;                6452      begin
;                6453      ROW_ORED_COL = ZEROES;                !CLEAR ROW ORED COL SAVE LOCATION
;                6454      PROM_ADRS = .ADRS_CNT;                !GET COPY OF ADRS_CNT
;                6455
;                6456      incr TWICE from 0 to 1 do             !READ ROW AND COL DATA FOR THIS ARRAY WORD
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (74)

;          6457          begin
;          6458          BAD_NIB_CNT = ZEROES;
;          6459          ERR_FLG = ZERO;
;          6460          MLPA = .PROM_ADRS;                    !LOADING MLPA INITIATES PROM READ
;          6461          DELAY (ONE_US);
;          6462          R_C_SAV = .MLPD;                      !GET THE ROW OR COL DATA
;          6463
;          6464          incr BIT_CNT from 0 to 9 do           !COUNT NUMBER BITS SET IN <9:0>
;          6465
;          6466              if .R_C_SAV [.BIT_CNT] IS_SET then BAD_NIB_CNT = .BAD_NIB_CNT + 1;
;          6467
;          6468          CHK_SUM = .R_C_SAV<10, 3>;            !GET THE CHECK SUM BITS
;          6469
;          6470          if .R_C_SAV [13] IS_SET then CHK_SUM = .CHK_SUM + 1;    !ADD IN BIT 13
;          6471
;          6472          if .R_C_SAV [14] IS_SET then CHK_SUM = .CHK_SUM + 1;    !ADD IN BIT 14
;          6473
;          6474          if .R_C_SAV [15] IS_SET then CHK_SUM = .CHK_SUM + 1;    !ADD IN BIT 15
;          6475
;          6476          if .R_C_SAV [15] IS_SET               !IS BIT 15 SET
;          6477          then
;          6478              begin
;          6479
;          6480              if .BAD_NIB_CNT lss .CHK_SUM then ERR_FLG = ONE;    !SET ERROR FLG IF CHECK SUM ERROR
;          6481
;          6482              end
;          6483          else
;          6484              begin
;          6485
;          6486              if .BAD_NIB_CNT neq .CHK_SUM then ERR_FLG = ONE;    !SET ERROR FLG IF CHECK SUM ERROR
;          6487
;          6488              end;
;          6489
;          6490          if .ERR_FLG IS_SET                    !WAS THERE A CHECK SUM ERROR
;          6491          then
;          6492              begin                             !REPORT INTERMEDIATE ERROR IF YES
;          6493              ERRDF (70, INTER, DUMPER);
;          6494              PRINTB (SIX_FMT, FNC_21, WRD_10, WRD_12, WRD_45, WRD_35, FNC_6);
;          6495              PRINTB (FMT_10, .CHK_SUM, .R_C_SAV);
;          6496              DODU_FLG = ONE;
;          6497              end;
;          6498
;          6499          ROW_ORED_COL = (.ROW_ORED_COL) or (.R_C_SAV);   !OR ROW AND COLUMN DATA
;          6500          PROM_ADRS = (.PROM_ADRS) or (%o'2000'); !GET COLUMN DATA
;          6501          end;
;          6502
;          6503      incr index from 0 to 9 do                 !GET TOTAL OFF SET COUNTS FROM THE 15 ARRAY WORDS
;          6504
;          6505          if .ROW_ORED_COL [.index] IS_SET then OFF_SET_CNT [.index] = .OFF_SET_CNT [.index] + 1;
;          6506
;          6507      end;
;          6508
```

```
13208 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
13209 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (74)
13210
13211 ;          6509  CNT_14_BAD = ZEROES;
13212 ;          6510
13213 ;          6511  incr CNT from 0 to 9 do                    !COUNT HOW MANY OFFSET COUNTS GEQ 14
13214 ;          6512
13215 ;          6513      if .OFF_SET_CNT [.CNT] geq 14 then CNT_14_BAD = .CNT_14_BAD + 1;
13216 ;          6514
13217 ;          6515  if .CNT_14_BAD neq ZERO                    !WAS ANY OFF_SET COUNTS GTR ZERO
13218 ;          6516  then
13219 ;          6517      begin
13220 ;          6518      ERRDF (71, ARR_DAT, DUMPER);           !ERROR IF YES
13221 ;          6519
13222 ;          6520      if .CNT_14_BAD eql 10                  !WERE ALL 10 NIBBLE OFFSETS GEQ 14
13223 ;          6521      then
13224 ;          6522          PRINTB (SIX_FMT, WRD_55, WRD_54, WRD_46, WRD_51, WRD_42, WRD_40)        !ERROR IF YES
13225 ;          6523      else                                   !IF NO THEN PRINT WHICH ONES WERE
13226 ;          6524          begin
13227 ;          6525          PRINTB (FOR_FMT, WRD_46, WRD_47, WRD_42, WRD_40);       !PRINT MESSAGE
13228 ;          6526
13229 ;          6527          incr CNT from 0 to 9 do                !FIND OFFSETS GEQ 14
13230 ;          6528
13231 ;          6529              if .OFF_SET_CNT [.CNT] geq 14 then PRINTB (FMT_13, .CNT, (.OFF_SET_CNT [.CNT]));
13232 ;          6530
13233 ;          6531                                                 !PRINT NIBBLE POSITION AND COUNT
13234 ;          6532          end;
13235 ;          6533
13236 ;          6534      DODU_FLG = ONE;
13237 ;          6535      end;
13238 ;          6536
13239 ;          6537  if .DODU_FLG IS_SET                        !DROP THIS UNIT IF DODU_FLG SET
13240 ;          6538  then
13241 ;          6539      begin
13242 ;          6540      DODU (.ML_LUN);
13243 ;          6541      DOCLN;
13244 ;          6542      end;
13245 ;          6543
13246 ;          6544  ENDTST;
13250
13254 045634  004167  136256          $T24:   JSR     R1,$SAVE5                       ;                       6403
13255 045640  162706  000030                  SUB     #30,SP
13256 045644  152777  000040  145342          BISB    #40,@ML.REG+40                  ;                       6441
13257 045652  016705  145724                  MOV     ML.DUT,R5
13258 045656  042705  177770                  BIC     #177770,R5
13259 045662  142777  000007  145324          BICB    #7,@ML.REG+40
13260 045670  150577  145320                  BISB    R5,@ML.REG+40
13261 045674  005066  000002                  CLR     2(SP)                           ; DODU.FLG              6444
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
                                        BISB    #40,@ML.REG+120         ;                                               6445
                                        CLR     R2                      ; CHK.SUM.ERR                                   6446
                                1$:     MOV     #16,R1                  ;                                               6449
                                        ADD     SP,R1                   ; OFF.SET.CNT,*
                                        ADD     R2,R1                   ; CNT,*
                                        CLRB    (R1)
                                        INC     R2                      ; CNT                                           6448
                                        CMP     R2,#11                  ; CNT,*
                                        BLE     1$
                                        CLR     R5                      ; ADRS.CNT                                      6451
                                2$:     CLR     10(SP)                  ; ROW.ORED.COL                                  6453
                                        MOV     R5,6(SP)                ; ADRS.CNT,PROM.ADRS                            6454
                                        CLR     R4                      ; TWICE                                         6456
                                3$:     CLR     4(SP)                   ; BAD.NIB.CNT                                   6458
                                        CLR     (SP)                    ; ERR.FLG                                       6459
                                        MOV     6(SP),@ML.REG+100       ; PROM.ADRS,*                                   6460
                                        MOV     #1,R1                   ; *,$$TMP2                                      6461
                                4$:     BEQ     7$
                                        MOV     L$DLY,R2                ; *,$$TMP1
                                        BEQ     6$
                                5$:     CLR     14(SP)                  ; $$TMP
                                        DEC     R2                      ; $$TMP1
                                        BNE     5$
                                6$:     DEC     R1                      ; $$TMP2
                                        BR      4$
                        000012  7$:     MOV     @ML.REG+230,12(SP)      ; *,R.C.SAV                                     6462
                                        CLR     R2                      ; BIT.CNT                                       6464
                                8$:     MOV     R2,R1                   ; BIT.CNT,*                                     6466
                                        ASR     R1
                                        ASR     R1
                                        ASR     R1
                        000012          MOV     #12,R0
                                        ADD     SP,R0                   ; R.C.SAV,*
                                        ADD     R0,R1
                                        MOV     R1,-(SP)
                                        MOV     R2,-(SP)                ; BIT.CNT,*
                        177770          BIC     #177770,(SP)
                        000001          MOV     #1,-(SP)
                                        CLR     -(SP)
                        135054          JSR     PC,BL$GT2
                        000010          ADD     #10,SP
                                        DEC     R0
                                        BNE     9$
                        000004          INC     4(SP)                   ; BAD.NIB.CNT
                                9$:     INC     R2                      ; BIT.CNT                                       6464
                        000011          CMP     R2,#11                  ; BIT.CNT,*
                                        BLE     8$
                        000012          MOV     12(SP),R3               ; R.C.SAV,CHK.SUM                               6468
                                        ASR     R3                      ; CHK.SUM
                                        ASR     R3                      ; CHK.SUM
                                        SWAB    R3                      ; CHK.SUM
                        177770          BIC     #177770,R3              ; *,CHK.SUM
```

```
13319                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
13320                                   ;                                                       22-Dec-1980 09:21:22    PA:<
13321
13322 046126 132766 000040 000013       BITB    #40,13(SP)      ; *,R.  .SAV+1                                  6470
13323 046134 001401                     BEQ     10$
13324 046136 005203                     INC     R3              ; CHK.SUM
13325 046140 132766 000100 000013 10$:  BITB    #100,13(SP)     ; *,R.C.SAV+1                                   6472
13326 046146 001401                     BEQ     11$
13327 046150 005203                     INC     R3              ; CHK.SUM
13328 046152 005002                 11$:CLR     R2              ;                                               6474
13329 046154 105766 000013              TSTB    13(SP)          ; R.C.SAV+1
13330 046160 100002                     BPL     12$
13331 046162 005203                     INC     R2
13332 046164 005203                     INC     R3              ; CHK.SUM
13333 046166 006002                 12$:ROR     R2              ;                                               6476
13334 046170 103004                     BCC     13$
13335 046172 026603 000004              CMP     4(SP),R3        ; BAD.NIB.CNT,CHK.SUM                           6480
13336 046176 002006                     BGE     15$
13337 046200 000403                     BR      14$
13338 046202 026603 000004          13$:CMP     4(SP),R3        ; BAD.NIB.CNT,CHK.SUM                           6486
13339 046206 001402                     BEQ     15$
13340 046210 012716 000001          14$:MOV     #1,(SP)         ; *,ERR.FLG
13341 046214 021627 000001          15$:CMP     (SP),#1         ; ERR.FLG,*                                     6490
13342 046220 001044                     BNE     16$
13343 046222 104455                     TRAP    55              ;                                               6493
13344 046224 000106                     .WORD   106
13345 046226 010672                     .WORD   INTER
13346 046230 024052                     .WORD   DUMPER
13347 046232 012746 010004              MOV     #FNC.6,-(SP)    ;                                               6494
13348 046236 012746 006666              MOV     #WRD.35,-(SP)
13349 046242 012746 006772              MOV     #WRD.45,-(SP)
13350 046246 012746 006426              MOV     #WRD.12,-(SP)
13351 046252 012746 006406              MOV     #WRD.10,-(SP)
13352 046256 012746 010216              MOV     #FNC.21,-(SP)
13353 046262 012746 006100              MOV     #SIX.FMT,-(SP)
13354 046266 012746 000007              MOV     #7,-(SP)
13355 046272 010600                     MOV     SP,R0           ; SP,*
13356 046274 104414                     TRAP    14
13357 046276 016616 000032              MOV     32(SP),(SP)     ; R.C.SAV,*                                     6495
13358 046302 010346                     MOV     R3,-(SP)        ; CHK.SUM,*
13359 046304 012746 004676              MOV     #FMT.10,-(SP)
13360 046310 012746 000003              MOV     #3,-(SP)
13361 046314 010600                     MOV     SP,R0           ; SP,*
13362 046316 104414                     TRAP    14
13363 046320 012766 000001 000030       MOV     #1,30(SP)       ; *,DODU.FLG                                    6496
13364 046326 062706 000026              ADD     #26,SP          ;                                               6492
13365 046332 056666 000012 000010 16$:  BIS     12(SP),10(SP)   ; R.C.SAV,ROW.ORED.COL                          6499
13366 046340 052766 002000 000006       BIS     #2000,6(SP)     ; *,PROM.ADRS                                   6500
13367 046346 005204                     INC     R4              ; TWICE                                         6456
13368 046350 020427 000001              CMP     R4,#1           ; TWICE,*
13369 046354 003002                     BGT     17$
13370 046356 000167 177364              JMP     3$
13371 046362 005002                 17$:CLR     R2              ; INDEX                                         6503
13372 046364 010201                 18$:MOV     R2,R1           ; INDEX.*                                       6505
13373 046366 006201                     ASR     R1
```

```
13375                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
13376                                   ;                                                       22-Dec-1980 09:21:22    PA:<
13377
13378 046370 006201                             ASR     R1
13379 046372 006201                             ASR     R1
13380 046374 012700 000010                      MOV     #10,R0
13381 046400 060600                             ADD     SP,R0                   ; ROW.ORED.COL,*
13382 046402 060001                             ADD     R0,R1
13383 046404 010146                             MOV     R1,-(SP)
13384 046406 010246                             MOV     R2,-(SP)                ; INDEX,*
13385 046410 042716 177770                      BIC     #177770,(SP)
13386 046414 012746 000001                      MOV     #1,-(SP)
13387 046420 005046                             CLR     -(SP)
13388 046422 004767 134512                      JSR     PC,BL$GT2
13389 046426 062706 000010                      ADD     #10,SP
13390 046432 005300                             DEC     R0
13391 046434 001005                             BNE     19$
13392 046436 012701 000016                      MOV     #16,R1
13393 046442 060601                             ADD     SP,R1                   ; OFF.SET.CNT,*
13394 046444 060201                             ADD     R2,R1                   ; INDEX,*
13395 046446 105211                             INCB    (R1)
13396 046450 005202                     19$:    INC     R2                      ; INDEX                                 6503
13397 046452 020227 000011                      CMP     R2,#11                  ; INDEX,*
13398 046456 003742                             BLE     18$
13399 046460 005205                             INC     R5                      ; ADRS.CNT                              6451
13400 046462 020527 000016                      CMP     R5,#16                  ; ADRS.CNT,*
13401 046466 003002                             BGT     20$
13402 046470 000167 177240                      JMP     2$
13403 046474 005000                     20$:    CLR     R0                      ; CNT.14.BAD                            6509
13404 046476 005001                             CLR     R1                      ; CNT                                   6511
13405 046500 012702 000016              21$:    MOV     #16,R2                  ;                                       6513
13406 046504 060602                             ADD     SP,R2                   ; OFF.SET.CNT,*
13407 046506 060102                             ADD     R1,R2                   ; CNT,*
13408 046510 121227 000016                      CMPB    (R2),#16
13409 046514 103401                             BLO     22$
13410 046516 005200                             INC     R0                      ; CNT.14.BAD
13411 046520 005201                     22$:    INC     R1                      ; CNT                                   6511
13412 046522 020127 000011                      CMP     R1,#11                  ; CNT,*
13413 046526 003764                             BLE     21$
13414 046530 005700                             TST     R0                      ; CNT.14.BAD                            6515
13415 046532 001505                             BEQ     27$
13416 046534 104455                             TRAP    55                      ;                                       6518
13417 046536 000107                             .WORD   107
13418 046540 010570                             .WORD   ARR.DAT
13419 046542 024052                             .WORD   DUMPER
13420 046544 020027 000012                      CMP     R0,#12                  ; CNT.14.BAD,*                          6520
13421 046550 001024                             BNE     23$
13422 046552 012746 006726                      MOV     #MRD.40,-(SP)           ;                                       6522
13423 046556 012746 006746                      MOV     #MRD.42,-(SP)
13424 046562 012746 007054                      MOV     #MRD.51,-(SP)
13425 046566 012746 007004                      MOV     #MRD.46,-(SP)
13426 046572 012746 007104                      MOV     #MRD.54,-(SP)
13427 046576 012746 007114                      MOV     #MRD.55,-(SP)
13428 046602 012746 006100                      MOV     #SIX.FMT,-(SP)
13429 046606 012746 000007                      MOV     #7,-(SP)
```

```
13431                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
13432                                   ;                                                       22-Dec-1980 09:21:22    PA:<
13433
13434 046612 010600                             MOV     SP,R0                   ; SP,*
13435 046614 104414                             TRAP    14
13436 046616 022626                             CMP     (SP)+,(SP)+
13437 046620 000445                             BR      26$                     ;                                       6520
13438 046622 012746 006726              23$:    MOV     #MRD.40,-(SP)           ;                                       6525
13439 046626 012746 006746                      MOV     #MRD.42,-(SP)
13440 046632 012746 007016                      MOV     #MRD.47,-(SP)
13441 046636 012746 007004                      MOV     #MRD.46,-(SP)
13442 046642 012746 006046                      MOV     #FOR.FMT,-(SP)
13443 046646 012746 000005                      MOV     #5.-(SP)
13444 046652 010600                             MOV     SP,R0                   ; SP,*
13445 046654 104414                             TRAP    14
13446 046656 005002                             CLR     R2                      ; CNT                                   6527
13447 046660 012701 000032              24$:    MOV     #32,R1                  ;                                       6529
13448 046664 060601                             ADD     SP,R1                   ; OFF.SET.CNT,*
13449 046666 060201                             ADD     R2,R1                   ; CNT,*
13450 046670 121127 000016                      CMPB    (R1),#16
13451 046674 103413                             BLO     25$
13452 046676 005046                             CLR     -(SP)
13453 046700 111116                             MOVB    (R1),(SP)
13454 046702 010246                             MOV     R2,-(SP)                ; CNT,*
13455 046704 012746 005034                      MOV     #FMT.13,-(SP)
13456 046710 012746 000003                      MOV     #3,-(SP)
13457 046714 010600                             MOV     SP,R0                   ; SP,*
13458 046716 104414                             TRAP    14
13459 046720 062706 000010                      ADD     #10,SP
13460 046724 005202                     25$:    INC     R2                      ; CNT                                   6527
13461 046726 020227 000011                      CMP     R2,#11                  ; CNT,*
13462 046732 003752                             BLE     24$
13463 046734 012766 000001 000016       26$:    MOV     #1,16(SP)               ; *,DODU.FLG                            6534
13464 046742 062706 000014                      ADD     #14,SP                  ;                                       6517
13465 046746 026627 000002 000001       27$:    CMP     2(SP),#1                ; DODU.FLG,*                            6537
13466 046754 001004                             BNE     28$
13467 046756 016700 144616                      MOV     ML.LUN,R0               ;                                       6540
13468 046762 104451                             TRAP    51
13469 046764 104444                             TRAP    44
13470 046766 062706 000030              28$:    ADD     #30,SP                  ;                                       6403
13471 046772 000207                             RTS     PC
13472
13473                                   ; Routine Size:  304 words
13474                                   ; Maximum stack depth per invocation:  29 words
13479
13480
13484
```

```
13486                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
13487                                   ;                                                       22-Dec-1980 09:21:22    PA:<
13488
13492 046774                            T24::
13493 046774  004767  176634           1$:     JSR     PC,$T24                 ;                                       6542
13494 047000  104466                            TRAP    66
13495 047002  006000                            ROR     R0
13496 047004  103773                            BLO     1$
13497 047006  000207                            RTS     PC
13498
13499                                   ; Routine Size:  6 words
13500                                   ; Maximum stack depth per invocation:  0 words
13505
13506
13507 ;         6545  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (75)

```
13509 ;ML4
13510 ;
13511
13512 ;          6546  !
13513 ;          6547  !
13514 ;          6548  BGNTST;
13515 ;          6549
13516 ;          6550  !++
13517 ;          6551  ! TEST NUMBER:  TST 25
13518 ;          6552  !
13519 ;          6553  ! TEST NAME:    PROM OR FUNCTION TEST
13520 ;          6554  !
13521 ;          6555  ! TEST DESCRIPTION:
13522 ;          6556  !
13523 ;          6557  !       TEST THE HARDWARE ORING OF
13524 ;          6558  !       THE MEMORY ARRAYS' PROM
13525 ;          6559  !       ROW COLUMN DATA BY:
13526 ;          6560  !
13527 ;          6561  !       1.  READING AND STORING 128
13528 ;          6562  !           HARDWARE ORED ROW COLUMN
13529 ;          6563  !           DATA.
13530 ;          6564  !
13531 ;          6565  !       2.  THEN IN PROM DISABLE MODE
13532 ;          6566  !           AND VIA SOFTWARE CONTROL,
13533 ;          6567  !           READ AND OR PROM ROW
13534 ;          6568  !           COLUMN DATA AND COMPARE
13535 ;          6569  !           AGAINST THE RESPECTIVE
13536 ;          6570  !           STORED HARDWARE ORED DATA.
13537 ;          6571  !
13538 ;          6572  !--
13539 ;          6573
13540 ;          6574  local
13541 ;          6575      R_BITS,                   !PROM ROW DATA
13542 ;          6576      C_BITS,                   !PROM COL DATA
13543 ;          6577      SW_ORED,                  !SOFTWARE CALCULATED PROM ORED DATA
13544 ;          6578      HW_SAVE,                  !SOFTWARE  PROM ORED DATA
13545 ;          6579      DODU_FLG;                 !DROP UNIT FLAG
13546 ;          6580
13547 ;          6581  CLR_MBUS;
13548 ;          6582  DODU_FLG = ZERO;
13549 ;          6583  DAT_DM = ONE;
13550 ;          6584  FIRST_BLK_XFER ();            !SET UP A FIRST BLOCK XFER
13551 ;          6585  ML_FUNC = write;              !DO A WRITE FUNCTION
13552 ;          6586
13553 ;          6587  incr PROM_ADRS from 0 to 127 do   !READ AND STORE 128 HARDWARE PROM ORED DATA
13554 ;          6588      begin
13555 ;          6589      DELAY (ONE_US);
13556 ;          6590      HW_OR_TBL [.PROM_ADRS] = .MLPD;   !READ HARDWARE PROM ORED DATA
13557 ;          6591      DAT_CLK = ONE;            !CLOCK NEXT ONE OUT
13558 ;          6592      end;
13559 ;          6593
13560 ;          6594  CLR_MBUS;
13561 ;          6595  PROM_DIS = ONE;               !SET PROM DISABLE MODE
13562 ;          6596
13563 ;          6597  incr PROM_ADRS from 0 to 127 do   !CALCULATE 128 SW ORED DATA & COMPARE TO HW TABLE
```

```
13565 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
13566 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (75)
13567
13568 ;          6598      begin
13569 ;          6599      MLPA = .PROM_ADRS;                 !LOADING MLPA INITIATES A PROM READ
13570 ;          6600      DELAY (ONE_US);
13571 ;          6601      R_BITS = .MLPD;                    !SAVE ROW DATA
13572 ;          6602      MLPA = .PROM_ADRS or %o'2000';     !ENABLE COLUMN DATA ADRS
13573 ;          6603      DELAY (ONE_US);
13574 ;          6604      C_BITS = .MLPD;                    !SAVE COL DATA
13575 ;          6605      SW_ORED = .R_BITS or .C_BITS;      !CALCULATE SOFTWARE ORED
13576 ;          6606      HW_SAVE = .HW_OR_TBL [.PROM_ADRS]; !GET RESPECTIVE HARDWARE ORED
13577 ;          6607
13578 ;          6608      if (.HW_SAVE<0, 9>) neq (.SW_ORED<0, 9>)    !COMPARE SW & HW ORED
13579 ;          6609      then
13580 ;          6610          begin                          !IF NEQ THEN ERROR
13581 ;          6611          ERRDF (76, ARR_DAT, DUMPER);
13582 ;          6612          PRINTB (FOR_FMT, WRD_35, WRD_36, WRD_19, PHR_4);
13583 ;          6613          PRINTB (FMT_2, .SW_ORED<0, 95, .HW_SAVE<0, 95, (.SW_ORED<0, 9> xor .HW_SAVE<0, 9>));
13584 ;          6614          DODU_FLG = ONE;
13585 ;          6615          end;
13586 ;          6616
13587 ;          6617      end;
13588 ;          6618
13589 ;          6619  if .DODU_FLG IS_SET                     !DROP THIS UNIT IF DODU FLG IS_SET
13590 ;          6620  then
13591 ;          6621      begin
13592 ;          6622      DODU (.ML_LUN);
13593 ;          6623      DOCLN;
13594 ;          6624      end;
13595 ;          6625
13596 ;          6626  ENDTST;
13600
13604 047010 004167 135102          $T25:  JSR    R1,$SAVE5          ;                          6544
13605 047014 162706 000010                 SUB    #10,SP
13606 047020 152777 000040 144166          BISB   #40,@ML.REG+40     ;                          6579
13607 047026 016705 144550                 MOV    ML.DUT,R5
13608 047032 042705 177770                 BIC    #177770,R5
13609 047036 142777 000007 144150          BICB   #7,@ML.REG+40
13610 047044 150577 144144                 BISB   R5,@ML.REG+40
13611 047050 005066 000004                 CLR    4(SP)              ; DODU.FLG              6582
13612 047054 152777 000010 144212          BISB   #10,@ML.REG+120    ;                       6583
13613 047062 004767 146752                 JSR    PC,FIRST.BLK.XFER  ;                       6584
13614 047066 142777 000077 144060          BICB   #77,@ML.REG        ;                       6585
13615 047074 152777 000061 144052          BISB   #61,@ML.REG
13616 047102 005002                        CLR    R2                 ; PROM.ADRS             6587
13617 047104 012701 000001          1$:    MOV    #1,R1              ; *,$$TMP2              6589
13618 047110 001411                 2$:    BEQ    5$
```

```
13620                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
13621                                   ;                                                       22-Dec-1980 09:21:22    PA:<
13622
13623 047112 016703 133000              MOV     L$DLY,R3        ; *,$$TMP1
13624 047116 001404                     BEQ     4$
13625 047120 005066 000006      3$:     CLR     6(SP)           ; $$TMP
13626 047124 005303                     DEC     R3              ; $$TMP1
13627 047126 001374                     BNE     3$
13628 047130 005301             4$:     DEC     R1              ; $$TMP2
13629 047132 000766                     BR      2$
13630 047134 010203             5$:     MOV     R2,R3           ; PROM.ADRS,*                   6590
13631 047136 006303                     ASL     R3
13632 047140 017763 144240 011160       MOV     @#..REG+230,HW.OR.TBL(R3)
13633 047146 152777 000020 144120       BISB    #20,@#ML.REG+120                                6591
13634 047154 005202                     INC     R2              ; PROM.ADRS                     6587
13635 047156 020227 000177              CMP     R2,#177         ; PROM.ADRS,*
13636 047162 003750                     BLE     1$
13637 047164 152777 000040 144022       BISB    #40,@#ML.REG+40                                 6592
13638 047172 016705 144404              MOV     #ML,DUT,R5
13639 047176 042705 177770              BIC     #177770,R5
13640 047202 142777 000007 144004       BICB    #7,@#ML.REG+40
13641 047210 150577 144000              BISB    R5,@#ML.REG+40
13642 047214 152777 000040 144052       BISB    #40,@#ML.REG+120                                6595
13643 047222 005001                     CLR     R1              ; PROM.ADRS                     6597
13644 047224 010177 144024      6$:     MOV     R1,@#ML.REG+100 ; PROM.ADRS,*                   6599
13645 047230 012702 000001              MOV     #1,R2           ; *,$$TMP2                      6600
13646 047234 001411             7$:     BEQ     10$
13647 047236 016703 132654              MOV     L$DLY,R3        ; *,$$TMP1
13648 047242 001404                     BEQ     9$
13649 047244 005066 000006      8$:     CLR     6(SP)           ; $$TMP
13650 047250 005303                     DEC     R3              ; $$TMP1
13651 047252 001374                     BNE     8$
13652 047254 005302             9$:     DEC     R2              ; $$TMP2
13653 047256 000766                     BR      7$
13654 047260 017766 144120 000002 10$:  MOV     @#ML.REG+230,2(SP)  ; *,R.BITS                  6601
13655 047266 010103                     MOV     R1,R3           ; PROM.ADRS,*                   6602
13656 047270 052703 002000              BIS     #2000,R3
13657 047274 010377 143754              MOV     R3,@#ML.REG+100
13658 047300 012702 000001              MOV     #1,R2           ; *,$$TMP2                      6603
13659 047304 001411             11$:    BEQ     14$
13660 047306 016703 132604              MOV     L$DLY,R3        ; *,$$TMP1
13661 047312 001404                     BEQ     13$
13662 047314 005066 000006      12$:    CLR     6(SP)           ; $$TMP
13663 047320 005303                     DEC     R3              ; $$TMP1
13664 047322 001374                     BNE     12$
13665 047324 005302             13$:    DEC     R2              ; $$TMP2
13666 047326 000766                     BR      11$
13667 047330 017716 144050      14$:    MOV     @#ML.REG+230,(SP)   ; *,C.BITS              6604
13668 047334 016605 000002              MOV     2(SP),R5        ; R.BITS,SW.ORED                6605
13669 047340 051605                     BIS     (SP),R5         ; C.BITS,SW.ORED
13670 047342 010103                     MOV     R1,R3           ; PROM.ADRS,*                   6606
13671 047344 006303                     ASL     R3
13672 047346 016304 011160              MOV     HW.OR.TBL(R3),R4    ; *,HW.SAVE
13673 047352 010502                     MOV     R5,R2           ; SW.ORED,*                     6608
13674 047354 042702 177000              BIC     #177000,R2
```

```
13676                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
13677                                   ;                                                       22-Dec-1980 09:21:22    PA:<
13678
13679 047360 010403                             MOV     R4,R3                   ; HW.SAVE,*
13680 047362 042703 177000                      BIC     #177000,R3
13681 047366 020302                             CMP     R3,R2
13682 047370 001451                             BEQ     15$
13683 047372 104455                             TRAP    55                      ;                                               6611
13684 047374 000114                             .WORD   114
13685 047376 010570                             .WORD   ARR.DAT
13686 047400 024052                             .WORD   DUMPER
13687 047402 012746 007454                      MOV     #PHR.4,-(SP)            ;                                               6612
13688 047406 012746 006506                      MOV     #WRD.19,-(SP)
13689 047412 012746 006674                      MOV     #WRD.36,-(SP)
13690 047416 012746 006666                      MOV     #WRD.35,-(SP)
13691 047422 012746 006046                      MOV     #FOR.FMT,-(SP)
13692 047426 012746 000005                      MOV     #5,-(SP)
13693 047432 010600                             MOV     SP,R0                   ; SP,*
13694 047434 104414                             TRAP    14
13695 047436 010403                             MOV     R4,R3                   ; HW.SAVE,*                                     6613
13696 047440 010516                             MOV     R5,(SP)                 ; SW.ORED,*
13697 047442 010302                             MOV     R3,R2
13698 047444 040502                             BIC     R5,R2
13699 047446 040316                             BIC     R3,(SP)
13700 047450 050216                             BIS     R2,(SP)
13701 047452 010446                             MOV     R4,-(SP)                ; HW.SAVE,*
13702 047454 042716 177000                      BIC     #177000,(SP)
13703 047460 010546                             MOV     R5,-(SP)                ; SW.ORED,*
13704 047462 042716 177000                      BIC     #177000,(SP)
13705 047466 012746 004266                      MOV     #FMT.2,-(SP)
13706 047472 012746 000004                      MOV     #4,-(SP)
13707 047476 010600                             MOV     SP,R0                   ; SP,*
13708 047500 104414                             TRAP    14
13709 047502 012766 000001 000030               MOV     #1,30(SP)               ; *,DODU.FLG                                    6614
13710 047510 062706 000024                      ADD     #24,SP                  ;                                               6610
13711 047514 005201                     15$:    INC     R1                      ; PROM.ADRS                                     6597
13712 047516 020127 000177                      CMP     R1,#177                 ; PROM.ADRS,*
13713 047522 003640                             BLE     6$
13714 047524 026627 000004 000001               CMP     4(SP),#1                ; DODU.FLG,*                                    6619
13715 047532 001004                             BNE     16$
13716 047534 016700 144040                      MOV     ML.LUN,R0               ;                                               6622
13717 047540 104451                             TRAP    51
13718 047542 104444                             TRAP    44
13719 047544 062706 000010              16$:    ADD     #10,SP                  ;                                               6544
13720 047550 000207                             RTS     PC
13721
13722                                   ; Routine Size:  177 words
13723                                   ; Maximum stack depth per invocation:  20 words
13728
13729
```

```
13737
13741 047552                            T25::
13742 047552  004767  177232            1$:     JSR     PC,$T25                 ;                       6624
13743 047556  104466                            TRAP    66
13744 047560  006000                            ROR     R0
13745 047562  103773                            BLO     1$
13746 047564  000207                            RTS     PC
13747
13748                                   ; Routine Size:  6 words
13749                                   ; Maximum stack depth per invocation:  0 words
13754
13755
13756 ;          6627  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (76)

```
13758 ;ML4
13759 ;
13760
13761 ;          6628  !
13762 ;          6629  !
13763 ;          6630  BGNTST;
13764 ;          6631
13765 ;          6632  !++
13766 ;          6633  ! TEST NUMBER:  TST 26
13767 ;          6634  !
13768 ;          6635  ! TEST NAME:    UV ADRS ERROR TEST
13769 ;          6636  !
13770 ;          6637  ! TEST DESCRIPTION:
13771 ;          6638  !
13772 ;          6639  !       TEST THE DETECTION OF UV ADRS
13773 ;          6640  !       ERRORS BY:
13774 ;          6641  !
13775 ;          6642  !       1.  GENERATING PROM DATA PATTERN
13776 ;          6643  !           FROM 0 TO %O'177777' AND
13777 ;          6644  !           DETERMINE WHETHER RESPECTIVE
13778 ;          6645  !           PATTERN IS GOOD/OR BAD
13779 ;          6646  !           PROM DATA.
13780 ;          6647  !
13781 ;          6648  !       2.  VIA DAT DM AND PROM R/W
13782 ;          6649  !           MODES PRESENT GENERATED
13783 ;          6650  !           PROM DATA TO THE UV ADRS
13784 ;          6651  !           ERR PROM.
13785 ;          6652  !
13786 ;          6653  !       3.  TEST ERROR CONDITIONS FOR
13787 ;          6654  !           CORRECT RESPONCE TO GOOD/
13788 ;          6655  !           OR BAD PROM DATA.
13789 ;          6656  !
13790 ;          6657  !--
13791 ;          6658
13792 ;          6659  local
13793 ;          6660      DODU_FLG,                          !DROP UNIT FLAG
13794 ;          6661      HIGH_CNT,                          !STORES PROM DATA CHECK SUM BITS
13795 ;          6662      PROM_DATA : bitvector [16],        !STORES PROM DATA
13796 ;          6663      LOW_CNT,                           !STORES SUM OF PROM DATA BITS <9:0>
13797 ;          6664      TEMP,                              !TEMPORARY STORAGE
13798 ;          6665      ERR_FLG,                           !ERROR FLAG
13799 ;          6666      GTR_FLG;                           !SETS WHEN PROM DATA BIT 15 IS A ONE
13800 ;          6667
13801 ;          6668  DODU_FLG = ZERO;
13802 ;          6669  PROM_DATA = -1;
13803 ;          6670
13804 ;          6671  do                                     !TEST ALL POSSIBLE PROM DATA COMBINATIONS
13805 ;          6672      begin
13806 ;          6673      PROM_DATA = .PROM_DATA + 1;        !INCREMENT PROM_DATA
13807 ;          6674      BGNSUB;
13808 ;          6675      CLR_MBUS;
13809 ;          6676      ERR_FLG = ZERO;
13810 ;          6677      LOW_CNT = ZEROES;
13811 ;          6678      HIGH_CNT = ZEROES;
13812 ;          6679      GTR_FLG = ZERO;
```

```
13814 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
13815 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (76)
13816
13817 ;          6680
13818 ;          6681        incr BIT_CNT from 0 to 9 do                  !COUNT PROM DATA BITS <9:0>
13819 ;          6682
13820 ;          6683            if .PROM_DATA [.BIT_CNT] IS_SET then LOW_CNT = .LOW_CNT + 1;
13821 ;          6684
13822 ;          6685        HIGH_CNT = .PROM_DATA<10, 3>;                !GET PROM DATA CHECK SUM BITS
13823 ;          6686
13824 ;          6687        if .PROM_DATA [13] IS_SET then HIGH_CNT = .HIGH_CNT + 1;    !ADD IN BIT 13 IF SET
13825 ;          6688
13826 ;          6689        if .PROM_DATA [14] IS_SET then HIGH_CNT = .HIGH_CNT + 1;    !ADD IN BIT 14 IF SET
13827 ;          6690
13828 ;          6691        if .PROM_DATA [15] IS_SET then HIGH_CNT = .HIGH_CNT + 1;    !ADD IN BIT 15 IF SET
13829 ;          6692
13830 ;          6693        if .PROM_DATA [15] IS_SET then GTR_FLG = ONE;       !SET FLAG IF BIT 15 IS SET
13831 ;          6694
13832 ;          6695        DAT_DM_XFER ();                              !SET UP A DATA DIAG MODE XFERR
13833 ;          6696        PROM_RW = ONE;                               !SET PROM READ WRITE
13834 ;          6697        MLPD = .PROM_DATA;                           !LOAD MLPD WITH PROM_DATA
13835 ;          6698        MLCS1 = write;                               !DO A WRITE FUNCTION
13836 ;          6699        DAT_CLK = ONE;                               !CLOCK PROM DATA INTO UV PROM
13837 ;          6700
13838 ;          6701        if .UNS IS_SET                               !SEE IF PROM DATA CAUSED A UV ERROR
13839 ;          6702        then
13840 ;          6703            begin
13841 ;          6704
13842 ;          6705            if .GTR_FLG IS_SET                       !UNS IS_SET. SEE IF GTR FLG IS SET
13843 ;          6706            then
13844 ;          6707                begin
13845 ;          6708                TEMP = .PROM_DATA;                   !LOAD TEMP WITH PROM DATA
13846 ;          6709                TEMP = .TEMP and %o'162000';         !SEE IF THESE BITS ARE SET IN PROM DATA
13847 ;          6710
13848 ;          6711                if .TEMP eql %o'162000'              !THESE BITS SET AUTOMATICALLY CAUSE A UNS
13849 ;          6712                then
13850 ;          6713                    begin
13851 ;          6714
13852 ;          6715                    if .LOW_CNT geq .HIGH_CNT        !LOW<9:0> SHOULD BE ISS THAN THE HIGH<15:10> IF GTR FLG IS S
13853 ;          6716                    then
13854 ;          6717                        begin                        !ERROR IF LOW<9:0> IS GEQ HIGH<15:10>
13855 ;          6718                        ERRDF (72, ARR_DAT, DUMPER);
13856 ;          6719                        PRINTB (SIX_FMT, WRD_34, PHR_5, WRD_32, WRD_6, WRD_33, WRD_24);
13857 ;          6720                        ERR_FLG = ONE;
13858 ;          6721                        end;
13859 ;          6722
13860 ;          6723                    end;
13861 ;          6724
13862 ;          6725                end
13863 ;          6726            else                                     !GTR FLG IS NOT SET
13864 ;          6727                begin
13865 ;          6728
13866 ;          6729                if .LOW_CNT eql .HIGH_CNT            !LOW<9:0> SHOULD BE NEQ HIGH<15:10>
13867 ;          6730                then
13868 ;          6731                    begin                            !ERROR IF EQL
```

```
13870 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
13871 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (76)
13872 ;
13873 ;         6732                ERRDF (73, ARR_DAT, DUMPER);
13874 ;         6733                PRINTB (SIX_FMT, WRD_34, PHR_5, WRD_32, WRD_6, WRD_33, WRD_24);
13875 ;         6734                ERR_FLG = ONE;
13876 ;         6735                end;
13877 ;         6736
13878 ;         6737            end
13879 ;         6738
13880 ;         6739        end
13881 ;         6740    else                                    !UNS WAS NOT SET
13882 ;         6741        begin
13883 ;         6742
13884 ;         6743        if .GTR_FLG IS_SET                  !SEE IF GTR FLG IS_SET
13885 ;         6744        then
13886 ;         6745            begin
13887 ;         6746            TEMP = .PROM_DATA;              !LOAD TEMP WITH PROM DATA
13888 ;         6747            TEMP = .TEMP and %o'162000';    !SEE IF THESE BITS ARE SET IN PROM DATA
13889 ;         6748
13890 ;         6749            if .TEMP neq %o'162000'         !IF THESE BITS ARE SET THEN UNS SHOULD BE SET
13891 ;         6750            then
13892 ;         6751                begin                       !ERROR UNS IS NOT SET
13893 ;         6752                ERRDF (74, ARR_DAT, DUMPER);
13894 ;         6753                PRINTB (SIX_FMT, WRD_34, PHR_1, WRD_32, WRD_5, WRD_33, WRD_24);
13895 ;         6754                ERR_FLG = ONE;
13896 ;         6755                end
13897 ;         6756            else                            !BITS 162000 ARE NOT SET
13898 ;         6757                begin
13899 ;         6758
13900 ;         6759                if .LOW_CNT lss .HIGH_CNT   !LOW<9:0> SHOULD BE GEQ HIGH<15:10>
13901 ;         6760                then
13902 ;         6761                    begin                   !ERROR IF LSS
13903 ;         6762                    ERRDF (75, ARR_DAT, DUMPER);
13904 ;         6763                    PRINTB (SIX_FMT, WRD_34, PHR_1, WRD_32, WRD_5, WRD_33, WRD_24);
13905 ;         6764                    ERR_FLG = ONE;
13906 ;         6765                    end;
13907 ;         6766
13908 ;         6767                end
13909 ;         6768
13910 ;         6769            end
13911 ;         6770        else                                !GTR_FLG IS NOT SET
13912 ;         6771            begin
13913 ;         6772
13914 ;         6773            if .LOW_CNT neq .HIGH_CNT       !LOW<9:0> SHOULD EQL HIGH<15:10>
13915 ;         6774            then
13916 ;         6775                begin                       !ERROR IF NEQ
13917 ;         6776                ERRDF (108, ARR_DAT, DUMPER);
13918 ;         6777                PRINTB (SIX_FMT, WRD_34, PHR_1, WRD_32, WRD_5, WRD_33, WRD_24);
13919 ;         6778                ERR_FLG = ONE;
13920 ;         6779                end
13921 ;         6780
13922 ;         6781            end
13923 ;         6782
13924 ;         6783        end;
```

```
13926 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
13927 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (76)
13928
13929 ;          6784
13930 ;          6785        if .ERR_FLG IS_SET                    !SEE IF ERROR FLG GOT SET
13931 ;          6786        then
13932 ;          6787            begin                             !PRINT FAILING PROM_DATA AND SET DODU_FLG
13933 ;          6788            PRINTB (FMT_7, .PROM_DATA);
13934 ;          6789            DODU_FLG = ONE;
13935 ;          6790            end;
13936 ;          6791
13937 ;          6792        ENDSUB;
13938 ;          6793        end
13939 ;          6794    until .PROM_DATA eql %o'177777';          !TRY ALL BIT COMBINATIONS
13940 ;          6795
13941 ;          6796    if .DODU_FLG IS_SET                       !DROP THIS UNIT IF DODU_FLG IS SET
13942 ;          6797    then
13943 ;          6798        begin
13944 ;          6799        DODU (.ML_LUN);
13945 ;          6800        DOCLN;
13946 ;          6801        end;
13947 ;          6802
13948 ;          6803    ENDTST;
13952
13956 047566  004167  134324          $T26:   JSR     R1,$SAVE5                   ;                                   6626
13957 047572  162706  000012                  SUB     #12,SP
13958 047576  005066  000006                  CLR     6(SP)                       ; DODU.FLG                          6668
13959 047602  012766  177777  000010          MOV     #-1,10(SP)                  ; *,PROM.DATA                       6669
13960 047610  005266  000010          1$:     INC     10(SP)                      ; PROM.DATA                         6673
13961 047614  104402                2$:     TRAP    2
13962 047616  152777  000040  143370        BISB    #40,@ML.REG+40              ;                                   6674
13963 047624  016705  143752                MOV     ML.DUT,R5
13964 047630  042705  177770                BIC     #177770,R5
13965 047634  142777  000007  143352        BICB    #7,@ML.REG+40
13966 047642  150577  143346                BISB    R5,@ML.REG+40
13967 047646  005001                        CLR     R1                          ; ERR.FLG                           6676
13968 047650  005066  000002                CLR     2(SP)                       ; LOW.CNT                           6677
13969 047654  005003                        CLR     R3                          ; HIGH.CNT                          6678
13970 047656  005066  000004                CLR     4(SP)                       ; GTR.FLG                           6679
13971 047662  005005                        CLR     R5                          ; BIT.CNT                           6681
13972 047664  010504                3$:     MOV     R5,R4                       ; BIT.CNT,*                         6683
13973 047666  006204                        ASR     R4
13974 047670  006204                        ASR     R4
13975 047672  006204                        ASR     R4
13976 047674  012702  000010                MOV     #10,R2
13977 047700  060602                        ADD     SP,R2                       ; PROM.DATA,*
13978 047702  060204                        ADD     R2,R4
13979 047704  010446                        MOV     R4,-(SP)
```

```
13981                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
13982                                   ;                                                       22-Dec-1980 09:21:22    PA:<
13983
13984 047706 010546                             MOV     R5,-(SP)        ; BIT.CNT,*
13985 047710 042716 177770                      BIC     #177770,(SP)
13986 047714 012746 000001                      MOV     #1,-(SP)
13987 047720 005046                             CLR     -(SP)
13988 047722 004767 133212                      JSR     PC,BL$GT2
13989 047726 062706 000010                      ADD     #10,SP
13990 047732 005300                             DEC     R0
13991 047734 001002                             BNE     4$
13992 047736 005266 000002                      INC     2(SP)           ; LOW.CNT
13993 047742 005205                     4$:     INC     R5              ; BIT.CNT                               6681
13994 047744 020527 000011                      CMP     R5,#11          ; BIT.CNT,*
13995 047750 003745                             BLE     3$
13996 047752 016603 000010                      MOV     10(SP),R3       ; PROM.DATA,HIGH.CNT                    6685
13997 047756 006203                             ASR     R3              ; HIGH.CNT
13998 047760 006203                             ASR     R3              ; HIGH.CNT
13999 047762 000303                             SWAB    R3              ; HIGH.CNT
14000 047764 042703 177770                      BIC     #177770,R3      ; *,HIGH.CNT
14001 047770 132766 000040 000011               BITB    #40,11(SP)      ; *,PROM.DATA+1                         6687
14002 047776 001401                             BEQ     5$
14003 050000 005203                             INC     R3              ; HIGH.CNT
14004 050002 132766 000100 000011       5$:     BITB    #100,11(SP)     ; *,PROM.DATA+1                         6689
14005 050010 001401                             BEQ     6$
14006 050012 005203                             INC     R3              ; HIGH.CNT
14007 050014 005005                     6$:     CLR     R5              ;                                       6691
14008 050016 105766 000011                      TSTB    11(SP)          ; PROM.DATA+1
14009 050022 100002                             BPL     7$
14010 050024 005205                             INC     R5
14011 050026 005203                             INC     R3              ; HIGH.CNT
14012 050030 006005                     7$:     ROR     R5              ;                                       6693
14013 050032 103003                             BCC     8$
14014 050034 012766 000001 000004               MOV     #1,4(SP)        ; *,GTR.FLG
14015 050042 004767 144114              8$:     JSR     PC,DAT.DM.XFER  ;                                       6695
14016 050046 152777 000100 143220               BISB    #100,@#L.REG+120 ;                                      6696
14017 050054 016605 000010                      MOV     10(SP),R5       ; PROM.DATA,*                           6697
14018 050060 010577 143320                      MOV     R5,@#L.REG+230
14019 050064 012777 000061 143062               MOV     #61,@#L.REG     ;                                       6698
14020 050072 152777 000020 143174               BISB    #20,@#L.REG+120 ;                                       6699
14021 050100 032777 040000 143126               BIT     #40000,@#L.REG+60 ;                                     6701
14022 050106 001500                             BEQ     12$
14023 050110 026627 000004 000001               CMP     4(SP),#1        ; GTR.FLG,*                             6705
14024 050116 001042                             BNE     11$
14025 050120 010516                             MOV     R5,(SP)         ; *,TEMP                                6708
14026 050122 042716 015777                      BIC     #15777,(SP)     ; *,TEMP                                6709
14027 050126 021627 162000                      CMP     (SP),#-16000    ; TEMP,*                                6711
14028 050132 001003                             BNE     9$
14029 050134 026603 000002                      CMP     2(SP),R3        ; LOW.CNT,HIGH.CNT                      6715
14030 050140 002002                             BGE     10$
14031 050142 000167 000422              9$:     JMP     16$
14032 050146 104455                     10$:    TRAP    55              ;                                       6718
14033 050150 000110                             .WORD   110
14034 050152 010570                             .WORD   ARR.DAT
14035 050154 024052                             .WORD   DUMPER
```

```
14037                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
14038                                   ;                                                       22-Dec-1980 09:21:22    PA:<
14039
14040 050156  012746  006552                     MOV     #WRD.24,-(SP)           ;                                       6719
14041 050162  012746  006654                     MOV     #WRD.33,-(SP)
14042 050166  012746  006336                     MOV     #WRD.6,-(SP)
14043 050172  012746  006646                     MOV     #WRD.32,-(SP)
14044 050176  012746  007472                     MOV     #PHR.5,-(SP)
14045 050202  012746  006660                     MOV     #WRD.34,-(SP)
14046 050206  012746  006100                     MOV     #SIX.FMT,-(SP)
14047 050212  012746  000007                     MOV     #7,-(SP)
14048 050216  010600                             MOV     SP,R0                   ; SP,*
14049 050220  104414                             TRAP    14
14050 050222  000556                             BR      15$                     ;                                       6720
14051 050224  026603  000002              11$:   CMP     2(SP),R3                ; LOW.CNT,HIGH.CNT                      6729
14052 050230  001157                             BNE     16$
14053 050232  104455                             TRAP    55                      ;                                       6732
14054 050234  000111                             .WORD   111
14055 050236  010570                             .WORD   ARR.DAT
14056 050240  024052                             .WORD   DUMPER
14057 050242  012746  006552                     MOV     #WRD.24,-(SP)           ;                                       6733
14058 050246  012746  006654                     MOV     #WRD.33,-(SP)
14059 050252  012746  006336                     MOV     #WRD.6,-(SP)
14060 050256  012746  006646                     MOV     #WRD.32,-(SP)
14061 050262  012746  007472                     MOV     #PHR.5,-(SP)
14062 050266  012746  006660                     MOV     #WRD.34,-(SP)
14063 050272  012746  006100                     MOV     #SIX.FMT,-(SP)
14064 050276  012746  000007                     MOV     #7,-(SP)
14065 050302  010600                             MOV     SP,R0                   ; SP,*
14066 050304  104414                             TRAP    14
14067 050306  000524                             BR      15$                     ;                                       6734
14068 050310  026627  000004  000001  12$:       CMP     4(SP),#1                ; GTR.FLG,*                             6743
14069 050316  001067                             BNE     14$
14070 050320  010516                             MOV     R5,(SP)                 ; *,TEMP                                6746
14071 050322  042716  015777                     BIC     #15777,(SP)             ; *,TEMP                                6747
14072 050326  021627  162000                     CMP     (SP),#-16000            ; TEMP,*                                6749
14073 050332  001427                             BEQ     13$
14074 050334  104455                             TRAP    55                      ;                                       6752
14075 050336  000112                             .WORD   112
14076 050340  010570                             .WORD   ARR.DAT
14077 050342  024052                             .WORD   DUMPER
14078 050344  012746  006552                     MOV     #WRD.24,-(SP)           ;                                       6753
14079 050350  012746  006654                     MOV     #WRD.33,-(SP)
14080 050354  012746  006330                     MOV     #WRD.5,-(SP)
14081 050360  012746  006646                     MOV     #WRD.32,-(SP)
14082 050364  012746  007366                     MOV     #PHR.1,-(SP)
14083 050370  012746  006660                     MOV     #WRD.34,-(SP)
14084 050374  012746  006100                     MOV     #SIX.FMT,-(SP)
14085 050400  012746  000007                     MOV     #7,-(SP)
14086 050404  010600                             MOV     SP,R0                   ; SP,*
14087 050406  104414                             TRAP    14
14088 050410  000463                             BR      15$                     ;                                       6754
14089 050412  026603  000002              13$:   CMP     2(SP),R3                ; LOW.CNT,HIGH.CNT                      6759
14090 050416  002064                             BGE     16$
14091 050420  104455                             TRAP    55                      ;                                       6762
```

```
14093                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
14094                                   ;                                                       22-Dec-1980 09:21:22    PA:<
14095
14096 050422 000113                             .WORD   113
14097 050424 010570                             .WORD   ARR.DAT
14098 050426 024052                             .WORD   DUMPER
14099 050430 012746 006552                      MOV     #WRD.24,-(SP)           ;                                       6763
14100 050434 012746 006654                      MOV     #WRD.33,-(SP)
14101 050440 012746 006330                      MOV     #WRD.5,-(SP)
14102 050444 012746 006646                      MOV     #WRD.32,-(SP)
14103 050450 012746 007366                      MOV     #PHR.1,-(SP)
14104 050454 012746 006660                      MOV     #WRD.34,-(SP)
14105 050460 012746 006100                      MOV     #SIX.FMT,-(SP)
14106 050464 012746 000007                      MOV     #7,-(SP)
14107 050470 010600                             MOV     SP,R0                   ; SP,*
14108 050472 104414                             TRAP    14
14109 050474 000431                             BR      15$                     ;                                       6764
14110 050476 026603 000002              14$:    CMP     2(SP),R3                ; LOW.CNT,HIGH.CNT                      6773
14111 050502 001432                             BEQ     16$
14112 050504 104455                             TRAP    55                      ;                                       6776
14113 050506 000154                             .WORD   154
14114 050510 010570                             .WORD   ARR.DAT
14115 050512 024052                             .WORD   DUMPER
14116 050514 012746 006552                      MOV     #WRD.24,-(SP)           ;                                       6777
14117 050520 012746 006654                      MOV     #WRD.33,-(SP)
14118 050524 012746 006330                      MOV     #WRD.5,-(SP)
14119 050530 012746 006646                      MOV     #WRD.32,-(SP)
14120 050534 012746 007366                      MOV     #PHR.1,-(SP)
14121 050540 012746 006660                      MOV     #WRD.34,-(SP)
14122 050544 012746 006100                      MOV     #SIX.FMT,-(SP)
14123 050550 012746 000007                      MOV     #7,-(SP)
14124 050554 010600                             MOV     SP,R0                   ; SP,*
14125 050556 104414                             TRAP    14
14126 050560 012701 000001              15$:    MOV     #1,R1                   ; *,ERR.FLG                             6778
14127 050564 062706 000020                      ADD     #20,SP                  ;                                       6775
14128 050570 020127 000001              16$:    CMP     R1,#1                   ; ERR.FLG,*                             6785
14129 050574 001014                             BNE     17$
14130 050576 010546                             MOV     R5,-(SP)                ;                                       6788
14131 050600 012746 004562                      MOV     #FMT.7,-(SP)
14132 050604 012746 000002                      MOV     #2,-(SP)
14133 050610 010600                             MOV     SP,R0                   ; SP,*
14134 050612 104414                             TRAP    14
14135 050614 012766 000001 000014               MOV     #1,14(SP)               ; *,DODU.FLG                            6789
14136 050622 062706 000006                      ADD     #6,SP                   ;                                       6787
14137 050626 104467                     17$:    TRAP    67                      ;                                       6790
14138 050630 006000                             ROR     R0
14139 050632 103002                             BHIS    18$
14140 050634 000167 176754                      JMP     2$
14141 050640 005205                     18$:    INC     R5                      ;                                       6794
14142 050642 001402                             BEQ     19$
14143 050644 000167 176740                      JMP     1$
14144 050650 026627 000006 000001       19$:    CMP     6(SP),#1                ; DODU.FLG,*                            6796
14145 050656 001004                             BNE     20$
14146 050660 016700 142714                      MOV     ML.LUN,R0               ;                                       6799
14147 050664 104451                             TRAP    51
```

```
14149                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
14150                                   ;                                                       22-Dec-1980 09:21:22    PA:<
14151
14152 050666  104444                              TRAP    44
14153 050670  062706  000012              20$:    ADD     #12,SP                          ;                               6626
14154 050674  000207                              RTS     PC
14155
14156                                   ; Routine Size:  292 words
14157                                   ; Maximum stack depth per invocation:  19 words
14162
14163
14167
14171 050676                            T26::
14172 050676  004767  176664            1$:     JSR     PC,$T26                         ;                               6801
14173 050702  104466                              TRAP    66
14174 050704  006000                              ROR     R0
14175 050706  103773                              BLO     1$
14176 050710  000207                              RTS     PC
14177
14178                                   ; Routine Size:  6 words
14179                                   ; Maximum stack depth per invocation:  0 words
14184
14185
14186 ;           6804  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (77)

```
14188 ;ML4
14189 ;
14190
14191 ;          6805  !
14192 ;          6806  !
14193 ;          6807  BGNTST;
14194 ;          6808
14195 ;          6809  !++
14196 ;          6810  ! TEST NUMBER:  TST 27
14197 ;          6811  !
14198 ;          6812  ! TEST NAME:    INITIAL ARRAY TEST
14199 ;          6813  !
14200 ;          6814  ! TEST DESCRIPTION:
14201 ;          6815  !
14202 ;          6816  !       DUE TO THE NATURE OF THE DEVICE
14203 ;          6817  !       THERE EXISTS KNOWN BAD ARRAY
14204 ;          6818  !       DATA LOCATIONS.
14205 ;          6819  !
14206 ;          6820  !       THEREFORE TO INITIALLY TEST THE ARRAYS'
14207 ;          6821  !       TIMING AND CONTROL LOGIC A BAD
14208 ;          6822  !       NIBBLE THRESHOLD OF 36 BAD NIBBLES
14209 ;          6823  !       OUT OF 100 NIBBLES TESTED WILL BE
14210 ;          6824  !       TOLERATED BEFORE DETERMINING CONTROL
14211 ;          6825  !       LOGIC TO BE IN ERROR.
14212 ;          6826  !
14213 ;          6827  !       THE ARRAYS' ARE INITIALLY TESTED BY:
14214 ;          6828  !
14215 ;          6829  !       1.  VIA DAT_DM MOD WRITE DATA PATTERNS
14216 ;          6830  !           OF 1'S AND 0'S TO 5 ARRAY
14217 ;          6831  !           WORDS.
14218 ;          6832  !
14219 ;          6833  !       2.  TEST EACH NIBBLE (4 BITS) FOR
14220 ;          6834  !           1'S AND 0'S AND COUNT EACH BAD
14221 ;          6835  !           NIBBLE ENCOUNTERED.
14222 ;          6836  !
14223 ;          6837  !       3.  IF ACCUMULATED BAD NIBBLES
14224 ;          6838  !           EXCEED 36 THEN REPORT AN ERROR.
14225 ;          6839  !
14226 ;          6840  !--
14227 ;          6841
14228 ;          6842  local
14229 ;          6843      TST_PAT,                          !TEST PATTERN
14230 ;          6844      BAD_NIB_CNT,                      !NUMBER OF BAD NIBBLES FOUND
14231 ;          6845      ERR_FLG;                          !ERROR FLAG
14232 ;          6846
14233 ;          6847  TST_PAT = ONES;
14234 ;          6848  BAD_NIB_CNT = ZEROES;
14235 ;          6849
14236 ;          6850  incr TWICE from 0 to 1 do             !REPEAT LOOP TWICE
14237 ;          6851      begin
14238 ;          6852      BGNSUB;
14239 ;          6853      CLR_MBUS;
14240 ;          6854      MLD1 = .TST_PAT;                  !LOAD TEST PATTERN INTO DIAG REGISTERS
14241 ;          6855      MLD2 = .TST_PAT;
14242 ;          6856      MLE2 = .TST_PAT;
```

```
14244 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
14245 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (77)
14246
14247 ;          6857      DAT_DM = ONE;                      !SET DATA DIAG MODE
14248 ;          6858      FIRST_BLK_XFER ();                 !SET UP A FIRST BLK XFERR
14249 ;          6859      MLCS1 = write;                     !DO A MBUS WRITE FUNCTION
14250 ;          6860
14251 ;          6861      incr CNT from 0 to 4 do            !CLOCK 5 WORDS INTO MEMORY
14252 ;          6862          begin
14253 ;          6863          DELAY (ONE_US);
14254 ;          6864          DAT_CLK = ONE;
14255 ;          6865          end;
14256 ;          6866
14257 ;          6867      CLR_MBUS;
14258 ;          6868      DAT_DM = ONE;                      !SET DATA DIAG MODE
14259 ;          6869      FIRST_BLK_XFER ();                 !SET UP A FIRST BLK XFERR
14260 ;          6870      MLCS1 = read;                      !DO A READ FUNCTION
14261 ;          6871      DELAY (ONE_US);
14262 ;          6872
14263 ;          6873      incr ARR_WRD from 0 to 4 do        !READ THE 5 WORD IN MEMORY
14264 ;          6874          begin
14265 ;          6875          DAT_CLK = ONE;                 !CLOCK OUT A WORD INTO THE DIAG REGS
14266 ;          6876          DELAY (ONE_US);
14267 ;          6877          RD_LNG_WRD;                    !READ THE DIAG REGISTERS
14268 ;          6878
14269 ;          6879          incr NIB_PTR from 0 to 9 do    !READ THE 10 NIBBLES IN THE WORD
14270 ;          6880              begin
14271 ;          6881              TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);  !COMPARE TST PAT TO NIBBLE UNDER TEST
14272 ;          6882
14273 ;          6883              if .ERR_FLG IS_SET then BAD_NIB_CNT = .BAD_NIB_CNT + 1;
14274 ;          6884
14275 ;          6885                                         !INCREMENT BAD_NIBBLE COUNT IFERR_FLG SET
14276 ;          6886              end;
14277 ;          6887
14278 ;          6888          end;
14279 ;          6889
14280 ;          6890      TST_PAT = not .TST_PAT;            !REPEAT WITH COMPLIMENT TST PAT
14281 ;          6891      ENDSUB;
14282 ;          6892      end;
14283 ;          6893
14284 ;          6894  if .BAD_NIB_CNT gtr 36                 !SEE IF 36 OUT OF THE 100 XFERRED WHERE BAD
14285 ;          6895  then
14286 ;          6896      begin                              !ERROR IF GTR 36
14287 ;          6897      ERRDF (77, ASYNC, DUMPER);
14288 ;          6898      PRINTB (FIV_FMT, WRD_22, PHR_4, WRD_12, WRD_45, FNC_14);
14289 ;          6899      DODU (.ML_LUN);
14290 ;          6900      DOCLN;
14291 ;          6901      end;
14292 ;          6902
14293 ;          6903  ENDTST;
14297
```

```
14299                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
14300                                   ;                                                       22-Dec-1980 09:21:22    PA:<
14301
14305 050712 004167 133200              $T27:   JSR     R1,$SAVE5               ;                                       6803
14306 050716 024646                             CMP     -(SP),-(SP)
14307 050720 012701 177777                      MOV     #-1,R1                  ; *,TST.PAT                             6847
14308 050724 005046                             CLR     -(SP)                   ; BAD.NIB.CNT                           6848
14309 050726 005005                             CLR     R5                      ; TWICE                                 6850
14310 050730 104402                     1$:     TRAP    2                       ;                                       6851
14311 050732 152777 000040 142254               BISB    #40,@ML.REG+40          ;                                       6852
14312 050740 016704 142636                      MOV     ML.DUT,R4
14313 050744 042704 177770                      BIC     #177770,R4
14314 050750 142777 000007 142236               BICB    #7,@ML.REG+40
14315 050756 150477 142232                      BISB    R4,@ML.REG+40
14316 050762 010177 142356                      MOV     R1,@ML.REG+170          ; TST.PAT,*                             6854
14317 050766 010177 142362                      MOV     R1,@ML.REG+200          ; TST.PAT,*                             6855
14318 050772 010177 142336                      MOV     R1,@ML.REG+160          ; TST.PAT,*                             6856
14319 050776 152777 000010 142270               BISB    #10,@ML.REG+120         ;                                       6857
14320 051004 004767 145030                      JSR     PC,FIRST.BLK.XFER       ;                                       6858
14321 051010 012777 000061 142136               MOV     #61,@ML.REG             ;                                       6859
14322 051016 005002                             CLR     R2                      ; CNT                                   6861
14323 051020 012703 000001              2$:     MOV     #1,R3                   ; *,$$TMP2                              6863
14324 051024 001411                     3$:     BEQ     6$
14325 051026 016704 131064                      MOV     L$DLY,R4                ; *,$$TMP1
14326 051032 001404                             BEQ     5$
14327 051034 005066 000004              4$:     CLR     4(SP)                   ; $$TMP
14328 051040 005304                             DEC     R4                      ; $$TMP1
14329 051042 001374                             BNE     4$
14330 051044 005303                     5$:     DEC     R3                      ; $$TMP2
14331 051046 000766                             BR      3$
14332 051050 152777 000020 142216       6$:     BISB    #20,@ML.REG+120         ;                                       6864
14333 051056 005202                             INC     R2                      ; CNT                                   6861
14334 051060 020227 000004                      CMP     R2,#4                   ; CNT,*
14335 051064 003755                             BLE     2$
14336 051066 152777 000040 142120               BISB    #40,@ML.REG+40          ;                                       6865
14337 051074 016704 142502                      MOV     ML.DUT,R4
14338 051100 042704 177770                      BIC     #177770,R4
14339 051104 142777 000007 142102               BICB    #7,@ML.REG+40
14340 051112 150477 142076                      BISB    R4,@ML.REG+40
14341 051116 152777 000010 142150               BISB    #10,@ML.REG+120         ;                                       6868
14342 051124 004767 144710                      JSR     PC,FIRST.BLK.XFER       ;                                       6869
14343 051130 012777 000071 142016               MOV     #71,@ML.REG             ;                                       6870
14344 051136 012703 000001                      MOV     #1,R3                   ; *,$$TMP2                              6871
14345 051142 001411                     7$:     BEQ     10$
14346 051144 016704 130746                      MOV     L$DLY,R4                ; *,$$TMP1
14347 051150 001404                             BEQ     9$
14348 051152 005066 000004              8$:     CLR     4(SP)                   ; $$TMP
14349 051156 005304                             DEC     R4                      ; $$TMP1
14350 051160 001374                             BNE     8$
14351 051162 005303                     9$:     DEC     R3                      ; $$TMP2
14352 051164 000766                             BR      7$
14353 051166 005002                     10$:    CLR     R2                      ; ARR.WRD                               6873
```

```
14355                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
14356                                   ;                                                       22-Dec-1980 09:21:22    PA:<
14357
14358 051170  152777  000020  142076  11$:    BISB    #20,@ML.REG+120         ;                                       6875
14359 051176  012703  000001                  MOV     #1,R3                   ; *,$$TMP2                              6876
14360 051202  001411                  12$:    BEQ     15$
14361 051204  016704  130706                  MOV     L$DLY,R4                ; *,$$TMP1
14362 051210  001404                          BEQ     14$
14363 051212  005066  000004          13$:    CLR     4(SP)                   ; $$TMP
14364 051216  005304                          DEC     R4                      ; $$TMP1
14365 051220  001374                          BNE     13$
14366 051222  005303                  14$:    DEC     R3                      ; $$TMP2
14367 051224  000766                          BR      12$
14368 051226  017767  142112  137716  15$:    MOV     @ML.REG+170,D1.TEMP
14369 051234  017767  142114  137712          MOV     @ML.REG+200,D2.TEMP
14370 051242  017767  142066  137706          MOV     @ML.REG+160,E2.TEMP
14371 051250  005004                          CLR     R4                      ; NIB.PTR                               6879
14372 051252  010446                  16$:    MOV     R4,-(SP)                ; NIB.PTR,*                             6881
14373 051254  010146                          MOV     R1,-(SP)                ; TST.PAT,*
14374 051256  012746  000010                  MOV     #10,-(SP)
14375 051262  060616                          ADD     SP,(SP)                 ; ERR.FLG,*
14376 051264  004767  144656                  JSR     PC,TST.LNG.WRD
14377 051270  026627  000010  000001          CMP     10(SP),#1               ; ERR.FLG,*                             6883
14378 051276  001002                          BNE     17$
14379 051300  005266  000006                  INC     6(SP)                   ; BAD.NIB.CNT
14380 051304  062706  000006          17$:    ADD     #6,SP                   ;                                       6880
14381 051310  005204                          INC     R4                      ; NIB.PTR                               6879
14382 051312  020427  000011                  CMP     R4,#11                  ; NIB.PTR,*
14383 051316  003755                          BLE     16$
14384 051320  005202                          INC     R2                      ; ARR.WRD                               6873
14385 051322  020227  000004                  CMP     R2,#4                   ; ARR.WRD,*
14386 051326  003720                          BLE     11$
14387 051330  005101                          COM     R1                      ; TST.PAT                               6890
14388 051332  104467                          TRAP    67
14389 051334  006000                          ROR     R0
14390 051336  103002                          BHIS    19$
14391 051340  000167  177364          18$:    JMP     1$
14392 051344  005205                  19$:    INC     R5                      ; TWICE                                 6850
14393 051346  020527  000001                  CMP     R5,#1                   ; TWICE,*
14394 051352  003772                          BLE     18$
14395 051354  021627  000044                  CMP     (SP),#44                ; BAD.NIB.CNT,*                         6894
14396 051360  003432                          BLE     20$
14397 051362  104455                          TRAP    55                      ;                                       6897
14398 051364  000115                          .WORD   115
14399 051366  010464                          .WORD   ASYNC
14400 051370  024052                          .WORD   DUMPER
14401 051372  012746  010122                  MOV     #FNC.14,-(SP)           ;                                       6898
14402 051376  012746  006772                  MOV     #WRD.45,-(SP)
14403 051402  012746  006426                  MOV     #WRD.12,-(SP)
14404 051406  012746  007454                  MOV     #PHR.4,-(SP)
14405 051412  012746  006530                  MOV     #WRD.22,-(SP)
14406 051416  012746  006062                  MOV     #FIV.FMT,-(SP)
14407 051422  012746  000006                  MOV     #6,-(SP)
14408 051426  010600                          MOV     SP,R0                   ; SP,*
14409 051430  104414                          TRAP    14
```

```
14411                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
14412                                   ;                                                       22-Dec-1980 09:21:22    PA:<
14413
14414 051432  016700  142142                    MOV     ML.LUN,R0                       ;                               6899
14415 051436  104451                            TRAP    51
14416 051440  104444                            TRAP    44
14417 051442  062706  000016                    ADD     #16,SP                          ;                               6896
14418 051446  062706  000006            20$:    ADD     #6,SP                           ;                               6803
14419 051452  000207                            RTS     PC
14420
14421                                   ; Routine Size:  177 words
14422                                   ; Maximum stack depth per invocation:  16 words
14427
14428
14432
14436 051454                            T27::
14437 051454  004767  177232            1$:     JSR     PC,$T27                         ;                               6901
14438 051460  104466                            TRAP    66
14439 051462  006000                            ROR     R0
14440 051464  103773                            BLO     1$
14441 051466  000207                            RTS     PC
14442
14443                                   ; Routine Size:  6 words
14444                                   ; Maximum stack depth per invocation:  0 words
14449
14450
14451 ;          6904  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (78)

```
14453 ;ML4
14454 ;
14455
14456 ;          6905  !
14457 ;          6906  BGNTST;
14458 ;          6907
14459 ;          6908  !++
14460 ;          6909  ! TEST NUMBER:  TST 28
14461 ;          6910  !
14462 ;          6911  ! TEST NAME:    PROM SELECTION TEST
14463 ;          6912  !
14464 ;          6913  ! TEST DESCRIPTION:
14465 ;          6914  !       DUE TO THE NATURE OF THE DEVICE
14466 ;          6915  !       AND OF THE ARRAY MODULES' UV
14467 ;          6916  !       PROMS, ONLY PROM READS ARE
14468 ;          6917  !       ALLOWED DURING DIAG TESTING.
14469 ;          6918  !
14470 ;          6919  !       THEREFORE THE ARRAY MODULE UV PROMS
14471 ;          6920  !       ARE TESTED FOR UNIQUE SELECTION BY:
14472 ;          6921  !
14473 ;          6922  !       1.  AT EACH PRESENT ARRAY MODULE WRITE 127 ARRAY WORDS WITH 1'S/0'S PATTERN.
14474 ;          6923  !
14475 ;          6924  !       2.  READ THE UV PROMS AT THEIR RESPECTIVE ARRAY WORD LOCATION AND SEE IF
14476 ;          6925  !           THE PROMS MASK BAD NIBBLE LOCATIONS (ENCOUNTERED BAD NIBBLES
14477 ;          6926  !           INDICATES INCORRECT MASKING).  COUNT EACH BAD NIBBLE ENCOUNTERED AT AN
14478 ;          6927  !           ARRAY MODULE.
14479 ;          6928  !
14480 ;          6929  !       3.  ALLOW A THRESHOLD OF 5 BAD NIBBLES AT ANY ARRAY MODULE.
14481 ;          6930  !
14482 ;          6931  !       4.  REPORT PROM SEL ERRORS AT RESPECTIVE ARRAY MODULE IF THE
14483 ;          6932  !           THRESHOLD IS EXCEEDED.
14484 ;          6933  !
14485 ;          6934  ! IMPLICIT INPUTS:
14486 ;          6935  !       PD_TEMP:
14487 ;          6936  !       A BIT VECTOR OF 16 BITS WHERE
14488 ;          6937  !       THE READ PROM DATA IS STORED
14489 ;          6938  !       AND ACCESSED FROM.
14490 ;          6939  !
14491 ;          6940  !       IO_BUF
14492 ;          6941  !       A VECTOR OF 256 WORDS WHERE
14493 ;          6942  !       DATA FOR MBUS READS AND WRITE
14494 ;          6943  !       FUNCTION ARE FOUND.
14495 ;          6944  !
14496 ;          6945  !--
14497 ;          6946
14498 ;          6947  local
14499 ;          6948      DODU_FLG,                          !DROP UNIT FLG
14500 ;          6949      ERR_FLG,                           !ERROR FLG
14501 ;          6950      TST_PAT,                           !TEST PATTERN
14502 ;          6951      ERR_CNT;                           !ERROR COUNT
14503 ;          6952
14504 ;          6953  DODU_FLG = ZERO;
14505 ;          6954  TST_PAT = ONES;
14506 ;          6955
14507 ;          6956  incr ARR_SEL from 0 to .LST_ARR by .ARR_INC do  !TEST ALL PRESENT ARRAYS
```

```
14509 ;ML4
14510 ;
14511
14512 ;          6957        begin
14513 ;          6958        ERR_CNT = ZERO;
14514 ;          6959        BGNSUB;
14515 ;          6960
14516 ;          6961        incr TWICE from 0 to 1 do                   !REPEAT LOOP TWICE
14517 ;          6962            begin
14518 ;          6963            CLR_MBUS;
14519 ;          6964            MLD1 = .TST_PAT;                        !LOAD DATA DIAG REGISTERS WITH TST_PAT
14520 ;          6965            MLD2 = .TST_PAT;
14521 ;          6966            MLE2 = .TST_PAT;
14522 ;          6967            DAT_DM = ONE;                           !SET DATA DIAG MODE
14523 ;          6968            MLWC = not 255;                         !LOAD WORD COUNT
14524 ;          6969            MLBA = IO_BUF;                          !LOAD UBUS ADRS
14525 ;          6970            MLDA = .ARR_SEL;                        !LOAD SECTOR
14526 ;          6971            MLCS1 = write;                          !DO A WRITE FUNCTION
14527 ;          6972
14528 ;          6973            incr CNT from 0 to 127 do               !CLOCK IN 127 WORDS
14529 ;          6974                begin
14530 ;          6975                DELAY (ONE_US);
14531 ;          6976                DAT_CLK = ONE;
14532 ;          6977                end;
14533 ;          6978
14534 ;          6979            CLR_MBUS;
14535 ;          6980            DAT_DM = ONE;                           !SET DATA DIAG MODE
14536 ;          6981            MLWC = not 255;                         !LOAD WORD COUNT
14537 ;          6982            MLBA = IO_BUF;                          !LOAD UBUS ADRS
14538 ;          6983            MLDA = .ARR_SEL;                        !LOAD SECTOR
14539 ;          6984            MLCS1 = read;                           !DO A READ FUNCTION
14540 ;          6985            DELAY (ONE_US);
14541 ;          6986
14542 ;          6987            incr WD_CNT from 0 to 127 do            !READ THE 10 WORDS
14543 ;          6988                begin
14544 ;          6989                PD_TEMP = .MLPD;                    !GET PROM DATA FOR THIS WORD
14545 ;          6990                DAT_CLK = ONE;                      !CLOCK THIS WORD INTO DIAG REG
14546 ;          6991                DELAY (ONE_US);
14547 ;          6992                RD_LNG_WRD;                         !READ DIAG REG FOR THIS WORD
14548 ;          6993
14549 ;          6994                incr NIB_PTR from 0 to 9 do         !LOOK AT ALL 10 NIBBLE
14550 ;          6995
14551 ;          6996                    if .PD_TEMP [.NIB_PTR] IS_NOT_SET       !FIND GOOD NIBBLES
14552 ;          6997                    then
14553 ;          6998                        begin
14554 ;          6999                        TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);  !COMPARE NIBBLE TO TST_PAT
14555 ;          7000
14556 ;          7001                        if .ERR_FLG IS_SET then ERR_CNT = .ERR_CNT + 1;
14557 ;          7002
14558 ;          7003                                                    !INCREMENT ERROR COUNT IF ERROR FLG IS SET
14559 ;          7004                        end;
14560 ;          7005
14561 ;          7006                end;
14562 ;          7007
14563 ;          7008        TST_PAT = not .TST_PAT;                     !REPEAT WITH COMPLIMENT DATA
```

```
14565 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
14566 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (78)
14567
14568 ;          7009          end;
14569 ;          7010
14570 ;          7011      if .ERR_CNT gtr 5                  !ALLOW 5 ERROR BEFORE ERRORING
14571 ;          7012      then
14572 ;          7013          begin                          !ERROR IF GTR 5
14573 ;          7014          ERRDF (78, ARR_DAT, DUMPER);
14574 ;          7015          PRINTB (THR_FMT, WRD_35, WRD_37, WRD_10);
14575 ;          7016          PRINTB (FMT_9, .ARR_SEL);
14576 ;          7017          DODU_FLG = ONE;
14577 ;          7018          end;
14578 ;          7019
14579 ;          7020      ENDSUB;
14580 ;          7021
14581 ;          7022      if .DODU_FLG IS_SET                !DROP THIS UNIT IF DODU_FLG IS SET
14582 ;          7023      then
14583 ;          7024          begin
14584 ;          7025          DODU (.ML_LUN);
14585 ;          7026          DOCLN;
14586 ;          7027          end;
14587 ;          7028
14588 ;          7029      end;
14589 ;          7030
14590 ;          7031  ENDTST;
14594
14598 051470  004167  132422          $T28:   JSR     R1,$SAVE5                       ;                       6903
14599 051474  162706  000016                  SUB     #16,SP
14600 051500  005066  000010                  CLR     10(SP)                          ; DODU.FLG              6953
14601 051504  012702  177777                  MOV     #-1,R2                          ; *,TST.PAT             6954
14602 051510  016766  140062  000006          MOV     LST.ARR,6(SP)                   ;                       6956
14603 051516  016766  140040  000004          MOV     ARR.INC,4(SP)
14604 051524  005001                          CLR     R1                              ; ARR.SEL
14605 051526  000167  000666                  JMP     25$
14606 051532  005066  000002          1$:     CLR     2(SP)                           ; ERR.CNT               6958
14607 051536  104402                  2$:     TRAP    2
14608 051540  005016                          CLR     (SP)                            ; TWICE                 6961
14609 051542  152777  000040  141444  3$:     BISB    #40,@ML.REG+40                  ;                       6962
14610 051550  016705  142026                  MOV     ML.DUT,R5
14611 051554  042705  177770                  BIC     #177770,R5
14612 051560  142777  000007  141426          BICB    #7,@ML.REG+40
14613 051566  150577  141422                  BISB    R5,@ML.REG+40
14614 051572  010277  141546                  MOV     R2,@ML.REG+170                  ; TST.PAT,*             6964
14615 051576  010277  141552                  MOV     R2,@ML.REG+200                  ; TST.PAT,*             6965
14616 051602  010277  141526                  MOV     R2,@ML.REG+160                  ; TST.PAT,*             6966
14617 051606  152777  000010  141460          BISB    #10,@ML.REG+120                 ;                       6967
14618 051614  012777  177400  141342          MOV     #-400,@ML.REG+10                ;                       6968
```

```
14620                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
14621                                   ;                                                       22-Dec-1980 09:21:22    PA:<
14622
14623 051622 012777 011600 141344       MOV     #IO.BUF,@ML.REG+20      ;                                       6969
14624 051630 010177 141350              MOV     R1,@ML.REG+30           ; ARR.SEL,*                             6970
14625 051634 012777 000061 141312       MOV     #61,@ML.REG             ;                                       6971
14626 051642 005003                     CLR     R3                      ; CNT                                   6973
14627 051644 012704 000001          4$: MOV     #1,R4                   ; *,$$TMP2                              6975
14628 051650 001411                 5$: BEQ     8$
14629 051652 016705 130240              MOV     L$DLY,R5                ; *,$$TMP1
14630 051656 001404                     BEQ     7$
14631 051660 005066 000014          6$: CLR     14(SP)                  ; $$TMP
14632 051664 005305                     DEC     R5                      ; $$TMP1
14633 051666 001374                     BNE     6$
14634 051670 005304                 7$: DEC     R4                      ; $$TMP2
14635 051672 000766                     BR      5$
14636 051674 152777 000020 141372   8$: BISB    #20,@ML.REG+120         ;                                       6976
14637 051702 005203                     INC     R3                      ; CNT                                   6973
14638 051704 020327 000177              CMP     R3,#177                 ; CNT,*
14639 051710 003755                     BLE     4$
14640 051712 152777 000040 141274       BISB    #40,@ML.REG+40          ;                                       6977
14641 051720 016705 141656              MOV     ML.DUT,R5
14642 051724 042705 177770              BIC     #177770,R5
14643 051730 142777 000007 141256       BICB    #7,@ML.REG+40
14644 051736 150577 141252              BISB    R5,@ML.REG+40
14645 051742 152777 000010 141324       BISB    #10,@ML.REG+120         ;                                       6980
14646 051750 012777 177400 141206       MOV     #-400,@ML.REG+10        ;                                       6981
14647 051756 012777 011600 141210       MOV     #IO.BUF,@ML.REG+20      ;                                       6982
14648 051764 010177 141214              MOV     R1,@ML.REG+30           ; ARR.SEL,*                             6983
14649 051770 012777 000071 141156       MOV     #71,@ML.REG             ;                                       6984
14650 051776 012704 000001              MOV     #1,R4                   ; *,$$TMP2                              6985
14651 052002 001411                 9$: BEQ     12$
14652 052004 016705 130106              MOV     L$DLY,R5                ; *,$$TMP1
14653 052010 001404                     BEQ     11$
14654 052012 005066 000014          10$:CLR     14(SP)                  ; $$TMP
14655 052016 005305                     DEC     R5                      ; $$TMP1
14656 052020 001374                     BNE     10$
14657 052022 005304                 11$:DEC     R4                      ; $$TMP2
14658 052024 000766                     BR      9$
14659 052026 005003                 12$:CLR     R3                      ; WD.CNT                                6987
14660 052030 017767 141350 141062   13$:MOV     @ML.REG+230,PD.TEMP     ;                                       6989
14661 052036 152777 000020 141230       BISB    #20,@ML.REG+120         ;                                       6990
14662 052044 012704 000001              MOV     #1,R4                   ; *,$$TMP2                              6991
14663 052050 001411                 14$:BEQ     17$
14664 052052 016705 130040              MOV     L$DLY,R5                ; *,$$TMP1
14665 052056 001404                     BEQ     16$
14666 052060 005066 000014          15$:CLR     14(SP)                  ; $$TMP
14667 052064 005305                     DEC     R5                      ; $$TMP1
14668 052066 001374                     BNE     15$
14669 052070 005304                 16$:DEC     R4                      ; $$TMP2
14670 052072 000766                     BR      14$
14671 052074 017767 141244 137050   17$:MOV     @ML.REG+170,D1.TEMP
14672 052102 017767 141246 137044       MOV     @ML.REG+200,D2.TEMP
14673 052110 017767 141220 137040       MOV     @ML.REG+160,E2.TEMP
14674 052116 005004                     CLR     R4                      ; NIB.PTR                               6994
```

```
14676                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
14677                                   ;                                                       22-Dec-1980 09:21:22    PA:<
14678
14679 052120 010405                     18$:    MOV     R4,R5           ; NIB.PTR,*                                     6996
14680 052122 006205                             ASR     R5
14681 052124 006205                             ASR     R5
14682 052126 006205                             ASR     R5
14683 052130 062705 013120                      ADD     #PD.TEMP,R5
14684 052134 010546                             MOV     R5,-(SP)
14685 052136 010446                             MOV     R4,-(SP)        ; NIB.PTR,*
14686 052140 042716 177770                      BIC     #177770,(SP)
14687 052144 012746 000001                      MOV     #1,-(SP)
14688 052150 005046                             CLR     -(SP)
14689 052152 004767 130762                      JSR     PC,BL$GT2
14690 052156 062706 000010                      ADD     #10,SP
14691 052162 005700                             TST     R0
14692 052164 001017                             BNE     20$
14693 052166 010446                             MOV     R4,-(SP)        ; NIB.PTR,*                                     6999
14694 052170 010246                             MOV     R2,-(SP)        ; TST.PAT,*
14695 052172 012746 000020                      MOV     #20,-(SP)
14696 052176 060616                             ADD     SP,(SP)         ; ERR.FLG,*
14697 052200 004767 143742                      JSR     PC,TST.LNG.WRD
14698 052204 026627 000020 000001               CMP     20(SP),#1       ; ERR.FLG,*                                     7001
14699 052212 001002                             BNE     19$
14700 052214 005266 000010                      INC     10(SP)          ; ERR.CNT
14701 052220 062706 000006              19$:    ADD     #6,SP           ;                                               6998
14702 052224 005204                     20$:    INC     R4              ; NIB.PTR                                       6994
14703 052226 020427 000011                      CMP     R4,#11          ; NIB.PTR,*
14704 052232 003732                             BLE     18$
14705 052234 005203                             INC     R3              ; WD.CNT                                        6987
14706 052236 020327 000177                      CMP     R3,#177         ; WD.CNT,*
14707 052242 003672                             BLE     13$
14708 052244 005102                             COM     R2              ; TST.PAT                                       7008
14709 052246 005216                             INC     (SP)            ; TWICE                                         6961
14710 052250 021627 000001                      CMP     (SP),#1         ; TWICE,*
14711 052254 003002                             BGT     21$
14712 052256 000167 177260                      JMP     3$
14713 052262 026627 000002 000005       21$:    CMP     2(SP),#5        ; ERR.CNT,*                                     7011
14714 052270 003434                             BLE     22$
14715 052272 104455                             TRAP    55              ;                                               7014
14716 052274 000116                             .WORD   116
14717 052276 010570                             .WORD   ARR.DAT
14718 052300 024052                             .WORD   DUMPER
14719 052302 012746 006406                      MOV     #WRD.10,-(SP)   ;                                               7015
14720 052306 012746 006700                      MOV     #WRD.37,-(SP)
14721 052312 012746 006666                      MOV     #WRD.35,-(SP)
14722 052316 012746 006034                      MOV     #THR.FMT,-(SP)
14723 052322 012746 000004                      MOV     #4,-(SP)
14724 052326 010600                             MOV     SP,R0           ; SP,*
14725 052330 104414                             TRAP    14
14726 052332 010116                             MOV     R1,(SP)         ; ARR.SEL,*                                     7016
14727 052334 012746 004644                      MOV     #FMT.9,-(SP)
14728 052340 012746 000002                      MOV     #2,-(SP)
14729 052344 010600                             MOV     SP,R0           ; SP,*
14730 052346 104414                             TRAP    14
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
                                                                                                                        7017
052350  012766  000001  000026          MOV     #1,26(SP)               ; *,DODU.FLG            ;                       7013
052356  062706  000016                  ADD     #16,SP                  ;                       ;                       7018
052362  104467                  22$:     TRAP    67                      ;
052364  006000                          ROR     R0
052366  103002                          BHIS    23$
052370  000167  177142                  JMP     2$
052374  026627  000010  000001  23$:     CMP     10(SP),#1               ; DODU.FLG,*                                    7022
052402  001004                          BNE     24$
052404  016700  141170                  MOV     ML.LUN,R0               ;                                               7025
052410  104451                          TRAP    51
052412  104444                          TRAP    44
052414  066601  000004          24$:     ADD     4(SP),R1                ; *,ARR.SEL                                     6956
052420  020166  000006          25$:     CMP     R1,6(SP)                ; ARR.SEL,*
052424  003002                          BGT     26$
052426  000167  177100                  JMP     1$
052432  062706  000016          26$:     ADD     #16,SP                  ;                                               6903
052436  000207                          RTS     PC

                                        ; Routine Size:  244 words
                                        ; Maximum stack depth per invocation:  20 words


052440                          T28::
052440  004767  177024          1$:     JSR     PC,$T28                 ;                                               7029
052444  104466                          TRAP    66
052446  006000                          ROR     R0
052450  103773                          BLO     1$
052452  000207                          RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;               7032  !<BLF/PAGE>
```

```
14785 ;ML4
14786 ;
14787
14788 ;          7033  !
14789 ;          7034  BGNTST;
14790 ;          7035
14791 ;          7036  !++
14792 ;          7037  ! TEST NUMBER:  TST 29
14793 ;          7038  !
14794 ;          7039  ! TEST NAME:    READ WRITE ARRAYS WITH PROM DATA
14795 ;          7040  !
14796 ;          7041  ! TEST DESCRIPTION:
14797 ;          7042  !       COMBINE THE READING OF ARRAY
14798 ;          7043  !       MODULE DATA WITH ARRAY MODULE UV PROM DATA AND
14799 ;          7044  !       FIND A GOOD BLOCK WHERE FURTHER
14800 ;          7045  !       TESTING WILL BE PERFORMED BY:
14801 ;          7046  !
14802 ;          7047  !       1.  STARTING AT BLOCK 0 WRITE THE BLOCK WITH SELECTED DATA PATTERNS
14803 ;          7048  !           AND READ THE BLOCK AVOIDING ANY BAD NIBBLES POINTED TO BY THE
14804 ;          7049  !           PROM DATA.
14805 ;          7050  !
14806 ;          7051  !           SET ERROR FLAG IF ANY BAD NIBBLES ARE ENCOUNTERED IN BLOCK.
14807 ;          7052  !
14808 ;          7053  !       2.  REPEAT WRITING/READING THIS BLOCK UNTIL ALL PATTERNS ARE TESTED
14809 ;          7054  !           OR THE ERROR FLAG IS SET.
14810 ;          7055  !
14811 ;          7056  !       3.  IF ALL PATTERN HAVE BEEN TESTED AND THE ERROR FLAG IS NOT SET
14812 ;          7057  !           THEN SAVE THIS BLOCK ADDRESS AS THE GOOD BLOCK ADRS AND EXIT TEST.
14813 ;          7058  !
14814 ;          7059  !       4.  ELSE IF THE ERROR FLG HAS SET THEN REPEAT TEST AT THE NEXT ROW.
14815 ;          7060  !           REPEAT UNTIL A GOOD BLOCK IS FOUND OR LAST ROW IS REACHED.
14816 ;          7061  !
14817 ;          7062  !       5.  IF NO GOOD BLOCK IS FOUND BY LAST ROW THEN REPORT ERROR AND
14818 ;          7063  !           EXIT TEST.
14819 ;          7064  !
14820 ;          7065  ! IMPLICIT INPUTS:
14821 ;          7066  !       RAS_INC
14822 ;          7067  !       LOADED DURING THE INITIALIZATION CODE AND CONTAINS THE ROW ADDRESS
14823 ;          7068  !       INCREMENT VALUE FOR THIS DRIVE.
14824 ;          7069  !
14825 ;          7070  !
14826 ;          7071  !       PD_TEMP:
14827 ;          7072  !       A BITVECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND
14828 ;          7073  !       ACCESSED FROM.
14829 ;          7074  !
14830 ;          7075  !       IO_BUF:
14831 ;          7076  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE FUNCTION
14832 ;          7077  !       ARE FOUND.
14833 ;          7078  !
14834 ;          7079  !
14835 ;          7080  !--
14836 ;          7081
14837 ;          7082  local
14838 ;          7083      WRD_CNT,                          !WORD COUNT
14839 ;          7084      NIB_PTR,                          !NIBBLE POINTER
```

```
14841 ;ML4
14842 ;
14843 ;
14844 ;          7085      PASS_CNT,                       !PASS COUNT
14845 ;          7086      NIB_PAT,                        !NIBBLE PATTERN
14846 ;          7087      DONE_FLG,                       !DONE FLAG
14847 ;          7088      ERR_FLG,                        !ERROR FLAG
14848 ;          7089      SECTOR_NO;                      !SECTOR NUMBER
14849 ;          7090
14850 ;          7091  BGNSUB;
14851 ;          7092  PASS_CNT = -1;
14852 ;          7093  SECTOR_NO = ZEROES;
14853 ;          7094  DONE_FLG = ZERO;
14854 ;          7095
14855 ;          7096  do                                  !THIS LOOP DETERMINES WHEN TO STOP
14856 ;          7097      begin
14857 ;          7098
14858 ;          7099      do                              !THIS LOOP RUNS THE PATTERNS
14859 ;          7100          begin
14860 ;          7101          PASS_CNT = .PASS_CNT + 1;   !INCREMENT THE PASS COUNT
14861 ;          7102          CLR_MBUS;
14862 ;          7103          DAT_DM = ONE;               !SET DATA DIAG MODE
14863 ;          7104          MLDA = .SECTOR_NO;          !LOAD SECTOR NUMBER IN DSA
14864 ;          7105          MLWC = not 255;             !LOAD WORD COUNT
14865 ;          7106          MLBA = IO_BUF;              !LOAD UBUS ADRS
14866 ;          7107
14867 ;          7108          case .PASS_CNT from 0 to 3 of   !SELECT A NIBBLE PATTERN
14868 ;          7109              set
14869 ;          7110
14870 ;          7111              [0] :
14871 ;          7112                  NIB_PAT = %o'000000';   !ZEROES
14872 ;          7113
14873 ;          7114              [1] :
14874 ;          7115                  NIB_PAT = %o'17';       !ONES
14875 ;          7116
14876 ;          7117              [2] :
14877 ;          7118                  NIB_PAT = %o'12';       !ALTERNATING ONE'S, ZEROES
14878 ;          7119
14879 ;          7120              [3] :
14880 ;          7121                  NIB_PAT = %o'15'        !COMPLIMENT ONE'S, ZEROES
14881 ;          7122              tes;
14882 ;          7123
14883 ;          7124          incr LD_CNT from 0 to 9 do      !LOAD NIBBLE PATTERN INTO NIBBLE SAVE
14884 ;          7125              LD_LNG_WRD (.LD_CNT, .NIB_PAT);
14885 ;          7126
14886 ;          7127          WRT_LNG_WRD;                    !LOAD THE DATA DIAG REGISTERS WITH NIBBLE SAVE
14887 ;          7128          MLCS1 = write;                  !DO A WRITE FUNCTION
14888 ;          7129
14889 ;          7130          incr WRT_CNT from 0 to 127 do   !WRITE PATTERN INTO THIS BLOCK
14890 ;          7131              begin
14891 ;          7132              DELAY (ONE_US);
14892 ;          7133              DAT_CLK = ONE;
14893 ;          7134              end;
14894 ;          7135
14895 ;          7136          CLR_MBUS;
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (79)

        7137        DAT_DM = ONE;                       !SET DATA DIAG MODE
        7138        MLDA = .SECTOR_NO;                  !LOAD SECTOR NUMBER
        7139        MLWC = not 255;                     !LOAD WORD COUNT
        7140        MLBA = IO_BUF;                      !LOAD UBUS ADRS
        7141        MLCS1 = read;                       !DO A READ FUNCTION
        7142        DELAY (ONE_US);
        7143        WRD_CNT = -1;                       !RESET THE WORD COUNT
        7144
        7145        do
        7146            begin                           !TEST ONE BLOCK FOR NIBBLE PATTERN
        7147            WRD_CNT = .WRD_CNT + 1;
        7148            PD_TEMP = .MLPD;                !GET PROM DATA
        7149            DAT_CLK = ONE;                  !CLOCK DATA WORD INTO DIAG REG
        7150            DELAY (ONE_US);                 !
        7151            RD_LNG_WRD;                     !READ DIAG REGISTERS
        7152            NIB_PTR = -1;                   !RESET THE NIBBLE POINTER
        7153
        7154            do
        7155                begin                       !SEARCH FOR GOOD NIBBLES
        7156                NIB_PTR = .NIB_PTR + 1;     !INCREMENT NIBBLE POINTER
        7157
        7158                if .PD_TEMP [.NIB_PTR] IS_NOT_SET       !TEST THIS NIB IF PROM FLAG NOT SET
        7159                then
        7160                    TST_LNG_WRD (.NIB_PTR, .NIB_PAT, ERR_FLG);
        7161
        7162                end
        7163            until (.ERR_FLG) or (.NIB_PTR eql 9);
        7164
        7165            end
        7166        until (.ERR_FLG) or (.WRD_CNT eql 127);
        7167
        7168        end
        7169    until (.PASS_CNT eql 3) or (.ERR_FLG IS_SET );      !REPEAT UNTIL ALL PAT TESTED OR ERROR FLG GETS SET
        7170
        7171    if (.PASS_CNT eql 3) and (.ERR_FLG IS_NOT_SET )     !WAS THIS A GOOD BLOCK?
        7172    then
        7173        begin                                   !YES
        7174        DONE_FLG = ONE;                         !SET DONE FLAG
        7175        GOOD_BLK = .SECTOR_NO;                  !GOOD BLOCK GETS THIS SECTOR NO
        7176        end
        7177    else
        7178        begin                                   !NO
        7179        SECTOR_NO = .SECTOR_NO + .RAS_INC;      !INCREMENT ROW NO
        7180        PASS_CNT = -1;                          !RESET PASS COUNT
        7181        end;
        7182
        7183    end
        7184 until (.DONE_FLG IS_SET ) or (.SECTOR_NO eql .LST_ARR + .ARR_INC);
        7185
        7186                                                !REPEAT UNTIL GOOD BLK FOUND OR AT LST ROW
        7187 ENDSUB;
        7188
```

```
14953 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
14954 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (79)
14955
14956 ;          7189  if .SECTOR_NO eql .LST_ARR + .ARR_INC          !SEE IF WE'RE AT THE LAST BLOCK
14957 ;          7190  then
14958 ;          7191      begin                                      !A GOOD BLK NOT FOUND BEFORE LAST BLK
14959 ;          7192      ERRDF (79, INTER, DUMPER);                 !ERROR AND DROP UNIT
14960 ;          7193      PRINTB (THR_FMT, WRD_14, PHR_10, FNC_15);
14961 ;          7194      DODU (.ML_LUN);
14962 ;          7195      DOCLN;
14963 ;          7196      end;
14964 ;          7197
14965 ;          7198  ENDTST;
14969
14973 052454  004167  131436          $T29:   JSR     R1,$SAVE5                       ;                               7031
14974 052460  162706  000014                  SUB     #14,SP
14975 052464  104402                  1$:     TRAP    2                               ;                               7089
14976 052466  012766  177777  000002          MOV     #-1,2(SP)                       ; *,PASS.CNT                    7092
14977 052474  005002                          CLR     R2                              ; SECTOR.NO                     7093
14978 052476  005066  000004                  CLR     4(SP)                           ; DONE.FLG                      7094
14979 052502  005266  000002          2$:     INC     2(SP)                           ; PASS.CNT                      7101
14980 052506  152777  000040  140500          BISB    #40,@ML.REG+40
14981 052514  016705  141062                  MOV     ML,DUT,R5
14982 052520  042705  177770                  BIC     #177770,R5
14983 052524  142777  000007  140462          BICB    #7,@ML.REG+40
14984 052532  150577  140456                  BISB    R5,@ML.REG+40
14985 052536  152777  000010  140530          BISB    #10,@ML.REG+120                 ;                               7103
14986 052544  010277  140434                  MOV     R2,@ML.REG+30                   ; SECTOR.NO,*                   7104
14987 052550  012777  177400  140406          MOV     #-400,@ML.REG+10                ;                               7105
14988 052556  012777  011600  140410          MOV     #IO.BUF,@ML.REG+20              ;                               7106
14989 052564  016605  000002                  MOV     2(SP),R5                        ; PASS.CNT,*                    7108
14990 052570  006305                          ASL     R5
14991 052572  066507  052576                  ADD     3$(R5),PC
14992 052576  000010                  3$:     .WORD   4$-3$
14993 052600  000014                          .WORD   5$-3$
14994 052602  000022                          .WORD   6$-3$
14995 052604  000030                          .WORD   7$-3$
14996 052606  005001                  4$:     CLR     R1                              ; NIB.PAT                       7112
14997 052610  000410                          BR      8$                              ;                               7108
14998 052612  012701  000017          5$:     MOV     #17,R1                          ; *,NIB.PAT                     7115
14999 052616  000405                          BR      8$                              ;                               7108
15000 052620  012701  000012          6$:     MOV     #12,R1                          ; *,NIB.PAT                     7118
15001 052624  000402                          BR      8$                              ;                               7108
15002 052626  012701  000015          7$:     MOV     #15,R1                          ; *,NIB.PAT                     7121
15003 052632  005005                  8$:     CLR     R5                              ; LD.CNT                        7124
15004 052634  010546                  9$:     MOV     R5,-(SP)                        ; LD.CNT,*                      7125
15005 052636  010146                          MOV     R1,-(SP)                        ; NIB.PAT,*
15006 052640  004767  144260                  JSR     PC,LD.LNG.WRD
```

```
15008                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
15009                                   ;                                                       22-Dec-1980 09:21:22    PA:<
15010
15011 052644  022626                          CMP     (SP)+,(SP)+
15012 052646  005205                          INC     R5                      ; LD.CNT                                7124
15013 052650  020527  000011                  CMP     R5,#11                  ; LD.CNT,*
15014 052654  003767                          BLE     9$
15015 052656  016777  136270  140460          MOV     D1.TEMP,@ML.REG+170     ;                                       7125
15016 052664  016777  136264  140462          MOV     D2.TEMP,@ML.REG+200
15017 052672  016777  136260  140434          MOV     E2.TEMP,@ML.REG+160
15018 052700  012777  000061  140246          MOV     #61,@ML.REG             ;                                       7128
15019 052706  005003                          CLR     R3                      ; WRT.CNT                               7130
15020 052710  012704  000001          10$:    MOV     #1,R4                   ; *,$$TMP2                              7132
15021 052714  001411          11$:    BEQ     14$
15022 052716  016705  127174                  MOV     L$DLY,R5                ; *,$$TMP1
15023 052722  001404                          BEQ     13$
15024 052724  005066  000012          12$:    CLR     12(SP)                  ; $$TMP
15025 052730  005305                          DEC     R5                      ; $$TMP1
15026 052732  001374                          BNE     12$
15027 052734  005304                  13$:    DEC     R4                      ; $$TMP2
15028 052736  000766                          BR      11$
15029 052740  152777  000020  140326  14$:    BISB    #20,@ML.REG+120         ;                                       7133
15030 052746  005203                          INC     R3                      ; WRT.CNT                               7130
15031 052750  020327  000177                  CMP     R3,#177                 ; WRT.CNT,*
15032 052754  003755                          BLE     10$
15033 052756  152777  000040  140230          BISB    #40,@ML.REG+40          ;                                       7134
15034 052764  016705  140612                  MOV     ML.DUT,R5
15035 052770  042705  177770                  BIC     #177770,R5
15036 052774  142777  000007  140212          BICB    #7,@ML.REG+40
15037 053002  150577  140206                  BISB    R5,@ML.REG+40
15038 053006  152777  000010  140260          BISB    #10,@ML.REG+120         ;                                       7137
15039 053014  010277  140164                  MOV     R2,@ML.REG+30           ; SECTOR.NO,*                           7138
15040 053020  012777  177400  140136          MOV     #-400,@ML.REG+10        ;                                       7139
15041 053026  012777  011600  140140          MOV     #IO.BUF,@ML.REG+20      ;                                       7140
15042 053034  012777  000071  140112          MOV     #71,@ML.REG             ;                                       7141
15043 053042  012704  000001                  MOV     #1,R4                   ; *,$$TMP2                              7142
15044 053046  001411          15$:    BEQ     18$
15045 053050  016705  127042                  MOV     L$DLY,R5                ; *,$$TMP1
15046 053054  001404                          BEQ     17$
15047 053056  005066  000012          16$:    CLR     12(SP)                  ; $$TMP
15048 053062  005305                          DEC     R5                      ; $$TMP1
15049 053064  001374                          BNE     16$
15050 053066  005304                  17$:    DEC     R4                      ; $$TMP2
15051 053070  000766                          BR      15$
15052 053072  012766  177777  000006  18$:    MOV     #-1,6(SP)               ; *,WRD.CNT                             7143
15053 053100  005266  000006          19$:    INC     6(SP)                   ; WRD.CNT                               7147
15054 053104  017767  140274  140006          MOV     @ML.REG+230,PD.TEMP     ;                                       7148
15055 053112  152777  000020  140154          BISB    #20,@ML.REG+120         ;                                       7149
15056 053120  012704  000001                  MOV     #1,R4                   ; *,$$TMP2                              7150
15057 053124  001411          20$:    BEQ     23$
15058 053126  016705  126764                  MOV     L$DLY,R5                ; *,$$TMP1
15059 053132  001404                          BEQ     22$
15060 053134  005066  000012          21$:    CLR     12(SP)                  ; $$TMP
15061 053140  005305                          DEC     R5                      ; $$TMP1
15062 053142  001374                          BNE     21$
```

```
15064                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
15065                                   ;                                                       22-Dec-1980 09:21:22    PA:<
15066
15067 053144 005304                     22$:    DEC     R4                      ; $$TMP2
15068 053146 000766                             BR      20$
15069 053150 017767 140170 135774       23$:    MOV     @ML.REG+170,D1.TEMP
15070 053156 017767 140172 135770               MOV     @ML.REG+200,D2.TEMP
15071 053164 017767 140144 135764               MOV     @ML.REG+160,E2.TEMP
15072 053172 012716 177777                      MOV     #-1,(SP)                ; *,NIB.PTR                                     7152
15073 053176 005216                     24$:    INC     (SP)                    ; NIB.PTR                                       7156
15074 053200 011605                             MOV     (SP),R5                 ; NIB.PTR,*                                     7158
15075 053202 006205                             ASR     R5
15076 053204 006205                             ASR     R5
15077 053206 006205                             ASR     R5
15078 053210 062705 013120                      ADD     #PD.TEMP,R5
15079 053214 010546                             MOV     R5,-(SP)
15080 053216 016646 000002                      MOV     2(SP),-(SP)             ; NIB.PTR,*
15081 053222 042716 177770                      BIC     #177770,(SP)
15082 053226 012746 000001                      MOV     #1,-(SP)
15083 053232 005046                             CLR     -(SP)
15084 053234 004767 127700                      JSR     PC,BL$GT2
15085 053240 062706 000010                      ADD     #10,SP
15086 053244 005700                             TST     R0
15087 053246 001011                             BNE     25$
15088 053250 011646                             MOV     (SP),-(SP)              ; NIB.PTR,*                                     7160
15089 053252 010146                             MOV     R1,-(SP)                ; NIB.PAT,*
15090 053254 012746 000016                      MOV     #16,-(SP)
15091 053260 060616                             ADD     SP,(SP)                 ; ERR.FLG,*
15092 053262 004767 142660                      JSR     PC,TST.LNG.WRD
15093 053266 062706 000006                      ADD     #6,SP
15094 053272 016605 000010              25$:    MOV     10(SP),R5               ; ERR.FLG,*                                     7163
15095 053276 032705 000001                      BIT     #1,R5
15096 053302 001012                             BNE     26$
15097 053304 021627 000011                      CMP     (SP),#11                ; NIB.PTR,*
15098 053310 001332                             BNE     24$
15099 053312 032705 000001                      BIT     #1,R5                   ;                                               7166
15100 053316 001004                             BNE     26$
15101 053320 026627 000006 000177               CMP     6(SP),#177              ; WRD.CNT,*
15102 053326 001264                             BNE     19$
15103 053330 005004                     26$:    CLR     R4                      ;                                               7169
15104 053332 026627 000002 000003               CMP     2(SP),#3                ; PASS.CNT,*
15105 053340 001002                             BNE     27$
15106 053342 005204                             INC     R4
15107 053344 000403                             BR      28$
15108 053346 020527 000001              27$:    CMP     R5,#1
15109 053352 001030                             BNE     31$
15110 053354 006004                     28$:    ROR     R4                      ;                                               7171
15111 053356 103010                             BCC     29$
15112 053360 005705                             TST     R5
15113 053362 001006                             BNE     29$
15114 053364 012766 000001 000004               MOV     #1,4(SP)                ; *,DONE.FLG                                    7174
15115 053372 010267 136166                      MOV     R2,GOOD.BLK             ; SECTOR.NO,*                                   7175
15116 053376 000405                             BR      30$                     ;                                               7171
15117 053400 066702 137520              29$:    ADD     RAS.INC,R2              ; *,SECTOR.NO                                   7179
15118 053404 012766 177777 000002               MOV     #-1,2(SP)               ; *,PASS.CNT                                    7180
```

```
15120                                   ;ML4
15121                                   ;
15122
15123 053412  026627  000004  000001  30$:    CMP     4(SP),#1                ; DONE.FLG,*                    7184
15124 053420  001410                          BEQ     32$
15125 053422  016705  136150                  MOV     LST.ARR,R5
15126 053426  066705  136130                  ADD     ARR.INC,R5
15127 053432  020205                          CMP     R2,R5                   ; SECTOR.NO,*
15128 053434  001402                  31$:    BEQ     32$
15129 053436  000167  177040                  JMP     2$
15130 053442  104467                  32$:    TRAP    67
15131 053444  006000                          ROR     R0
15132 053446  103002                          BHIS    33$
15133 053450  000167  177010                  JMP     1$
15134 053454  016705  136116          33$:    MOV     LST.ARR,R5              ;                               7189
15135 053460  066705  136076                  ADD     ARR.INC,R5
15136 053464  020205                          CMP     R2,R5                   ; SECTOR.NO,*
15137 053466  001026                          BNE     34$
15138 053470  104455                          TRAP    55                      ;                               7192
15139 053472  000117                          .WORD   117
15140 053474  010672                          .WORD   INTER
15141 053476  024052                          .WORD   DUMPER
15142 053500  012746  010136                  MOV     #FNC.15,-(SP)           ;                               7193
15143 053504  012746  007564                  MOV     #PHR.10,-(SP)
15144 053510  012746  006442                  MOV     #WRD.14,-(SP)
15145 053514  012746  006034                  MOV     #THR.FMT,-(SP)
15146 053520  012746  000004                  MOV     #4,-(SP)
15147 053524  010600                          MOV     SP,R0                   ; SP,*
15148 053526  104414                          TRAP    14
15149 053530  016700  140044                  MOV     ML.LUN,R0               ;                               7194
15150 053534  104451                          TRAP    51
15151 053536  104444                          TRAP    44
15152 053540  062706  000012                  ADD     #12,SP                  ;                               7191
15153 053544  062706  000014          34$:    ADD     #14,SP                  ;                               7031
15154 053550  000207                          RTS     PC
15155
15156                                   ; Routine Size:  287 words
15157                                   ; Maximum stack depth per invocation:  17 words
15162
15163
15167
15171 053552                            T29::
15172 053552  004767  176676          1$:     JSR     PC,$T29                 ;                               7196
15173 053556  104466                          TRAP    66
```

```
15175                                   ;ML4                                    22-Dec-1980 09:24:31    TOPS
15176                                   ;                                       22-Dec-1980 09:21:22    PA:<
15177
15178 053560  006000                            ROR     R0
15179 053562  103773                            BLO     1$
15180 053564  000207                            RTS     PC
15181
15182                                   ; Routine Size:  6 words
15183                                   ; Maximum stack depth per invocation:  0 words
15188
15189
15190 ;         7199  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (80)

```
15192 ;ML4
15193 ;
15194
15195 ;          7200  !
15196 ;          7201  !
15197 ;          7202  BGNTST;
15198 ;          7203
15199 ;          7204  !++
15200 ;          7205  ! TEST NUMBER:  TST 30
15201 ;          7206  !
15202 ;          7207  ! TEST NAME:    REFRESH TIMING TEST
15203 ;          7208  !
15204 ;          7209  ! TEST DESCRIPTION:
15205 ;          7210  !
15206 ;          7211  !       TEST THE MEMORY ARRAY MODULES
15207 ;          7212  !       REFRESH TIMING AND CONTROL LOGIC
15208 ;          7213  !       REG BY:
15209 ;          7214  !
15210 ;          7215  !       1.  WRITING ALL ONES INTO THE
15211 ;          7216  !           GOOD BLOCK.
15212 ;          7217  !
15213 ;          7218  !       2.  DELAY FOR 2 MS
15214 ;          7219  !
15215 ;          7220  !       3.  READ THE GOOD BLOCK FOR ONES.
15216 ;          7221  !           KEEP COUNT OF BAD NIBBLES
15217 ;          7222  !           ENCOUNTERED
15218 ;          7223  !
15219 ;          7224  !       4.  ALLOW A BAD NIBBLE THRESHOLD
15220 ;          7225  !           OF 20 BAD NIBBLES OUT OF THE
15221 ;          7226  !           1280 NIBBLES TESTED.
15222 ;          7227  !
15223 ;          7228  !       5.  IF THRESHOLD IS EXCEEDED THEN
15224 ;          7229  !           REPORT ERROR AND DROP THE UNIT.
15225 ;          7230  !
15226 ;          7231  ! IMPLICIT INPUTS:
15227 ;          7232  !
15228 ;          7233  !       PD_TEMP:
15229 ;          7234  !       A BIT VECTOR OF 16 BITS WHERE
15230 ;          7235  !       THE READ PROM DATA IS STORED
15231 ;          7236  !       AND ACCESSED FROM.
15232 ;          7237  !
15233 ;          7238  !--
15234 ;          7239
15235 ;          7240  local
15236 ;          7241      TST_PAT,                    !TEST PATTERN
15237 ;          7242      ERR_CNT,                    !ERROR COUNT
15238 ;          7243      ERR_FLG;                    !ERROR FLAG
15239 ;          7244
15240 ;          7245  BGNSUB;
15241 ;          7246  CLR_MBUS;
15242 ;          7247  ERR_CNT = ZERO;
15243 ;          7248  TST_PAT = ONES;
15244 ;          7249  MLD1 = .TST_PAT;              !LOAD DATA DIAG REGS WITH TST PAT
15245 ;          7250  MLD2 = .TST_PAT;
15246 ;          7251  MLE2 = .TST_PAT;
```

```
15248 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
15249 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (80)
15250
15251 ;          7252  DAT_DM_XFER ();                        !SET UP A DATA DIAG MODE XFERR
15252 ;          7253  MLCS1 = write;                         !DO A WRITE FUNCTION
15253 ;          7254
15254 ;          7255  incr WRD_CNT from 0 to 127 do          !WRITE BLOCK WITH TST PAT
15255 ;          7256      begin
15256 ;          7257      DELAY (ONE_US);
15257 ;          7258      DAT_CLK = ONE;
15258 ;          7259      end;
15259 ;          7260
15260 ;          7261  CLR_MBUS;
15261 ;          7262  DAT_DM_XFER ();                        !SET UP A DATA DIAG MODE XFERR
15262 ;          7263  MLCS1 = read;                          !DO A READ FUNCTION
15263 ;          7264  DELAY (TWO_TH_US);                     !DELAY FOR 2 MS
15264 ;          7265
15265 ;          7266  incr WRD_CNT from 0 to 127 do          !READ THE BLOCK
15266 ;          7267      begin
15267 ;          7268      PD_TEMP = .MLPD;                   !GET THE PROM DATA
15268 ;          7269      DAT_CLK = ONE;                     !CLOCK DATA WORD INTO DIAG REG
15269 ;          7270      DELAY (ONE_US);
15270 ;          7271      RD_LNG_WRD;                        !READ THE DIAG REG
15271 ;          7272
15272 ;          7273      incr NIB_PTR from 0 to 9 do        !LOOK AT 10 NIBBLES
15273 ;          7274          begin
15274 ;          7275
15275 ;          7276          if .PD_TEMP [.NIB_PTR] IS_NOT_SET then TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);
15276 ;          7277
15277 ;          7278                                         !FIND GOOD NIBBLES AND COMPARE THEM
15278 ;          7279
15279 ;          7280          if .ERR_FLG IS_SET then ERR_CNT = .ERR_CNT + 1; !INCREMENT ERROR COUNT IF ERR_FLG IS SET
15280 ;          7281
15281 ;          7282          end;
15282 ;          7283
15283 ;          7284      end;
15284 ;          7285
15285 ;          7286  ENDSUB;
15286 ;          7287
15287 ;          7288  if .ERR_CNT gtr 20                     !ALLOW 20 NIBBLES TO FAIL
15288 ;          7289  then
15289 ;          7290      begin                              !ERROR IF GTR 20
15290 ;          7291      ERRDF (80, ASYNC, DUMPER);
15291 ;          7292      PRINTB (FIV_FMT, WRD_22, PHR_4, WRD_12, FNC_16, WRD_48);
15292 ;          7293      DODU (.ML_LDN);
15293 ;          7294      DOCLN;
15294 ;          7295      end;
15295 ;          7296
15296 ;          7297  ENDTST;
15300
```

```
15308 053566 004167 130324          $T30:  JSR     R1,$SAVE5                ;                                  7198
15309 053572 024646                        CMP     -(SP),-(SP)
15310 053574 104402                 1$:    TRAP    2                        ;                                  7243
15311 053576 152777 000040 137410          BISB    #40,@ML.REG+40           ;                                  7245
15312 053604 016703 137772                 MOV     ML.DUT,R3
15313 053610 042703 177770                 BIC     #177770,R3
15314 053614 142777 000007 137372          BICB    #7,@ML.REG+40
15315 053622 150377 137366                 BISB    R3,@ML.REG+40
15316 053626 005005                        CLR     R5                       ; ERR.CNT                          7247
15317 053630 012704 177777                 MOV     #-1,R4                   ; *,TST.PAT                        7248
15318 053634 010477 137504                 MOV     R4,@ML.REG+170           ; TST.PAT,*                        7249
15319 053640 010477 137510                 MOV     R4,@ML.REG+200           ; TST.PAT,*                        7250
15320 053644 010477 137464                 MOV     R4,@ML.REG+160           ; TST.PAT,*                        7251
15321 053650 004767 140306                 JSR     PC,DAT.DM.XFER           ;                                  7252
15322 053654 012777 000061 137272          MOV     #61,@ML.REG              ;                                  7253
15323 053662 005001                        CLR     R1                       ; WRD.CNT                          7255
15324 053664 012702 000001          2$:    MOV     #1,R2                    ; *,$$TMP2                         7257
15325 053670 001411                 3$:    BEQ     6$
15326 053672 016703 126220                 MOV     L$DLY,R3                 ; *,$$TMP1
15327 053676 001404                        BEQ     5$
15328 053700 005066 000002          4$:    CLR     2(SP)                    ; $$TMP
15329 053704 005303                        DEC     R3                       ; $$TMP1
15330 053706 001374                        BNE     4$
15331 053710 005302                 5$:    DEC     R2                       ; $$TMP2
15332 053712 000766                        BR      3$
15333 053714 152777 000020 137352   6$:    BISB    #20,@ML.REG+120          ;                                  7258
15334 053722 005201                        INC     R1                       ; WRD.CNT                          7255
15335 053724 020127 000177                 CMP     R1,#177                  ; WRD.CNT,*
15336 053730 003755                        BLE     2$
15337 053732 152777 000040 137254          BISB    #40,@ML.REG+40           ;                                  7259
15338 053740 016703 137636                 MOV     ML.DUT,R3
15339 053744 042703 177770                 BIC     #177770,R3
15340 053750 142777 000007 137236          BICB    #7,@ML.REG+40
15341 053756 150377 137232                 BISB    R3,@ML.REG+40
15342 053762 004767 140174                 JSR     PC,DAT.DM.XFER           ;                                  7262
15343 053766 012777 000071 137160          MOV     #71,@ML.REG              ;                                  7263
15344 053774 012702 003720                 MOV     #3720,R2                 ; *,$$TMP2                         7264
15345 054000 001411                 7$:    BEQ     10$
15346 054002 016703 126110                 MOV     L$DLY,R3                 ; *,$$TMP1
15347 054006 001404                        BEQ     9$
15348 054010 005066 000002          8$:    CLR     2(SP)                    ; $$TMP
15349 054014 005303                        DEC     R3                       ; $$TMP1
15350 054016 001374                        BNE     8$
15351 054020 005302                 9$:    DEC     R2                       ; $$TMP2
15352 054022 000766                        BR      7$
15353 054024 005001                 10$:   CLR     R1                       ; WRD.CNT                          7266
15354 054026 017767 137352 137064   11$:   MOV     @ML.REG+230,PD.TEMP      ;                                  7268
15355 054034 152777 000020 137232          BISB    #20,@ML.REG+120          ;                                  7269
15356 054042 012702 000001                 MOV     #1,R2                    ; *,$$TMP2                         7270
15357 054046 001411                 12$:   BEQ     15$
```

```
15359                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
15360                                   ;                                                       22-Dec-1980 09:21:22    PA:<
15361
15362 054050 016703 126042                      MOV     L$DLY,R3                ; *,$$TMP1
15363 054054 001404                             BEQ     14$
15364 054056 005066 000002              13$:    CLR     2(SP)                   ; $$TMP
15365 054062 005303                             DEC     R3                      ; $$TMP1
15366 054064 001374                             BNE     13$
15367 054066 005302                     14$:    DEC     R2                      ; $$TMP2
15368 054070 000766                             BR      12$
15369 054072 017767 137246 135052       15$:    MOV     @ML.REG+170,D1.TEMP
15370 054100 017767 137250 135046               MOV     @ML.REG+200,D2.TEMP
15371 054106 017767 137222 135042               MOV     @M..REG+160,E2.TEMP
15372 054114 005002                             CLR     R2                      ; NIB.PTR                                       7273
15373 054116 010203                     16$:    MOV     R2,R3                   ; NIB.PTR,*                                     7276
15374 054120 006203                             ASR     R3
15375 054122 006203                             ASR     R3
15376 054124 006203                             ASR     R3
15377 054126 062703 013120                      ADD     #PD.TEMP,R3
15378 054132 010346                             MOV     R3,-(SP)
15379 054134 010246                             MOV     R2,-(SP)                ; NIB.PTR,*
15380 054136 042716 177770                      BIC     #177770,(SP)
15381 054142 012746 000001                      MOV     #1,-(SP)
15382 054146 005046                             CLR     -(SP)
15383 054150 004767 126764                      JSR     PC,BL$GT2
15384 054154 062706 000010                      ADD     #10,SP
15385 054160 005700                             TST     R0
15386 054162 001011                             BNE     17$
15387 054164 010246                             MOV     R2,-(SP)                ; NIB.PTR,*
15388 054166 010446                             MOV     R4,-(SP)                ; TST.PAT,*
15389 054170 012746 000006                      MOV     #6,-(SP)
15390 054174 060616                             ADD     SP,(SP)                 ; ERR.FLG,*
15391 054176 004767 141744                      JSR     PC,TST.LNG.WRD
15392 054202 062706 000006                      ADD     #6,SP
15393 054206 021627 000001              17$:    CMP     (SP),#1                 ; ERR.FLG,*                                     7280
15394 054212 001001                             BNE     18$
15395 054214 005205                             INC     R5                      ; ERR.CNT
15396 054216 005202                     18$:    INC     R2                      ; NIB.PTR                                       7273
15397 054220 020227 000011                      CMP     R2,#11                  ; NIB.PTR,*
15398 054224 003734                             BLE     16$
15399 054226 005201                             INC     R1                      ; WRD.CNT                                       7266
15400 054230 020127 000177                      CMP     R1,#177                 ; WRD.CNT,*
15401 054234 003674                             BLE     11$
15402 054236 104467                             TRAP    67                      ;                                               7284
15403 054240 006000                             ROR     R0
15404 054242 103002                             BHIS    19$
15405 054244 000167 177324                      JMP     1$
15406 054250 020527 000024              19$:    CMP     R5,#24                  ; ERR.CNT,*                                     7288
15407 054254 003432                             BLE     20$
15408 054256 104455                             TRAP    55                      ;                                               7291
15409 054260 000120                             .WORD   120
15410 054262 010464                             .WORD   ASYNC
15411 054264 024052                             .WORD   DUMPER
15412 054266 012746 007026                      MOV     #WRD.48,-(SP)           ;                                               7292
15413 054272 012746 010150                      MOV     #FNC.16,-(SP)
```

```
15415                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
15416                                   ;                                                       22-Dec-1980 09:21:22    PA:<
15417
15418 054276  012746  006426                    MOV     #WRD.12,-(SP)
15419 054302  012746  007454                    MOV     #PHR.4,-(SP)
15420 054306  012746  006530                    MOV     #WRD.22,-(SP)
15421 054312  012746  006062                    MOV     #FIV.FMT,-(SP)
15422 054316  012746  000006                    MOV     #6,-(SP)
15423 054322  010600                            MOV     SP,R0                           ; SP,*
15424 054324  104414                            TRAP    14
15425 054326  016700  137246                    MOV     ML.LUN,R0                       ;                       7293
15426 054332  104451                            TRAP    51
15427 054334  104444                            TRAP    44
15428 054336  062706  000016                    ADD     #16,SP                          ;                       7290
15429 054342  022626                  20$:      CMP     (SP)+,(SP)+                     ;                       7198
15430 054344  000207                            RTS     PC
15431
15432                                   ; Routine Size:  184 words
15433                                   ; Maximum stack depth per invocation:  15 words
15438
15439
15443
15447 054346                            T30::
15448 054346  004767  177214            1$:     JSR     PC,$T30                         ;                       7295
15449 054352  104466                            TRAP    66
15450 054354  006000                            ROR     R0
15451 054356  103773                            BLO     1$
15452 054360  000207                            RTS     PC
15453
15454                                   ; Routine Size:  6 words
15455                                   ; Maximum stack depth per invocation:  0 words
15460
15461
15462 ;           7298  !<BLF/PAGE>
```

```
15464 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
15465 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (81)
15466
15467 ;          7299  !
15468 ;          7300  BGNTST;
15469 ;          7301
15470 ;          7302  !++
15471 ;          7303  ! TEST NUMBER:  TST 31
15472 ;          7304  !
15473 ;          7305  ! TEST NAME:    ADDRESS COUNTER TEST
15474 ;          7306  !
15475 ;          7307  ! TEST DESCRIPTION:
15476 ;          7308  !       TEST THE ABILITY OF THE ADDRESS
15477 ;          7309  !       COUNTER TO SUCCESSFULLY COUNT
15478 ;          7310  !       FROM BLOCK ZERO THROUGH THE
15479 ;          7311  !       DEVICES LAST BLOCK BY:
15480 ;          7312  !
15481 ;          7313  !       1.  WRITING THE LAST BLOCK WITH ONES PATTERN.
15482 ;          7314  !
15483 ;          7315  !       2.  STARTING AT BLOCK ZERO WRITE ZEROES INTO ALL BLOCK UP TO THE
15484 ;          7316  !           LAST BLOCK ADRS MINUS ONE.
15485 ;          7317  !
15486 ;          7318  !           READ THE LAST BLOCK FOR ONES AND ERROR IF ZEROES.
15487 ;          7319  !
15488 ;          7320  !       3.  STARTING AT BLOCK ZERO WRITE ZEROES INTO ALL BLOCK THROUGH THE LAST
15489 ;          7321  !           BLOCK.
15490 ;          7322  !
15491 ;          7323  !           READ THE LAST BLOCK FOR ZEROES AND ERROR IF STILL ONES.
15492 ;          7324  !
15493 ;          7325  ! IMPLICIT INPUTS:
15494 ;          7326  !       PD_TEMP:
15495 ;          7327  !       A BITVECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND ACCESSED FROM.
15496 ;          7328  !--
15497 ;          7329
15498 ;          7330  local
15499 ;          7331      DODU_FLG,                          !DROP UNIT FLAG
15500 ;          7332      ERR_FLG,                           !ERROR FLG
15501 ;          7333      END_CNT,                           !ENDING SECTOR NUMBER
15502 ;          7334      BG_PAT;                            !BACKGROUND PATTERN
15503 ;          7335
15504 ;          7336  BGNSUB;
15505 ;          7337  CLR_MBUS;
15506 ;          7338  DODU_FLG = ZERO;
15507 ;          7339  BG_PAT = ONES;                         !BACKGROUND PAT OF ONES
15508 ;          7340  MLD1 = .BG_PAT;                        !LOAD DATA DIAGS WITH BG PAT
15509 ;          7341  MLD2 = .BG_PAT;
15510 ;          7342  MLE2 = .BG_PAT;
15511 ;          7343  DAT_DM = ONE;                          !SET DATA DIAG MODE
15512 ;          7344  LAST_BLK_XFER ();                      !SET UP A LAST BLOCK XFERR
15513 ;          7345  MLCST = write;                         !DO A WRITE FUNCTION
15514 ;          7346
15515 ;          7347  incr WRD_CNT from 0 to 127 do         !WRITE THE LAST BLOCK WITH THE BG PATTERN
15516 ;          7348      begin
15517 ;          7349      DELAY (ONE_US);
15518 ;          7350      DAT_CLK = ONE;
```

```
15520 ;ML4                                                          22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
15521 ;                                                             22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (81)
15522
15523 ;          7351        end;
15524 ;          7352
15525 ;          7353    CLR_MBUS;
15526 ;          7354    DAT_DM = ONE;                              !SET DATA DIAG MODE
15527 ;          7355    LAST_BLK_XFER ();                          !SET UP A LAST BLOCK XFERR
15528 ;          7356    MLCST = read;                              !DO A READ FUNCTION
15529 ;          7357    DELAY (ONE_US);
15530 ;          7358
15531 ;          7359    incr WD_CNT from 0 to 127 do               !READ THE LAST BLOCK FOR BG PATTERN
15532 ;          7360        begin
15533 ;          7361        PD_TEMP = .MLPD;                       !GET PROM DATA
15534 ;          7362        DAT_CLK = ONE;                         !CLOCK OUT THE DATA WORD
15535 ;          7363        DELAY (ONE_US);
15536 ;          7364        RD_LNG_WRD;                            !READ THE DATA WORD
15537 ;          7365
15538 ;          7366        incr NIB_PTR from 0 to 9 do            !LOOK AT 10 NIBBLES
15539 ;          7367            begin
15540 ;          7368
15541 ;          7369            if .PD_TEMP [.NIB_PTR] IS_NOT_SET then TST_LNG_WRD (.NIB_PTR, .BG_PAT, ERR_FLG);
15542 ;          7370
15543 ;          7371                                                   !FIND GOOD NIBBLES AND COMPARE THEM
15544 ;          7372
15545 ;          7373            if .ERR_FLG IS_SET                     !SEE IF ERROR WAS FOUND
15546 ;          7374            then
15547 ;          7375                begin                          !ERROR IF FLG IS SET
15548 ;          7376                ERRDF (81, INTER, DUMPER);
15549 ;          7377                PRINTB (THR_FMT, PHR_4, WRD_13, FNC_22);
15550 ;          7378                PRINTB (TWO_FMT, FNC_13, WRD_56);
15551 ;          7379                EXIT_TST;
15552 ;          7380                end;
15553 ;          7381
15554 ;          7382            end;
15555 ;          7383
15556 ;          7384        end;
15557 ;          7385
15558 ;          7386    END_CNT = .LST_BLK - 1;                    !END AT LAST BLOCK -1
15559 ;          7387    MLDT = ZEROES;                             !LOAD DATA DIAG REG WITH COMP BG PAT
15560 ;          7388    MLD2 = ZEROES;
15561 ;          7389    MLE2 = ZEROES;
15562 ;          7390
15563 ;          7391    incr TWICE from 0 to 1 do                  !REPEAT LOOP TWICE
15564 ;          7392        begin
15565 ;          7393        CLR_MBUS;
15566 ;          7394        DAT_DM = ONE;                          !SET DATA DIAG MODE
15567 ;          7395        FIRST_BLK_XFER ();                     !SET UP A FIRST BLOCK XFERR
15568 ;          7396        MLCS1 = write;                         !DO A WRITE FUNCTION
15569 ;          7397
15570 ;          7398        incr BLK_CNT from 0 to .END_CNT do     !CLOCK THE ADDRESS COUNTER UP TO END_CNT
15571 ;          7399
15572 ;          7400            incr ADRS_CNT from 0 to 127 do
15573 ;          7401                begin
15574 ;          7402                DAT_CLK = ONE;
```

```
15576 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
15577 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (81)
15578
15579 ;          7403              end;
15580 ;          7404
15581 ;          7405      CLR_MBUS;
15582 ;          7406      DAT_DM = ONE;                      !SET DATA DIAG MODE
15583 ;          7407      LAST_BLK_XFER ();                  !SET UP A LAST BLOCK XFERR
15584 ;          7408      MLCST = read;                      !DO A READ FUNCTION
15585 ;          7409      DELAY (ONE_US);
15586 ;          7410
15587 ;          7411      incr WD_CNT from 0 to 127 do       !READ THE LAST BLOCK FOR BG PATTERN
15588 ;          7412          begin
15589 ;          7413          PD_TEMP = .MLPD;               !GET THE PROM DATA
15590 ;          7414          DAT_CLK = ONE;                 !CLOCK OUT DATA WORD
15591 ;          7415          DELAY (ONE_US);
15592 ;          7416          RD_LNG_WRD;                    !READ DATA WORD
15593 ;          7417
15594 ;          7418          incr NIB_PTR from 0 to 9 do    !LOOK AT 10 NIBBLES
15595 ;          7419              begin
15596 ;          7420
15597 ;          7421              if .PD_TEMP [.NIB_PTR] IS_NOT_SET then TST_LNG_WRD (.NIB_PTR, .BG_PAT, ERR_FLG);
15598 ;          7422
15599 ;          7423                                         !FIND GOOD NIBBLES AND COMPARE THEM
15600 ;          7424
15601 ;          7425              if .ERR_FLG IS_SET         !SEE IF ERROR WAS FOUND
15602 ;          7426              then
15603 ;          7427                  begin                  !ERROR IF FLG IS SET
15604 ;          7428                  ERRDF (82, ASYNC, DUMPER);
15605 ;          7429                  PRINTB (THR_FMT, WRD_50, WRD_51, WRD_10);
15606 ;          7430                  DODU_FLG = ONE;
15607 ;          7431                  end;
15608 ;          7432
15609 ;          7433              end;
15610 ;          7434
15611 ;          7435          end;
15612 ;          7436
15613 ;          7437      END_CNT = .END_CNT + 1;            !NOW END AT THE LAST BLOCK
15614 ;          7438      BG_PAT = not .BG_PAT;              !COMPLIMENT THE BG PATTERN AND REPEAT
15615 ;          7439      end;
15616 ;          7440
15617 ;          7441  ENDSUB;
15618 ;          7442
15619 ;          7443  if .DODU_FLG IS_SET                   !DROP THIS UNIT IF DODU_FLG IS_SET
15620 ;          7444  then
15621 ;          7445      begin
15622 ;          7446      DODU (.ML_LUN);
15623 ;          7447      DOCLN;
15624 ;          7448      end;
15625 ;          7449
15626 ;          7450  ENDTST;
15630
```

```
                                                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                                                    22-Dec-1980 09:21:22    PA:<
15632                                   ;ML4
15633                                   ;
15634
15638 054362  004167  127530          $T31:   JSR     R1,$SAVE5                       ;                                                   7297
15639 054366  162706  000010                  SUB     #10,SP
15640 054372  104402                  1$:     TRAP    2                               ;                                                   7334
15641 054374  152777  000040  136612          BISB    #40,@ML.REG+40                  ;                                                   7336
15642 054402  016705  137174                  MOV     ML.DUT,R5
15643 054406  042705  177770                  BIC     #177770,R5
15644 054412  142777  000007  136574          BICB    #7,@ML.REG+40
15645 054420  150577  136570                  BISB    R5,@ML.REG+40
15646 054424  005066  000002                  CLR     2(SP)                           ; DODU.FLG                                          7338
15647 054430  012701  177777                  MOV     #-1,R1                          ; *,BG.PAT                                          7339
15648 054434  010177  136704                  MOV     R1,@ML.REG+170                  ; BG.PAT,*                                          7340
15649 054440  010177  136710                  MOV     R1,@ML.REG+200                  ; BG.PAT,*                                          7341
15650 054444  010177  136664                  MOV     R1,@ML.REG+160                  ; BG.PAT,*                                          7342
15651 054450  152777  000010  136616          BISB    #10,@ML.REG+120                 ;                                                   7343
15652 054456  004767  141432                  JSR     PC,LAST.BLK.XFER                ;                                                   7344
15653 054462  012777  000061  136464          MOV     #61,@ML.REG                     ;                                                   7345
15654 054470  005002                          CLR     R2                              ; WRD.CNT                                           7347
15655 054472  012703  000001          2$:     MOV     #1,R3                           ; *,$$TMP2                                          7349
15656 054476  001411                  3$:     BEQ     6$
15657 054500  016704  125412                  MOV     L$DLY,R4                        ; *,$$TMP1
15658 054504  001404                          BEQ     5$
15659 054506  005066  000006          4$:     CLR     6(SP)                           ; $$TMP
15660 054512  005304                          DEC     R4                              ; $$TMP1
15661 054514  001374                          BNE     4$
15662 054516  005303                  5$:     DEC     R3                              ; $$TMP2
15663 054520  000766                          BR      3$
15664 054522  152777  000020  136544  6$:     BISB    #20,@ML.REG+120                 ;                                                   7350
15665 054530  005202                          INC     R2                              ; WRD.CNT                                           7347
15666 054532  020227  000177                  CMP     R2,#177                         ; WRD.CNT,*
15667 054536  003755                          BLE     2$
15668 054540  152777  000040  136446          BISB    #40,@ML.REG+40                  ;                                                   7351
15669 054546  016705  137030                  MOV     ML.DUT,R5
15670 054552  042705  177770                  BIC     #177770,R5
15671 054556  142777  000007  136430          BICB    #7,@ML.REG+40
15672 054564  150577  136424                  BISB    R5,@ML.REG+40
15673 054570  152777  000010  136476          BISB    #10,@ML.REG+120                 ;                                                   7354
15674 054576  004767  141312                  JSR     PC,LAST.BLK.XFER                ;                                                   7355
15675 054602  012777  000071  136344          MOV     #71,@ML.REG                     ;                                                   7356
15676 054610  012703  000001                  MOV     #1,R3                           ; *,$$TMP2                                          7357
15677 054614  001411                  7$:     BEQ     10$
15678 054616  016704  125274                  MOV     L$DLY,R4                        ; *,$$TMP1
15679 054622  001404                          BEQ     9$
15680 054624  005066  000006          8$:     CLR     6(SP)                           ; $$TMP
15681 054630  005304                          DEC     R4                              ; $$TMP1
15682 054632  001374                          BNE     8$
15683 054634  005303                  9$:     DEC     R3                              ; $$TMP2
15684 054636  000766                          BR      7$
15685 054640  005002                  10$:    CLR     R2                              ; WD.CNT                                            7359
```

```
15687                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
15688                                   ;                                                       22-Dec-1980 09:21:22    PA:<
15689
15690 054642  017767  136536  136250  11$:    MOV     @ML.REG+230,PD.TEMP             ;                                       7361
15691 054650  152777  000020  136416           BISB    #20,@ML.REG+120                 ;                                       7362
15692 054656  012703  000001                   MOV     #1,R3                           ; *,$$TMP2                              7363
15693 054662  001411                   12$:     BEQ     15$
15694 054664  016704  125226                   MOV     L$DLY,R4                        ; *,$$TMP1
15695 054670  001404                           BEQ     14$
15696 054672  005066  000006           13$:     CLR     6(SP)                           ; $$TMP
15697 054676  005304                           DEC     R4                              ; $$TMP1
15698 054700  001374                           BNE     13$
15699 054702  005303                   14$:     DEC     R3                              ; $$TMP2
15700 054704  000766                           BR      12$
15701 054706  017767  136432  134236  15$:     MOV     @ML.REG+170,D1.TEMP
15702 054714  017767  136434  134232           MOV     @ML.REG+200,D2.TEMP
15703 054722  017767  136406  134226           MOV     @ML.REG+160,E2.TEMP
15704 054730  005003                           CLR     R3                              ; NIB.PTR                               7366
15705 054732  010304                   16$:     MOV     R3,R4                           ; NIB.PTR,*                             7369
15706 054734  006204                           ASR     R4
15707 054736  006204                           ASR     R4
15708 054740  006204                           ASR     R4
15709 054742  062704  013120                   ADD     #PD.TEMP,R4
15710 054746  010446                           MOV     R4,-(SP)
15711 054750  010346                           MOV     R3,-(SP)                        ; NIB.PTR,*
15712 054752  042716  177770                   BIC     #177770,(SP)
15713 054756  012746  000001                   MOV     #1,-(SP)
15714 054762  005046                           CLR     -(SP)
15715 054764  004767  126150                   JSR     PC,BL$GT2
15716 054770  062706  000010                   ADD     #10,SP
15717 054774  005700                           TST     R0
15718 054776  001011                           BNE     17$
15719 055000  010346                           MOV     R3,-(SP)                        ; NIB.PTR,*
15720 055002  010146                           MOV     R1,-(SP)                        ; BG.PAT,*
15721 055004  012746  000012                   MOV     #12,-(SP)
15722 055010  060616                           ADD     SP,(SP)                         ; ERR.FLG,*
15723 055012  004767  141130                   JSR     PC,TST.LNG.WRD
15724 055016  062706  000006                   ADD     #6,SP
15725 055022  026627  000004  000001  17$:     CMP     4(SP),#1                        ; ERR.FLG,*                             7373
15726 055030  001037                           BNE     18$
15727 055032  104455                           TRAP    55                              ;                                       7376
15728 055034  000121                           .WORD   121
15729 055036  010672                           .WORD   INTER
15730 055040  024052                           .WORD   DUMPER
15731 055042  012746  010230                   MOV     #FNC.22,-(SP)                   ;                                       7377
15732 055046  012746  006436                   MOV     #WRD.13,-(SP)
15733 055052  012746  007454                   MOV     #PHR.4,-(SP)
15734 055056  012746  006034                   MOV     #THR.FMT,-(SP)
15735 055062  012746  000004                   MOV     #4,-(SP)
15736 055066  010600                           MOV     SP,R0                           ; SP,*
15737 055070  104414                           TRAP    14
15738 055072  012716  007122                   MOV     #WRD.56,(SP)                    ;                                       7378
15739 055076  012746  010112                   MOV     #FNC.13,-(SP)
15740 055102  012746  006024                   MOV     #TWO.FMT,-(SP)
15741 055106  012746  000003                   MOV     #3,-(SP)
```

```
                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                    22-Dec-1980 09:21:22    PA:<
15743                           ;ML4
15744                           ;
15745
15746 055112  010600                      MOV     SP,R0                   ; SP,*
15747 055114  104414                      TRAP    14
15748 055116  104463                      TRAP    63
15749 055120  062706  000020              ADD     #20,SP                  ;                                       7373
15750 055124  000167  000604              JMP     37$                     ;                                       7375
15751 055130  005203              18$:    INC     R3                      ; NIB.PTR                               7366
15752 055132  020327  000011              CMP     R3,#11                  ; NIB.PTR,*
15753 055136  003675                      BLE     16$
15754 055140  005202                      INC     R2                      ; WD.CNT                                7359
15755 055142  020227  000177              CMP     R2,#177                 ; WD.CNT,*
15756 055146  003635                      BLE     11$
15757 055150  016716  134416              MOV     LST.BLK,(SP)            ; *,END.CNT                             7386
15758 055154  005316                      DEC     (SP)                    ; END.CNT
15759 055156  005077  136162              CLR     @ML.REG+170             ;                                       7387
15760 055162  005077  136166              CLR     @ML.REG+200             ;                                       7388
15761 055166  005077  136142              CLR     @ML.REG+160             ;                                       7389
15762 055172  005005                      CLR     R5                      ; TWICE                                 7391
15763 055174  152777  000040  136012  19$:BISB    #40,@ML.REG+40          ;                                       7392
15764 055202  016704  136374              MOV     ML.DUT,R4
15765 055206  042704  177770              BIC     #177770,R4
15766 055212  142777  000007  135774      BICB    #7,@ML.REG+40
15767 055220  150477  135770              BISB    R4,@ML.REG+40
15768 055224  152777  000010  136042      BISB    #10,@ML.REG+120         ;                                       7394
15769 055232  004767  140602              JSR     PC,FIRST.BLK.XFER       ;                                       7395
15770 055236  012777  000061  135710      MOV     #61,@ML.REG             ;                                       7396
15771 055244  005003                      CLR     R3                      ; BLK.CNT                               7398
15772 055246  000411                      BR      22$
15773 055250  005004              20$:    CLR     R4                      ; ADRS.CNT                              7400
15774 055252  152777  000020  136014  21$:BISB    #20,@ML.REG+120         ;                                       7402
15775 055260  005204                      INC     R4                      ; ADRS.CNT                              7400
15776 055262  020427  000177              CMP     R4,#177                 ; ADRS.CNT,*
15777 055266  003771                      BLE     21$
15778 055270  005203                      INC     R3                      ; BLK.CNT                               7398
15779 055272  020316              22$:    CMP     R3,(SP)                 ; BLK.CNT,END.CNT
15780 055274  003765                      BLE     20$
15781 055276  152777  000040  135710      BISB    #40,@ML.REG+40          ;                                       7403
15782 055304  016704  136272              MOV     ML.DUT,R4
15783 055310  042704  177770              BIC     #177770,R4
15784 055314  142777  000007  135672      BICB    #7,@ML.REG+40
15785 055322  150477  135666              BISB    R4,@ML.REG+40
15786 055326  152777  000010  135740      BISB    #10,@ML.REG+120         ;                                       7406
15787 055334  004767  140554              JSR     PC,LAST.BLK.XFER        ;                                       7407
15788 055340  012777  000071  135606      MOV     #71,@ML.REG             ;                                       7408
15789 055346  012703  000001              MOV     #1,R3                   ; *,$$TMP2                              7409
15790 055352  001411              23$:    BEQ     26$
15791 055354  016704  124536              MOV     L$DLY,R4                ; *,$$TMP1
15792 055360  001404                      BEQ     25$
15793 055362  005066  000006      24$:    CLR     6(SP)                   ; $$TMP
15794 055366  005304                      DEC     R4                      ; $$TMP1
15795 055370  001374                      BNE     24$
15796 055372  005303              25$:    DEC     R3                      ; $$TMP2
15797 055374  000766                      BR      23$
```

```
                                                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                                                    22-Dec-1980 09:21:22    PA:<
15799                                    ;ML4
15800                                    ;
15801
15802 055376 005002                26$:   CLR     R2                              ; WD.CNT                                                 7411
15803 055400 017767 136000 135512  27$:   MOV     @ML.REG+230,PD.TEMP             ;                                                        7413
15804 055406 152777 000020 135660          BISB    #20,@ML.REG+120                 ;                                                        7414
15805 055414 012703 000001                 MOV     #1,R3                           ; *,$$TMP2                                               7415
15806 055420 001411                28$:   BEQ     31$
15807 055422 016704 124470                 MOV     L$DLY,R4                        ; *,$$TMP1
15808 055426 001404                        BEQ     30$
15809 055430 005066 000006         29$:   CLR     6(SP)                           ; $$TMP
15810 055434 005304                        DEC     R4                              ; $$TMP1
15811 055436 001374                        BNE     29$
15812 055440 005303                30$:   DEC     R3                              ; $$TMP2
15813 055442 000766                        BR      28$
15814 055444 017767 135674 133500  31$:   MOV     @ML.REG+170,D1.TEMP
15815 055452 017767 135676 133474          MOV     @ML.REG+200,D2.TEMP
15816 055460 017767 135650 133470          MOV     @ML.REG+160,E2.TEMP
15817 055466 005003                        CLR     R3                              ; NIB.PTR                                                7418
15818 055470 010304                32$:   MOV     R3,R4                           ; NIB.PTR,*                                              7421
15819 055472 006204                        ASR     R4
15820 055474 006204                        ASR     R4
15821 055476 006204                        ASR     R4
15822 055500 062704 013120                 ADD     #PD.TEMP,R4
15823 055504 010446                        MOV     R4,-(SP)
15824 055506 010346                        MOV     R3,-(SP)                        ; NIB.PTR,*
15825 055510 042716 177770                 BIC     #177770,(SP)
15826 055514 012746 000001                 MOV     #1,-(SP)
15827 055520 005046                        CLR     -(SP)
15828 055522 004767 125412                 JSR     PC,BL$GT2
15829 055526 062706 000010                 ADD     #10,SP
15830 055532 005700                        TST     R0
15831 055534 001011                        BNE     33$
15832 055536 010346                        MOV     R3,-(SP)                        ; NIB.PTR,*
15833 055540 010146                        MOV     R1,-(SP)                        ; BG.PAT,*
15834 055542 012746 000012                 MOV     #12,-(SP)
15835 055546 060616                        ADD     SP,(SP)                         ; ERR.FLG,*
15836 055550 004767 140372                 JSR     PC,TST.LNG.WRD
15837 055554 062706 000006                 ADD     #6,SP
15838 055560 026627 000004 000001  33$:   CMP     4(SP),#1                        ; ERR.FLG,*                                              7425
15839 055566 001025                        BNE     34$
15840 055570 104455                        TRAP    55                              ;                                                        7428
15841 055572 000122                        .WORD   122
15842 055574 010464                        .WORD   ASYNC
15843 055576 024052                        .WORD   DUMPER
15844 055600 012746 006406                 MOV     #WRD.10,-(SP)                   ;                                                        7429
15845 055604 012746 007054                 MOV     #WRD.51,-(SP)
15846 055610 012746 007046                 MOV     #WRD.50,-(SP)
15847 055614 012746 006034                 MOV     #THR.FMT,-(SP)
15848 055620 012746 000004                 MOV     #4,-(SP)
15849 055624 010600                        MOV     SP,R0                           ; SP,*
15850 055626 104414                        TRAP    14
15851 055630 012766 000001 000014          MOV     #1,14(SP)                       ; *,DODU.FLG                                             7430
15852 055636 062706 000012                 ADD     #12,SP                          ;                                                        7427
15853 055642 005203                34$:   INC     R3                              ; NIB.PTR                                                7418
```

```
15855                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
15856                                   ;                                                       22-Dec-1980 09:21:22    PA:<
15857
15858 055644  020327  000011                    CMP     R3,#11          ; NIB.PTR,*
15859 055650  003707                            BLE     32$
15860 055652  005202                            INC     R2              ; WD.CNT                                        7411
15861 055654  020227  000177                    CMP     R2,#177         ; WD.CNT,*
15862 055660  003647                            BLE     27$
15863 055662  005216                            INC     (SP)            ; END.CNT                                       7437
15864 055664  005101                            COM     R1              ; BG.PAT                                        7438
15865 055666  005205                            INC     R5              ; TWICE                                         7391
15866 055670  020527  000001                    CMP     R5,#1           ; TWICE,*
15867 055674  003002                            BGT     35$
15868 055676  000167  177272                    JMP     19$
15869 055702  104467                  35$:      TRAP    67              ;                                               7439
15870 055704  006000                            ROR     R0
15871 055706  103002                            BHIS    36$
15872 055710  000167  176456                    JMP     1$
15873 055714  026627  000002  000001  36$:      CMP     2(SP),#1        ; DODU.FLG,*                                    7443
15874 055722  001004                            BNE     37$
15875 055724  016700  135650                    MOV     ML.LUN,R0       ;                                               7446
15876 055730  104451                            TRAP    51
15877 055732  104444                            TRAP    44
15878 055734  062706  000010            37$:    ADD     #10,SP          ;                                               7297
15879 055740  000207                            RTS     PC
15880
15881                                   ; Routine Size:  376 words
15882                                   ; Maximum stack depth per invocation:  18 words
15887
15888
15892
15896 055742                            T31::
15897 055742  004767  176414            1$:     JSR     PC,$T31         ;                                               7448
15898 055746  104466                            TRAP    66
15899 055750  006000                            ROR     R0
15900 055752  103773                            BLO     1$
15901 055754  000207                            RTS     PC
15902
15903                                   ; Routine Size:  6 words
15904                                   ; Maximum stack depth per invocation:  0 words
```

```
15910 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
15911 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (81)
15912
15913 ;         7451   !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (82)

```
15915 ;ML4
15916 ;
15917
15918 ;          7452  !
15919 ;          7453  !
15920 ;          7454  BGNTST;
15921 ;          7455
15922 ;          7456  !++
15923 ;          7457  ! TEST NUMBER:  TST 32
15924 ;          7458  !
15925 ;          7459  ! TEST NAME:    ARRAY MODULE SELECTION TEST
15926 ;          7460  !
15927 ;          7461  ! TEST DESCRIPTION:
15928 ;          7462  !
15929 ;          7463  !       TEST FOR UNIQUE ARRAY MODULE
15930 ;          7464  !       SELECTION BY:
15931 ;          7465  !
15932 ;          7466  !       1.  WRITING THE RESPECTIVE ARRAY
15933 ;          7467  !           MODULE POSITION NUMBER INTO
15934 ;          7468  !           THE FIRST GOOD NIBBLE FOUND
15935 ;          7469  !           IN THE ARRAY.  DO FOR ALL
15936 ;          7470  !           PRESENT ARRAYS.
15937 ;          7471  !
15938 ;          7472  !       2.  READ THE ARRAYS FOR THEIR
15939 ;          7473  !           RESPECTIVE POSTION NUMBERS.
15940 ;          7474  !
15941 ;          7475  ! IMPLICIT INPUTS:
15942 ;          7476  !       PD_TEMP:
15943 ;          7477  !       A BIT VECTOR OF 16 BITS WHERE
15944 ;          7478  !       THE READ PROM DATA IS STORED
15945 ;          7479  !       AND ACCESSED FROM.
15946 ;          7480  !
15947 ;          7481  !       IO_BUF :
15948 ;          7482  !       A VECTOR OF 256 WORDS WHERE
15949 ;          7483  !       DATA FOR MBUS READS AND WRITE
15950 ;          7484  !       FUNCTION ARE FOUND.
15951 ;          7485  !
15952 ;          7486  !--
15953 ;          7487
15954 ;          7488  local
15955 ;          7489      WRDS_TSTED,                       !WORDS TESTED
15956 ;          7490      ARR_SEL,                          !ARRAY SELECT
15957 ;          7491      FND_GD_NIB,                       !FOUND GOOD NIBBLE
15958 ;          7492      ARR_NUM;                          !ARRAY NUMBER
15959 ;          7493
15960 ;          7494  ARR_SEL = ZEROES;
15961 ;          7495  ARR_SEL = .ARR_SEL - .ARR_INC;        !START ARR_SEL BACK ONE ARRAY
15962 ;          7496
15963 ;          7497  incr ARR_CNT from 0 to .OP_NUM_ARR do !TEST ALL PRESENT ARRAYS
15964 ;          7498      begin
15965 ;          7499      CLR_MBUS;
15966 ;          7500      FND_GD_NIB = ZERO;
15967 ;          7501      WRDS_TSTED = ZERO;
15968 ;          7502      DAT_DM = ONE;                     !SET DATA DIAG MODE
15969 ;          7503      MLWC = not 255;                   !LOAD WORD COUNT
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (82)

;          7504      MLBA = IO_BUF;                     !LOAD IO_BUF
;          7505      ARR_SEL = .ARR_SEL + .ARR_INC;     !LOOK AT NEXT ARRAY
;          7506      MLDA = .ARR_SEL;                   !LOAD DSA WITH SELECTED ARRAY AT BLOCK ZERO
;          7507      MLCS1 = write;                     !DO A WRITE FUNCTION
;          7508
;          7509      do                                 !THIS LOOP WRITES ARRAY NUMBERS TO THE ARRAYS
;          7510          begin
;          7511          DELAY (ONE_US);
;          7512          PD_TEMP = .MLPD;               !GET THE PROM DATA
;          7513          WRDS_TSTED = .WRDS_TSTED + 1;  !COUNT WORDS TESTED
;          7514
;          7515          incr CNT from 0 to 8 do        !LOOK AT 9 NIBBLES
;          7516
;          7517              if .PD_TEMP [.CNT] IS_NOT_SET   !FIND A GOOD NIBBLE
;          7518              then
;          7519                  begin
;          7520
;          7521                  case .CNT from 0 to 8 of    !SELECT AND LOAD GOOD NIBBLE WITH ARRAY CNT
;          7522                      set
;          7523
;          7524                      [0] :
;          7525                          (MLD1)<0, 4> = .ARR_CNT;    !NIBBLE 0
;          7526
;          7527                      [1] :
;          7528                          (MLD1)<4, 4> = .ARR_CNT;    !NIBBLE 1
;          7529
;          7530                      [2] :
;          7531                          (MLD1)<8, 4> = .ARR_CNT;    !NIBBLE 2
;          7532
;          7533                      [3] :
;          7534                          (MLD1)<12, 4> = .ARR_CNT;   !NIBBLE 3
;          7535
;          7536                      [4] :
;          7537                          (MLD2)<0, 4> = .ARR_CNT;    !NIBBLE 4
;          7538
;          7539                      [5] :
;          7540                          (MLD2)<4, 4> = .ARR_CNT;    !NIBBLE 5
;          7541
;          7542                      [6] :
;          7543                          (MLD2)<8, 4> = .ARR_CNT;    !NIBBLE 6
;          7544
;          7545                      [7] :
;          7546                          (MLD2)<12, 4> = .ARR_CNT;   !NIBBLE 7
;          7547
;          7548                      [8] :
;          7549                          (MLE2)<8, 4> = .ARR_CNT;    !NIBBLE 8
;          7550                      tes;
;          7551
;          7552              FND_GD_NIB = ONE;          !SET FOUND GOOD NIBBLE FLG
;          7553              exitloop;                  !EXIT THE LOOP
;          7554              end;
;          7555
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (82)

;          7556          DAT_CLK = ONE;                          !CLOCK GOOD NIBBLE INTO MEMORY & GET NXT PROM WRD
;          7557          end
;          7558      until (.FND_GD_NIB IS_SET ) or (.WRDS_TSTED eql 14);      !DO UNTIL FOUND GOOD NIBBLE OR 14 WRDS TSTED
;          7559
;          7560      if .WRDS_TSTED eql 14                   !IF 14 WORDS TSTED
;          7561      then
;          7562          begin                               !THEN ERROR AND EXIT TESTED
;          7563          ERRDF (111, INTER, DUMPER);
;          7564          PRINTB (SEV_FMT, WRD_14, PHR_10, FNC_15, WRD_12, FNC_17, WRD_37, WRD_56);
;          7565          EXIT_TST;
;          7566          end;
;          7567
;          7568      end;
;          7569
;          7570  ARR_SEL = ZEROES;
;          7571  ARR_SEL = .ARR_SEL - .ARR_INC;              !START ARR SEL BACK ONE AGAIN
;          7572
;          7573  incr ARR_CNT from 0 to .OP_NUM_ARR do       !TEST ALL PRESENT ARRAYS
;          7574      begin
;          7575      BGNSUB;
;          7576      CLR_MBUS;
;          7577      FND_GD_NIB = ZERO;
;          7578      DAT_DM = ONE;                           !SET DATA DIAG MODE
;          7579      MLWC = not 255;                         !LOAD WORD COUNT
;          7580      MLBA = IO_BUF;                          !LOAD UBUS ADDRESS
;          7581      ARR_SEL = .ARR_SEL + .ARR_INC;          !LOOK AT NEXT ARRAY
;          7582      MLDA = .ARR_SEL;                        !LOAD DSA WITH ARRAY SELECT
;          7583      MLCS1 = read;                           !DO A READ FUNCTION
;          7584
;          7585      do                                      !THIS LOOP READS ARRAYS FOR ARRAY NUMBERS
;          7586          begin
;          7587          DELAY (ONE_US);
;          7588          PD_TEMP = .MLPD;                    !GET THE PROM DATA
;          7589
;          7590          incr CNT from 0 to 8 do             !LOOK AT 9 NIBBLES
;          7591
;          7592              if .PD_TEMP [.CNT] IS_NOT_SET   !FIND THE GOOD NIBBLES WHERE ARR NUM IS STORED
;          7593              then
;          7594                  begin
;          7595                  DAT_CLK = ONE;              !CLOCK ARRAY WORD OUT
;          7596
;          7597                  case .CNT from 0 to 8 of    !SELECT AND READ GOOD NIBBLE
;          7598                      set
;          7599
;          7600                      [0] :
;          7601                          ARR_NUM = .(MLD1)<0, 4>;        !NIBBLE 0
;          7602
;          7603                      [1] :
;          7604                          ARR_NUM = .(MLD1)<4, 4>;        !NIBBLE 1
;          7605
;          7606                      [2] :
;          7607                          ARR_NUM = .(MLD1)<8, 4>;        !NIBBLE 2
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (82)

```
16083 ;ML4
16084 ;
16085
16086 ;          7608
16087 ;          7609                    [3] :
16088 ;          7610                        ARR_NUM = .(MLD1)<12, 4>;       !NIBBLE 3
16089 ;          7611
16090 ;          7612                    [4] :
16091 ;          7613                        ARR_NUM = .(MLD2)<0, 4>;        !NIBBLE 4
16092 ;          7614
16093 ;          7615                    [5] :
16094 ;          7616                        ARR_NUM = .(MLD2)<4, 4>;        !NIBBLE 5
16095 ;          7617
16096 ;          7618                    [6] :
16097 ;          7619                        ARR_NUM = .(MLD2)<8, 4>;        !NIBBLE 6
16098 ;          7620
16099 ;          7621                    [7] :
16100 ;          7622                        ARR_NUM = .(MLD2)<12, 4>;       !NIBBLE 7
16101 ;          7623
16102 ;          7624                    [8] :
16103 ;          7625                        ARR_NUM = .(MLE2)<8, 4>;        !NIBBLE 8
16104 ;          7626                    tes;
16105 ;          7627
16106 ;          7628                FND_GD_NIB = ONE;                   !SET FND GD NIB FLG
16107 ;          7629                exitloop;                           !EXIT LOOP
16108 ;          7630                end;
16109 ;          7631
16110 ;          7632            DAT_CLK = ONE;                          !CLOCK OUT NEXT PROM LOCATION
16111 ;          7633            end
16112 ;          7634        until .FND_GD_NIB IS_SET;                   !REPEAT UNTIL FOUND THE GOOD NIBBLE
16113 ;          7635
16114 ;          7636        if .ARR_CNT neq .ARR_NUM                    !SEE IF ARRAY CONTAINS IT'S ARR NUM
16115 ;          7637        then
16116 ;          7638            begin                                   !ERROR IF NOT THERE
16117 ;          7639            ERRDF (83, ASYNC, DUMPER);
16118 ;          7640            PRINTB (FOR_FMT, WRD_39, FNC_17, WRD_37, WRD_10);
16119 ;          7641            PRINTB (FMT_14, .ARR_CNT, .ARR_NUM);
16120 ;          7642            end;
16121 ;          7643
16122 ;          7644        ENDSUB;
16123 ;          7645        end;
16124 ;          7646
16125 ;          7647    ENDTST;
16129
16133 055756  004167  126134          $T32:   JSR     R1,$SAVE5               ;                       7450
16134 055762  162706  000006                  SUB     #6,SP
16135 055766  005005                          CLR     R5                      ; ARR.SEL               7494
16136 055770  166705  133566                  SUB     ARR.INC,R5              ; *,ARR.SEL             7495
```

```
                                                                                22-Dec-1980 09:24:31    TOPS
                                                                                22-Dec-1980 09:21:22    PA:<
                                        ;ML4
                                        ;
                                                                                                        7497
055774 016766 133560 000002             MOV     OP.NUM.ARR,2(SP)        ;
056002 005003                           CLR     R3                      ; ARR.CNT
056004 000167 000702                    JMP     27$
056010 152777 000040 135176 1$:         BISB    #40,@ML.REG+40          ;                               7498
056016 016702 135560                    MOV     ML.DUT,R2
056022 042702 177770                    BIC     #177770,R2
056026 142777 000007 135160             BICB    #7,@ML.REG+40
056034 150277 135154                    BISB    R2,@ML.REG+40
056040 005016                           CLR     (SP)                    ; FND.GD.NIB                    7500
056042 005004                           CLR     R4                      ; WRDS.TSTED                    7501
056044 152777 000010 135222             BISB    #10,@ML.REG+120         ;                               7502
056052 012777 177400 135104             MOV     #-400,@ML.REG+10        ;                               7503
056060 012777 011600 135106             MOV     #IO.BUF,@ML.REG+20      ;                               7504
056066 066705 133470                    ADD     ARR.INC,R5              ; *,ARR.SEL                     7505
056072 010577 135106                    MOV     R5,@ML.REG+30           ; ARR.SEL,*                     7506
056076 012777 000061 135050             MOV     #61,@ML.REG             ;                               7507
056104 012701 000001             2$:    MOV     #1,R1                   ; *,$$TMP2                      7511
056110 001411                    3$:    BEQ     6$
056112 016702 124000                    MOV     LSDLY,R2                ; *,$$TMP1
056116 001404                           BEQ     5$
056120 005066 000004             4$:    CLR     4(SP)                   ; $$TMP
056124 005302                           DEC     R2                      ; $$TMP1
056126 001374                           BNE     4$
056130 005301                    5$:    DEC     R1                      ; $$TMP2
056132 000766                           BR      3$
056134 017767 135244 134756      6$:    MOV     @ML.REG+230,PD.TEMP     ;                               7512
056142 005204                           INC     R4                      ; WRDS.TSTED                    7513
056144 005002                           CLR     R2                      ; CNT                           7515
056146 010201                    7$:    MOV     R2,R1                   ; CNT,*                         7517
056150 006201                           ASR     R1
056152 006201                           ASR     R1
056154 006201                           ASR     R1
056156 062701 013120                    ADD     #PD.TEMP,R1
056162 010146                           MOV     R1,-(SP)
056164 010246                           MOV     R2,-(SP)                ; CNT,*
056166 042716 177770                    BIC     #177770,(SP)
056172 012746 000001                    MOV     #1,-(SP)
056176 005046                           CLR     -(SP)
056200 004767 124734                    JSR     PC,BL$GT2
056204 062706 000010                    ADD     #10,SP
056210 005700                           TST     R0
056212 001155                           BNE     23$
056214 010201                           MOV     R2,R1                   ; CNT,*                         7521
056216 006301                           ASL     R1
056220 066107 056224                    ADD     8$(R1),PC
056224 000022                    8$:    .WORD   9$-8$
056226 000040                           .WORD   10$-8$
056230 000072                           .WORD   12$-8$
056232 000112                           .WORD   13$-8$
056234 000146                           .WORD   15$-8$
056236 000164                           .WORD   16$-8$
056240 000216                           .WORD   18$-8$
```

```
                                                                                                22-Dec-1980 09:24:31    TOPS
                                                                                                22-Dec-1980 09:21:22    PA:<
16194                                   ;ML4
16195                                   ;
16196
16197 056242  000236                              .WORD   19$-8$
16198 056244  000272                              .WORD   21$-8$
16199 056246  010301                    9$:       MOV     R3,R1                   ; ARR.CNT,*                     7525
16200 056250  042701  177760                      BIC     #177760,R1
16201 056254  142777  000017  135062              BICB    #17,@ML.REG+170
16202 056262  000412                              BR      11$
16203 056264  010301                    10$:      MOV     R3,R1                   ; ARR.CNT,*                     7528
16204 056266  006301                              ASL     R1
16205 056270  006301                              ASL     R1
16206 056272  006301                              ASL     R1
16207 056274  006301                              ASL     R1
16208 056276  042701  177417                      BIC     #177417,R1
16209 056302  142777  000360  135034              BICB    #360,@ML.REG+170
16210 056310  150177  135030            11$:      BISB    R1,@ML.REG+170
16211 056314  000511                              BR      22$                     ;                               7521
16212 056316  010301                    12$:      MOV     R3,R1                   ; ARR.CNT,*                     7531
16213 056320  000301                              SWAB    R1
16214 056322  042701  170377                      BIC     #170377,R1
16215 056326  042777  007400  135010              BIC     #7400,@ML.REG+170
16216 056334  000413                              BR      14$
16217 056336  010301                    13$:      MOV     R3,R1                   ; ARR.CNT,*                     7534
16218 056340  000301                              SWAB    R1
16219 056342  006301                              ASL     R1
16220 056344  006301                              ASL     R1
16221 056346  006301                              ASL     R1
16222 056350  006301                              ASL     R1
16223 056352  042701  007777                      BIC     #7777,R1
16224 056356  042777  170000  134760              BIC     #170000,@ML.REG+170
16225 056364  050177  134754            14$:      BIS     R1,@ML.REG+170
16226 056370  000463                              BR      22$                     ;                               7521
16227 056372  010301                    15$:      MOV     R3,R1                   ; ARR.CNT,*                     7537
16228 056374  042701  177760                      BIC     #177760,R1
16229 056400  142777  000017  134746              BICB    #17,@ML.REG+200
16230 056406  000412                              BR      17$
16231 056410  010301                    16$:      MOV     R3,R1                   ; ARR.CNT,*                     7540
16232 056412  006301                              ASL     R1
16233 056414  006301                              ASL     R1
16234 056416  006301                              ASL     R1
16235 056420  006301                              ASL     R1
16236 056422  042701  177417                      BIC     #177417,R1
16237 056426  142777  000360  134720              BICB    #360,@ML.REG+200
16238 056434  150177  134714            17$:      BISB    R1,@ML.REG+200
16239 056440  000437                              BR      22$                     ;                               7521
16240 056442  010301                    18$:      MOV     R3,R1                   ; ARR.CNT,*                     7543
16241 056444  000301                              SWAB    R1
16242 056446  042701  170377                      BIC     #170377,R1
16243 056452  042777  007400  134674              BIC     #7400,@ML.REG+200
16244 056460  000413                              BR      20$
16245 056462  010301                    19$:      MOV     R3,R1                   ; ARR.CNT,*                     7546
16246 056464  000301                              SWAB    R1
16247 056466  006301                              ASL     R1
16248 056470  006301                              ASL     R1
```

```
16250                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
16251                                   ;                                                       22-Dec-1980 09:21:22    PA:<
i6252
16253 056472 006301                             ASL     R1
16254 056474 006301                             ASL     R1
16255 056476 042701 007777                      BIC     #7777,R1
16256 056502 042777 170000 134644               BIC     #170000,@ML.REG+200
16257 056510 050177 134640              20$:    BIS     R1,@ML.REG+200
16258 056514 000411                             BR      22$                     ;                       7521
16259 056516 010301                     21$:    MOV     R3,R1                   ; ARR.CNT,*             7549
16260 056520 000301                             SWAB    R1
16261 056522 042701 170377                      BIC     #170377,R1
16262 056526 042777 007400 134600               BIC     #7400,@ML.REG+160
16263 056534 050177 134574                      BIS     R1,@ML.REG+160
16264 056540 012716 000001              22$:    MOV     #1,(SP)                 ; *,FND.GD.NIB          7552
16265 056544 000406                             BR      24$                     ;                       7553
16266 056546 005202                     23$:    INC     R2                      ; CNT                   7515
16267 056550 020227 000010                      CMP     R2,#10                  ; CNT,*
16268 056554 003002                             BGT     24$
16269 056556 000167 177364                      JMP     7$
16270 056562 152777 000020 134504       24$:    BISB    #20,@ML.REG+120         ;                       7556
16271 056570 021627 000001                      CMP     (SP),#1                 ; FND.GD.NIB,*          7558
16272 056574 001405                             BEQ     25$
16273 056576 020427 000016                      CMP     R4,#16                  ; WRDS.TSTED,*
16274 056602 001402                             BEQ     25$
16275 056604 000167 177274                      JMP     2$
16276 056610 020427 000016              25$:    CMP     R4,#16                  ; WRDS.TSTED,*          7560
16277 056614 001035                             BNE     26$
16278 056616 104455                             TRAP    55                      ;                       7563
16279 056620 000157                             .WORD   157
16280 056622 010672                             .WORD   INTER
16281 056624 024052                             .WORD   DUMPER
16282 056626 012746 007122                      MOV     #WRD.56,-(SP)           ;                       7564
16283 056632 012746 006700                      MOV     #WRD.37,-(SP)
16284 056636 012746 010162                      MOV     #FNC.17,-(SP)
16285 056642 012746 006426                      MOV     #WRD.12,-(SP)
16286 056646 012746 010136                      MOV     #FNC.15,-(SP)
16287 056652 012746 007564                      MOV     #PHR.10,-(SP)
16288 056656 012746 006442                      MOV     #WRD.14,-(SP)
16289 056662 012746 006120                      MOV     #SEV.FMT,-(SP)
16290 056666 012746 000010                      MOV     #10,-(SP)
16291 056672 010600                             MOV     SP,R0                   ; SP,*
16292 056674 104414                             TRAP    14
16293 056676 104463                             TRAP    63
16294 056700 062706 000022                      ADD     #22,SP                  ;                       7560
16295 056704 000167 000562                      JMP     56$                     ;                       7562
16296 056710 005203                     26$:    INC     R3                      ; ARR.CNT               7497
16297 056712 020366 000002              27$:    CMP     R3,2(SP)                ; ARR.CNT,*
16298 056716 003002                             BGT     28$
16299 056720 000167 177064                      JMP     1$
16300 056724 005005                     28$:    CLR     R5                      ; ARR.SEL               7570
16301 056726 166705 132630                      SUB     ARR.INC,R5              ; *,ARR.SEL             7571
16302 056732 016766 132622 000002               MOV     OP.NUM.ARR,2(SP)        ;                       7573
16303 056740 005004                             CLR     R4                      ; ARR.CNT
16304 056742 000167 000516                      JMP     55$
```

```
16306                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
16307                                   ;                                                       22-Dec-1980 09:21:22    PA:<
16308
16309 056746  104402                    29$:    TRAP    2                                                                       7574
16310 056750  152777  000040  134236            BISB    #40,@ML.REG+40          ;                                               7575
16311 056756  016702  134620                    MOV     ML.DUT,R2
16312 056762  042702  177770                    BIC     #177770,R2
16313 056766  142777  000007  134220            BICB    #7,@ML.REG+40
16314 056774  150277  134214                    BISB    R2,@ML.REG+40
16315 057000  005016                            CLR     (SP)                    ; FND.GD.NIB                                    7577
16316 057002  152777  000010  134264            BISB    #10,@ML.REG+120         ;                                               7578
16317 057010  012777  177400  134146            MOV     #-400,@ML.REG+10        ;                                               7579
16318 057016  012777  011600  134150            MOV     #ID.BUF,@ML.REG+20      ;                                               7580
16319 057024  066705  132532                    ADD     ARR.INC,R5              ; *,ARR.SEL                                     7581
16320 057030  010577  134150                    MOV     R5,@ML.REG+30           ; ARR.SEL,*                                     7582
16321 057034  012777  000071  134112            MOV     #71,@ML.REG             ;                                               7583
16322 057042  012701  000001          30$:      MOV     #1,R1                   ; *,$$TMP2                                      7587
16323 057046  001411          31$:      BEQ     34$
16324 057050  016702  123042                    MOV     L$DLY,R2                ; *,$$TMP1
16325 057054  001404                            BEQ     33$
16326 057056  005066  000004          32$:      CLR     4(SP)                   ; $$TMP
16327 057062  005302                            DEC     R2                      ; $$TMP1
16328 057064  001374                            BNE     32$
16329 057066  005301          33$:      DEC     R1                      ; $$TMP2
16330 057070  000766                            BR      31$
16331 057072  017767  134306  134020  34$:      MOV     @ML.REG+230,PD.TEMP     ;                                               7588
16332 057100  005002                            CLR     R2                      ; CNT                                           7590
16333 057102  010201          35$:      MOV     R2,R1                   ; CNT,*                                         7592
16334 057104  006201                            ASR     R1
16335 057106  006201                            ASR     R1
16336 057110  006201                            ASR     R1
16337 057112  062701  013120                    ADD     #PD.TEMP,R1
16338 057116  010146                            MOV     R1,-(SP)
16339 057120  010246                            MOV     R2,-(SP)                ; CNT,*
16340 057122  042716  177770                    BIC     #177770,(SP)
16341 057126  012746  000001                    MOV     #1,-(SP)
16342 057132  005046                            CLR     -(SP)
16343 057134  004767  124000                    JSR     PC,BL$GT2
16344 057140  062706  000010                    ADD     #10,SP
16345 057144  005700                            TST     R0
16346 057146  001070                            BNE     50$
16347 057150  152777  000020  134116            BISB    #20,@ML.REG+120         ;                                               7595
16348 057156  010201                            MOV     R2,R1                   ; CNT,*                                         7597
16349 057160  006301                            ASL     R1
16350 057162  066107  057166                    ADD     36$(R1),PC
16351 057166  000022          36$:      .WORD   37$-36$
16352 057170  000030                    .WORD   38$-36$
16353 057172  000036                    .WORD   39$-36$
16354 057174  000044                    .WORD   40$-36$
16355 057176  000052                    .WORD   41$-36$
16356 057200  000060                    .WORD   42$-36$
16357 057202  000076                    .WORD   44$-36$
16358 057204  000104                    .WORD   45$-36$
16359 057206  000122                    .WORD   47$-36$
16360 057210  117703  134130    37$:      MOVB    @ML.REG+170,R3          ; *,ARR.NUM                                     7601
```

```
16362                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
16363                                   ;                                                       22-Dec-1980 09:21:22    PA:<
16364
16365 057214  000440                          BR      49$
16366 057216  117703  134122          38$:    MOVB    @ML.REG+170,R3          ; *,ARR.NUM                             7604
16367 057222  000413                          BR      43$
16368 057224  017703  134114          39$:    MOV     @ML.REG+170,R3          ; *,ARR.NUM                             7607
16369 057230  000431                          BR      48$
16370 057232  017703  134106          40$:    MOV     @ML.REG+170,R3          ; *,ARR.NUM                             7610
16371 057236  000417                          BR      46$
16372 057240  117703  134110          41$:    MOVB    @ML.REG+200,R3          ; *,ARR.NUM                             7613
16373 057244  000424                          BR      49$
16374 057246  117703  134102          42$:    MOVB    @M..REG+200,R3          ; *,ARR.NUM                             7616
16375 057252  006203                  43$:    ASR     R3                      ; ARR.NUM
16376 057254  006203                          ASR     R3                      ; ARR.NUM
16377 057256  006203                          ASR     R3                      ; ARR.NUM
16378 057260  006203                          ASR     R3                      ; ARR.NUM
16379 057262  000415                          BR      49$
16380 057264  017703  134064          44$:    MOV     @ML.REG+200,R3          ; *,ARR.NUM                             7619
16381 057270  000411                          BR      48$
16382 057272  017703  134056          45$:    MOV     @ML.REG+200,R3          ; *,ARR.NUM                             7622
16383 057276  006203                  46$:    ASR     R3                      ; ARR.NUM
16384 057300  006203                          ASR     R3                      ; ARR.NUM
16385 057302  006203                          ASR     R3                      ; ARR.NUM
16386 057304  006203                          ASR     R3                      ; ARR.NUM
16387 057306  000402                          BR      48$
16388 057310  017703  134020          47$:    MOV     @ML.REG+160,R3          ; *,ARR.NUM                             7625
16389 057314  000303                  48$:    SWAB    R3                      ; ARR.NUM
16390 057316  042703  177760          49$:    BIC     #177760,R3              ; *,ARR.NUM
16391 057322  012716  000001                  MOV     #1,(SP)                 ; *,FND.GD.NIB                          7628
16392 057326  000404                          BR      51$                     ;                                       7629
16393 057330  005202                  50$:    INC     R2                      ; CNT                                   7590
16394 057332  020227  000010                  CMP     R2,#10                  ; CNT,*
16395 057336  003661                          BLE     35$
16396 057340  152777  000020  133726  51$:    BISB    #20,@ML.REG+120         ;                                       7632
16397 057346  021627  000001                  CMP     (SP),#1                 ; FND.GD.NIB,*                          7634
16398 057352  001233                          BNE     30$
16399 057354  020403                          CMP     R4,R3                   ; ARR.CNT,ARR.NUM                       7636
16400 057356  001434                          BEQ     52$
16401 057360  104455                          TRAP    55                      ;                                       7639
16402 057362  000123                          .WORD   123
16403 057364  010464                          .WORD   ASYNC
16404 057366  024052                          .WORD   DUMPER
16405 057370  012746  006406                  MOV     #WRD.10,-(SP)           ;                                       7640
16406 057374  012746  006700                  MOV     #WRD.37,-(SP)
16407 057400  012746  010162                  MOV     #FNC.17,-(SP)
16408 057404  012746  006716                  MOV     #WRD.39,-(SP)
16409 057410  012746  006046                  MOV     #FOR.FMT,-(SP)
16410 057414  012746  000005                  MOV     #5,-(SP)
16411 057420  010600                          MOV     SP,R0                   ; SP,*
16412 057422  104414                          TRAP    14
16413 057424  010316                          MOV     R3,(SP)                 ; ARR.NUM,*                             7641
16414 057426  010446                          MOV     R4,-(SP)                ; ARR.CNT,*
16415 057430  012746  005110                  MOV     #FMT.14,-(SP)
16416 057434  012746  000003                  MOV     #3,-(SP)
```

```
16418                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
16419                                   ;                                                       22-Dec-1980 09:21:22    PA:<
16420
16421 057440  010600                            MOV     SP,R0                   ; SP,*
16422 057442  104414                            TRAP    14
16423 057444  062706  000022                    ADD     #22,SP                  ;                                       7638
16424 057450  104467                    52$:    TRAP    67                      ;                                       7642
16425 057452  006000                            ROR     R0
16426 057454  103002                            BHIS    54$
16427 057456  000167  177264              53$:    JMP     29$
16428 057462  005204                    54$:    INC     R4                      ; ARR.CNT                               7573
16429 057464  020466  000002              55$:    CMP     R4,2(SP)                ; ARR.CNT,*
16430 057470  003772                            BLE     53$
16431 057472  062706  000006              56$:    ADD     #6,SP                   ;                                       7450
16432 057476  000207                            RTS     PC
16433
16434                                   ; Routine Size:  425 words
16435                                   ; Maximum stack depth per invocation:  18 words
16440
16441
16445
16449 057500                            T32::
16450 057500  004767  176252              1$:   JSR     PC,$T32                 ;                                       7645
16451 057504  104466                            TRAP    66
16452 057506  006000                            ROR     R0
16453 057510  103773                            BLO     1$
16454 057512  000207                            RTS     PC
16455
16456                                   ; Routine Size:  6 words
16457                                   ; Maximum stack depth per invocation:  0 words
16462
16463
16464 ;           7648  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (83)

```
16466 ;ML4
16467 ;
16468
16469 ;          7649  !
16470 ;          7650  BGNTST;
16471 ;          7651
16472 ;          7652  !++
16473 ;          7653  ! TEST NUMBER:  TST 33
16474 ;          7654  !
16475 ;          7655  ! TEST NAME:    SEQUENCER EXISTENCE TEST
16476 ;          7656  !
16477 ;          7657  ! TEST DESCRIPTION:
16478 ;          7658  !
16479 ;          7659  !       TEST SEQUENCER TIMING AND CONTROL
16480 ;          7660  !       LOGIC FOR EXISTENCE BY:
16481 ;          7661  !
16482 ;          7662  !       1.  FIRST WRITING THE GOOD BLOCK VIA DAT_DM MODE WITH A BACKGROUND
16483 ;          7663  !           PATTERN OF ONES.
16484 ;          7664  !
16485 ;          7665  !
16486 ;          7666  !       2.  VIA A MBUS WRITE FUNCTION WRITE ONES INTO THE GOOD BLOCK.
16487 ;          7667  !
16488 ;          7668  !       3.  THEN VIA DAT_DM READ GOOD NIBBLES IN THE GOOD BLOCK AND XOR THEM
16489 ;          7669  !           AGAINST THE BACKGROUND PATTERN.
16490 ;          7670  !
16491 ;          7671  !           RECORD THE NUMBER OF NIBBLES THAT WERE UNCHANGED OR PARTIALLY CHANGED
16492 ;          7672  !           BY THE MBUS WIRTE.
16493 ;          7673  !
16494 ;          7674  !       4.  REPORT A FATAL ERROR AND DROP THIS UNIT IF THE NIBBLES TESTED EQUALS
16495 ;          7675  !           THE COUNT OF UNCHANGED NIBBLES.
16496 ;          7676  !
16497 ;          7677  !           REPORT AN INTERMEDIATE DIAGNOSTIC MESSAGE IF AT LEAST SOME NIBBLES
16498 ;          7678  !           WERE CHANGED BY THE MBUS WRITE.
16499 ;          7679  !
16500 ;          7680  ! IMPLICIT INPUTS:
16501 ;          7681  !       PD_TEMP:
16502 ;          7682  !       A BIT VECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND ACCESSED FROM.
16503 ;          7683  !
16504 ;          7684  !       IO_BUF:
16505 ;          7685  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE FUNCTIONS
16506 ;          7686  !       ARE FOUND.
16507 ;          7687  !--
16508 ;          7688
16509 ;          7689  local
16510 ;          7690      BG_PAT,                         !BACK GROUND PATTERN
16511 ;          7691      SUM_BAD,                        !SUM NIBBLE ARE BAD
16512 ;          7692      NIB_TSTED,                      !NIBBLES TESTED
16513 ;          7693      ALL_BAD,                        !ALL NIBBLES ARE BAD
16514 ;          7694      RESULT;                         !RESULTS OF XOR
16515 ;          7695
16516 ;          7696  CLR_MBUS;
16517 ;          7697  BG_PAT = ONES;                      !BACKGROUND EQL ONES
16518 ;          7698  MLD1 = .BG_PAT;                     !LOAD DATA DIAG REG WITH BG PAT
16519 ;          7699  MLD2 = .BG_PAT;
16520 ;          7700  MLE2 = .BG_PAT;
```

```
16522 ;ML4
16523 ;
16524
16525 ;          7701  DAT_DM_XFER ();                          !SET UP A  DATA DIAG XFERR AT THE GOOD BLOCK
16526 ;          7702  MLCS1 = write;                           !DO A WRITE FUNCTION
16527 ;          7703
16528 ;          7704  incr WD_CNT from 0 to 127 do             !WRITE BLOCK WITH BG PAT
16529 ;          7705      begin
16530 ;          7706      DELAY (ONE_US);
16531 ;          7707      DAT_CLK = ONE;
16532 ;          7708      end;
16533 ;          7709
16534 ;          7710  CLR_MBUS;
16535 ;          7711  IO_BUF = ZEROES;                         !LOAD FIRST WORD OF IO_BUF
16536 ;          7712  BAI = ONE;                               !MAKE XFERR SET ON ONE ADRS
16537 ;          7713  GD_BLK_XFER ();                          !SET UP A GOOD BLOCK XFERR
16538 ;          7714  MLCS1 = write;                           !DO A WRITE FUNCTION
16539 ;          7715  TIME_OUT_LOOP;
16540 ;          7716  BGNSUB;
16541 ;          7717  CLR_MBUS;
16542 ;          7718  ALL_BAD = ZEROES;
16543 ;          7719  SUM_BAD = ZEROES;
16544 ;          7720  NIB_TSTED = ZEROES;
16545 ;          7721  DAT_DM_XFER ();                          !SET UP SAME DATA DIAG XFERR
16546 ;          7722  MLCS1 = read;                            !DO A READ FUNCTION
16547 ;          7723  DELAY (ONE_US);
16548 ;          7724
16549 ;          7725  incr WD_CNT from 0 to 112 do             !READ 113 LONG WORDS
16550 ;          7726      begin
16551 ;          7727      PD_TEMP = .MLPD;                     !GET PROM DATA
16552 ;          7728      DAT_CLK = ONE;                       !CLOCK OUT THE DATA WORD
16553 ;          7729      DELAY (ONE_US);
16554 ;          7730      RD_LNG_WRD;                          !READ THE DATA WORD
16555 ;          7731
16556 ;          7732      incr NIB_PTR from 0 to 8 do          !LOOK AT 9 NIBBLES
16557 ;          7733
16558 ;          7734          if .PD_TEMP [.NIB_PTR] eql ZERO  !FIND GOOD NIBBLE
16559 ;          7735          then
16560 ;          7736              begin
16561 ;          7737              NIB_TSTED = .NIB_TSTED + 1;  !INCREMENT COUNT OF NIBBLES TESTED
16562 ;          7738              XOR_LNG_WRD (.NIB_PTR, .BG_PAT, RESULT);    !XOR NIBBLE WITH BG PAT
16563 ;          7739
16564 ;          7740              if .RESULT<0, 4> eql ZERO    !SEE IF ALL BITS IN NIBBLE WERE BAD?
16565 ;          7741              then
16566 ;          7742                  ALL_BAD = .ALL_BAD + 1   !INCREMENT COUNT IF ALL BAD
16567 ;          7743              else
16568 ;          7744
16569 ;          7745                  if .RESULT<0, 4> neq %o'17' then SUM_BAD = .SUM_BAD + 1;
16570 ;          7746
16571 ;          7747                                           !SEE IF SOME BITS IN NIBBLE WERE BAD
16572 ;          7748              end;                         !INCREMENT COUNT IF SOME BAD
16573 ;          7749
16574 ;          7750      end;
16575 ;          7751
16576 ;          7752  ENDSUB;
```

```
16578 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
16579 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (83)
16580
16581 ;          7753
16582 ;          7754  if .NIB_TSTED eql .ALL_BAD                    !WHERE ALL NIBBLES XFERR'ED ALL BAD?
16583 ;          7755  then                                          !ERROR IF ALL BAD
16584 ;          7756      begin
16585 ;          7757      ERRDF (84, SYNC, DUMPER);
16586 ;          7758      PRINTB (SEV_FMT, WRD_22, PHR_4, WRD_9, WRD_12, WRD_23, FNC_5, WRD_19);
16587 ;          7759      DODU (.ML_LUN);
16588 ;          7760      DOCLN;
16589 ;          7761      end
16590 ;          7762  else
16591 ;          7763
16592 ;          7764      if .SUM_BAD gtr ZERO                       !SEE IF SEE NIBBLE WERE BAD?
16593 ;          7765      then
16594 ;          7766          begin                                  !SOME BAD IS OK SO GIVE INTERMEDIATE ERROR
16595 ;          7767          ERRDF (85, INTER, DUMPER);
16596 ;          7768          PRINTB (SIX_FMT, PHR_4, WRD_9, WRD_12, WRD_23, FNC_5, WRD_19);
16597 ;          7769          end;
16598 ;          7770
16599 ;          7771  ENDTST;
16603
16607 057514  004167  124376          $T33:  JSR     R1,$SAVE5                    ;                    7647
16608 057520  162706  000010                 SUB     #10,SP
16609 057524  152777  000040  133462        BISB    #40,@ML.REG+40               ;                    7694
16610 057532  016705  134044                MOV     ML.DUT,R5
16611 057536  042705  177770                BIC     #177770,R5
16612 057542  142777  000007  133444        BICB    #7,@ML.REG+40
16613 057550  150577  133440                BISB    R5,@ML.REG+40
16614 057554  012766  177777  000002        MOV     #-1,2(SP)                    ; *,BG.PAT           7697
16615 057562  012777  177777  133554        MOV     #-1,@ML.REG+170              ;                    7698
16616 057570  016677  000002  133556        MOV     2(SP),@ML.REG+200            ; BG.PAT,*           7699
16617 057576  016677  000002  133530        MOV     2(SP),@ML.REG+160            ; BG.PAT,*           7700
16618 057604  004767  134352                JSR     PC,DAT.DM.XFER               ;                    7701
16619 057610  012777  000061  133336        MOV     #61,@ML.REG                  ;                    7702
16620 057616  005000                        CLR     R0                           ; WD.CNT             7704
16621 057620  012701  000001          1$:   MOV     #1,R1                        ; *,$$TMP2           7706
16622 057624  001411          2$:   BEQ     5$
16623 057626  016702  122264                MOV     L$DLY,R2                     ; *,$$TMP1
16624 057632  001404                        BEQ     4$
16625 057634  005066  000006          3$:   CLR     6(SP)                        ; $$TMP
16626 057640  005302                        DEC     R2                           ; $$TMP1
16627 057642  001374                        BNE     3$
16628 057644  005301                  4$:   DEC     R1                           ; $$TMP2
16629 057646  000766                        BR      2$
16630 057650  152777  000020  133416  5$:   BISB    #20,@ML.REG+120              ;                    7707
16631 057656  005200                        INC     R0                           ; WD.CNT             7704
```

```
16633                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
16634                                   ;                                                       22-Dec-1980 09:21:22    PA:<
16635
16636 057660 020027 000177              CMP     R0,#177         ; WD.CNT,*
16637 057664 003755                     BLE     1$
16638 057666 152777 000040 133320       BISB    #40,@ML.REG+40  ;                                                       7708
16639 057674 016705 133702              MOV     ML.DUT,R5
16640 057700 042705 177770              BIC     #177770,R5
16641 057704 142777 000007 133302       BICB    #7,@ML.REG+40
16642 057712 150577 133276              BISB    R5,@ML.REG+40
16643 057716 005067 131656              CLR     IO.BUF          ;                                                       7711
16644 057722 152777 000010 133264       BISB    #10,@ML.REG+40  ;                                                       7712
16645 057730 004767 136126              JSR     PC,GD.BLK.XFER  ;                                                       7713
16646 057734 012777 000061 133212       MOV     #61,@ML.REG     ;                                                       7714
16647 057742 105777 133256      6$:     TSTB    @ML.REG+50
16648 057746 100375                     BPL     6$
16649 057750 104402             7$:     TRAP    2               ;                                                       7715
16650 057752 152777 000040 133234       BISB    #40,@ML.REG+40  ;                                                       7716
16651 057760 016703 133616              MOV     ML.DUT,R3
16652 057764 042703 177770              BIC     #177770,R3
16653 057770 142777 000007 133216       BICB    #7,@ML.REG+40
16654 057776 150377 133212              BISB    R3,@ML.REG+40
16655 060002 005004                     CLR     R4              ; ALL.BAD                                               7718
16656 060004 005016                     CLR     (SP)            ; SUM.BAD                                               7719
16657 060006 005005                     CLR     R5              ; NIB.TSTED                                             7720
16658 060010 004767 134146              JSR     PC,DAT.DM.XFER  ;                                                       7721
16659 060014 012777 000071 133132       MOV     #71,@ML.REG     ;                                                       7722
16660 060022 012701 000001              MOV     #1,R1           ; *,$$TMP2                                              7723
16661 060026 001411             8$:     BEQ     11$
16662 060030 016702 122062              MOV     L$DLY,R2        ; *,$$TMP1
16663 060034 001404                     BEQ     10$
16664 060036 005066 000006      9$:     CLR     6(SP)           ; $$TMP
16665 060042 005302                     DEC     R2              ; $$TMP1
16666 060044 001374                     BNE     9$
16667 060046 005301             10$:    DEC     R1              ; $$TMP2
16668 060050 000766                     BR      8$
16669 060052 005003             11$:    CLR     R3              ; WD.CNT                                                7725
16670 060054 017767 133324 133036 12$:  MOV     @ML.REG+230,PD.TEMP ;                                                   7727
16671 060062 152777 000020 133204       BISB    #20,@ML.REG+120 ;                                                       7728
16672 060070 012701 000001              MOV     #1,R1           ; *,$$TMP2                                              7729
16673 060074 001411             13$:    BEQ     16$
16674 060076 016702 122014              MOV     L$DLY,R2        ; *,$$TMP1
16675 060102 001404                     BEQ     15$
16676 060104 005066 000006      14$:    CLR     6(SP)           ; $$TMP
16677 060110 005302                     DEC     R2              ; $$TMP1
16678 060112 001374                     BNE     14$
16679 060114 005301             15$:    DEC     R1              ; $$TMP2
16680 060116 000766                     BR      13$
16681 060120 017767 133220 131024 16$:  MOV     @ML.REG+170,D1.TEMP
16682 060126 017767 133222 131020       MOV     @ML.REG+200,D2.TEMP
16683 060134 017767 133174 131014       MOV     @ML.REG+160,E2.TEMP
16684 060142 005001                     CLR     R1              ; NIB.PTR                                               7732
16685 060144 010102             17$:    MOV     R1,R2           ; NIB.PTR,*                                             7734
16686 060146 006202                     ASR     R2
16687 060150 006202                     ASR     R2
```

```
16689                           ;ML4                                                    22-Dec-1980 09:24:31    TOPS
16690                           ;                                                       22-Dec-1980 09:21:22    PA:<
16691
16692 060152 006202                     ASR     R2
16693 060154 062702 013120              ADD     #PD.TEMP,R2
16694 060160 010246                     MOV     R2,-(SP)
16695 060162 010146                     MOV     R1,-(SP)                ; NIB.PTR,*
16696 060164 042716 177770              BIC     #177770,(SP)
16697 060170 012746 000001              MOV     #1,-(SP)
16698 060174 005046                     CLR     -(SP)
16699 060176 004767 122736              JSR     PC,BL$GT2
16700 060202 062706 000010              ADD     #10,SP
16701 060206 005700                     TST     R0
16702 060210 001027                     BNE     20$
16703 060212 005205                     INC     R5                      ; NIB.TSTED                     7737
16704 060214 010146                     MOV     R1,-(SP)                ; NIB.PTR,*                     7738
16705 060216 016646 000004              MOV     4(SP),-(SP)             ; BG.PAT,*
16706 060222 012746 000012              MOV     #12,-(SP)
16707 060226 060616                     ADD     SP,(SP)                 ; RESULT,*
16708 060230 004767 136406              JSR     PC,XOR.LNG.WRD
16709 060234 016602 000012              MOV     12(SP),R2               ; RESULT,*                      7740
16710 060240 042702 177760              BIC     #177760,R2
16711 060244 001002                     BNE     18$
16712 060246 005204                     INC     R4                      ; ALL.BAD                       7742
16713 060250 000405                     BR      19$                     ;                               7740
16714 060252 020227 000017      18$:    CMP     R2,#17                  ;                               7745
16715 060256 001402                     BEQ     19$
16716 060260 005266 000006              INC     6(SP)                   ; SUM.BAD
16717 060264 062706 000006      19$:    ADD     #6,SP                   ;                               7736
16718 060270 005201             20$:    INC     R1                      ; NIB.PTR                       7732
16719 060272 020127 000010              CMP     R1,#10                  ; NIB.PTR,*
16720 060276 003722                     BLE     17$
16721 060300 005203                     INC     R3                      ; WD.CNT                        7725
16722 060302 020327 000160              CMP     R3,#160                 ; WD.CNT,*
16723 060306 003662                     BLE     12$
16724 060310 104467                     TRAP    67                      ;                               7750
16725 060312 006000                     ROR     R0
16726 060314 103615                     BLO     7$
16727 060316 020504                     CMP     R5,R4                   ; NIB.TSTED,ALL.BAD             7754
16728 060320 001037                     BNE     21$
16729 060322 104455                     TRAP    55                      ;                               7757
16730 060324 000124                     .WORD   124
16731 060326 010526                     .WORD   SYNC
16732 060330 024052                     .WORD   DUMPER
16733 060332 012746 006506              MOV     #WRD.19,-(SP)           ;                               7758
16734 060336 012746 007774              MOV     #FNC.5,-(SP)
16735 060342 012746 006544              MOV     #WRD.23,-(SP)
16736 060346 012746 006426              MOV     #WRD.12,-(SP)
16737 060352 012746 006374              MOV     #WRD.9,-(SP)
16738 060356 012746 007454              MOV     #PHR.4,-(SP)
16739 060362 012746 006530              MOV     #WRD.22,-(SP)
16740 060366 012746 006120              MOV     #SEV.FMT,-(SP)
16741 060372 012746 000010              MOV     #10,-(SP)
16742 060376 010600                     MOV     SP,R0                   ; SP,*
16743 060400 104414                     TRAP    14
```

```
16745                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
16746                                   ;                                                       22-Dec-1980 09:21:22    PA:<
16747
16748 060402  016700  133172                    MOV     ML.LUN,R0                       ;                               7759
16749 060406  104451                            TRAP    51
16750 060410  104444                            TRAP    44
16751 060412  062706  000022                    ADD     #22,SP                          ;                               7756
16752 060416  000432                            BR      22$                             ;                               7754
16753 060420  005716                    21$:    TST     (SP)                            ; SUM.BAD                       7764
16754 060422  003430                            BLE     22$
16755 060424  104455                            TRAP    55                              ;                               7767
16756 060426  000125                            .WORD   125
16757 060430  010672                            .WORD   INTER
16758 060432  024052                            .WORD   DUMPER
16759 060434  012746  006506                    MOV     #WRD.19,-(SP)                   ;                               7768
16760 060440  012746  007774                    MOV     #FNC.5,-(SP)
16761 060444  012746  006544                    MOV     #WRD.23,-(SP)
16762 060450  012746  006426                    MOV     #WRD.12,-(SP)
16763 060454  012746  006374                    MOV     #WRD.9,-(SP)
16764 060460  012746  007454                    MOV     #PHR.4,-(SP)
16765 060464  012746  006100                    MOV     #SIX.FMT,-(SP)
16766 060470  012746  000007                    MOV     #7,-(SP)
16767 060474  010600                            MOV     SP,R0                           ; SP,*
16768 060476  104414                            TRAP    14
16769 060500  062706  000020                    ADD     #20,SP                          ;                               7766
16770 060504  062706  000010            22$:    ADD     #10,SP                          ;                               7647
16771 060510  000207                            RTS     PC
16772
16773                                   ; Routine Size:  255 words
16774                                   ; Maximum stack depth per invocation:  19 words
16779
16780
16784
16788 060512                            T33::
16789 060512  004767  176776            1$:     JSR     PC,$T33                         ;                               7769
16790 060516  104466                            TRAP    66
16791 060520  006000                            ROR     R0
16792 060522  103773                            BLO     1$
16793 060524  000207                            RTS     PC
16794
16795                                   ; Routine Size:  6 words
16796                                   ; Maximum stack depth per invocation:  0 words
```

```
16805
16806
16807 ;          7772  !<BLF/PAGE>
```

```
16809 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
16810 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (84)
16811
16812 ;          7773  !
16813 ;          7774  !
16814 ;          7775  BGNTST;
16815 ;          7776
16816 ;          7777  !++
16817 ;          7778  ! TEST NUMBER:  TST 34
16818 ;          7779  !
16819 ;          7780  ! TEST NAME:    SYNC DATA BUS CONTINUITY TEST (WRITE PATH)
16820 ;          7781  !
16821 ;          7782  ! TEST DESCRIPTION:
16822 ;          7783  !
16823 ;          7784  !       TEST THE CONTINUITY OF THE
16824 ;          7785  !       SYNCHRONOUS MODULE WRITE PATH
16825 ;          7786  !       DATA BUS BY:
16826 ;          7787  !
16827 ;          7788  !       1.  VIA DAT_DM MODE WRITE A
16828 ;          7789  !           BACKGROUND PATTERN OF ONES
16829 ;          7790  !           INTO THE GOOD BLOCK.
16830 ;          7791  !
16831 ;          7792  !       2.  VIA MBUS WRITE FUNCTION
16832 ;          7793  !           WRITE A ZEROES PATTERN INTO
16833 ;          7794  !           THE GOOD BLOCK.
16834 ;          7795  !
16835 ;          7796  !       3.  VIA DAT_DM MODE READ GOOD
16836 ;          7797  !           NIBBLES IN THE GOOD BLOCK FOR
16837 ;          7798  !           ZEROES.
16838 ;          7799  !
16839 ;          7800  !       4.  REPEAT WITH COMPLIMENT
16840 ;          7801  !           DATA AND BACKGROUND PATTERNS.
16841 ;          7802  !
16842 ;          7803  ! IMPLICIT INPUTS:
16843 ;          7804  !
16844 ;          7805  !       PD_TEMP
16845 ;          7806  !
16846 ;          7807  !       A BIT VECTOR OF 16 BITS WHERE
16847 ;          7808  !       THE READ PROM DATA IS STORED
16848 ;          7809  !       AND ACCESSED FROM.
16849 ;          7810  !
16850 ;          7811  !       IO_BUF
16851 ;          7812  !
16852 ;          7813  !       A VECTOR OF 256 WORDS WHERE
16853 ;          7814  !       DATA FOR MBUS READS AND WRITE
16854 ;          7815  !       FUNCTION ARE FOUND.
16855 ;          7816  !
16856 ;          7817  !
16857 ;          7818  !--
16858 ;          7819
16859 ;          7820  local
16860 ;          7821      DODU_FLG,                    !DROP UNIT FLAG
16861 ;          7822      BG_PAT,                      !BACKGROUND PATTERN
16862 ;          7823      RESULT,                      !RESULTS FROM XOR
16863 ;          7824      TST_PAT;                     !TEST PATTERN
```

```
16865 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
16866 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (84)
16867
16868 ;          7825
16869 ;          7826  DODU_FLG = ZERO;
16870 ;          7827  BG_PAT = ZEROES;                       !BG PAT EQL 0'S
16871 ;          7828  TST_PAT = ONES;                        !TST PAT EQL 1'S
16872 ;          7829
16873 ;          7830  incr TWICE from 0 to 1 do              !REPEAT LOOP TWICE
16874 ;          7831      begin
16875 ;          7832      BGNSUB;
16876 ;          7833      CLR_MBUS;
16877 ;          7834      MLDT = .BG_PAT;                    !LOAD DATA DIAG REG WITH BG PAT
16878 ;          7835      MLD2 = .BG_PAT;
16879 ;          7836      MLE2 = .BG_PAT;
16880 ;          7837      DAT_DM_XFER ();                    !SET UP A DATA DIAG XFERR AT THE GOOD BLK
16881 ;          7838      MLCS1 = write;                     !DO A WRITE FUNCTION
16882 ;          7839
16883 ;          7840      incr WD_CNT from 0 to 127 do       !LOAD BLOCK WITH BG PAT
16884 ;          7841          begin
16885 ;          7842          DELAY (ONE_US);
16886 ;          7843          DAT_CLK = ONE;
16887 ;          7844          end;
16888 ;          7845
16889 ;          7846      CLR_MBUS;
16890 ;          7847      BAI = ONE;                         !SET ON FIRST IO_BUF ADRS
16891 ;          7848      IO_BUF = .TST_PAT;                 !FIRST IO_BUF WORD EQL'S TST_PAT
16892 ;          7849      GD_BLK_XFER ();                    !SET UP A GOOD BLOCK XFERR
16893 ;          7850      MLCS1 = write;                     !DO A WRITE FUNCTION
16894 ;          7851      TIME_OUT_LOOP;
16895 ;          7852      CLR_MBUS;
16896 ;          7853      DAT_DM_XFER ();                    !SET UP A DATA DIAG XFERR AT SAME BLOCK
16897 ;          7854      MLCS1 = read;                      !DO A READ FUNCTION
16898 ;          7855      DELAY (ONE_US);
16899 ;          7856
16900 ;          7857      incr WD_CNT from 0 to 112 do       !READ 113 LONG WORDS
16901 ;          7858          begin
16902 ;          7859          PD_TEMP = .MLPD;               !GET THE PROM DATA
16903 ;          7860          DAT_CLK = ONE;                 !CLOCK OUT THE DATA WORD
16904 ;          7861          DELAY (ONE_US);
16905 ;          7862          RD_LNG_WRD;                    !READ THE DATA WORD
16906 ;          7863
16907 ;          7864          incr NIB_PTR from 0 to 8 do    !LOOK AT 9 NIBBLES
16908 ;          7865
16909 ;          7866              if .PD_TEMP [.NIB_PTR] IS_NOT_SET   !FIND GOOD NIBBLES
16910 ;          7867              then
16911 ;          7868                  begin
16912 ;          7869                  XOR_LNG_WRD (.NIB_PTR, .TST_PAT, RESULT);       !XOR NIBBLE DATA WITH TST_PAT
16913 ;          7870
16914 ;          7871                  if .RESULT<0, 4> neq ZERO       !SEE IF EQUAL
16915 ;          7872                  then
16916 ;          7873                      begin                       !ERROR IF NEQ
16917 ;          7874                      ERRDF (86, SYNC, DUMPER);
16918 ;          7875                      PRINTB (FIV_FMT, WRD_24, WRD_25, WRD_10, WRD_12, FNC_5);
16919 ;          7876                      PRINTB (FMT_5, .TST_PAT, .RESULT, .NIB_PTR);
```

```
                                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
                                                                    22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (84)

16921 ;ML4
16922 ;
16923
16924 ;          7877                       DODU_FLG = ONE;
16925 ;          7878                       end
16926 ;          7879
16927 ;          7880                   end
16928 ;          7881
16929 ;          7882           end;
16930 ;          7883
16931 ;          7884       ENDSUB;
16932 ;          7885
16933 ;          7886       if .DODU_FLG IS_SET                  !DROP THIS UNIT IF DODU IS_SET
16934 ;          7887                                            !AND EXITS TEST
16935 ;          7888       then
16936 ;          7889           begin
16937 ;          7890           DODU (.ML_LUN);
16938 ;          7891           DOCLN;
16939 ;          7892           end;
16940 ;          7893
16941 ;          7894       BG_PAT = not .BG_PAT;                !COMPLIMENT BG_PAT
16942 ;          7895       TST_PAT = not .TST_PAT;              !COMPLIMENT TST_PAT AND REPEAT
16943 ;          7896       end;
16944 ;          7897
16945 ;          7898   ENDTST;
16949
16953 060526  004167  123364          $T34:   JSR     R1,$SAVE5                       ;                       7771
16954 060532  024646                  CMP     -(SP),-(SP)
16955 060534  005046                  CLR     -(SP)                           ; DODU.FLG              7826
16956 060536  005001                  CLR     R1                              ; BG.PAT                7827
16957 060540  012702  177777          MOV     #-1,R2                          ; *,TST.PAT             7828
16958 060544  005046                  CLR     -(SP)                           ; TWICE                 7830
16959 060546  104402                  TRAP    2                               ;                       7831
16960 060550  152777  000040  132436  BISB    #40,@ML.REG+40                  ;                       7832
16961 060556  016705  133020          MOV     ML.DUT,R5
16962 060562  042705  177770          BIC     #177770,R5
16963 060566  142777  000007  132420  BICB    #7,@ML.REG+40
16964 060574  150577  132414          BISB    R5,@ML.REG+40
16965 060600  010177  132540          MOV     R1,@ML.REG+170                  ; BG.PAT,*              7834
16966 060604  010177  132544          MOV     R1,@ML.REG+200                  ; BG.PAT,*              7835
16967 060610  010177  132520          MOV     R1,@ML.REG+160                  ; BG.PAT,*              7836
16968 060614  004767  133342          JSR     PC,DAT.DM.XFER                  ;                       7837
16969 060620  012777  000061  132326  MOV     #61,@ML.REG                     ;                       7838
16970 060626  005003                  CLR     R3                              ; WD.CNT                7840
16971 060630  012704  000001          MOV     #1,R4           2$:             ; *,$$TMP2              7842
16972 060634  001411                  BEQ     6$              3$:
16973 060636  016705  121254          MOV     L$DLY,R5                        ; *,$$TMP1
16974 060642  001404                  BEQ     5$
```

```
16976                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
16977                                   ;                                                       22-Dec-1980 09:21:22    PA:<
16978
16979 060644 005066 000006        4$:   CLR     6(SP)                   ; $STMP
16980 060650 005305                     DEC     R5                      ; $STMP1
16981 060652 001374                     BNE     4$
16982 060654 005304               5$:   DEC     R4                      ; $STMP2
16983 060656 000766                     BR      3$
16984 060660 152777 000020 132406 6$:   BISB    #20,@ML.REG+120         ;                                                       7843
16985 060666 005203                     INC     R3                      ; WD.CNT                                                7840
16986 060670 020327 000177              CMP     R3,#177                 ; WD.CNT,*
16987 060674 003755                     BLE     2$
16988 060676 152777 000040 132310       BISB    #40,@ML.REG+40          ;                                                       7844
16989 060704 016705 132672              MOV     ML.DUT,R5
16990 060710 042705 177770              BIC     #177770,R5
16991 060714 142777 000007 132272       BICB    #7,@ML.REG+40
16992 060722 150577 132266              BISB    R5,@ML.REG+40
16993 060726 152777 000010 132260       BISB    #10,@ML.REG+40          ;                                                       7847
16994 060734 010267 130640              MOV     R2,IO.BUF               ; TST.PAT,*                                             7848
16995 060740 004767 135116              JSR     PC,GD.BLK.XFER          ;                                                       7849
16996 060744 012777 000061 132202       MOV     #61,@ML.REG             ;                                                       7850
16997 060752 105777 132246        7$:   TSTB    @ML.REG+50
16998 060756 100375                     BPL     7$
16999 060760 152777 000040 132226       BISB    #40,@ML.REG+40          ;                                                       7851
17000 060766 016705 132610              MOV     ML.DUT,R5
17001 060772 042705 177770              BIC     #177770,R5
17002 060776 142777 000007 132210       BICB    #7,@ML.REG+40
17003 061004 150577 132204              BISB    R5,@ML.REG+40
17004 061010 004767 133146              JSR     PC,DAT.DM.XFER          ;                                                       7853
17005 061014 012777 000071 132132       MOV     #71,@ML.REG             ;                                                       7854
17006 061022 012704 000001              MOV     #1,R4                   ; *,$STMP2                                              7855
17007 061026 001411               8$:   BEQ     11$
17008 061030 016705 121062              MOV     L$DLY,R5                ; *,$STMP1
17009 061034 001404                     BEQ     10$
17010 061036 005066 000006        9$:   CLR     6(SP)                   ; $STMP
17011 061042 005305                     DEC     R5                      ; $STMP1
17012 061044 001374                     BNE     9$
17013 061046 005304               10$:  DEC     R4                      ; $STMP2
17014 061050 000766                     BR      8$
17015 061052 005003               11$:  CLR     R3                      ; WD.CNT                                                7857
17016 061054 017767 132324 132036 12$:  MOV     @ML.REG+230,PD.TEMP     ;                                                       7859
17017 061062 152777 000020 132204       BISB    #20,@ML.REG+120         ;                                                       7860
17018 061070 012704 000001              MOV     #1,R4                   ; *,$STMP2                                              7861
17019 061074 001411               13$:  BEQ     16$
17020 061076 016705 121014              MOV     L$DLY,R5                ; *,$STMP1
17021 061102 001404                     BEQ     15$
17022 061104 005066 000006        14$:  CLR     6(SP)                   ; $STMP
17023 061110 005305                     DEC     R5                      ; $STMP1
17024 061112 001374                     BNE     14$
17025 061114 005304               15$:  DEC     R4                      ; $STMP2
17026 061116 000766                     BR      13$
17027 061120 017767 132220 130024 16$:  MOV     @ML.REG+170,D1.TEMP
17028 061126 017767 132222 130020       MOV     @ML.REG+200,D2.TEMP
17029 061134 017767 132174 130014       MOV     @ML.REG+160,E2.TEMP
17030 061142 005004                     CLR     R4                      ; NIB.PTR                                               7864
```

```
                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                    22-Dec-1980 09:21:22    PA:<
17032                                ;ML4
17033                                ;
17034
17035 061144  010405                17$:    MOV     R4,R5                   ; NIB.PTR,*                     7866
17036 061146  006205                        ASR     R5
17037 061150  006205                        ASR     R5
17038 061152  006205                        ASR     R5
17039 061154  062705  013120              ADD     #PD.TEMP,R5
17040 061160  010546                        MOV     R5,-(SP)
17041 061162  010446                        MOV     R4,-(SP)                ; NIB.PTR,*
17042 061164  042716  177770              BIC     #177770,(SP)
17043 061170  012746  000001              MOV     #1,-(SP)
17044 061174  005046                        CLR     -(SP)
17045 061176  004767  121736              JSR     PC,BL$GT2
17046 061202  062706  000010              ADD     #10,SP
17047 061206  005700                        TST     R0
17048 061210  001060                        BNE     19$
17049 061212  010446                        MOV     R4,-(SP)                ; NIB.PTR,*                     7869
17050 061214  010246                        MOV     R2,-(SP)                ; TST.PAT,*
17051 061216  012746  000012              MOV     #12,-(SP)
17052 061222  060616                        ADD     SP,(SP)                 ; RESULT,*
17053 061224  004767  135412              JSR     PC,XOR.LNG.WRD
17054 061230  032766  000017  000012      BIT     #17,12(SP)              ; *,RESULT                      7871
17055 061236  001443                        BEQ     18$
17056 061240  104455                        TRAP    55                      ;                               7874
17057 061242  000126                        .WORD   126
17058 061244  010526                        .WORD   SYNC
17059 061246  024052                        .WORD   DUMPER
17060 061250  012746  007774              MOV     #FNC.5,-(SP)            ;                               7875
17061 061254  012746  006426              MOV     #WRD.12,-(SP)
17062 061260  012746  006406              MOV     #WRD.10,-(SP)
17063 061264  012746  006560              MOV     #WRD.25,-(SP)
17064 061270  012746  006552              MOV     #WRD.24,-(SP)
17065 061274  012746  006062              MOV     #FIV.FMT,-(SP)
17066 061300  012746  000006              MOV     #6,-(SP)
17067 061304  010600                        MOV     SP,R0                   ; SP,*
17068 061306  104414                        TRAP    14
17069 061310  010416                        MOV     R4,(SP)                 ; NIB.PTR,*                     7876
17070 061312  016646  000030              MOV     30(SP),-(SP)            ; RESULT,*
17071 061316  010246                        MOV     R2,-(SP)                ; TST.PAT,*
17072 061320  012746  004430              MOV     #FMT.5,-(SP)
17073 061324  012746  000004              MOV     #4,-(SP)
17074 061330  010600                        MOV     SP,R0                   ; SP,*
17075 061332  104414                        TRAP    14
17076 061334  012766  000001  000036      MOV     #1,36(SP)               ; *,DODU.FLG                    7877
17077 061342  062706  000026              ADD     #26,SP                  ;                               7873
17078 061346  062706  000006      18$:    ADD     #6,SP                   ;                               7868
17079 061352  005204              19$:    INC     R4                      ; NIB.PTR                       7864
17080 061354  020427  000010              CMP     R4,#10                  ; NIB.PTR,*
17081 061360  003671                        BLE     17$
17082 061362  005203                        INC     R3                      ; WD.CNT                        7857
17083 061364  020327  000160              CMP     R3,#160                 ; WD.CNT,*
17084 061370  003631                        BLE     12$
17085 061372  104467                        TRAP    67                      ;                               7882
17086 061374  006000                        ROR     R0
```

```
17088                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
17089                                   ;                                                       22-Dec-1980 09:21:22    PA:<
17090
17091 061376  103002                             BHIS    21$
17092 061400  000167  177142               20$:   JMP     1$
17093 061404  026627  000002  000001       21$:   CMP     2(SP),#1                ; DODU.FLG,*                    7886
17094 061412  001004                             BNE     22$
17095 061414  016700  132160                     MOV     ML.LUN,R0               ;                               7890
17096 061420  104451                             TRAP    51
17097 061422  104444                             TRAP    44
17098 061424  005101                       22$:  COM     R1                      ; BG.PAT                        7894
17099 061426  005102                             COM     R2                      ; TST.PAT                       7895
17100 061430  005216                             INC     (SP)                    ; TWICE                         7830
17101 061432  021627  000001                     CMP     (SP),#1                 ; TWICE,*
17102 061436  003760                             BLE     20$
17103 061440  062706  000010                     ADD     #10,SP                  ;                               7771
17104 061444  000207                             RTS     PC
17105
17106                                   ; Routine Size:  232 words
17107                                   ; Maximum stack depth per invocation:  24 words
17112
17113
17117
17121 061446                            T34::
17122 061446  004767  177054               1$:   JSR     PC,$T34                 ;                               7896
17123 061452  104466                             TRAP    66
17124 061454  006000                             ROR     R0
17125 061456  103773                             BLO     1$
17126 061460  000207                             RTS     PC
17127
17128                                   ; Routine Size:  6 words
17129                                   ; Maximum stack depth per invocation:  0 words
17134
17135
17136 ;          7899  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (85)

```
17138 ;ML4
17139 ;
17140
17141 ;          7900  !
17142 ;          7901  BGNTST;
17143 ;          7902
17144 ;          7903  !++
17145 ;          7904  ! TEST NUMBER:  TST 35
17146 ;          7905  !
17147 ;          7906  ! TEST NAME:    SYNC DATA BUS CONIINUITY /READ PATH
17148 ;          7907  !
17149 ;          7908  ! TEST DESCRIPTION:
17150 ;          7909  !       TEST THE CONITNUITY OF THE SYNCHRONOUS MODULE READ
17151 ;          7910  !       DATA BUS BY:
17152 ;          7911  !
17153 ;          7912  !       1.  VIA MBUS WRITE FUNCTION WRITE ONES INTO THE GOOD BLOCK.
17154 ;          7913  !
17155 ;          7914  !       2.  VIA MBUS READ FUNCTION READ THE GOOD BLOCK FOR ONES.
17156 ;          7915  !
17157 ;          7916  !       3.  REPEAT WITH COMPLIMENT DATA PATTERN.
17158 ;          7917  !
17159 ;          7918  ! IMPLICIT INPUTS:
17160 ;          7919  !       IO_BUF
17161 ;          7920  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE
17162 ;          7921  !       FUNCTION ARE FOUND.
17163 ;          7922  !--
17164 ;          7923
17165 ;          7924  local
17166 ;          7925      DODU_FLG,                       !DROP UNIT FLAG
17167 ;          7926      TST_PAT,                        !TEST PATTERN
17168 ;          7927      BG_PAT;                         !BACKGROUND PATTERN
17169 ;          7928
17170 ;          7929  DODU_FLG = ZERO;
17171 ;          7930  TST_PAT = ONES;
17172 ;          7931  BG_PAT = ZEROES;
17173 ;          7932
17174 ;          7933  incr TWICE from 0 to 1 do       !REPEAT LOOP TWICE
17175 ;          7934      begin
17176 ;          7935      CLR_MBUS;
17177 ;          7936      BAI = ONE;                      !SET ON FIRST IO_BUF ADRS
17178 ;          7937      IO_BUF = .TST_PAT;              !FIRST IO_BUF ADRS GET TST PAT
17179 ;          7938      GD_BLK_XFER ();                 !SET UP A GOOD BLOCK XFERR
17180 ;          7939      MLCS1 = write;                  !DO A WRITE FUNCTION (WRITES THE TST_PAT)
17181 ;          7940      TIME_OUT_LOOP;
17182 ;          7941      BGNSOB;
17183 ;          7942      CLR_MBUS;
17184 ;          7943
17185 ;          7944      incr IO_CNT from 0 to 255 do    !LOAD IO_BUF WITH BG PAT
17186 ;          7945          IO_BUF [.IO_CNT] = .BG_PAT;
17187 ;          7946
17188 ;          7947      GD_BLK_XFER ();                 !SET UP A GOOD BLOCK XFERR
17189 ;          7948      MLCS1 = read;                   !DO A READ FUNCTION (READ THE TST PAT)
17190 ;          7949      TIME_OUT_LOOP;
17191 ;          7950
17192 ;          7951      incr IO_CNT from 0 to 255 do    !READ THE IO_BUF FOR TEST PATTERN
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (85)

;          7952
;          7953          if .IO_BUF [.IO_CNT] neq .TST_PAT       !SEE IF IO_BUF WORD EQLS TST PAT
;          7954          then
;          7955              begin                               !ERROR AND SET DODU_FLG IF NEQ
;          7956              ERRDF (87, SYNC, DUMPER);
;          7957              PRINTB (SEV_FMT, WRD_24, WRD_25, WRD_10, WRD_12, WRD_23, FNC_6, WRD_19);
;          7958              PRINTB (FMT_2, .TST_PAT, .IO_BUF [.IO_CNT], (.TST_PAT xor .IO_BUF [.IO_CNT]));
;          7959              DODU_FLG = ONE;
;          7960              end;
;          7961
;          7962      ENDSUB;
;          7963
;          7964      if .DODU_FLG IS_SET                         !DROP THIS UNIT IF DODU_FLG IS SET
;          7965      then
;          7966          begin
;          7967          DODU (.ML_LUN);
;          7968          DOCLN;
;          7969          end;
;          7970
;          7971      TST_PAT = not .TST_PAT;                     !COMPLIMENT TST_PAT
;          7972      BG_PAT = not .BG_PAT;                       !COMPLIMENT BG_PAT AND REPEAT
;          7973      end;
;          7974
;          7975  ENDTST;
17224
17228 061462  004167  122430          $T35:   JSR     R1,$SAVE5                       ;                       7898
17229 061466  005046                  CLR     -(SP)                   ; DODU.FLG      7929
17230 061470  012701  177777          MOV     #-1,R1                  ; *,TST.PAT     7930
17231 061474  005004                  CLR     R4                      ; BG.PAT        7931
17232 061476  005005                  CLR     R5                      ; TWICE         7933
17233 061500  152777  000040  131506  1$:     BISB    #40,@ML.REG+40          ;       7934
17234 061506  016703  132070          MOV     ML.DUT,R3
17235 061512  042703  177770          BIC     #177770,R3
17236 061516  142777  000007  131470  BICB    #7,@ML.REG+40
17237 061524  150377  131464          BISB    R3,@ML.REG+40
17238 061530  152777  000010  131456  BISB    #10,@ML.REG+40          ;               7936
17239 061536  010167  130036          MOV     R1,IO.BUF               ; TST.PAT,*     7937
17240 061542  004767  134314          JSR     PC,GD.BLK.XFER          ;               7938
17241 061546  012777  000061  131400  MOV     #61,@ML.REG             ;               7939
17242 061554  105777  131444  2$:     TSTB    @ML.REG+50
17243 061560  100375                  BPL     2$
17244 061562  104402          3$:     TRAP    2                       ;               7940
17245 061564  152777  000040  131422  BISB    #40,@ML.REG+40          ;               7941
17246 061572  016703  132004          MOV     ML.DUT,R3
17247 061576  042703  177770          BIC     #177770,R3
```

```
                                                                                                22-Dec-1980 09:24:31    TOPS
                                                                                                22-Dec-1980 09:21:22    PA:<
17249                                   ;ML4
17250                                   ;
17251
17252 061602 142777 000007 131404       BICB    #7,@ML.REG+40
17253 061610 150377 131400              BISB    R3,@ML.REG+40
17254 061614 005002                     CLR     R2                      ; IO.CNT                                        7944
17255 061616 010203                 4$: MOV     R2,R3                   ; IO.CNT,*                                      7945
17256 061620 006303                     ASL     R3
17257 061622 010463 011600              MOV     R4,IO.BUF(R3)           ; BG.PAT,*
17258 061626 005202                     INC     R2                      ; IO.CNT                                        7944
17259 061630 020227 000377              CMP     R2,#377                 ; IO.CNT,*
17260 061634 003770                     BLE     4$
17261 061636 004767 134220              JSR     PC,GD.BLK.XFER          ;                                               7947
17262 061642 012777 000071 131304       MOV     #71,@ML.REG             ;                                               7948
17263 061650 105777 131350          5$: TSTB    @ML.REG+50
17264 061654 100375                     BPL     5$
17265 061656 005002                     CLR     R2                      ; IO.CNT                                        7951
17266 061660 010203                 6$: MOV     R2,R3                   ; IO.CNT,*                                      7953
17267 061662 006303                     ASL     R3
17268 061664 062703 011600              ADD     #IO.BUF,R3
17269 061670 021301                     CMP     (R3),R1                 ; *,TST.PAT
17270 061672 001454                     BEQ     7$
17271 061674 104455                     TRAP    55                      ;                                               7956
17272 061676 000127                     .WORD   127
17273 061700 010526                     .WORD   SYNC
17274 061702 024052                     .WORD   DUMPER
17275 061704 012746 006506              MOV     #WRD.19,-(SP)           ;                                               7957
17276 061710 012746 010004              MOV     #FNC.6,-(SP)
17277 061714 012746 006544              MOV     #WRD.23,-(SP)
17278 061720 012746 006426              MOV     #WRD.12,-(SP)
17279 061724 012746 006406              MOV     #WRD.10,-(SP)
17280 061730 012746 006560              MOV     #WRD.25,-(SP)
17281 061734 012746 006552              MOV     #WRD.24,-(SP)
17282 061740 012746 006120              MOV     #SEV.FMT,-(SP)
17283 061744 012746 000010              MOV     #10,-(SP)
17284 061750 010600                     MOV     SP,R0                   ; SP,*
17285 061752 104414                     TRAP    14
17286 061754 011316                     MOV     (R3),(SP)               ;                                               7958
17287 061756 010146                     MOV     R1,-(SP)                ; TST.PAT,*
17288 061760 046616 000002              BIC     2(SP),(SP)
17289 061764 040166 000002              BIC     R1,2(SP)                ; TST.PAT,*
17290 061770 052616                     BIS     (SP)+,(SP)
17291 061772 011346                     MOV     (R3),-(SP)
17292 061774 010146                     MOV     R1,-(SP)                ; TST.PAT,*
17293 061776 012746 004266              MOV     #FMT.2,-(SP)
17294 062002 012746 000004              MOV     #4,-(SP)
17295 062006 010600                     MOV     SP,R0                   ; SP,*
17296 062010 104414                     TRAP    14
17297 062012 012766 000001 000032       MOV     #1,32(SP)               ; *,DODU.FLG                                    7959
17298 062020 062706 000032              ADD     #32,SP                  ;                                               7955
17299 062024 005202                 7$: INC     R2                      ; IO.CNT                                        7951
17300 062026 020227 000377              CMP     R2,#377                 ; IO.CNT,*
17301 062032 003712                     BLE     6$
17302 062034 104467                     TRAP    67                      ;                                               7960
17303 062036 006000                     ROR     R0
```

```
17305                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
17306                                   ;                                                       22-Dec-1980 09:21:22    PA:<
17307
17308 062040  103650                            BLO     3$
17309 062042  021627  000001                    CMP     (SP),#1                 ; DODU.FLG,*                    7964
17310 062046  001004                            BNE     8$
17311 062050  016700  131524                    MOV     ML.LUN,R0               ;                               7967
17312 062054  104451                            TRAP    51
17313 062056  104444                            TRAP    44
17314 062060  005101                    8$:     COM     R1                      ; TST.PAT                       7971
17315 062062  005104                            COM     R4                      ; BG.PAT                        7972
17316 062064  005205                            INC     R5                      ; TWICE                         7933
17317 062066  020527  000001                    CMP     R5,#1                   ; TWICE,*
17318 062072  003602                            BLE     1$
17319 062074  005726                            TST     (SP)+                   ;                               7898
17320 062076  000207                            RTS     PC
17321
17322                                   ; Routine Size:  135 words
17323                                   ; Maximum stack depth per invocation:  20 words
17328
17329
17333
17337 062100                            T35::
17338 062100  004767  177356            1$:     JSR     PC,$T35                 ;                               7973
17339 062104  104466                            TRAP    66
17340 062106  006000                            ROR     R0
17341 062110  103773                            BLO     1$
17342 062112  000207                            RTS     PC
17343
17344                                   ; Routine Size:  6 words
17345                                   ; Maximum stack depth per invocation:  0 words
17350
17351
17352 ;               7976  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (86)

```
17354 ;ML4
17355 ;
17356
17357 ;          7977  !
17358 ;          7978  !
17359 ;          7979  BGNTST;
17360 ;          7980
17361 ;          7981  !++
17362 ;          7982  ! TEST NUMBER:  TST 36
17363 ;          7983  !
17364 ;          7984  ! TEST NAME:    RAM BUS ADRS COUNTER TEST /WRITE PATH
17365 ;          7985  !
17366 ;          7986  ! TEST DESCRIPTION:
17367 ;          7987  !
17368 ;          7988  !       TEST ABILITY OF THE RAM_BUS ADDRESS
17369 ;          7989  !       COUNTERS TO LOAD/UNLOAD THE SKIP
17370 ;          7990  !       RAM DURING WRITE FUNCTIONS BY:
17371 ;          7991  !
17372 ;          7992  !       1.  LOADING A REPEATING COUNT OF 0
17373 ;          7993  !           TO 63 INTO THE NIBBLES OF THE
17374 ;          7994  !           FIRST 64 WORDS OF THE IO_BUF.
17375 ;          7995  !
17376 ;          7996  !       2.  VIA MBUS WRITE FUNCTION WRITE
17377 ;          7997  !           THE CONTENTS OF THE IO_BUF
17378 ;          7998  !           INTO THE GOOD BLOCK.
17379 ;          7999  !
17380 ;          8000  !       3.  VIA DAT_DM READ GOOD NIBBLES IN
17381 ;          8001  !           THE GOOD BLOCK FOR THE UNBROKEN
17382 ;          8002  !           COUNT OF 0 TO 63.
17383 ;          8003  !
17384 ;          8004  !           ONCE A BAD NIBBLE IS ENCOUNTERED
17385 ;          8005  !           MASK THAT NIBBLE FROM FURTHER
17386 ;          8006  !           READS.
17387 ;          8007  !
17388 ;          8008  !       4.  REPEAT READING NIBBLES UNTIL
17389 ;          8009  !           113 WORDS ARE READ OR ALL 10 NIBBLES
17390 ;          8010  !           ARE MASKED.
17391 ;          8011  !
17392 ;          8012  ! IMPLICIT INPUTS:
17393 ;          8013  !
17394 ;          8014  !       PD_TEMP
17395 ;          8015  !
17396 ;          8016  !       A BIT VECTOR OF 16 BITS WHERE
17397 ;          8017  !       THE READ PROM DATA IS STORED
17398 ;          8018  !       AND ACCESSED FROM.
17399 ;          8019  !
17400 ;          8020  !       IO_BUF
17401 ;          8021  !       A VECTOR OF 256 WORDS WHERE
17402 ;          8022  !       DATA FOR MBUS READS AND WRITE
17403 ;          8023  !       FUNCTION ARE FOUND.
17404 ;          8024  !
17405 ;          8025  !--
17406 ;          8026
17407 ;          8027  local
17408 ;          8028      DODU_FLG,                          !DROP UNIT FLAG
```

```
17410 ;ML4                                                          22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
17411 ;                                                             22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (86)
17412
17413 ;          8029      WRD_CNT,                                 !WORD COUNT
17414 ;          8030      NIB_IGNORE : bitvector [16],             !NIBBLE IGNORE FLAGS
17415 ;          8031      ERR_FLG,                                 !ERROR FLAG
17416 ;          8032      BAD_NIB_CNT,                             !BAD NIBBLE COUNT
17417 ;          8033      PASS_CNT,                                !PASS COUNT
17418 ;          8034      NIB_PAT;                                 !NIBBLE PATTERN
17419 ;          8035
17420 ;          8036  DODU_FLG = ZERO;
17421 ;          8037  WRD_CNT = ZERO;
17422 ;          8038
17423 ;          8039  incr CNT from 0 to 63 do                     !LOAD 64 WORDS WITH REPEATING COUNTS OF 0-63
17424 ;          8040
17425 ;          8041      incr PAT_CNT from -1 to 11 by 4 do       !LOAD NIBBLES IN WORD WITH REPEATING COUNTS OF 0-63
17426 ;          8042          begin
17427 ;          8043          (IO_BUF [.WRD_CNT])<0, 4> = .PAT_CNT + 1;       !LOAD FIRST NIBBLE IN WORD
17428 ;          8044          (IO_BUF [.WRD_CNT])<4, 4> = .PAT_CNT + 2;       !LOAD SECOND NIBBLE IN WORD
17429 ;          8045          (IO_BUF [.WRD_CNT])<8, 4> = .PAT_CNT + 3;       !LOAD THIRD NIBBLE IN WORD
17430 ;          8046          (IO_BUF [.WRD_CNT])<12, 4> = .PAT_CNT + 4;      !LOAD FORTH NIBBLE IN WORD
17431 ;          8047          WRD_CNT = .WRD_CNT + 1;                  !INCREMENT TO NEXT WORD
17432 ;          8048          end;
17433 ;          8049
17434 ;          8050  BGNSUB;
17435 ;          8051  CLR_MBUS;
17436 ;          8052  GD_BLK_XFER ();                              !SET UP A GOOD BLOCK XFERR
17437 ;          8053  MLCS1 = write;                               !DO A WRITE FUNCTION
17438 ;          8054  TIME_OUT_LOOP;
17439 ;          8055  CLR_MBUS;
17440 ;          8056  NIB_IGNORE = ZEROES;
17441 ;          8057  PASS_CNT = ZEROES;
17442 ;          8058  NIB_PAT = ZEROES;
17443 ;          8059  BAD_NIB_CNT = ZEROES;
17444 ;          8060  DAT_DM_XFER ();                              !SET UP A DATA DIAG MODE AT THE GOOD BLOCK
17445 ;          8061  MLCS1 = read;                                !DO A READ FUNCTION
17446 ;          8062  DELAY (ONE_US);
17447 ;          8063
17448 ;          8064  do                                          !LOOP UNTIL THE BLOCK IS READ OR 9 BAD NIBBLES FOUND
17449 ;          8065      begin
17450 ;          8066      PD_TEMP = .MLPD;                        !GET THE PROM DATA
17451 ;          8067      DAT_CLK = ONE;                          !CLOCK OUT THE DATA WORD
17452 ;          8068      DELAY (ONE_US);
17453 ;          8069      RD_LNG_WRD;                             !READ THE DATA DIAG REGISTERS
17454 ;          8070
17455 ;          8071      incr NIB_PTR from 0 to 8 do             !LOOK AT 9 NIBBLES
17456 ;          8072          begin
17457 ;          8073
17458 ;          8074          if .PD_TEMP [.NIB_PTR] IS_NOT_SET   !FIND GOOD NIBBLES
17459 ;          8075          then
17460 ;          8076              begin
17461 ;          8077
17462 ;          8078              if .NIB_IGNORE [.NIB_PTR] IS_NOT_SET        !SEE IF THIS NIBBLE FOUND BAD BEFORE
17463 ;          8079              then
17464 ;          8080                  begin
```

```
17466 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
17467 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (86)
17468
17469 ;          8081                TST_LNG_WRD (.NIB_PTR, .NIB_PAT, ERR_FLG);      !TEST THE NIBBLE IF NEVER FOUND BAD
17470 ;          8082
17471 ;          8083                if .ERR_FLG IS_SET                              !SEE IF TEST FOUND AN ERROR
17472 ;          8084                then
17473 ;          8085                    begin                                       !ERROR AND SET DODU_FLG IS SET
17474 ;          8086                    ERRDF (88, ARR_DAT, DUMPER);
17475 ;          8087                    PRINTB (SIX_FMT, FNC_18, WRD_50, WRD_10, WRD_12, FNC_5, WRD_19);
17476 ;          8088                    DODU_FLG = ONE;
17477 ;          8089                    end
17478 ;          8090
17479 ;          8091                end
17480 ;          8092
17481 ;          8093            end
17482 ;          8094            else                                                !THIS NIBBLE IS BAD
17483 ;          8095                begin
17484 ;          8096                NIB_IGNORE [.NIB_PTR] = ONE;                    !SET THIS NIBBLE NIB_IGNORE FLAG
17485 ;          8097                BAD_NIB_CNT = .BAD_NIB_CNT + 1;                 !INCREMENT BAD NIB COUNT
17486 ;          8098                end;
17487 ;          8099
17488 ;          8100            NIB_PAT = .NIB_PAT + 1;                             !INCREMENT NIB PAT
17489 ;          8101            end;
17490 ;          8102
17491 ;          8103        PASS_CNT = .PASS_CNT + 1;                               !INCREMENT PASS COUNT
17492 ;          8104        end
17493 ;          8105    until (.PASS_CNT eql 113) or (.BAD_NIB_CNT eql 9);          !REPEAT UNTIL COMPLETE
17494 ;          8106
17495 ;          8107    ENDSUB;
17496 ;          8108
17497 ;          8109    if .DODU_FLG IS_SET                                         !DROP THIS UNIT IF DODU_FLG SET
17498 ;          8110    then
17499 ;          8111        begin
17500 ;          8112        DODU (.ML_LUN);
17501 ;          8113        DOCLN;
17502 ;          8114        end;
17503 ;          8115
17504 ;          8116    ENDTST;
17508
17512 062114 004167 121776          $T36:   JSR     R1,$SAVE5                       ;                                   7975
17513 062120 162706 000006                  SUB     #6,SP
17514 062124 005046                         CLR     -(SP)                           ; DODU.FLG                          8036
17515 062126 005003                         CLR     R3                              ; WRD.CNT                           8037
17516 062130 005002                         CLR     R2                              ; CNT                               8039
17517 062132 012700 177777          1$:     MOV     #-1,R0                          ; *,PAT.CNT                         8041
17518 062136 010301                 2$:     MOV     R3,R1                           ; WRD.CNT,*                         8043
17519 062140 006301                         ASL     R1
```

```
17521                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
17522                                   ;                                                       22-Dec-1980 09:21:22    PA:<
17523
17524 062142  062701  011600                    ADD     #IO.BUF,R1
17525 062146  010005                            MOV     R0,R5                   ; PAT.CNT,*
17526 062150  005205                            INC     R5
17527 062152  042705  177760                    BIC     #177760,R5
17528 062156  142711  000017                    BICB    #17,(R1)
17529 062162  150511                            BISB    R5,(R1)
17530 062164  010005                            MOV     R0,R5                   ; PAT.CNT,*                                     8044
17531 062166  062705  000002                    ADD     #2,R5
17532 062172  006305                            ASL     R5
17533 062174  006305                            ASL     R5
17534 062176  006305                            ASL     R5
17535 062200  006305                            ASL     R5
17536 062202  042705  177417                    BIC     #177417,R5
17537 062206  142711  000360                    BICB    #360,(R1)
17538 062212  150511                            BISB    R5,(R1)
17539 062214  010005                            MOV     R0,R5                   ; PAT.CNT,*                                     8045
17540 062216  062705  000003                    ADD     #3,R5
17541 062222  000305                            SWAB    R5
17542 062224  042705  170377                    BIC     #170377,R5
17543 062230  042711  007400                    BIC     #7400,(R1)
17544 062234  050511                            BIS     R5,(R1)
17545 062236  010005                            MOV     R0,R5                   ; PAT.CNT,*                                     8046
17546 062240  062705  000004                    ADD     #4,R5
17547 062244  000305                            SWAB    R5
17548 062246  006305                            ASL     R5
17549 062250  006305                            ASL     R5
17550 062252  006305                            ASL     R5
17551 062254  006305                            ASL     R5
17552 062256  042705  007777                    BIC     #7777,R5
17553 062262  042711  170000                    BIC     #170000,(R1)
17554 062266  050511                            BIS     R5,(R1)
17555 062270  005203                            INC     R3                      ; WRD.CNT                                       8047
17556 062272  062700  000004                    ADD     #4,R0                   ; *,PAT.CNT                                     8041
17557 062276  020027  000013                    CMP     R0,#13                  ; PAT.CNT,*
17558 062302  003715                            BLE     2$
17559 062304  005202                            INC     R2                      ; CNT                                           8039
17560 062306  020227  000077                    CMP     R2,#77                  ; CNT,*
17561 062312  003707                            BLE     1$
17562 062314  104402                    3$:     TRAP    2                       ;                                               8048
17563 062316  152777  000040  130670            BISB    #40,@ML.REG+40          ;                                               8050
17564 062324  016702  131252                    MOV     ML.DUT,R2
17565 062330  042702  177770                    BIC     #177770,R2
17566 062334  142777  000007  130652            BICB    #7,@ML.REG+40
17567 062342  150277  130646                    BISB    R2,@ML.REG+40
17568 062346  004767  133510                    JSR     PC,GD.BLK.XFER          ;                                               8052
17569 062352  012777  000061  130574            MOV     #61,@ML.REG             ;                                               8053
17570 062360  105777  130640            4$:     TSTB    @ML.REG+50
17571 062364  100375                            BPL     4$
17572 062366  152777  000040  130620            BISB    #40,@ML.REG+40          ;                                               8054
17573 062374  016702  131202                    MOV     ML.DUT,R2
17574 062400  042702  177770                    BIC     #177770,R2
17575 062404  142777  000007  130602            BICB    #7,@ML.REG+40
```

```
                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                    22-Dec-1980 09:21:22    PA:<
17577                           ;ML4
17578                           ;
17579
17580 062412 150277 130576              BISB    R2,@ML.REG+40
17581 062416 005066 000004              CLR     4(SP)                   ; NIB.IGNORE                    8056
17582 062422 005004                     CLR     R4                      ; PASS.CNT                      8057
17583 062424 005003                     CLR     R3                      ; NIB.PAT                       8058
17584 062426 005005                     CLR     R5                      ; BAD.NIB.CNT                   8059
17585 062430 004767 131526              JSR     PC,DAT.DM.XFER          ;                               8060
17586 062434 012777 000071 130512       MOV     #71,@ML.REG             ;                               8061
17587 062442 012701 000001              MOV     #1,R1                   ; *,$$TMP2                      8062
17588 062446 001411             5$:     BEQ     8$
17589 062450 016702 117442              MOV     L$DLY,R2                ; *,$$TMP1
17590 062454 001404                     BEQ     7$
17591 062456 005066 000006      6$:     CLR     6(SP)                   ; $$TMP
17592 062462 005302                     DEC     R2                      ; $$TMP1
17593 062464 001374                     BNE     6$
17594 062466 005301             7$:     DEC     R1                      ; $$TMP2
17595 062470 000766                     BR      5$
17596 062472 017767 130706 130420 8$:   MOV     @ML.REG+230,PD.TEMP     ;                               8066
17597 062500 152777 000020 130566       BISB    #20,@ML.REG+120         ;                               8067
17598 062506 012701 000001              MOV     #1,R1                   ; *,$$TMP2                      8068
17599 062512 001411             9$:     BEQ     12$
17600 062514 016702 117376              MOV     L$DLY,R2                ; *,$$TMP1
17601 062520 001404                     BEQ     11$
17602 062522 005066 000006      10$:    CLR     6(SP)                   ; $$TMP
17603 062526 005302                     DEC     R2                      ; $$TMP1
17604 062530 001374                     BNE     10$
17605 062532 005301             11$:    DEC     R1                      ; $$TMP2
17606 062534 000766                     BR      9$
17607 062536 017767 130602 126406 12$:  MOV     @ML.REG+170,D1.TEMP
17608 062544 017767 130604 126402       MOV     @ML.REG+200,D2.TEMP
17609 062552 017767 130556 126376       MOV     @ML.REG+160,E2.TEMP
17610 062560 005001                     CLR     R1                      ; NIB.PTR                       8071
17611 062562 010100             13$:    MOV     R1,R0                   ; NIB.PTR,*                     8074
17612 062564 006200                     ASR     R0
17613 062566 006200                     ASR     R0
17614 062570 006200                     ASR     R0
17615 062572 012702 000004              MOV     #4,R2                   ;                               8078
17616 062576 060602                     ADD     SP,R2                   ; NIB.IGNORE,*
17617 062600 060002                     ADD     R0,R2
17618 062602 010046                     MOV     R0,-(SP)                ;                               8074
17619 062604 062716 013120              ADD     #PD.TEMP,(SP)
17620 062610 010146                     MOV     R1,-(SP)                ; NIB.PTR,*
17621 062612 042716 177770              BIC     #177770,(SP)
17622 062616 012746 000001              MOV     #1,-(SP)
17623 062622 005046                     CLR     -(SP)
17624 062624 004767 120310              JSR     PC,BL$GT2
17625 062630 062706 000010              ADD     #10,SP
17626 062634 005700                     TST     R0
17627 062636 001066                     BNE     15$
17628 062640 010246                     MOV     R2,-(SP)                ;                               8078
17629 062642 010146                     MOV     R1,-(SP)                ; NIB.PTR,*
17630 062644 042716 177770              BIC     #177770,(SP)
17631 062650 012746 000001              MOV     #1,-(SP)
```

```
17633                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
17634                                   ;                                                       22-Dec-1980 09:21:22    PA:<
17635
17636 062654 005046                             CLR     -(SP)
17637 062656 004767 120256                      JSR     PC,BL$GT2
17638 062662 062706 000010                      ADD     #10,SP
17639 062666 005700                             TST     R0
17640 062670 001065                             BNE     16$
17641 062672 010146                             MOV     R1,-(SP)                ; NIB.PTR,*                             8081
17642 062674 010346                             MOV     R3,-(SP)                ; NIB.PAT,*
17643 062676 012746 000010                      MOV     #10,-(SP)
17644 062702 060616                             ADD     SP,(SP)                 ; ERR.FLG,*
17645 062704 004767 133236                      JSR     PC,TST.LNG.WRD
17646 062710 026627 000010 000001               CMP     10(SP),#1               ; ERR.FLG,*                             8083
17647 062716 001033                             BNE     14$
17648 062720 104455                             TRAP    55                      ;                                       8086
17649 062722 000130                             .WORD   130
17650 062724 010570                             .WORD   ARR.DAT
17651 062726 024052                             .WORD   DUMPER
17652 062730 012746 006506                      MOV     #WRD.19,-(SP)           ;                                       8087
17653 062734 012746 007774                      MOV     #FNC.5,-(SP)
17654 062740 012746 006426                      MOV     #WRD.12,-(SP)
17655 062744 012746 006406                      MOV     #WRD.10,-(SP)
17656 062750 012746 007046                      MOV     #WRD.50,-(SP)
17657 062754 012746 010172                      MOV     #FNC.18,-(SP)
17658 062760 012746 006100                      MOV     #SIX.FMT,-(SP)
17659 062764 012746 000007                      MOV     #7,-(SP)
17660 062770 010600                             MOV     SP,R0                   ; SP,*
17661 062772 104414                             TRAP    14
17662 062774 012766 000001 000026               MOV     #1,26(SP)               ; *,DODU.FLG                            8088
17663 063002 062706 000020                      ADD     #20,SP                  ;                                       8085
17664 063006 062706 000006              14$:    ADD     #6,SP                   ;                                       8080
17665 063012 000414                             BR      16$                     ;                                       8074
17666 063014 010246                     15$:    MOV     R2,-(SP)                ;                                       8096
17667 063016 010146                             MOV     R1,-(SP)                ; NIB.PTR,*
17668 063020 042716 177770                      BIC     #177770,(SP)
17669 063024 012746 000001                      MOV     #1,-(SP)
17670 063030 011646                             MOV     (SP),-(SP)
17671 063032 004767 120340                      JSR     PC,BL$PU2
17672 063036 005205                             INC     R5                      ; BAD.NIB.CNT                           8097
17673 063040 062706 000010                      ADD     #10,SP                  ;                                       8095
17674 063044 005203                     16$:    INC     R3                      ; NIB.PAT                               8100
17675 063046 005201                             INC     R1                      ; NIB.PTR                               8071
17676 063050 020127 000010                      CMP     R1,#10                  ; NIB.PTR,*
17677 063054 003642                             BLE     13$
17678 063056 005204                             INC     R4                      ; PASS.CNT                              8103
17679 063060 020427 000161                      CMP     R4,#161                 ; PASS.CNT,*                            8105
17680 063064 001405                             BEQ     17$
17681 063066 020527 000011                      CMP     R5,#11                  ; BAD.NIB.CNT,*
17682 063072 001402                             BEQ     17$
17683 063074 000167 177372                      JMP     8$
17684 063100 104467                     17$:    TRAP    67
17685 063102 006000                             ROR     R0
17686 063104 103002                             BHIS    18$
17687 063106 000167 177202                      JMP     3$
```

```
17689                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
17690                                   ;                                                       22-Dec-1980 09:21:22    PA:<
17691
17692 063112  021627  000001            18$:    CMP     (SP),#1                 ; DODU.FLG,*                            8109
17693 063116  001004                            BNE     19$
17694 063120  016700  130454                    MOV     ML.LUN,R0               ;                                       8112
17695 063124  104451                            TRAP    51
17696 063126  104444                            TRAP    44
17697 063130  062706  000010            19$:    ADD     #10,SP                  ;                                       7975
17698 063134  000207                            RTS     PC
17699
17700                                   ; Routine Size:  265 words
17701                                   ; Maximum stack depth per invocation:  21 words
17706
17707
17711
17715 063136                            T36::
17716 063136  004767  176752            1$:     JSR     PC,$T36                 ;                                       8114
17717 063142  104466                            TRAP    66
17718 063144  006000                            ROR     R0
17719 063146  103773                            BLO     1$
17720 063150  000207                            RTS     PC
17721
17722                                   ; Routine Size:  6 words
17723                                   ; Maximum stack depth per invocation:  0 words
17728
17729
17730 ;          8117  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (87)

```
17732 ;ML4
17733 ;
17734 ;
17735 ;          8118  !
17736 ;          8119  !
17737 ;          8120  BGNTST;
17738 ;          8121
17739 ;          8122  !++
17740 ;          8123  ! TEST NUMBER:  TST 37
17741 ;          8124  !
17742 ;          8125  ! TEST NAME:    RAM BUS ADRS COUNTER TEST /READ PATH
17743 ;          8126  !
17744 ;          8127  ! TEST DESCRIPTION:
17745 ;          8128  !
17746 ;          8129  !       TEST ABILITY OF RAM/BUS ADRS
17747 ;          8130  !       COUNTERS TO LOAD/UNLOAD THE SKIP
17748 ;          8131  !       RAM DURING READ FUNCTIONS BY:
17749 ;          8132  !
17750 ;          8133  !       1.  LOADING A REPEATING COUNT OF 0
17751 ;          8134  !           TO 63 INTO THE NIBBLES OF THE
17752 ;          8135  !           FIRST 64 WORDS OF THE IO_BUF.
17753 ;          8136  !
17754 ;          8137  !       2.  VIA MBUS WRITE FUNCTION WRITE
17755 ;          8138  !           THE CONTENTS OF THE IO_BUF
17756 ;          8139  !           INTO THE GOOD BLOCK.
17757 ;          8140  !
17758 ;          8141  !       3.  CLEAR OUT THE IO_BUF
17759 ;          8142  !
17760 ;          8143  !       4.  VIA MBUS READ FUNCTION READ
17761 ;          8144  !           THE GOOD BLOCK FOR THE REPEATING
17762 ;          8145  !           COUNT OF 0 TO 63.
17763 ;          8146  !
17764 ;          8147  ! IMPLICIT INPUTS:
17765 ;          8148  !
17766 ;          8149  !       IO_BUF
17767 ;          8150  !
17768 ;          8151  !       A VECTOR OF 256 WORDS WHERE
17769 ;          8152  !       DATA FOR MBUS READS AND WRITE
17770 ;          8153  !       FUNCTION ARE FOUND.
17771 ;          8154  !
17772 ;          8155  !--
17773 ;          8156
17774 ;          8157  local
17775 ;          8158      DODU_FLG,                   !DROP UNIT FLAG
17776 ;          8159      WRD_CNT,                    !WORD COUNT
17777 ;          8160      PAT_INC,                    !PATTERN INCREMENT
17778 ;          8161      SIZ_EXP,                    !SIZE EXPRESSION
17779 ;          8162      POS_EXP,                    !POSITIONAL EXPRESSION
17780 ;          8163      TEMP;                       !TEMPORARY STORAGE LOCATION
17781 ;          8164
17782 ;          8165  CLR_MBUS;
17783 ;          8166  DODU_FLG = ZERO;
17784 ;          8167  WRD_CNT = ZERO;
17785 ;          8168
17786 ;          8169  incr COUNT from 0 to 63 do    !LOAD 64 WORDS WITH REPEATING  COUNTS OF 0-63
```

```
17788 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
17789 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (87)
17790
17791 ;          8170
17792 ;          8171        incr PAT_CNT from -1 to 11 by 4 do          !LOAD NIBBLES IN WORD WITH REPEATING COUNT OF 0-63
17793 ;          8172            begin
17794 ;          8173            (IO_BUF [.WRD_CNT])<0, 4> = .PAT_CNT + 1;       !LOAD FIRST NIBBLE IN WORD
17795 ;          8174            (IO_BUF [.WRD_CNT])<4, 4> = .PAT_CNT + 2;       !LOAD SECOND NIBBLE IN WORD
17796 ;          8175            (IO_BUF [.WRD_CNT])<8, 4> = .PAT_CNT + 3;       !LOAD THIRD NIBBLE IN WORD
17797 ;          8176            (IO_BUF [.WRD_CNT])<12, 4> = .PAT_CNT + 4;      !LOAD FORTH NIBBLE IN WORD
17798 ;          8177            WRD_CNT = .WRD_CNT + 1;                         !INCREMENT TO NEXT WORD
17799 ;          8178            end;
17800 ;          8179
17801 ;          8180    GD_BLK_XFER ();                                 !SET UP A GOOD BLOCK XFERR
17802 ;          8181    MLCS1 = write;                                  !DO A WRITE FUNCTION
17803 ;          8182    TIME_OUT_LOOP;
17804 ;          8183    BGNSUB;
17805 ;          8184
17806 ;          8185    incr IO_CNT from 0 to 255 do                    !CLEAR OUT IO_BUF
17807 ;          8186        IO_BUF [.IO_CNT] = ZEROES;
17808 ;          8187
17809 ;          8188    CLR_MBUS;
17810 ;          8189    GD_BLK_XFER ();                                 !SET UP A GOOD BLOCK XFERR
17811 ;          8190    MLCS1 = read;                                   !DO A READ FUNCTION
17812 ;          8191    TIME_OUT_LOOP;
17813 ;          8192    CLR_MBUS;
17814 ;          8193    SIZ_EXP = 4;                                    !FIELD SIZE FOR NIBBLES ALWAYS 4 BITS
17815 ;          8194    WRD_CNT = 0;
17816 ;          8195
17817 ;          8196    incr COUNT from 0 to 63 do                      !READ 64 WORDS IN IO_BUF
17818 ;          8197
17819 ;          8198        incr PAT_CNT from -1 to 11 by 4 do          !READ REPEATING COUNTS OF 0-63
17820 ;          8199            begin
17821 ;          8200            POS_EXP = ZERO;                         !FIELD SELECTOR SELECTS THE FOUR NIBBLES
17822 ;          8201            PAT_INC = ONE;
17823 ;          8202            TEMP = .IO_BUF [.WRD_CNT];              !GET A WORD OUT OF IO_BUF
17824 ;          8203
17825 ;          8204            incr CNT from 0 to 3 do                 !READ THE FOUR NIBBLES IN WORD
17826 ;          8205                begin
17827 ;          8206
17828 ;          8207                if .TEMP<.POS_EXP, .SIZ_EXP> neq (.PAT_CNT + .PAT_INC)
17829 ;          8208                                                    !COMPARE NIBBLE WITH RESPECTIVE 0 -63 CNT
17830 ;          8209                then
17831 ;          8210                    begin                           !ERROR AND SET DODU_FLG IF NEQ
17832 ;          8211                    ERRDF (89, ARR_DAT, DUMPER);
17833 ;          8212                    PRINTB (SIX_FMT, FNC_18, WRD_50, WRD_10, WRD_12, FNC_6, WRD_19);
17834 ;          8213                    DODU_FLG = ONE;
17835 ;          8214                    end;
17836 ;          8215
17837 ;          8216                POS_EXP = .POS_EXP + 4;             !POINT TO THE NEXT NIBBLE IN WORD
17838 ;          8217                PAT_INC = .PAT_INC + 1;             !INCREMENT THE 0-63 COUNT
17839 ;          8218                end;
17840 ;          8219
17841 ;          8220            WRD_CNT = .WRD_CNT + 1;                 !GET THE NEXT IO_BUF WORD
17842 ;          8221            end;
```

```
17844 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
17845 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (87)
17846
17847 ;          8222
17848 ;          8223  ENDSUB;
17849 ;          8224
17850 ;          8225  if .DODU_FLG IS_SET                    !DROP THIS UNIT IF DODU_FLG SET
17851 ;          8226  then
17852 ;          8227      begin
17853 ;          8228      DODU (.ML_LUN);
17854 ;          8229      DOCLN;
17855 ;          8230      end;
17856 ;          8231
17857 ;          8232  ENDTST;
17861
17865 063152  004167  120740          $T37:  JSR     R1,$SAVE5          ;                                  8116
17866 063156  162706  000012                 SUB     #12,SP
17867 063162  152777  000040  130024         BISB    #40,@ML.REG+40     ;                                  8163
17868 063170  016705  130406                 MOV     ML.DUT,R5
17869 063174  042705  177770                 BIC     #177770,R5
17870 063200  142777  000007  130006         BICB    #7,@ML.REG+40
17871 063206  150577  130002                 BISB    R5,@ML.REG+40
17872 063212  005066  000010                 CLR     10(SP)             ; DODU.FLG                         8166
17873 063216  005066  000002                 CLR     2(SP)              ; WRD.CNT                          8167
17874 063222  005002                         CLR     R2                 ; COUNT                            8169
17875 063224  012703  177777          1$:    MOV     #-1,R3             ; *,PAT.CNT                        8171
17876 063230  016604  000002          2$:    MOV     2(SP),R4           ; WRD.CNT,*                        8173
17877 063234  006304                         ASL     R4
17878 063236  062704  011600                 ADD     #IO.BUF,R4
17879 063242  010305                         MOV     R3,R5              ; PAT.CNT,*
17880 063244  005205                         INC     R5
17881 063246  042705  177760                 BIC     #177760,R5
17882 063252  142714  000017                 BICB    #17,(R4)
17883 063256  150514                         BISB    R5,(R4)
17884 063260  010305                         MOV     R3,R5              ; PAT.CNT,*                        8174
17885 063262  062705  000002                 ADD     #2,R5
17886 063266  006305                         ASL     R5
17887 063270  006305                         ASL     R5
17888 063272  006305                         ASL     R5
17889 063274  006305                         ASL     R5
17890 063276  042705  177417                 BIC     #177417,R5
17891 063302  142714  000360                 BICB    #360,(R4)
17892 063306  150514                         BISB    R5,(R4)
17893 063310  010305                         MOV     R3,R5              ; PAT.CNT,*                        8175
17894 063312  062705  000003                 ADD     #3,R5
17895 063316  000305                         SWAB    R5
17896 063320  042705  170377                 BIC     #170377,R5
17897 063324  042714  007400                 BIC     #7400,(R4)
```

```
17899                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
17900                                   ;                                                       22-Dec-1980 09:21:22    PA:<
17901
17902 063330 050514                             BIS     R5,(R4)
17903 063332 010305                             MOV     R3,R5                   ; PAT.CNT,*                             8176
17904 063334 062705 000004                      ADD     #4,R5
17905 063340 000305                             SWAB    R5
17906 063342 006305                             ASL     R5
17907 063344 006305                             ASL     R5
17908 063346 006305                             ASL     R5
17909 063350 006305                             ASL     R5
17910 063352 042705 007777                      BIC     #7777,R5
17911 063356 042714 170000                      BIC     #170000,(R4)
17912 063362 050514                             BIS     R5,(R4)
17913 063364 005266 000002                      INC     2(SP)                   ; WRD.CNT                               8177
17914 063370 062703 000004                      ADD     #4,R3                   ; *,PAT.CNT                             8171
17915 063374 020327 000013                      CMP     R3,#13                  ; PAT.CNT,*
17916 063400 003713                             BLE     2$
17917 063402 005202                             INC     R2                      ; COUNT                                 8169
17918 063404 020227 000077                      CMP     R2,#77                  ; COUNT,*
17919 063410 003705                             BLE     1$
17920 063412 004767 132444                      JSR     PC,GD.BLK.XFER          ;                                       8180
17921 063416 012777 000061 127530               MOV     #61,@ML.REG             ;                                       8181
17922 063424 105777 127574              3$:     TSTB    @ML.REG+50
17923 063430 100375                             BPL     3$
17924 063432 104402                     4$:     TRAP    2                       ;                                       8182
17925 063434 005003                             CLR     R3                      ; IO.CNT                                8185
17926 063436 010304                     5$:     MOV     R3,R4                   ; IO.CNT,*                              8186
17927 063440 006304                             ASL     R4
17928 063442 005064 011600                      CLR     IO.BUF(R4)
17929 063446 005203                             INC     R3                      ; IO.CNT                                8185
17930 063450 020327 000377                      CMP     R3,#377                 ; IO.CNT,*
17931 063454 003770                             BLE     5$
17932 063456 152777 000040 127530               BISB    #40,@ML.REG+40          ;                                       8186
17933 063464 016704 130112                      MOV     ML.DUT,R4
17934 063470 042704 177770                      BIC     #177770,R4
17935 063474 142777 000007 127512               BICB    #7,@ML.REG+40
17936 063502 150477 127506                      BISB    R4,@ML.REG+40
17937 063506 004767 132350                      JSR     PC,GD.BLK.XFER          ;                                       8189
17938 063512 012777 000071 127434               MOV     #71,@ML.REG             ;                                       8190
17939 063520 105777 127500              6$:     TSTB    @ML.REG+50
17940 063524 100375                             BPL     6$
17941 063526 152777 000040 127460               BISB    #40,@ML.REG+40          ;                                       8191
17942 063534 016704 130042                      MOV     ML.DUT,R4
17943 063540 042704 177770                      BIC     #177770,R4
17944 063544 142777 000007 127442               BICB    #7,@ML.REG+40
17945 063552 150477 127436                      BISB    R4,@ML.REG+40
17946 063556 012766 000004 000006               MOV     #4,6(SP)                ; *,SIZ.EXP                             8193
17947 063564 005066 000002                      CLR     2(SP)                   ; WRD.CNT                               8194
17948 063570 005001                             CLR     R1                      ; COUNT                                 8196
17949 063572 012703 177777              7$:     MOV     #-1,R3                  ; *,PAT.CNT                             8198
17950 063576 005005                     8$:     CLR     R5                      ; POS.EXP                               8200
17951 063600 012716 000001                      MOV     #1,(SP)                 ; *,PAT.INC                             8201
17952 063604 016604 000002                      MOV     2(SP),R4                ; WRD.CNT,*                             8202
17953 063610 006304                             ASL     R4
```

```
17955                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
17956                                   ;                                                       22-Dec-1980 09:21:22    PA:<
17957
17958 063612  016466  011600  000004            MOV     IO.BUF(R4),4(SP)        ; *,TEMP
17959 063620  005002                            CLR     R2                      ; CNT                                   8204
17960 063622  016646  000004            9$:     MOV     4(SP),-(SP)             ; TEMP,*                                8207
17961 063626  010546                            MOV     R5,-(SP)                ; POS.EXP,*
17962 063630  016646  000012                    MOV     12(SP),-(SP)            ; SIZ.EXP,*
17963 063634  005046                            CLR     -(SP)
17964 063636  004767  117154                    JSR     PC,BL$GT1
17965 063642  062706  000010                    ADD     #10,SP
17966 063646  010304                            MOV     R3,R4                   ; PAT.CNT,*
17967 063650  061604                            ADD     (SP),R4                 ; PAT.INC,*
17968 063652  020004                            CMP     R0,R4
17969 063654  001433                            BEQ     10$
17970 063656  104455                            TRAP    55                      ;                                       8211
17971 063660  000131                            .WORD   131
17972 063662  010570                            .WORD   ARR.DAT
17973 063664  024052                            .WORD   DUMPER
17974 063666  012746  006506                    MOV     #WRD.19,-(SP)           ;                                       8212
17975 063672  012746  010004                    MOV     #FNC.6,-(SP)
17976 063676  012746  006426                    MOV     #WRD.12,-(SP)
17977 063702  012746  006406                    MOV     #WRD.10,-(SP)
17978 063706  012746  007046                    MOV     #WRD.50,-(SP)
17979 063712  012746  010172                    MOV     #FNC.18,-(SP)
17980 063716  012746  006100                    MOV     #SIX.FMT,-(SP)
17981 063722  012746  000007                    MOV     #7,-(SP)
17982 063726  010600                            MOV     SP,R0                   ; SP,*
17983 063730  104414                            TRAP    14
17984 063732  012766  000001  000030            MOV     #1,30(SP)               ; *,DODU.FLG                            8213
17985 063740  062706  000020                    ADD     #20,SP                  ;                                       8210
17986 063744  062705  000004            10$:    ADD     #4,R5                   ; *,POS.EXP                             8216
17987 063750  005216                            INC     (SP)                    ; PAT.INC                               8217
17988 063752  005202                            INC     R2                      ; CNT                                   8204
17989 063754  020227  000003                    CMP     R2,#3                   ; CNT,*
17990 063760  003720                            BLE     9$
17991 063762  005266  000002                    INC     2(SP)                   ; WRD.CNT                               8220
17992 063766  062703  000004                    ADD     #4,R3                   ; *,PAT.CNT                             8198
17993 063772  020327  000013                    CMP     R3,#13                  ; PAT.CNT,*
17994 063776  003677                            BLE     8$
17995 064000  005201                            INC     R1                      ; COUNT                                 8196
17996 064002  020127  000077                    CMP     R1,#77                  ; COUNT,*
17997 064006  003671                            BLE     7$
17998 064010  104467                            TRAP    67                      ;                                       8221
17999 064012  006000                            ROR     R0
18000 064014  103606                            BLO     4$
18001 064016  026627  000010  000001            CMP     10(SP),#1               ; DODU.FLG,*                            8225
18002 064024  001004                            BNE     11$
18003 064026  016700  127546                    MOV     ML.LUN,R0               ;                                       8228
18004 064032  104451                            TRAP    51
18005 064034  104444                            TRAP    44
18006 064036  062706  000012            11$:    ADD     #12,SP                  ;                                       8116
18007 064042  000207                            RTS     PC
18008
18009                                   ; Routine Size:  221 words
```

```
18011                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
18012                                   ;                                                       22-Dec-1980 09:21:22    PA:<
18013
18014                                   ; Maximum stack depth per invocation:  19 words
18019
18020
18024
18028 064044                            T37::
18029 064044  004767  177102            1$:     JSR     PC,$T37                         ;                               8230
18030 064050  104466                            TRAP    66
18031 064052  006000                            ROR     R0
18032 064054  103773                            BLO     1$
18033 064056  000207                            RTS     PC
18034
18035                                   ; Routine Size:  6 words
18036                                   ; Maximum stack depth per invocation:  0 words
18041
18042
18043 ;          8233  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (88)

```
18045 ;ML4
18046 ;
18047
18048 ;          8234  !
18049 ;          8235  !
18050 ;          8236  BGNTST;
18051 ;          8237
18052 ;          8238  !++
18053 ;          8239  ! TEST NUMBER:  TST 38
18054 ;          8240  !
18055 ;          8241  ! TEST NAME:    SYNC DATA BUS BIT UNIQUENESS TEST/WRITE PATH
18056 ;          8242  !
18057 ;          8243  ! TEST DESCRIPTION:
18058 ;          8244  !
18059 ;          8245  !       TEST SYNCHRONOUS DATA BUS FOR
18060 ;          8246  !       DATA BIT UNIQUENESS BY:
18061 ;          8247  !
18062 ;          8248  !       1.  LOADING THE FIRST 16 WORDS IN
18063 ;          8249  !           THE IO_BUF WITH A SHIFTING
18064 ;          8250  !           ZERO IN A FIELD OF ONES PATTERN.
18065 ;          8251  !
18066 ;          8252  !       2.  VIA MBUS WRITE FUNCTION WRITE
18067 ;          8253  !           SHIFTING PATTERN THROUGH THE
18068 ;          8254  !           DATA BUS AND INTO THE GOOD
18069 ;          8255  !           BLOCK.
18070 ;          8256  !
18071 ;          8257  !       3.  VIA DAT_DM MODE READ THE
18072 ;          8258  !           GOOD BLOCK AND SAVE ALL GOOD
18073 ;          8259  !           NIBBLE DATA, IN THEIR PROPER
18074 ;          8260  !           SEQUENCE, INTO A STACK
18075 ;          8261  !           STRUCTURE.
18076 ;          8262  !
18077 ;          8263  !       4.  INTERRIGATE STACK STRUCTURE FOR
18078 ;          8264  !           SHIFTED DATA PATTERN.
18079 ;          8265  !
18080 ;          8266  !
18081 ;          8267  ! IMPLICIT INPUTS:
18082 ;          8268  !
18083 ;          8269  !       PD_TEMP
18084 ;          8270  !       A BIT VECTOR OF 16 BITS WHERE
18085 ;          8271  !       THE READ PROM DATA IS STORED
18086 ;          8272  !       AND ACCESSED FROM.
18087 ;          8273  !
18088 ;          8274  !       IO_BUF
18089 ;          8275  !       A VECTOR OF 256 WORDS WHERE
18090 ;          8276  !       DATA FOR MBUS READS AND WRITE
18091 ;          8277  !       FUNCTION ARE FOUND.
18092 ;          8278  !
18093 ;          8279  !       STACK
18094 ;          8280  !       A VECTOR OF 198 BYTE LOCATIONS
18095 ;          8281  !       WHERE GOOD NIBBLE DATA IS STORED
18096 ;          8282  !       WHEN STRIPPING AWAY BAD NIBBLE
18097 ;          8283  !       LOCATIONS OF A BLOCK.
18098 ;          8284  !
18099 ;          8285  !
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (88)

```
18101 ;ML4
18102 ;
18103
18104 ;          8286  !--
18105 ;          8287
18106 ;          8288  local
18107 ;          8289      SAV_NIB,                    !STORES THE SHIFTED BIT PATTERN
18108 ;          8290      DODU_FLG,                   !DROP UNIT FLAG
18109 ;          8291      NIB_BIT,                    !NIBBLE PATTERN
18110 ;          8292      TST_PAT,                    !TEST PATTERN
18111 ;          8293      ALL_ONES_1,                 !HOW MANY '17' NIBBLE PATTERN POSITION TO READ
18112 ;          8294      ALL_ONES_2,                 !HOW MANY '17' NIBBLE PATTERN POSITION TO READ
18113 ;          8295      STK_PTR,                    !STACK POINTER
18114 ;          8296      COUNT;                      !COUNTER
18115 ;          8297
18116 ;          8298  BGNSUB;
18117 ;          8299  CLR_MBUS;
18118 ;          8300  DODU_FLG = ZERO;
18119 ;          8301  TST_PAT = ONE;                  !ONE IN A FIELD OF ZEROES
18120 ;          8302
18121 ;          8303  incr CNT from 0 to 15 do        !WRITE 16 WORDS WITH SHIFTING 0 IN FIELD OF 1'S.
18122 ;          8304      begin
18123 ;          8305      IO_BUF [.CNT] = not .TST_PAT;
18124 ;          8306      TST_PAT = .TST_PAT^ONE;
18125 ;          8307      end;
18126 ;          8308
18127 ;          8309  GD_BLK_XFER ();                 !SET UP A GOOD BLOCK XFERR
18128 ;          8310  MLCS1 = write;                  !WRITE SHIFTING PATTERN THROUGH SYNC BUS
18129 ;          8311  TIME_OUT_LOOP;
18130 ;          8312  STRIPPER (21, 8);               !CALL ROUTINE TO STRIP OUT BAD NIBBLE DATA FROM ARRAY WORDS
18131 ;          8313  STK_PTR = -1;                   !RESET THE STACK POINTER
18132 ;          8314  NIB_BIT = ONE;                  !SHIFTING NIBBLE PAT OF 1 IN FIELD OF 0'S
18133 ;          8315  ALL_ONES_1 = ZERO;              !READ NO '17' NIBBLE PATTERN ON FIRST PASS
18134 ;          8316  ALL_ONES_2 = 3;                 !READ THREE '17' NIBBLE PATTERN ON FIRST PASS
18135 ;          8317
18136 ;          8318  incr BY_FOUR_WRDS from 0 to 3 do    !READ 4 GROUPS OF 4 WORDS
18137 ;          8319      begin
18138 ;          8320
18139 ;          8321      incr BY_ONE_WRD from 0 to 3 do  !READ 4 GROUPS OF 1 WORD
18140 ;          8322          begin
18141 ;          8323          COUNT = ZERO;               !CLEAR COUNT
18142 ;          8324
18143 ;          8325          until .COUNT eql .ALL_ONES_1 do     !READ X NUMBER OF '17' NIBBLE PAT
18144 ;          8326              begin
18145 ;          8327              COUNT = .COUNT + 1;         !INCREMENT COUNT
18146 ;          8328              STK_PTR = .STK_PTR + 1;     !INCREMENT STACK POINTER
18147 ;          8329
18148 ;          8330              if (.stack [.STK_PTR]) neq %o'000017'       !COMPARE STACK WITH '17'
18149 ;          8331              then
18150 ;          8332                  begin                   !ERROR AND SET DODU_FLG IF NEQ
18151 ;          8333                  ERRDF (90, SYNC, DUMPER);
18152 ;          8334                  PRINTB (SIX_FMT, WRD_23, WRD_39, PHR_4, WRD_12, FNC_5, WRD_19);
18153 ;          8335                  PRINTB (FMT_5, ONES, .stack [.STK_PTR], .STK_PTR);
18154 ;          8336                  DODU_FLG = ONE;
18155 ;          8337                  end;
```

```
18157 ;ML4
18158 ;
18159
18160 ;          8338
18161 ;          8339              end;
18162 ;          8340
18163 ;          8341          STK_PTR = .STK_PTR + 1;                 !INCREMENT THE STACK POINTER
18164 ;          8342          SAV_NIB = ( not .NIB_BIT) and (%o'000017');     !GENERATE THE SHIFTED BIT
18165 ;          8343
18166 ;          8344          if (.stack [.STK_PTR]) neq (.SAV_NIB)   !COMPARE STACK TO SHIFTED BIT
18167 ;          8345          then
18168 ;          8346              begin                               !ERROR AND SET DODU_FLG IF NEQ
18169 ;          8347              ERRDF (91, SYNC, DUMPER);
18170 ;          8348              PRINTB (SIX_FMT, WRD_23, WRD_39, PHR_4, WRD_12, FNC_5, WRD_19);
18171 ;          8349              PRINTB (FMT_15, .STK_PTR);
18172 ;          8350              PRINTB (FMT_5, .SAV_NIB, .stack [.STK_PTR]);
18173 ;          8351              DODU_FLG = ONE;
18174 ;          8352              end;
18175 ;          8353
18176 ;          8354          COUNT = ZEROES;                         !CLEAR COUNT
18177 ;          8355
18178 ;          8356          until .COUNT eql .ALL_ONES_2 do         !READ X NUMBER OF '17' NIBBLE PAT
18179 ;          8357              begin
18180 ;          8358              COUNT = .COUNT + 1;                 !INCREMENT COUNT
18181 ;          8359              STK_PTR = .STK_PTR + 1;             !INCREMENT STACK POINTER
18182 ;          8360
18183 ;          8361              if (.stack [.STK_PTR]) neq %o'000017'       !COMPARE STACK POINTER WITH  '17'
18184 ;          8362              then
18185 ;          8363                  begin                           !ERROR AND SET DODU_FLG IF SET
18186 ;          8364                  ERRDF (92, SYNC, DUMPER);
18187 ;          8365                  PRINTB (SIX_FMT, WRD_23, WRD_39, PHR_4, WRD_12, FNC_5, WRD_19);
18188 ;          8366                  PRINTB (FMT_5, ONES, .stack [.STK_PTR], .STR_PTR);
18189 ;          8367                  DODU_FLG = ONE;
18190 ;          8368                  end;
18191 ;          8369
18192 ;          8370              end;
18193 ;          8371
18194 ;          8372          NIB_BIT = .NIB_BIT^ONE;                 !SHIFT THE SHIFTED NIBBLE BIT
18195 ;          8373          end;
18196 ;          8374
18197 ;          8375      NIB_BIT = ONE;                              !RESET THE SHIFTED NIBBLE BIT
18198 ;          8376      ALL_ONES_1 = .ALL_ONES_1 + 1;               !READ ONE MORE '17' PATTERN
18199 ;          8377      ALL_ONES_2 = .ALL_ONES_2 - 1;               !READ ONE LESS '17' PATTERN
18200 ;          8378      end;
18201 ;          8379
18202 ;          8380  ENDSUB;
18203 ;          8381
18204 ;          8382  if .DODU_FLG IS_SET                            !DROP THIS UNIT IF DODU_FLG SET
18205 ;          8383  then
18206 ;          8384      begin
18207 ;          8385      DODU (.ML_LUN);
18208 ;          8386      DOCLN;
18209 ;          8387      end;
18210 ;          8388
18211 ;          8389  ENDTST;
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (88)

```
18213 ;ML4
18214 ;
18215
18219
18223 064060 004167 120032          $T38:  JSR    R1,$SAVE5                    ;                                  8232
18224 064064 162706 000012                 SUB    #12,SP
18225 064070 104402                1$:     TRAP   2                            ;                                  8296
18226 064072 152777 000040 127114          BISB   #40,@ML.REG+40               ;                                  8298
18227 064100 016705 127476                 MOV    ML.DUT,R5
18228 064104 042705 177770                 BIC    #177770,R5
18229 064110 142777 000007 127076          BICB   #7,@ML.REG+40
18230 064116 150577 127072                 BISB   R5,@ML.REG+40
18231 064122 005001                        CLR    R1                           ; DODU.FLG                         8300
18232 064124 012766 000001 000006          MOV    #1,6(SP)                     ; *,TST.PAT                        8301
18233 064132 005004                        CLR    R4                           ; CNT                              8303
18234 064134 010405                2$:     MOV    R4,R5                        ; CNT,*                            8305
18235 064136 006305                        ASL    R5
18236 064140 016665 000006 011600          MOV    6(SP),IO.BUF(R5)             ; TST.PAT,*
18237 064146 005165 011600                 COM    IO.BUF(R5)
18238 064152 006366 000006                 ASL    6(SP)                        ; TST.PAT                          8306
18239 064156 005204                        INC    R4                           ; CNT                              8303
18240 064160 020427 000017                 CMP    R4,#17                       ; CNT,*
18241 064164 003763                        BLE    2$
18242 064166 004767 131670                 JSR    PC,GD.BLK.XFER               ;                                  8309
18243 064172 012777 000061 126754          MOV    #61,@ML.REG                  ;                                  8310
18244 064200 105777 127020                 TSTB   @ML.REG+50
18245 064204 100375                        BPL    3$
18246 064206 012746 000025                 MOV    #25,-(SP)                    ;                                  8312
18247 064212 012746 000010                 MOV    #10,-(SP)
18248 064216 004767 127772                 JSR    PC,STRIPPER
18249 064222 012702 177777                 MOV    #-1,R2                       ; *,STK.PTR                        8313
18250 064226 012766 000001 000004          MOV    #1,4(SP)                     ; *,NIB.BIT                        8314
18251 064234 005066 000010                 CLR    10(SP)                       ; ALL.ONES.1                       8315
18252 064240 012766 000003 000006          MOV    #3,6(SP)                     ; *,ALL.ONES.2                     8316
18253 064246 005004                        CLR    R4                           ; BY.FOUR.WRDS                     8318
18254 064250 005005                4$:     CLR    R5                           ; BY.ONE.WRD                       8321
18255 064252 005003                5$:     CLR    R3                           ; COUNT                            8323
18256 064254 020366 000010         6$:     CMP    R3,10(SP)                    ; COUNT,ALL.ONES.1                 8325
18257 064260 001455                        BEQ    7$
18258 064262 005203                        INC    R3                           ; COUNT                            8327
18259 064264 005202                        INC    R2                           ; STK.PTR                          8328
18260 064266 126227 012612 000017          CMPB   STACK(R2),#17                ; *(STK.PTR),*                     8330
18261 064274 001767                        BEQ    6$
18262 064276 104455                        TRAP   55                           ;                                  8333
18263 064300 000132                        .WORD  132
18264 064302 010526                        .WORD  SYNC
18265 064304 024052                        .WORD  DUMPER
18266 064306 012746 006506                 MOV    #WRD.19,-(SP)                ;                                  8334
```

```
18268                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
18269                                   ;                                                       22-Dec-1980 09:21:22    PA:<
18270
18271 064312  012746  007774                    MOV     #FNC.5,-(SP)
18272 064316  012746  006426                    MOV     #WRD.12,-(SP)
18273 064322  012746  007454                    MOV     #PHR.4,-(SP)
18274 064326  012746  006716                    MOV     #WRD.39,-(SP)
18275 064332  012746  006544                    MOV     #WRD.23,-(SP)
18276 064336  012746  006100                    MOV     #SIX.FMT,-(SP)
18277 064342  012746  000007                    MOV     #7,-(SP)
18278 064346  010600                            MOV     SP,R0                   ; SP,*
18279 064350  104414                            TRAP    14
18280 064352  010216                            MOV     R2,(SP)                 ; STK.PTR,*                                     8335
18281 064354  005046                            CLR     -(SP)
18282 064356  116216  012612                    MOVB    STACK(R2),(SP)          ; *(STK.PTR),*
18283 064362  012746  177777                    MOV     #-1,-(SP)
18284 064366  012746  004430                    MOV     #FMT.5,-(SP)
18285 064372  012746  000004                    MOV     #4,-(SP)
18286 064376  010600                            MOV     SP,R0                   ; SP,*
18287 064400  104414                            TRAP    14
18288 064402  012701  000001                    MOV     #1,R1                   ; *,DODU.FLG                                    8336
18289 064406  062706  000030                    ADD     #30,SP                  ;                                               8332
18290 064412  000720                            BR      6$                      ;                                               8325
18291 064414  005202                    7$:     INC     R2                      ; STK.PTR                                       8341
18292 064416  012766  000017  000014            MOV     #17,14(SP)              ; *,SAV.NIB                                     8342
18293 064424  046666  000004  000014            BIC     4(SP),14(SP)            ; NIB.BIT,SAV.NIB
18294 064432  005000                            CLR     R0                      ;                                               8344
18295 064434  156200  012612                    BISB    STACK(R2),R0            ; *(STK.PTR),*
18296 064440  020066  000014                    CMP     R0,14(SP)               ; *,SAV.NIB
18297 064444  001454                            BEQ     8$
18298 064446  104455                            TRAP    55                      ;                                               8347
18299 064450  000133                            .WORD   133
18300 064452  010526                            .WORD   SYNC
18301 064454  024052                            .WORD   DUMPER
18302 064456  012746  006506                    MOV     #WRD.19,-(SP)           ;                                               8348
18303 064462  012746  007774                    MOV     #FNC.5,-(SP)
18304 064466  012746  006426                    MOV     #WRD.12,-(SP)
18305 064472  012746  007454                    MOV     #PHR.4,-(SP)
18306 064476  012746  006716                    MOV     #WRD.39,-(SP)
18307 064502  012746  006544                    MOV     #WRD.23,-(SP)
18308 064506  012746  006100                    MOV     #SIX.FMT,-(SP)
18309 064512  012746  000007                    MOV     #7,-(SP)
18310 064516  010600                            MOV     SP,R0                   ; SP,*
18311 064520  104414                            TRAP    14
18312 064522  010216                            MOV     R2,(SP)                 ; STK.PTR,*                                     8349
18313 064524  012746  005150                    MOV     #FMT.15,-(SP)
18314 064530  012746  000002                    MOV     #2,-(SP)
18315 064534  010600                            MOV     SP,R0                   ; SP,*
18316 064536  104414                            TRAP    14
18317 064540  005016                            CLR     (SP)                    ;                                               8350
18318 064542  116216  012612                    MOVB    STACK(R2),(SP)          ; *(STK.PTR),*
18319 064546  016646  000040                    MOV     40(SP),-(SP)            ; SAV.NIB,*
18320 064552  012746  004430                    MOV     #FMT.5,-(SP)
18321 064556  012746  000003                    MOV     #3,-(SP)
18322 064562  010600                            MOV     SP,R0                   ; SP,*
```

```
18324                                   ;ML4
18325                                   ;
18326
18327 064564 104414                             TRAP    14
18328 064566 012701 000001                      MOV     #1,R1                   ; *,DODU.FLG                    8351
18329 064572 062706 000032                      ADD     #32,SP                  ;                               8346
18330 064576 005003                     8$:     CLR     R3                      ; COUNT                         8354
18331 064600 020366 000006              9$:     CMP     R3,6(SP)                ; COUNT,ALL.ONES.2              8356
18332 064604 001455                             BEQ     10$
18333 064606 005203                             INC     R3                      ; COUNT                         8358
18334 064610 005202                             INC     R2                      ; STK.PTR                       8359
18335 064612 126227 012612 000017               CMPB    STACK(R2),#17           ; *(STK.PTR),*                  8361
18336 064620 001767                             BEQ     9$
18337 064622 104455                             TRAP    55                      ;                               8364
18338 064624 000134                             .WORD   134
18339 064626 010526                             .WORD   SYNC
18340 064630 024052                             .WORD   DUMPER
18341 064632 012746 006506                      MOV     #WRD.19,-(SP)           ;                               8365
18342 064636 012746 007774                      MOV     #FNC.5,-(SP)
18343 064642 012746 006426                      MOV     #WRD.12,-(SP)
18344 064646 012746 007454                      MOV     #PHR.4,-(SP)
18345 064652 012746 006716                      MOV     #WRD.39,-(SP)
18346 064656 012746 006544                      MOV     #WRD.23,-(SP)
18347 064662 012746 006100                      MOV     #SIX.FMT,-(SP)
18348 064666 012746 000007                      MOV     #7,-(SP)
18349 064672 010600                             MOV     SP,R0                   ; SP,*
18350 064674 104414                             TRAP    14
18351 064676 010216                             MOV     R2,(SP)                 ; STK.PTR,*                     8366
18352 064700 005046                             CLR     -(SP)
18353 064702 116216 012612                      MOVB    STACK(R2),(SP)          ; *(STK.PTR),*
18354 064706 012746 177777                      MOV     #-1,-(SP)
18355 064712 012746 004430                      MOV     #FMT.5,-(SP)
18356 064716 012746 000004                      MOV     #4,-(SP)
18357 064722 010600                             MOV     SP,R0                   ; SP,*
18358 064724 104414                             TRAP    14
18359 064726 012701 000001                      MOV     #1,R1                   ; *,DODU.FLG                    8367
18360 064732 062706 000030                      ADD     #30,SP                  ;                               8363
18361 064736 000720                             BR      9$                      ;                               8356
18362 064740 006366 000004              10$:    ASL     4(SP)                   ; NIB.BIT                       8372
18363 064744 005205                             INC     R5                      ; BY.ONE.WRD                    8321
18364 064746 020527 000003                      CMP     R5,#3                   ; BY.ONE.WRD,*
18365 064752 003002                             BGT     11$
18366 064754 000167 177272                      JMP     5$
18367 064760 012766 000001 000004       11$:    MOV     #1,4(SP)                ; *,NIB.BIT                     8375
18368 064766 005266 000010                      INC     10(SP)                  ; ALL.ONES.1                    8376
18369 064772 005366 000006                      DEC     6(SP)                   ; ALL.ONES.2                    8377
18370 064776 005204                             INC     R4                      ; BY.FOUR.WRDS                  8318
18371 065000 020427 000003                      CMP     R4,#3                   ; BY.FOUR.WRDS,*
18372 065004 003002                             BGT     12$
18373 065006 000167 177236                      JMP     4$
18374 065012 022626                     12$:    CMP     (SP)+,(SP)+             ;                               8296
18375 065014 104467                             TRAP    67                      ;                               8378
18376 065016 006000                             ROR     R0
18377 065020 103002                             BHIS    13$
18378 065022 000167 177042                      JMP     1$
```

```
18380                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
18381                                   ;                                                       22-Dec-1980 09:21:22    PA:<
18382
18383 065026  005301                    13$:    DEC     R1                      ; DODU.FLG                              8382
18384 065030  001004                            BNE     14$
18385 065032  016700  126542                    MOV     ML.LUN,R0               ;                                       8385
18386 065036  104451                            TRAP    51
18387 065040  104444                            TRAP    44
18388 065042  062706  000012              14$:  ADD     #12,SP                  ;                                       8232
18389 065046  000207                            RTS     PC
18390
18391                                   ; Routine Size:  252 words
18392                                   ; Maximum stack depth per invocation:  26 words
18397
18398
18402
18406 065050                            T38::
18407 065050  004767  177004              1$:   JSR     PC,$T38                 ;                                       8387
18408 065054  104466                            TRAP    66
18409 065056  006000                            ROR     R0
18410 065060  103773                            BLO     1$
18411 065062  000207                            RTS     PC
18412
18413                                   ; Routine Size:  6 words
18414                                   ; Maximum stack depth per invocation:  0 words
18419
18420
18421 ;          8390  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (89)

```
18423 ;ML4
18424 ;
18425
18426 ;          8391  !
18427 ;          8392  BGNTST;
18428 ;          8393
18429 ;          8394  !++
18430 ;          8395  ! TEST NUMBER:  TST 39
18431 ;          8396  !
18432 ;          8397  ! TEST NAME:    SYNC DATA BUS BIT UNIQUENESS TEST/READ PATH
18433 ;          8398  !
18434 ;          8399  ! TEST DESCRIPTION:
18435 ;          8400  !       TEST SYNCHRONOUS DATA BUS READ
18436 ;          8401  !       PATH FOR DATA BIT UNIQUENESS BY:
18437 ;          8402  !
18438 ;          8403  !       1.  LOADING THE FIRST 16 WORDS IN THE IO_BUF WITH A SHIFTING
18439 ;          8404  !           ZERO IN A FIELD OF ONES PATTERN.
18440 ;          8405  !
18441 ;          8406  !       2.  VIA MBUS WRITE FUNCTION WRITE SHIFTING PATTERN INTO THE GOOD BLOCK.
18442 ;          8407  !
18443 ;          8408  !       3.  CLEAR THE IO_BUF.
18444 ;          8409  !
18445 ;          8410  !       4.  VIA MBUS READ FUNCTION READ THE SHIFTING PATTERN THROUGH THE
18446 ;          8411  !           READ PATH.
18447 ;          8412  !
18448 ;          8413  !       5.  INTERIGATE THE IO_BUF FOR THE SHIFTING PATTERN.
18449 ;          8414  !
18450 ;          8415  ! IMPLICIT INPUTS:
18451 ;          8416  !       IO_BUF
18452 ;          8417  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE FUNCTION ARD FOUND.
18453 ;          8418  !--
18454 ;          8419
18455 ;          8420  local
18456 ;          8421      DODU_FLG,                          !DROP UNIT FLAG
18457 ;          8422      TST_PAT;                           !TEST PATTERN
18458 ;          8423
18459 ;          8424  CLR_MBUS;
18460 ;          8425  DODU_FLG = ZERO;
18461 ;          8426  TST_PAT = ONE;                         !ONE IN A FIELD OF ZEROES
18462 ;          8427
18463 ;          8428  incr CNT from 0 to 15 do               !WRITE 16 WORDS WITH SHIFTED 0 IN A FIELD OF 1'S
18464 ;          8429      begin
18465 ;          8430      IO_BUF [.CNT] = not .TST_PAT;
18466 ;          8431      TST_PAT = .TST_PAT^ONE;
18467 ;          8432      end;
18468 ;          8433
18469 ;          8434  GD_BLK_XFER ();                        !SET UP A GOOD BLOCK XFERR
18470 ;          8435  MLCS1 = write;                         !WRITE SHIFTING PATTERN
18471 ;          8436  TIME_OUT_LOOP;
18472 ;          8437  BGNSUB;
18473 ;          8438
18474 ;          8439  incr CNT from 0 to 15 do               !CLEAR OUT THE IO_BUF
18475 ;          8440      IO_BUF [.CNT] = ZEROES;
18476 ;          8441
18477 ;          8442  CLR_MBUS;
```

```
18479 ;ML4                                                          22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
18480 ;                                                             22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (89)
18481
18482 ;          8443  GD_BLK_XFER ();                              !SET UP A GOOD BLOCK XFERR
18483 ;          8444  ML[CS1 = read;                               !READ SHIFTING PATTERN THROUGH SYNC BUS
18484 ;          8445  TIME_OUT_LOOP;
18485 ;          8446  TST_PAT = ONE;                               !SHIFTING PATTERN
18486 ;          8447
18487 ;          8448  incr CNT from 0 to 15 do                     !READ IO_BUF FOR SHIFTING 0 IN FIELD OF 1'S
18488 ;          8449      begin
18489 ;          8450
18490 ;          8451      if .IO_BUF [.CNT] neq ( not .TST_PAT)    !COMPARE IO_BUF TO SHIFTED PAT
18491 ;          8452      then
18492 ;          8453          begin                                !ERROR AND SET DODU_FLG IF NEQ
18493 ;          8454          ERRDF (93, SYNC, DUMPER);
18494 ;          8455          PRINTB (FIV_FMT, WRD_23, FNC_6, WRD_19, WRD_39, PHR_4);
18495 ;          8456          PRINTB (FMT_2, ( not .TST_PAT), .IO_BUF [.CNT], ( not .TST_PAT xor .IO_BUF [.CNT]));
18496 ;          8457          DODU_FLG = ONE;
18497 ;          8458          end;
18498 ;          8459
18499 ;          8460      TST_PAT = .TST_PAT^ONE;                  !SHIFT THE PATTERN AND REPEAT
18500 ;          8461      end;
18501 ;          8462
18502 ;          8463  ENDSUB;
18503 ;          8464
18504 ;          8465  if .DODU_FLG IS_SET                          !DROP THIS UNIT IF DODU_FLG IS_SET
18505 ;          8466  then
18506 ;          8467      begin
18507 ;          8468      DODU (.ML_LUN);
18508 ;          8469      DOCLN;
18509 ;          8470      end;
18510 ;          8471
18511 ;          8472  ENDTST;
18515
18519 065064  004167  117026            $T39:  JSR     R1,$SAVE5                ;                          8389
18520 065070  152777  000040  126116           BISB    #40,@ML.REG+40           ;                          8422
18521 065076  016705  126500                   MOV     ML.DUT,R5
18522 065102  042705  177770                   BIC     #177770,R5
18523 065106  142777  000007  126100           BICB    #7,@ML.REG+40
18524 065114  150577  126074                   BISB    R5,@ML.REG+40
18525 065120  005005                           CLR     R5                       ; DODU.FLG                 8425
18526 065122  012704  000001                   MOV     #1,R4                    ; *,TST.PAT                8426
18527 065126  005000                           CLR     R0                       ; CNT                      8428
18528 065130  010001                    1$:    MOV     R0,R1                    ; CNT,*                    8430
18529 065132  006301                           ASL     R1
18530 065134  010461  011600                   MOV     R4,IO.BUF(R1)            ; TST.PAT,*
18531 065140  005161  011600                   COM     IO.BUF(R1)
18532 065144  006304                           ASL     R4                       ; TST.PAT                  8431
```

```
18534                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
18535                                   ;                                                       22-Dec-1980 09:21:22    PA:<
18536
18537 065146  005200                          INC     R0                      ; CNT                                   8428
18538 065150  020027  000017                  CMP     R0,#17                  ; CNT,*
18539 065154  003765                          BLE     1$
18540 065156  004767  130700                  JSR     PC,GD.BLK.XFER          ;                                       8434
18541 065162  012777  000061  125764          MOV     #61,@ML.REG             ;                                       8435
18542 065170  105777  126030          2$:     TSTB    @ML.REG+50
18543 065174  100375                          BPL     2$
18544 065176  104402                  3$:     TRAP    2                       ;                                       8436
18545 065200  005000                          CLR     R0                      ; CNT                                   8439
18546 065202  010001                  4$:     MOV     R0,R1                   ; CNT,*                                 8440
18547 065204  006301                          ASL     R1
18548 065206  005061  011600                  CLR     IO.BUF(R1)
18549 065212  005200                          INC     R0                      ; CNT                                   8439
18550 065214  020027  000017                  CMP     R0,#17                  ; CNT,*
18551 065220  003770                          BLE     4$
18552 065222  152777  000040  125764          BISB    #40,@ML.REG+40          ;                                       8440
18553 065230  016703  126346                  MOV     ML.DUT,R3
18554 065234  042703  177770                  BIC     #177770,R3
18555 065240  142777  000007  125746          BICB    #7,@ML.REG+40
18556 065246  150377  125742                  BISB    R3,@ML.REG+40
18557 065252  004767  130604                  JSR     PC,GD.BLK.XFER          ;                                       8443
18558 065256  012777  000071  125670          MOV     #71,@ML.REG             ;                                       8444
18559 065264  105777  125734          5$:     TSTB    @ML.REG+50
18560 065270  100375                          BPL     5$
18561 065272  012704  000001                  MOV     #1,R4                   ; *,TST.PAT                             8446
18562 065276  005002                          CLR     R2                      ; CNT                                   8448
18563 065300  010201                  6$:     MOV     R2,R1                   ; CNT,*                                 8451
18564 065302  006301                          ASL     R1
18565 065304  012703  011600                  MOV     #IO.BUF,R3
18566 065310  060103                          ADD     R1,R3
18567 065312  010401                          MOV     R4,R1                   ; TST.PAT,*
18568 065314  005101                          COM     R1
18569 065316  021301                          CMP     (R3),R1
18570 065320  001447                          BEQ     7$
18571 065322  104455                          TRAP    55                      ;                                       8454
18572 065324  000135                          .WORD   135
18573 065326  010526                          .WORD   SYNC
18574 065330  024052                          .WORD   DUMPER
18575 065332  012746  007454                  MOV     #PHR.4,-(SP)            ;                                       8455
18576 065336  012746  006716                  MOV     #WRD.39,-(SP)
18577 065342  012746  006506                  MOV     #WRD.19,-(SP)
18578 065346  012746  010004                  MOV     #FNC.6,-(SP)
18579 065352  012746  006544                  MOV     #WRD.23,-(SP)
18580 065356  012746  006062                  MOV     #FIV.FMT,-(SP)
18581 065362  012746  000006                  MOV     #6,-(SP)
18582 065366  010600                          MOV     SP,R0                   ; SP,*
18583 065370  104414                          TRAP    14
18584 065372  011316                          MOV     (R3),(SP)               ;                                       8456
18585 065374  010146                          MOV     R1,-(SP)
18586 065376  046616  000002                  BIC     2(SP),(SP)
18587 065402  040166  000002                  BIC     R1,2(SP)
18588 065406  052616                          BIS     (SP)+,(SP)
```

```
18590                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
18591                                   ;                                                       22-Dec-1980 09:21:22    PA:<
18592
18593 065410  011346                            MOV     (R3),-(SP)
18594 065412  010146                            MOV     R1,-(SP)
18595 065414  012746  004266                    MOV     #FMT.2,-(SP)
18596 065420  012746  000004                    MOV     #4,-(SP)
18597 065424  010600                            MOV     SP,R0                           ; SP,*
18598 065426  104414                            TRAP    14
18599 065430  012705  000001                    MOV     #1,R5                           ; *,DODU.FLG                            8457
18600 065434  062706  000026                    ADD     #26,SP                          ;                                       8453
18601 065440  006304                    7$:     ASL     R4                              ; TST.PAT                               8460
18602 065442  005202                            INC     R2                              ; CNT                                   8448
18603 065444  020227  000017                    CMP     R2,#17                          ; CNT,*
18604 065450  003713                            BLE     6$
18605 065452  104467                            TRAP    67                              ;                                       8461
18606 065454  006000                            ROR     R0
18607 065456  103647                            BLO     3$
18608 065460  005305                            DEC     R5                              ; DODU.FLG                              8465
18609 065462  001004                            BNE     8$
18610 065464  016700  126110                    MOV     ML.LUN,R0                       ;                                       8468
18611 065470  104451                            TRAP    51
18612 065472  104444                            TRAP    44
18613 065474  000207                    8$:     RTS     PC                              ;                                       8389
18614
18615                                   ; Routine Size:  133 words
18616                                   ; Maximum stack depth per invocation:  17 words
18621
18622
18626
18630 065476                            T39::
18631 065476  004767  177362            1$:     JSR     PC,$T39                         ;                                       8470
18632 065502  104466                            TRAP    66
18633 065504  006000                            ROR     R0
18634 065506  103773                            BLO     1$
18635 065510  000207                            RTS     PC
18636
18637                                   ; Routine Size:  6 words
18638                                   ; Maximum stack depth per invocation:  0 words
18643 ;         8473  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (90)

```
18645 ;ML4
18646 ;
18647
18648 ;          8474  !
18649 ;          8475  !
18650 ;          8476  BGNTST;
18651 ;          8477
18652 ;          8478  !++
18653 ;          8479  ! TEST NUMBER:  TST 40
18654 ;          8480  !
18655 ;          8481  ! TEST NAME:    ARRAY ADDRESS MUX TEST
18656 ;          8482  !
18657 ;          8483  ! TEST DESCRIPTION:
18658 ;          8484  !
18659 ;          8485  !       TEST FOR UNIQUE MOS RAM ROW
18660 ;          8486  !       AND COLUMN ADDRESSING BY:
18661 ;          8487  !
18662 ;          8488  !       1.  FIRST FINDING A ERROR FREE
18663 ;          8489  !           16K OR 64K CHUNK OF MEMORY.
18664 ;          8490  !           THIS REPRESENTS ONE ROW OF
18665 ;          8491  !           EITHER 16K OR 64K MOS RAMS.
18666 ;          8492  !
18667 ;          8493  !       2.  WRITE A BACKGROUND OF ALL
18668 ;          8494  !           ONES INTO THE GOOD CHUNK
18669 ;          8495  !
18670 ;          8496  !       3.  WRITE ZEROES INTO THE FIRST
18671 ;          8497  !           BLOCK OF THE GOOD CHUNK.
18672 ;          8498  !
18673 ;          8499  !       4.  READ REMAINING BLOCKS IN
18674 ;          8500  !           GOOD CHUNK FOR ONES.
18675 ;          8501  !
18676 ;          8502  !
18677 ;          8503  ! IMPLICIT INPUTS:
18678 ;          8504  !
18679 ;          8505  !       IO_BUF
18680 ;          8506  !
18681 ;          8507  !       A VECTOR OF 256 WORDS
18682 ;          8508  !       WHERE DATA FOR MBUS
18683 ;          8509  !       READ AND WRITE TRANSFERS
18684 ;          8510  !       CAN BE FOUND.
18685 ;          8511  !--
18686 ;          8512
18687 ;          8513  local
18688 ;          8514      DSA_ADRS,                     !DSA ADRS COUNTER
18689 ;          8515      FND_GD_CHK;                   !FOUND GOOD 16K/64K CHUNK FLAG
18690 ;          8516
18691 ;          8517  IO_BUF = ONES;                    !LOAD FIRST IO_BUF WORD WITH ONES
18692 ;          8518  DSA_ADRS = -.RAS_INC;             !REST DSA COUNT
18693 ;          8519  FND_GD_CHK = ZERO;                !CLEAR FLAG
18694 ;          8520
18695 ;          8521  do                                !DO UNTIL FOUND GOOD CHUNK OR LBT
18696 ;          8522      begin
18697 ;          8523      CLR_MBUS;
18698 ;          8524      BAI = ONE;                    !SET ON FIRST IO BUF WORD
18699 ;          8525      ECC_DIS = ONE;                !DISABLE ECC
```

```
18701 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
18702 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (90)
18703
18704 ;          8526      DSA_ADRS = .DSA_ADRS + .RAS_INC;          !INCREMENT DSA ADRS COUNTER
18705 ;          8527      MLWC = .W_C_SIZE;                         !16K OR 64K WORDS
18706 ;          8528      MLBA = IO_BUF;                            !LOAD UBUS ADRS
18707 ;          8529      MLDA = .DSA_ADRS;                         !LOAD DSA ADRS
18708 ;          8530      ML_FUNC = write;                          !DO A WRITE FUNCTION
18709 ;          8531      TIME_OUT_LOOP;
18710 ;          8532
18711 ;          8533      if .SC IS_NOT_SET                         !DID XFERR CAUSE AN SC
18712 ;          8534      then
18713 ;          8535          begin                                 !XFERR WAS OK
18714 ;          8536          MLWC = .W_C_SIZE;                     !LOAD WORD COUNT
18715 ;          8537          MLBA = IO_BUF;                        !LOAD UBUS ADRS
18716 ;          8538          MLDA = .DSA_ADRS;                     !LOAD DSA ADRS
18717 ;          8539          ML_FUNC = WRT_CHK;                    !DO A WRITE CHECK FUNCTION
18718 ;          8540          TIME_OUT_LOOP;
18719 ;          8541
18720 ;          8542          if .SC IS_NOT_SET                     !IS THIS CHUNK GOOD
18721 ;          8543          then
18722 ;          8544              FND_GD_CHK = ONE;                 !YES SET FLG
18723 ;          8545
18724 ;          8546          end
18725 ;          8547
18726 ;          8548      end
18727 ;          8549  until (.FND_GD_CHK IS_SET ) or (.DSA_ADRS eql .LST_ARR + .ARR_INC);
18728 ;          8550
18729 ;          8551                                                !REPEAT UNTIL FOUND GOOD CHUNCK OR AT LBT
18730 ;          8552
18731 ;          8553  if .DSA_ADRS eql .LST_ARR + .ARR_INC
18732 ;          8554  then
18733 ;          8555      begin
18734 ;          8556      ERRDF (111, INTER, DUMPER);
18735 ;          8557      PRINTB (FIV_FMT, FNC_13, FNC_17, WRD_50, WRD_60, WRD_56);
18736 ;          8558      PRINTB (THR_FMT, WRD_14, PHR_10, FNC_15);
18737 ;          8559      DODU (.ML_LUN);
18738 ;          8560      DOCLN;
18739 ;          8561      end
18740 ;          8562  else                                          !A GOOD CHUNCK WAS FOUND CONTINUE TEST
18741 ;          8563      begin
18742 ;          8564      CLR_MBUS;
18743 ;          8565      BAI = ONE;
18744 ;          8566      ECC_DIS = ONE;                            !DISABLE ECC
18745 ;          8567      IO_BUF = ZEROES;                          !FIRST BLOCK IN CHUNCK GETS ZEROES
18746 ;          8568      MLDA = .DSA_ADRS;                         !LOAD DSA
18747 ;          8569      MLWC = not 255;                           !LOAD WORD COUNT
18748 ;          8570      MLBA = IO_BUF;                            !LOAD UBUS ADRS
18749 ;          8571      ML_FUNC = write;                          !DO A WRITE FUNCTION
18750 ;          8572      TIME_OUT_LOOP;
18751 ;          8573      CLR_MBUS;
18752 ;          8574      BAI = ONE;
18753 ;          8575      IO_BUF = ONES;                            !READ REMAINING BLOCKS FOR ONES
18754 ;          8576      ECC_DIS = ONE;
18755 ;          8577      MLDA = .DSA_ADRS + 1;                     !LOAD DSA WITH NEXT DSA INCREMENT
```

```
                                                                                22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
                                                                                22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (90)

                        8578      MLBA = IO_BUF;                                !LOAD  UBUS ADRS
                        8579      MLWC = .W_C_SIZE + 256;                       !LOAD WORD COUNT WITH LESS ONE BLOCK
                        8580      ML_FUNC = WRT_CHK;                            !DO A WRITE CHECK FUNCTION
                        8581      TIME_OUT_LOOP;
                        8582
                        8583      if .WCE IS_SET                                !WERE ANY BITS DISTURBED
                        8584      then
                        8585          begin                                     !ERROR IF WRITE CHECK FOUND BAD DATA
                        8586          ERRDF (112, ASYNC, DUMPER);
                        8587          PRINTB (FOR_FMT, FNC_17, WRD_50, WRD_60, WRD_14);
                        8588          PRINTB (FMT_9, (.MLDA - 1));
                        8589          DODU (.ML_LON);
                        8590          DOCLN;
                        8591          end;
                        8592
                        8593      end;
                        8594
                        8595  ENDTST;
                        8781
18785 065512  004167  116326          $T40:   JSR     R1,$SAVE2                 ;                                          8472
18786 065516  012767  177777  124054          MOV     #-1,IO.BUF                ;                                          8517
18787 065524  016702  125374                  MOV     RAS.INC,R2                ; *,DSA.ADRS                               8518
18788 065530  005402                          NEG     R2                        ; DSA.ADRS
18789 065532  005000                          CLR     R0                        ; FND.GD.CHK                               8519
18790 065534  152777  000040  125452  1$:     BISB    #40,@ML.REG+40            ;                                          8522
18791 065542  016701  126034                  MOV     ML.DUT,R1
18792 065546  042701  177770                  BIC     #177770,R1
18793 065552  142777  000007  125434          BICB    #7,@ML.REG+40
18794 065560  150177  125430                  BISB    R1,@ML.REG+40
18795 065564  152777  000010  125422          BISB    #10,@ML.REG+40            ;                                          8524
18796 065572  152777  000002  125474          BISB    #2,@ML.REG+120            ;                                          8525
18797 065600  066702  125320                  ADD     RAS.INC,R2                ; *,DSA.ADRS                               8526
18798 065604  016777  125312  125352          MOV     W.C.SIZE,@ML.REG+10       ;                                          8527
18799 065612  012777  011600  125354          MOV     #IO.BUF,@ML.REG+20        ;                                          8528
18800 065620  010277  125360                  MOV     R2,@ML.REG+30             ; DSA.ADRS,*                               8529
18801 065624  142777  000077  125322          BICB    #77,@ML.REG               ;                                          8530
18802 065632  152777  000061  125314          BISB    #61,@ML.REG
18803 065640  105777  125360          2$:     TSTB    @ML.REG+50
18804 065644  100375                          BPL     2$
18805 065646  032777  100000  125300          BIT     #100000,@ML.REG           ;                                          8533
18806 065654  001027                          BNE     4$
18807 065656  016777  125240  125300          MOV     W.C.SIZE,@ML.REG+10       ;                                          8536
18808 065664  012777  011600  125302          MOV     #IO.BUF,@ML.REG+20        ;                                          8537
18809 065672  010277  125306                  MOV     R2,@ML.REG+30             ; DSA.ADRS,*                               8538
18810 065676  142777  000077  125250          BICB    #77,@ML.REG               ;                                          8539
```

```
                                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                                    22-Dec-1980 09:21:22    PA:<
18812                                   ;ML4
18813                                   ;
18814
18815 065704  152777  000051  125242            BISB    #51,@ML.REG
18816 065712  105777  125306          3$:       TSTB    @ML.REG+50
18817 065716  100375                            BPL     3$
18818 065720  032777  100000  125226            BIT     #100000,@ML.REG                 ;                                       8542
18819 065726  001002                            BNE     4$
18820 065730  012700  000001                    MOV     #1,R0                           ; *,FND.GD.CHK                          8544
18821 065734  020027  000001          4$:       CMP     R0,#1                           ; FND.GD.CHK,*                          8549
18822 065740  001406                            BEQ     5$
18823 065742  016701  123630                    MOV     LST.ARR,R1
18824 065746  066701  123610                    ADD     ARR.INC,R1
18825 065752  020201                            CMP     R2,R1                           ; DSA.ADRS,*
18826 065754  001267                            BNE     1$
18827 065756  016701  123614          5$:       MOV     LST.ARR,R1                      ;                                       8553
18828 065762  066701  123574                    ADD     ARR.INC,R1
18829 065766  020201                            CMP     R2,R1                           ; DSA.ADRS,*
18830 065770  001047                            BNE     6$
18831 065772  104455                            TRAP    55                              ;                                       8556
18832 065774  000157                            .WORD   157
18833 065776  010672                            .WORD   INTER
18834 066000  024052                            .WORD   DUMPER
18835 066002  012746  007122                    MOV     #WRD.56,-(SP)                   ;                                       8557
18836 066006  012746  007156                    MOV     #WRD.60,-(SP)
18837 066012  012746  007046                    MOV     #WRD.50,-(SP)
18838 066016  012746  010162                    MOV     #FNC.17,-(SP)
18839 066022  012746  010112                    MOV     #FNC.13,-(SP)
18840 066026  012746  006062                    MOV     #FIV.FMT,-(SP)
18841 066032  012746  000006                    MOV     #6,-(SP)
18842 066036  010600                            MOV     SP,R0                           ; SP,*
18843 066040  104414                            TRAP    14
18844 066042  012716  010136                    MOV     #FNC.15,(SP)                    ;                                       8558
18845 066046  012746  007564                    MOV     #PHR.10,-(SP)
18846 066052  012746  006442                    MOV     #WRD.14,-(SP)
18847 066056  012746  006034                    MOV     #THR.FMT,-(SP)
18848 066062  012746  000004                    MOV     #4,-(SP)
18849 066066  010600                            MOV     SP,R0                           ; SP,*
18850 066070  104414                            TRAP    14
18851 066072  016700  125502                    MOV     ML.LUN,R0                       ;                                       8559
18852 066076  104451                            TRAP    51
18853 066100  104444                            TRAP    44
18854 066102  062706  000026                    ADD     #26,SP                          ;                                       8555
18855 066106  000207                            RTS     PC                              ;                                       8553
18856 066110  152777  000040  125076  6$:       BISB    #40,@ML.REG+40                  ;                                       8563
18857 066116  016701  125460                    MOV     ML.DUT,R1
18858 066122  042701  177770                    BIC     #177770,R1
18859 066126  142777  000007  125060            BICB    #7,@ML.REG+40
18860 066134  150177  125054                    BISB    R1,@ML.REG+40
18861 066140  152777  000010  125046            BISB    #10,@ML.REG+40                  ;                                       8565
18862 066146  152777  000002  125120            BISB    #2,@ML.REG+120                  ;                                       8566
18863 066154  005067  123420                    CLR     IO.BUF                          ;                                       8567
18864 066160  010277  125020                    MOV     R2,@ML.REG+30                   ; DSA.ADRS,*                            8568
18865 066164  012777  177400  124772            MOV     #-400,@ML.REG+10                ;                                       8569
18866 066172  012777  011600  124774            MOV     #IO.BUF,@ML.REG+20              ;                                       8570
```

```
18868                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
18869                                   ;                                                       22-Dec-1980 09:21:22    PA:<
18870
18871 066200 142777 000077 124746       BICB    #77,@ML.REG                     ;                                       8571
18872 066206 152777 000061 124740       BISB    #61,@ML.REG
18873 066214 105777 125004          7$: TSTB    @ML.REG+50
18874 066220 100375                     BPL     7$
18875 066222 152777 000040 124764       BISB    #40,@ML.REG+40                  ;                                       8572
18876 066230 016701 125346              MOV     ML.DUT,R1
18877 066234 042701 177770              BIC     #177770,R1
18878 066240 142777 000007 124746       BICB    #7,@ML.REG+40
18879 066246 150177 124742              BISB    R1,@ML.REG+40
18880 066252 152777 000010 124734       BISB    #10,@ML.REG+40                  ;                                       8574
18881 066260 012767 177777 123312       MOV     #-1,IO.BUF                      ;                                       8575
18882 066266 152777 000002 125000       BISB    #2,@ML.REG+120                  ;                                       8576
18883 066274 010201                     MOV     R2,R1                           ; DSA.ADRS,*                            8577
18884 066276 005201                     INC     R1
18885 066300 010177 124700              MOV     R1,@ML.REG+30
18886 066304 012777 011600 124662       MOV     #IO.BUF,@ML.REG+20              ;                                       8578
18887 066312 016702 124604              MOV     W.C.SIZE,R2                     ;                                       8579
18888 066316 062702 000400              ADD     #400,R2
18889 066322 010277 124636              MOV     R2,@ML.REG+10
18890 066326 142777 000077 124620       BICB    #77,@ML.REG                     ;                                       8580
18891 066334 152777 000051 124612       BISB    #51,@ML.REG
18892 066342 105777 124656          8$: TSTB    @ML.REG+50
18893 066346 100375                     BPL     8$
18894 066350 032777 040000 124636       BIT     #40000,@ML.REG+40               ;                                       8583
18895 066356 001441                     BEQ     9$
18896 066360 104455                     TRAP    55                              ;                                       8586
18897 066362 000160                     .WORD   160
18898 066364 010464                     .WORD   ASYNC
18899 066366 024052                     .WORD   DUMPER
18900 066370 012746 006442              MOV     #WRD.14,-(SP)                   ;                                       8587
18901 066374 012746 007156              MOV     #WRD.60,-(SP)
18902 066400 012746 007046              MOV     #WRD.50,-(SP)
18903 066404 012746 010162              MOV     #FNC.17,-(SP)
18904 066410 012746 006046              MOV     #FOR.FMT,-(SP)
18905 066414 012746 000005              MOV     #5,-(SP)
18906 066420 010600                     MOV     SP,R0                           ; SP,*
18907 066422 104414                     TRAP    14
18908 066424 017716 124554              MOV     @ML.REG+30,(SP)                 ;                                       8588
18909 066430 005316                     DEC     (SP)
18910 066432 012746 004644              MOV     #FMT.9,-(SP)
18911 066436 012746 000002              MOV     #2,-(SP)
18912 066442 010600                     MOV     SP,R0                           ; SP,*
18913 066444 104414                     TRAP    14
18914 066446 016700 125126              MOV     ML.LUN,R0                       ;                                       8589
18915 066452 104451                     TRAP    51
18916 066454 104444                     TRAP    44
18917 066456 062706 000020              ADD     #20,SP                          ;                                       8585
18918 066462 000207                 9$: RTS     PC                              ;                                       8472
18919
18920                                   ; Routine Size:  245 words
18921                                   ; Maximum stack depth per invocation:  14 words
```

```
18930
18931
18935
18939 066464                          T40::
18940 066464  004767  177022          1$:     JSR     PC,$T40                 ;                       8593
18941 066470  104466                          TRAP    66
18942 066472  006000                          ROR     R0
18943 066474  103773                          BLO     1$
18944 066476  000207                          RTS     PC
18945
18946                                 ; Routine Size:  6 words
18947                                 ; Maximum stack depth per invocation:  0 words
18952
18953
18954 ;          8596  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (91)

```
18956 ;ML4
18957 ;
18958
18959 ;          8597  !
18960 ;          8598  BGNTST;
18961 ;          8599
18962 ;          8600  !++
18963 ;          8601  ! TEST NUMBER:  TST 41
18964 ;          8602  !
18965 ;          8603  ! TEST NAME:    NIBBLE OFFSET TEST
18966 ;          8604  !
18967 ;          8605  ! TEST DESCRIPTION:
18968 ;          8606  !       TEST NIBBLE OFFSET COUNTERS TO OFFSET GOOD NIBBLE DATA A MAX
18969 ;          8607  !       OF 14 WORDS ON DETECTION OF ALL BAD NIBBLES BY:
18970 ;          8608  !
18971 ;          8609  !           1.  LOADING FIRST 2 1/4 WORDS OF THE IO_BUF WITH ZEROES AND THE
18972 ;          8610  !               REMAINING OF BUFFER WITH ONES.
18973 ;          8611  !
18974 ;          8612  !           2.  VIA DAT_DM MODE WRITE THE GOOD BLOCK WITH BACKGROUND
18975 ;          8613  !               ON ONES.
18976 ;          8614  !
18977 ;          8615  !           3.  VIA PROM R/W MODE FORCE ALL ARRAY NIBBLES BAD.
18978 ;          8616  !
18979 ;          8617  !           4.  VIA A MBUS WRITE FUNCTION LOAD IO_BUF INTO THE GOOD BLOCK.
18980 ;          8618  !
18981 ;          8619  !           5.  VIA DAT_DM MODE READ FIRST 15 ARRAY WORDS FOR ZEROES AND THE
18982 ;          8620  !               REMAINING WORDS FOR ONES.
18983 ;          8621  !
18984 ;          8622  ! IMPLICIT INPUTS:
18985 ;          8623  !       PD_TEMP
18986 ;          8624  !       A BIT VECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND
18987 ;          8625  !       ACCESSED FROM.
18988 ;          8626  !
18989 ;          8627  !       IO_BUF
18990 ;          8628  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE
18991 ;          8629  !       FUNCTIONS ARE FOUND.
18992 ;          8630  !--
18993 ;          8631
18994 ;          8632  local
18995 ;          8633      DODU_FLG,                          !DROP UNIT FLAG
18996 ;          8634      TST_PAT,                           !TEST PATTERN
18997 ;          8635      START,                             !STARTING WORD
18998 ;          8636      FINISH,                            !ENDING WORD
18999 ;          8637      ERR_FLG;                           !ERROR FLAG
19000 ;          8638
19001 ;          8639  BGNSUB;
19002 ;          8640  CLR_MBUS;
19003 ;          8641  DODU_FLG = ZERO;
19004 ;          8642
19005 ;          8643  incr WD_CNT from 0 to 255 do           !LOAD IO_BUF WITH ONES
19006 ;          8644      IO_BUF [.WD_CNT] = ONES;
19007 ;          8645
19008 ;          8646  IO_BUF [0] = ZEROES;                   !LOAD FIRST 2 1/4 WORDS WITH ZEROES
19009 ;          8647  IO_BUF [1] = ZEROES;
19010 ;          8648  IO_BUF [2] = %o'177760';
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (91)

;          8649  MLD1 = ONES;                           !LOAD DATA DIAG REGISTERS WITH ONES
;          8650  MLD2 = ONES;
;          8651  MLE2 = ONES;
;          8652  DAT_DM_XFER ();                       !SET UP A DATA DIAG MODE XFERR
;          8653  MLCS1 = write;                        !DO A WRITE XFERR
;          8654
;          8655  incr WD_CNT from 0 to 127 do         !LOAD BLOCK WITH BG PAT
;          8656      begin
;          8657      DELAY (ONE_US);
;          8658      DAT_CLK = ONE;
;          8659      end;
;          8660
;          8661  CLR_MBUS;
;          8662  WRT_PD (ONES, 19);                    !FORCE ALL NIBBLES BAD
;          8663  PROM_RW = ONE;                        !SET PROM READ WRITE
;          8664  GD_BLK_XFER ();                       !SET UP A GOOD BLOCK XFERR
;          8665  MLCS1 = write;                        !WRITE ZEROES IN FIRST BLOCK WORD LOCATION
;          8666                                       !OFFSETTING 14 NIBBLES WITH ZEROES ALSO
;          8667  TIME_OUT_LOOP;
;          8668  CLR_MBUS;
;          8669  START = ZERO;                         !START AT THE FIRST BLOCK WORD
;          8670  FINISH = 14;                          !END AT THE 14'TH BLOCK WORD
;          8671  TST_PAT = ZEROES;                     !TEST FOR ZEROES IN FIRST 14 WORDS
;          8672  DAT_DM_XFER ();                       !SET UP A DATA DIAG MODE XFERR
;          8673  MLCS1 = read;                         !DO A READ FUNCTION
;          8674  DELAY (ONE_US);
;          8675
;          8676  incr TWICE from 0 to 1 do            !READ WORDS 0-14 FOR 0'S AND 15-126 FOR 1'S
;          8677      begin
;          8678
;          8679      incr WRD_CNT from .START to .FINISH do   !READ BLOCK WORDS FORM START TO FINISH
;          8680          begin
;          8681          PD_TEMP = .MLPD;              !GET PROM DATA
;          8682          DAT_CLK = ONE;                !CLOCK OUT THE DATA WORD
;          8683          DELAY (ONE_US);
;          8684          RD_LNG_WRD;                   !READ THE DATA DIAG REGISTERS
;          8685
;          8686          incr NIB_PTR from 0 to 8 do   !LOOK AT 9 NIBBLES
;          8687
;          8688              if .PD_TEMP [.NIB_PTR] IS_NOT_SET   !FIND GOOD NIBBLES
;          8689              then
;          8690                  begin
;          8691                  TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);      !COMPARE NIBBLE WITH TST PAT
;          8692
;          8693                  if .ERR_FLG IS_SET            !SEE IF COMPARE FOUND AN ERROR
;          8694                  then
;          8695                      begin                     !ERROR AND SET DODU_FLG IF ERROR FLG SET
;          8696                      ERRDF (94, ARR_DAT, DUMPER);
;          8697                      PRINTB (THR_FMT, WRD_41, WRD_46, WRD_10);
;          8698                      PRINTB (FMT_6, .NIB_PTR);
;          8699                      DODU_FLG = ONE;
;          8700                      end;
```

```
19068 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
19069 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (91)
19070
19071 ;          8701
19072 ;          8702                    end;
19073 ;          8703
19074 ;          8704                end;
19075 ;          8705
19076 ;          8706        TST_PAT = not .TST_PAT;                  !NOW READ FOR ONES
19077 ;          8707        START = 15;                              !START A 15
19078 ;          8708        FINISH = 126;                            !END AT 126
19079 ;          8709        end
19080 ;          8710
19081 ;          8711    ENDSUB;
19082 ;          8712
19083 ;          8713    if .DODU_FLG IS_SET                          !DROP THIS UNIT IF DODU_FLG SET
19084 ;          8714    then
19085 ;          8715        begin
19086 ;          8716        DODU (.ML_LUN);
19087 ;          8717        DOCLN;
19088 ;          8718        end;
19089 ;          8719
19090 ;          8720    ENDTST;
19094
19098 066500  004167  115412          $T41:   JSR     R1,$SAVE5                       ;                       8595
19099 066504  162706  000012                  SUB     #12,SP
19100 066510  104402                  1$:     TRAP    2                               ;                       8637
19101 066512  152777  000040  124474          BISB    #40,@ML.REG+40                  ;                       8639
19102 066520  016704  125056                  MOV     ML.DUT,R4
19103 066524  042704  177770                  BIC     #177770,R4
19104 066530  142777  000007  124456          BICB    #7,@ML.REG+40
19105 066536  150477  124452                  BISB    R4,@ML.REG+40
19106 066542  005066  000004                  CLR     4(SP)                           ; DODU.FLG              8641
19107 066546  005002                          CLR     R2                              ; WD.CNT                8643
19108 066550  010203                  2$:     MOV     R2,R3                           ; WD.CNT,*              8644
19109 066552  006303                          ASL     R3
19110 066554  012763  177777  011600          MOV     #-1,IO.BUF(R3)
19111 066562  005202                          INC     R2                              ; WD.CNT                8643
19112 066564  020227  000377                  CMP     R2,#377                         ; WD.CNT,*
19113 066570  003767                          BLE     2$
19114 066572  005067  123002                  CLR     IO.BUF                          ;                       8646
19115 066576  005067  123000                  CLR     IO.BUF+2                        ;                       8647
19116 066602  012767  177760  122774          MOV     #-20,IO.BUF+4                   ;                       8648
19117 066610  012777  177777  124526          MOV     #-1,@ML.REG+170                 ;                       8649
19118 066616  012777  177777  124530          MOV     #-1,@ML.REG+200                 ;                       8650
19119 066624  012777  177777  124502          MOV     #-1,@ML.REG+160                 ;                       8651
19120 066632  004767  125324                  JSR     PC,DAT.DM.XFER                  ;                       8652
19121 066636  012777  000061  124310          MOV     #61,@ML.REG                     ;                       8653
```

```
19123                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
19124                                   ;                                                       22-Dec-1980 09:21:22    PA:<
19125
19126 066644  005001                          CLR     R1                      ; WD.CNT                                8655
19127 066646  012702  000001           3$:    MOV     #1,R2                   ; *,$$TMP2                              8657
19128 066652  001411                   4$:    BEQ     7$
19129 066654  016703  113236                 MOV     L$DLY,R3                ; *,$$TMP1
19130 066660  001404                         BEQ     6$
19131 066662  005066  000010           5$:    CLR     10(SP)                  ; $$TMP
19132 066666  005303                         DEC     R3                      ; $$TMP1
19133 066670  001374                         BNE     5$
19134 066672  005302                   6$:    DEC     R2                      ; $$TMP2
19135 066674  000766                         BR      4$
19136 066676  152777  000020  124370   7$:    BISB    #20,@ML.REG+120         ;                                       8658
19137 066704  005201                         INC     R1                      ; WD.CNT                                8655
19138 066706  020127  000177                 CMP     R1,#177                 ; WD.CNT,*
19139 066712  003755                         BLE     3$
19140 066714  152777  000040  124272         BISB    #40,@ML.REG+40          ;                                       8659
19141 066722  016704  124654                 MOV     ML.DUT,R4
19142 066726  042704  177770                 BIC     #177770,R4
19143 066732  142777  000007  124254         BICB    #7,@ML.REG+40
19144 066740  150477  124250                 BISB    R4,@ML.REG+40
19145 066744  012746  177777                 MOV     #-1,-(SP)               ;                                       8662
19146 066750  012746  000023                 MOV     #23,-(SP)
19147 066754  004767  132240                 JSR     PC,WRT.PD
19148 066760  152777  000100  124306         BISB    #100,@ML.REG+120        ;                                       8663
19149 066766  004767  127070                 JSR     PC,GD.BLK.XFER          ;                                       8664
19150 066772  012777  000061  124154         MOV     #61,@ML.REG             ;                                       8665
19151 067000  105777  124220           8$:    TSTB    @ML.REG+50
19152 067004  100375                         BPL     8$
19153 067006  152777  000040  124200         BISB    #40,@ML.REG+40          ;                                       8667
19154 067014  016704  124562                 MOV     ML.DUT,R4
19155 067020  042704  177770                 BIC     #177770,R4
19156 067024  142777  000007  124162         BICB    #7,@ML.REG+40
19157 067032  150477  124156                 BISB    R4,@ML.REG+40
19158 067036  005066  000006                 CLR     6(SP)                   ; START                                 8669
19159 067042  012766  000016  000004         MOV     #16,4(SP)               ; *,FINISH                              8670
19160 067050  005005                         CLR     R5                      ; TST.PAT                               8671
19161 067052  004767  125104                 JSR     PC,DAT.DM.XFER          ;                                       8672
19162 067056  012777  000071  124070         MOV     #71,@ML.REG             ;                                       8673
19163 067064  012702  000001                 MOV     #1,R2                   ; *,$$TMP2                              8674
19164 067070  001411                   9$:    BEQ     12$
19165 067072  016703  113020                 MOV     L$DLY,R3                ; *,$$TMP1
19166 067076  001404                         BEQ     11$
19167 067100  005066  000014           10$:   CLR     14(SP)                  ; $$TMP
19168 067104  005303                         DEC     R3                      ; $$TMP1
19169 067106  001374                         BNE     10$
19170 067110  005302                   11$:   DEC     R2                      ; $$TMP2
19171 067112  000766                         BR      9$
19172 067114  005004                   12$:   CLR     R4                      ; TWICE                                 8676
19173 067116  016601  000006           13$:   MOV     6(SP),R1                ; START,WRD.CNT                         8679
19174 067122  005301                         DEC     R1                      ; WRD.CNT
19175 067124  000534                         BR      22$
19176 067126  017767  124252  123764   14$:   MOV     @ML.REG+230,PD.TEMP     ;                                       8681
19177 067134  152777  000020  124132         BISB    #20,@ML.REG+120         ;                                       8682
```

```
19179                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
19180                                   ;                                                       22-Dec-1980 09:21:22    PA:<
19181
19182 067142  012702  000001                    MOV     #1,R2                   ; *,$$TMP2                              8683
19183 067146  001411                    15$:    BEQ     18$
19184 067150  016703  112742                    MOV     L$DLY,R3                ; *,$$TMP1
19185 067154  001404                            BEQ     17$
19186 067156  005066  000014              16$:  CLR     14(SP)                  ; $$TMP
19187 067162  005303                            DEC     R3                      ; $$TMP1
19188 067164  001374                            BNE     16$
19189 067166  005302                    17$:    DEC     R2                      ; $$TMP2
19190 067170  000766                            BR      15$
19191 067172  017767  124146  121752    18$:    MOV     @#..REG+170,D1.TEMP
19192 067200  017767  124150  121746            MOV     @#L.REG+200,D2.TEMP
19193 067206  017767  124122  121742            MOV     @#L.REG+160,E2.TEMP
19194 067214  005002                            CLR     R2                      ; NIB.PTR                               8686
19195 067216  010203                    19$:    MOV     R2,R3                   ; NIB.PTR,*                             8688
19196 067220  006203                            ASR     R3
19197 067222  006203                            ASR     R3
19198 067224  006203                            ASR     R3
19199 067226  062703  013120                    ADD     #PD.TEMP,R3
19200 067232  010346                            MOV     R3,-(SP)
19201 067234  010246                            MOV     R2,-(SP)                ; NIB.PTR,*
19202 067236  042716  177770                    BIC     #177770,(SP)
19203 067242  012746  000001                    MOV     #1,-(SP)
19204 067246  005046                            CLR     -(SP)
19205 067250  004767  113664                    JSR     PC,BL$GT2
19206 067254  062706  000010                    ADD     #10,SP
19207 067260  005700                            TST     R0
19208 067262  001051                            BNE     21$
19209 067264  010246                            MOV     R2,-(SP)                ; NIB.PTR,*                             8691
19210 067266  010546                            MOV     R5,-(SP)                ; TST.PAT,*
19211 067270  012746  000020                    MOV     #20,-(SP)
19212 067274  060616                            ADD     SP,(SP)                 ; ERR.FLG,*
19213 067276  004767  126644                    JSR     PC,TST.LNG.WRD
19214 067302  026627  000020  000001            CMP     20(SP),#1               ; ERR.FLG,*                             8693
19215 067310  001034                            BNE     20$
19216 067312  104455                            TRAP    55                      ;                                       8696
19217 067314  000136                            .WORD   136
19218 067316  010570                            .WORD   ARR.DAT
19219 067320  024052                            .WORD   DUMPER
19220 067322  012746  006406                    MOV     #WRD.10,-(SP)           ;                                       8697
19221 067326  012746  007004                    MOV     #WRD.46,-(SP)
19222 067332  012746  006732                    MOV     #WRD.41,-(SP)
19223 067336  012746  006034                    MOV     #THR.FMT,-(SP)
19224 067342  012746  000004                    MOV     #4,-(SP)
19225 067346  010600                            MOV     SP,R0                   ; SP,*
19226 067350  104414                            TRAP    14
19227 067352  010216                            MOV     R2,(SP)                 ; NIB.PTR,*                             8698
19228 067354  012746  004532                    MOV     #FMT.6,-(SP)
19229 067360  012746  000002                    MOV     #2,-(SP)
19230 067364  010600                            MOV     SP,R0                   ; SP,*
19231 067366  104414                            TRAP    14
19232 067370  012766  000001  000034            MOV     #1,34(SP)               ; *,DODU.FLG                            8699
19233 067376  062706  000016                    ADD     #16,SP                  ;                                       8695
```

```
19235                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
19236                                   ;                                                       22-Dec-1980 09:21:22    PA:<
19237
19238 067402  062706  000006            20$:    ADD     #6,SP           ;                                               8690
19239 067406  005202                    21$:    INC     R2              ; NIB.PTR                                       8686
19240 067410  020227  000010                    CMP     R2,#10          ; NIB.PTR,*
19241 067414  003700                            BLE     19$
19242 067416  005201                    22$:    INC     R1              ; WRD.CNT                                       8679
19243 067420  020166  000004                    CMP     R1,4(SP)        ; WRD.CNT,FINISH
19244 067424  003640                            BLE     14$
19245 067426  005105                            COM     R5              ; TST.PAT                                       8706
19246 067430  012766  000017  000006            MOV     #17,6(SP)       ; *,START                                       8707
19247 067436  012766  000176  000004            MOV     #176,4(SP)      ; *,FINISH                                      8708
19248 067444  005204                            INC     R4              ; TWICE                                         8676
19249 067446  020427  000001                    CMP     R4,#1           ; TWICE,*
19250 067452  003621                            BLE     13$
19251 067454  022626                            CMP     (SP)+,(SP)+     ;                                               8637
19252 067456  104467                            TRAP    67              ;                                               8709
19253 067460  006000                            ROR     R0
19254 067462  103002                            BHIS    23$
19255 067464  000167  177020                    JMP     1$
19256 067470  026627  000004  000001  23$:     CMP     4(SP),#1        ; DODU.FLG,*                                    8713
19257 067476  001004                            BNE     24$
19258 067500  016700  124074                    MOV     ML.LUN,R0       ;                                               8716
19259 067504  104451                            TRAP    51
19260 067506  104444                            TRAP    44
19261 067510  062706  000012            24$:    ADD     #12,SP          ;                                               8595
19262 067514  000207                            RTS     PC
19263
19264                                   ; Routine Size:  263 words
19265                                   ; Maximum stack depth per invocation:  23 words
19270
19271
19275
19279 067516                            T41::
19280 067516  004767  176756            1$:     JSR     PC,$T41         ;                                               8718
19281 067522  104466                            TRAP    66
19282 067524  006000                            ROR     R0
19283 067526  103773                            BLO     1$
19284 067530  000207                            RTS     PC
19285
19286                                   ; Routine Size:  6 words
19287                                   ; Maximum stack depth per invocation:  0 words
```

```
19296
19297
19298 ;       8721  !<BLF/PAGE>
```

```
19300 ;ML4
19301 ;
19302
19303 ;          8722  !
19304 ;          8723  BGNTST;
19305 ;          8724
19306 ;          8725  !++
19307 ;          8726  ! TEST NUMBER:  TST 42
19308 ;          8727  !
19309 ;          8728  ! TEST NAME:    CS1 FUNCTION ABORT TEST
19310 ;          8729  !
19311 ;          8730  ! TEST DESCRIPTION:
19312 ;          8731  !       TEST CS1 FUNCTION ABORTS ON DETECTION OF CLASS 'A' & 'B' ERRORS BY:
19313 ;          8732  !
19314 ;          8733  !       1.  VIA MBUS WRITE FUNCTION LOAD THE GOOD BLOCK WITH BACKGROUND
19315 ;          8734  !           PATTERN OF ONES.
19316 ;          8735  !
19317 ;          8736  !       2.  CLEAR THE IO_BUF
19318 ;          8737  !
19319 ;          8738  !       3.  DO A MBUS READ FUNCTION.  WHILE THE READ IS IN PROGRESS WRITE TO
19320 ;          8739  !           MLDA (CLASS 'A' ERROR) READ THE IO_BUF FOR ONES.
19321 ;          8740  !
19322 ;          8741  !       4.  CLEAR THE IO_BUF
19323 ;          8742  !
19324 ;          8743  !       5.  VIA PROM R/W MODE FORCE UV ERROR TO THE UV ADRS ERROR PROM
19325 ;          8744  !           (CLASS 'B' ERROR).  DO A MBUS READ.
19326 ;          8745  !
19327 ;          8746  !       6.  READ IO_BUF FOR ZEROES
19328 ;          8747  !
19329 ;          8748  ! IMPLICIT INPUTS:
19330 ;          8749  !       IO_BUF
19331 ;          8750  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND
19332 ;          8751  !       WRITE FUNCTION ARE FOUND.
19333 ;          8752  !--
19334 ;          8753
19335 ;          8754  CLR_MBUS;
19336 ;          8755  BAI = ONE;                              !SET ON FIRST IO_BUF ADRS
19337 ;          8756  IO_BUF = ONES;                          !LOAD FIRST IO_BUF ADRS
19338 ;          8757  GD_BLK_XFER ();                         !SET UP A GOOD BLOCK XFERR
19339 ;          8758  MLCS1 = write;                          !WRITE BACKGROUND PATTERN
19340 ;          8759  TIME_OUT_LOOP;
19341 ;          8760
19342 ;          8761  incr TWICE from 0 to 1 do               !FORCE CLASS 'A' AND CLASS 'B' ERRORS
19343 ;          8762      begin
19344 ;          8763      BGNSUB;
19345 ;          8764      CLR_MBUS;
19346 ;          8765
19347 ;          8766      incr CNT from 0 to 255 do
19348 ;          8767          IO_BUF [.CNT] = ZEROES;         !CLEAR OUT IO_BUF
19349 ;          8768
19350 ;          8769      if .TWICE eql 1                     !IF 2ND PASS THEN FORCE 'B' ERROR
19351 ;          8770      then
19352 ;          8771          begin
19353 ;          8772          PROM_RW = ONE;
19354 ;          8773          MLPD = %o'777';
```

```
19356 ;ML4
19357 ;
19358
19359 ;          8774          end;
19360 ;          8775
19361 ;          8776      GD_BLK_XFER ();                          !SET UP A GOOD BLOCK XFERR
19362 ;          8777      MLCS1 = read;                            !DO A READ FUNCTION
19363 ;          8778
19364 ;          8779      if .TWICE eql 0 then MLDA = ONES;        !IF FIRST PASS THEN FORCE AN 'A' ERROR
19365 ;          8780
19366 ;          8781      TIME_OUT_LOOP;
19367 ;          8782
19368 ;          8783      if .TWICE eql 0                          !SEE WHICH PASS WE'RE ON
19369 ;          8784      then
19370 ;          8785          begin                                !CLASS 'A' ERROR
19371 ;          8786
19372 ;          8787          incr WRD_CNT from 0 to 64 do         !SEE IF XFERR WAY ALLOWED TO CONTINUE
19373 ;          8788              begin
19374 ;          8789
19375 ;          8790              if .IO_BUF [.WRD_CNT] neq ONES   !READ IO_BUF FOR BG PAT
19376 ;          8791              then
19377 ;          8792                  begin                        !ERROR AND EXIT LOOP IF ZEROES
19378 ;          8793                  ERRDF (95, SYNC, DUMPER);
19379 ;          8794                  PRINTB (FOR_FMT, PHR_8, FNC_13, WRD_19, WRD_10);
19380 ;          8795                  exitloop;
19381 ;          8796                  end;
19382 ;          8797
19383 ;          8798              end;
19384 ;          8799
19385 ;          8800          end
19386 ;          8801      else                                     !CLASS 'B' ERROR
19387 ;          8802          begin
19388 ;          8803
19389 ;          8804          incr WRD_CNT from 0 to 64 do         !SEE IF XFERR WAS ABORTED
19390 ;          8805              begin
19391 ;          8806
19392 ;          8807              if .IO_BUF [.WRD_CNT] neq ZEROES !READ IO_BUF CLEARED DATA
19393 ;          8808              then
19394 ;          8809                  begin                        !ERROR IF ONES AND EXIT LOOP
19395 ;          8810                  ERRDF (96, SYNC, DUMPER);
19396 ;          8811                  PRINTB (FOR_FMT, PHR_9, FNC_13, WRD_19, WRD_10);
19397 ;          8812                  exitloop
19398 ;          8813                  end;
19399 ;          8814
19400 ;          8815              end;
19401 ;          8816
19402 ;          8817          end;
19403 ;          8818
19404 ;          8819      if .SC IS_NOT_SET                        !SEE IF SC BIT SET
19405 ;          8820      then
19406 ;          8821          begin                                !ERROR IF NOT SET
19407 ;          8822          ERRDF (104, SYNC, DUMPER);
19408 ;          8823          PRINTB (FIV_FMT, WRD_59, PHR_1, WRD_11, WRD_19, FNC_13)
19409 ;          8824          end;
19410 ;          8825
```

```
19412 ;ML4
19413 ;
19414
19415 ;          8826      ENDSUB;
19416 ;          8827      end;
19417 ;          8828
19418 ;          8829  ENDTST;
19422
19426 067532  004167  114322            $T42:  JSR     R1,$SAVE3                ;                                  8720
19427 067536  152777  000040  123450           BISB    #40,@ML.REG+40           ;                                  8723
19428 067544  016703  124032                   MOV     ML.DUT,R3
19429 067550  042703  177770                   BIC     #177770,R3
19430 067554  142777  000007  123432           BICB    #7,@ML.REG+40
19431 067562  150377  123426                   BISB    R3,@ML.REG+40
19432 067566  152777  000010  123420           BISB    #10,@ML.REG+40           ;                                  8755
19433 067574  012767  177777  121776           MOV     #-1,IO.BUF               ;                                  8756
19434 067602  004767  126254                   JSR     PC,GD.BLK.XFER           ;                                  8757
19435 067606  012777  000061  123340           MOV     #61,@ML.REG              ;                                  8758
19436 067614  105777  123404             1$:   TSTB    @ML.REG+50
19437 067620  100375                           BPL     1$
19438 067622  005003                           CLR     R3                       ; TWICE                            8761
19439 067624  104402                     2$:   TRAP    2                        ;                                  8762
19440 067626  152777  000040  123360           BISB    #40,@ML.REG+40           ;                                  8763
19441 067634  016702  123742                   MOV     ML.DUT,R2
19442 067640  042702  177770                   BIC     #177770,R2
19443 067644  142777  000007  123342           BICB    #7,@ML.REG+40
19444 067652  150277  123336                   BISB    R2,@ML.REG+40
19445 067656  005000                           CLR     R0                       ; CNT                              8766
19446 067660  010001                     3$:   MOV     R0,R1                    ; CNT,*                            8767
19447 067662  006301                           ASL     R1
19448 067664  005061  011600                   CLR     IO.BUF(R1)
19449 067670  005200                           INC     R0                       ; CNT                              8766
19450 067672  020027  000377                   CMP     R0,#377                  ; CNT,*
19451 067676  003770                           BLE     3$
19452 067700  020327  000001                   CMP     R3,#1                    ; TWICE,*                          8769
19453 067704  001006                           BNE     4$
19454 067706  152777  000100  123360           BISB    #100,@ML.REG+120         ;                                  8772
19455 067714  012777  000777  123462           MOV     #777,@ML.REG+230         ;                                  8773
19456 067722  004767  126134             4$:   JSR     PC,GD.BLK.XFER           ;                                  8776
19457 067726  012777  000071  123220           MOV     #71,@ML.REG              ;                                  8777
19458 067734  005002                           CLR     R2                       ;                                  8779
19459 067736  005703                           TST     R3                       ; TWICE
19460 067740  001004                           BNE     5$
19461 067742  005202                           INC     R2
19462 067744  012777  177777  123232           MOV     #-1,@ML.REG+30
19463 067752  105777  123246             5$:   TSTB    @ML.REG+50
19464 067756  100375                           BPL     5$
19465 067760  006002                           ROR     R2                       ;                                  8783
```

```
19467                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
19468                                   ;                                                       22-Dec-1980 09:21:22    PA:<
19469
19470 067762  103037                          BCC     8$
19471 067764  005002                          CLR     R2                      ; WRD.CNT                               8787
19472 067766  010201                    6$:   MOV     R2,R1                   ; WRD.CNT,*                             8790
19473 067770  006301                          ASL     R1
19474 067772  026127  011600  177777          CMP     IO.BUF(R1),#-1
19475 070000  001423                          BEQ     7$
19476 070002  104455                          TRAP    55                      ;                                       8793
19477 070004  000137                          .WORD   137
19478 070006  010526                          .WORD   SYNC
19479 070010  024052                          .WORD   DUMPER
19480 070012  012746  006406                  MOV     #WRD.10,-(SP)           ;                                       8794
19481 070016  012746  006506                  MOV     #WRD.19,-(SP)
19482 070022  012746  010112                  MOV     #FNC.13,-(SP)
19483 070026  012746  007540                  MOV     #PHR.8,-(SP)
19484 070032  012746  006046                  MOV     #FOR.FMT,-(SP)
19485 070036  012746  000005                  MOV     #5,-(SP)
19486 070042  010600                          MOV     SP,R0                   ; SP,*
19487 070044  104414                          TRAP    14
19488 070046  000435                          BR      10$                     ;                                       8795
19489 070050  005202                    7$:   INC     R2                      ; WRD.CNT                               8787
19490 070052  020227  000100                  CMP     R2,#100                 ; WRD.CNT,*
19491 070056  003743                          BLE     6$
19492 070060  000437                          BR      12$                     ;                                       8783
19493 070062  005002                    8$:   CLR     R2                      ; WRD.CNT                               8804
19494 070064  010201                    9$:   MOV     R2,R1                   ; WRD.CNT,*                             8807
19495 070066  006301                          ASL     R1
19496 070070  005761  011600                  TST     IO.BUF(R1)
19497 070074  001425                          BEQ     11$
19498 070076  104455                          TRAP    55                      ;                                       8810
19499 070100  000140                          .WORD   140
19500 070102  010526                          .WORD   SYNC
19501 070104  024052                          .WORD   DUMPER
19502 070106  012746  006406                  MOV     #WRD.10,-(SP)           ;                                       8811
19503 070112  012746  006506                  MOV     #WRD.19,-(SP)
19504 070116  012746  010112                  MOV     #FNC.13,-(SP)
19505 070122  012746  007552                  MOV     #PHR.9,-(SP)
19506 070126  012746  006046                  MOV     #FOR.FMT,-(SP)
19507 070132  012746  000005                  MOV     #5,-(SP)
19508 070136  010600                          MOV     SP,R0                   ; SP,*
19509 070140  104414                          TRAP    14
19510 070142  062706  000014            10$:  ADD     #14,SP                  ;                                       8812
19511 070146  000404                          BR      12$
19512 070150  005202                    11$:  INC     R2                      ; WRD.CNT                               8804
19513 070152  020227  000100                  CMP     R2,#100                 ; WRD.CNT,*
19514 070156  003742                          BLE     9$
19515 070160  032777  100000  122766    12$:  BIT     #100000,@#ML.REG        ;                                       8819
19516 070166  001026                          BNE     13$
19517 070170  104455                          TRAP    55                      ;                                       8822
19518 070172  000150                          .WORD   150
19519 070174  010526                          .WORD   SYNC
19520 070176  024052                          .WORD   DUMPER
19521 070200  012746  010112                  MOV     #FNC.13,-(SP)           ;                                       8823
```

```
19523                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
19524                                   ;                                                       22-Dec-1980 09:21:22    PA:<
19525
19526 070204  012746  006506                    MOV     #WRD.19,-(SP)
19527 070210  012746  006416                    MOV     #WRD.11,-(SP)
19528 070214  012746  007366                    MOV     #PHR.1,-(SP)
19529 070220  012746  007152                    MOV     #WRD.59,-(SP)
19530 070224  012746  006062                    MOV     #FIV.FMT,-(SP)
19531 070230  012746  000006                    MOV     #6,-(SP)
19532 070234  010600                            MOV     SP,R0                           ; SP,*
19533 070236  104414                            TRAP    14
19534 070240  062706  000016                    ADD     #16,SP                          ;                                       8821
19535 070244  104467                  13$:      TRAP    67                              ;                                       8824
19536 070246  006000                            ROR     R0
19537 070250  103002                            BHIS    15$
19538 070252  000167  177346          14$:      JMP     2$
19539 070256  005203                  15$:      INC     R3                              ; TWICE                                 8761
19540 070260  020327  000001                    CMP     R3,#1                           ; TWICE,*
19541 070264  003772                            BLE     14$
19542 070266  000207                            RTS     PC                              ;                                       8720
19543
19544                                   ; Routine Size:  175 words
19545                                   ; Maximum stack depth per invocation:  11 words
19550
19551
19555
19559 070270                            T42::
19560 070270  004767  177236          1$:       JSR     PC,$T42                         ;                                       8827
19561 070274  104466                            TRAP    66
19562 070276  006000                            ROR     R0
19563 070300  103773                            BLO     1$
19564 070302  000207                            RTS     PC
19565
19566                                   ; Routine Size:  6 words
19567                                   ; Maximum stack depth per invocation:  0 words
19572
19573
19574 ;          8830  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (93)

```
19576 ;ML4
19577 ;
19578
19579 ;          8831  !
19580 ;          8832  !
19581 ;          8833  BGNTST;
19582 ;          8834
19583 ;          8835  !++
19584 ;          8836  ! TEST NUMBER:  TST 43
19585 ;          8837  !
19586 ;          8838  ! TEST NAME:    LAST BLOCK TRANSFER TEST
19587 ;          8839  !
19588 ;          8840  ! TEST DESCRIPTION:
19589 ;          8841  !
19590 ;          8842  !       TEST THE LAST BLOCK INDICATOR BIT
19591 ;          8843  !       FOR SETTING/NOT SETTING AND THE
19592 ;          8844  !       DSA REGISTER FOR INCREMENTING BY:
19593 ;          8845  !
19594 ;          8846  !       1.  DOING MBUS TRANSFERRS AT EACH
19595 ;          8847  !           BLOCK FROM BLOCK ZERO TO
19596 ;          8848  !           LAST BLOCK -1 AND TEST LBT
19597 ;          8849  !           CLEAR AND DSA REGISTER TO BE
19598 ;          8850  !           INCREMENTED.
19599 ;          8851  !
19600 ;          8852  !       2.  DO A MBUS TRANSFERR AT
19601 ;          8853  !           THE LAST BLOCK.
19602 ;          8854  !           TEST LBT TO BE SET AND
19603 ;          8855  !           TEST FOR CLEAR.
19604 ;          8856  !           TEST DSA REG TO BE INCREMENTED.
19605 ;          8857  !
19606 ;          8858  ! IMPLICIT INPUTS:
19607 ;          8859  !       IO_BUF
19608 ;          8860  !       A VECTOR OF 256 WORDS WHERE
19609 ;          8861  !       DATA FOR MBUS READS AND WRITE
19610 ;          8862  !       FUNCTION ARE FOUND.
19611 ;          8863  !
19612 ;          8864  !--
19613 ;          8865
19614 ;          8866  local
19615 ;          8867      DODU_FLG;                          !DROP UNIT FLAG
19616 ;          8868
19617 ;          8869  DODU_FLG = ZERO;
19618 ;          8870
19619 ;          8871  incr DSA_CNT from 0 to .LST_BLK - 1 do      !DO XFERRS UP TO THE LAST BLOCK
19620 ;          8872      begin
19621 ;          8873      BGNSUB;
19622 ;          8874      CLR_MBUS;
19623 ;          8875      ECC_DIS = ONE;                     !DISABLE ECC
19624 ;          8876      MLWC = not 255;                    !LOAD WORD COUNT
19625 ;          8877      MLBA = IO_BUF;                     !LOAD UBUS ADRS
19626 ;          8878      MLDA = .DSA_CNT;                   !LOAD DSA WITH DSA_CNT
19627 ;          8879      MLCS1 = write;                     !DO A WRITE FUNCTION
19628 ;          8880      TIME_OUT_LOOP;
19629 ;          8881
19630 ;          8882      if .LBT IS_SET                     !SEE IF THE LAST BLOCK XFERR BIT SET
```

```
;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (93)

;          8883        then
;          8884            begin                                   !ERROR AND SET DODU_FLG IF SET
;          8885            ERRDF (97, ASYNC, DUMPER);
;          8886            PRINTB (THR_FMT, WRD_27, PHR_5, WRD_29);
;          8887            PRINTB (FMT_7, .DSA_CNT);
;          8888            DODU_FLG = ONE;
;          8889            end;
;          8890
;          8891        if .MLDA neq .DSA_CNT + 1                   !SEE IF THE DSA REG INCREMENTED
;          8892        then
;          8893            begin                                   !ERROR AND SET DODU_FLG IF NOT
;          8894            ERRDF (98, ASYNC, DUMPER);
;          8895            PRINTB (THR_FMT, REG_6, WRD_31, WRD_14);
;          8896            PRINTB (FMT_7, .DSA_CNT);
;          8897            DODU_FLG = ONE;
;          8898            end;
;          8899
;          8900        ENDSUB;
;          8901        end;
;          8902
;          8903    BGNSUB;
;          8904    CLR_MBUS;
;          8905    ECC_DIS = ONE;                                  !DISABLE ECC
;          8906    LAST_BLK_XFER ();                               !SET UP A LAST BLOCK XFERR
;          8907    MLCST = write;                                  !DO A WRITE FUNCTION
;          8908    TIME_OUT_LOOP;
;          8909
;          8910    if .MLDA neq .LST_BLK + 1                       !SEE IF DSA REGISTER INCREMENTED
;          8911    then
;          8912        begin                                       !ERROR AND SET DODU_FLG IF NOT
;          8913        ERRDF (101, ASYNC, DUMPER);
;          8914        PRINTB (THR_FMT, REG_6, WRD_31, WRD_14);
;          8915        PRINTB (FMT_7, .LST_BLK);
;          8916        DODU_FLG = ONE;
;          8917        end;
;          8918
;          8919    if .LBT IS_SET                                  !SEE IF LBT BIT SET
;          8920    then
;          8921        begin
;          8922        MLDA = ONES;                                !IF SET THEN TRY TO CLEAR IT
;          8923
;          8924        if .LBT IS_SET                              !SEE IF BIT CLEARED
;          8925        then
;          8926            begin                                   !ERROR IF NOT
;          8927            ERRDF (99, ASYNC, DUMPER);
;          8928            PRINTB (FIV_FMT, WRD_27, PHR_2, WRD_11, WRD_17, REG_6);
;          8929            DODU_FLG = ONE;
;          8930            end;
;          8931
;          8932        end
;          8933    else                                            !LBT NOT SET
;          8934        begin                                       !ERROR AND SET DODU_FLG
```

```
19688 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
19689 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (93)
19690
19691 ;          8935      ERRDF (100, ASYNC, DUMPER);
19692 ;          8936      PRINTB (FOR_FMT, WRD_27, PHR_1, WRD_11, WRD_27);
19693 ;          8937      DODU_FLG = ONE;
19694 ;          8938      end;
19695 ;          8939
19696 ;          8940  ENDSUB;
19697 ;          8941
19698 ;          8942  if .DODU_FLG IS_SET                    !DROP THIS UNIT IF DODU_FLG SET
19699 ;          8943  then
19700 ;          8944      begin
19701 ;          8945      DODU (.ML_LUN);
19702 ;          8946      DOCLN;
19703 ;          8947      end;
19704 ;          8948
19705 ;          8949  ENDTST;
19709
19713 070304  004167  113566          $T43:   JSR     R1,$SAVE4                       ;                       8829
19714 070310  005001                          CLR     R1                              ; DODU.FLG              8869
19715 070312  016704  121254                  MOV     LST.BLK,R4                      ;                       8871
19716 070316  005002                          CLR     R2                              ; DSA.CNT
19717 070320  000541                          BR      6$
19718 070322  010203                  1$:     MOV     R2,R3                           ; DSA.CNT,*             8891
19719 070324  005203                          INC     R3
19720 070326  104402                  2$:     TRAP    2                               ;                       8872
19721 070330  152777  000040  122656          BISB    #40,@ML.REG+40                  ;                       8873
19722 070336  016700  123240                  MOV     ML.DUT,R0
19723 070342  042700  177770                  BIC     #177770,R0
19724 070346  142777  000007  122640          BICB    #7,@ML.REG+40
19725 070354  150077  122634                  BISB    R0,@ML.REG+40
19726 070360  152777  000002  122706          BISB    #2,@ML.REG+120                  ;                       8875
19727 070366  012777  177400  122570          MOV     #-400,@ML.REG+10                ;                       8876
19728 070374  012777  011600  122572          MOV     #IO.BUF,@ML.REG+20              ;                       8877
19729 070402  010277  122576                  MOV     R2,@ML.REG+30                   ; DSA.CNT,*             8878
19730 070406  012777  000061  122540          MOV     #61,@ML.REG                     ;                       8879
19731 070414  105777  122604          3$:     TSTB    @ML.REG+50
19732 070420  100375                          BPL     3$
19733 070422  032777  002000  122574          BIT     #2000,@ML.REG+50                ;                       8882
19734 070430  001433                          BEQ     4$
19735 070432  104455                          TRAP    55                              ;                       8885
19736 070434  000141                          .WORD   141
19737 070436  010464                          .WORD   ASYNC
19738 070440  024052                          .WORD   DUMPER
19739 070442  012746  006610                  MOV     #WRD.29,-(SP)                   ;                       8886
19740 070446  012746  007472                  MOV     #PHR.5,-(SP)
19741 070452  012746  006602                  MOV     #WRD.27,-(SP)
```

```
                                                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                                                    22-Dec-1980 09:21:22    PA:<
                                        ;ML4
                                        ;
19746 070456  012746  006034                MOV     #THR.FMT,-(SP)
19747 070462  012746  000004                MOV     #4,-(SP)
19748 070466  010600                       MOV     SP,R0                       ; SP,*
19749 070470  104414                       TRAP    14
19750 070472  010216                       MOV     R2,(SP)                     ; DSA.CNT,*                                 8887
19751 070474  012746  004562               MOV     #FMT.7,-(SP)
19752 070500  012746  000002               MOV     #2,-(SP)
19753 070504  010600                       MOV     SP,R0                       ; SP,*
19754 070506  104414                       TRAP    14
19755 070510  012701  000001               MOV     #1,R1                       ; *,DODU.FLG                                8888
19756 070514  062706  000016               ADD     #16,SP                      ;                                           8884
19757 070520  027703  122460        4$:    CMP     @ML.REG+30,R3               ;                                           8891
19758 070524  001433                       BEQ     5$
19759 070526  104455                       TRAP    55                          ;                                           8894
19760 070530  000142                       .WORD   142
19761 070532  010464                       .WORD   ASYNC
19762 070534  024052                       .WORD   DUMPER
19763 070536  012746  006442               MOV     #WRD.14,-(SP)               ;                                           8895
19764 070542  012746  006632               MOV     #WRD.31,-(SP)
19765 070546  012746  010316               MOV     #REG.6,-(SP)
19766 070552  012746  006034               MOV     #THR.FMT,-(SP)
19767 070556  012746  000004               MOV     #4,-(SP)
19768 070562  010600                       MOV     SP,R0                       ; SP,*
19769 070564  104414                       TRAP    14
19770 070566  010216                       MOV     R2,(SP)                     ; DSA.CNT,*                                 8896
19771 070570  012746  004562               MOV     #FMT.7,-(SP)
19772 070574  012746  000002               MOV     #2,-(SP)
19773 070600  010600                       MOV     SP,R0                       ; SP,*
19774 070602  104414                       TRAP    14
19775 070604  012701  000001               MOV     #1,R1                       ; *,DODU.FLG                                8897
19776 070610  062706  000016               ADD     #16,SP                      ;                                           8893
19777 070614  104467                 5$:   TRAP    67                          ;                                           8898
19778 070616  006000                       ROR     R0
19779 070620  103642                       BLO     2$
19780 070622  005202                       INC     R2                          ; DSA.CNT                                   8871
19781 070624  020204                 6$:   CMP     R2,R4                       ; DSA.CNT,*
19782 070626  002635                       BLT     1$
19783 070630  104402                 7$:   TRAP    2                           ;                                           8901
19784 070632  152777  000040  122354       BISB    #40,@ML.REG+40              ;                                           8903
19785 070640  016704  122736               MOV     ML.DUT,R4
19786 070644  042704  177770               BIC     #177770,R4
19787 070650  142777  000007  122336       BICB    #7,@ML.REG+40
19788 070656  150477  122332               BISB    R4,@ML.REG+40
19789 070662  152777  000002  122404       BISB    #2,@ML.REG+120              ;                                           8905
19790 070670  004767  125220               JSR     PC,LAST.BLK.XFER            ;                                           8906
19791 070674  012777  000061  122252       MOV     #61,@ML.REG                 ;                                           8907
19792 070702  105777  122316           8$:  TSTB    @ML.REG+50
19793 070706  100375                       BPL     8$
19794 070710  016702  120656               MOV     LST.BLK,R2                  ;                                           8910
19795 070714  005202                       INC     R2
19796 070716  027702  122262               CMP     @ML.REG+30,R2
19797 070722  001434                       BEQ     9$
```

```
19799                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
19800                                   ;                                                       22-Dec-1980 09:21:22    PA:<
19801
19802 070724  104455                             TRAP    55                      ;                                       8913
19803 070726  000145                             .WORD   145
19804 070730  010464                             .WORD   ASYNC
19805 070732  024052                             .WORD   DUMPER
19806 070734  012746  006442                     MOV     #WRD.14,-(SP)           ;                                       8914
19807 070740  012746  006632                     MOV     #WRD.31,-(SP)
19808 070744  012746  010316                     MOV     #REG.6,-(SP)
19809 070750  012746  006034                     MOV     #THR.FMT,-(SP)
19810 070754  012746  000004                     MOV     #4,-(SP)
19811 070760  010600                             MOV     SP,R0                   ; SP,*
19812 070762  104414                             TRAP    14
19813 070764  016716  120602                     MOV     LST.BLK,(SP)            ;                                       8915
19814 070770  012746  004562                     MOV     #FMT.7,-(SP)
19815 070774  012746  000002                     MOV     #2,-(SP)
19816 071000  010600                             MOV     SP,R0                   ; SP,*
19817 071002  104414                             TRAP    14
19818 071004  012701  000001                     MOV     #1,R1                   ; *,DODU.FLG                            8916
19819 071010  062706  000016                     ADD     #16,SP                  ;                                       8912
19820 071014  032777  002000  122202  9$:        BIT     #2000,@ML.REG+50        ;                                       8919
19821 071022  001440                             BEQ     10$
19822 071024  012777  177777  122152             MOV     #-1,@ML.REG+30          ;                                       8922
19823 071032  032777  002000  122164             BIT     #2000,@ML.REG+50        ;                                       8924
19824 071040  001457                             BEQ     11$
19825 071042  104455                             TRAP    55                      ;                                       8927
19826 071044  000143                             .WORD   143
19827 071046  010464                             .WORD   ASYNC
19828 071050  024052                             .WORD   DUMPER
19829 071052  012746  010316                     MOV     #REG.6,-(SP)            ;                                       8928
19830 071056  012746  006470                     MOV     #WRD.17,-(SP)
19831 071062  012746  006416                     MOV     #WRD.11,-(SP)
19832 071066  012746  007404                     MOV     #PHR.2,-(SP)
19833 071072  012746  006602                     MOV     #WRD.27,-(SP)
19834 071076  012746  006062                     MOV     #FIV.FMT,-(SP)
19835 071102  012746  000006                     MOV     #6,-(SP)
19836 071106  010600                             MOV     SP,R0                   ; SP,*
19837 071110  104414                             TRAP    14
19838 071112  012701  000001                     MOV     #1,R1                   ; *,DODU.FLG                            8929
19839 071116  062706  000016                     ADD     #16,SP                  ;                                       8926
19840 071122  000426                             BR      11$                     ;                                       8919
19841 071124  104455                10$:         TRAP    55                      ;                                       8935
19842 071126  000144                             .WORD   144
19843 071130  010464                             .WORD   ASYNC
19844 071132  024052                             .WORD   DUMPER
19845 071134  012746  006602                     MOV     #WRD.27,-(SP)           ;                                       8936
19846 071140  012746  006416                     MOV     #WRD.11,-(SP)
19847 071144  012746  007366                     MOV     #PHR.1,-(SP)
19848 071150  012746  006602                     MOV     #WRD.27,-(SP)
19849 071154  012746  006046                     MOV     #FOR.FMT,-(SP)
19850 071160  012746  000005                     MOV     #5,-(SP)
19851 071164  010600                             MOV     SP,R0                   ; SP,*
19852 071166  104414                             TRAP    14
19853 071170  012701  000001                     MOV     #1,R1                   ; *,DODU.FLG                            8937
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
                                                                                                                        8934
071174  062706  000014                  ADD     #14,SP                  ;                                               8934
071200  104467                  11$:    TRAP    67                      ;                                               8938
071202  006000                          ROR     R0
071204  103611                          BLO     7$
071206  005301                          DEC     R1                      ; DODU.FLG                                      8942
071210  001004                          BNE     12$
071212  016700  122362                  MOV     ML.LUN,R0               ;                                               8945
071216  104451                          TRAP    51
071220  104444                          TRAP    44
071222  000207                  12$:    RTS     PC                      ;                                               8829

                                        ; Routine Size:  232 words
                                        ; Maximum stack depth per invocation:  12 words


071224                                  T43::
071224  004767  177054            1$:   JSR     PC,$T43                 ;                                               8947
071230  104466                          TRAP    66
071232  006000                          ROR     R0
071234  103773                          BLO     1$
071236  000207                          RTS     PC

                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words


;               8950  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (94)

```
19901 ;ML4
19902 ;
19903
19904 ;          8951  !
19905 ;          8952  !
19906 ;          8953  BGNTST;
19907 ;          8954
19908 ;          8955  !++
19909 ;          8956  ! TEST NUMBER:  TST 44
19910 ;          8957  !
19911 ;          8958  ! TEST NAME:    INVALID ADRS TEST
19912 ;          8959  !
19913 ;          8960  ! TEST DESCRIPTION:
19914 ;          8961  !
19915 ;          8962  !       TEST THE DETECTION OF ILLEGAL DSA
19916 ;          8963  !       ADDRESSES BY:
19917 ;          8964  !
19918 ;          8965  !       1.  DOING A MBUS WRITE FUNCTION
19919 ;          8966  !           AT ALL POSSIBLE ILLEGAL DSA
19920 ;          8967  !           ADDRESSES AND TEST THE
19921 ;          8968  !           IAE BIT SET.
19922 ;          8969  !
19923 ;          8970  ! IMPLICIT INPUTS:
19924 ;          8971  !
19925 ;          8972  !       IO_BUF
19926 ;          8973  !       A VECTOR OF 256 WORDS WHERE
19927 ;          8974  !       DATA FOR MBUS READS AND WRITE
19928 ;          8975  !       FUNCTION ARE FOUND.
19929 ;          8976  !
19930 ;          8977  !
19931 ;          8978  !--
19932 ;          8979
19933 ;          8980  local
19934 ;          8981      IAE_CNT;                          !INVLID ADRS COUNT
19935 ;          8982
19936 ;          8983  IAE_CNT = .LST_BLK;                  !START AT LAST  BLOCK + 1
19937 ;          8984
19938 ;          8985  do                                   !TEST FOR ALL INVALID ADDRESSES
19939 ;          8986      begin
19940 ;          8987      IAE_CNT = .IAE_CNT + 1;          !INCREMENT IAE_CNT
19941 ;          8988      BGNSUB;
19942 ;          8989      CLR_MBUS;
19943 ;          8990      MLDA = .IAE_CNT;                 !LOAD DSA
19944 ;          8991      MLWC = not 255;                  !LOAD WORD COUNT
19945 ;          8992      MLBA = IO_BUF;                   !LOAD UBUS ADRS
19946 ;          8993      MLCS1 = write;                   !DO A WRITE FUNCTION
19947 ;          8994
19948 ;          8995      if .IAE IS_NOT_SET               !SET IF IAE SET
19949 ;          8996      then
19950 ;          8997          begin                        !ERROR IF NOT SET
19951 ;          8998          ERRDF (102, ASYNC, DUMPER);
19952 ;          8999          PRINTB (FIV_FMT, WRD_30, PHR_1, WRD_11, WRD_30, WRD_10);
19953 ;          9000          end;
19954 ;          9001
19955 ;          9002      ENDSUB;
```

```
19957 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
19958 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (94)
19959
19960 ;          9003      end
19961 ;          9004  until .IAE_CNT eql %o'177777';                !REPEAT UNTIL ALL TESTED
19962 ;          9005
19963 ;          9006  ENDTST;
19967
19971 071240  010146                    $T44:   MOV     R1,-(SP)                        ;                                8949
19972 071242  016701  120324                    MOV     LST.BLK,R1                      ; *,IAE.CNT                      8983
19973 071246  005201                    1$:     INC     R1                              ; IAE.CNT                        8987
19974 071250  104402                    2$:     TRAP    2
19975 071252  152777  000040  121734            BISB    #40,@ML.REG+40                  ;                                8988
19976 071260  016700  122316                    MOV     ML.DUT,R0
19977 071264  042700  177770                    BIC     #177770,R0
19978 071270  142777  000007  121716            BICB    #7,@ML.REG+40
19979 071276  150077  121712                    BISB    R0,@ML.REG+40
19980 071302  010177  121676                    MOV     R1,@ML.REG+30                   ; IAE.CNT,*                      8990
19981 071306  012777  177400  121650            MOV     #-400,@ML.REG+10                ;                                8991
19982 071314  012777  011600  121652            MOV     #IO.BUF,@ML.REG+20              ;                                8992
19983 071322  012777  000061  121624            MOV     #61,@ML.REG                     ;                                8993
19984 071330  032777  002000  121676            BIT     #2000,@ML.REG+60                ;                                8995
19985 071336  001026                            BNE     3$
19986 071340  104455                            TRAP    55                              ;                                8998
19987 071342  000146                            .WORD   146
19988 071344  010464                            .WORD   ASYNC
19989 071346  024052                            .WORD   DUMPER
19990 071350  012746  006406                    MOV     #WRD.10,-(SP)                   ;                                8999
19991 071354  012746  006624                    MOV     #WRD.30,-(SP)
19992 071360  012746  006416                    MOV     #WRD.11,-(SP)
19993 071364  012746  007366                    MOV     #PHR.1,-(SP)
19994 071370  012746  006624                    MOV     #WRD.30,-(SP)
19995 071374  012746  006062                    MOV     #FIV.FMT,-(SP)
19996 071400  012746  000006                    MOV     #6,-(SP)
19997 071404  010600                            MOV     SP,R0                           ; SP,*
19998 071406  104414                            TRAP    14
19999 071410  062706  000016                    ADD     #16,SP                          ;                                8997
20000 071414  104467                    3$:     TRAP    67                              ;                                9000
20001 071416  006000                            ROR     R0
20002 071420  103713                            BLO     2$
20003 071422  020127  177777                    CMP     R1,#-1                          ; IAE.CNT,*                      9004
20004 071426  001307                            BNE     1$
20005 071430  012601                            MOV     (SP)+,R1                        ;                                8949
20006 071432  000207                            RTS     PC
20007
20008                                   ; Routine Size:  62 words
20009                                   ; Maximum stack depth per invocation:  8 words
```

```
20018
20019
20023
20027 071434                          T44::
20028 071434  004767  177600          1$:     JSR     PC,$T44                 ;                9004
20029 071440  104466                          TRAP    66
20030 071442  006000                          ROR     R0
20031 071444  103773                          BLO     1$
20032 071446  000207                          RTS     PC
20033
20034                                 ; Routine Size:  6 words
20035                                 ; Maximum stack depth per invocation:  0 words
20040
20041
20042 ;         9007  !<BLF/PAGE>
```

```
20044 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
20045 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (95)
20046
20047 ;          9008  !
20048 ;          9009  BGNTST;
20049 ;          9010
20050 ;          9011  !++
20051 ;          9012  ! TEST NUMBER:  TST 45
20052 ;          9013  !
20053 ;          9014  ! TEST NAME:    ADRS OVERFLOW BIT TEST
20054 ;          9015  !
20055 ;          9016  ! TEST DESCRIPTION:
20056 ;          9017  !       TEST THE DETECTION OF ADDRESS OVERFLOWS BY:
20057 ;          9018  !
20058 ;          9019  !       1.  STARTING AT THE LAST BLOCK DO A TWO BLOCK TRANSFER.
20059 ;          9020  !
20060 ;          9021  !       2.  READ THE AOE BIT SET.
20061 ;          9022  !
20062 ;          9023  ! IMPLICIT INPUTS:
20063 ;          9024  !       IO_BUF
20064 ;          9025  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE
20065 ;          9026  !       FUNCTIONS ARE FOUND.
20066 ;          9027  !--
20067 ;          9028
20068 ;          9029  CLR_MBUS;
20069 ;          9030  MLWC = not 511;                          !DO TWO BLOCK XFERR
20070 ;          9031  MLBA = IO_BUF;                          !LOAD UBUS ADRS
20071 ;          9032  MLDA = .LST_BLK;                        !START AT LAST BLOCK
20072 ;          9033  MLCS1 = write;                          !DO A WRITE FUNCTION
20073 ;          9034  TIME_OUT_LOOP;
20074 ;          9035
20075 ;          9036  if .AOE IS_NOT_SET                      !SEE IF AOE SET
20076 ;          9037  then
20077 ;          9038      begin                                !ERROR IF NOT SET
20078 ;          9039      ERRDF (103, SYNC, DUMPER);
20079 ;          9040      PRINTB (FOR_FMT, WRD_26, PHR_1, WRD_11, FNC_19);
20080 ;          9041      end;
20081 ;          9042
20082 ;          9043  ENDTST;
20086
20090 071450  152777  000040  121536  $T45:   BISB    #40,@ML.REG+40                ;                9009
20091 071456  016700  122120                  MOV     ML.DUT,R0
20092 071462  042700  177770                  BIC     #177770,R0
20093 071466  142777  000007  121520          BICB    #7,@ML.REG+40
20094 071474  150077  121514                  BISB    R0,@ML.REG+40
20095 071500  012777  177000  121456          MOV     #-1000,@ML.REG+10             ;                9030
20096 071506  012777  011600  121460          MOV     #IO.BUF,@ML.REG+20            ;                9031
20097 071514  016777  120052  121462          MOV     LST.BLK,@ML.REG+30            ;                9032
```

```
20099                                   :ML4                                                    22-Dec-1980 09:24:31    TOPS
20100                                   ;                                                       22-Dec-1980 09:21:22    PA:<
20101
20102 071522  012777  000061  121424            MOV     #61,@ML.REG                     ;                               9033
20103 071530  105777  121470          1$:       TSTB    @ML.REG+50
20104 071534  100375                            BPL     1$
20105 071536  032777  001000  121470            BIT     #1000,@ML.REG+60                ;                               9036
20106 071544  001024                            BNE     2$
20107 071546  104455                            TRAP    55                              ;                               9039
20108 071550  000147                            .WORD   147
20109 071552  010526                            .WORD   SYNC
20110 071554  024052                            .WORD   DUMPER
20111 071556  012746  010204                    MOV     #FNC.19,-(SP)                   ;                               9040
20112 071562  012746  006416                    MOV     #WRD.11,-(SP)
20113 071566  012746  007366                    MOV     #PHR.1,-(SP)
20114 071572  012746  006574                    MOV     #WRD.26,-(SP)
20115 071576  012746  006046                    MOV     #FOR.FMT,-(SP)
20116 071602  012746  000005                    MOV     #5,-(SP)
20117 071606  010600                            MOV     SP,R0                           ; SP,*
20118 071610  104414                            TRAP    14
20119 071612  062706  000014                    ADD     #14,SP                          ;                               9038
20120 071616  000207                  2$:       RTS     PC                              ;                               9006
20121
20122                                   ; Routine Size:  52 words
20123                                   ; Maximum stack depth per invocation:  6 words
20128
20129
20133
20137 071620                            T45::
20138 071620  004767  177624           1$:       JSR     PC,$T45                         ;                               9041
20139 071624  104466                            TRAP    66
20140 071626  006000                            ROR     R0
20141 071630  103773                            BLO     1$
20142 071632  000207                            RTS     PC
20143
20144                                   ; Routine Size:  6 words
20145                                   ; Maximum stack depth per invocation:  0 words
20150
20151
20152 ;               9044    !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (96)

```
20154 ;ML4
20155 ;
20156
20157 ;          9045  !
20158 ;          9046  BGNTST;
20159 ;          9047
20160 ;          9048  !++
20161 ;          9049  ! TEST NUMBER:  TST 46
20162 ;          9050  !
20163 ;          9051  ! TEST NAME:    SYNC BUS PARITY TEST
20164 ;          9052  !
20165 ;          9053  ! TEST DESCRIPTION:
20166 ;          9054  !       TEST ABILITY OF SYNC BUS TO DETECT AND GENERATE
20167 ;          9055  !       GOOD PARITY BY:
20168 ;          9056  !
20169 ;          9057  !       1.  VIA MBUS WRITE FUNCTION WRITE ALTERNATING ONES AND ZEROES TO THE
20170 ;          9058  !           DEVICE AND READ THE DPAR BIT CLEARED.
20171 ;          9059  !
20172 ;          9060  !       2.  REPEAT WITH SHIFTED DATA
20173 ;          9061  !
20174 ;          9062  !       3.  VIA MBUS READ FUNCTION READ THE ALTERNATING PATTERN AND MDPE CLEARED.
20175 ;          9063  !
20176 ;          9064  ! IMPLICIT INPUTS:
20177 ;          9065  !       IO_BUF
20178 ;          9066  !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITES
20179 ;          9067  !       FUNCTIONS ARE FOUND.
20180 ;          9068  !--
20181 ;          9069
20182 ;          9070  if .PAR_DIS IS_SET                          !SEE IF PARITY IS DISABLED
20183 ;          9071  then
20184 ;          9072      begin                                   !PRINT MESSAGE AND EXIT TST IF YES
20185 ;          9073      PRINTB (THR_FMT, FNC_3, WRD_7, WRD_37);
20186 ;          9074      EXIT_TST;
20187 ;          9075      end;
20188 ;          9076
20189 ;          9077  CLR_MBUS;
20190 ;          9078  BAI = ONE;                                  !SET ON FIRST IO_BUF ADRS
20191 ;          9079  IO_BUF = %o'125252';                        !ALTERNATE 1, 0 PATTERN
20192 ;          9080
20193 ;          9081  incr TWICE from 0 to 1 do                   !REPEAT LOOP TWICE
20194 ;          9082      begin
20195 ;          9083      BGNSUB;
20196 ;          9084      GD_BLK_XFER ();                         !SET UP A GOOD BLOCK XFERR
20197 ;          9085      MLCS1 = write;                          !DO A WRITE FUNCTION
20198 ;          9086      TIME_OUT_LOOP;
20199 ;          9087
20200 ;          9088      if .DPAR IS_SET                         !SEE IF DPAR GOT SET
20201 ;          9089      then
20202 ;          9090          begin                               !ERROR IF SET
20203 ;          9091          ERRDF (105, SYNC, DUMPER);
20204 ;          9092          PRINTB (FOR_FMT, WRD_23, WRD_6, WRD_7, WRD_9);
20205 ;          9093          end;
20206 ;          9094
20207 ;          9095      IO_BUF = .IO_BUF^ONE;                   !SHIFT THE IO_BUF & REPEAT
20208 ;          9096      MLER = ZEROES;                          !CLEAR OUT ERROR REG & REPEAT
```

```
20210 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
20211 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (96)
20212
20213 ;          9097      ENDSUB;
20214 ;          9098      end;
20215 ;          9099
20216 ;          9100  incr TWICE from 0 to 1 do                    !REPEATE LOOP TWICE
20217 ;          9101      begin
20218 ;          9102      BGNSUB;
20219 ;          9103      CLR_MBUS;
20220 ;          9104      BAI = ONE;                                !SET ON FIRST IO_BUF ADRS
20221 ;          9105      GD_BLK_XFER ();                           !SET UP A GOOD BLOCK XFERR
20222 ;          9106      ML.CS1 = read;                            !DO A READ XFERR
20223 ;          9107      TIME_OUT_LOOP;
20224 ;          9108
20225 ;          9109      if .MDPE IS_SET                           !SEE IF READ GENERATED BAD PARITY
20226 ;          9110      then
20227 ;          9111          begin                                 !ERROR IF MDPE SET
20228 ;          9112          ERRDF (106, SYNC, DUMPER);
20229 ;          9113          PRINTB (FOR_FMT, WRD_23, WRD_6, WRD_7, WRD_8);
20230 ;          9114          end;
20231 ;          9115
20232 ;          9116      ENDSUB;
20233 ;          9117      IO_BUF = .IO_BUF^ONE;                     !MAKE DATA PATTERN HAVE ONE LESS ONE
20234 ;          9118      GD_BLK_XFER ();                           !SET UP A GOOD BLK XFER
20235 ;          9119      ML.CS1 = write;                           !CHANGE THE BACKGROUND IN MEMORY
20236 ;          9120      TIME_OUT_LOOP;
20237 ;          9121      end;
20238 ;          9122
20239 ;          9123  ENDTST;
20243
20247 071634  010146                    $T46:  MOV   R1,-(SP)                ;                          9043
20248 071636  026727  117724  000001          CMP   PAR.DIS,#1               ;                          9070
20249 071644  001021                          BNE   1$
20250 071646  012746  006700                  MOV   #WRD.37,-(SP)            ;                          9073
20251 071652  012746  006344                  MOV   #WRD.7,-(SP)
20252 071656  012746  007750                  MOV   #FNC.3,-(SP)
20253 071662  012746  006034                  MOV   #THR.FMT,-(SP)
20254 071666  012746  000004                  MOV   #4,-(SP)
20255 071672  010600                          MOV   SP,R0                    ; SP,*
20256 071674  104414                          TRAP  14
20257 071676  104463                          TRAP  63
20258 071700  062706  000012                  ADD   #12,SP                   ;                          9070
20259 071704  000167  000402                  JMP   9$                       ;                          9072
20260 071710  152777  000040  121276  1$:     BISB  #40,@ML.REG+40           ;                          9075
20261 071716  016701  121660                  MOV   ML.DUT,R1
20262 071722  042701  177770                  BIC   #177770,R1
20263 071726  142777  000007  121260          BICB  #7,@ML.REG+40
```

```
20265                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
20266                                   ;                                                       22-Dec-1980 09:21:22    PA:<
20267
20268 071734 150177 121254              BISB    R1,@ML.REG+40
20269 071740 152777 000010 121246       BISB    #10,@ML.REG+40          ;                                               9078
20270 071746 012767 125252 117624       MOV     #-52526,IO.BUF          ;                                               9079
20271 071754 005001                     CLR     R1                      ; TWICE                                         9081
20272 071756 104402                2$:  TRAP    2                       ;                                               9082
20273 071760 004767 124076              JSR     PC,GD.BLK.XFER          ;                                               9084
20274 071764 012777 000061 121162       MOV     #61,@ML.REG             ;                                               9085
20275 071772 105777 121226         3$:  TSTB    @ML.REG+50
20276 071776 100375                     BPL     3$
20277 072000 132777 000040 121226       BITB    #40,@ML.REG+60          ;                                               9088
20278 072006 001424                     BEQ     4$
20279 072010 104455                     TRAP    55                      ;                                               9091
20280 072012 000151                     .WORD   151
20281 072014 010526                     .WORD   SYNC
20282 072016 024052                     .WORD   DUMPER
20283 072020 012746 006374              MOV     #WRD.9,-(SP)            ;                                               9092
20284 072024 012746 006344              MOV     #WRD.7,-(SP)
20285 072030 012746 006336              MOV     #WRD.6,-(SP)
20286 072034 012746 006544              MOV     #WRD.23,-(SP)
20287 072040 012746 006046              MOV     #FOR.FMT,-(SP)
20288 072044 012746 000005              MOV     #5,-(SP)
20289 072050 010600                     MOV     SP,R0                   ; SP,*
20290 072052 104414                     TRAP    14
20291 072054 062706 000014              ADD     #14,SP                  ;                                               9090
20292 072060 006367 117514         4$:  ASL     IO.BUF                  ;                                               9095
20293 072064 005077 121144              CLR     @ML.REG+60              ;                                               9096
20294 072070 104467                     TRAP    67
20295 072072 006000                     ROR     R0
20296 072074 103730                     BLO     2$
20297 072076 005201                     INC     R1                      ; TWICE                                         9081
20298 072100 020127 000001              CMP     R1,#1                   ; TWICE,*
20299 072104 003724                     BLE     2$
20300 072106 005001                     CLR     R1                      ; TWICE                                         9100
20301 072110 104402                5$:  TRAP    2                       ;                                               9101
20302 072112 152777 000040 121074       BISB    #40,@ML.REG+40          ;                                               9102
20303 072120 016700 121456              MOV     ML.DUT,R0
20304 072124 042700 177770              BIC     #177770,R0
20305 072130 142777 000007 121056       BICB    #7,@ML.REG+40
20306 072136 150077 121052              BISB    R0,@ML.REG+40
20307 072142 152777 000010 121044       BISB    #10,@ML.REG+40          ;                                               9104
20308 072150 004767 123706              JSR     PC,GD.BLK.XFER          ;                                               9105
20309 072154 012777 000071 120772       MOV     #71,@ML.REG             ;                                               9106
20310 072162 105777 121036         6$:  TSTB    @ML.REG+50
20311 072166 100375                     BPL     6$
20312 072170 032777 000400 121016       BIT     #400,@ML.REG+40         ;                                               9109
20313 072176 001424                     BEQ     7$
20314 072200 104455                     TRAP    55                      ;                                               9112
20315 072202 000152                     .WORD   152
20316 072204 010526                     .WORD   SYNC
20317 072206 024052                     .WORD   DUMPER
20318 072210 012746 006360              MOV     #WRD.8,-(SP)            ;                                               9113
20319 072214 012746 006344              MOV     #WRD.7,-(SP)
```

```
20321                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
20322                                   ;                                                       22-Dec-1980 09:21:22    PA:<
20323
20324 072220  012746  006336                    MOV     #WRD.6,-(SP)
20325 072224  012746  006544                    MOV     #WRD.23,-(SP)
20326 072230  012746  006046                    MOV     #FOR.FMT,-(SP)
20327 072234  012746  000005                    MOV     #5,-(SP)
20328 072240  010600                            MOV     SP,R0                           ; SP,*
20329 072242  104414                            TRAP    14
20330 072244  062706  000014                    ADD     #14,SP                          ;                                       9111
20331 072250  104467                    7$:     TRAP    67                              ;                                       9114
20332 072252  006000                            ROR     R0
20333 072254  103715                            BLO     5$
20334 072256  006367  117316                    ASL     IO.BUF                          ;                                       9117
20335 072262  004767  123574                    JSR     PC,GD.BLK.XFER                  ;                                       9118
20336 072266  012777  000061  120660            MOV     #61,@ML.REG                     ;                                       9119
20337 072274  105777  120724            8$:     TSTB    @ML.REG+50
20338 072300  100375                            BPL     8$
20339 072302  005201                            INC     R1                              ; TWICE                                 9100
20340 072304  020127  000001                    CMP     R1,#1                           ; TWICE,*
20341 072310  003677                            BLE     5$
20342 072312  012601                    9$:     MOV     (SP)+,R1                        ;                                       9043
20343 072314  000207                            RTS     PC
20344
20345                                   ; Routine Size:  153 words
20346                                   ; Maximum stack depth per invocation:  7 words
20351
20352
20356
20360 072316                            T46::
20361 072316  004767  177312            1$:     JSR     PC,$T46                         ;                                       9121
20362 072322  104466                            TRAP    66
20363 072324  006000                            ROR     R0
20364 072326  103773                            BLO     1$
20365 072330  000207                            RTS     PC
20366
20367                                   ; Routine Size:  6 words
20368                                   ; Maximum stack depth per invocation:  0 words
20373
20374 ;         9124  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (97)

```
20376 ;ML4
20377 ;
20378
20379 ;          9125  !
20380 ;          9126  !
20381 ;          9127  BGNTST;
20382 ;          9128
20383 ;          9129  !++
20384 ;          9130  ! TEST NUMBER:  TST 47
20385 ;          9131  !
20386 ;          9132  ! TEST NAME:    WRITE READ ML11
20387 ;          9133  !
20388 ;          9134  ! TEST DESCRIPTION:
20389 ;          9135  !
20390 ;          9136  !       PROVIDES A MBUS READ/WRITE
20391 ;          9137  !       DATA TRANSFER TROUBLE SHOOTING
20392 ;          9138  !       LOOP BY:
20393 ;          9139  !
20394 ;          9140  !       1.  LOAD APPROPRIATE RH REGISTERS.
20395 ;          9141  !           DO A WRITE FUNCTION.
20396 ;          9142  !
20397 ;          9143  !       2.  LOAD APPROPRIATE RH REGISTERS
20398 ;          9144  !           DO A WRITE CHECK FUNCTION.
20399 ;          9145  !
20400 ;          9146  !       3.  COMPLIMENT DATA AND
20401 ;          9147  !           REPEAT.
20402 ;          9148  !
20403 ;          9149  ! IMPLICIT INPUTS:
20404 ;          9150  !
20405 ;          9151  !       IO_BUF
20406 ;          9152  !       A VECTOR OF 256 WORDS WHERE
20407 ;          9153  !       DATA FOR MBUS READ AND WRITE
20408 ;          9154  !       FUNCTIONS IS FOUND.
20409 ;          9155  !
20410 ;          9156  !--
20411 ;          9157
20412 ;          9158  local
20413 ;          9159      TST_PAT;                          !TEST PATTERN
20414 ;          9160
20415 ;          9161  TST_PAT = %o'052525';
20416 ;          9162
20417 ;          9163  incr TWICE from 0 to 1 do             !WRITE READ 1'S AND 0'S ON MBUS
20418 ;          9164      begin
20419 ;          9165      CLR_MBUS;
20420 ;          9166      BAI = ONE;                        !SET ON FIRST IO_BUF ADRS
20421 ;          9167      IO_BUF = .TST_PAT;                !LOAD FIRST IO_BUF ADRS
20422 ;          9168      GD_BLK_XFER ();                   !SET UP A GOOD BLOCK XFERR
20423 ;          9169      MLCS1 = write;                    !DO A WRITE FUNCTION
20424 ;          9170      TIME_OUT_LOOP;
20425 ;          9171      CLR_MBUS;
20426 ;          9172      BAI = ONE;                        !SET ON FIRST IO_BUF ADRS
20427 ;          9173      GD_BLK_XFER ();                   !SET UP A GOOD BLOCK XFERR
20428 ;          9174      MLCS1 = WRT_CHK;                  !DO A WRITE CHECK FUNCTION
20429 ;          9175      TIME_OUT_LOOP;
20430 ;          9176
```

```
20432 :ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
20433 :                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (97)
20434
20435 :          9177      if .WCE IS_SET                     !SEE IF WRITE CHECK ERROR SET
20436 :          9178      then
20437 :          9179          begin                          !ERROR IF SET
20438 :          9180          ERRDF (109, TRBLE_LOOP, DUMPER);
20439 :          9181          PRINTB (SIX_FMT, FNC_4, WRD_10, WRD_12, FNC_5, FNC_6, FNC_3);
20440 :          9182          end;
20441 :          9183
20442 :          9184      TST_PAT = not .TST_PAT;            !COMPLIMENT TST_PAT AND REPEAT
20443 :          9185      end;
20444 :          9186
20445 :          9187  ENDTST;
20449
20453 072332  004167  111506          $T47:   JSR     R1,$SAVE2                       ;                                  9123
20454 072336  012701  052525                  MOV     #52525,R1                       ; *,TST.PAT                        9161
20455 072342  005002                          CLR     R2                              ; TWICE                            9163
20456 072344  152777  000040  120642  1$:     BISB    #40,@ML.REG+40                  ;                                  9164
20457 072352  016700  121224                  MOV     ML.DUT,R0
20458 072356  042700  177770                  BIC     #177770,R0
20459 072362  142777  000007  120624          BICB    #7,@ML.REG+40
20460 072370  150077  120620                  BISB    R0,@ML.REG+40
20461 072374  152777  000010  120612          BISB    #10,@ML.REG+40                  ;                                  9166
20462 072402  010167  117172                  MOV     R1,IO.BUF                       ; TST.PAT,*                        9167
20463 072406  004767  123450                  JSR     PC,GD.BLK.XFER                  ;                                  9168
20464 072412  012777  000061  120534          MOV     #61,@ML.REG                     ;                                  9169
20465 072420  105777  120600          2$:     TSTB    @ML.REG+50
20466 072424  100375                  BPL     2$
20467 072426  152777  000040  120560          BISB    #40,@ML.REG+40                  ;                                  9170
20468 072434  016700  121142                  MOV     ML.DUT,R0
20469 072440  042700  177770                  BIC     #177770,R0
20470 072444  142777  000007  120542          BICB    #7,@ML.REG+40
20471 072452  150077  120536                  BISB    R0,@ML.REG+40
20472 072456  152777  000010  120530          BISB    #10,@ML.REG+40                  ;                                  9172
20473 072464  004767  123372                  JSR     PC,GD.BLK.XFER                  ;                                  9173
20474 072470  012777  000051  120456          MOV     #51,@ML.REG                     ;                                  9174
20475 072476  105777  120522          3$:     TSTB    @ML.REG+50
20476 072502  100375                  BPL     3$
20477 072504  032777  040000  120502          BIT     #40000,@ML.REG+40               ;                                  9177
20478 072512  001430                  BEQ     4$
20479 072514  104455                  TRAP    55                                      ;                                  9180
20480 072516  000155                  .WORD   155
20481 072520  011026                  .WORD   TRBLE.LOOP
20482 072522  024052                  .WORD   DUMPER
20483 072524  012746  007750                  MOV     #FNC.3,-(SP)                    ;                                  9181
20484 072530  012746  010004                  MOV     #FNC.6,-(SP)
20485 072534  012746  007774                  MOV     #FNC.5,-(SP)
```

```
20487                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
20488                                   ;                                                       22-Dec-1980 09:21:22    PA:<
20489
20490 072540  012746  006426                     MOV     #WRD.12,-(SP)
20491 072544  012746  006406                     MOV     #WRD.10,-(SP)
20492 072550  012746  007756                     MOV     #FNC.4,-(SP)
20493 072554  012746  006100                     MOV     #SIX.FMT,-(SP)
20494 072560  012746  000007                     MOV     #7,-(SP)
20495 072564  010600                            MOV     SP,R0                           ; SP,*
20496 072566  104414                            TRAP    14
20497 072570  062706  000020                     ADD     #20,SP                          ;                                       9179
20498 072574  005101                  4$:       COM     R1                              ; TST.PAT                               9184
20499 072576  005202                            INC     R2                              ; TWICE                                 9163
20500 072600  020227  000001                     CMP     R2,#1                           ; TWICE,*
20501 072604  003657                            BLE     1$
20502 072606  000207                            RTS     PC                              ;                                       9123
20503
20504                                   ; Routine Size:  87 words
20505                                   ; Maximum stack depth per invocation:  11 words
20510
20511
20515
20519 072610                            T47::
20520 072610  004767  177516            1$:     JSR     PC,$T47                         ;                                       9185
20521 072614  104466                            TRAP    66
20522 072616  006000                            ROR     R0
20523 072620  103773                            BLO     1$
20524 072622  000207                            RTS     PC
20525
20526                                   ; Routine Size:  6 words
20527                                   ; Maximum stack depth per invocation:  0 words
20532
20533
20534 ;          9188  !<BLF/PAGE>
```

```
20536 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
20537 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (98)
20538
20539 ;          9189  !
20540 ;          9190  BGNTST;
20541 ;          9191
20542 ;          9192  !++
20543 ;          9193  ! TEST NUMBER:  TST 48
20544 ;          9194  !
20545 ;          9195  ! TEST NAME:    CRC DATA BUS TEST
20546 ;          9196  !
20547 ;          9197  ! TEST DESCRIPTION:
20548 ;          9198  !       TEST THE CRC DATA BUS BETWEEN THE CRC
20549 ;          9199  !       GENERATORS AND THE CRC/MBUS DATA
20550 ;          9200  !       MUX FOR CONTINUITY AND BIT UNIQUENESS
20551 ;          9201  !       BY:
20552 ;          9202  !
20553 ;          9203  !       1.  WHILE IN ECC DIAGNOSTIC MODE DO
20554 ;          9204  !           GOOD BLOCK TRANSFERS WITH VARIOUS
20555 ;          9205  !           CRC_A,CRC_B AND PAR_CRC_WRD WHICH
20556 ;          9206  !           WILL EXERCISE BUS CONTINUITY AND
20557 ;          9207  !           UNIQUENESS.
20558 ;          9208  !
20559 ;          9209  !       2.  THEN IN DATA DIAGNOSTEC MODE READ
20560 ;          9210  !           THE CRC NIBBLES FROM ONE CRC GROUP
20561 ;          9211  !           FOR CORRECT CRC_A,CRC_B AND PAR_CRC_WRD
20562 ;          9212  !           DATA PATTERNS.
20563 ;          9213  !
20564 ;          9214  ! IMPLICIT INPUTS:
20565 ;          9215  !       PD_TEMP
20566 ;          9216  !       A BIT VECTOR OF 16 BITS WHERE THE READ
20567 ;          9217  !       PROM DATA IS STORED OAND ACCESSED FROM.
20568 ;          9218  !
20569 ;          9219  !
20570 ;          9220  !--
20571 ;          9221
20572 ;          9222  local
20573 ;          9223      CRC_NIB,                          !POINTER TO THE CRC NIBBLE
20574 ;          9224      CRC_TSTED,                        !STORES HOW MANY CRC NIBBLES WE HAVE TESTED
20575 ;          9225      ERR_FLG,                          !ERROR FLAG
20576 ;          9226      NIB_PAT;                          !TEST DATA FOR THE CRC NIBBLE
20577 ;          9227
20578 ;          9228  CRC_NIB = 9;                          !SET CRC NIBBLE POINTER
20579 ;          9229
20580 ;          9230  incr LOOP from 0 to 4 do              !REPEAT THE TEST WITH FIVE NIBBLE PATTERNS
20581 ;          9231      begin
20582 ;          9232      BGNSUB;                           !START OF THE SCOPE LOOP
20583 ;          9233      CLR_MBUS;
20584 ;          9234      ECC_DM = ONE;                     !SET ECC DIAG MOD
20585 ;          9235
20586 ;          9236      case .LOOP from 0 to 4 of         !SELECT ONE OF THE FIVE NIBBLE PATTERNS
20587 ;          9237          set
20588 ;          9238
20589 ;          9239              [0] :                     !PATTERN 0
20590 ;          9240                  NIB_PAT = %b'110';
```

```
20592 ;ML4
20593 ;
20594
20595 ;          9241
20596 ;          9242          [1] :                                   !PATTERN 1
20597 ;          9243              begin
20598 ;          9244              MLE1 = ONES;
20599 ;          9245              MLE2 = ONES;
20600 ;          9246              NIB_PAT = %b'001';
20601 ;          9247              end;
20602 ;          9248
20603 ;          9249          [2] :                                   !PATTERN 2
20604 ;          9250              begin
20605 ;          9251              CRC_A = ONES;
20606 ;          9252              CRC_B = ONES;
20607 ;          9253              NIB_PAT = %b'000';
20608 ;          9254              end;
20609 ;          9255
20610 ;          9256          [3] :                                   !PATTERN 3
20611 ;          9257              begin
20612 ;          9258              PAR_CRC_WRD = ONES;
20613 ;          9259              CRC_B = ONES;
20614 ;          9260              NIB_PAT = %b'011';
20615 ;          9261              end;
20616 ;          9262
20617 ;          9263          [4] :                                   !PATTERN 4
20618 ;          9264              begin
20619 ;          9265              PAR_CRC_WRD = ONES;
20620 ;          9266              CRC_A = ONES;
20621 ;          9267              NIB_PAT = %b'101';
20622 ;          9268              end;
20623 ;          9269          tes;
20624 ;          9270
20625 ;          9271          GD_BLK_XFER ();                         !SET UP A GOOD BLOCK TRANSFER
20626 ;          9272          MLCS1 = write;                          !DO A WRITE TRANSFER
20627 ;          9273          TIME_OUT_LOOP;                          !WAIT UNTIL DRIVE READY
20628 ;          9274          DAT_DM = ONE;                           !SET DATA DIAG MODE
20629 ;          9275          GD_BLK_XFER ();                         !SET UP A GOOD BLOCK TRANSFER
20630 ;          9276          MLCS1 = read;                           !DO A READ TRANSFER
20631 ;          9277          CRC_TSTED = ZERO;
20632 ;          9278          DELAY (ONE_US);
20633 ;          9279
20634 ;          9280          do                                      !TEST ONE CRC GROUP '6 CRC NIBBLES'
20635 ;          9281              begin
20636 ;          9282              PD_TEMP = .MLPD;                    !READ THE PROM DATA FOR THIS ARRAY WORD
20637 ;          9283              DAT_CLK = ONE;                      !CLOCK OUT AN ARRAY WORD INTO THE DATA DIAG REG'S
20638 ;          9284              DELAY (ONE_US);                     !DELAY ONE MICRO SECOND
20639 ;          9285              RD_LNG_WRD;                         !READ THE DATA DIAG REG'S INTO MEMORY
20640 ;          9286
20641 ;          9287              if .PD_TEMP [.CRC_NIB] IS_NOT_SET   !TEST THIS CRC NIBBLE IF GOOD
20642 ;          9288              then
20643 ;          9289                  begin
20644 ;          9290                  CRC_TSTED = .CRC_TSTED + 1;     !INCREMENT THE GOOD NIBBLE COUNTER
20645 ;          9291                  TST_LNG_WRD (.CRC_NIB, .NIB_PAT, ERR_FLG);  !TEST THE CRC NIBBLE
20646 ;          9292
```

```
20648 :ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
20649 :                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (98)
20650
20651 ;          9293              if .ERR_FLG IS_SET                  !SEE IF THE TEST FOUND AN ERROR
20652 ;          9294              then
20653 ;          9295                  begin                           !REPORT ERROR IF FLAG IS SET
20654 ;          9296                  ERRDF (131, SYNC, DUMPER);
20655 ;          9297                  PRINTB (FOR_FMT, WRD_64, WRD_24, WRD_73, WRD_10);
20656 ;          9298                  PRINTB (FMT_5, .NIB_PAT, .NIB_SAVE [NIB_9], 8);
20657 ;          9299                  end;
20658 ;          9300
20659 ;          9301              end;
20660 ;          9302
20661 ;          9303          end
20662 ;          9304      until .CRC_TSTED eql 6;                     !REPEAT UNTIL ONE CRC GROUP HAS BEEN TESTED
20663 ;          9305
20664 ;          9306      ENDSUB;                                     !END OF SCOPE LOOP
20665 ;          9307      end;
20666 ;          9308
20667 ;          9309  ENDTST;
20671
20675 072624  004167  111266          $T48:   JSR     R1,$SAVE5                       ;                       9187
20676 072630  162706  000006                  SUB     #6,SP
20677 072634  012705  000011                  MOV     #11,R5                          ; *,CRC.NIB             9228
20678 072640  010546                          MOV     R5,-(SP)                        ; CRC.NIB,*             9287
20679 072642  006216                          ASR     (SP)
20680 072644  006216                          ASR     (SP)
20681 072646  006216                          ASR     (SP)
20682 072650  062716  013120                  ADD     #PD.TEMP,(SP)
20683 072654  005001                          CLR     R1                              ; LOOP                  9230
20684 072656  104402                  1$:     TRAP    2                               ;                       9231
20685 072660  152777  000040  120326          BISB    #40,@ML.REG+40                  ;                       9232
20686 072666  016704  120710                  MOV     ML.DUT,R4
20687 072672  042704  177770                  BIC     #177770,R4
20688 072676  142777  000007  120310          BICB    #7,@ML.REG+40
20689 072704  150477  120304                  BISB    R4,@ML.REG+40
20690 072710  152777  000001  120356          BISB    #1,@ML.REG+120                  ;                       9234
20691 072716  010104                          MOV     R1,R4                           ; LOOP,*                9236
20692 072720  006304                          ASL     R4
20693 072722  066407  072726                  ADD     2$(R4),PC
20694 072726  000012                  2$:     .WORD   3$-2$
20695 072730  000020                          .WORD   4$-2$
20696 072732  000042                          .WORD   5$-2$
20697 072734  000062                          .WORD   6$-2$
20698 072736  000104                          .WORD   7$-2$
20699 072740  012702  000006          3$:     MOV     #6,R2                           ; *,NIB.PAT             9240
20700 072744  000442                          BR      8$                              ;                       9236
20701 072746  012777  177777  120350  4$:     MOV     #-1,@ML.REG+150                 ;                       9244
```

```
20703                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
20704                                   ;                                                       22-Dec-1980 09:21:22    PA:<
20705
20706 072754 012777 177777 120352       MOV     #-1,@ML.REG+160                 ;                                       9245
20707 072762 012702 000001              MOV     #1,R2                           ; *,NIB.PAT                             9246
20708 072766 000431                     BR      8$                              ;                                       9236
20709 072770 152777 000077 120326 5$:   BISB    #77,@ML.REG+150                 ;                                       9251
20710 072776 152777 000077 120330       BISB    #77,@ML.REG+160                 ;                                       9252
20711 073004 005002                     CLR     R2                              ; NIB.PAT                               9253
20712 073006 000421                     BR      8$                              ;                                       9236
20713 073010 052777 037400 120306 6$:   BIS     #37400,@ML.REG+150              ;                                       9258
20714 073016 152777 000077 120310       BISB    #77,@ML.REG+160                 ;                                       9259
20715 073024 012702 000003              MOV     #3,R2                           ; *,NIB.PAT                             9260
20716 073030 000410                     BR      8$                              ;                                       9236
20717 073032 052777 037400 120264 7$:   BIS     #37400,@ML.REG+150              ;                                       9265
20718 073040 152777 000077 120256       BISB    #77,@ML.REG+150                 ;                                       9266
20719 073046 012702 000005              MOV     #5,R2                           ; *,NIB.PAT                             9267
20720 073052 004767 123004        8$:   JSR     PC,GD.BLK.XFER                  ;                                       9271
20721 073056 012777 000061 120070       MOV     #61,@ML.REG                     ;                                       9272
20722 073064 105777 120134        9$:   TSTB    @ML.REG+50
20723 073070 100375                     BPL     9$
20724 073072 152777 000010 120174       BISB    #10,@ML.REG+120                 ;                                       9274
20725 073100 004767 122756              JSR     PC,GD.BLK.XFER                  ;                                       9275
20726 073104 012777 000071 120042       MOV     #71,@ML.REG                     ;                                       9276
20727 073112 005066 000002              CLR     2(SP)                           ; CRC.TSTED                             9277
20728 073116 012703 000001              MOV     #1,R3                           ; *,$$TMP2                              9278
20729 073122 001411               10$:  BEQ     13$
20730 073124 016704 106766              MOV     L$DLY,R4                        ; *,$$TMP1
20731 073130 001404                     BEQ     12$
20732 073132 005066 000006        11$:  CLR     6(SP)                           ; $$TMP
20733 073136 005304                     DEC     R4                              ; $$TMP1
20734 073140 001374                     BNE     11$
20735 073142 005303               12$:  DEC     R3                              ; $$TMP2
20736 073144 000766                     BR      10$
20737 073146 017767 120232 117744 13$:  MOV     @ML.REG+230,PD.TEMP             ;                                       9282
20738 073154 152777 000020 120112       BISB    #20,@ML.REG+120                 ;                                       9283
20739 073162 012703 000001              MOV     #1,R3                           ; *,$$TMP2                              9284
20740 073166 001411               14$:  BEQ     17$
20741 073170 016704 106722              MOV     L$DLY,R4                        ; *,$$TMP1
20742 073174 001404                     BEQ     16$
20743 073176 005066 000006        15$:  CLR     6(SP)                           ; $$TMP
20744 073202 005304                     DEC     R4                              ; $$TMP1
20745 073204 001374                     BNE     15$
20746 073206 005303               16$:  DEC     R3                              ; $$TMP2
20747 073210 000766                     BR      14$
20748 073212 017767 120126 115732 17$:  MOV     @ML.REG+170,D1.TEMP
20749 073220 017767 120130 115726       MOV     @ML.REG+200,D2.TEMP
20750 073226 017767 120102 115722       MOV     @ML.REG+160,E2.TEMP
20751 073234 011646                     MOV     (SP),-(SP)                      ;                                       9287
20752 073236 010546                     MOV     R5,-(SP)                        ; CRC.NIB,*
20753 073240 042716 177770              BIC     #177770,(SP)
20754 073244 012746 000001              MOV     #1,-(SP)
20755 073250 005046                     CLR     -(SP)
20756 073252 004767 107662              JSR     PC,BL$GT2
20757 073256 062706 000010              ADD     #10,SP
```

```
20759                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
20760                                   ;                                                       22-Dec-1980 09:21:22    PA:<
20761
20762 073262  005700                          TST     R0
20763 073264  001066                          BNE     19$
20764 073266  005266  000002                  INC     2(SP)                   ; CRC.TSTED                             9290
20765 073272  010546                          MOV     R5,-(SP)                ; CRC.NIB,*                             9291
20766 073274  010246                          MOV     R2,-(SP)                ; NIB.PAT,*
20767 073276  012746  000012                  MOV     #12,-(SP)
20768 073302  060616                          ADD     SP,(SP)                 ; ERR.FLG,*
20769 073304  004767  122636                  JSR     PC,TST.LNG.WRD
20770 073310  026627  000012  000001          CMP     12(SP),#1               ; ERR.FLG,*                             9293
20771 073316  001047                          BNE     18$
20772 073320  104455                          TRAP    55                      ;                                       9296
20773 073322  000203                          .WORD   203
20774 073324  010526                          .WORD   SYNC
20775 073326  024052                          .WORD   DUMPER
20776 073330  012746  006406                  MOV     #WRD.10,-(SP)           ;                                       9297
20777 073334  012746  007310                  MOV     #WRD.73,-(SP)
20778 073340  012746  006552                  MOV     #WRD.24,-(SP)
20779 073344  012746  007224                  MOV     #WRD.64,-(SP)
20780 073350  012746  006046                  MOV     #FOR.FMT,-(SP)
20781 073354  012746  000005                  MOV     #5,-(SP)
20782 073360  010600                          MOV     SP,R0                   ; SP,*
20783 073362  104414                          TRAP    14
20784 073364  012716  000010                  MOV     #10,(SP)                ;                                       9298
20785 073370  016704  115562                  MOV     NIB.SAVE+4,R4
20786 073374  006204                          ASR     R4
20787 073376  006204                          ASR     R4
20788 073400  006204                          ASR     R4
20789 073402  006204                          ASR     R4
20790 073404  000304                          SWAB    R4
20791 073406  042704  177770                  BIC     #177770,R4
20792 073412  010446                          MOV     R4,-(SP)
20793 073414  010246                          MOV     R2,-(SP)                ; NIB.PAT,*
20794 073416  012746  004430                  MOV     #FMT.5,-(SP)
20795 073422  012746  000004                  MOV     #4,-(SP)
20796 073426  010600                          MOV     SP,R0                   ; SP,*
20797 073430  104414                          TRAP    14
20798 073432  062706  000024                  ADD     #24,SP                  ;                                       9295
20799 073436  062706  000006          18$:    ADD     #6,SP                   ;                                       9289
20800 073442  026627  000002  000006  19$:    CMP     2(SP),#6                ; CRC.TSTED,*                           9304
20801 073450  001236                          BNE     13$
20802 073452  104467                          TRAP    67
20803 073454  006000                          ROR     R0
20804 073456  103002                          BHIS    21$
20805 073460  000167  177172          20$:    JMP     1$
20806 073464  005201                21$:    INC     R1                      ; LOOP                                  9230
20807 073466  020127  000004                  CMP     R1,#4                   ; LOOP,*
20808 073472  003772                          BLE     20$
20809 073474  062706  000010                  ADD     #10,SP                  ;                                       9187
20810 073500  000207                          RTS     PC
20811
20812                                   ; Routine Size:  215 words
20813                                   ; Maximum stack depth per invocation:  23 words
```

```
20815                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
20816                                   ;                                                       22-Dec-1980 09:21:22    PA:<
20817
20822
20823
20827
20831 073502                            T48::
20832 073502  004767  177116            1$:     JSR     PC,$T48                 ;                                       9307
20833 073506  104466                            TRAP    66
20834 073510  006000                            ROR     R0
20835 073512  103773                            BLO     1$
20836 073514  000207                            RTS     PC
20837
20838                                   ; Routine Size:  6 words
20839                                   ; Maximum stack depth per invocation:  0 words
20844
20845
20846 ;          9310  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (99)

```
20848 ;ML4
20849 ;
20850
20851 ;          9311  !
20852 ;          9312  BGNTST
20853 ;          9313
20854 ;          9314  !++
20855 ;          9315  ! TEST NUMBER:  TST 49
20856 ;          9316  !
20857 ;          9317  ! TEST NAME:    UNIQUE NIBBLE CRC GENERATION TEST
20858 ;          9318  !
20859 ;          9319  ! TEST DESCRIPTION:
20860 ;          9320  !       TEST CRC CODES GENERATED FOR ONE CRC
20861 ;          9321  !       GROUP (52 UNIQUE UNIBUS NIBBLES) BY:
20862 ;          9322  !
20863 ;          9323  !       1.  DOING MASS BUS WRITE TRANSFERSS WITH THE
20864 ;          9324  !       FIRST IO BUF CRC GROUP HAVING 51 NIBBLES
20865 ;          9325  !       OF %B'0000' PATTERN AND THE REMAINING NIBBLE
20866 ;          9326  !           WITH PATTERNS OF %B'0000' TO %B'1111'.
20867 ;          9327  !
20868 ;          9328  !       2.  THEN IN DATA DIAGNOSTIC MODE CALCULATE
20869 ;          9329  !           THE CRC CODE FOR THE FIRST CRC
20870 ;          9330  !           GROUP AND COMPARE IT AGAINST THE
20871 ;          9331  !           HARDWARE GENERATED CRC CODE.
20872 ;          9332  !
20873 ;          9333  !       3.  REPEAT PATTERN OF %B'0000' TO %B'1111'
20874 ;          9334  !           FOR EACH OF THE 52 NIBBLES.
20875 ;          9335  !
20876 ;          9336  ! IMPLICIT INPUTS:
20877 ;          9337  !       IO_BUF
20878 ;          9338  !       A  VECTOR OF 256 WORDS WHERE DATA
20879 ;          9339  !       FOR MBUS READS AND WRITES TRANSFERS
20880 ;          9340  !       IS FOUND.
20881 ;          9341  !
20882 ;          9342  !
20883 ;          9343  !--
20884 ;          9344
20885 ;          9345  local
20886 ;          9346  DODU_FLG ,                          !DROP UNIT FLAG
20887 ;          9347  TEMP ,                              !TEMPORARY STORAGE LOCATION
20888 ;          9348  NIB_SEL;                            !SELECTS 4 BITS 'ONE NIBBLE' FROM THE IO_BUF
20889 ;          9349  DODU_FLG = ZEROES;                  !CLEAR THE DROP UNIT FLAG
20890 ;          9350
20891 ;          9351  incr CNT from 0 to 13 do            !CLEAR THE FIRST 14 IO_BUF WORDS
20892 ;          9352      IO_BUF [.CNT] = ZEROES;
20893 ;          9353
20894 ;          9354  incr WRD_CNT from 0 to 12 do        !DO THIS TEST ON 13 IO_BUF WORDS
20895 ;          9355      begin
20896 ;          9356      NIB_SEL = -4;                   !RESET THE NIBBLE SELECTOR
20897 ;          9357
20898 ;          9358      incr NIB_TST from 0 to 3 do     !DO THIS TEST ON 4 NIBBLES PER WORD
20899 ;          9359          begin
20900 ;          9360
20901 ;          9361          if (.WRD_CNT eql 12) and (.NIB_TST eql 2) then exitloop;        !THE LAST 2 NIBBLES ARE NOT TESTED
20902 ;          9362
```

```
20904 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
20905 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (99)
20906 ;
20907 ;          9363        NIB_SEL = .NIB_SEL + 4;                  !INCREMENT THE NIBBLE SELECTED
20908 ;          9364        TEMP = ZEROES;                           !CLEAR  TEMP LOCATION
20909 ;          9365
20910 ;          9366        incr NIB_PAT from %b'0000' to %b'1111' by %b'0001' do   !RUN PATTERNS ON THEIS NIBBLE
20911 ;          9367            begin
20912 ;          9368            BGNSUB;                              !START OF SCOPE LOOP
20913 ;          9369            TEMP<.NIB_SEL, 4> = .NIB_PAT;        !LOAD PATTERN INTO TEMP AT THIS NIBBLE
20914 ;          9370            IO_BUF [.WRD_CNT] = .TEMP;           !LOAD THE GENERATED PATTERN INTO THE IO_BUF
20915 ;          9371            CLR_MBUS;
20916 ;          9372            GD_BLK_XFER ();                      !SET UP A GOOD BLOCK TRANSFER
20917 ;          9373            ML_CS1 = write;                      !DO A WRITE TRANSFER
20918 ;          9374            TIME_OUT_LOOP;                       !WAIT FOR THE TRANSFER TO COMPLETE
20919 ;          9375            A_GEN = ZEROES;                      !CLEAR THE GEN & CAL STORAGE LOCATIONS
20920 ;          9376            B_GEN = ZEROES;
20921 ;          9377            P_GEN = ZEROES;
20922 ;          9378            A_CAL = ZEROES;
20923 ;          9379            B_CAL = ZEROES;
20924 ;          9380            P_CAL = ZEROES;
20925 ;          9381            CAL_CRC ();                          !CALL ROUTINE TO CALCULATE THE CRC CODE FOR THIS PATTERN
20926 ;          9382
20927 ;          9383            if ERR_CHK_CRC ()                    !NOW SEE IF THE GEN CRC IS SAME AS CAL CRC
20928 ;          9384            then
20929 ;          9385                begin                            !REPORT THE ERROR IF NOT THE SAME
20930 ;          9386                ERRDF (132, SYNC, DUMPER);
20931 ;          9387                PRINTB (THR_FMT, WRD_5, WRD_64, WRD_8);
20932 ;          9388                PRINTB (FMT_19, .B_GEN, .A_GEN, .P_GEN);
20933 ;          9389                PRINTB (FMT_20, .B_CAL, .A_CAL, .P_CAL);
20934 ;          9390                DODU_FLG = ONE;
20935 ;          9391                end;
20936 ;          9392
20937 ;          9393                ENDSUB;                          !END OF SCOPE LOOP
20938 ;          9394                end;
20939 ;          9395
20940 ;          9396            IO_BUF [.WRD_CNT] = ZEROES;          !CLEAR THIS IO_BUF WORD FO NEXT NIBBLE
20941 ;          9397            end;
20942 ;          9398
20943 ;          9399        end;
20944 ;          9400
20945 ;          9401    if .DODU_FLG IS_SET                          !DROP THIS UNIT IF THE DODU FLAG GOT SET
20946 ;          9402    then
20947 ;          9403        begin
20948 ;          9404        DODU (.ML_LUN);
20949 ;          9405        DOCLN;
20950 ;          9406        end;
20951 ;          9407
20952 ;          9408    ENDTST;
20956
```

```
20964 073516 004167 110374          $T49:  JSR     R1,$SAVE5                ;                                    9309
20965 073522 024646                        CMP     -(SP),-(SP)
20966 073524 005066 000002                 CLR     2(SP)                    ; DODU.FLG                           9349
20967 073530 005000                        CLR     R0                       ; CNT                                9351
20968 073532 010001                 1$:    MOV     R0,R1                    ; CNT,*                              9352
20969 073534 006301                        ASL     R1
20970 073536 005061 011600                 CLR     IO.BUF(R1)
20971 073542 005200                        INC     R0                       ; CNT                                9351
20972 073544 020027 000015                 CMP     R0,#15                   ; CNT,*
20973 073550 003770                        BLE     1$
20974 073552 005002                        CLR     R2                       ; WRD.CNT                            9354
20975 073554 012716 177774          2$:    MOV     #-4,(SP)                 ; *,NIB.SEL                          9356
20976 073560 010201                        MOV     R2,R1                    ; WRD.CNT,*                          9370
20977 073562 006301                        ASL     R1
20978 073564 005004                        CLR     R4                       ; NIB.TST                            9358
20979 073566 020227 000014          3$:    CMP     R2,#14                   ; WRD.CNT,*                          9361
20980 073572 001003                        BNE     4$
20981 073574 020427 000002                 CMP     R4,#2                    ; NIB.TST,*
20982 073600 001562                        BEQ     8$
20983 073602 062716 000004          4$:    ADD     #4,(SP)                  ; *,NIB.SEL                          9363
20984 073606 005005                        CLR     R5                       ; TEMP                               9364
20985 073610 005003                        CLR     R3                       ; NIB.PAT                            9366
20986 073612 104402                 5$:    TRAP    2                        ;                                    9367
20987 073614 010546                        MOV     R5,-(SP)                 ; TEMP,*                             9369
20988 073616 016646 000002                 MOV     2(SP),-(SP)              ; NIB.SEL,*
20989 073622 012746 000004                 MOV     #4,-(SP)
20990 073626 010346                        MOV     R3,-(SP)                 ; NIB.PAT,*
20991 073630 004767 107446                 JSR     PC,BL$PU1
20992 073634 010005                        MOV     R0,R5                    ; *,TEMP                             9367
20993 073636 010561 011600                 MOV     R5,IO.BUF(R1)            ; TEMP,*                             9370
20994 073642 152777 000040 117344          BISB    #40,@ML.REG+40
20995 073650 016700 117726                 MOV     ML.DUT,R0
20996 073654 042700 177770                 BIC     #177770,R0
20997 073660 142777 000007 117326          BICB    #7,@ML.REG+40
20998 073666 150077 117322                 BISB    R0,@ML.REG+40
20999 073672 004767 122164                 JSR     PC,GD.BLK.XFER           ;                                    9372
21000 073676 012777 000061 117250          MOV     #61,@ML.REG              ;                                    9373
21001 073704 105777 117314          6$:    TSTB    @ML.REG+50
21002 073710 100375                        BPL     6$
21003 073712 005067 117230                 CLR     A.GEN                    ;                                    9375
21004 073716 005067 117226                 CLR     B.GEN                    ;                                    9376
21005 073722 005067 117224                 CLR     P.GEN                    ;                                    9377
21006 073726 005067 117206                 CLR     A.CAL                    ;                                    9378
21007 073732 005067 117204                 CLR     B.CAL                    ;                                    9379
21008 073736 005067 117202                 CLR     P.CAL                    ;                                    9380
21009 073742 004767 120644                 JSR     PC,CAL.CRC               ;                                    9381
21010 073746 004767 121240                 JSR     PC,ERR.CHK.CRC           ;                                    9383
21011 073752 006000                        ROR     R0
21012 073754 103055                        BCC     7$
21013 073756 104455                        TRAP    55                       ;                                    9386
```

```
21015                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
21016                                   ;                                                       22-Dec-1980 09:21:22    PA:<
21017
21018 073760 000204                             .WORD   204
21019 073762 010526                             .WORD   SYNC
21020 073764 024052                             .WORD   DUMPER
21021 073766 012746 006360                      MOV     #WRD.8,-(SP)            ;                                       9387
21022 073772 012746 007224                      MOV     #WRD.64,-(SP)
21023 073776 012746 006330                      MOV     #WRD.5,-(SP)
21024 074002 012746 006034                      MOV     #THR.FMT,-(SP)
21025 074006 012746 000004                      MOV     #4,-(SP)
21026 074012 010600                             MOV     SP,R0                   ; SP,*
21027 074014 104414                             TRAP    14
21028 074016 016716 117130                      MOV     P.GEN,(SP)              ;                                       9388
21029 074022 016746 117120                      MOV     A.GEN,-(SP)
21030 074026 016746 117116                      MOV     B.GEN,-(SP)
21031 074032 012746 005412                      MOV     #FMT.19,-(SP)
21032 074036 012746 000004                      MOV     #4,-(SP)
21033 074042 010600                             MOV     SP,R0                   ; SP,*
21034 074044 104414                             TRAP    14
21035 074046 016716 117072                      MOV     P.CAL,(SP)              ;                                       9389
21036 074052 016746 117062                      MOV     A.CAL,-(SP)
21037 074056 016746 117060                      MOV     B.CAL,-(SP)
21038 074062 012746 005462                      MOV     #FMT.20,-(SP)
21039 074066 012746 000004                      MOV     #4,-(SP)
21040 074072 010600                             MOV     SP,R0                   ; SP,*
21041 074074 104414                             TRAP    14
21042 074076 012766 000001 000044               MOV     #1,44(SP)               ; *,DODU.FLG                            9390
21043 074104 062706 000032                      ADD     #32,SP                  ;                                       9385
21044 074110 062706 000010              7$:     ADD     #10,SP                  ;                                       9367
21045 074114 104467                             TRAP    67                      ;                                       9391
21046 074116 006000                             ROR     R0
21047 074120 103634                             BLO     5$
21048 074122 005203                             INC     R3                      ; NIB.PAT                               9366
21049 074124 020327 000017                      CMP     R3,#17                  ; NIB.PAT,*
21050 074130 003630                             BLE     5$
21051 074132 005061 011600                      CLR     IO.BUF(R1)              ;                                       9396
21052 074136 005204                             INC     R4                      ; NIB.TST                               9358
21053 074140 020427 000003                      CMP     R4,#3                   ; NIB.TST,*
21054 074144 003610                             BLE     3$
21055 074146 005202                     8$:     INC     R2                      ; WRD.CNT                               9354
21056 074150 020227 000014                      CMP     R2,#14                  ; WRD.CNT,*
21057 074154 003002                             BGT     9$
21058 074156 000167 177372                      JMP     2$
21059 074162 026627 000002 000001       9$:     CMP     2(SP),#1                ; DODU.FLG,*                            9401
21060 074170 001004                             BNE     10$
21061 074172 016700 117402                      MOV     ML.LUN,R0               ;                                       9404
21062 074176 104451                             TRAP    51
21063 074200 104444                             TRAP    44
21064 074202 022626                     10$:    CMP     (SP)+,(SP)+             ;                                       9309
21065 074204 000207                             RTS     PC
21066
21067                                   ; Routine Size:  156 words
21068                                   ; Maximum stack depth per invocation:  25 words
```

```
21077
21078
21082
21086 074206                            T49::
21087 074206  004767  177304            1$:     JSR     PC,$T49                 ;                       9406
21088 074212  104466                            TRAP    66
21089 074214  006000                            ROR     R0
21090 074216  103773                            BLO     1$
21091 074220  000207                            RTS     PC
21092
21093                                   ; Routine Size:  6 words
21094                                   ; Maximum stack depth per invocation:  0 words
21099
21100
21101 ;         9409  !
21102 ;         9410  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (100)

```
21104 ;ML4
21105 ;
21106
21107 ;          9411  !
21108 ;          9412  BGNTST;
21109 ;          9413
21110 ;          9414  !++
21111 ;          9415  ! TEST NUMBER:  TST 50
21112 ;          9416  !
21113 ;          9417  ! TEST NAME:              UNIQUE WORD CRC GENERATION TEST
21114 ;          9418  !
21115 ;          9419  ! TEST DESCRIPTION:
21116 ;          9420  !       TEST CRC CODES GENERATED FOR ONE
21117 ;          9421  !       CRC GROUP (13 UNIBUS WORDS) BY:
21118 ;          9422  !
21119 ;          9423  !       1.  DOING MASS BUS WRITE TRANSFERS
21120 ;          9424  !           USING VARIOUS WORD DATA PATTERENS.
21121 ;          9425  !
21122 ;          9426  !       2.  THEN IN DATA DIAGNOSTIC MODE
21123 ;          9427  !           CALCULATE THE CRC CODE FOR THE
21124 ;          9428  !           FIRST CRC GROUP AND COMPARE IT TO
21125 ;          9429  !           THE HARDWARE GENERATED CRC CODE.
21126 ;          9430  !
21127 ;          9431  ! IMPLICIT INPUTS:
21128 ;          9432  !       IO_BUF
21129 ;          9433  !       A  VECTOR OF 256 WORDS WHERE DATA
21130 ;          9434  !       FOR MBUS READS AND WRITES TRANSFERS
21131 ;          9435  !       IS FOUND.
21132 ;          9436  !
21133 ;          9437  !--
21134 ;          9438
21 35 ;          9439  local
21136 ;          9440      DODU_FLG,                       !DROP UNIT FLAG
21137 ;          9441      TST_PAT;                        !TEST PATTERN SAVE LOCATION
21138 ;          9442
21139 ;          9443  DODU_FLG = ZEROES;                  !CLEAR THE DROP UNIT FLAG
21140 ;          9444
21141 ;          9445  incr PAT_SEL from 0 to 3 do         !RUN THE TEST ON 4 PATTERNS
21142 ;          9446      begin
21143 ;          9447      BGNSUB;                         !START OF SCOPE LOOP
21144 ;          9448      CLR_MBUS;
21145 ;          9449
21146 ;          9450      case .PAT_SEL from 0 to 3 of    !SELECT ONE OF THE 4 PATTERNS
21147 ;          9451          set
21148 ;          9452
21149 ;          9453          [0] :
21150 ;          9454              TST_PAT = ONES;
21151 ;          9455
21152 ;          9456          [1] :
21153 ;          9457              TST_PAT = %o'052525';
21154 ;          9458
21155 ;          9459          [2] :
21156 ;          9460              TST_PAT = %o'125252';
21157 ;          9461
21158 ;          9462          [3] :
```

```
21160 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
21161 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (100)
21162
21163 ;          9463              TST_PAT = %o'070707';
21164 ;          9464          tes;
21165 ;          9465
21166 ;          9466      incr CNT from 0 to 255 do                   !LOAD THE FIRST 13 IO_BUF WORDS WITH TST_PAT
21167 ;          9467          IO_BUF [.CNT] = .TST_PAT;
21168 ;          9468
21169 ;          9469      GD_BLK_XFER ();                             !SET UP A GOOD BLOCK TRANSFER
21170 ;          9470      ML.CS1 = write;                             !DO A WRITE TRANSFER
21171 ;          9471      TIME_OUT_LOOP;                              !WAIT FOR THE TRANSFER TO COMPLETE
21172 ;          9472      A_GEN = ZEROES;                             !CLEAR THE GEN & CAL SAVE LOCATIONS
21173 ;          9473      B_GEN = ZEROES;
21174 ;          9474      P_GEN = ZEROES;
21175 ;          9475      A_CAL = ZEROES;
21176 ;          9476      B_CAL = ZEROES;
21177 ;          9477      P_CAL = ZEROES;
21178 ;          9478      CAL_CRC ();                                 !CALCULATE WHAT THE CRC CODE SHOULD BE
21179 ;          9479
21180 ;          9480      if ERR_CHK_CRC ()                           !NOW SEE IF THE GENERATED CRC CODE IS THE SAME
21181 ;          9481      then
21182 ;          9482          begin                                   !REPORT THE ERROR IF NOT THE SAME
21183 ;          9483          ERRDF (133, SYNC, DUMPER);
21184 ;          9484          PRINTB (THR_FMT, WRD_5, WRD_64, WRD_8);
21185 ;          9485          PRINTB (FMT_19, .B_GEN, .A_GEN, .P_GEN);
21186 ;          9486          PRINTB (FMT_20, .B_CAL, .A_CAL, .P_CAL);
21187 ;          9487          DODU_FLG = ONE;
21188 ;          9488          end;
21189 ;          9489
21190 ;          9490      ENDSUB;                                     !END OF SCOPE LOOP
21191 ;          9491      end;
21192 ;          9492
21193 ;          9493  if .DODU_FLG IS_SET                            !DROP THIS UNIT IF THE DODU FLAG GOT SET
21194 ;          9494  then
21195 ;          9495      begin
21196 ;          9496      DODU (.ML_LUN);
21197 ;          9497      DOCLN;
21198 ;          9498      end;
21199 ;          9499
21200 ;          9500  ENDTST;
21204
21208 074222  004167  107670          $T50:   JSR     R1,$SAVE5                   ;                          9408
21209 074226  005005                  CLR     R5                          ; DODU.FLG                 9443
21210 074230  005004                  CLR     R4                          ; PAT.SEL                  9445
21211 074232  104402              1$: TRAP    2                           ;                          9446
21212 074234  152777  000040  116752  BISB    #40,@ML.REG+40              ;                          9447
21213 074242  016703  117334          MOV     ML.DUT,R3
```

```
21215                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
21216                                   ;                                                       22-Dec-1980 09:21:22    PA:<
21217
21218 074246 042703 177770              BIC     #177770,R3
21219 074252 142777 000007 116734       BICB    #7,@ML.REG+40
21220 074260 150377 116730              BISB    R3,@ML.REG+40
21221 074264 010403                     MOV     R4,R3                   ; PAT.SEL,*             9450
21222 074266 006303                     ASL     R3
21223 074270 066307 074274              ADD     2$(R3),PC
21224 074274 000010             2$:     .WORD   3$-2$
21225 074276 000016                     .WORD   4$-2$
21226 074300 000024                     .WORD   5$-2$
21227 074302 000032                     .WORD   6$-2$
21228 074304 012701 177777      3$:     MOV     #-1,R1                  ; *,TST.PAT             9454
21229 074310 000410                     BR      7$                      ;                       9450
21230 074312 012701 052525      4$:     MOV     #52525,R1               ; *,TST.PAT             9457
21231 074316 000405                     BR      7$                      ;                       9450
21232 074320 012701 125252      5$:     MOV     #-52526,R1              ; *,TST.PAT             9460
21233 074324 000402                     BR      7$                      ;                       9450
21234 074326 012701 070707      6$:     MOV     #70707,R1               ; *,TST.PAT             9463
21235 074332 005002             7$:     CLR     R2                      ; CNT                   9466
21236 074334 010203             8$:     MOV     R2,R3                   ; CNT,*                 9467
21237 074336 006303                     ASL     R3
21238 074340 010163 011600              MOV     R1,IO.BUF(R3)           ; TST.PAT,*
21239 074344 005202                     INC     R2                      ; CNT                   9466
21240 074346 020227 000377              CMP     R2,#377                 ; CNT,*
21241 074352 003770                     BLE     8$
21242 074354 004767 121502              JSR     PC,GD.BLK.XFER          ;                       9469
21243 074360 012777 000061 116566       MOV     #61,@ML.REG             ;                       9470
21244 074366 105777 116632      9$:     TSTB    @ML.REG+50
21245 074372 100375                     BPL     9$
21246 074374 005067 116546              CLR     A.GEN                   ;                       9472
21247 074400 005067 116544              CLR     B.GEN                   ;                       9473
21248 074404 005067 116542              CLR     P.GEN                   ;                       9474
21249 074410 005067 116524              CLR     A.CAL                   ;                       9475
21250 074414 005067 116522              CLR     B.CAL                   ;                       9476
21251 074420 005067 116520              CLR     P.CAL                   ;                       9477
21252 074424 004767 120162              JSR     PC,CAL.CRC              ;                       9478
21253 074430 004767 120556              JSR     PC,ERR.CHK.CRC          ;                       9480
21254 074434 006000                     ROR     R0
21255 074436 103054                     BCC     10$
21256 074440 104455                     TRAP    55                      ;                       9483
21257 074442 000205                     .WORD   205
21258 074444 010526                     .WORD   SYNC
21259 074446 024052                     .WORD   DUMPER
21260 074450 012746 006360              MOV     #WRD.8,-(SP)            ;                       9484
21261 074454 012746 007224              MOV     #WRD.64,-(SP)
21262 074460 012746 006330              MOV     #WRD.5,-(SP)
21263 074464 012746 006034              MOV     #THR.FMT,-(SP)
21264 074470 012746 000004              MOV     #4,-(SP)
21265 074474 010600                     MOV     SP,R0                   ; SP,*
21266 074476 104414                     TRAP    14
21267 074500 016716 116446              MOV     P.GEN,(SP)              ;                       9485
21268 074504 016746 116436              MOV     A.GEN,-(SP)
21269 074510 016746 116434              MOV     B.GEN,-(SP)
```

```
21271                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
21272                                   ;                                                       22-Dec-1980 09:21:22    PA:<
21273
21274 074514  012746  005412                    MOV     #FMT.19,-(SP)
21275 074520  012746  000004                    MOV     #4,-(SP)
21276 074524  010600                            MOV     SP,R0                   ; SP,*
21277 074526  104414                            TRAP    14
21278 074530  016716  116410                    MOV     P.CAL,(SP)              ;                                       9486
21279 074534  016746  116400                    MOV     A.CAL,-(SP)
21280 074540  016746  116376                    MOV     B.CAL,-(SP)
21281 074544  012746  005462                    MOV     #FMT.20,-(SP)
21282 074550  012746  000004                    MOV     #4,-(SP)
21283 074554  010600                            MOV     SP,R0                   ; SP,*
21284 074556  104414                            TRAP    14
21285 074560  012705  000001                    MOV     #1,R5                   ; *,DODU.FLG                            9487
21286 074564  062706  000032                    ADD     #32,SP                  ;                                       9482
21287 074570  104467                  10$:      TRAP    67                      ;                                       9488
21288 074572  006000                            ROR     R0
21289 074574  103616                            BLO     1$
21290 074576  005204                            INC     R4                      ; PAT.SEL                               9445
21291 074600  020427  000003                    CMP     R4,#3                   ; PAT.SEL,*
21292 074604  003612                            BLE     1$
21293 074606  005305                            DEC     R5                      ; DODU.FLG                              9493
21294 074610  001004                            BNE     11$
21295 074612  016700  116762                    MOV     ML.LUN,R0               ;                                       9496
21296 074616  104451                            TRAP    51
21297 074620  104444                            TRAP    44
21298 074622  000207                  11$:      RTS     PC                      ;                                       9408
21299
21300                                   ; Routine Size:  129 words
21301                                   ; Maximum stack depth per invocation:  19 words
21306
21307
21311
21315 074624                            T50::
21316 074624  004767  177372            1$:     JSR     PC,$T50                 ;                                       9498
21317 074630  104466                            TRAP    66
21318 074632  006000                            ROR     R0
21319 074634  103773                            BLO     1$
21320 074636  000207                            RTS     PC
21321
21322                                   ; Routine Size:  6 words
21323                                   ; Maximum stack depth per invocation:  0 words
```

```
21332
21333
21334 ;          9501   !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (101)

```
21336 ;ML4
21337 ;
21338
21339 ;          9502  !
21340 ;          9503  BGNTST;
21341 ;          9504
21342 ;          9505  !++
21343 ;          9506  ! TEST NUMBER:  TST 51
21344 ;          9507  !
21345 ;          9508  ! TEST NAME:              CORRECTABLE ERROR SYNDRONE DECODE TEST
21346 ;          9509  !
21347 ;          9510  ! TEST DESCRIPTION:
21348 ;          9511  !       TEST SYNDRONE DECODE AND ERROR
21349 ;          9512  !       CORRECTION TO DECODE AND CORRECT
21350 ;          9513  !       SINGLE BIT AND MULTIPLE BIT
21351 ;          9514  !       CHANNEL ERRORS BY:
21352 ;          9515  !
21353 ;          9516  !       1.  VIA ECC DIAG MODE FORCE SYNDRONE
21354 ;          9517  !           BITS TO DECODE SINGLE BIT AND
21355 ;          9518  !           MULTIPLE BIT CHANNEL ERRORS.
21356 ;          9519  !
21357 ;          9520  !       2.  THEN DO A MASS BUS READ TRANSFER
21358 ;          9521  !           AND EXAM THE IO_BUF FOR CORRECT
21359 ;          9522  !           BIT COMPLIMENTING.
21360 ;          9523  !
21361 ;          9524  ! IMPLICIT INPUTS:
21362 ;          9525  !       IO_BUF
21363 ;          9526  !       A VECTOR OF 256 WORDS WHERE DATA
21364 ;          9527  !       FOR MBUS READS AND WRITES TRANSFERS
21365 ;          9528  !       IS FOUND.
21366 ;          9529  !
21367 ;          9530  !
21368 ;          9531  !--
21369 ;          9532
21370 ;          9533  local
21371 ;          9534      BITS_XFERED;                    !POINTS TO THE CHANNEL BEING TESTED
21372 ;          9535
21373 ;          9536  BAI = ONE;                          !BEFORE WE START LETS CLEAR OUT THE ML11'S
21374 ;          9537  IO_BUF = ZEROES;                    !GOOD BLOCK BY WRITTING ZEROES TO IT
21375 ;          9538  GD_BLK_XFER ();
21376 ;          9539  MLCS1 = write;
21377 ;          9540  TIME_OUT_LOOP;
21378 ;          9541  BITS_XFERED = -1;                   !RESET THE CHANNEL POINTER
21379 ;          9542
21380 ;          9543  incr PLOG from 0 to 5 do            !TEST ONE CRC GROUP '6 ARRAY WORDS'
21381 ;          9544      begin
21382 ;          9545
21383 ;          9546      incr CHANNEL from 0 to 35 do    !TEST 36 BITS IN EACH ARRAY WORD
21384 ;          9547          begin
21385 ;          9548          BGNSUB;                     !START OF SCOPE LOOP
21386 ;          9549          CLR_MBUS;                   !CLEAR THE DRIVE
21387 ;          9550          BITS_XFERED = .BITS_XFERED + 1;   !INCREMENT THE CHANNEL POINTER
21388 ;          9551
21389 ;          9552          incr CNT from 0 to 255 do   !CLEAR THE FIRST CRC GROUP IN THE IO_BUF
21390 ;          9553              IO_BUF [.CNT] = ZEROES;
```

```
21392 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
21393 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (101)
21394
21395 ;          9554
21396 ;          9555        FORCE_REM (.PLOG, .CHANNEL);                !FORCE THIS BIT IN THIS WORD IN ERROR
21397 ;          9556        GD_BLK_XFER ();                             !SET UP A GOOD BLOCK TRANSFER
21398 ;          9557        ECC_DIS = ZERO;                             !CLEAR ECC DISABLE
21399 ;          9558        MLCS1 = read;                               !DO A READ TRANSFER
21400 ;          9559        TIME_OUT_LOOP;                              !WAIT FOR THE TRANSFER TO COMPLETE
21401 ;          9560
21402 ;          9561        if not FIND_COMP_BIT (.BITS_XFERED)         !SEARCH THE IO_BUF FOR THE COMP BIT
21403 ;          9562        then
21404 ;          9563            begin                                   !REPORT AN ERROR IF THIS BIT IS NOT COMP
21405 ;          9564            ERRDF (134, SYNC, DUMPER);
21406 ;          9565            PRINTB (THR_FMT, WRD_74, WRD_75, PHR_1);
21407 ;          9566            PRINTB (FMT_21, .PLOG, .CHANNEL);
21408 ;          9567            end;
21409 ;          9568
21410 ;          9569        incr WRD_CNT from 0 to 12 do                !SEE IF ANY OTHER BITS GOT COMP'ED
21411 ;          9570
21412 ;          9571            if .IO_BUF [.WRD_CNT] neq ZEROES        !TEST THE IO_BUF FOR ZEROES
21413 ;          9572            then
21414 ;          9573                begin                               !REPORT AN ERROR IF ANY OTHERS ARE SET
21415 ;          9574                ERRDF (135, SYNC, DUMPER);
21416 ;          9575                PRINTB (FOR_FMT, WRD_61, WRD_74, WRD_75, PHR_5);
21417 ;          9576                PRINTB (FMT_21, .PLOG, .CHANNEL);
21418 ;          9577                end;
21419 ;          9578
21420 ;          9579            ENDSUB;                                 !END OF SCOPE LOOP
21421 ;          9580            end;
21422 ;          9581
21423 ;          9582        end;
21424 ;          9583
21425 ;          9584    BITS_XFERED = -1;                               !RESET THE CHANNEL POINTER
21426 ;          9585
21427 ;          9586    incr CHANNEL from 0 to 35 do                    !TEST 36 CHANNELS FOR MULTIPLE BIT ERRORS
21428 ;          9587        begin
21429 ;          9588        BGNSUB;                                     !START OF SCOPE LOOP
21430 ;          9589        CLR_MBUS;                                   !CLEAR THE DRIVE
21431 ;          9590        BITS_XFERED = .BITS_XFERED + 1;             !INCREMENT THE CHANNEL POINTER
21432 ;          9591
21433 ;          9592        incr CNT from 0 to 20 do                    !CLEAR THE FIRST CRC GROUP IN THE IO_BUF
21434 ;          9593            IO_BUF [.CNT] = ZEROES;
21435 ;          9594
21436 ;          9595        FORCE_REM (58, .CHANNEL);                   !FORCE ALL 6 BITS IN THIS CHANNEL IN ERROR
21437 ;          9596        GD_BLK_XFER ();                             !SET UP A GOOD BLOCK TRANSFER
21438 ;          9597        ECC_DIS = ZERO;                             !CLEAR ECC DISABLE
21439 ;          9598        MLCS1 = read;                               !DO A READ TRANSFER
21440 ;          9599        TIME_OUT_LOOP;                              !WAIT FOR THE TRANSFER TO CMOPLETE
21441 ;          9600
21442 ;          9601        incr BIT_OFFSET from 0 to 180 by 36 do      !SEE IF EVERY 36TH BIT GOT COMP'ED
21443 ;          9602
21444 ;          9603            if not FIND_COMP_BIT (.BITS_XFERED + .BIT_OFFSET)       !SEARCH THE IO_BUF FOR THE COMP'ED BITS
21445 ;          9604            then
21446 ;          9605                begin                               !REPORT AN ERROR IF ANY OF THE BITS ARE NOT COMP'ED
```

```
21448 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
21449 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (101)
21450
21451 ;          9606              ERRDF (134, SYNC, DUMPER);
21452 ;          9607              PRINTB (THR_FMT, WRD_74, WRD_75, PHR_1);
21453 ;          9608              PRINTB (FMT_21, 58, .CHANNEL);
21454 ;          9609              end;
21455 ;          9610
21456 ;          9611          incr WRD_CNT from 0 to 12 do              !ALSO SEE IF ANY OTHER BIT GOT COMP'ED
21457 ;          9612
21458 ;          9613              if .IO_BUF [.WRD_CNT] neq ZEROES      !TEST THE IO_BUF FOR ALL ZEROES
21459 ;          9614              then
21460 ;          9615                  begin                             !REPORT AN ERROR IF ANY OTHERS ARE COMP'ED
21461 ;          9616                  ERRDF (135, SYNC, DUMPER);
21462 ;          9617                  PRINTB (FIV_FMT, WRD_61, WRD_74, WRD_75, WRD_12, WRD_67);
21463 ;          9618                  PRINTB (FMT_21, 58, .CHANNEL);
21464 ;          9619                  end;
21465 ;          9620
21466 ;          9621          ENDSUB;                                   !END OF SCOPE LOOP
21467 ;          9622          end;
21468 ;          9623
21469 ;          9624      ENDTST;
21473
21477 074640  004167  107252          $T51:   JSR     R1,$SAVE5                       ;                       9500
21478 074644  152777  000010  116342          BISB    #10,@ML.REG+40                  ;                       9536
21479 074652  005067  114722                  CLR     IO.BUF                          ;                       9537
21480 074656  004767  121200                  JSR     PC,GD.BLK.XFER                  ;                       9538
21481 074662  012777  000061  116264          MOV     #61,@ML.REG                     ;                       9539
21482 074670  105777  116330          1$:     TSTB    @ML.REG+50
21483 074674  100375                  BPL     1$
21484 074676  012705  177777                  MOV     #-1,R5                  ; *,BITS.XFERED         9541
21485 074702  005004                  CLR     R4                      ; PLOG                  9543
21486 074704  005003          2$:     CLR     R3                      ; CHANNEL               9546
21487 074706  104402          3$:     TRAP    2                       ;                       9547
21488 074710  152777  000040  116276          BISB    #40,@ML.REG+40          ;               9548
21489 074716  016702  116660                  MOV     ML.DUT,R2
21490 074722  042702  177770                  BIC     #177770,R2
21491 074726  142777  000007  116260          BICB    #7,@ML.REG+40
21492 074734  150277  116254                  BISB    R2,@ML.REG+40
21493 074740  005205                  INC     R5                      ; BITS.XFERED           9550
21494 074742  005001                  CLR     R1                      ; CNT                   9552
21495 074744  010102          4$:     MOV     R1,R2                   ; CNT,*                 9553
21496 074746  006302                  ASL     R2
21497 074750  005062  011600                  CLR     IO.BUF(R2)
21498 074754  005201                  INC     R1                      ; CNT                   9552
21499 074756  020127  000377                  CMP     R1,#377                 ; CNT,*
21500 074762  003770                  BLE     4$
21501 074764  010446                  MOV     R4,-(SP)                ; PLOG,*                9555
```

```
21503                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
21504                                   ;                                                       22-Dec-1980 09:21:22    PA:<
21505
21506 074766  010346                          MOV     R3,-(SP)                ; CHANNEL,*
21507 074770  004767  120606                  JSR     PC,FORCE.REM
21508 074774  004767  121062                  JSR     PC,GD.BLK.XFER          ;                                               9556
21509 075000  142777  000002  116266          BICB    #2,@ML.REG+120          ;                                               9557
21510 075006  012777  000071  116140          MOV     #71,@ML.REG             ;                                               9558
21511 075014  105777  116204          5$:     TSTB    @ML.REG+50
21512 075020  100375                          BPL     5$
21513 075022  010546                          MOV     R5,-(SP)                ; BITS.XFERED,*                                 9561
21514 075024  004767  120400                  JSR     PC,FIND.CMP.BIT
21515 075030  005726                          TST     (SP)+
21516 075032  006000                          ROR     R0
21517 075034  103432                          BLO     6$
21518 075036  104455                          TRAP    55                      ;                                               9564
21519 075040  000206                          .WORD   206
21520 075042  010526                          .WORD   SYNC
21521 075044  024052                          .WORD   DUMPER
21522 075046  012746  007366                  MOV     #PHR.1,-(SP)            ;                                               9565
21523 075052  012746  007330                  MOV     #WRD.75,-(SP)
21524 075056  012746  007316                  MOV     #WRD.74,-(SP)
21525 075062  012746  006034                  MOV     #THR.FMT,-(SP)
21526 075066  012746  000004                  MOV     #4,-(SP)
21527 075072  010600                          MOV     SP,R0                   ; SP,*
21528 075074  104414                          TRAP    14
21529 075076  010316                          MOV     R3,(SP)                 ; CHANNEL,*                                     9566
21530 075100  010446                          MOV     R4,-(SP)                ; PLOG,*
21531 075102  012746  005534                  MOV     #FMT.21,-(SP)
21532 075106  012746  000003                  MOV     #3,-(SP)
21533 075112  010600                          MOV     SP,R0                   ; SP,*
21534 075114  104414                          TRAP    14
21535 075116  062706  000020                  ADD     #20,SP                  ;                                               9563
21536 075122  005001                  6$:     CLR     R1                      ; WRD.CNT                                       9569
21537 075124  010102                  7$:     MOV     R1,R2                   ; WRD.CNT,*                                     9571
21538 075126  006302                          ASL     R2
21539 075130  005762  011600                  TST     IO.BUF(R2)
21540 075134  001434                          BEQ     8$
21541 075136  104455                          TRAP    55                      ;                                               9574
21542 075140  000207                          .WORD   207
21543 075142  010526                          .WORD   SYNC
21544 075144  024052                          .WORD   DUMPER
21545 075146  012746  007472                  MOV     #PHR.5,-(SP)            ;                                               9575
21546 075152  012746  007330                  MOV     #WRD.75,-(SP)
21547 075156  012746  007316                  MOV     #WRD.74,-(SP)
21548 075162  012746  007174                  MOV     #WRD.61,-(SP)
21549 075166  012746  006046                  MOV     #FOR.FMT,-(SP)
21550 075172  012746  000005                  MOV     #5,-(SP)
21551 075176  010600                          MOV     SP,R0                   ; SP,*
21552 075200  104414                          TRAP    14
21553 075202  010316                          MOV     R3,(SP)                 ; CHANNEL,*                                     9576
21554 075204  010446                          MOV     R4,-(SP)                ; PLOG,*
21555 075206  012746  005534                  MOV     #FMT.21,-(SP)
21556 075212  012746  000003                  MOV     #3,-(SP)
21557 075216  010600                          MOV     SP,R0                   ; SP,*
```

```
21559                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
21560                                   ;                                                       22-Dec-1980 09:21:22    PA:<
21561
21562 075220 104414                             TRAP    14
21563 075222 062706 000022                      ADD     #22,SP                  ;                                       9573
21564 075226 005201                     8$:     INC     R1                      ; WRD.CNT                               9569
21565 075230 020127 000014                      CMP     R1,#14                  ; WRD.CNT,*
21566 075234 003733                             BLE     7$
21567 075236 022626                             CMP     (SP)+,(SP)+             ;                                       9547
21568 075240 104467                             TRAP    67                      ;                                       9577
21569 075242 006000                             ROR     R0
21570 075244 103620                             BLO     3$
21571 075246 005203                             INC     R3                      ; CHANNEL                               9546
21572 075250 020327 000043                      CMP     R3,#43                  ; CHANNEL,*
21573 075254 003614                             BLE     3$
21574 075256 005204                             INC     R4                      ; PLOG                                  9543
21575 075260 020427 000005                      CMP     R4,#5                   ; PLOG,*
21576 075264 003607                             BLE     2$
21577 075266 012705 177777                      MOV     #-1,R5                  ; *,BITS.XFERED                         9584
21578 075272 005003                             CLR     R3                      ; CHANNEL                               9586
21579 075274 104402                     9$:     TRAP    2                       ;                                       9587
21580 075276 152777 000040 115710               BISB    #40,@ML.REG+40          ;                                       9588
21581 075304 016704 116272                      MOV     ML.DUT,R4
21582 075310 042704 177770                      BIC     #177770,R4
21583 075314 142777 000007 115672               BICB    #7,@ML.REG+40
21584 075322 150477 115666                      BISB    R4,@ML.REG+40
21585 075326 005205                             INC     R5                      ; BITS.XFERED                           9590
21586 075330 005001                             CLR     R1                      ; CNT                                   9592
21587 075332 010102                     10$:    MOV     R1,R2                   ; CNT,*                                 9593
21588 075334 006302                             ASL     R2
21589 075336 005062 011600                      CLR     IO.BUF(R2)
21590 075342 005201                             INC     R1                      ; CNT                                   9592
21591 075344 020127 000024                      CMP     R1,#24                  ; CNT,*
21592 075350 003770                             BLE     10$
21593 075352 012746 000072                      MOV     #72,-(SP)               ;                                       9595
21594 075356 010346                             MOV     R3,-(SP)                ; CHANNEL,*
21595 075360 004767 120216                      JSR     PC,FORCE.REM
21596 075364 004767 120472                      JSR     PC,GD.BLK.XFER          ;                                       9596
21597 075370 142777 000002 115676               BICB    #2,@ML.REG+120          ;                                       9597
21598 075376 012777 000071 115550               MOV     #71,@ML.REG             ;                                       9598
21599 075404 105777 115614              11$:    TSTB    @ML.REG+50
21600 075410 100375                             BPL     11$
21601 075412 005002                             CLR     R2                      ; BIT.OFFSET                            9601
21602 075414 010246                     12$:    MOV     R2,-(SP)                ; BIT.OFFSET,*                          9603
21603 075416 060516                             ADD     R5,(SP)                 ; BITS.XFERED,*
21604 075420 004767 120004                      JSR     PC,FIND.COMP.BIT
21605 075424 005726                             TST     (SP)+
21606 075426 006000                             ROR     R0
21607 075430 103433                             BLO     13$
21608 075432 104455                             TRAP    55                      ;                                       9606
21609 075434 000206                             .WORD   206
21610 075436 010526                             .WORD   SYNC
21611 075440 024052                             .WORD   DUMPER
21612 075442 012746 007366                      MOV     #PHR.1,-(SP)            ;                                       9607
21613 075446 012746 007330                      MOV     #WRD.75,-(SP)
```

```
21615                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
21616                                   ;                                                       22-Dec-1980 09:21:22    PA:<
21617
21618 075452  012746  007316                    MOV     #WRD.74,-(SP)
21619 075456  012746  006034                    MOV     #THR.FMT,-(SP)
21620 075462  012746  000004                    MOV     #4,-(SP)
21621 075466  010600                            MOV     SP,R0                           ; SP,*
21622 075470  104414                            TRAP    14
21623 075472  010316                            MOV     R3,(SP)                         ; CHANNEL,*                             9608
21624 075474  012746  000072                    MOV     #72,-(SP)
21625 075500  012746  005534                    MOV     #FMT.21,-(SP)
21626 075504  012746  000003                    MOV     #3,-(SP)
21627 075510  010600                            MOV     SP,R0                           ; SP,*
21628 075512  104414                            TRAP    14
21629 075514  062706  000020                    ADD     #20,SP                          ;                                       9605
21630 075520  062702  000044          13$:      ADD     #44,R2                          ; *,BIT.OFFSET                          9601
21631 075524  020227  000264                    CMP     R2,#264                         ; BIT.OFFSET,*
21632 075530  003731                            BLE     12$
21633 075532  005001                            CLR     R1                              ; WRD.CNT                               9611
21634 075534  010102          14$:      MOV     R1,R2                           ; WRD.CNT,*                             9613
21635 075536  006302                            ASL     R2
21636 075540  005762  011600                    TST     IO.BUF(R2)
21637 075544  001437                            BEQ     15$
21638 075546  104455                            TRAP    55                              ;                                       9616
21639 075550  000207                            .WORD   207
21640 075552  010526                            .WORD   SYNC
21641 075554  024052                            .WORD   DUMPER
21642 075556  012746  007240                    MOV     #WRD.67,-(SP)                   ;                                       9617
21643 075562  012746  006426                    MOV     #WRD.12,-(SP)
21644 075566  012746  007330                    MOV     #WRD.75,-(SP)
21645 075572  012746  007316                    MOV     #WRD.74,-(SP)
21646 075576  012746  007174                    MOV     #WRD.61,-(SP)
21647 075602  012746  006062                    MOV     #FIV.FMT,-(SP)
21648 075606  012746  000006                    MOV     #6,-(SP)
21649 075612  010600                            MOV     SP,R0                           ; SP,*
21650 075614  104414                            TRAP    14
21651 075616  010316                            MOV     R3,(SP)                         ; CHANNEL,*                             9618
21652 075620  012746  000072                    MOV     #72,-(SP)
21653 075624  012746  005534                    MOV     #FMT.21,-(SP)
21654 075630  012746  000003                    MOV     #3,-(SP)
21655 075634  010600                            MOV     SP,R0                           ; SP,*
21656 075636  104414                            TRAP    14
21657 075640  062706  000024                    ADD     #24,SP                          ;                                       9615
21658 075644  005201          15$:      INC     R1                              ; WRD.CNT                               9611
21659 075646  020127  000014                    CMP     R1,#14                          ; WRD.CNT,*
21660 075652  003730                            BLE     14$
21661 075654  022626                            CMP     (SP)+,(SP)+                     ;                                       9587
21662 075656  104467                            TRAP    67                              ;                                       9619
21663 075660  006000                            ROR     R0
21664 075662  103604                            BLO     9$
21665 075664  005203                            INC     R3                              ; CHANNEL                               9586
21666 075666  020327  000043                    CMP     R3,#43                          ; CHANNEL,*
21667 075672  003600                            BLE     9$
21668 075674  000207                            RTS     PC                              ;                                       9500
21669
```

```
21671                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
21672                                   ;                                                       22-Dec-1980 09:21:22    PA:<
21673
21674                                   ; Routine Size:  271 words
21675                                   ; Maximum stack depth per invocation:  18 words
21680
21681
21685
21689 075676                            T51::
21690 075676  004767  176736            1$:     JSR     PC,$T51                         ;               9622
21691 075702  104466                            TRAP    66
21692 075704  006000                            ROR     R0
21693 075706  103773                            BLO     1$
21694 075710  000207                            RTS     PC
21695
21696                                   ; Routine Size:  6 words
21697                                   ; Maximum stack depth per invocation:  0 words
21702
21703
21704 ;          9625  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (102)

```
21706 ;ML4
21707 ;
21708
21709 ;          9626  !
21710 ;          9627  BGNTST;
21711 ;          9628
21712 ;          9629  !++
21713 ;          9630  ! TEST NUMBER:  TST 52
21714 ;          9631  !
21715 ;          9632  ! TEST NAME:              UNCORRECTABLE ERROR SYNDRONE DECODE TEST AT CHANNELS > 35
21716 ;          9633  !
21717 ;          9634  ! TEST DESCRIPTION:
21718 ;          9635  !       TEST SYNDRONE DECODE TO DETECT BUT
21719 ;          9636  !       NOT CORRECT UNCORRECTABLE CHANNEL
21720 ;          9637  !       ERRORS BY:
21721 ;          9638  !
21722 ;          9639  !       1.  VIA ECC DIAG MODE FORCE SYNDRONE
21723 ;          9640  !           BITS TO INDICATE CHANNEL ERRORS
21724 ;          9641  !           AT WORDS OF A CRC GROUP BUT AT CHANNELS
21725 ;          9642  !           GREATER THAN 35.
21726 ;          9643  !
21727 ;          9644  !       2.  DO A MASS BUS READ TRANSFER
21728 ;          9645  !
21729 ;          9646  !       3.  THEN EXAMIN THE IO_BUF FOR NO
21730 ;          9647  !           BITS COMPLIMENTED AND ECH  AND
21731 ;          9648  !           BITS SET
21732 ;          9649  !
21733 ;          9650  ! IMPLICIT INPUTS:
21734 ;          9651  !       IO_BUF
21735 ;          9652  !       A  VECTOR OF 256 WORDS WHERE DATA
21736 ;          9653  !       FOR MBUS READS AND WRITES TRANSFERS
21737 ;          9654  !       IS FOUND.
21738 ;          9655  !
21739 ;          9656  !
21740 ;          9657  !--
21741 ;          9658
21742 ;          9659  local
21743 ;          9660      PLOG;                                   !INDEX INTO REMAINDER TABLE 'REM_TBL'
21744 ;          9661
21745 ;          9662  BAI = ONE;                                  !FIRST LETS CLEAR THE ML11'S GOOD BLOCK
21746 ;          9663  IO_BUF = ZEROES;                            !BY WRITING ZEROES TO IT
21747 ;          9664  GO_BLK_XFER ();
21748 ;          9665  ML[CS1 = write;
21749 ;          9666  TIME_OUT_LOOP;
21750 ;          9667
21751 ;          9668  incr PLOG_SEL from 0 to 6 do                !TEST SYNDRONE DECODE AT 7 DIFFERENT PLOG VALUES
21752 ;          9669      begin
21753 ;          9670
21754 ;          9671      case .PLOG_SEL from 0 to 6 of           !SELECT A PLOG VALUE
21755 ;          9672          set
21756 ;          9673
21757 ;          9674          [0] :                               !POINTS TO WORD 0 IN THE CRC GROUP
21758 ;          9675              PLOG = 0;
21759 ;          9676
21760 ;          9677          [1] :                               !POINTS TO WORD 1 IN THE CRC GROUP
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (102)

```
21762 ;ML4
21763 ;
21764
21765 ;          9678              PLOG = 1;
21766 ;          9679
21767 ;          9680          [2] :
21768 ;          9681              PLOG = 2;
21769 ;          9682
21770 ;          9683          [3] :
21771 ;          9684              PLOG = 3;
21772 ;          9685
21773 ;          9686          [4] :
21774 ;          9687              PLOG = 4;
21775 ;          9688
21776 ;          9689          [5] :
21777 ;          9690              PLOG = 5;
21778 ;          9691
21779 ;          9692          [6] :
21780 ;          9693              PLOG = 58;
21781 ;          9694          tes;
21782 ;          9695
21783 ;          9696      incr CHANNEL from 36 to 62 do          !TEST AT CHANNELS > 35 TO FORCE UNCORRECTABLE ERROR
21784 ;          9697          begin
21785 ;          9698          BGNSUB;                            !START OF SCOPE LOOP
21786 ;          9699          CLR_MBUS;                          !CLEAR THE DRIVE
21787 ;          9700
21788 ;          9701          incr COUNT from 0 to 255 do        !CLEAR THE FIRST CRC GROUP IN THE IO_BUF
21789 ;          9702              IO_BUF [.COUNT] = ZEROES;
21790 ;          9703
21791 ;          9704          FORCE_REM (.PLOG, .CHANNEL);       !FORCE UNCORRECTABLE ERROR AT THIS WORD AND CHANNEL
21792 ;          9705          GD_BLK_XFER ();                    !SET UP A GOOD BLOCK TRANSFER
21793 ;          9706          ECC_DIS = ZERO;                    !CLEAR ECC DISABLE
21794 ;          9707          MLCS1 = read;                      !DO A READ TRANSFER
21795 ;          9708          TIME_OUT_LOOP;                     !WAIT FOR THE  TRANSFER TO COMPLETE
21796 ;          9709
21797 ;          9710          if not ((.ECH_ERR) and (.UNC_ERR))  !SEE IF THE ERROR WAS DETECTED
21798 ;          9711          then
21799 ;          9712              begin                          !ERROR IF NOT DECTECTED
21800 ;          9713              ERRDF (136, SYNC, DUMPER);
21801 ;          9714              PRINTB (FOR_FMT, WRD_67, WRD_10, WRD_76, WRD_9);
21802 ;          9715              PRINTB (FMT_21, .PLOG, .CHANNEL);
21803 ;          9716              end;
21804 ;          9717
21805 ;          9718          incr CNT from 0 to 12 do           !SEE IF ANY CORRECTION WAS DONE
21806 ;          9719
21807 ;          9720              if .IO_BUF [.CNT] neq ZEROES   !SEARCH THE IO_BUF FOR ALL ZEROES
21808 ;          9721              then
21809 ;          9722                  begin                      !REPORT AN ERROR IF ANY CORRECTION WAS DONE
21810 ;          9723                  ERRDF (137, SYNC, DUMPER);
21811 ;          9724                  PRINTB (FIV_FMT, WRD_61, WRD_74, WRD_75, WRD_12, WRD_67);
21812 ;          9725                  PRINTB (FMT_21, .PLOG, .CHANNEL);
21813 ;          9726                  end;
21814 ;          9727
21815 ;          9728          ENDSUB;                            !END OF SCOPE LOOP
21816 ;          9729          end;
```

```
21818 ;ML4
21819 ;
21820
21821 ;          9730
21822 ;          9731      end;
21823 ;          9732
21824 ;          9733  ENDTST;
21828
21832 075712  004167  106200           $T52:   JSR     R1,$SAVE5                       ;                                9624
21833 075716  152777  000010  115270           BISB    #10,@ML.REG+40                  ;                                9662
21834 075724  005067  113650                   CLR     IO.BUF                          ;                                9663
21835 075730  004767  120126                   JSR     PC,GD.BLK.XFER                  ;                                9664
21836 075734  012777  000061  115212           MOV     #61,@ML.REG                     ;                                9665
21837 075742  105777  115256             1$:   TSTB    @ML.REG+50
21838 075746  100375                           BPL     1$
21839 075750  005005                           CLR     R5                              ; PLOG.SEL                       9668
21840 075752  010504                     2$:   MOV     R5,R4                           ; PLOG.SEL,*                     9671
21841 075754  006304                           ASL     R4
21842 075756  066407  075762                   ADD     3$(R4),PC
21843 075762  000016                     3$:   .WORD   4$-3$
21844 075764  000022                           .WORD   5$-3$
21845 075766  000030                           .WORD   6$-3$
21846 075770  000036                           .WORD   7$-3$
21847 075772  000044                           .WORD   8$-3$
21848 075774  000052                           .WORD   9$-3$
21849 075776  000060                           .WORD   10$-3$
21850 076000  005003                     4$:   CLR     R3                              ; PLOG                           9675
21851 076002  000421                           BR      11$                             ;                                9671
21852 076004  012703  000001             5$:   MOV     #1,R3                           ; *,PLOG                         9678
21853 076010  000416                           BR      11$                             ;                                9671
21854 076012  012703  000002             6$:   MOV     #2,R3                           ; *,PLOG                         9681
21855 076016  000413                           BR      11$                             ;                                9671
21856 076020  012703  000003             7$:   MOV     #3,R3                           ; *,PLOG                         9684
21857 076024  000410                           BR      11$                             ;                                9671
21858 076026  012703  000004             8$:   MOV     #4,R3                           ; *,PLOG                         9687
21859 076032  000405                           BR      11$                             ;                                9671
21860 076034  012703  000005             9$:   MOV     #5,R3                           ; *,PLOG                         9690
21861 076040  000402                           BR      11$                             ;                                9671
21862 076042  012703  000072             10$:  MOV     #72,R3                          ; *,PLOG                         9693
21863 076046  012704  000044             11$:  MOV     #44,R4                          ; *,CHANNEL                      9696
21864 076052  104402                     12$:  TRAP    2                               ;                                9697
21865 076054  152777  000040  115132           BISB    #40,@ML.REG+40                  ;                                9698
21866 076062  016702  115514                   MOV     ML.DUT,R2
21867 076066  042702  177770                   BIC     #177770,R2
21868 076072  142777  000007  115114           BICB    #7,@ML.REG+40
21869 076100  150277  115110                   BISB    R2,@ML.REG+40
21870 076104  005001                           CLR     R1                              ; COUNT                          9701
21871 076106  010102                     13$:  MOV     R1,R2                           ; COUNT,*                        9702
```

```
21873                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
21874                                   ;                                                       22-Dec-1980 09:21:22    PA:<
21875
21876 076110 006302                             ASL     R2
21877 076112 005062 011600                      CLR     IO.BUF(R2)
21878 076116 005201                             INC     R1                      ; COUNT                                 9701
21879 076120 020127 000377                      CMP     R1,#377                 ; COUNT,*
21880 076124 003770                             BLE     13$
21881 076126 010346                             MOV     R3,-(SP)                ; PLOG,*                                9704
21882 076130 010446                             MOV     R4,-(SP)                ; CHANNEL,*
21883 076132 004767 117444                      JSR     PC,FORCE.REM
21884 076136 004767 117720                      JSR     PC,GD.BLK.XFER          ;                                       9705
21885 076142 142777 000002 115124               BICB    #2,@ML.REG+120          ;                                       9706
21886 076150 012777 000071 114776               MOV     #71,@ML.REG             ;                                       9707
21887 076156 105777 115042              14$:    TSTB    @ML.REG+50
21888 076162 100375                             BPL     14$
21889 076164 132777 000100 115042               BITB    #100,@ML.REG+60         ;                                       9710
21890 076172 001403                             BEQ     15$
21891 076174 005777 115164                      TST     @ML.REG+210
21892 076200 100434                             BMI     16$
21893 076202 104455                     15$:    TRAP    55                      ;                                       9713
21894 076204 000210                             .WORD   210
21895 076206 010526                             .WORD   SYNC
21896 076210 024052                             .WORD   DUMPER
21897 076212 012746 006374                      MOV     #WRD.9,-(SP)            ;                                       9714
21898 076216 012746 007340                      MOV     #WRD.76,-(SP)
21899 076222 012746 006406                      MOV     #WRD.10,-(SP)
21900 076226 012746 007240                      MOV     #WRD.67,-(SP)
21901 076232 012746 006046                      MOV     #FOR.FMT,-(SP)
21902 076236 012746 000005                      MOV     #5,-(SP)
21903 076242 010600                             MOV     SP,R0                   ; SP,*
21904 076244 104414                             TRAP    14
21905 076246 010416                             MOV     R4,(SP)                 ; CHANNEL,*                             9715
21906 076250 010346                             MOV     R3,-(SP)                ; PLOG,*
21907 076252 012746 005534                      MOV     #FMT.21,-(SP)
21908 076256 012746 000003                      MOV     #3,-(SP)
21909 076262 010600                             MOV     SP,R0                   ; SP,*
21910 076264 104414                             TRAP    14
21911 076266 062706 000022                      ADD     #22,SP                  ;                                       9712
21912 076272 005001                     16$:    CLR     R1                      ; CNT                                   9718
21913 076274 010102                     17$:    MOV     R1,R2                   ; CNT,*                                 9720
21914 076276 006302                             ASL     R2
21915 076300 005762 011600                      TST     IO.BUF(R2)
21916 076304 001436                             BEQ     18$
21917 076306 104455                             TRAP    55                      ;                                       9723
21918 076310 000211                             .WORD   211
21919 076312 010526                             .WORD   SYNC
21920 076314 024052                             .WORD   DUMPER
21921 076316 012746 007240                      MOV     #WRD.67,-(SP)           ;                                       9724
21922 076322 012746 006426                      MOV     #WRD.12,-(SP)
21923 076326 012746 007330                      MOV     #WRD.75,-(SP)
21924 076332 012746 007316                      MOV     #WRD.74,-(SP)
21925 076336 012746 007174                      MOV     #WRD.61,-(SP)
21926 076342 012746 006062                      MOV     #FIV.FMT,-(SP)
21927 076346 012746 000006                      MOV     #6,-(SP)
```

```
21929                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
21930                                   ;                                                       22-Dec-1980 09:21:22    PA:<
21931
21932 076352  010600                            MOV     SP,R0                   ; SP,*
21933 076354  104414                            TRAP    14
21934 076356  010416                            MOV     R4,(SP)                 ; CHANNEL,*                             9725
21935 076360  010346                            MOV     R3,-(SP)                ; PLOG,*
21936 076362  012746  005534                    MOV     #FMT.21,-(SP)
21937 076366  012746  000003                    MOV     #3,-(SP)
21938 076372  010600                            MOV     SP,R0                   ; SP,*
21939 076374  104414                            TRAP    14
21940 076376  062706  000024                    ADD     #24,SP                  ;                                       9722
21941 076402  005201                    18$:    INC     R1                      ; CNT                                   9718
21942 076404  020127  000014                    CMP     R1,#14                  ; CNT,*
21943 076410  003731                            BLE     17$
21944 076412  022626                            CMP     (SP)+,(SP)+             ;                                       9697
21945 076414  104467                            TRAP    67                      ;                                       9726
21946 076416  006000                            ROR     R0
21947 076420  103614                            BLO     12$
21948 076422  005204                            INC     R4                      ; CHANNEL                               9696
21949 076424  020427  000076                    CMP     R4,#76                  ; CHANNEL,*
21950 076430  003610                            BLE     12$
21951 076432  005205                            INC     R5                      ; PLOG.SEL                              9668
21952 076434  020527  000006                    CMP     R5,#6                   ; PLOG.SEL,*
21953 076440  003002                            BGT     19$
21954 076442  000167  177304                    JMP     2$
21955 076446  000207                    19$:    RTS     PC                      ;                                       9624
21956
21957                                   ; Routine Size:  175 words
21958                                   ; Maximum stack depth per invocation:  18 words
21963
21964
21968
21972 076450                            T52::
21973 076450  004767  177236             1$:    JSR     PC,$T52                 ;                                       9731
21974 076454  104466                            TRAP    66
21975 076456  006000                            ROR     R0
21976 076460  103773                            BLO     1$
21977 076462  000207                            RTS     PC
21978
21979                                   ; Routine Size:  6 words
21980                                   ; Maximum stack depth per invocation:  0 words
```

```
21989
21990
21991 ;          9734  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (103)

```
21993 ;ML4
21994 ;
21995
21996 ;          9735  !
21997 ;          9736  BGNTST;
21998 ;          9737
21999 ;          9738  !++
22000 ;          9739  ! TEST NUMBER:  TST 53
22001 ;          9740  !
22002 ;          9741  ! TEST NAME:              MULTIPLE CHANNEL ERROR SYNDRONE DECODE TEST
22003 ;          9742  !
22004 ;          9743  ! TEST DESCRIPTION:
22005 ;          9744  !       TEST SYNDRONE DECODE TO DETECT BUT NOT
22006 ;          9745  !       CORRECT UNCORRECTABLE MULTIPLE CHANNEL
22007 ;          9746  !       ERRORS BY:
22008 ;          9747  !
22009 ;          9748  !       1.  VIA ECC DIAGNOSTIC MODE FORCE SYNDRONE
22010 ;          9749  !           BITS TO INDICATE MULTIPLE CHANNEL ERRORS
22011 ;          9750  !           BY ASSIGNING CRC_A EQUAL TO CRC_B
22012 ;          9751  !
22013 ;          9752  !       2.  DO A MASS BUS READ TRANSFER
22014 ;          9753  !
22015 ;          9754  !       3.  THEN EXAMIN THE IO_BUF FOR  NO BITS
22016 ;          9755  !           COMPLIMENTED AND ECH AND UNC BITS SET
22017 ;          9756  !
22018 ;          9757  ! IMPLICIT INPUTS:
22019 ;          9758  !       IO_BUF
22020 ;          9759  !       A  VECTOR OF 256 WORDS WHERE DATA
22021 ;          9760  !       FOR MBUS READS AND WRITES TRANSFERS
22022 ;          9761  !       IS FOUND.
22023 ;          9762  !
22024 ;          9763  !
22025 ;          9764  !--
22026 ;          9765
22027 ;          9766  local
22028 ;          9767      PLOG;                          !INDEX INTO REMAINDER TABLE 'REM_TBL'
22029 ;          9768
22030 ;          9769  BAI = ONE;                         !FIRST LETS CLEAR THE ML11'S GOOD
22031 ;          9770  IO_BUF = ZEROES;                   !BLOCK BY WRITING ZEROES TO IT
22032 ;          9771  GD_BLK_XFER ();
22033 ;          9772  ML[CS1 = write;
22034 ;          9773  TIME_OUT_LOOP;
22035 ;          9774
22036 ;          9775  incr PLOG_SEL from 0 to 6 do       !TEST SYNDRONE DECODE AT 7 DIFFERENT PLOG VALUES
22037 ;          9776      begin
22038 ;          9777
22039 ;          9778      case .PLOG_SEL from 0 to 6 of  !SELECT A PLOG VALUE
22040 ;          9779          set
22041 ;          9780
22042 ;          9781          [0] :                      !POINTS TO CRC WORD 0
22043 ;          9782              PLOG = 0;
22044 ;          9783
22045 ;          9784          [1] :                      !POINTS TO CRC WORD 1
22046 ;          9785              PLOG = 1;
22047 ;          9786
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (103)

```
22049 ;ML4
22050 ;
22051
22052 ;          9787          [2] :                                   !POINTS TO CRC WORD 2
22053 ;          9788              PLOG = 2;
22054 ;          9789
22055 ;          9790          [3] :                                   !POINTS TO CRC WORD 3
22056 ;          9791              PLOG = 3;
22057 ;          9792
22058 ;          9793          [4] :                                   !POINTS TO CRC WORD 4
22059 ;          9794              PLOG = 4;
22060 ;          9795
22061 ;          9796          [5] :                                   !POINTS TO CRC WORD 5
22062 ;          9797              PLOG = 5;
22063 ;          9798
22064 ;          9799          [6] :                                   !POINTS TO ALL 6 WORDS IN CRC GROUP
22065 ;          9800              PLOG = 58;
22066 ;          9801          tes;
22067 ;          9802
22068 ;          9803      incr CHANNEL from 1 to 35 do                !TEST 35 CHANNELS STARTING AT CHANNEL 1
22069 ;          9804          begin
22070 ;          9805          BGNSUB;                                 !START OF SCOPE LOOP
22071 ;          9806          CLR_MBUS;                               !CLEAR THE DRIVE
22072 ;          9807
22073 ;          9808          incr COUNT from 0 to 255 do             !CLEAR FIRST CRC GROUP IN THE IO_BUF
22074 ;          9809              IO_BUF [.COUNT] = ZEROES;
22075 ;          9810
22076 ;          9811          FORCE_REM (.PLOG, .CHANNEL);            !FORCE ERR AT THIS WORD AND CHANNEL
22077 ;          9812          CRC_A = .CRC_B;                         !CRC_A EQL TO CRC_B CAUSES THE UNC ERROR
22078 ;          9813          GD_BLK_XFER ();                         !SET UP A GOOD BLOCK TRANSFER
22079 ;          9814          ECC_DIS = ZERO;                         !CLEAR ECC DISABLE
22080 ;          9815          MLCS1 = read;                           !DO A READ TRANSFER
22081 ;          9816          TIME_OUT_LOOP;                          !WAIR UNTIL THE TRANSFER IS COMPLETE
22082 ;          9817
22083 ;          9818          if not ((.ECH_ERR) and (.UNC_ERR))      !SEE IF THE ERROR WAS DETECTED
22084 ;          9819          then
22085 ;          9820              begin                               !REPORT ERROR IF NOT DETECTED
22086 ;          9821              ERRDF (138, SYNC, DUMPER);
22087 ;          9822              PRINTB (FOR_FMT, WRD_77, WRD_10, WRD_76, WRD_9);
22088 ;          9823              PRINTB (FMT_21, .PLOG, .CHANNEL);
22089 ;          9824              end;
22090 ;          9825
22091 ;          9826          incr CNT from 0 to 12 do                !SEE IF ANY ERROR CORRECTION WAS DONE
22092 ;          9827
22093 ;          9828              if .IO_BUF [.CNT] neq ZEROES        !TEST THE IO_BUF FOR ALL ZEROES
22094 ;          9829              then
22095 ;          9830                  begin                           !ERROR IF ANY BITS GOT FLIPPED
22096 ;          9831                  ERRDF (139, SYNC, DUMPER);
22097 ;          9832                  PRINTB (FIV_FMT, WRD_61, WRD_74, WRD_75, WRD_12, WRD_67);
22098 ;          9833                  PRINTB (FMT_21, .PLOG, .CHANNEL);
22099 ;          9834                  end;
22100 ;          9835
22101 ;          9836          ENDSUB;                                 !END OF SCOPE LOOP
22102 ;          9837          end;
22103 ;          9838
```

```
22105 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
22106 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (103)
22107
22108 ;          9839      end;
22109 ;          9840
22110 ;          9841  ENDTST;
22114
22118 076464  004167  105426            $T53:   JSR     R1,$SAVE5                       ;                                9733
22119 076470  152777  000010  114516            BISB    #10,@ML.REG+40                  ;                                9769
22120 076476  005067  113076                    CLR     IO.BUF                          ;                                9770
22121 076502  004767  117354                    JSR     PC,GD.BLK.XFER                  ;                                9771
22122 076506  012777  000061  114440            MOV     #61,@ML.REG                     ;                                9772
22123 076514  105777  114504            1$:     TSTB    @ML..REG+50
22124 076520  100375                            BPL     1$
22125 076522  005005                            CLR     R5                              ; PLOG.SEL                       9775
22126 076524  010504                    2$:     MOV     R5,R4                           ; PLOG.SEL,*                     9778
22127 076526  006304                            ASL     R4
22128 076530  066407  076534                    ADD     3$(R4),PC
22129 076534  000016                    3$:     .WORD   4$-3$
22130 076536  000022                            .WORD   5$-3$
22131 076540  000030                            .WORD   6$-3$
22132 076542  000036                            .WORD   7$-3$
22133 076544  000044                            .WORD   8$-3$
22134 076546  000052                            .WORD   9$-3$
22135 076550  000060                            .WORD   10$-3$
22136 076552  005003                    4$:     CLR     R3                              ; PLOG                           9782
22137 076554  000421                            BR      11$                             ;                                9778
22138 076556  012703  000001            5$:     MOV     #1,R3                           ; *,PLOG                         9785
22139 076562  000416                            BR      11$                             ;                                9778
22140 076564  012703  000002            6$:     MOV     #2,R3                           ; *,PLOG                         9788
22141 076570  000413                            BR      11$                             ;                                9778
22142 076572  012703  000003            7$:     MOV     #3,R3                           ; *,PLOG                         9791
22143 076576  000410                            BR      11$                             ;                                9778
22144 076600  012703  000004            8$:     MOV     #4,R3                           ; *,PLOG                         9794
22145 076604  000405                            BR      11$                             ;                                9778
22146 076606  012703  000005            9$:     MOV     #5,R3                           ; *,PLOG                         9797
22147 076612  000402                            BR      11$                             ;                                9778
22148 076614  012703  000072            10$:    MOV     #72,R3                          ; *,PLOG                         9800
22149 076620  012704  000001            11$:    MOV     #1,R4                           ; *,CHANNEL                      9803
22150 076624  104402                    12$:    TRAP    2                               ;                                9804
22151 076626  152777  000040  114360            BISB    #40,@ML.REG+40                  ;                                9805
22152 076634  016702  114742                    MOV     ML.DUT,R2
22153 076640  042702  177770                    BIC     #177770,R2
22154 076644  142777  000007  114342            BICB    #7,@ML.REG+40
22155 076652  150277  114336                    BISB    R2,@ML.REG+40
22156 076656  005001                            CLR     R1                              ; COUNT                          9808
22157 076660  010102                    13$:    MOV     R1,R2                           ; COUNT,*                        9809
22158 076662  006302                            ASL     R2
```

```
22160                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
22161                                   ;                                                       22-Dec-1980 09:21:22    PA:<
22162
22163 076664  005062  011600                    CLR     IO.BUF(R2)
22164 076670  005201                            INC     R1                      ; COUNT                                 9808
22165 076672  020127  000377                    CMP     R1,#377                 ; COUNT,*
22166 076676  003770                            BLE     13$
22167 076700  010346                            MOV     R3,-(SP)                ; PLOG,*                                9811
22168 076702  010446                            MOV     R4,-(SP)                ; CHANNEL,*
22169 076704  004767  116672                    JSR     PC,FORCE.REM
22170 076710  117702  114420                    MOVB    @ML,REG+160,R2          ;                                       9812
22171 076714  042702  177700                    BIC     #177700,R2
22172 076720  142777  000077  114376            BICB    #77,@ML.REG+150
22173 076726  150277  114372                    BISB    R2,@ML.REG+150
22174 076732  004767  117124                    JSR     PC,GD.BLK.XFER          ;                                       9813
22175 076736  142777  000002  114330            BICB    #2,@ML.REG+120          ;                                       9814
22176 076744  012777  000071  114202            MOV     #71,@ML.REG             ;                                       9815
22177 076752  105777  114246          14$:      TSTB    @ML.REG+50
22178 076756  100375                            BPL     14$
22179 076760  132777  000100  114246            BITB    #100,@ML.REG+60         ;                                       9818
22180 076766  001403                            BEQ     15$
22181 076770  005777  114370                    TST     @ML.REG+210
22182 076774  100434                            BMI     16$
22183 076776  104455          15$:      TRAP    55                              ;                                       9821
22184 077000  000212                            .WORD   212
22185 077002  010526                            .WORD   SYNC
22186 077004  024052                            .WORD   DUMPER
22187 077006  012746  006374                    MOV     #WRD.9,-(SP)            ;                                       9822
22188 077012  012746  007340                    MOV     #WRD.76,-(SP)
22189 077016  012746  006406                    MOV     #WRD.10,-(SP)
22190 077022  012746  007346                    MOV     #WRD.77,-(SP)
22191 077026  012746  006046                    MOV     #FOR.FMT,-(SP)
22192 077032  012746  000005                    MOV     #5,-(SP)
22193 077036  010600                            MOV     SP,R0                   ; SP,*
22194 077040  104414                            TRAP    14
22195 077042  010416                            MOV     R4,(SP)                 ; CHANNEL,*                             9823
22196 077044  010346                            MOV     R3,-(SP)                ; PLOG,*
22197 077046  012746  005534                    MOV     #FMT.21,-(SP)
22198 077052  012746  000003                    MOV     #3,-(SP)
22199 077056  010600                            MOV     SP,R0                   ; SP,*
22200 077060  104414                            TRAP    14
22201 077062  062706  000022                    ADD     #22,SP                  ;                                       9820
22202 077066  005001          16$:      CLR     R1                              ; CNT                                   9826
22203 077070  010102          17$:      MOV     R1,R2                           ; CNT,*                                 9828
22204 077072  006302                            ASL     R2
22205 077074  005762  011600                    TST     IO.BUF(R2)
22206 077100  001436                            BEQ     18$
22207 077102  104455                            TRAP    55                      ;                                       9831
22208 077104  000213                            .WORD   213
22209 077106  010526                            .WORD   SYNC
22210 077110  024052                            .WORD   DUMPER
22211 077112  012746  007240                    MOV     #WRD.67,-(SP)           ;                                       9832
22212 077116  012746  006426                    MOV     #WRD.12,-(SP)
22213 077122  012746  007330                    MOV     #WRD.75,-(SP)
22214 077126  012746  007316                    MOV     #WRD.74,-(SP)
```

```
22216                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
22217                                   ;                                                       22-Dec-1980 09:21:22    PA:<
22218
22219 077132  012746  007174                   MOV     #WRD.61,-(SP)
22220 077136  012746  006062                   MOV     #FIV.FMT,-(SP)
22221 077142  012746  000006                   MOV     #6,-(SP)
22222 077146  010600                           MOV     SP,R0                           ; SP,*
22223 077150  104414                           TRAP    14
22224 077152  010416                           MOV     R4,(SP)                         ; CHANNEL,*                             9833
22225 077154  010346                           MOV     R3,-(SP)                        ; PLOG,*
22226 077156  012746  005534                   MOV     #FMT.21,-(SP)
22227 077162  012746  000003                   MOV     #3,-(SP)
22228 077166  010600                           MOV     SP,R0                           ; SP,*
22229 077170  104414                           TRAP    14
22230 077172  062706  000024                   ADD     #24,SP                          ;                                       9830
22231 077176  005201                   18$:    INC     R1                              ; CNT                                   9826
22232 077200  020127  000014                   CMP     R1,#14                          ; CNT,*
22233 077204  003731                           BLE     17$
22234 077206  022626                           CMP     (SP)+,(SP)+                     ;                                       9804
22235 077210  104467                           TRAP    67                              ;                                       9834
22236 077212  006000                           ROR     R0
22237 077214  103603                           BLO     12$
22238 077216  005204                           INC     R4                              ; CHANNEL                               9803
22239 077220  020427  000043                   CMP     R4,#43                          ; CHANNEL,*
22240 077224  003002                           BGT     19$
22241 077226  000167  177372                   JMP     12$
22242 077232  005205                   19$:    INC     R5                              ; PLOG.SEL                              9775
22243 077234  020527  000006                   CMP     R5,#6                           ; PLOG.SEL,*
22244 077240  003002                           BGT     20$
22245 077242  000167  177256                   JMP     2$
22246 077246  000207                   20$:    RTS     PC                              ;                                       9733
22247
22248                                   ; Routine Size:  186 words
22249                                   ; Maximum stack depth per invocation:  18 words
22254
22255
22259
22263 077250                           T53::
22264 077250  004767  177210           1$:     JSR     PC,$T53                         ;                                       9839
22265 077254  104466                           TRAP    66
22266 077256  006000                           ROR     R0
22267 077260  103773                           BLO     1$
22268 077262  000207                           RTS     PC
22269
```

```
22271                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
22272                                   ;                                                       22-Dec-1980 09:21:22    PA:<
22273
22274                                   ; Routine Size:  6 words
22275                                   ; Maximum stack depth per invocation:  0 words
22280
22281
22282 ;          9842  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (104)

```
;ML4
;
;
;
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (104)

```
22340 ;ML4
22341 ;
22342
22343 ;          9895
22344 ;          9896          CLR_MBUS;                          !CLEAR THE DRIVE
22345 ;          9897          GD_BLK_XFER ();                    !SET UP A GOOF BLOCK TRANSFER
22346 ;          9898          MLCS1 = write;                     !DO A WRITE TRANSFER
22347 ;          9899          TIME_OUT_LOOP;                     !WAIT UNTIL THE TRANSFER IS COMPLETE
22348 ;          9900          CLR_MBUS;                          !CLEAR THE DRIVE AGAIN
22349 ;          9901          DONE = ZERO;                       !CLEAR THE DONE FLAG
22350 ;          9902          GD_WRD_CNT = -1;                   !RESET THE COUNT
22351 ;          9903          MLD1 = ZEROES;                     !LOAD THE DATA DIAG REG (BITS 0-38)
22352 ;          9904          MLD2 = ZEROES;                     !WITH ZEROES PAT AND CRC BIT FOR
22353 ;          9905          MLE2 = %o'060000';                 !ZEROES PAT
22354 ;          9906          NIB_SEL = .BIT_CNT/4;              !CALCULATE THE NIBBLE WHERE THE SBE IS TO GO
22355 ;          9907          DAT_DM_XFER ();                    !SET UP A DATA DIAG MODE TRANSFER
22356 ;          9908          MLCS1 = write;                     !DO A WRITE TRANSFER
22357 ;          9909          DELAY (ONE_US);                    !GIVE THE PROM DATA TIME TO GET OUT
22358 ;          9910
22359 ;          9911          do                                 !FIND THE GOOD NIB AT THE TESTED WORD
22360 ;          9912              begin
22361 ;          9913              PD_TEMP = .MLPD;               !READ THE PROM DATA FOR THIS ARRAY WORD
22362 ;          9914
22363 ;          9915              if .PD_TEMP [.NIB_SEL] IS_SET  !IS THIS A GOOD NIBBLE
22364 ;          9916              then
22365 ;          9917                  DAT_CLK = ONE              !IF NOT THEN GET THE NEXT ARRAY WORD
22366 ;          9918              else
22367 ;          9919                  begin                      !ELSE SEE IF WE ARE AT THE TESTED WORD
22368 ;          9920                  GD_WRD_CNT = .GD_WRD_CNT + 1;  !UP THE COUNT
22369 ;          9921                                             !AND SEE IF WE ARE DONE
22370 ;          9922
22371 ;          9923                  if .GD_WRD_CNT eql .WRD_CNT then DONE = ONE else DAT_CLK = ONE;
22372 ;          9924
22373 ;          9925                  end;
22374 ;          9926
22375 ;          9927              end
22376 ;          9928          until .DONE IS_SET;                !REPEAT UNTIL WE ARE DONE
22377 ;          9929
22378 ;          9930          NIB_PAT = ZEROES;                  !CLEAR THE SAVE LOCATION
22379 ;          9931          NIB_PAT [.BIT_CNT mod 4] = ONE;    !AND SET THE SBE IN THIS NIBBLE
22380 ;          9932          D1_TEMP = ZEROES;                  !CLEAR THE OTHER NIBBLES IN THIS ARRAY WORD
22381 ;          9933          D2_TEMP = ZEROES;                  !TO BE ZEROES PATTERN AND ZEROES CRC PATTERN
22382 ;          9934          E2_TEMP = %o'060000';
22383 ;          9935          LD_LNG_WRD (.NIB_SEL, .NIB_PAT);   !LOAD THE SBE INTO THE SAVE LOCATION
22384 ;          9936          WRT_LNG_WRD;                       !AND WRITE THE SBE INTO THE DATA DIAG RES'S
22385 ;          9937          DAT_CLK = ONE;                     !CLOCK THE SBE INTO THE ARRAYS MEMORY
22386 ;          9938          DELAY (ONE_US);                    !GIVE IT TIME TO WRITE INTO THE MEMORY
22387 ;          9939          BGNSUB;                            !START OF SCOPE LOOP
22388 ;          9940          CLR_MBUS;                          !CLEAR OUT THE DATA DIAG MODE XFERR
22389 ;          9941          GD_BLK_XFER ();                    !SET UP A GOOD BLOCK TRANSFER
22390 ;          9942          ECC_DIS = ZERO;                    !CLEAR ECC DISABLE
22391 ;          9943          MLCS1 = read;                      !AND READ OUT THE SBE
22392 ;          9944          TIME_OUT_LOOP;
22393 ;          9945
22394 ;          9946          incr CNT from 0 to 13 do           !SEE IF THE SBE WAS CORRECTED
```

```
                                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
                                                                    22-Dec-1980 09:21:22    PA:<NEALE>3L3ML4.BLI.2 (104)

;          9947
;          9948            if .IO_BUF [.CNT] neq ZEROES            !TEST THE IO_BUF FOR ALL ZEROES
;          9949            then
;          9950                begin                               !ERROR IF THE ERROR WAS NOT CORRECTED
;          9951                ERRDF (140, SYNC, DUMPER);
;          9952                PRINTB (THR_FMT, PHR_12, WRD_76, WRD_9);
;          9953                PRINTB (FMT_22, .WRD_CNT, .BIT_CNT);
;          9954                end;
;          9955
;          9956            ENDSUB;                                 !END OF SCOPE LOOP
;          9957            end;
;          9958
;          9959        end;
;          9960
;          9961    ENDTST;
;

077264  004167  104626          $T54:   JSR     R1,$SAVE5                       ;                       9841
077270  162706  000010                  SUB     #10,SP
077274  005001                          CLR     R1                              ; WRD.CNT               9887
077276  005002                  1$:     CLR     R2                              ; BIT.CNT               9890
077300  005003                  2$:     CLR     R3                              ; CNT                   9893
077302  010304                  3$:     MOV     R3,R4                           ; CNT,*                 9894
077304  006304                          ASL     R4
077306  005064  011600                  CLR     IO.BUF(R4)
077312  005203                          INC     R3                              ; CNT                   9893
077314  020327  000377                  CMP     R3,#377                         ; CNT,*
077320  003770                          BLE     3$
077322  152777  000040  113664          BISB    #40,@ML.REG+40                  ;                       9894
077330  016704  114246                  MOV     ML.DUT,R4
077334  042704  177770                  BIC     #177770,R4
077340  142777  000007  113646          BICB    #7,@ML.REG+40
077346  150477  113642                  BISB    R4,@ML.REG+40
077352  004767  116504                  JSR     PC,GD.BLK.XFER                  ;                       9897
077356  012777  000061  113570          MOV     #61,@ML.REG                     ;                       9898
077364  105777  113634          4$:     TSTB    @ML.REG+50
077370  100375                          BPL     4$
077372  152777  000040  113614          BISB    #40,@ML.REG+40                  ;                       9899
077400  016704  114176                  MOV     ML.DUT,R4
077404  042704  177770                  BIC     #177770,R4
077410  142777  000007  113576          BICB    #7,@ML.REG+40
077416  150477  113572                  BISB    R4,@ML.REG+40
077422  005066  000002                  CLR     2(SP)                           ; DONE                  9901
077426  012716  177777                  MOV     #-1,(SP)                        ; *,GD.WRD.CNT          9902
077432  005077  113706                  CLR     @ML.REG+170                     ;                       9903
077436  005077  113712                  CLR     @ML.REG+200                     ;                       9904
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
                                        MOV     #60000,@ML.REG+160      ;                                               9905
                                        MOV     R2,-(SP)                ; BIT.CNT,*                                     9906
                                        MOV     #4,-(SP)
                                        JSR     PC,BL$DIV
                                        MOV     R0,R5                   ; *,NIB.SEL
                                        JSR     PC,DAT.DM.XFER          ;                                               9907
                                        MOV     #61,@ML.REG             ;                                               9908
                                        MOV     #1,R3                   ; *,$$TMP2                                      9909
                                5$:     BEQ     8$
                                        MOV     L$ONLY,R4               ; *,$$TMP1
                                        BEQ     7$
                                6$:     CLR     12(SP)                  ; $$TMP
                                        DEC     R4                      ; $$TMP1
                                        BNE     6$
                                7$:     DEC     R3                      ; $$TMP2
                                        BR      5$
                                8$:     MOV     R5,R4                   ; NIB.SEL,*                             9915
                                        ASR     R4
                                        ASR     R4
                                        ASR     R4
                                        ADD     #PD.TEMP,R4
                                9$:     MOV     @ML.REG+230,PD.TEMP     ;                                       9913
                                        MOV     R4,-(SP)                ;                                       9915
                                        MOV     R5,-(SP)                ; NIB.SEL,*
                                        BIC     #177770,(SP)
                                        MOV     #1,-(SP)
                                        CLR     -(SP)
                                        JSR     PC,BL$GT2
                                        ADD     #10,SP
                                        DEC     R0
                                        BEQ     10$                     ;                                       9917
                                        INC     4(SP)                   ; GD.WRD.CNT                            9920
                                        CMP     4(SP),R1                ; GD.WRD.CNT,WRD.CNT                    9923
                                        BNE     10$
                                        MOV     #1,6(SP)                ; *,DONE
                                        BR      11$
                                10$:    BISB    #20,@ML.REG+120
                                11$:    CMP     6(SP),#1                ; DONE,*                                9928
                                        BNE     9$
                                        CLR     10(SP)                  ; NIB.PAT                               9930
                                        MOV     R2,-(SP)                ; BIT.CNT,*                             9931
                                        MOV     #4,-(SP)
                                        JSR     PC,BL$MOD
                                        MOV     R0,R4
                                        ASR     R0
                                        ASR     R0
                                        ASR     R0
                                        MOV     #14,R3
                                        ADD     SP,R3                   ; NIB.PAT,*
                                        ADD     R3,R0
                                        MOV     R0,(SP)
                                        MOV     R4,-(SP)
```

```
22507                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
22508                                   ;                                                       22-Dec-1980 09:21:22    PA:<
22509
22510 077704  042716  177770                  BIC     #177770,(SP)
22511 077710  012746  000001                  MOV     #1,-(SP)
22512 077714  011646                          MOV     (SP),-(SP)
22513 077716  004767  103454                  JSR     PC,BL$PU2
22514 077722  005067  111224                  CLR     D1.TEMP                         ;                       9932
22515 077726  005067  111222                  CLR     D2.TEMP                         ;                       9933
22516 077732  012767  060000  111216          MOV     #60000,E2.TEMP                  ;                       9934
22517 077740  010516                          MOV     R5,(SP)                         ; NIB.SEL,*             9935
22518 077742  016646  000022                  MOV     22(SP),-(SP)                    ; NIB.PAT,*
22519 077746  004767  117152                  JSR     PC,LD.LNG.WRD
22520 077752  016777  111174  113364          MOV     D1.TEMP,@ML.REG+170
22521 077760  016777  111170  113366          MOV     D2.TEMP,@ML.REG+200
22522 077766  016777  111164  113340          MOV     E2.TEMP,@ML.REG+160
22523 077774  152777  000020  113272          BISB    #20,@ML.REG+120                 ;                       9937
22524 100002  012703  000001                  MOV     #1,R3                           ; *,$$TMP2              9938
22525 100006  001411                  12$:    BEQ     15$
22526 100010  016704  102102                  MOV     L$DLY,R4                        ; *,$$TMP1
22527 100014  001404                          BEQ     14$
22528 100016  005066  000026          13$:    CLR     26(SP)                          ; $$TMP
22529 100022  005304                          DEC     R4                              ; $$TMP1
22530 100024  001374                          BNE     13$
22531 100026  005303                  14$:    DEC     R3                              ; $$TMP2
22532 100030  000766                          BR      12$
22533 100032  104402                  15$:    TRAP    2
22534 100034  152777  000040  113152          BISB    #40,@ML.REG+40                  ;                       9939
22535 100042  016704  113534                  MOV     ML.DUT,R4
22536 100046  042704  177770                  BIC     #177770,R4
22537 100052  142777  000007  113134          BICB    #7,@ML.REG+40
22538 100060  150477  113130                  BISB    R4,@ML.REG+40
22539 100064  004767  115772                  JSR     PC,GD.BLK.XFER                  ;                       9941
22540 100070  142777  000002  113176          BICB    #2,@ML.REG+120                  ;                       9942
22541 100076  012777  000071  113050          MOV     #71,@ML.REG                     ;                       9943
22542 100104  105777  113114          16$:    TSTB    @ML.REG+50
22543 100110  100375                          BPL     16$
22544 100112  005003                          CLR     R3                              ; CNT                   9946
22545 100114  010304                  17$:    MOV     R3,R4                           ; CNT,*                 9948
22546 100116  006304                          ASL     R4
22547 100120  005764  011600                  TST     IO.BUF(R4)
22548 100124  001432                          BEQ     18$
22549 100126  104455                          TRAP    55                              ;                       9951
22550 100130  000214                          .WORD   214
22551 100132  010526                          .WORD   SYNC
22552 100134  024052                          .WORD   DUMPER
22553 100136  012746  006374                  MOV     #WRD.9,-(SP)                    ;                       9952
22554 100142  012746  007340                  MOV     #WRD.76,-(SP)
22555 100146  012746  007614                  MOV     #PHR.12,-(SP)
22556 100152  012746  006034                  MOV     #THR.FMT,-(SP)
22557 100156  012746  000004                  MOV     #4,-(SP)
22558 100162  010600                          MOV     SP,R0                           ; SP,*
22559 100164  104414                          TRAP    14
22560 100166  010216                          MOV     R2,(SP)                         ; BIT.CNT,*             9953
22561 100170  010146                          MOV     R1,-(SP)                        ; WRD.CNT,*
```

```
22563                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
22564                                   ;                                                       22-Dec-1980 09:21:22    PA:<
22565
22566 100172  012746  005606                    MOV     #FMT.22,-(SP)
22567 100176  012746  000003                    MOV     #3,-(SP)
22568 100202  010600                            MOV     SP,R0                   ; SP,*
22569 100204  104414                            TRAP    14
22570 100206  062706  000020                    ADD     #20,SP                  ;                                       9950
22571 100212  005203                    18$:    INC     R3                      ; CNT                                   9946
22572 100214  020327  000015                    CMP     R3,#15                  ; CNT,*
22573 100220  003735                            BLE     17$
22574 100222  104467                            TRAP    67                      ;                                       9954
22575 100224  006000                            ROR     R0
22576 100226  103701                            BLO     15$
22577 100230  062706  000020                    ADD     #20,SP                  ;                                       9891
22578 100234  005202                            INC     R2                      ; BIT.CNT                               9890
22579 100236  020227  000043                    CMP     R2,#43                  ; BIT.CNT,*
22580 100242  003002                            BGT     19$
22581 100244  000167  177030                    JMP     2$
22582 100250  005201                    19$:    INC     R1                      ; WRD.CNT                               9887
22583 100252  020127  000005                    CMP     R1,#5                   ; WRD.CNT,*
22584 100256  003002                            BGT     20$
22585 100260  000167  177012                    JMP     1$
22586 100264  062706  000010            20$:    ADD     #10,SP                  ;                                       9841
22587 100270  000207                            RTS     PC
22588
22589                                   ; Routine Size:  259 words
22590                                   ; Maximum stack depth per invocation:  26 words
22595
22596
22600
22604 100272                            T54::
22605 100272  004767  176766            1$:     JSR     PC,$T54                 ;                                       9959
22606 100276  104466                            TRAP    66
22607 100300  006000                            ROR     R0
22608 100302  103773                            BLO     1$
22609 100304  000207                            RTS     PC
22610
22611                                   ; Routine Size:  6 words
22612                                   ; Maximum stack depth per invocation:  0 words
```

```
22618 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
22619 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (104)
22620
22621 ;          9962  !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (105)

```
22623 ;ML4
22624 ;
22625
22626 ;          9963  !
22627 ;          9964  BGNTST;
22628 ;          9965
22629 ;          9966  !++
22630 ;          9967  ! TEST NUMBER:  TST 55
22631 ;          9968  !
22632 ;          9969  ! TEST NAME:              MULTIPLE BIT ERROR SYNDRONE GENERATION AND DECODE TEST
22633 ;          9970  !
22634 ;          9971  ! TEST DESCRIPTION:
22635 ;          9972  !       TEST SYNDRONE GENERATION, SYNDRONE DECODE
22636 ;          9973  !       AND ERROR CORRECTION FOR MULTIPLE BIT
22637 ;          9974  !       CHANNEL ERRORS BY:
22638 ;          9975  !
22639 ;          9976  !       1.  CLEAR THE FIRST CRC GROUP IN THE
22640 ;          9977  !           IO_BUF AND GOOD BLOCK TO ZEROES
22641 ;          9978  !
22642 ;          9979  !       2.  VIA DATA DIAG MODE FLIP ALL BITS IN
22643 ;          9980  !           A CHANNEL TO ONES
22644 ;          9981  !
22645 ;          9982  !       3.  THEN DO A MASS BUS READ TRANSFER AND
22646 ;          9983  !           EXAMIN THE IO_BUF FOR ZEROES INDICATING
22647 ;          9984  !           THE CORRECTION WAS PERFORMED
22648 ;          9985  !
22649 ;          9986  !       4.  REPEAT FOR ALL CHANNELS IN THE CRC GROUP
22650 ;          9987  !
22651 ;          9988  ! IMPLICIT INPUTS:
22652 ;          9989  !       PD_TEMP
22653 ;          9990  !       A BIT VECTOR OF 16 BITS WHERE THE READ
22654 ;          9991  !       PROM DATA IS STORED OAND ACCESSED FROM.
22655 ;          9992  !
22656 ;          9993  !       IO_BUF
22657 ;          9994  !       A  VECTOR OF 256 WORDS WHERE DATA
22658 ;          9995  !       FOR MBUS READS AND WRITES TRANSFERS
22659 ;          9996  !       IS FOUND.
22660 ;          9997  !
22661 ;          9998  !
22662 ;          9999  !--
22663 ;         10000
22664 ;         10001  local
22665 ;         10002      NIB_PAT : bitvector [4],          !STORAGE FOR SBE TO BE GENERATED
22666 ;         10003      NIB_SEL,                          !POINTER TO WHERE ERROR IS TO BE WRITTEN
22667 ;         10004      GD_WRD_CNT;                       !COUNT OF WHERE GOOD 'NIB_SEL' ARE FOUND
22668 ;         10005
22669 ;         10006  E2_TEMP<12, 3> = %b'110';             !LOAD DATA STRUCTURE WITH ZEROES CRC PATTERN
22670 ;         10007
22671 ;         10008  incr BIT_CNT from 0 to 35 do          !TEST FOR MULTILPLE ERRORS AT 36 CHANNELS
22672 ;         10009      begin
22673 ;         10010      CLR_MBUS;                         !CLEAR THE DRIVE
22674 ;         10011
22675 ;         10012      incr CNT from 0 to 255 do         !CLEAR FIRST CRC GROUP IN THE IO_BUF
22676 ;         10013          IO_BUF [.CNT] = ZEROES;
22677 ;         10014
```

```
22679 ;ML4
22680 ;
22681
22682 ;          10015     GD_BLK_XFER ();                          !ALSO CLEAR THTE FIRST CRC GROUP
22683 ;          10016     MLCS1 = write;                           !IN THE ML11'S GOOD BLOCK
22684 ;          10017     TIME_OUT_LOOP;
22685 ;          10018     GD_WRD_CNT = ZERO;                       !CLEAR COUNT
22686 ;          10019     D1_TEMP = ZEROES;                        !CLEAR D1_TEMP
22687 ;          10020     D2_TEMP = ZEROES;                        !CLEAR D2_TEMP
22688 ;          10021     NIB_PAT = ZEROES;                        !CLEAR NIBBLE PATTERN
22689 ;          10022     NIB_SEL = .BIT_CNT/4;                    !CALCULATE THE NIBBLE TO BE IN ERROR
22690 ;          10023     NIB_PAT [.BIT_CNT mod 4] = ONE;          !CALCULATE AND THE BIT TO BE IN ERROR
22691 ;          10024     LD_LNG_WRD (.NIB_SEL, .NIB_PAT);         !LOAD THE ERROR IN D1_TEMP OR D2_TEMP
22692 ;          10025     WRT_LNG_WRD;                             !LOAD THE REGISTER WITH THE ERROR
22693 ;          10026     DAT_DM_XFER ();                          !SET UP A DATA DIAG MODE TRANSFER
22694 ;          10027     MLCS1 = write;                           !DO A WRITE TRANSFER
22695 ;          10028     DELAY (ONE_US);                          !GIVE THE PROM DATA TIME TO COME OUT
22696 ;          10029
22697 ;          10030     do                                       !LOAD THIS CHANNEL WITH MULTIPLE ERRORS
22698 ;          10031         begin
22699 ;          10032         PD_TEMP = .MLPD;                     !READ THIS ARRAY WORDS PROM_DATA
22700 ;          10033
22701 ;          10034         if .PD_TEMP [.NIB_SEL] IS_SET        !SEE IF THIS A GOOD NIBBLE
22702 ;          10035         then
22703 ;          10036             DAT_CLK = ONE                    !CLOCK OUT ANOTHER ARRAY WORD IF BAD
22704 ;          10037         else
22705 ;          10038             begin                            !ELSE CLOCK IN THE ERROR INTO A GOOD NIBBLE
22706 ;          10039             GD_WRD_CNT = .GD_WRD_CNT + 1;
22707 ;          10040             DAT_CLR = ONE;
22708 ;          10041             end;
22709 ;          10042
22710 ;          10043         end
22711 ;          10044     until .GD_WRD_CNT eql 6;                 !REPEAT UNTIL 6 WORDS ARE WRITTEN
22712 ;          10045
22713 ;          10046     BGNSUB;                                  !START OF SCOPE LOOP
22714 ;          10047     CLR_MBUS;                                !CLEAR OUT THE DATA DISG MODE TRANSFER
22715 ;          10048     GD_BLK_XFER ();                          !SET UP A GOOD BLOCK TRANSFER
22716 ;          10049     ECC_DIS = 0;                             !ENABLE ERROR CORRECTION
22717 ;          10050     MLCS1 = read;                            !READ OUT THE ERRORS
22718 ;          10051     TIME_OUT_LOOP;                           !WAIT FOR THE TRANSFER TO COMPLETE
22719 ;          10052
22720 ;          10053     incr WRD_CNT from 0 to 13 do             !SEE IF THE CORRECTIONS WHERE DONE
22721 ;          10054
22722 ;          10055         if .IO_BUF [.WRD_CNT] neq ZEROES     !TEST THE IO_BUF FOR ALL ZEROES
22723 ;          10056         then
22724 ;          10057             begin                            !REPORT THE ERROR IF ANY LOCATIONS ARE NOT ZEROES
22725 ;          10058             ERRDF (141, SYNC, DUMPER);
22726 ;          10059             PRINTB (THR_FMT, PHR_13, WRD_76, WRD_9);
22727 ;          10060             PRINTB (FMT_22, .WRD_CNT, .BIT_CNT);
22728 ;          10061             end;
22729 ;          10062
22730 ;          10063     ENDSUB;                                  !END OF SCOPE LOOP
22731 ;          10064     end;
22732 ;          10065
22733 ;          10066 ENDTST;
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (105)

```
22735 ;ML4
22736 ;
22737
22741
22745 100306 004167 103604        $T55:  JSR     R1,$SAVE5                    ;                                  9961
22746 100312 024646                      CMP     -(SP),-(SP)
22747 100314 042767 070000 110634        BIC     #70000,E2.TEMP               ;                                  1000
22748 100322 052767 060000 110626        BIS     #60000,E2.TEMP
22749 100330 005003                      CLR     R3                           ; BIT.CNT                          1000
22750 100332 152777 000040 112654  1$:   BISB    #40,@ML.REG+40               ;                                  1000
22751 100340 016702 113236               MOV     ML.DUT,R2
22752 100344 042702 177770               BIC     #177770,R2
22753 100350 142777 000007 112636        BICB    #7,@ML.REG+40
22754 100356 150277 112632               BISB    R2,@ML.REG+40
22755 100362 005001                      CLR     R1                           ; CNT                              1001
22756 100364 010102                2$:   MOV     R1,R2                        ; CNT,*                            1001
22757 100366 006302                      ASL     R2
22758 100370 005062 011600               CLR     IO.BUF(R2)
22759 100374 005201                      INC     R1                           ; CNT                              1001
22760 100376 020127 000377               CMP     R1,#377                      ; CNT,*
22761 100402 003770                      BLE     2$
22762 100404 004767 115452               JSR     PC,GD.BLK.XFER               ;                                  1001
22763 100410 012777 000061 112536        MOV     #61,@ML.REG                  ;                                  1001
22764 100416 105777 112602         3$:   TSTB    @ML.REG+50
22765 100422 100375                      BPL     3$
22766 100424 005005                      CLR     R5                           ; GD.WRD.CNT                       1001
22767 100426 005067 110520               CLR     D1.TEMP                      ;                                  1001
22768 100432 005067 110516               CLR     D2.TEMP                      ;                                  1002
22769 100436 005016                      CLR     (SP)                         ; NIB.PAT                          1002
22770 100440 010346                      MOV     R3,-(SP)                     ; BIT.CNT,*                        1002
22771 100442 012746 000004               MOV     #4,-(SP)
22772 100446 004767 103300               JSR     PC,BL$DIV
22773 100452 010004                      MOV     R0,R4                        ; *,NIB.SEL
22774 100454 010346                      MOV     R3,-(SP)                     ; BIT.CNT,*                        1002
22775 100456 012746 000004               MOV     #4,-(SP)
22776 100462 004767 103276               JSR     PC,BL$MOD
22777 100466 010002                      MOV     R0,R2
22778 100470 006200                      ASR     R0
22779 100472 006200                      ASR     R0
22780 100474 006200                      ASR     R0
22781 100476 012701 000010               MOV     #10,R1
22782 100502 060601                      ADD     SP,R1                        ; NIB.PAT,*
22783 100504 060100                      ADD     R1,R0
22784 100506 010016                      MOV     R0,(SP)
22785 100510 010246                      MOV     R2,-(SP)
22786 100512 042716 177770               BIC     #177770,(SP)
22787 100516 012746 000001               MOV     #1,-(SP)
22788 100522 011646                      MOV     (SP),-(SP)
```

```
                                                                                                                    22-Dec-1980 09:24:31    TOPS
                                                                                                                    22-Dec-1980 09:21:22    PA:<
                                ;ML4
                                ;
                                                                                                                                            
                                                JSR     PC,BLSPU2
                                                MOV     R4,(SP)                 ; NIB.SEL,*                                                 1002
                                                MOV     16(SP),-(SP)            ; NIB.PAT,*
                                                JSR     PC,LD.LNG.WRD
                                                MOV     D1.TEMP,@ML.REG+170
                                                MOV     D2.TEMP,@ML.REG+200
                                                MOV     E2.TEMP,@ML.REG+160
                                                JSR     PC,DAT.DM.XFER          ;                                                           1002
                                                MOV     #61,@ML.REG             ;                                                           1002
                                                MOV     #1,R1                   ; *,$$TMP2                                                  1002
                                4$:             BEQ     7$
                                                MOV     L$DLY,R2                ; *,$$TMP1
                                                BEQ     6$
                                5$:             CLR     22(SP)                  ; $$TMP
                                                DEC     R2                      ; $$TMP1
                                                BNE     5$
                                6$:             DEC     R1                      ; $$TMP2
                                                BR      4$
                                7$:             MOV     R4,R2                   ; NIB.SEL,*                                                 1003
                                                ASR     R2
                                                ASR     R2
                                                ASR     R2
                                                ADD     #PD.TEMP,R2
                                8$:             MOV     @ML.REG+230,PD.TEMP     ;                                                           1003
                                                MOV     R2,-(SP)                ;                                                           1003
                                                MOV     R4,-(SP)                ; NIB.SEL,*
                                                BIC     #177770,(SP)
                                                MOV     #1,-(SP)
                                                CLR     -(SP)
                                                JSR     PC,BL$GT2
                                                ADD     #10,SP
                                                DEC     R0
                                                BEQ     9$                      ;                                                           1003
                                                INC     R5                      ; GD.WRD.CNT                                                1003
                                9$:             BISB    #20,@ML.REG+120         ;                                                           1004
                                                CMP     R5,#6                   ; GD.WRD.CNT,*                                              1004
                                                BNE     8$
                                10$:            TRAP    2
                                                BISB    #40,@ML.REG+40          ;                                                           1004
                                                MOV     ML.DUT,R2
                                                BIC     #177770,R2
                                                BICB    #7,@ML.REG+40
                                                BISB    R2,@ML.REG+40
                                                JSR     PC,GD.BLK.XFER          ;                                                           1004
                                                BICB    #2,@ML.REG+120          ;                                                           1004
                                                MOV     #71,@ML.REG             ;                                                           1005
                                11$:            TSTB    @ML.REG+50
                                                BPL     11$
                                                CLR     R1                      ; WRD.CNT                                                   1005
                                12$:            MOV     R1,R2                   ; WRD.CNT,*                                                 1005
                                                ASL     R2
                                                TST     IO.BUF(R2)
```

```
22846                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
22847                                   ;                                                       22-Dec-1980 09:21:22    PA:<
22848
22849 101012  001432                          BEQ     13$
22850 101014  104455                          TRAP    55                              ;                                       1005
22851 101016  000215                          .WORD   215
22852 101020  010526                          .WORD   SYNC
22853 101022  024052                          .WORD   DUMPER
22854 101024  012746  006374                  MOV     #WRD.9,-(SP)                    ;                                       1005
22855 101030  012746  007340                  MOV     #WRD.76,-(SP)
22856 101034  012746  007636                  MOV     #PHR.13,-(SP)
22857 101040  012746  006034                  MOV     #THR.FMT,-(SP)
22858 101044  012746  000004                  MOV     #4,-(SP)
22859 101050  010600                          MOV     SP,R0                           ; SP,*
22860 101052  104414                          TRAP    14
22861 101054  010316                          MOV     R3,(SP)                         ; BIT.CNT,*                             1006
22862 101056  010146                          MOV     R1,-(SP)                        ; WRD.CNT,*
22863 101060  012746  005606                  MOV     #FMT.22,-(SP)
22864 101064  012746  000003                  MOV     #3,-(SP)
22865 101070  010600                          MOV     SP,R0                           ; SP,*
22866 101072  104414                          TRAP    14
22867 101074  062706  000020                  ADD     #20,SP                          ;                                       1005
22868 101100  005201                  13$:    INC     R1                              ; WRD.CNT                               1005
22869 101102  020127  000015                  CMP     R1,#15                          ; WRD.CNT,*
22870 101106  003735                          BLE     12$
22871 101110  104467                          TRAP    67                              ;                                       1006
22872 101112  006000                          ROR     R0
22873 101114  103701                          BLO     10$
22874 101116  062706  000020                  ADD     #20,SP                          ;                                       1000
22875 101122  005203                          INC     R3                              ; BIT.CNT                               1000
22876 101124  020327  000043                  CMP     R3,#43                          ; BIT.CNT,*
22877 101130  003002                          BGT     14$
22878 101132  000167  177174                  JMP     1$
22879 101136  022626                  14$:    CMP     (SP)+,(SP)+                     ;                                       9961
22880 101140  000207                          RTS     PC
22881
22882                                   ; Routine Size:  206 words
22883                                   ; Maximum stack depth per invocation:  24 words
22888
22889
22893
22897 101142                            T55::
22898 101142  004767  177140            1$:     JSR     PC,$T55                         ;                                       1006
22899 101146  104466                          TRAP    66
```

```
22901                                   ;ML4                                    22-Dec-1980 09:24:31    TOPS
22902                                   ;                                       22-Dec-1980 09:21:22    PA:<
22903
22904 101150  006000                            ROR     R0
22905 101152  103773                            BLO     1$
22906 101154  000207                            RTS     PC
22907
22908                                   ; Routine Size:  6 words
22909                                   ; Maximum stack depth per invocation:  0 words
22914
22915
22916 ;         10067 !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (106)

```
22918 ;ML4
22919 ;
22920
22921 ;          10068 !
22922 ;          10069 BGNTST;
22923 ;          10070
22924 ;          10071 !++
22925 ;          10072 ! TEST NUMBER:  TST 56
22926 ;          10073 !
22927 ;          10074 ! TEST NAME:            ECC ERROR REGISTER TEST
22928 ;          10075 !
22929 ;          10076 ! TEST DESCRIPTION:
22930 ;          10077 !       TEST THE ECC ERROR REGISTER FOR
22931 ;          10078 !       CLEARING AND LATCHING OF ECC ERROR
22932 ;          10079 !       INFORMATION ON DETTECTION
22933 ;          10080 !       OF ECC ERRORS BY:
22934 ;          10081 !
22935 ;          10082 !       1.  THIS TEST IS TABLE DRIVEN.  DATA TABLE (DT_1)
22936 ;          10083 !           CONTAINS ERROR FORCING DATA AND EXPECTED
22937 ;          10084 !           MLEE DATA AS A RESULT OF THE FORCED ERROR
22938 ;          10085 !
22939 ;          10086 !       2.  THE TEST THEREFOR INDEXES INTO DT_1 TO FORCE
22940 ;          10087 !           AN ECC ERROR
22941 ;          10088 !
22942 ;          10089 !       3.  A MASS BUS READ TRANSFER IS DONE
22943 ;          10090 !
22944 ;          10091 !       4.  DT_1 IS AGAIN INDEXED AND ITS CONTENTS
22945 ;          10092 !           IS COMPARED AGAINST THE RESULTING
22946 ;          10093 !           MLEE REGISTER  CONTENTS
22947 ;          10094 !
22948 ;          10095 !       5.  A MASS BUS CLEAR IS DONE AN MLEE IS CHECKED FOR
22949 ;          10096 !           ZEROES
22950 ;          10097 !
22951 ;          10098 !       6.  THE ECH BIT IS ALSO EXAMINED FOR CORRECT
22952 ;          10099 !           LATCHING INFORMATION
22953 ;          10100 !
22954 ;          10101 !
22955 ;          10102 !
22956 ;          10103 !--
22957 ;          10104
22958 ;          10105 local
22959 ;          10106     FINISH,                          !VARIABLE ENDING CONDITION FOR LATCH_LOOP
22960 ;          10107     ERR_FLG;                         !ERROR FLAG
22961 ;          10108
22962 ;          10109 CLR_MBUS;                            !CLEAR THE DRIVE
22963 ;          10110 FINISH = 4;                          !MAKE LATCH_LOOP DO 5 LOOPS AT FIRST
22964 ;          10111
22965 ;          10112 incr CLR_LOOP from 0 to 1 do         !THE FIRST PASS TESTS MLEE FOR LATCHING
22966 ;          10113     !THE SECOND PASS TESTS MLEE FOR CLEARING
22967 ;          10114     begin
22968 ;          10115
22969 ;          10116     incr LATCH_LOOP from 0 to .FINISH do   !TEST MLEE FOR LATCHING BY USING DT_1 DATA
22970 ;          10117         begin
22971 ;          10118         BGNSUB;                      !START OF SCOPE LOOP
22972 ;          10119         ERR_FLG = ZERO;              !CLEAR THE ERROR FLAG
```

```
22974 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
22975 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (106)
22976
22977 ;          10120      MLER = ZEROES;                    !CLEAR THE ERROR REGISTER
22978 ;          10121      ECC_DM = ONE;                     !ENABLE ECC DIAG MODE
22979 ;          10122      PAR_CRC_WRD = .DT_1 [.LATCH_LOOP, P0_5];        !GET PAR_CRC_WRD DATA FROM DT_1
22980 ;          10123      CRC_A = .DT_1 [.LATCH_LOOP, A0_5];    !GET CRC_A FROM DT_1
22981 ;          10124      CRC_B = .DT_1 [.LATCH_LOOP, B0_5];    !GET CRC_B FROM DT_1
22982 ;          10125      GD_BLK_XFER ();                   !SET UP A GOOD BLOCK TRANSFER
22983 ;          10126      ECC_DIS = ZERO;                   !DISABLE ECC DIABLE
22984 ;          10127      MLCS1 = read;                     !READ THE ERROR AND LACTH MLEE
22985 ;          10128      TIME_OUT_LOOP;
22986 ;          10129
22987 ;          10130      if .CRC_ERR neq .DT_1 [.LATCH_LOOP, CRC_DATA] then ERR_FLG = ONE;       !TEST CRC_ERR
22988 ;          10131
22989 ;          10132      if .SGL_ERR neq .DT_1 [.LATCH_LOOP, SGL_DATA] then ERR_FLG = ONE;       !TEST SGL_ERR
22990 ;          10133
22991 ;          10134      if .UNC_ERR neq .DT_1 [.LATCH_LOOP, UNC_DATA] then ERR_FLG = ONE;       !TEST UNC
22992 ;          10135
22993 ;          10136      if .BIT_IN_ERR neq .DT_1 [.LATCH_LOOP, E0_5] then ERR_FLG = ONE;        !TEST BIT IN ERROR
22994 ;          10137
22995 ;          10138      if .CHAN_IN_ERR neq .DT_1 [.LATCH_LOOP, C0_5] then ERR_FLG = ONE;       !TEST CHANNEL IN ERROR
22996 ;          10139
22997 ;          10140      if .ECH_ERR neq .DT_1 [.LATCH_LOOP, ECH_DATA]   !TEST IF ECH GOT SET
22998 ;          10141      then
22999 ;          10142          begin                         !REPORT ERROR IF NOT SET
23000 ;          10143          ERRDF (123, ASYNC, DUMPER);
23001 ;          10144          PRINTB (FOR_FMT, WRD_67, WRD_10, WRD_69, WRD_14);
23002 ;          10145          end;
23003 ;          10146
23004 ;          10147          if .ERR_FLG IS_SET            !TEST IF THE ERROR FLAG GOT SET
23005 ;          10148          then
23006 ;          10149              begin                     !REPORT ERROR IF SET
23007 ;          10150              ERRDF (124, SYNC, DUMPER);
23008 ;          10151              PRINTB (THR_FMT, REG_14, WRD_52, PHR_11);
23009 ;          10152              PRINTB (FMT_1, .DT_1 [.LATCH_LOOP, EE_DATA], .MLEE);
23010 ;          10153              PRINTB (FMT_19, .DT_1 [.LATCH_LOOP, B0_5], .DT_1 [.LATCH_LOOP, A0_5], .DT_1 [.LATCH_LOOP, P0_5])
23011 ;          10154              end;
23012 ;          10155
23013 ;          10156          ENDSUB;                       !END OF SCOPE LOOP
23014 ;          10157          end;
23015 ;          10158
23016 ;          10159      CLR_MBUS;                         !CLEAR THE REGISTER
23017 ;          10160
23018 ;          10161      if .MLEE neq ZERO                 !SEE IF THE REGISTER GOT CLEARED
23019 ;          10162      then
23020 ;          10163          begin                         !REPORT ERROR IF NOT CLEARED
23021 ;          10164          ERRDF (125, SYNC, DUMPER);
23022 ;          10165          PRINTB (FOR_FMT, REG_14, WRD_52, FNC_7, WRD_14);
23023 ;          10166          end;
23024 ;          10167
23025 ;          10168      ECC_DM = ONE;                     !ENABLE ECC DISABLE
23026 ;          10169      FINISH = ZERO;                    !MAKE LATCH_LOOP LOOP ONCE TO CLEAR MLEE AGAIN
23027 ;          10170      end;
23028 ;          10171
```

```
23030 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
23031 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (106)
23032
23033 ;          10172 ENDTST;
23037
23041 101156 004167 102734          $T56:  JSR    R1,$SAVE5                    ;                              1006
23042 101162 152777 000040 112024          BISB   #40,@ML.REG+40               ;                              1010
23043 101170 016705 112406                 MOV    ML.DUT,R5
23044 101174 042705 177770                 BIC    #177770,R5
23045 101200 142777 000007 112006          BICB   #7,@ML.REG+40
23046 101206 150577 112002                 BISB   R5,@ML.REG+40
23047 101212 012746 000004                 MOV    #4,-(SP)                     ; *,FINISH                     1011
23048 101216 005046                        CLR    -(SP)                        ; CLR.LOOP                     1011
23049 101220 005004                 1$:    CLR    R4                           ; LATCH.LOOP                   1011
23050 101222 000167 000644                 JMP    16$
23051 101226 010446                 2$:    MOV    R4,-(SP)                     ; LATCH.LOOP,*                 1012
23052 101230 012746 000006                 MOV    #6,-(SP)
23053 101234 004767 102266                 JSR    PC,BL$MUL
23054 101240 010005                        MOV    R0,R5
23055 101242 012701 013534                 MOV    #DT.1,R1                     ;                              1013
23056 101246 060501                        ADD    R5,R1
23057 101250 012702 013536                 MOV    #DT.1+2,R2                   ;                              1012
23058 101254 060502                        ADD    R5,R2
23059 101256 104402                 3$:    TRAP   2                            ;                              1011
23060 101260 005003                        CLR    R3                           ; ERR.FLG                      1011
23061 101262 005077 111746                 CLR    @ML.REG+60                   ;                              1012
23062 101266 152777 000001 112000          BISB   #1,@ML.REG+120               ;                              1012
23063 101274 011200                        MOV    (R2),R0                      ;                              1012
23064 101276 006300                        ASL    R0
23065 101300 006300                        ASL    R0
23066 101302 042700 140377                 BIC    #140377,R0
23067 101306 042777 037400 112010          BIC    #37400,@ML.REG+150
23068 101314 050077 112004                 BIS    R0,@ML.REG+150
23069 101320 111200                        MOVB   (R2),R0                      ;                              1012
23070 101322 042700 177700                 BIC    #177700,R0
23071 101326 142777 000077 111770          BICB   #77,@ML.REG+150
23072 101334 150077 111764                 BISB   R0,@ML.REG+150
23073 101340 116500 013540                 MOVB   DT.1+4(R5),R0                ;                              1012
23074 101344 042700 177700                 BIC    #177700,R0
23075 101350 142777 000077 111756          BICB   #77,@ML.REG+160
23076 101356 150077 111752                 BISB   R0,@ML.REG+160
23077 101362 004767 114474                 JSR    PC,GD.BLK.XFER               ;                              1012
23078 101366 142777 000002 111700          BICB   #2,@ML.REG+120               ;                              1012
23079 101374 012777 000071 111552          MOV    #71,@ML.REG                  ;                              1012
23080 101402 105777 111616          4$:    TSTB   @ML.REG+50
23081 101406 100375                        BPL    4$
23082 101410 011146                        MOV    (R1),-(SP)                   ;                              1013
23083 101412 042716 157777                 BIC    #157777,(SP)
```

```
23085                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
23086                                   ;                                                       22-Dec-1980 09:21:22    PA:<
23087
23088 101416 017700 111742                     MOV     @ML.REG+210,R0
23089 101422 042700 157777                     BIC     #157777,R0
23090 101426 020026                            CMP     R0,(SP)+
23091 101430 001402                            BEQ     5$
23092 101432 012703 000001                     MOV     #1,R3                           ; *,ERR.FLG
23093 101436 011146                     5$:    MOV     (R1),-(SP)                      ;                                       1013
23094 101440 042716 137777                     BIC     #137777,(SP)
23095 101444 017700 111714                     MOV     @ML.REG+210,R0
23096 101450 042700 137777                     BIC     #137777,R0
23097 101454 020026                            CMP     R0,(SP)+
23098 101456 001402                            BEQ     6$
23099 101460 012703 000001                     MOV     #1,R3                           ; *,ERR.FLG
23100 101464 011146                     6$:    MOV     (R1),-(SP)                      ;                                       1013
23101 101466 042716 077777                     BIC     #77777,(SP)
23102 101472 017700 111666                     MOV     @ML.REG+210,R0
23103 101476 042700 077777                     BIC     #77777,R0
23104 101502 020026                            CMP     R0,(SP)+
23105 101504 001402                            BEQ     7$
23106 101506 012703 000001                     MOV     #1,R3                           ; *,ERR.FLG
23107 101512 111146                     7$:    MOVB    (R1),-(SP)                      ;                                       1013
23108 101514 042716 177700                     BIC     #177700,(SP)
23109 101520 117700 111640                     MOVB    @ML.REG+210,R0
23110 101524 042700 177700                     BIC     #177700,R0
23111 101530 020026                            CMP     R0,(SP)+
23112 101532 001402                            BEQ     8$
23113 101534 012703 000001                     MOV     #1,R3                           ; *,ERR.FLG
23114 101540 011146                     8$:    MOV     (R1),-(SP)                      ;                                       1013
23115 101542 042716 170077                     BIC     #170077,(SP)
23116 101546 017700 111612                     MOV     @ML.REG+210,R0
23117 101552 042700 170077                     BIC     #170077,R0
23118 101556 020026                            CMP     R0,(SP)+
23119 101560 001402                            BEQ     9$
23120 101562 012703 000001                     MOV     #1,R3                           ; *,ERR.FLG
23121 101566 011246                     9$:    MOV     (R2),-(SP)                      ;                                       1014
23122 101570 005046                            CLR     -(SP)
23123 101572 032766 010000 000002              BIT     #10000,2(SP)
23124 101600 001401                            BEQ     10$
23125 101602 005216                            INC     (SP)
23126 101604 005000                     10$:   CLR     R0
23127 101606 132777 000100 111420              BITB    #100,@ML.REG+60
23128 101614 001401                            BEQ     11$
23129 101616 005200                            INC     R0
23130 101620 020026                     11$:   CMP     R0,(SP)+
23131 101622 001002                            BNE     12$
23132 101624 005726                            TST     (SP)+
23133 101626 000425                            BR      13$
23134 101630 005726                     12$:   TST     (SP)+
23135 101632 104455                            TRAP    55                              ;                                       1014
23136 101634 000173                            .WORD   173
23137 101636 010464                            .WORD   ASYNC
23138 101640 024052                            .WORD   DUMPER
23139 101642 012746 006442                     MOV     #WRD.14,-(SP)                   ;                                       1014
```

```
23141                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
23142                                   ;                                                       22-Dec-1980 09:21:22    PA:<
23143
23144 101646  012746  007252                    MOV     #WRD.69,-(SP)
23145 101652  012746  006406                    MOV     #WRD.10,-(SP)
23146 101656  012746  007240                    MOV     #WRD.67,-(SP)
23147 101662  012746  006046                    MOV     #FOR.FMT,-(SP)
23148 101666  012746  000005                    MOV     #5,-(SP)
23149 101672  010600                            MOV     SP,R0                           ; SP,*
23150 101674  104414                            TRAP    14
23151 101676  062706  000014                    ADD     #14,SP                          ;                                       1014
23152 101702  020327  000001          13$:      CMP     R3,#1                           ; ERR.FLG,*                             1014
23153 101706  001062                            BNE     14$
23154 101710  104455                            TRAP    55                              ;                                       1015
23155 101712  000174                            .WORD   174
23156 101714  010526                            .WORD   SYNC
23157 101716  024052                            .WORD   DUMPER
23158 101720  012746  007576                    MOV     #PHR.11,-(SP)                   ;                                       1015
23159 101724  012746  007066                    MOV     #WRD.52,-(SP)
23160 101730  012746  010376                    MOV     #REG.14,-(SP)
23161 101734  012746  006034                    MOV     #THR.FMT,-(SP)
23162 101740  012746  000004                    MOV     #4,-(SP)
23163 101744  010600                            MOV     SP,R0                           ; SP,*
23164 101746  104414                            TRAP    14
23165 101750  017716  111410                    MOV     @ML.REG+210,(SP)                ;                                       1015
23166 101754  011146                            MOV     (R1),-(SP)
23167 101756  012746  004222                    MOV     #FMT.1,-(SP)
23168 101762  012746  000003                    MOV     #3,-(SP)
23169 101766  010600                            MOV     SP,R0                           ; SP,*
23170 101770  104414                            TRAP    14
23171 101772  011200                            MOV     (R2),R0                         ;                                       1015
23172 101774  006200                            ASR     R0
23173 101776  006200                            ASR     R0
23174 102000  006200                            ASR     R0
23175 102002  006200                            ASR     R0
23176 102004  006200                            ASR     R0
23177 102006  006200                            ASR     R0
23178 102010  042700  177700                    BIC     #177700,R0
23179 102014  010016                            MOV     R0,(SP)
23180 102016  111246                            MOVB    (R2),-(SP)
23181 102020  042716  177700                    BIC     #177700,(SP)
23182 102024  116546  013540                    MOVB    DT.1+4(R5),-(SP)
23183 102030  042716  177700                    BIC     #177700,(SP)
23184 102034  012746  005412                    MOV     #FMT.19,-(SP)
23185 102040  012746  000004                    MOV     #4,-(SP)
23186 102044  010600                            MOV     SP,R0                           ; SP,*
23187 102046  104414                            TRAP    14
23188 102050  062706  000030                    ADD     #30,SP                          ;                                       1014
23189 102054  104467                14$:       TRAP    67                              ;                                       1015
23190 102056  006000                            ROR     R0
23191 102060  103002                            BHIS    15$
23192 102062  000167  177170                    JMP     3$
23193 102066  022626                15$:       CMP     (SP)+,(SP)+                     ;                                       1011
23194 102070  005204                            INC     R4                              ; LATCH.LOOP                            1011
23195 102072  020466  000002          16$:      CMP     R4,2(SP)                        ; LATCH.LOOP,FINISH
```

```
23197                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
23198                                   ;                                                       22-Dec-1980 09:21:22    PA:<
23199
23200 102076  003002                            BGT     17$
23201 102100  000167  177122                    JMP     2$
23202 102104  152777  000040  111102  17$:      BISB    #40,@ML.REG+40          ;                               1015
23203 102112  016705  111464                    MOV     ML.DUT,R5
23204 102116  042705  177770                    BIC     #177770,R5
23205 102122  142777  000007  111064            BICB    #7,@ML.REG+40
23206 102130  150577  111060                    BISB    R5,@ML.REG+40
23207 102134  005777  111224                    TST     @ML.REG+210             ;                               1016
23208 102140  001424                            BEQ     18$
23209 102142  104455                            TRAP    55                      ;                               1016
23210 102144  000175                            .WORD   175
23211 102146  010526                            .WORD   SYNC
23212 102150  024052                            .WORD   DUMPER
23213 102152  012746  006442                    MOV     #WRD.14,-(SP)           ;                               1016
23214 102156  012746  010012                    MOV     #FNC.7,-(SP)
23215 102162  012746  007066                    MOV     #WRD.52,-(SP)
23216 102166  012746  010376                    MOV     #REG.14,-(SP)
23217 102172  012746  006046                    MOV     #FOR.FMT,-(SP)
23218 102176  012746  000005                    MOV     #5,-(SP)
23219 102202  010600                            MOV     SP,R0                   ; SP,*
23220 102204  104414                            TRAP    14
23221 102206  062706  000014                    ADD     #14,SP                  ;                               1016
23222 102212  152777  000001  111054  18$:      BISB    #1,@ML.REG+120          ;                               1016
23223 102220  005066  000002                    CLR     2(SP)                   ; FINISH                        1016
23224 102224  005216                            INC     (SP)                    ; CLR.LOOP                      1011
23225 102226  021627  000001                    CMP     (SP),#1                 ; CLR.LOOP,*
23226 102232  003002                            BGT     19$
23227 102234  000167  176760                    JMP     1$
23228 102240  022626                    19$:    CMP     (SP)+,(SP)+             ;                               1006
23229 102242  000207                            RTS     PC
23230
23231                                   ; Routine Size:  283 words
23232                                   ; Maximum stack depth per invocation:  22 words
23237
23238
23242
23246 102244                            T56::
23247 102244  004767  176706            1$:     JSR     PC,$T56                 ;                               1017
23248 102250  104466                            TRAP    66
23249 102252  006000                            ROR     R0
23250 102254  103773                            BLO     1$
```

```
23252                                   ;ML4                                    22-Dec-1980 09:24:31    TOPS
23253                                   ;                                       22-Dec-1980 09:21:22    PA:<
23254
23255 102256  000207                            RTS     PC
23256
23257                                   ; Routine Size:  6 words
23258                                   ; Maximum stack depth per invocation:  0 words
23263
23264
23265 ;          10173 !<BLF/PAGE>
```

```
23267 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
23268 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (107)
23269
23270 ;          10174 !
23271 ;          10175 BGNTST;
23272 ;          10176
23273 ;          10177 !++
23274 ;          10178 ! TEST NUMBER:  TST 57
23275 ;          10179 !
23276 ;          10180 ! TEST NAME:            ECC ERROR LOCATION REGISTER TEST
23277 ;          10181 !
23278 ;          10182 ! TEST DESCRIPTION:
23279 ;          10183 !       TEST THE ECC ERROR LOCATION REGISTER FOR CLOCKING, BIT UNIQUENESS
23280 ;          10184 !       CLEARING AND LATCHING OF DSA ADDRESSES ON DETECTION OF ECC ERROR BY:
23281 ;          10185 !
23282 ;          10186 !       1.  TEST FOR CLOCKING BY:
23283 ;          10187 !           A. DO A MASS BUS CLEAR FORCING REGISTER BITS TO ZEROES
23284 ;          10188 !           B. FORCE AN ECC ERROR AT THE LAST BLOCK AND DO A READ TRANSFER
23285 ;          10189 !           C. CHECK MLEL FOR LAST BLOCK ADDRESS
23286 ;          10190 !
23287 ;          10191 !       2.  TEST FOR BIT UNIQUENESS BY:
23288 ;          10192 !           A. WITH FORCED ECC ERRORS DO READ TRANSFERS AT VARIOUS DSA
23289 ;          10193 !              ADDRESSES AND CHECK MLEL FOR LATCHED DSA ADDRESSES
23290 ;          10194 !           B. DO CLEAR AND REPEAT
23291 ;          10195 !
23292 ;          10196 !       3.  TEST FOR LATCHING AND CLEARING BY:
23293 ;          10197 !           A. WITH A FORCED SINGLE BIT ERROR DO A READ TRANSFER AT THE
23294 ;          10198 !              LAST BLOCK. (LATCHES MLEL WITH THE LAST BLOCK ADDRESS TO START THE TEST OFF)
23295 ;          10199 !           B. AGAIN WITH A FORCED SINGLE BIT ERROR DO A READ TRANSFER AT DSA
23296 ;          10200 !              ZERO AND CHECK MLEL FOR NOT LATCHING.
23297 ;          10201 !              NO CLEAR DONE
23298 ;          10202 !           C. WITH FORCED UNCORRECTABLE ERRORS DO A READ TRANSFER AT DSA
23299 ;          10203 !              ZERO  CHECK MLEL FOR LATCHED DSA ZERO
23300 ;          10204 !              NO CLEAR DONE
23301 ;          10205 !           D. WITH FORCED SINGLE BIT ERRORS DO A READ TRANSFER AT THE LAST
23302 ;          10206 !              BLOCK AND CHECK MLEL FOR NOT LATCHING
23303 ;          10207 !              NO CLEAR DONE
23304 ;          10208 !           E. WITH A FORCED UNCORRECTABLE ERROR DO A READ TRANSFER AT
23305 ;          10209 !              THE LAST BLOCK AN CHECK MLEL FOR NOT LATCHING
23306 ;          10210 !           F. DO A MASS BUS CLEAR
23307 ;          10211 !           G. WITH A FORCED SINGLE BIT ERROR DO A READ TRANSFER AT THE
23308 ;          10212 !              LAST BLOCK
23309 ;          10213 !           H. DO A MASS BUS CLEAR AGAIN AND CHECK MLEL FOR ZEROES
23310 ;          10214 !
23311 ;          10215 ! IMPLICIT INPUTS:
23312 ;          10216 !       IO_BUF
23313 ;          10217 !       A VECTOR OF 256 WORDS WHERE DATA
23314 ;          10218 !       FOR MBUS READS AND WRITES TRANSFERS
23315 ;          10219 !       IS FOUND.
23316 ;          10220 !
23317 ;          10221 !
23318 ;          10222 !--
23319 ;          10223
23320 ;          10224 local
23321 ;          10225     SGL,                                    !SINGLE BIT ERROR PARRAMETER
```

```
23323 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
23324 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (107)
23325
23326 ;          10226      UNC,                              !UNCORRECTABLE ERR PARRAMETER
23327 ;          10227      SAVE,                             !TEMPORY SAVE LOCATION
23328 ;          10228      SHF_DATA,                         !SHIFTING DATA PATTERN SAVE LOCATION
23329 ;          10229      DSA_PAT;                          !EXPECTED DSA PATTERN LATCHED IN MLEL
23330 ;          10230
23331 ;          10231 BGNSUB;                                !START OF SCOPE LOOP
23332 ;          10232 CLR_MBUS;                              !CLEAR THE MLEL REGISTER
23333 ;          10233 FOR_ECC_ERR (SGL = 1, UNC = 0);        !FORCE A SBE
23334 ;          10234 MLDA = .LST_BLK;                       !LATCH THE LAST BLK ADRS INTO THE MLEL
23335 ;          10235 MLWC = not 255;
23336 ;          10236 MLBA = IO_BUF;
23337 ;          10237 MLCS1 = read;                          !DO A READ AND LATCH THE MLEL
23338 ;          10238 TIME_OUT_LOOP;
23339 ;          10239
23340 ;          10240 if .MLEL eql ZEROES                    !SEE IF THE MLEL GOT CLOCKED
23341 ;          10241 then
23342 ;          10242     begin                              !REPORT AN ERROR IF NOT CLOCKED
23343 ;          10243     ERRDF (126, SYNC, DUMPER);
23344 ;          10244     PRINTB (THR_FMT, REG_15, WRD_52, PHR_11);
23345 ;          10245     EXIT_TST;
23346 ;          10246     end;
23347 ;          10247
23348 ;          10248 ENDSUB;                                !END OF SCOPE LOOP
23349 ;          10249 SHF_DATA = .LST_ARR;                   !LOAD  THE SHIFT DATA
23350 ;          10250
23351 ;          10251 incr LOOP from 0 to 16 do              !FIRST TEST FOR 1'S AND 0'S THEN SHIFT DATA
23352 ;          10252     begin
23353 ;          10253     BGNSUB;                            !START OF SCOPE LOOP
23354 ;          10254     CLR_MBUS;                          !CLEAR THE DRIVE
23355 ;          10255     FOR_ECC_ERR (SGL = 1, UNC = 0);    !FORCE A SBE
23356 ;          10256
23357 ;          10257     selectone .LOOP of                 !SELECT THE TEST PATTERN
23358 ;          10258         set
23359 ;          10259
23360 ;          10260         [0] :                          !ZEROES PATTERN
23361 ;          10261             begin
23362 ;          10262             DSA_PAT = ZEROES;
23363 ;          10263             MLDA = .DSA_PAT;
23364 ;          10264             end;
23365 ;          10265
23366 ;          10266         [1] :                          !MOSTLY ONES PATTERN
23367 ;          10267             begin
23368 ;          10268             DSA_PAT = .LST_BLK;
23369 ;          10269             MLDA = .DSA_PAT;
23370 ;          10270             end;
23371 ;          10271
23372 ;          10272         [otherwise] :                  !SHIFT PATTERN
23373 ;          10273             begin
23374 ;          10274             DSA_PAT = .SHF_DATA;
23375 ;          10275             MLDA = .SHF_DATA;
23376 ;          10276             SHF_DATA = .SHF_DATA^-ONE;
23377 ;          10277             end;
```

```
23381
23382 ;          10278          tes;
23383 ;          10279
23384 ;          10280      MLWC = not 255;                    !SET UP THE TRANSFER
23385 ;          10281      MLBA = IO_BUF;
23386 ;          10282      MLCS1 = read;                      !DO THE TRANSFER AND LATCH MLEL
23387 ;          10283      TIME_OUT_LOOP;
23388 ;          10284      SAVE = .MLEL;                      !READ AND SAVE THE MLEL REGISTER
23389 ;          10285
23390 ;          10286      if .SAVE neq .DSA_PAT              !SEE IF SAVE IS WHAT WE EXPECTED
23391 ;          10287      then
23392 ;          10288          begin                          !REPORT AN ERROR IF NOT THE SAME
23393 ;          10289          ERRDF (127, ASYNC, DUMPER);
23394 ;          10290          PRINTB (TWO_FMT, REG_15, PHR_4);
23395 ;          10291          PRINTB (FMT_2, .DSA_PAT, .SAVE, (.DSA_PAT xor .SAVE));
23396 ;          10292          end;
23397 ;          10293
23398 ;          10294      ENDSUB;                            !END OF SCOPE LOOP
23399 ;          10295      end;
23400 ;          10296
23401 ;          10297 CLR_MBUS;                               !CLEAR THE DRIVE
23402 ;          10298 FOR_ECC_ERR (SGL = 1, UNC = 0);         !FORCE A SBE
23403 ;          10299 MLWC = not 255;                         !SET UP A LAST BLOCK TRANSFER
23404 ;          10300 MLBA = IO_BUF;                          !TO LATCH THE MLEL WITH T
23405 ;          10301 MLDA = .LST_BLK;
23406 ;          10302 MLCS1 = read;
23407 ;          10303 TIME_OUT_LOOP;
23408 ;          10304
23409 ;          10305 incr LOOP from 0 to 4 do                !NOW TEST FOR CORRECT LATCHING
23410 ;          10306     begin
23411 ;          10307     BGNSUB;                            !START OF SCOPE LOOP
23412 ;          10308     MLER = ZEROES;                     !CLEAR THE ERROR REGISTER
23413 ;          10309
23414 ;          10310     case .LOOP from 0 to 4 of          !SELECT TEST DATA
23415 ;          10311         set
23416 ;          10312
23417 ;          10313         [0] :                          !FORCE A SBE AND CHECK FOR THE LST BLK ADRS
23418 ;          10314             begin
23419 ;          10315             SGL = 1;
23420 ;          10316             UNC = 0;
23421 ;          10317             DSA_PAT = .LST_BLK;
23422 ;          10318             MLDA = ZEROES;
23423 ;          10319             end;
23424 ;          10320
23425 ;          10321         [1] :                          !FORCE A UNC ERROR AND CHECK FOR ADRS ZERO
23426 ;          10322             begin
23427 ;          10323             SGL = 0;
23428 ;          10324             UNC = 1;
23429 ;          10325             DSA_PAT = ZEROES;
23430 ;          10326             MLDA = ZEROES;
23431 ;          10327             end;
23432 ;          10328
23433 ;          10329         [2] :                          !FORCE SBE AND CHECK FOR ADRS ZERO
```

```
23435 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
23436 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (107)
23437
23438 ;          10330              begin
23439 ;          10331              SGL = 1;
23440 ;          10332              UNC = 0;
23441 ;          10333              DSA_PAT = ZEROES;
23442 ;          10334              MLDA = .LST_BLK;
23443 ;          10335              end;
23444 ;          10336
23445 ;          10337          [3] :                                  !FORCE UNC ERROR AND CHECK FOR ADRS ZERO
23446 ;          10338              begin
23447 ;          10339              SGL = 0;
23448 ;          10340              UNC = 1;
23449 ;          10341              DSA_PAT = ZEROES;
23450 ;          10342              MLDA = .LST_BLK;
23451 ;          10343              end;
23452 ;          10344
23453 ;          10345          [4] :                                  !FORCE SBE AND CHECK FOR ADRS ZERO
23454 ;          10346              begin
23455 ;          10347              CLR_MBUS;
23456 ;          10348              SGL = 1;
23457 ;          10349              UNC = 0;
23458 ;          10350              DSA_PAT = ZEROES;
23459 ;          10351              MLDA = .LST_BLK;
23460 ;          10352              end;
23461 ;          10353          tes;
23462 ;          10354
23463 ;          10355      FOR_ECC_ERR (.SGL, .UNC);                  !FORCE SELECTED FORCED ERROR INTO ML11
23464 ;          10356      MLWC = not 255;                            !SET UP A TRANSFER
23465 ;          10357      MLBA = IO_BUF;
23466 ;          10358      MLCS1 = read;                              !READ THE ERROR OUT AND LATCH MLEL
23467 ;          10359      TIME_OUT_LOOP;
23468 ;          10360
23469 ;          10361      if .LOOP neq 4                             !TEST THE REG FOR LATCH DATA IF LOOP NEQ 4
23470 ;          10362      then
23471 ;          10363          SAVE = .MLEL
23472 ;          10364      else
23473 ;          10365          begin                                  !ELSE TEST THE REG FOR CLEAR
23474 ;          10366          CLR_MBUS;
23475 ;          10367          SAVE = .MLEL;
23476 ;          10368          end;
23477 ;          10369
23478 ;          10370      if .SAVE neq .DSA_PAT                      !SEE IF THE REG LATCHED  OK
23479 ;          10371      then
23480 ;          10372          begin                                  !REPORT ERROR IF NOT LATCHED
23481 ;          10373          ERRDF (128, SYNC, DUMPER);
23482 ;          10374          PRINTB (THR_FMT, REG_15, WRD_71, WRD_10);
23483 ;          10375          PRINTB (FMT_1, .DSA_PAT, .SAVE)
23484 ;          10376          end;
23485 ;          10377
23486 ;          10378      ENDSUB;                                    !END OF SCOPE LOOP
23487 ;          10379      end;
23488 ;          10380
23489 ;          10381 ENDTST;
```

```
23491 :ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
23492 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (107)
23493
23497
23501 102260 004167 101632        $T57:  JSR     R1,$SAVE5                    ;                                  1017
23502 102264 005746                      TST     -(SP)
23503 102266 104402               1$:    TRAP    2                            ;                                  1022
23504 102270 152777 000040 110716        BISB    #40,@ML.REG+40               ;                                  1023
23505 102276 016705 111300               MOV     ML.DUT,R5
23506 102302 042705 177770               BIC     #177770,R5
23507 102306 142777 000007 110700        BICB    #7,@ML.REG+40
23508 102314 150577 110674               BISB    R5,@ML.REG+40
23509 102320 012703 000001               MOV     #1,R3                        ; *,SGL                            1023
23510 102324 010346                      MOV     R3,-(SP)                     ; SGL,*
23511 102326 005001                      CLR     R1                           ; UNC
23512 102330 005046                      CLR     -(SP)
23513 102332 004767 113422               JSR     PC,FOR.ECC.ERR
23514 102336 016777 107230 110640        MOV     LST.BLK,@ML.REG+30           ;                                  1023
23515 102344 012777 177400 110612        MOV     #-400,@ML.REG+10             ;                                  1023
23516 102352 012777 011600 110614        MOV     #IO.BUF,@ML.REG+20           ;                                  1023
23517 102360 012777 000071 110566        MOV     #71,@ML.REG                  ;                                  1023
23518 102366 105777 110632               TSTB    @ML.REG+50
23519 102372 100375                      BPL     2$
23520 102374 005777 110774               TST     @ML.REG+220                  ;                                  1024
23521 102400 001025                      BNE     3$
23522 102402 104455                      TRAP    55                           ;                                  1024
23523 102404 000176                      .WORD   176
23524 102406 010526                      .WORD   SYNC
23525 102410 024052                      .WORD   DUMPER
23526 102412 012746 007576               MOV     #PHR.11,-(SP)                ;                                  1024
23527 102416 012746 007066               MOV     #WRD.52,-(SP)
23528 102422 012746 010404               MOV     #REG.15,-(SP)
23529 102426 012746 006034               MOV     #THR.FMT,-(SP)
23530 102432 012746 000004               MOV     #4,-(SP)
23531 102436 010600                      MOV     SP,R0                        ; SP,*
23532 102440 104414                      TRAP    14
23533 102442 104463                      TRAP    63
23534 102444 062706 000016               ADD     #16,SP                       ;                                  1024
23535 102450 000167 001006               JMP     26$                          ;                                  1024
23536 102454 022626               3$:    CMP     (SP)+,(SP)+                  ;                                  1022
23537 102456 104467                      TRAP    67                           ;                                  1024
23538 102460 006000                      ROR     R0
23539 102462 103701                      BLO     1$
23540 102464 016705 107106               MOV     LST.ARR,R5                   ; *,SHF.DATA                       1024
23541 102470 005002                      CLR     R2                           ; LOOP                             1025
23542 102472 104402               4$:    TRAP    2                            ;                                  1025
23543 102474 152777 000040 110512        BISB    #40,@ML.REG+40               ;                                  1025
23544 102502 016700 111074               MOV     ML.DUT,R0
```

```
23546                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
23547                                   ;                                                       22-Dec-1980 09:21:22    PA:<
23548
23549 102506  042700  177770                    BIC     #177770,R0
23550 102512  142777  000007  110474            BICB    #7,@ML.REG+40
23551 102520  150077  110470                    BISB    R0,@ML.REG+40
23552 102524  012703  000001                    MOV     #1,R3                   ; *,SGL                 1025
23553 102530  010346                            MOV     R3,-(SP)                ; SGL,*
23554 102532  005001                            CLR     R1                      ; UNC
23555 102534  005046                            CLR     -(SP)
23556 102536  004767  113216                    JSR     PC,FOR.ECC.ERR
23557 102542  005702                            TST     R2                      ; LOOP                  1025
23558 102544  001002                            BNE     5$
23559 102546  005004                            CLR     R4                      ; DSA.PAT               1026
23560 102550  000405                            BR      6$                      ;                       1026
23561 102552  020227  000001          5$:       CMP     R2,#1                   ; LOOP,*                1025
23562 102556  001005                            BNE     7$
23563 102560  016704  107006                    MOV     LST.BLK,R4              ; *,DSA.PAT             1026
23564 102564  010477  110414          6$:       MOV     R4,@ML.REG+30           ; DSA.PAT,*             1026
23565 102570  000404                            BR      8$                      ;                       1025
23566 102572  010504          7$:               MOV     R5,R4                   ; SHF.DATA,DSA.PAT      1027
23567 102574  010577  110404                    MOV     R5,@ML.REG+30           ; SHF.DATA,*            1027
23568 102600  006205                            ASR     R5                      ; SHF.DATA              1027
23569 102602  012777  177400  110354  8$:       MOV     #-400,@ML.REG+10        ;                       1028
23570 102610  012777  011600  110356            MOV     #IO.BUF,@ML.REG+20      ;                       1028
23571 102616  012777  000071  110330            MOV     #71,@ML.REG             ;                       1028
23572 102624  105777  110374          9$:       TSTB    @ML.REG+50
23573 102630  100375                            BPL     9$
23574 102632  017766  110536  000004            MOV     @ML.REG+220,4(SP)       ; *,SAVE                1028
23575 102640  026604  000004                    CMP     4(SP),R4                ; SAVE,DSA.PAT          1028
23576 102644  001441                            BEQ     10$
23577 102646  104455                            TRAP    55                      ;                       1028
23578 102650  000177                            .WORD   177
23579 102652  010464                            .WORD   ASYNC
23580 102654  024052                            .WORD   DUMPER
23581 102656  012746  007454                    MOV     #PHR.4,-(SP)            ;                       1029
23582 102662  012746  010404                    MOV     #REG.15,-(SP)
23583 102666  012746  006024                    MOV     #TWO.FMT,-(SP)
23584 102672  012746  000003                    MOV     #3,-(SP)
23585 102676  010600                            MOV     SP,R0                   ; SP,*
23586 102700  104414                            TRAP    14
23587 102702  016616  000014                    MOV     14(SP),(SP)             ; SAVE,*                1029
23588 102706  010446                            MOV     R4,-(SP)                ; DSA.PAT,*
23589 102710  046616  000002                    BIC     2(SP),(SP)
23590 102714  040466  000002                    BIC     R4,2(SP)                ; DSA.PAT,*
23591 102720  052616                            BIS     (SP)+,(SP)
23592 102722  016646  000014                    MOV     14(SP),-(SP)            ; SAVE,*
23593 102726  010446                            MOV     R4,-(SP)                ; DSA.PAT,*
23594 102730  012746  004266                    MOV     #FMT.2,-(SP)
23595 102734  012746  000004                    MOV     #4,-(SP)
23596 102740  010600                            MOV     SP,R0                   ; SP,*
23597 102742  104414                            TRAP    14
23598 102744  062706  000020                    ADD     #20,SP                  ;                       1028
23599 102750  022626                  10$:      CMP     (SP)+,(SP)+             ;                       1025
23600 102752  104467                            TRAP    67                      ;                       1029
```

```
23602                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
23603                                   ;                                                       22-Dec-1980 09:21:22    PA:<
23604
23605 102754 006000                             ROR     R0
23606 102756 103645                             BLO     4$
23607 102760 005202                             INC     R2                      ; LOOP                                  1025
23608 102762 020227 000020                      CMP     R2,#20                  ; LOOP,*
23609 102766 003641                             BLE     4$
23610 102770 152777 000040 110216               BISB    #40,@ML.REG+40          ;                                       1029
23611 102776 016705 110600                      MOV     ML.DUT,R5
23612 103002 042705 177770                      BIC     #177770,R5
23613 103006 142777 000007 110200               BICB    #7,@ML.REG+40
23614 103014 150577 110174                      BISB    R5,@ML.REG+40
23615 103020 012703 000001                      MOV     #1,R3                   ; *,SGL                                 1029
23616 103024 010346                             MOV     R3,-(SP)                ; SGL,*
23617 103026 005001                             CLR     R1                      ; UNC
23618 103030 005046                             CLR     -(SP)
23619 103032 004767 112722                      JSR     PC,FOR.ECC.ERR
23620 103036 012777 177400 110120               MOV     #-400,@ML.REG+10        ;                                       1029
23621 103044 012777 011600 110122               MOV     #IO.BUF,@ML.REG+20      ;                                       1030
23622 103052 016777 106514 110124               MOV     LST.BLK,@ML.REG+30      ;                                       1030
23623 103060 012777 000071 110066               MOV     #71,@ML.REG             ;                                       1030
23624 103066 105777 110132              11$:    TSTB    @ML.REG+50
23625 103072 100375                             BPL     11$
23626 103074 005002                             CLR     R2                      ; LOOP                                  1030
23627 103076 104402                     12$:    TRAP    2                       ;                                       1030
23628 103100 005077 110130                      CLR     @ML.REG+60              ;                                       1030
23629 103104 010205                             MOV     R2,R5                   ; LOOP,*                                1031
23630 103106 006305                             ASL     R5
23631 103110 066507 103114                      ADD     13$(R5),PC
23632 103114 000012                     13$:    .WORD   14$-13$
23633 103116 000026                             .WORD   15$-13$
23634 103120 000044                             .WORD   17$-13$
23635 103122 000046                             .WORD   18$-13$
23636 103124 000056                             .WORD   19$-13$
23637 103126 012703 000001              14$:    MOV     #1,R3                   ; *,SGL                                 1031
23638 103132 005001                             CLR     R1                      ; UNC                                   1031
23639 103134 016704 106432                      MOV     LST.BLK,R4              ; *,DSA.PAT                             1031
23640 103140 000404                             BR      16$                     ;                                       1031
23641 103142 005003                     15$:    CLR     R3                      ; SGL                                   1032
23642 103144 012701 000001                      MOV     #1,R1                   ; *,UNC                                 1032
23643 103150 005004                             CLR     R4                      ; DSA.PAT                               1032
23644 103152 005077 110026              16$:    CLR     @ML.REG+30              ;                                       1032
23645 103156 000430                             BR      22$                     ;                                       1031
23646 103160 000420                     17$:    BR      20$                     ;                                       1033
23647 103162 005003                     18$:    CLR     R3                      ; SGL                                   1033
23648 103164 012701 000001                      MOV     #1,R1                   ; *,UNC                                 1034
23649 103170 000417                             BR      21$                     ;                                       1034
23650 103172 152777 000040 110014       19$:    BISB    #40,@ML.REG+40          ;                                       1034
23651 103200 016705 110376                      MOV     ML.DUT,R5
23652 103204 042705 177770                      BIC     #177770,R5
23653 103210 142777 000007 107776               BICB    #7,@ML.REG+40
23654 103216 150577 107772                      BISB    R5,@ML.REG+40
23655 103222 012703 000001              20$:    MOV     #1,R3                   ; *,SGL                                 1034
23656 103226 005001                             CLR     R1                      ; UNC                                   1034
```

```
23658                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
23659                                   ;                                                       22-Dec-1980 09:21:22    PA:<
23660
23661 103230 005004                     21$:    CLR     R4                      ; DSA.PAT                               1035
23662 103232 016777 106334 107744               MOV     LST.BLK,@ML.REG+30      ;                                       1035
23663 103240 010346                     22$:    MOV     R3,-(SP)                ; SGL,*                                 1035
23664 103242 010146                             MOV     R1,-(SP)                ; UNC,*
23665 103244 004767 112510                      JSR     PC,FOR.ECC.ERR
23666 103250 012777 177400 107706               MOV     #-400,@ML.REG+10        ;                                       1035
23667 103256 012777 011600 107710               MOV     #IO.BUF,@ML.REG+20      ;                                       1035
23668 103264 012777 000071 107662               MOV     #71,@ML.REG             ;                                       1035
23669 103272 105777 107726              23$:    TSTB    @ML.REG+5)
23670 103276 100375                             BPL     23$
23671 103300 020227 000004                      CMP     R2,#4                   ; LOOP,*                                1036
23672 103304 001014                             BNE     24$                     ;                                       1036
23673 103306 152777 000040 107700               BISB    #40,@ML.REG+40          ;                                       1036
23674 103314 016705 110262                      MOV     ML,DUT,R5
23675 103320 042705 177770                      BIC     #177770,R5
23676 103324 142777 000007 107662               BICB    #7,@ML.REG+40
23677 103332 150577 107656                      BISB    R5,@ML.REG+40
23678 103336 017766 110032 000010       24$:    MOV     @ML.REG+220,10(SP)      ; *,SAVE                                1036
23679 103344 026604 000010                      CMP     10(SP),R4               ; SAVE,DSA.PAT                          1037
23680 103350 001433                             BEQ     25$
23681 103352 104455                             TRAP    55                      ;                                       1037
23682 103354 000200                             .WORD   200
23683 103356 010526                             .WORD   SYNC
23684 103360 024052                             .WORD   DUMPER
23685 103362 012746 006406                      MOV     #WRD.10,-(SP)           ;                                       1037
23686 103366 012746 007272                      MOV     #WRD.71,-(SP)
23687 103372 012746 010404                      MOV     #REG.15,-(SP)
23688 103376 012746 006034                      MOV     #THR.FMT,-(SP)
23689 103402 012746 000004                      MOV     #4,-(SP)
23690 103406 010600                             MOV     SP,R0                   ; SP,*
23691 103410 104414                             TRAP    14
23692 103412 016616 000022                      MOV     22(SP),(SP)             ; SAVE,*                                1037
23693 103416 010446                             MOV     R4,-(SP)                ; DSA.PAT,*
23694 103420 012746 004222                      MOV     #FMT.1,-(SP)
23695 103424 012746 000003                      MOV     #3,-(SP)
23696 103430 010600                             MOV     SP,R0                   ; SP,*
23697 103432 104414                             TRAP    14
23698 103434 062706 000020                      ADD     #20,SP                  ;                                       1037
23699 103440 022626                     25$:    CMP     (SP)+,(SP)+             ;                                       1030
23700 103442 104467                             TRAP    67                      ;                                       1037
23701 103444 006000                             ROR     R0
23702 103446 103613                             BLO     12$
23703 103450 005202                             INC     R2                      ; LOOP                                  1030
23704 103452 020227 000004                      CMP     R2,#4                   ; LOOP,*
23705 103456 003607                             BLE     12$
23706 103460 022626                             CMP     (SP)+,(SP)+             ;                                       1017
23707 103462 005726                     26$:    TST     (SP)+
23708 103464 000207                             RTS     PC
23709
23710                                   ; Routine Size:  323 words
23711                                   ; Maximum stack depth per invocation:  19 words
```

```
23720
23721
23725
23729 103466                        T57::
23730 103466  004767  176566        1$:     JSR     PC,$T57                 ;  1037
23731 103472  104466                        TRAP    66
23732 103474  006000                        ROR     R0
23733 103476  103773                        BLO     1$
23734 103500  000207                        RTS     PC
23735
23736                               ; Routine Size:  6 words
23737                               ; Maximum stack depth per invocation:  0 words
23742
23743
23744 ;          10382 !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (108)

```
23746 ;ML4
23747 ;
23748
23749 ;          10383 !
23750 ;          10384 BGNTST;
23751 ;          10385
23752 ;          10386 !++
23753 ;          10387 ! TEST NUMBER:  TST 58
23754 ;          10388 !
23755 ;          10389 ! TEST NAME:              ECC HARD ERROR BIT TEST
23756 ;          10390 !
23757 ;          10391 ! TEST DESCRIPTION:
23758 ;          10392 !       VIA ECC_DM AND ECC_DIS TEST THE
23759 ;          10393 !       ECH BIT FOR SETTING AND NOT SETTING BY:
23760 ;          10394 !
23761 ;          10395 !       1.  VIA ECC_DM AND A WRITE TRANSFER FORCE
23762 ;          10396 !           ECC ERRORS INTO THE ML11'S GOOD BLOCK
23763 ;          10397 !
23764 ;          10398 !       2.  WITH ECC_DM = 0 AND ECC_DIS = 0
23765 ;          10399 !           DO A READ TRANSFER AND CHECK ECH SET
23766 ;          10400 !
23767 ;          10401 !       3.  WITH ECC_DM = 0 AND ECC_DIS = 1
23768 ;          10402 !           DO A READ TRANSFER AND CHECK ECH NOT SET
23769 ;          10403 !
23770 ;          10404 ! IMPLICIT INPUTS:
23771 ;          10405 !       IO_BUF
23772 ;          10406 !       A  VECTOR OF 256 WORDS WHERE DATA
23773 ;          10407 !       FOR MBUS READS AND WRITES TRANSFERS
23774 ;          10408 !       IS FOUND.
23775 ;          10409 !
23776 ;          10410 !
23777 ;          10411 !--
23778 ;          10412
23779 ;          10413 local
23780 ;          10414     EXPECTED;                          !EXPECTED ECH_ERR VALUE
23781 ;          10415
23782 ;          10416 CLR_MBUS;                              !CLEAR THE DRIVE
23783 ;          10417 ECC_DM = ONE;                          !SET ECC DIAG MODE
23784 ;          10418 PAR_CRC_WRD = ZEROES;                  !FORCE UNCORRECTABLE ERRORS INTO THE GOOD BLOCK
23785 ;          10419 CRC_A = ZEROES;
23786 ;          10420 CRC_B = ZEROES;
23787 ;          10421 BAI = ONE;
23788 ;          10422 IO_BUF = ONES;
23789 ;          10423 GD_BLK_XFER ();
23790 ;          10424 MLCS1 = write;
23791 ;          10425 TIME_OUT_LOOP;
23792 ;          10426
23793 ;          10427 incr LOOP from 0 to 1 do               !TEST ECH BIT FOR SETTING / NOT SETTING
23794 ;          10428     begin
23795 ;          10429     BGNSUB;                            !START OF SCOPE LOOP
23796 ;          10430     CLR_MBUS;                          !CLEAR THE DRIVE
23797 ;          10431     GD_BLK_XFER ();                    !SET UP A GOOD BLOCK TRANSFER
23798 ;          10432
23799 ;          10433     if .LOOP eql ZERO                  !SELECT THE TEST DATA
23800 ;          10434     then
```

```
23802 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
23803 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (108)
23804
23805 ;          10435          begin                         !EXPECT ECH BIT TO SET
23806 ;          10436          ECC_DIS = 0;
23807 ;          10437          EXPECTED = 1;
23808 ;          10438          end
23809 ;          10439      else
23810 ;          10440          begin                         !EXPECT ECH BIT NOT TO SET
23811 ;          10441          ECC_DIS = 1;
23812 ;          10442          EXPECTED = 0;
23813 ;          10443          end;
23814 ;          10444
23815 ;          10445      MLCS1 = read;                     !READ THE ERROR OUT
23816 ;          10446      TIME_OUT_LOOP;
23817 ;          10447
23818 ;          10448      if .ECH_ERR neq .EXPECTED         !IS ECH BIT WHAT WE EXPECTED
23819 ;          10449      then
23820 ;          10450          begin                         !ERROR IF NOT
23821 ;          10451          ERRDF (129, SYNC, DUMPER);
23822 ;          10452          PRINTB (FOR_FMT, WRD_67, WRD_10, WRD_69, WRD_14);
23823 ;          10453          PRINTB (FMT_1, .EXPECTED, .ECH_ERR);
23824 ;          10454          end;
23825 ;          10455
23826 ;          10456      ENDSUB;                           !END OF SCOPE LOOP
23827 ;          10457      end;
23828 ;          10458
23829 ;          10459 ENDTST;
23833
23837 103502  004167  100352          $T58:   JSR     R1,$SAVE3                       ;                       1038
23838 103506  152777  000040  107500          BISB    #40,@ML.REG+40                  ;                       1041
23839 103514  016702  110062                  MOV     ML.DUT,R2
23840 103520  042702  177770                  BIC     #177770,R2
23841 103524  142777  000007  107462          BICB    #7,@ML.REG+40
23842 103532  150277  107456                  BISB    R2,@ML.REG+40
23843 103536  152777  000001  107530          BISB    #1,@ML.REG+120                  ;                       1041
23844 103544  042777  037400  107552          BIC     #37400,@ML.REG+150              ;                       1041
23845 103552  142777  000077  107544          BICB    #77,@ML.REG+150                 ;                       1041
23846 103560  142777  000077  107546          BICB    #77,@ML.REG+160                 ;                       1042
23847 103566  152777  000010  107420          BISB    #10,@ML.REG+40                  ;                       1042
23848 103574  012767  177777  105776          MOV     #-1,IO.BUF                      ;                       1042
23849 103602  004767  112254                  JSR     PC,GD.BLK.XFER                  ;                       1042
23850 103606  012777  000061  107340          MOV     #61,@ML.REG                     ;                       1042
23851 103614  105777  107404          1$:     TSTB    @ML.REG+50
23852 103620  100375                  BPL     1$
23853 103622  005001                  CLR     R1                              ; LOOP  1042
23854 103624  104402          2$:     TRAP    2                               ;       1042
23855 103626  152777  000040  107360          BISB    #40,@ML.REG+40                  ;                       1042
```

```
23857                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
23858                                   ;                                                       22-Dec-1980 09:21:22    PA:<
23859
23860 103634  016700  107742                    MOV     ML.DUT,R0
23861 103640  042700  177770                    BIC     #177770,R0
23862 103644  142777  000007  107342            BICB    #7,@ML.REG+40
23863 103652  150077  107336                    BISB    R0,@ML.REG+40
23864 103656  004767  112200                    JSR     PC,GD.BLK.XFER          ;                               1043
23865 103662  005701                            TST     R1                      ; LOOP                          1043
23866 103664  001006                            BNE     3$
23867 103666  142777  000002  107400            BICB    #2,@ML.REG+120          ;                               1043
23868 103674  012702  000001                    MOV     #1,R2                   ; *,EXPECTED                    1043
23869 103700  000404                            BR      4$                      ;                               1043
23870 103702  152777  000002  107364  3$:       BISB    #2,@ML.REG+120          ;                               1044
23871 103710  005002                            CLR     R2                      ; EXPECTED                      1044
23872 103712  012777  000071  107234  4$:       MOV     #71,@ML.REG             ;                               1044
23873 103720  105777  107300        5$:         TSTB    @ML.REG+50
23874 103724  100375                            BPL     5$
23875 103726  010203                            MOV     R2,R3                   ; EXPECTED,*                    1C44
23876 103730  005000                            CLR     R0
23877 103732  132777  000100  107274            BITB    #100,@ML.REG+60
23878 103740  001401                            BEQ     6$
23879 103742  005200                            INC     R0
23880 103744  020003        6$:                 CMP     R0,R3
23881 103746  001441                            BEQ     8$
23882 103750  104455                            TRAP    55                      ;                               1045
23883 103752  000201                            .WORD   201
23884 103754  010526                            .WORD   SYNC
23885 103756  024052                            .WORD   DUMPER
23886 103760  012746  006442                    MOV     #WRD.14,-(SP)           ;                               1045
23887 103764  012746  007252                    MOV     #WRD.69,-(SP)
23888 103770  012746  006406                    MOV     #WRD.10,-(SP)
23889 103774  012746  007240                    MOV     #WRD.67,-(SP)
23890 104000  012746  006046                    MOV     #FOR.FMT,-(SP)
23891 104004  012746  000005                    MOV     #5,-(SP)
23892 104010  010600                            MOV     SP,R0                   ; SP,*
23893 104012  104414                            TRAP    14
23894 104014  005016                            CLR     (SP)                    ;                               1045
23895 104016  132777  000100  107210            BITB    #100,@ML.REG+60
23896 104024  001401                            BEQ     7$
23897 104026  005216                            INC     (SP)
23898 104030  010246        7$:                 MOV     R2,-(SP)                ; EXPECTED,*
23899 104032  012746  004222                    MOV     #FMT.1,-(SP)
23900 104036  012746  000003                    MOV     #3,-(SP)
23901 104042  010600                            MOV     SP,R0                   ; SP,*
23902 104044  104414                            TRAP    14
23903 104046  062706  000022                    ADD     #22,SP                  ;                               1045
23904 104052  104467        8$:                 TRAP    67                      ;                               1045
23905 104054  006000                            ROR     R0
23906 104056  103662                            BLO     2$
23907 104060  005201                            INC     R1                      ; LOOP                          1042
23908 104062  020127  000001                    CMP     R1,#1                   ; LOOP,*
23909 104066  003656                            BLE     2$
23910 104070  000207                            RTS     PC                      ;                               1038
23911
```

```
                                        ;ML4                                                    22-Dec-1980 09:24:31    TOPS
                                        ;                                                       22-Dec-1980 09:21:22    PA:<
                                        ; Routine Size:  124 words
                                        ; Maximum stack depth per invocation:  13 words
                                        T58::
104072                                  1$:     JSR     PC,$T58                         ;                               1045
104072  004767  177404                          TRAP    66
104076  104466                                  ROR     R0
104100  006000                                  BLO     1$
104102  103773                                  RTS     PC
104104  000207
                                        ; Routine Size:  6 words
                                        ; Maximum stack depth per invocation:  0 words
;       10460 !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (109)

```
23948 ;ML4
23949 ;
23950
23951 ;          10461 !
23952 ;          10462 BGNTST;
23953 ;          10463
23954 ;          10464 !++
23955 ;          10465 ! TEST NUMBER:  TST 59
23956 ;          10466 !
23957 ;          10467 ! TEST NAME:            DATA CHECK ERROR BIT TEST
23958 ;          10468 !
23959 ;          10469 ! TEST DESCRIPTION:
23960 ;          10470 !       VIA ECC_EN, ECC_DM AND ECC_DM TEST THE
23961 ;          10471 !       DCK BIT FOR SETTING AND NOT SETTING BY:
23962 ;          10472 !
23963 ;          10473 !       1.  VIA ECC_DM AND A WRITE TRANSFER FORCE
23964 ;          10474 !           ECC ERRORS INTO THE ML11'S GOOD BLOCK
23965 ;          10475 !
23966 ;          10476 !       2.  WITH DCK_EN = 1, ECC_DM = 0, ECC_DIS = 0
23967 ;          10477 !           DO A READ TRANSFER AND CHECK THE DCK BIT SET
23968 ;          10478 !
23969 ;          10479 !       3.  WITH DCK_EN = 0, ECC_DM = 0, ECC_DIS = 0
23970 ;          10480 !           DO A READ TRANSFER AND CHECK THE DCK BIT NOT SET
23971 ;          10481 !
23972 ;          10482 !       4.  WITH ECK_EN = 1, ECC_DM = 0, ECC_DIS = 1
23973 ;          10483 !           DO A READ TRANSFER AND CHECK THE DCK BIT SET
23974 ;          10484 !
23975 ;          10485 !
23976 ;          10486 ! IMPLICIT INPUTS:
23977 ;          10487 !       IO_BUF
23978 ;          10488 !       A VECTOR OF 256 WORDS WHERE DATA
23979 ;          10489 !       FOR MBUS READS AND WRITES TRANSFERS
23980 ;          10490 !       IS FOUND.
23981 ;          10491 !
23982 ;          10492 !
23983 ;          10493 !--
23984 ;          10494
23985 ;          10495 local
23986 ;          10496     SGL,                          !SINGLE BIT ERROR PARRAMETER
23987 ;          10497     UNC,                          !UNCORRECTABLE ERROR PARRAMETER
23988 ;          10498     EXPECTED;                     !EXPECTED DATA CHECK BIT VALUE
23989 ;          10499
23990 ;          10500 CLR_MBUS;                         !CLEAR THE DRIVE
23991 ;          10501 FOR_ECC_ERR (SGL = 1, UNC = 0);   !FORCE  A SBE
23992 ;          10502 BAI = ONE;
23993 ;          10503 IO_BUF = ZEROES;
23994 ;          10504 GD_BLK_XFER ();                   !SET UP A GOOD BLOCK TRANSFER
23995 ;          10505 MLCS1 = write;                    !WRITE THE DRIVE WITH THE ERROR
23996 ;          10506 TIME_OUT_LOOP;
23997 ;          10507
23998 ;          10508 incr LOOP from 0 to 2 do          !TEST DCK BIT FOR 3 CONDITIONS
23999 ;          10509     begin
24000 ;          10510     BGNSUB;                       !START OF SCOPE LOOP
24001 ;          10511     CLR_MBUS;                     !CLEAR THE DRIVE
24002 ;          10512     GD_BLK_XFER ();               !SET UP A GOOD BLOCK TRANSFER
```

```
24004 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
24005 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (109)
24006
24007 ;          10513
24008 ;          10514      case .LOOP from 0 to 2 of                    !SELECT THE TEST DATA
24009 ;          10515           set
24010 ;          10516
24011 ;          10517           [0] :                                   !EXPECT THE DCK BIT TO SET
24012 ;          10518               begin
24013 ;          10519               DCK_EN = 1;
24014 ;          10520               ECC_DIS = 0;
24015 ;          10521               EXPECTED = 1;
24016 ;          10522               end;
24017 ;          10523
24018 ;          10524           [1] :                                   !EXPECT THE DCK BIT NOT TO SET
24019 ;          10525               begin
24020 ;          10526               DCK_EN = 0;
24021 ;          10527               ECC_DIS = 0;
24022 ;          10528               EXPECTED = 0;
24023 ;          10529               end;
24024 ;          10530
24025 ;          10531           [2] :                                   !EXPECT THE DCK BIT TO SET
24026 ;          10532               begin
24027 ;          10533               DCK_EN = 1;
24028 ;          10534               ECC_DIS = 1;
24029 ;          10535               EXPECTED = 1;
24030 ;          10536               end;
24031 ;          10537           tes;
24032 ;          10538
24033 ;          10539      MLCS1 = read;                                !READ THE ERROR AND CLOCK THE DCK BIT
24034 ;          10540      TIME_OUT_LOOP;
24035 ;          10541
24036 ;          10542      if .DCK neq .EXPECTED                        !IS THE DCK BIT WHAT WE EXPECTED
24037 ;          10543      then
24038 ;          10544          begin                                    !REPORT THE ERRRO IF NOT THE SAME
24039 ;          10545
24040 ;          10546          if .LOOP neq ONE then ERRDF (130, SYNC, DUMPER) else ERRDF (130, ASYNC, DUMPER);
24041 ;          10547
24042 ;          10548                                                   !CHOOSE WHICH THE ERROR IS ON
24043 ;          10549          PRINTB (THR_FMT, WRD_72, PHR_5, WRD_10);
24044 ;          10550          PRINTB (FMT_1, .EXPECTED, .DCK);
24045 ;          10551          end;
24046 ;          10552
24047 ;          10553      ENDSUB;                                      !END OF THE SCOPE LOOP
24048 ;          10554      end;
24049 ;          10555
24050 ;          10556 ENDTST;
24054
```

```
24059                                ;ML4                                                    22-Dec-1980 09:24:31    TOPS
24060                                ;                                                       22-Dec-1980 09:21:22    PA:<
24061
24062 104106 004167 077746           $T59:  JSR     R1,$SAVE3                ;                                      1045
24063 104112 152777 000040 107074           BISB    #40,@ML.REG+40           ;                                      1049
24064 104120 016702 107456                  MOV     ML.DUT,R2
24065 104124 042702 177770                  BIC     #177770,R2
24066 104130 142777 000007 107056           BICB    #7,@ML.REG+40
24067 104136 150277 107052                  BISB    R2,@ML.REG+40
24068 104142 012701 000001                  MOV     #1,R1                    ; *,SGL                                1050
24069 104146 010146                         MOV     R1,-(SP)                 ; SGL,*
24070 104150 005001                         CLR     R1                       ; UNC
24071 104152 005046                         CLR     -(SP)
24072 104154 004767 111600                  JSR     PC,FOR.ECC.ERR
24073 104160 152777 000010 107026           BISB    #10,@ML.REG+40           ;                                      1050
24074 104166 005067 105406                  CLR     IO.BUF                   ;                                      1050
24075 104172 004767 111664                  JSR     PC,GD.BLK.XFER           ;                                      1050
24076 104176 012777 000061 106750           MOV     #61,@ML.REG              ;                                      1050
24077 104204 105777 107014           1$:    TSTB    @ML.REG+50
24078 104210 100375                         BPL     1$
24079 104212 005001                         CLR     R1                       ; LOOP                                 1050
24080 104214 104402                  2$:    TRAP    2                        ;                                      1050
24081 104216 152777 000040 106770           BISB    #40,@ML.REG+40           ;                                      1051
24082 104224 016700 107352                  MOV     ML.DUT,R0
24083 104230 042700 177770                  BIC     #177770,R0
24084 104234 142777 000007 106752           BICB    #7,@ML.REG+40
24085 104242 150077 106746                  BISB    R0,@ML.REG+40
24086 104246 004767 111610                  JSR     PC,GD.BLK.XFER           ;                                      1051
24087 104252 010100                         MOV     R1,R0                    ; LOOP,*                               1051
24088 104254 006300                         ASL     R0
24089 104256 066007 104262                  ADD     3$(R0),PC
24090 104262 000006                  3$:    .WORD   4$-3$
24091 104264 000024                         .WORD   5$-3$
24092 104266 000044                         .WORD   6$-3$
24093 104270 152777 000004 106776    4$:    BISB    #4,@ML.REG+120           ;                                      1051
24094 104276 142777 000002 106770           BICB    #2,@ML.REG+120           ;                                      1052
24095 104304 000416                         BR      7$                       ;                                      1052
24096 104306 142777 000004 106760    5$:    BICB    #4,@ML.REG+120           ;                                      1052
24097 104314 142777 000002 106752           BICB    #2,@ML.REG+120           ;                                      1052
24098 104322 005002                         CLR     R2                       ; EXPECTED                             1052
24099 104324 000410                         BR      8$                       ;                                      1051
24100 104326 152777 000004 106740    6$:    BISB    #4,@ML.REG+120           ;                                      1053
24101 104334 152777 000002 106732           BISB    #2,@ML.REG+120           ;                                      1053
24102 104342 012702 000001           7$:    MOV     #1,R2                    ; *,EXPECTED                           1053
24103 104346 012777 000071 106600    8$:    MOV     #71,@ML.REG              ;                                      1053
24104 104354 105777 106644           9$:    TSTB    @ML.REG+50
24105 104360 100375                         BPL     9$
24106 104362 010203                         MOV     R2,R3                    ; EXPECTED,*                           1054
24107 104364 005000                         CLR     R0
24108 104366 005777 106642                  TST     @ML.REG+60
24109 104372 100001                         BPL     10$
24110 104374 005200                         INC     R0
24111 104376 020003                  10$:   CMP     R0,R3
24112 104400 001446                         BEQ     14$
24113 104402 020127 000001                  CMP     R1,#1                    ; LOOP,*                               1054
```

```
24115                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
24116                                   ;                                                       22-Dec-1980 09:21:22    PA:<
24117
24118 104406  001405                            BEQ     11$
24119 104410  104455                            TRAP    55
24120 104412  000202                            .WORD   202
24121 104414  010526                            .WORD   SYNC
24122 104416  024052                            .WORD   DUMPER
24123 104420  000404                            BR      12$
24124 104422  104455                    11$:    TRAP    55
24125 104424  000202                            .WORD   202
24126 104426  010464                            .WORD   ASYNC
24127 104430  024052                            .WORD   DUMPER
24128 104432  012746  006406            12$:    MOV     #WRD.10,-(SP)                   ;                                       1054
24129 104436  012746  007472                    MOV     #PHR.5,-(SP)
24130 104442  012746  007302                    MOV     #WRD.72,-(SP)
24131 104446  012746  006034                    MOV     #THR.FMT,-(SP)
24132 104452  012746  000004                    MOV     #4,-(SP)
24133 104456  010600                            MOV     SP,R0                           ; SP,*
24134 104460  104414                            TRAP    14
24135 104462  005016                            CLR     (SP)                            ;                                       1055
24136 104464  005777  106544                    TST     @ML.REG+60
24137 104470  100001                            BPL     13$
24138 104472  005216                            INC     (SP)
24139 104474  010246                    13$:    MOV     R2,-(SP)                        ; EXPECTED,*
24140 104476  012746  004222                    MOV     #FMT.1,-(SP)
24141 104502  012746  000003                    MOV     #3,-(SP)
24142 104506  010600                            MOV     SP,R0                           ; SP,*
24143 104510  104414                            TRAP    14
24144 104512  062706  000020                    ADD     #20,SP                          ;                                       1054
24145 104516  104467                    14$:    TRAP    67                              ;                                       1055
24146 104520  006000                            ROR     R0
24147 104522  103634                            BLO     2$
24148 104524  005201                            INC     R1                              ; LOOP                                  1050
24149 104526  020127  000002                    CMP     R1,#2                           ; LOOP,*
24150 104532  003630                            BLE     2$
24151 104534  022626                            CMP     (SP)+,(SP)+                     ;                                       1045
24152 104536  000207                            RTS     PC
24153
24154                                   ; Routine Size:  141 words
24155                                   ; Maximum stack depth per invocation:  14 words
24160
24161
24165
```

```
24170                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
24171                                   ;                                                       22-Dec-1980 09:21:22    PA:<
24172
24173 104540                            T59::
24174 104540  004767  177342             1$:     JSR     PC,$T59                 ;                                       1055
24175 104544  104466                             TRAP    66
24176 104546  006000                             ROR     R0
24177 104550  103773                             BLO     1$
24178 104552  000207                             RTS     PC
24179
24180                                   ; Routine Size:  6 words
24181                                   ; Maximum stack depth per invocation:  0 words
24186
24187
24188 ;          10557 !<BLF/PAGE>
```

22-Dec-1980 09:24:31 TOPS-20 Bliss-16 V2(212)
22-Dec-1980 09:21:22 PA:<NEALE>BL3ML4.BLI.2 (110)

```
24190 ;ML4
24191 ;
24192
24193 ;          10558 !
24194 ;          10559 BGNTST;
24195 ;          10560
24196 ;          10561 !++
24197 ;          10562 ! TEST NUMBER:  TST 60
24198 ;          10563 !
24199 ;          10564 ! TEST NAME:    PROM DATA TEST
24200 ;          10565 !
24201 ;          10566 ! TEST DESCRIPTION:
24202 ;          10567 !
24203 ;          10568 !       VERIFY THAT CHECK SUM VALUES FOR
24204 ;          10569 !       ALL PRESENT MEMORY ARRAY UV PROM
24205 ;          10570 !       LOCATIONS ARE ERROR FREE BY:
24206 ;          10571 !
24207 ;          10572 !       1.  DOING MBUS TRANSFERS
24208 ;          10573 !           AT ALL PRESENT BLOCKS
24209 ;          10574 !           AND TESTING THE UNS BIT
24210 ;          10575 !           TO BE CLEARED.
24211 ;          10576 !
24212 ;          10577 ! IMPLICIT INPUTS:
24213 ;          10578 !
24214 ;          10579 !       IO_BUF
24215 ;          10580 !
24216 ;          10581 !       A VECTOR OF 256 WORDS WHERE
24217 ;          10582 !       DATA FOR MBUS READ AND WRITE
24218 ;          10583 !       FUNCTIONS IS FOUND.
24219 ;          10584 !
24220 ;          10585 !
24221 ;          10586 !       CHIP_SIZ
24222 ;          10587 !       INDICATED THE SIZE OF THE
24223 ;          10588 !       ARRAY MODULES MOS RAMS.
24224 ;          10589 !
24225 ;          10590 !
24226 ;          10591 !--
24227 ;          10592
24228 ;          10593 incr DSA_CNT from 0 to .LST_BLK do          !WRITE TO ALL PRESENT BLK'S AND CHECK UNS BIT
24229 ;          10594     begin
24230 ;          10595     BGNSUB;
24231 ;          10596     CLR_MBUS;
24232 ;          10597     ECC_DIS = ONE;                        !DISABLE ECC
24233 ;          10598     MLWC = not 255;                       !LOAD WORD COUNT
24234 ;          10599     MLBA = IO_BUF;                        !LOAD UBUS ADRS
24235 ;          10600     MLDA = .DSA_CNT;                      !LOAD DSA
24236 ;          10601     MLCS1 = write;                        !DO A WRITE FUNCTION
24237 ;          10602     TIME_OUT_LOOP;
24238 ;          10603
24239 ;          10604     if .UNS IS_SET                        !SEE IF XFERR CAUSED AN UNS ERROR
24240 ;          10605     then
24241 ;          10606         begin                             !ERROR IF SET
24242 ;          10607         ERRDF (107, ARR_DAT, DUMPER);
24243 ;          10608         PRINTB (TWO_FMT, WRD_35, PHR_4);
24244 ;          10609         PRINTB (FMT_9, .DSA_CNT);
```

```
24246 :ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
24247 :                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (110)
24248
24249 ;          10610
24250 ;          10611          if .CHIP_SIZ eql 64                    !NEED TO KNOW CHIP SIZE TO PRINT ARRAY NUMBER
24251 ;          10612          then
24252 ;          10613              begin
24253 ;          10614              PRINTB (FMT_8, ((.DSA_CNT<11, 4>) + 1));    !64K MOS RAM
24254 ;          10615              end
24255 ;          10616          else
24256 ;          10617              begin
24257 ;          10618              PRINTB (FMT_8, ((.DSA_CNT<9, 4>) + 1));     !16K MOS RAM
24258 ;          10619              end
24259 ;          10620
24260 ;          10621          end;
24261 ;          10622
24262 ;          10623      ENDSUB;
24263 ;          10624      end;
24264 ;          10625
24265 ;          10626 ENDTST;
24269
24273 104554  004167  077264          $T60:   JSR     R1,$SAVE2                       ;                       1055
24274 104560  016702  105006                  MOV     LST.BLK,R2                      ;                       1059
24275 104564  005001                          CLR     R1                              ; DSA.CNT
24276 104566  000536                          BR      6$
24277 104570  104402                  1$:     TRAP    2                               ;                       1059
24278 104572  152777  000040  106414          BISB    #40,@ML.REG+40                  ;                       1059
24279 104600  016700  106776                  MOV     ML.DUT,R0
24280 104604  042700  177770                  BIC     #177770,R0
24281 104610  142777  000007  106376          BICB    #7,@ML.REG+40
24282 104616  150077  106372                  BISB    R0,@ML.REG+40
24283 104622  152777  000002  106444          BISB    #2,@ML.REG+120                  ;                       1059
24284 104630  012777  177400  106326          MOV     #-400,@ML.REG+10                ;                       1059-
24285 104636  012777  011600  106330          MOV     #IO.BUF,@ML.REG+20              ;                       1059
24286 104644  010177  106334                  MOV     R1,@ML.REG+30                   ; DSA.CNT,*             1060
24287 104650  012777  000061  106276          MOV     #61,@ML.REG                     ;                       1060
24288 104656  105777  106342          2$:     TSTB    @ML.REG+50
24289 104662  100375                          BPL     2$
24290 104664  032777  040000  106342          BIT     #40000,@ML.REG+60               ;                       1060
24291 104672  001470                          BEQ     5$
24292 104674  104455                          TRAP    55                              ;                       1060
24293 104676  000153                          .WORD   153
24294 104700  010570                          .WORD   ARR.DAT
24295 104702  024052                          .WORD   DUMPER
24296 104704  012746  007454                  MOV     #PHR.4,-(SP)                    ;                       1060
24297 104710  012746  006666                  MOV     #WRD.35,-(SP)
24298 104714  012746  006024                  MOV     #TWO.FMT,-(SP)
24299 104720  012746  000003                  MOV     #3,-(SP)
```

```
24301                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
24302                                   ;                                                       22-Dec-1980 09:21:22    PA:<
24303
24304 104724 010600                             MOV     SP,R0           ; SP,*
24305 104726 104414                             TRAP    14
24306 104730 010116                             MOV     R1,(SP)         ; DSA.CNT,*                                     1060
24307 104732 012746 004644                      MOV     #FMT.9,-(SP)
24308 104736 012746 000002                      MOV     #2,-(SP)
24309 104742 010600                             MOV     SP,R0           ; SP,*
24310 104744 104414                             TRAP    14
24311 104746 026727 104616 000100               CMP     CHIP.SIZ,#100   ;                                               1061
24312 104754 001020                             BNE     3$
24313 104756 010100                             MOV     R1,R0           ; DSA.CNT,*                                     1061
24314 104760 006200                             ASR     R0
24315 104762 006200                             ASR     R0
24316 104764 006200                             ASR     R0
24317 104766 000300                             SWAB    R0
24318 104770 042700 177760                      BIC     #177760,R0
24319 104774 010046                             MOV     R0,-(SP)
24320 104776 005216                             INC     (SP)
24321 105000 012746 004610                      MOV     #FMT.8,-(SP)
24322 105004 012746 000002                      MOV     #2,-(SP)
24323 105010 010600                             MOV     SP,R0           ; SP,*
24324 105012 104414                             TRAP    14
24325 105014 000415                             BR      4$              ;                                               1061
24326 105016 010100                     3$:     MOV     R1,R0           ; DSA.CNT,*                                     1061
24327 105020 006200                             ASR     R0
24328 105022 000300                             SWAB    R0
24329 105024 042700 177760                      BIC     #177760,R0
24330 105030 010046                             MOV     R0,-(SP)
24331 105032 005216                             INC     (SP)
24332 105034 012746 004610                      MOV     #FMT.8,-(SP)
24333 105040 012746 000002                      MOV     #2,-(SP)
24334 105044 010600                             MOV     SP,R0           ; SP,*
24335 105046 104414                             TRAP    14
24336 105050 062706 000022              4$:     ADD     #22,SP          ;                                               1060
24337 105054 104467                     5$:     TRAP    67              ;                                               1062
24338 105056 006000                             ROR     R0
24339 105060 103643                             BLO     1$
24340 105062 005201                             INC     R1              ; DSA.CNT                                       1059
24341 105064 020102                     6$:     CMP     R1,R2           ; DSA.CNT,*
24342 105066 003640                             BLE     1$
24343 105070 000207                             RTS     PC              ;                                               1055
24344
24345                                   ; Routine Size:  103 words
24346                                   ; Maximum stack depth per invocation:  12 words
24351
24352
```

```
24357                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
24358                                   ;                                                       22-Dec-1980 09:21:22    PA:<
24359
24360
24364 105072                            T60::
24365 105072  004767  177456            1$:     JSR     PC,$T60                 ;                                       1062
24366 105076  104466                            TRAP    66
24367 105100  006000                            ROR     R0
24368 105102  103773                            BLO     1$
24369 105104  000207                            RTS     PC
24370
24371                                   ; Routine Size:  6 words
24372                                   ; Maximum stack depth per invocation:  0 words
24377
24378
24379 ;         10627 !<BLF/PAGE>
```

```
24381 ;ML4                                                    22-Dec-1980 09:24:31    TOPS-20 Bliss-16 V2(212)
24382 ;                                                       22-Dec-1980 09:21:22    PA:<NEALE>BL3ML4.BLI.2 (111)
24383
24384 ;          10628 !       THE CLEANUP CODING SECTION IS EXECUTED AFTER THE
24385 ;          10629 !       HARDWARE TESTS ARE RUN ON A LOGICAL UNIT.
24386 ;          10630 BGNCLN;
24387 ;          10631 CLR = ONE;                                !CLEAR THE MASS BUS
24388 ;          10632 return;
24389 ;          10633 ENDCLN;
24393
24397 105106  152777  000040  106100  LCLEAN: BISB    #40,@ML.REG+40                  ;                    1063
24398 105114  000207                          RTS     PC                              ;                    1062
24399
24400                                 ; Routine Size:  4 words
24401                                 ; Maximum stack depth per invocation:  0 words
24406
24407
24411
24415 105116                          L$CLEAN::
24416 105116  004767  177764                  JSR     PC,LCLEAN                       ;                    1063
24417 105122  104412                          TRAP    12
24418 105124  000207                          RTS     PC
24419
24420                                 ; Routine Size:  4 words
24421                                 ; Maximum stack depth per invocation:  0 words
24426
24427
24428 ;          10634 LASTAD;
24429 ;          10635 BGNSETUP (0);
24430 ;          10636 ENDSETUP;
```

```
24435                                   ;ML4                                                    22-Dec-1980 09:24:31    TOPS
24436                                   ;                                                       22-Dec-1980 09:21:22    PA:<
24437
24438
24439 105126  105132                    BL$LAS::.WORD   T$FREE
24440 105130  000000                            .WORD   <<T$FREE-<BL$LAS+4>>/2>
24441 105132  000000                    T$FREE::.WORD   0
24442
24443
24444         105132                    L$LAST==        BL$LAS+4
24445         000000                    T$PTHV==        0
24446
24447
24451 105134                            $END.LINK::
24452 105134  000207                            RTS     PC                              ;       1063
24453
24454                                   ; Routine Size:  1 word
24455                                   ; Maximum stack depth per invocation:  0 words
24460
24461
24462 ;           10637 end
24463 ;           10638
24464 ;           10639 eludom
24468
24469                                   ; OTS external references
24470                                           .GLOBL  BL$GT2, $SAVE5, $SAVE4, $SAVE3
24471                                           .GLOBL  $SAVE2, BL$PU2, BL$PU1, BL$GT1
24472                                           .GLOBL  BL$DIV, BL$MOD, BL$MUL
24473
24474
24475
24476
24477
24478
24479                                   ; Size:         14698 code + 1916 data words
24480                                   ; Run Time:     03:04.1
24481                                   ; Elapsed Time: 03:48.6
24482                                   ; Memory Used:  118 pages
24483                                   ; Compilation Complete
24484
24485         000001                            .END
```

SYMBOL TABLE

```
ADR    = 000020 G
ARR.DA= 010570
ARR.IN  011562
ARR.16  011574
ASSEMB= 000010
ASYNC  = 010464
A.CAL   013140
A.GEN   013146
BIT0   = 000001 G
BIT00  = 000001 G
BIT01  = 000002 G
BIT02  = 000004 G
BIT03  = 000010 G
BIT04  = 000020 G
BIT05  = 000040 G
BIT06  = 000100 G
BIT07  = 000200 G
BIT08  = 000400 G
BIT09  = 001000 G
BIT1   = 000002 G
BIT10  = 002000 G
BIT11  = 004000 G
BIT12  = 010000 G
BIT13  = 020000 G
BIT14  = 040000 G
BIT15  = 100000 G
BIT2   = 000004 G
BIT3   = 000010 G
BIT4   = 000020 G
BIT5   = 000040 G
BIT6   = 000100 G
BIT7   = 000200 G
BIT8   = 000400 G
BIT9   = 001000 G
BL$DIV  003752 G
BL$GT1  003016 G
BL$GT2  003140 G
BL$LAS  105126 G
BL$MOD  003764 G
BL$PUL  003526 G
BL$PU1  003302 G
BL$PU2  003376 G
BL$SHF  003776 G
BOE    = 000400 G
B.CAL   013142
B.GEN   013150
CAL.CR  014612
CHIP.S  011570
C$AU   = 000052
C$AUTO= 000061
C$BRK  = 000022
C$BSEG= 000004
C$BSUB= 000002
C$CEFG= 000045
C$CLCK= 000062
C$CLEA= 000012
C$CLOS= 000035
C$CLP1= 000006
C$CVEC= 000036
C$DCLN= 000044
C$DODU= 000051
C$DRPT= 000024
C$DU   = 000053
C$EDIT= 000003
C$ERMF= 000055
C$ERMR= 000056
C$ERRO= 000060
C$ERSF= 000054
C$ERSO= 000057
C$ESCA= 000010
C$ESEG= 000005
C$ESUB= 000003
C$ETST= 000001
C$EXIT= 000032
C$GETB= 000026
C$GETW= 000027
C$GMAN= 000043
C$GPHR= 000042
C$GPLO= 000030
C$GPRI= 000040
C$INIT= 000011
C$INLP= 000020
C$MANI= 000050
C$MEM  = 000031
C$MSG  = 000023
C$OPEN= 000034
C$PNTB= 000014
C$PNTF= 000017
C$PNTS= 000016
C$PNTX= 000015
C$QIO  = 000377
C$RDBU= 000007
C$REFG= 000047
C$RESE= 000033
C$REVI= 000003
C$RFLA= 000021
C$RPT  = 000025
C$SEFG= 000046
C$SPRI= 000041
C$SVEC= 000037
C$TPRI= 000013
DATA.L= 010732
DAT.DM  014162
DFPTBL  002356 G
DIAGMC= 000000
DIVMOD  003570
DRIVE.  013132
DT.1    013534
DUMPER  024052 G
D1.TEM= 011152
D2.TEM= 011154
EF.CON= 000036 G
EF.NEW= 000035 G
EF.PWR= 000034 G
EF.RES= 000037 G
EF.STA= 000040 G
EIG.FM= 006142
ELV.FM= 006244
ERRBLK  002160 G
ERRMSG  002156 G
ERRNBR  002154 G
ERRTYP  002152 G
ERR.CH  015212
EVL    = 000004 G
ESEND  = 002100
ESLOAD= 000035
E2.TEM= 011156
FIND.C  015430
FIRST.  016040
FIV.FM= 006062
FMT.1  = 004222
FMT.10= 004676
FMT.11= 004750
FMT.12= 005004
FMT.13= 005034
FMT.14= 005110
FMT.15= 005150
FMT.16= 005216
FMT.17= 005306
FMT.18= 005342
FMT.19= 005412
FMT.2  = 004266
FMT.20= 005462
FMT.21= 005534
FMT.22= 005606
FMT.23= 005652
FMT.24= 005722
FMT.25= 005746
FMT.26= 005764
FMT.3  = 004354
FMT.4  = 004400
FMT.5  = 004430
FMT.6  = 004532
FMT.7  = 004562
FMT.8  = 004610
FMT.9  = 004644
FNC.1  = 007726
FNC.10= 010050
FNC.11= 010060
FNC.12= 010100
FNC.13= 010112
FNC.14= 010122
FNC.15= 010136
FNC.16= 010150
FNC.17= 010162
FNC.18= 010172
FNC.19= 010204
FNC.2  = 007742
FNC.21= 010216
FNC.22= 010230
FNC.23= 010242
FNC.3  = 007750
FNC.4  = 007756
FNC.5  = 007774
FNC.6  = 010004
FNC.7  = 010012
FNC.8  = 010022
FNC.9  = 010036
FORCE.  015602
FOR.EC  015760
FOR.FM= 006046
F$AU   = 000015
F$AUTO= 000020
F$BGN  = 000040
F$CLEA= 000007
F$DU   = 000016
F$END  = 000041
F$HARD= 000004
F$HW   = 000013
F$INIT= 000006
F$JMP  = 000050
F$MOD  = 000000
F$MSG  = 000011
F$PROT= 000021
F$PWR  = 000017
F$RPT  = 000012
F$SEG  = 000003
F$SOFT= 000005
F$SRV  = 000010
F$SUB  = 000002
F$SW   = 000014
F$TEST= 000001
GD.BLK  016062
GOOD.B  011564
G$CNTO= 000200
G$DELM= 000372
G$DISP= 000003
G$EXCP= 000400
G$HILI= 000002
G$LOLI= 000001
G$NO   = 000000
G$OFFS= 000400
G$OFSI= 000376
G$PRMA= 000001
G$PRMD= 000002
G$PRML= 000000
G$RADA= 000140
G$RADB= 000000
G$RADD= 000040
G$RADL= 000120
G$RADO= 000020
G$XFER= 000004
G$YES  = 000010
HELP   = 000000
HOE    = 100000 G
HW.OR.  011160
IBE    = 010000 G
IDU    = 000040 G
IER    = 020000 G
INTER  = 010672
IO.BUF  011600
ISR    = 000100 G
IXE    = 004000 G
I$AU   = 000041
I$AUTO= 000041
I$CLN  = 000041
I$DU   = 000041
I$HRD  = 000041
I$INIT= 000041
I$MOD  = 000041
I$MSG  = 000041
I$PROT= 000040
I$PTAB= 000041
I$PWR  = 000041
I$RPT  = 000041
I$SEG  = 000041
I$SETU= 000041
I$SFT  = 000041
I$SRV  = 000041
I$SUB  = 000041
I$TST  = 000041
J$JMP  = 000167
LAST.B  016114
LAU     004210
LAUTO   004164
LCLEAN  105106
LDU     004176
LD.LNG  017124
LINIT   024714
LOAD.S  013604
LOE    = 040000 G
LOT    = 000010 G
LRPT    004152
LST.AR  011576
LST.BL  011572
LST.DU  013134
L$ACP   002110 G
L$APT   002036 G
L$AU    004212 G
L$AUT   002070 G
L$AUTO  004166 G
L$CCP   002106 G
L$CLEA  105116 G
L$CO    002032 G
L$DEPO  002011 G
L$DESC  002130 G
L$DESP  002076 G
L$DEVP  002060 G
L$DISP  002164 G
L$DLY   002116 G
L$DTP   002040 G
L$DTYP  002034 G
L$DU    004200 G
L$DUT   002072 G
L$DVTY  002122 G
```

```
L$EF     002052 G    O$APTS= 000001      P.AAT  005462    P.ACY  006732    P.AFD  010012
L$ENVI   002044 G    O$AU  = 000001      P.AAU  005534    P.ACZ  006746    P.AFE  010022
L$ERRT   002152 G    O$BGNR= 000001      P.AAV  005606    P.ADA  006754    P.AFF  010036
L$ETP    002102 G    O$BGNS= 000001      P.AAW  005652    P.ADB  006764    P.AFG  010050
L$EXP1   002046 G    O$DU  = 000001      P.AAX  005722    P.ADC  006772    P.AFH  010060
L$EXP4   002064 G    O$ERRT= 000001      P.AAY  005746    P.ADD  007004    P.AFI  010100
L$EXP5   002066 G    O$GNSW= 000001      P.AAZ  005764    P.ADE  007016    P.AFJ  010112
L$HARD   002402 G    O$POIN= 000001      P.ABA  006016    P.ADF  007026    P.AFK  010122
L$HIME   002120 G    O$SETU= 000001      P.ABB  006024    P.ADG  007036    P.AFL  010136
L$HPCP   002016 G    PAR.DI  011566      P.ABC  006034    P.ADH  007046    P.AFM  010150
L$HPTP   002022 G    PD.TEM  013120      P.ABD  006046    P.ADI  007054    P.AFN  010162
L$HW     002356 G    PHR.1 = 007366      P.ABE  006062    P.ADJ  007066    P.AFO  010172
L$ICP    002104 G    PHR.10= 007564      P.ABF  006100    P.ADK  007074    P.AFP  010204
L$INIT   025660 G    PHR.11= 007576      P.ABG  006120    P.ADL  007104    P.AFQ  010216
L$LADP   002026 G    PHR.12= 007614      P.ABH  006142    P.ADM  007114    P.AFR  010230
L$LAST=  105132 G    PHR.13= 007636      P.ABI  006166    P.ADN  007122    P.AFS  010242
L$LOAD   002100 G    PHR.14= 007662      P.ABJ  006214    P.ADO  007130    P.AFT  010256
L$LUN    002074 G    PHR.15= 007714      P.ABK  006244    P.ADP  007140    P.AFU  010266
L$MREV   002050 G    PHR.2 = 007404      P.ABL  006276    P.ADQ  007152    P.AFV  010274
L$NAME   002000 G    PHR.3 = 007422      P.ABM  006302    P.ADR  007156    P.AFW  010302
L$PRIO   002042 G    PHR.4 = 007454      P.ABN  006314    P.ADS  007174    P.AFX  010310
L$PROT   002750 G    PHR.5 = 007472      P.ABO  006322    P.ADT  007210    P.AFY  010316
L$PRT    002112 G    PHR.6 = 007504      P.ABP  006330    P.ADU  007216    P.AFZ  010324
L$REPP   002062 G    PHR.7 = 007516      P.ABQ  006336    P.ADV  007224    P.AGA  010332
L$REV    002010 G    PHR.8 = 007540      P.ABR  006344    P.ADW  007232    P.AGB  010340
L$RPT    004154 G    PHR.9 = 007552      P.ABS  006360    P.ADX  007240    P.AGC  010346
L$SOFT   002720 G    PNT   = 001000 G    P.ABT  006374    P.ADY  007246    P.AGD  010354
L$SPC    002056 G    PRI   = 002000 G    P.ABU  006406    P.ADZ  007252    P.AGE  010362
L$SPCP   002020 G    PRI00 = 000000 G    P.ABV  006416    P.AEA  007260    P.AGF  010370
L$SPTP   002024 G    PRI01 = 000040 G    P.ABW  006426    P.AEB  007272    P.AGG  010376
L$STA    002030 G    PRI02 = 000100 G    P.ABX  006436    P.AEC  007302    P.AGH  010404
L$SW     002376 G    PRI03 = 000140 G    P.ABY  006442    P.AED  007310    P.AGI  010412
L$TEST   002114 G    PRI04 = 000200 G    P.ABZ  006454    P.AEE  007316    P.AGJ  010420
L$TIML   002014 G    PRI05 = 000240 G    P.ACA  006462    P.AEF  007330    P.AGK  010430
L$UNIT   002012 G    PRI06 = 000300 G    P.ACB  006470    P.AEG  007340    P.AGL  010436
L10000   002374       PRI07 = 000340 G    P.ACC  006502    P.AEH  007346    P.AGM  010444
L10001   002400       PRSN    002376 G    P.ACD  006506    P.AEI  007366    P.AGN  010454
L10002   002476       PTBL.P  011556      P.ACE  006514    P.AEJ  007404    P.AGO  010464
L10003   002726       P.AAA   004222      P.ACF  006522    P.AEK  007422    P.AGP  010526
MEM.AR=  010630       P.AAB   004266      P.ACG  006530    P.AEL  007454    P.AGQ  010570
ML.DUT   013602       P.AAC   004354      P.ACH  006544    P.AEM  007472    P.AGR  010630
ML.LUN   013600       P.AAD   004400      P.ACI  006552    P.AEN  007504    P.AGS  010672
ML.REG   013154       P.AAE   004430      P.ACJ  006560    P.AEO  007516    P.AGT  010732
MSGH1    002476       P.AAF   004532      P.ACK  006574    P.AEP  007540    P.AGU  010772
MSGH2    002512       P.AAG   004562      P.ACL  006602    P.AEQ  007552    P.AGV  011026
MSGH3    002540       P.AAH   004610      P.ACM  006610    P.AER  007564    P.AGW  011060
MSGH4    002563       P.AAI   004644      P.ACN  006624    P.AES  007576    P.AGX  011106
MSGH5    002614       P.AAJ   004676      P.ACO  006632    P.AET  007614    P.CAL  013144
MSGH6    002646       P.AAK   004750      P.ACP  006646    P.AEU  007636    P.GEN  013152
MSGH7    002672       P.AAL   005004      P.ACQ  006654    P.AEV  007662    RAS.IN 013124
MSGS1    002726       P.AAM   005034      P.ACR  006660    P.AEW  007714    RD.CS1 017532
MSDUMP   024062       P.AAN   005110      P.ACS  006666    P.AEX  007726    RD.DA  020066
NIB.SA   011152       P.AAO   005150      P.ACT  006674    P.AEY  007742    RD.DAT 013130
NIN.FM=  006166       P.AAP   005216      P.ACU  006700    P.AEZ  007750    RD.DS  022766
ONEFIL=  000001       P.AAQ   005306      P.ACV  006710    P.AFA  007756    RD.D1  021654
ONE.FM=  006016       P.AAR   005342      P.ACW  006716    P.AFB  007774    RD.D2  022166
OP.NUM   011560       P.AAS   005412      P.ACX  006726    P.AFC  010004    RD.D3  022514
```

```
RD.EE    021530        TST.LN  016146        T33     060512 G      WRD.30= 006624      WRT.D2  022102
RD.EL    021466        TWO.FM= 006024        T34     061446 G      WRD.31= 006632      WRT.D3  022414
RD.ER    017710        T$ARGC= 000003        T35     062100 G      WRD.32= 006646      WRT.EE  021526
RD.E1    020644        T$CODE= 000130        T36     063136 G      WRD.33= 006654      WRT.EL  021464
RD.E2    021064        T$ERRN= 000000        T37     064044 G      WRD.34= 006660      WRT.ER  017640
RD.MR    020244        T$EXCP= 000000        T38     065050 G      WRD.35= 006666      WRT.E1  020560
RD.PA    020436        T$FREE  105132 G      T39     065476 G      WRD.36= 006674      WRT.E2  020766
RD.PD    021326        T$GMAN= 000000        T4      027222 G      WRD.37= 006700      WRT.MR  020174
RD.REG   023462        T$HILI= 000007        T40     066464 G      WRD.38= 006710      WRT.PA  020352
REG.IN   013136        T$LAST= 000000        T41     067516 G      WRD.39= 006716      WRT.PD  021220
REG.1 =  010256        T$LOLI= 000000        T42     070270 G      WRD.4 = 006322      WRT.RE  023074
REG.10=  010346        T$LSYM= 010000        T43     071224 G      WRD.40= 006726      WT.DAT  013126
REG.11=  010354        T$NEST= 177777        T44     071434 G      WRD.41= 006732      W.C.SI  013122
REG.12=  010362        T$NS0 = 000000        T45     071620 G      WRD.42= 006746      XOR.LN  016642
REG.13=  010370        T$NS1 = 000021        T46     072316 G      WRD.43= 006754      X$ALWA= 000000
REG.14=  010376        T$PTHV= 000000 G      T47     072610 G      WRD.44= 006764      X$FALS= 000040
REG.15=  010404        T$PTNU= 000000        T48     073502 G      WRD.45= 006772      X$OFFS= 000400
REG.16=  010412        T$SAVL= 177777        T49     074206 G      WRD.46= 007004      X$TRUE= 000020
REG.17=  010420        T$SEGL= 177777        T5      027644 G      WRD.47= 007016      $END.L  105134 G
REG.18=  010430        T$SUBN= 000000        T50     074624 G      WRD.48= 007026      $PATCH  002756 G
REG.19=  010436        T$TAGL= 177777        T51     075676 G      WRD.49= 007036      $SAVE2  004044 G
REG.2 =  010266        T$TAGN= 010005        T52     076450 G      WRD.5 = 006330      $SAVE3  004060 G
REG.20=  010444        T$TEMP= 000000        T53     077250 G      WRD.50= 007046      $SAVE4  004076 G
REG.21=  010454        T$TEST= 000000        T54     100272 G      WRD.51= 007054      $SAVE5  004116 G
REG.3 =  010274        T$TSTM= 177777        T55     101142 G      WRD.52= 007066      $T1     025670
REG.4 =  010302        T$TSTS= 000000        T56     102244 G      WRD.53= 007074      $T10    032366
REG.5 =  010310        T$$HAR= 010002        T57     103466 G      WRD.54= 007104      $T11    033030
REG.6 =  010316        T$$HW =  010000       T58     104072 G      WRD.55= 007114      $T12    033274
REG.7 =  010324        T$$PRO= 010004        T59     104540 G      WRD.56= 007122      $T13    033704
REG.8 =  010332        T$$SOF= 010003        T6      030302 G      WRD.57= 007130      $T14    035056
REG.9 =  010340        T$$SW =  010001       T60     105072 G      WRD.58= 007140      $T15    036324
REM.TB   013434        T1      026056 G      T7      031132 G      WRD.59= 007152      $T16    037572
RE2      004144        T10     033014 G      T8      032116 G      WRD.6 = 006336      $T17    040472
RE3      004142        T11     033260 G      T9      032352 G      WRD.60= 007156      $T18    041666
RE4      004140        T12     033670 G      UAM   = 000200 G      WRD.61= 007174      $T19    042124
RH.ADD   013572        T13     035042 G      WRD.1 = 006276        WRD.62= 007210      $T2     026072
RH.ERR=  011060        T14     036310 G      WRD.10= 006406        WRD.63= 007216      $T20    043274
RH.TYP   013574        T15     037556 G      WRD.11= 006416        WRD.64= 007224      $T21    044234
RH.VEC   013576        T16     040456 G      WRD.12= 006426        WRD.65= 007232      $T22    044630
SC.SET=  010772        T17     041652 G      WRD.13= 006436        WRD.67= 007240      $T23    045276
SEV.FM=  006120        T18     042110 G      WRD.14= 006442        WRD.68= 007246      $T24    045634
SFPTBL   002376 G      T19     043260 G      WRD.15= 006454        WRD.69= 007252      $T25    047010
SIX.FM=  006100        T2      026322 G      WRD.16= 006462        WRD.7 = 006344      $T26    047566
STACK    012612        T20     044220 G      WRD.17= 006470        WRD.70= 007260      $T27    050712
STK.OF   012600        T21     044614 G      WRD.18= 006502        WRD.71= 007272      $T28    051470
STRIPP   014214        T22     045262 G      WRD.19= 006506        WRD.72= 007302      $T29    052454
SVCGBL=  177777        T23     045620 G      WRD.2 = 006302        WRD.73= 007310      $T3     026336
SVCINS=  177777        T24     046774 G      WRD.20= 006514        WRD.74= 007316      $T30    053566
SVCSUB=  177777        T25     047552 G      WRD.21= 006522        WRD.75= 007330      $T31    054362
SVCTAG=  177777        T26     050676 G      WRD.22= 006530        WRD.76= 007340      $T32    055756
SVCTST=  177777        T27     051454 G      WRD.23= 006544        WRD.77= 007346      $T33    057514
SYNC   = 010526        T28     052440 G      WRD.24= 006552        WRD.8 = 006360      $T34    060526
S$LSYM=  010000        T29     053552 G      WRD.25= 006560        WRD.9 = 006374      $T35    061462
TEN.FM=  006214        T3      026530 G      WRD.26= 006574        WRT.CS  017462      $T36    062114
THR.FM=  006034        T30     054346 G      WRD.27= 006602        WRT.DA  020016      $T37    063152
TIME.O=  011106        T31     055742 G      WRD.29= 006610        WRT.DS  022764      $T38    064060
TRBLE.=  011026        T32     057500 G      WRD.3 = 006314        WRT.D1  021570      $T39    065064
```

```
$T4     026544          $T45    071450          $T50    074222          $T55    100306          $T6     027660
$T40    065512          $T46    071634          $T51    074640          $T56    101156          $T60    104554
$T41    066500          $T47    072332          $T52    075712          $T57    102260          $T7     030316
$T42    067532          $T48    072624          $T53    076464          $T58    103502          $T8     031146
$T43    070304          $T49    073516          $T54    077264          $T59    104106          $T9     032132
$T44    071240          $T5     027236

. ABS.  105136      000
        000000      001
ERRORS DETECTED:  0

VIRTUAL MEMORY USED:  34695 WORDS  ( 136 PAGES)
DYNAMIC MEMORY:  21558 WORDS  ( 82 PAGES)
ELAPSED TIME:  00:11:10
ML11,ML11/-SP/CR:SYM=SVC/ML,CZMLAB.DOC,ML2.P11,B16PG1.P11,B16PG2.P11,B16PG3.P11,B16PG4.P11,B16MUL.P11,B16SAV.P11,ML3.P11,ML4.P11
```

ML11 CREATED BY MACRO ON 22-DEC-80 AT 12:19 PAGE 1
SYMBOL CROSS REFERENCE CREF SEQ 0515

```
SYMBOL  VALUE              REFERENCES
ADR     = 000020  G        #84-2189
ARR.DA  = 010570           #88-2389    204-8071    209-8320    215-8617    223-9002    271-11447   272-11511   273-11587   309-13418
                            315-13685   321-14034   322-14055   322-14076   323-14097   323-14114   334-14717   390-17650   396-17972
                            419-19218   519-24294
ARR.IN    011562           #79-1880    *186-7192   *186-7212   289-12395   289-12436   290-12442   332-14603   342-15126   342-15135
                            361-16136   362-16154   364-16301   365-16319   412-18824   412-18828
ARR.16    011574           #79-1887    *186-7182   *186-7193   *186-7213   *186-7214   289-12437
ASSEMB  = 000010           4-13        4-13
ASYNC   = 010464           #88-2387    196-7647    200-7860    204-8053    209-8302    215-8597    216-8659    222-8989    229-9334
                            230-9358    230-9378    233-9527    236-9704    237-9725    237-9742    241-9954    242-9973    242-9990
                            242-10007   243-10028   243-10063   244-10086   244-10110   248-10330   249-10349   249-10366   249-10383
                            250-10404   250-10439   251-10462   251-10486   256-10735   257-10754   257-10771   257-10788   258-10809
                            258-10844   259-10867   259-10891   264-11107   264-11123   264-11142   265-11163   265-11181   265-11199
                            277-11765   281-11997   282-12018   282-12036   283-12072   283-12105   284-12151   288-12344   288-12360
                            288-12377   289-12410   290-12456   293-12589   293-12605   293-12621   294-12641   297-12800   298-12823
                            298-12844   302-13025   328-14399   347-15410   355-15842   366-16403   413-18898   429-19737   430-19761
                            431-19804   431-19827   431-19843   434-19988   496-23137   505-23579   516-24126
A.CAL     013140           #79-1904    98-2891     *98-2892    *98-2893    101-3015    *453-21006  454-21036   *458-21249  459-21279
A.GEN     013146           #79-1907    101-2991    101-3015    *453-21003  454-21029   *458-21246  458-21268
BIT0    = 000001  G        #84-2173
BIT00   = 000001  G        #84-2163
BIT01   = 000002  G        #84-2162
BIT02   = 000004  G        #84-2161
BIT03   = 000010  G        #84-2160
BIT04   = 000020  G        #84-2159
BIT05   = 000040  G        #84-2158
BIT06   = 000100  G        #84-2157
BIT07   = 000200  G        #84-2156
BIT08   = 000400  G        #84-2155
BIT09   = 001000  G        #84-2154
BIT1    = 000002  G        #84-2172
BIT10   = 002000  G        #84-2153
BIT11   = 004000  G        #84-2152
BIT12   = 010000  G        #84-2151
BIT13   = 020000  G        #84-2150
BIT14   = 040000  G        #84-2149
BIT15   = 100000  G        #84-2148
BIT2    = 000004  G        #84-2171
BIT3    = 000010  G        #84-2170
BIT4    = 000020  G        #84-2169
BIT5    = 000040  G        #84-2168
BIT6    = 000100  G        #84-2167
BIT7    = 000200  G        #84-2166
BIT8    = 000400  G        #84-2165
BIT9    = 001000  G        #84-2164
BL$DIV    003752  G        #37-274     102-3086    483-22457   489-22772   523-24472
BL$GT1    003016  G        #9-143      396-17964   523-24471
BL$GT2    003140  G        #15-153     94-2707     98-2863     103-3112    281-11991   283-12066   284-12145   307-13305   309-13388
                            321-13988   334-14689   341-15084   347-15383   353-15715   355-15828   362-16179   365-16343   372-16699
                            379-17045   389-17624   390-17637   419-19205   448-20756   483-22481   490-22822   523-24470
BL$LAS    105126  G        #523-24439  523-24440   523-24444
BL$MOD    003764  G        #38-304     103-3094    483-22496   489-22776   523-24472
```

SYMBOL	VALUE		REFERENCES								
BL$MUL	003526	G	#34-128	495-23053	523-24472						
BL$PU1	003302	G	#21-140	453-20991	523-24471						
BL$PU2	003376	G	#28-183	101-2990	101-2999	101-3008	283-12099	390-17671	484-22513	490-22793	523-24471
BL$SHF	003776	G	9-155	9-158	9-162	9-166	10-191	16-175	16-178	16-182	16-186
			16-207	21-143	21-147	21-153	22-180	28-192	28-196	28-202	29-234
			#39-338								
BOE	= 000400	G	#84-2193								
B.CAL	013142		#79-1905	98-2897	*98-2898	*98-2899	101-3017	*453-21007	454-21037	*458-21250	459-21280
B.GEN	013150		#79-1908	101-3000	101-3017	*453-21004	454-21030	*458-21247	458-21269		
CAL.CR	014612		#97-2832	453-21009	458-21252						
CHIP.S	011570		#79-1884	*186-7191	*186-7211	520-24311					
C$AU	= 000052		#4-13								
C$AUTO	= 000061		#4-13								
C$BRK	= 000022		#4-13								
C$BSEG	= 000004		#4-13								
C$BSUB	= 000002		#4-13								
C$CEFG	= 000045		#4-13								
C$CLCK	= 000062		#4-13								
C$CLEA	= 000012		#4-13								
C$CLOS	= 000035		#4-13								
C$CLP1	= 000006		#4-13								
C$CVEC	= 000036		#4-13								
C$DCLN	= 000044		#4-13								
C$DODU	= 000051		#4-13								
C$DRPT	= 000024		#4-13								
C$DU	= 000053		#4-13								
C$EDIT	= 000003		#4-13	4-65							
C$ERDF	= 000055		#4-13								
C$ERHR	= 000056		#4-13								
C$ERRO	= 000060		#4-13								
C$ERSF	= 000054		#4-13								
C$ERSO	= 000057		#4-13								
C$ESCA	= 000010		#4-13								
C$ESEG	= 000005		#4-13								
C$ESUB	= 000003		#4-13								
C$ETST	= 000001		#4-13								
C$EXIT	= 000032		#4-13								
C$GETB	= 000026		#4-13								
C$GETW	= 000027		#4-13								
C$GMAN	= 000043		#4-13								
C$GPHR	= 000042		#4-13								
C$GPLO	= 000030		#4-13								
C$GPRI	= 000040		#4-13								
C$INIT	= 000011		#4-13								
C$INLP	= 000020		#4-13								
C$MANI	= 000050		#4-13								
C$MEM	= 000031		#4-13								
C$MSG	= 000023		#4-13								
C$OPEN	= 000034		#4-13								
C$PNTB	= 000014		#4-13								
C$PNTF	= 000017		#4-13								
C$PNTS	= 000016		#4-13								

```
SYMBOL  VALUE          REFERENCES
C$PNTX  = 000015       #4-13
C$QIO   = 000377       #4-13
C$RDBU  = 000007       #4-13
C$REFG  = 000047       #4-13
C$RESE  = 000033       #4-13          #4-13
C$REVI  = 000003       #4-13           4-65
C$RFLA  = 000021       #4-13
C$RPT   = 000025       #4-13
C$SEFG  = 000046       #4-13
C$SPRI  = 000041       #4-13
C$SVEC  = 000037       #4-13
C$TPRI  = 000013       #4-13
DATA.L  = 010732       #88-2392
DAT.DM    014162       #91-2556    93-2663    321-14015  346-15321  346-15342  370-16618  371-16658  377-16968  378-17004
                        389-17585  417-19120  418-19161  483-22459  490-22800
DFPTBL    002356  G    #4-119
DIAGMC  = 000000        4-13        4-13
DIVMOD    003570       #35-196     37-275     38-305
DRIVE.    013132       #79-1898   *186-7188  *186-7208   216-8655   216-8668
DT.1      013534       #83-2117    495-23055  495-23057  495-23073  497-23182
DUMPER    024052  G    #179-6800   190-7359   193-7497   196-7648   199-7802   200-7861   204-8054   204-8063   204-8072
                        209-8303   209-8312   210-8325   215-8598   215-8609   215-8618   216-8660   222-8990   223-9003
                        229-9335   230-9359   230-9379   233-9528   236-9705   237-9726   237-9743   241-9955   242-9974
                        242-9991   242-10008  243-10029  243-10064  243-10069  244-10087  244-10111  244-10116  248-10331
                        249-10350  249-10367  249-10384  250-10405  250-10440  250-10445  251-10463  251-10487  251-10492
                        252-10517  256-10736  257-10755  257-10772  257-10789  258-10810  258-10845  258-10850  259-10868
                        259-10892  259-10897  260-10922  264-11108  264-11124  264-11143  265-11164  265-11182  265-11200
                        271-11448  272-11512  273-11588  277-11766  282-12002  282-12019  282-12037  283-12073  283-12106
                        284-12152  288-12345  288-12361  288-12378  289-12411  290-12457  293-12590  293-12606  293-12622
                        294-12642  298-12805  298-12824  298-12845  302-13026  302-13041  308-13346  309-13419  315-13686
                        321-14035  322-14056  322-14077  323-14098  323-14115  328-14400  334-14718  342-15141  347-15411
                        353-15730  355-15843  364-16281  366-16404  372-16732  373-16758  379-17059  383-17274  390-17651
                        396-17973  401-18265  402-18301  403-18340  407-18574  412-18834  413-18899  419-19219  425-19479
                        425-19501  425-19520  429-19738  430-19762  431-19805  431-19828  431-19844  434-19989  437-20110
                        440-20282  440-20317  443-20482  449-20775  454-21020  458-21259  464-21521  464-21544  465-21611
                        466-21641  471-21896  471-21920  477-22186  477-22210  484-22552  491-22853  496-23138  497-23157
                        498-23212  504-23525  505-23580  507-23684  511-23885  516-24122  516-24127  519-24295
D1.TEM  = 011152       #88-2397   *94-2691   *328-14368 *333-14671  340-15015 *341-15069 *347-15369 *353-15701 *355-15814
                       *371-16681 *378-17027 *389-17607 *419-19191 *448-20748 *484-22514  484-22520 *489-22767  490-22797
D2.TEM  = 011154       #88-2398   *94-2692   *328-14369 *333-14672  340-15016 *341-15070 *347-15370 *353-15702 *355-15815
                       *371-16682 *378-17028 *389-17608 *419-19192 *448-20749 *484-22515  484-22521 *489-22768  490-22798
EF.CON  = 000036  G    #84-2176
EF.NEW  = 000035  G    #84-2177
EF.PWR  = 000034  G    #84-2178
EF.RES  = 000037  G    #84-2175
EF.STA  = 000040  G    #84-2174
EIG.FM  = 006142       #85-2238
ELV.FM  = 006244       #85-2241
ERRBLK    002160  G    #4-96
ERRMSG    002156  G    #4-96
ERRNBR    002154  G    #4-96
ERRTYP    002152  G    #4-96
```

```
SYMBOL  VALUE          REFERENCES
ERR.CH    015212       #100-2974   453-21010   458-21253
EVL     = 000004   G   #84-2187
ESEND   = 002100       #4-13
ESLOAD  = 000035       #4-13       4-65
E2.TEM  = 011156       #88-2399    *94-2693    *328-14370  *333-14673   340-15017  *341-15071  *347-15371  *353-15703  *355-15816
                       *371-16683  *378-17029  *389-17609  *419-19193  *448-20750  *484-22516   484-22522  *489-22747  *489-22748
                        490-22799
FIND.C    015430       #102-3081   464-21514   465-21604
FIRST.    016040       #108-3333   241-9948    248-10324   256-10729   297-12792   313-13613   327-14320   327-14342   354-15769
FIV.FM  = 006002       #85-2235    193-7503    215-8624    237-9715    237-9732    237-9749    241-9961    242-9980    242-9997
                        242-10014   243-10035   243-10075   244-10093   244-10122   248-10337   249-10356   249-10373   249-10390
                        250-10411   250-10451   251-10469   251-10498   257-10746   257-10761   257-10778   257-10795   258-10816
                        259-10860   259-10874   259-10903   264-11115   264-11130   265-11153   265-11171   265-11189   273-11594
                        282-12025   283-12079   284-12116   288-12351   288-12368   289-12388   289-12417   290-12463   293-12596
                        293-12612   294-12632   294-12648   298-12811   298-12830   298-12851   328-14406   348-15421   379-17065
                        407-18580   412-18840   426-19530   431-19834   434-19995   466-21647   471-21926   478-22220
FMT.1   = 004222       #85-2205    201-7875    497-23167   507-23694   511-23899   516-24140
FMT.10  = 004676       #85-2214    308-13359
FMT.11  = 004750       #85-2215    193-7508
FMT.12  = 005004       #85-2216    298-12816   298-12835   298-12856
FMT.13  = 005034       #85-2217    310-13455
FMT.14  = 005110       #85-2218    366-16415
FMT.15  = 005150       #85-2219    402-18313
FMT.16  = 005216       #85-2220    205-8094    210-8343    216-8635    223-9018    271-11466   272-11530   274-11605
FMT.17  = 005306       #85-2221    187-7243
FMT.18  = 005342       #85-2222
FMT.19  = 005412       #85-2223    454-21031   459-21274   497-23184
FMT.2   = 004266       #85-2206    200-7824    216-8669    233-9544    315-13705   383-17293   408-18595   505-23594
FMT.20  = 005462       #85-2224    454-21038   459-21281
FMT.21  = 005534       #85-2225    464-21531   464-21555   466-21625   466-21653   471-21907   472-21936   477-22197   478-22226
FMT.22  = 005606       #85-2226    485-22566   491-22863
FMT.23  = 005652       #85-2227    180-6861
FMT.24  = 005722       #85-2228    180-6868    180-6875    180-6882    180-6889    180-6896    181-6907    181-6914    181-6921
                        181-6928    181-6935    181-6942    181-6949    182-6961    182-6970    182-6977
FMT.25  = 005746       #85-2229    226-9175
FMT.26  = 005764       #85-2230    226-9185
FMT.3   = 004354       #85-2207
FMT.4   = 004400       #85-2208    277-11776
FMT.5   = 004430       #85-2209    379-17072   402-18284   402-18320   403-18355   449-20794
FMT.6   = 004532       #85-2210    419-19228
FMT.7   = 004562       #85-2211    284-12164   323-14131   430-19751   430-19771   431-19814
FMT.8   = 004610       #85-2212    520-24321   520-24332
FMT.9   = 004644       #85-2213    289-12422   290-12468   334-14727   413-18910   520-24307
FNC.1   = 007726       #87-2340    233-9530
FNC.10  = 010050       #87-2349    288-12347   288-12363   288-12380   289-12413   290-12459
FNC.11  = 010060       #87-2350    288-12364   293-12592   293-12608   293-12624   294-12644
FNC.12  = 010100       #87-2351    298-12807   298-12826   298-12847
FNC.13  = 010112       #87-2352    353-15739   412-18839   425-19482   425-19504   425-19521
FNC.14  = 010122       #87-2353    328-14401
FNC.15  = 010136       #87-2354    342-15142   364-16286   412-18844
FNC.16  = 010150       #87-2355    347-15413
FNC.17  = 010162       #87-2356    364-16284   366-16407   412-18838   413-18903
```

```
SYMBOL  VALUE     REFERENCES
FNC.18  = 010172  #87-2357  390-17657  396-17979
FNC.19  = 010204  #87-2358  437-20111
FNC.2   = 007742  #87-2341  237-9711   237-9728   237-9745   282-12039  283-12075
FNC.21  = 010216  #87-2359  308-13352
FNC.22  = 010230  #87-2360  353-15731
FNC.23  = 010242  #87-2361  190-7361   215-8620   273-11590
FNC.3   = 007750  #87-2342  199-7806   200-7864   264-11111  265-11167  265-11185  266-11210  439-20252  443-20483
FNC.4   = 007756  #87-2343  241-9957   242-10010  243-10031  243-10071  244-10089  244-10118  444-20492
FNC.5   = 007774  #87-2344  204-8076   210-8329   248-10333  249-10386  250-10407  250-10447  251-10465  251-10494
                  252-10519  257-10791  258-10812  259-10856  259-10870  259-10899  271-11452  272-11516  372-16734
                  373-16760  379-17060  390-17653  402-18271  402-18303  403-18342  443-20485
FNC.6   = 010004  #87-2345  193-7498   204-8075   210-8328   256-10738  260-10924  271-11451  272-11515  308-13347
                  383-17276  396-17975  407-18578  443-20484
FNC.7   = 010012  #87-2346  264-11110  265-11166  265-11184  266-11209  498-23214
FNC.8   = 010022  #87-2347  277-11767  277-11770  282-12003  282-12020
FNC.9   = 010036  #87-2348
FORCE.    015602  #104-3183  464-21507  465-21595  471-21883  477-22169
FOR.EC    015760  #106-3277  504-23513  505-23556  506-23619  507-23665  515-24072
FOR.FM  = 006046  #85-2234   277-11771  282-12007  282-12043  302-13031  302-13046  310-13442  315-13691  366-16409
                  413-18904  425-19484  425-19506  431-19849  437-20115  440-20287  441-20326  449-20780  464-21549
                  471-21901  477-22191  497-23147  498-23217  511-23890
FSAU    = 000015  #4-13
FSAUTO  = 000020  #4-13
FSBGN   = 000040  #4-13  4-39  5-226  5-274  5-305  5-337
FSCLEA  = 000007  #4-13
FSDU    = 000016  #4-13
FSEND   = 000041  #4-13  4-13  4-13  4-13  4-13  4-13  4-13  4-13  4-13
                  4-13  4-13  4-13  4-13  4-13  4-13  4-13  4-13  4-39
                  5-247  5-288  5-337
FSHARD  = 000004  #4-13  5-226  5-247
FSHW    = 000013  #4-13  4-119  4-139
FSINIT  = 000006  #4-13
FSJMP   = 000050  #4-13
FSMOD   = 000000  #4-13  4-39  5-337
FSMSG   = 000011  #4-13
FSPROT  = 000021  #4-13  5-305  5-311
FSPUR   = 000017  #4-13
FSRPT   = 000012  #4-13
FSSEG   = 000003  #4-13
FSSOFT  = 000005  #4-13  5-274  5-288
FSSRV   = 000010  #4-13
FSSUB   = 000002  #4-13
FSSW    = 000014  #4-13  4-150  4-162
FSTEST  = 000001  #4-13
GD.BLK    016062  #109-3382  371-16645  378-16995  382-17240  383-17261  388-17568  395-17920  395-17937  401-18242
                  407-18540  407-18557  418-19149  424-19434  424-19456  440-20273  440-20308  441-20335  443-20463
                  443-20473  448-20720  448-20725  453-20999  458-21242  463-21480  464-21508  465-21596  470-21835
                  471-21884  476-22121  477-22174  482-22437  484-22539  489-22762  490-22836  495-23077  510-23849
                  511-23864  515-24075  515-24086
GOOD.B    011564  #79-1881   91-2558   109-3384  *186-7181  *341-15115
G$CNTO  = 000200  #4-13
G$DELM  = 000372  #4-13
```

```
SYMBOL  VALUE          REFERENCES
GSDISP  = 000003       #4-13
GSEXCP  = 000400       #4-13
GSHILI  = 000002       #4-13
GSLOLI  = 000001       #4-13
GSND    = 000000       #4-13
GSOFFS  = 000400       #4-13     5-239   5-240   5-241   5-242   5-243   5-244   5-245   5-285
GSOFSI  = 000376       #4-13     5-239   5-240   5-241   5-242   5-243   5-244   5-245   5-285
GSPRMA  = 000001       #4-13     5-239
GSPRMD  = 000002       #4-13     5-240   5-241   5-242   5-244
GSPRML  = 000000       #4-13     5-243   5-245   5-285
GSRADA  = 000140       #4-13
GSRADB  = 000000       #4-13
GSRADD  = 000040       #4-13     5-242
GSRADL  = 000120       #4-13     5-243   5-245   5-285
GSRADO  = 000020       #4-13     5-239   5-240   5-241   5-244
GSXFER  = 000004       #4-13
GSYES   = 000010       #4-13     5-239   5-240   5-241   5-242   5-243   5-244   5-245   5-285
HELP    = 000000       #4-4      4-8     4-30    4-48    4-67    4-105   4-121   4-152   #5-167
                         5-228   5-249   5-276   5-291   5-313   5-330   5-340
HOE     = 100000   G   #85-2204
HW.OR.    011160       #79-1874  *314-13632  314-13672
IBE     = 010000   G   #85-2201
IDU     = 000040   G   #84-2190
IER     = 020000   G   #85-2202
INTER   = 010672       #88-2391  199-7801  252-10516  260-10921  308-13345  342-15140  353-15729  364-16280  373-16757
                         412-18833
IO.BUF    011600       #79-1889  91-2559  103-3098  *103-3099  108-3335  109-3385  110-3434  333-14623  333-14647
                         339-14988  340-15041  362-16153  365-16318  *371-16643  *378-16994  *382-17239  *383-17257  383-17268
                         388-17524  394-17878  *395-17928  396-17958  *401-18236  *401-18237  *406-18530  *406-18531  *407-18548
                         407-18565  *411-18786  411-18799  411-18808  *412-18863  412-18866  *413-18881  413-18886  *417-19110
                         *417-19114  *417-19115  *417-19116  *424-19433  *424-19448  425-19474  425-19496  429-19728  434-19982
                         436-20096  *440-20270  *440-20292  *441-20334  *443-20462  *453-20970  *453-20993  *454-21051  *458-21238
                         *463-21479  *463-21497  464-21539  *465-21589  466-21636  *470-21834  *471-21877  471-21915  *476-22120
                         *477-22163  477-22205  *482-22428  484-22547  *489-22758  490-22844  504-23516  505-23570  506-23621
                         507-23667  *510-23848  *515-24074  519-24285
ISR     = 000100   G   #84-2191
IXE     = 004000   G   #8_-2200
ISAU    = 000041       #4-13
ISAUTO  = 000041       #4-13
ISCLN   = 000041       #4-13
ISDU    = 000041       #4-13
ISHRD   = 000041       #5-226    #5-247
ISINIT  = 000041       #4-13
ISMOD   = 000041       #4-13     4-39    #4-39    5-337    #5-337
ISMSG   = 000041       #4-13
ISPROT  = 000040       #4-13     #5-305
ISPTAB  = 000041       #4-13
ISPWR   = 000041       #4-13
ISRPT   = 000041       #4-13
ISSEG   = 000041       #4-13
ISSETU  = 000041       #4-13
ISSFT   = 000041       #5-274    #5-288
```

```
SYMBOL  VALUE          REFERENCES
I$SRV   = 000041       #4-13
I$SUB   = 000041       #4-13
I$TST   = 000041       #4-13
J$JMP   = 000167       #4-13
LAST.B    016114       #110-3431   352-15652  352-15674  354-15787  430-19790
LAU       004210       #43-181     43-198
LAUTO     004164       #43-83      43-100
LCLEAN    105106       #522-24397  522-24416
LDU       004176       #43-131     43-148
LD.LNG    017124       #121-3963   339-15006  484-22519  490-22796
LINIT     024714       #185-7119   187-7270
LOAD.S    013604       #88-2406    94-2720
LOE     = 040000  G    #85-2203
LOT     = 000010  G    #84-2188
LRPT      004152       #43-32      43-49
LST.AR    011576       #79-1888   *186-7183  *186-7198  *186-7199  *187-7225  *187-7226   289-12394  289-12435  332-14602
                        342-15125  342-15134  412-18823  412-18827  504-23540
LST.BL    011572       #79-1886    110-3433  *186-7184  *186-7204  *186-7205  *186-7206  *187-7233  *187-7234  *187-7235
                        354-15757  429-19715  430-19794  431-19813  434-19972  436-20097  504-23514  505-23563  506-23622
                        506-23639  507-23662  519-24274
LST.DU    013134       #79-1900    182-6965  *187-7239  *187-7241   193-7477
L$ACP     002110  G    #4-65
L$APT     002036  G    #4-65
L$AU      004212  G     4-65       #43-198
L$AUT     002070  G    #4-65
L$AUTO    004166  G     4-65       #43-100
L$CCP     002106  G    #4-65
L$CLEA    105116  G     4-65       #522-24415
L$CO      002032  G    #4-65
L$DEPO    002011  G    #4-65
L$DESC    002130  G     4-65       #4-87
L$DESP    002076  G    #4-65
L$DEVP    002060  G    #4-65
L$DISP    002164  G     4-65       #4-103
L$DLY     002116  G    #4-65        93-2641   93-2667   93-2680   190-7347  196-7636  200-7841  236-9693  243-10043
                        250-10419  258-10824  264-11096  301-13010  307-13284  314-13623  314-13647  314-13660  327-14325
                        327-14346  328-14361  333-14629  333-14652  333-14664  340-15022  340-15045  340-15058  346-15326
                        346-15346  347-15362  352-15657  352-15678  353-15694  354-15791  355-15807  362-16159  365-16324
                        370-16623  371-16662  371-16674  377-16973  378-17008  378-17020  389-17589  389-17600  418-19129
                        418-19165  419-19184  448-20730  448-20741  483-22463  484-22526  490-22804
L$DTP     002040  G    #4-65
L$DTYP    002034  G    #4-65
L$DU      004200  G     4-65       #43-148
L$DUT     002072  G    #4-65
L$DVTY    002122  G     4-65       #4-80
L$EF      002052  G    #4-65
L$ENVI    002044  G    #4-65
L$ERRT    002152  G     4-65       #4-96
L$ETP     002102  G    #4-65
L$EXP1    002046  G    #4-65
L$EXP4    002064  G    #4-65
L$EXP5    002066  G    #4-65
```

SYMBOL	VALUE		REFERENCES								
LSHARD	002402	G	4-65	5-226	#5-226						
LSHIME	002120	G	#4-65								
LSHPCP	002016	G	#4-65								
LSHPTP	002022	G	#4-65								
LSHW	002356	G	4-65	4-119	#4-119						
LSICP	002104	G	#4-65								
LSINIT	025660	G	4-65	#187-7270							
LSLADP	002026	G	#4-65								
LSLAST	= 105132	G	4-65	#523-24444							
LSLOAD	002100	G	#4-65								
LSLUN	002074	G	#4-65								
LSMREV	002050	G	#4-65								
LSNAME	002000	G	#4-65								
LSPRIO	002042	G	#4-65								
LSPROT	002750	G	4-65	#5-305							
LSPRT	002112	G	#4-65								
LSREPP	002062	G	#4-65								
LSREV	002010	G	#4-65								
LSRPT	004154	G	4-65	#43-49							
LSSOFT	002720	G	4-65	5-274	#5-274						
LSSPC	002056	G	#4-65								
LSSPCP	002020	G	#4-65								
LSSPTP	002024	G	#4-65								
LSSTA	002030	G	#4-65								
LSSW	002376	G	4-65	4-150	#4-150						
LSTEST	002114	G	#4-65								
LSTIML	002014	G	#4-65								
LSUNIT	002012	G	#4-65	185-7113	185-7129	186-7165					
L10000	002374		4-119	#4-139							
L10001	002400		4-150	#4-162							
L10002	002476		5-226	#5-247							
L10003	002726		5-274	#5-288							
MEM.AR	= 010630		#88-2390								
ML.DUT	013602		#84-2145	93-2658	94-2729	157-5790	158-5815	161-5978	162-6003	166-6189	167-6217
			*186-7176	187-7248	189-7335	193-7487	196-7629	199-7790	199-7795	199-7797	200-7817
			200-7823	200-7832	200-7851	200-7856	201-7874	203-8027	209-8280	214-8554	214-8572
			220-8867	229-9324	230-9349	230-9369	233-9509	236-9685	241-9943	243-10055	244-10102
			248-10319	250-10431	251-10478	256-10724	258-10836	259-10883	263-11083	270-11425	272-11493
			273-11561	277-11749	281-11973	281-11980	281-11987	282-12051	283-12062	283-12088	283-12095
			284-12130	284-12134	284-12141	288-12334	289-12400	290-12446	293-12580	297-12787	301-12992
			306-13257	313-13607	314-13638	320-13963	327-14312	327-14337	332-14610	333-14641	339-14981
			340-15034	346-15312	346-15338	352-15642	352-15669	354-15764	354-15782	362-16145	365-16311
			370-16610	371-16639	371-16651	377-16961	378-16989	378-17000	382-17234	382-17246	388-17564
			388-17573	394-17868	395-17933	395-17942	401-18227	406-18521	407-18553	411-18791	412-18857
			413-18876	417-19102	418-19141	418-19154	424-19428	424-19441	429-19722	430-19785	434-19976
			436-20091	439-20261	440-20303	443-20457	443-20468	447-20686	453-20995	457-21213	463-21489
			465-21581	470-21866	476-22152	482-22433	482-22442	484-22535	489-22751	490-22832	495-23043
			498-23203	504-23505	504-23544	506-23611	506-23651	507-23674	510-23839	511-23860	515-24064
			515-24082	519-24279							
ML.LUN	013600		#84-2144	*185-7127	*185-7128	185-7129	185-7132	*185-7159	*185-7160	186-7165	186-7168
			187-7242	190-7367	194-7526	196-7661	201-7887	205-8113	210-8366	216-8676	223-9041
			234-9559	237-9760	244-10134	252-10532	260-10937	266-11222	274-11625	278-11795	310-13467

SYMBOL VALUE REFERENCES

315-13716 323-14146 329-14414 335-14743 342-15149 348-15425 356-15875 373-16748 380-17095
384-17311 391-17694 396-18003 404-18385 408-18610 412-18851 413-18914 420-19258 432-19864
454-21061 459-21295

ML.REG 013154 #79-1910 91-2557 91-2558 91-2559 91-2560 93-2657 93-2660 93-2661 93-2664
93-2676 93-2677 94-2691 94-2692 94-2693 94-2728 94-2731 94-2732 105-3203
105-3207 105-3208 105-3211 105-3212 105-3215 105-3216 106-3278 106-3281 107-3286
107-3288 107-3289 107-3290 108-3334 108-3335 108-3336 109-3383 109-3384 109-3385
109-3386 110-3432 110-3433 110-3434 110-3435 123-4088 123-4090 123-4091 123-4093
125-4186 125-4188 125-4189 125-4192 125-4193 126-4245 126-4247 126-4248 126-4250
128-4344 128-4346 128-4347 128-4350 128-4351 129-4403 129-4405 129-4406 129-4408
131-4501 131-4503 131-4504 131-4507 131-4508 132-4560 132-4562 132-4563 132-4565
134-4659 134-4661 134-4662 134-4665 134-4666 135-4711 135-4717 135-4719 135-4720
135-4722 135-4723 137-4812 137-4818 137-4820 137-4821 137-4824 137-4825 137-4830
138-4871 138-4877 138-4879 138-4880 138-4882 138-4883 140-4972 140-4978 140-4980
140-4981 140-4984 140-4985 140-4990 141-5044 *141-5045 141-5051 141-5053 141-5054
142-5060 *142-5061 142-5062 144-5155 *144-5156 144-5162 144-5164 144-5165 144-5168
144-5169 *144-5174 144-5175 145-5229 145-5230 145-5236 145-5238 146-5243 146-5245
146-5246 146-5247 146-5248 148-5341 148-5342 148-5348 148-5350 148-5351 148-5354
148-5355 148-5360 148-5361 151-5492 154-5625 155-5669 155-5675 155-5677 155-5678
155-5680 155-5681 157-5783 157-5784 157-5785 157-5786 157-5789 157-5792 157-5793
157-5794 157-5800 157-5802 158-5807 158-5810 158-5814 158-5817 158-5818 159-5859
159-5865 159-5867 159-5868 159-5870 159-5871 161-5971 161-5972 161-5973 161-5974
161-5977 161-5980 161-5981 161-5982 161-5988 161-5990 161-5991 162-5998 162-6002
162-6005 162-6006 163-6061 *163-6062 163-6068 163-6070 163-6071 164-6077 *164-6078
164-6079 *166-6181 166-6182 166-6183 166-6184 166-6185 166-6188 166-6191 166-6192
166-6193 166-6199 167-6205 167-6206 167-6209 167-6210 *167-6215 167-6216 167-6219
167-6220 170-6361 170-6363 170-6364 170-6367 170-6368 180-6865 180-6866 180-6872
180-6873 180-6879 180-6880 180-6886 180-6887 180-6893 180-6894 181-6904 181-6905
181-6911 181-6912 181-6918 181-6919 181-6925 181-6926 181-6932 181-6933 181-6939
181-6940 181-6946 181-6947 182-6958 182-6959 182-6967 182-6968 182-6974 182-6975
*185-7150 187-7247 187-7250 187-7251 189-7334 189-7337 189-7338 189-7339 189-7340
190-7354 193-7486 193-7489 193-7490 193-7491 193-7492 193-7507 196-7628 196-7631
196-7632 196-7633 196-7643 199-7789 199-7792 199-7793 199-7795 199-7796 200-7836
200-7837 200-7838 200-7853 200-7854 200-7855 203-8026 203-8029 203-8030 205-8093
209-8279 209-8282 209-8283 210-8342 *214-8547 214-8553 214-8556 214-8557 214-8568
214-8569 214-8571 214-8574 215-8579 215-8630 *216-8654 216-8655 220-8866 220-8869
220-8870 223-9017 226-9147 226-9154 226-9157 226-9163 226-9173 229-9323 229-9326
229-9327 229-9328 229-9329 229-9330 230-9348 230-9351 230-9352 230-9353 230-9354
230-9368 230-9371 230-9372 230-9373 230-9374 233-9508 233-9511 233-9512 233-9516
233-9535 236-9684 236-9687 236-9688 236-9690 236-9700 237-9721 237-9738 241-9942
241-9945 241-9946 241-9949 241-9950 241-9965 242-9986 242-10003 242-10020 243-10050
243-10052 243-10054 243-10057 243-10058 243-10059 244-10099 244-10101 244-10104 244-10105
244-10106 248-10318 248-10321 248-10322 248-10325 248-10326 248-10341 249-10362 249-10379
249-10396 250-10426 250-10428 250-10430 250-10433 250-10434 250-10435 251-10475 251-10477
251-10480 251-10481 251-10482 251-10508 256-10723 256-10726 256-10727 256-10730 256-10731
257-10750 257-10767 257-10784 258-10805 258-10831 258-10833 258-10835 258-10838 258-10839
258-10840 259-10880 259-10882 259-10885 259-10886 259-10887 260-10917 263-11082 263-11085
263-11086 263-11088 264-11093 264-11103 264-11119 264-11138 265-11159 265-11177 265-11195
270-11424 270-11427 271-11432 271-11465 272-11492 272-11495 272-11496 272-11529 273-11560
273-11563 273-11564 273-11575 273-11576 274-11604 277-11748 277-11751 277-11752 277-11760
277-11761 281-11972 281-11975 281-11976 281-11977 281-11978 281-11979 282-12014 282-12031
282-12032 282-12050 283-12085 283-12086 283-12100 283-12101 284-12126 284-12127 284-12132

SYMBOL VALUE REFERENCES

284-12133 288-12333 288-12336 288-12337 288-12338 288-12339 288-12340 288-12356 288-12373
289-12399 289-12402 289-12403 289-12404 289-12405 289-12406 290-12445 290-12448 290-12449
290-12450 290-12451 290-12452 293-12579 293-12582 293-12583 293-12584 293-12585 293-12601
293-12617 294-12637 297-12786 297-12789 297-12790 297-12793 297-12794 297-12796 298-12840
301-12991 301-12994 301-12995 301-12996 301-13003 301-13005 301-13007 301-13017 302-13036
306-13256 306-13259 306-13260 307-13266 307-13281 307-13291 313-13606 313-13609 313-13610
313-13612 313-13614 313-13615 314-13632 314-13633 314-13637 314-13640 314-13641 314-13642
314-13644 314-13654 314-13657 314-13667 320-13962 320-13965 320-13966 321-14016 321-14018
321-14019 321-14020 321-14021 327-14311 327-14314 327-14315 327-14316 327-14317 327-14318
327-14319 327-14321 327-14332 327-14336 327-14339 327-14340 327-14341 327-14343 328-14358
328-14368 328-14369 328-14370 332-14609 332-14612 332-14613 332-14614 332-14615 332-14616
332-14617 332-14618 333-14623 333-14624 333-14625 333-14636 333-14640 333-14643 333-14644
333-14645 333-14646 333-14647 333-14648 333-14649 333-14660 333-14661 333-14671 333-14672
333-14673 339-14980 339-14983 339-14984 339-14985 339-14986 339-14987 339-14988 340-15015
340-15016 340-15017 340-15018 340-15029 340-15033 340-15036 340-15037 340-15038 340-15039
340-15040 340-15041 340-15042 340-15054 340-15055 341-15069 341-15070 341-15071 346-15311
346-15314 346-15315 346-15318 346-15319 346-15320 346-15322 346-15333 346-15337 346-15340
346-15341 346-15343 346-15354 346-15355 347-15369 347-15370 347-15371 352-15641 352-15644
352-15645 352-15648 352-15649 352-15650 352-15651 352-15653 352-15664 352-15668 352-15671
352-15672 352-15673 352-15675 353-15690 353-15691 353-15701 353-15702 353-15703 354-15759
354-15760 354-15761 354-15763 354-15766 354-15767 354-15768 354-15770 354-15774 354-15781
354-15784 354-15785 354-15786 354-15788 355-15803 355-15804 355-15814 355-15815 355-15816
362-16144 362-16147 362-16148 362-16151 362-16152 362-16153 362-16155 362-16156 362-16166
363-16201 363-16209 363-16210 363-16215 363-16224 363-16225 363-16229 363-16237 363-16238
363-16243 364-16256 364-16257 364-16262 364-16263 364-16270 365-16310 365-16313 365-16314
365-16316 365-16317 365-16318 365-16320 365-16321 365-16331 365-16347 365-16360 366-16366
366-16368 366-16370 366-16372 366-16374 366-16380 366-16382 366-16388 366-16396 370-16609
370-16612 370-16613 370-16615 370-16616 370-16617 370-16619 370-16630 371-16638 371-16641
371-16642 371-16644 371-16646 371-16647 371-16650 371-16653 371-16654 371-16659 371-16670
371-16671 371-16681 371-16682 371-16683 377-16960 377-16963 377-16964 377-16965 377-16966
377-16967 377-16969 378-16984 378-16988 378-16991 378-16992 378-16993 378-16996 378-16997
378-16999 378-17002 378-17003 378-17005 378-17016 378-17017 378-17027 378-17028 378-17029
382-17233 382-17236 382-17237 382-17238 382-17241 382-17242 382-17245 383-17252 383-17253
383-17262 383-17263 388-17563 388-17566 388-17567 388-17569 388-17570 388-17572 388-17575
389-17580 389-17586 389-17596 389-17597 389-17607 389-17608 389-17609 394-17867 394-17870
394-17871 395-17921 395-17922 395-17932 395-17935 395-17936 395-17938 395-17939 395-17941
395-17944 395-17945 401-18226 401-18229 401-18230 401-18243 401-18244 406-18520 406-18523
406-18524 407-18541 407-18542 407-18552 407-18555 407-18556 407-18558 407-18559 411-18790
411-18793 411-18794 411-18795 411-18796 411-18798 411-18799 411-18800 411-18801 411-18802
411-18803 411-18805 411-18807 411-18808 411-18809 411-18810 412-18815 412-18816 412-18818
412-18856 412-18859 412-18860 412-18861 412-18862 412-18864 412-18865 412-18866 413-18871
413-18872 413-18873 413-18875 413-18878 413-18879 413-18880 413-18882 413-18885 413-18886
413-18889 413-18890 413-18891 413-18892 413-18894 413-18908 417-19101 417-19104 417-19105
417-19117 417-19118 417-19119 417-19121 418-19136 418-19140 418-19143 418-19144 418-19148
418-19150 418-19151 418-19153 418-19156 418-19157 418-19162 418-19176 418-19177 419-19191
419-19192 419-19193 424-19427 424-19430 424-19431 424-19432 424-19435 424-19436 424-19440
424-19443 424-19444 424-19454 424-19455 424-19457 424-19462 424-19463 425-19515 429-19721
429-19724 429-19725 429-19726 429-19727 429-19728 429-19729 429-19730 429-19731 429-19733
430-19757 430-19784 430-19787 430-19788 430-19789 430-19791 430-19792 430-19796 431-19820
431-19822 431-19823 434-19975 434-19978 434-19979 434-19980 434-19981 434-19982 434-19983
434-19984 436-20090 436-20093 436-20094 436-20095 436-20096 436-20097 437-20102 437-20103
437-20105 439-20260 439-20263 440-20268 440-20269 440-20274 440-20275 440-20277 440-20293

SYMBOL VALUE REFERENCES

440-20302 440-20305 440-20306 440-20307 440-20309 440-20310 440-20312 441-20336 441-20337
443-20456 443-20459 443-20460 443-20461 443-20464 443-20465 443-20467 443-20470 443-20471
443-20472 443-20474 443-20475 443-20477 447-20685 447-20688 447-20689 447-20690 447-20701
448-20706 448-20709 448-20710 448-20713 448-20714 448-20717 448-20718 448-20721 448-20722
448-20724 448-20726 448-20737 448-20738 448-20748 448-20749 448-20750 453-20994 453-20997
453-20998 453-21000 453-21001 457-21212 458-21219 458-21220 458-21243 458-21244 463-21478
463-21481 463-21482 463-21488 463-21491 463-21492 464-21509 464-21510 464-21511 465-21580
465-21583 465-21584 465-21597 465-21598 465-21599 470-21833 470-21836 470-21837 470-21865
470-21868 470-21869 471-21885 471-21886 471-21887 471-21889 471-21891 476-22119 476-22122
476-22123 476-22151 476-22154 476-22155 477-22170 477-22172 477-22173 477-22175 477-22176
477-22177 477-22179 477-22181 482-22432 482-22435 482-22436 482-22438 482-22439 482-22441
482-22444 482-22445 482-22448 482-22449 483-22454 483-22460 483-22475 483-22490 484-22520
484-22521 484-22522 484-22523 484-22534 484-22537 484-22538 484-22540 484-22541 484-22542
489-22750 489-22753 489-22754 489-22763 489-22764 490-22797 490-22798 490-22799 490-22801
490-22816 490-22827 490-22831 490-22834 490-22835 490-22837 490-22838 490-22839 495-23042
495-23045 495-23046 495-23061 495-23062 495-23067 495-23068 495-23071 495-23072 495-23075
495-23076 495-23078 495-23079 495-23080 496-23088 496-23095 496-23102 496-23109 496-23116
496-23127 497-23165 498-23202 498-23205 498-23206 498-23207 498-23222 504-23504 504-23507
504-23508 504-23514 504-23515 504-23516 504-23517 504-23518 504-23520 504-23543 505-23550
505-23551 505-23564 505-23567 505-23569 505-23570 505-23571 505-23572 505-23574 506-23610
506-23613 506-23614 506-23620 506-23621 506-23622 506-23623 506-23624 506-23628 506-23644
506-23650 506-23653 506-23654 507-23662 507-23666 507-23667 507-23668 507-23669 507-23673
507-23676 507-23677 507-23678 510-23838 510-23841 510-23842 510-23843 510-23844 510-23845
510-23846 510-23847 510-23850 510-23851 510-23855 511-23862 511-23863 511-23867 511-23870
511-23872 511-23873 511-23877 511-23895 515-24063 515-24066 515-24067 515-24073 515-24076
515-24077 515-24081 515-24084 515-24085 515-24093 515-24094 515-24096 515-24097 515-24100
515-24101 515-24103 515-24104 515-24108 516-24136 519-24278 519-24281 519-24282 519-24283
519-24284 519-24285 519-24286 519-24287 519-24288 519-24290 522-24397

MSGH1 002476 5-239 #5-256
MSGH2 002512 5-240 #5-257
MSGH3 002540 5-241 #5-258
MSGH4 002563 5-242 #5-259
MSGH5 002614 5-243 #5-260
MSGH6 002646 5-244 #5-261
MSGH7 002672 5-245 #5-262
MSGS1 002726 5-285 #5-297
MSDUMP 024062 179-6800 #180-6855
NIB.SA 011152 #79-1872 88-2397 88-2398 88-2399 89-2433 89-2439 89-2445 89-2451 89-2457
89-2463 90-2477 90-2483 90-2493 90-2502 113-3588 113-3595 113-3606 114-3618
114-3630 114-3637 114-3648 114-3656 114-3668 115-3680 118-3817 118-3820 118-3828
118-3830 118-3832 118-3839 118-3845 118-3847 118-3853 118-3857 *121-3980 *121-3987
*121-3991 *122-4003 *122-4004 *122-4007 *122-4014 *122-4018 *122-4026 *122-4027 *122-4031
*122-4039 *122-4040 449-20785
NIN.FM = 006166 #85-2239
ONEFIL = 000001 #2-4 2-1307 3-1308 4-34 4-164 5-190 5-353
ONE.FM = 006016 #85-2231 180-6857 196-7650
OP.NUM 011560 #79-1878 *186-7180 186-7194 186-7200 186-7215 187-7227 233-9514 233-9542 289-12433
362-16141 364-16302
OSAPTS = 000001 #4-13 #4-46 4-65
OSAU = 000001 #4-13 #4-46 4-65
OSBGNR = 000001 #4-13 #4-46 4-65
OSBGNS = 000001 #4-13 #4-46 4-65

SYMBOL	VALUE		REFERENCES									
O$DU	= 000001		#4-13	#4-46	4-65							
O$ERRT	= 000001		#4-13	#4-46	4-65							
O$GNSW	= 000001		#4-13	#4-46	4-65							
O$POIN	= 000001		#4-13	#4-46	4-46	4-65						
O$SETU	= 000001		#4-13	#4-46	4-65							
PAR.DI	011566		#79-1883	*186-7174	229-9319	439-20248						
PD.TEM	013120		#79-1892	*93-2676	94-2701	*333-14660	334-14683	*340-15054	341-15078	*346-15354	347-15377	
			*353-15690	353-15709	*355-15803	355-15822	*362-16166	362-16173	*365-16331	365-16337	*371-16670	
			372-16693	*378-17016	379-17039	*389-17596	389-17619	*418-19176	419-19199	447-20682	*448-20737	
			483-22474	*483-22475	490-22815	*490-22816						
PHR.1	= 007366		#87-2325	241-9959	242-9978	244-10091	248-10335	249-10354	251-10467	257-10744	257-10759	
			259-10872	265-11151	277-11769	282-12005	282-12022	289-12386	290-12461	294-12646	298-12828	
			302-13029	302-13044	322-14082	323-14103	323-14120	426-19528	431-19847	434-19993	437-20113	
			464-21522	465-21612								
PHR.10	= 007564		#87-2334	342-15143	364-16287	412-18845						
PHR.11	= 007576		#87-2335	497-23158	504-23526							
PHR.12	= 007614		#87-2336	484-22555								
PHR.13	= 007636		#87-2337	491-22856								
PHR.14	= 007662		#87-2338	180-6856								
PHR.15	= 007714		#87-2339	226-9174	226-9184							
PHR.2	= 007404		#87-2326	237-9713	242-9995	243-10073	244-10120	249-10371	250-10449	251-10496	257-10776	
			259-10858	259-10901	282-12041	283-12077	284-12114	288-12349	293-12594	298-12809	431-19832	
PHR.3	= 007422		#87-2327	196-7649								
PHR.4	= 007454		#87-2328	190-7360	199-7808	204-8078	210-8331	215-8623	216-8661	271-11454	272-11518	
			273-11593	315-13687	328-14404	348-15419	353-15733	372-16738	373-16764	402-18273	402-18305	
			403-18344	407-18575	505-23581	519-24296						
PHR.5	= 007472		#87-2329	193-7501	237-9730	237-9747	242-9992	242-10012	243-10033	249-10368	249-10388	
			250-10409	252-10521	257-10773	257-10793	258-10814	260-10926	264-11113	264-11125	264-11128	
			265-11169	265-11187	288-12366	289-12415	293-12610	293-12626	298-12849	322-14044	322-14061	
			429-19740	464-21545	516-24129							
PHR.6	= 007504		#87-2330	242-9975	249-10351	257-10756	264-11144	284-12157				
PHR.7	= 007516		#87-2331	284-12153								
PHR.8	= 007540		#87-2332	425-19483								
PHR.9	= 007552		#87-2333	425-19505								
PNT	= 001000	G	#84-2194									
PRI	= 002000	G	#85-2199									
PRI00	= 000000	G	#84-2186									
PRI01	= 000040	G	#84-2185									
PRI02	= 000100	G	#84-2184									
PRI03	= 000140	G	#84-2183									
PRI04	= 000200	G	#84-2182									
PRI05	= 000240	G	#84-2181									
PRI06	= 000300	G	#84-2180									
PRI07	= 000340	G	#84-2179									
PRSN	002376	G	#4-160	225-9134	226-9145							
PTBL.P	011556		#79-1876	*185-7134	185-7135	185-7137	185-7138	185-7140	*186-7170	186-7171	186-7173	
			186-7175	186-7177	186-7185	187-7236						
P.AAA	004222		#62-912	85-2205								
P.AAB	004266		#62-924	85-2206								
P.AAC	004354		#62-942	85-2207								
P.AAD	004400		#62-949	85-2208								
P.AAE	004430		#62-957	85-2209								

SYMBOL	VALUE	REFERENCES	
P.AAF	004532	#63-983	85-2210
P.AAG	004562	#63-991	85-2211
P.AAH	004610	#63-999	85-2212
P.AAI	004644	#63-1009	85-2213
P.AAJ	004676	#63-1018	85-2214
P.AAK	004750	#64-1036	85-2215
P.AAL	005004	#64-1046	85-2216
P.AAM	005034	#64-1054	85-2217
P.AAN	005110	#64-1069	85-2218
P.AAO	005150	#65-1084	85-2219
P.AAP	005216	#65-1097	85-2220
P.AAQ	005306	#65-1116	85-2221
P.AAR	005342	#65-1126	85-2222
P.AAS	005412	#66-1144	85-2223
P.AAT	005462	#66-1158	85-2224
P.AAU	005534	#66-1172	85-2225
P.AAV	005606	#66-1186	85-2226
P.AAW	005652	#67-1202	85-2227
P.AAX	005722	#67-1216	85-2228
P.AAY	005746	#67-1223	85-2229
P.AAZ	005764	#67-1228	85-2230
P.ABA	006016	#67-1237	85-2231
P.ABB	006024	#67-1239	85-2232
P.ABC	006034	#67-1242	85-2233
P.ABD	006046	#68-1250	85-2234
P.ABE	006062	#68-1254	85-2235
P.ABF	006100	#68-1259	85-2236
P.ABG	006120	#68-1265	85-2237
P.ABH	006142	#68-1271	85-2238
P.ABI	006166	#68-1278	85-2239
P.ABJ	006214	#68-1286	85-2240
P.ABK	006244	#68-1294	85-2241
P.ABL	006276	#69-1307	85-2242
P.ABM	006302	#69-1309	85-2243
P.ABN	006314	#69-1313	85-2244
P.ABO	006322	#69-1315	85-2245
P.ABP	006330	#69-1317	85-2246
P.ABQ	006336	#69-1319	85-2247
P.ABR	006344	#69-1321	85-2248
P.ABS	006360	#69-1325	85-2249
P.ABT	006374	#69-1329	85-2250
P.ABU	006406	#69-1333	86-2255
P.ABV	006416	#69-1336	86-2256
P.ABW	006426	#69-1339	86-2257
P.ABX	006436	#69-1342	86-2258
P.ABY	006442	#69-1344	86-2259
P.ABZ	006454	#69-1348	86-2260
P.ACA	006462	#69-1350	86-2261
P.ACB	006470	#69-1352	86-2262
P.ACC	006502	#70-1360	86-2263
P.ACD	006506	#70-1362	86-2264
P.ACE	006514	#70-1364	86-2265

SYMBOL	VALUE	REFERENCES	
P.ACF	006522	#70-1366	86-2266
P.ACG	006530	#70-1368	86-2267
P.ACH	006544	#70-1372	86-2268
P.ACI	006552	#70-1374	86-2269
P.ACJ	006560	#70-1376	86-2270
P.ACK	006574	#70-1380	86-2271
P.ACL	006602	#70-1382	86-2272
P.ACM	006610	#70-1384	86-2273
P.ACN	006624	#70-1388	86-2274
P.ACO	006632	#70-1390	86-2275
P.ACP	006646	#70-1394	86-2276
P.ACQ	006654	#70-1396	86-2277
P.ACR	006660	#70-1398	86-2278
P.ACS	006666	#70-1400	86-2279
P.ACT	006674	#70-1402	86-2280
P.ACU	006700	#70-1404	86-2281
P.ACV	006710	#70-1407	86-2282
P.ACW	006716	#70-1409	86-2283
P.ACX	006726	#71-1416	86-2284
P.ACY	006732	#71-1418	86-2285
P.ACZ	006746	#71-1422	86-2286
P.ADA	006754	#71-1424	86-2287
P.ADB	006764	#71-1427	86-2288
P.ADC	006772	#71-1429	86-2289
P.ADD	007004	#71-1433	86-2290
P.ADE	007016	#71-1437	86-2291
P.ADF	007026	#71-1440	86-2292
P.ADG	007036	#71-1443	86-2293
P.ADH	007046	#71-1446	86-2294
P.ADI	007054	#71-1448	86-2295
P.ADJ	007066	#71-1452	86-2296
P.ADK	007074	#71-1454	86-2297
P.ADL	007104	#71-1457	86-2298
P.ADM	007114	#71-1460	86-2299
P.ADN	007122	#71-1462	86-2300
P.ADO	007130	#71-1464	86-2301
P.ADP	007140	#71-1467	86-2302
P.ADQ	007152	#72-1475	86-2303
P.ADR	007156	#72-1477	86-2304
P.ADS	007174	#72-1482	86-2305
P.ADT	007210	#72-1486	86-2306
P.ADU	007216	#72-1488	87-2311
P.ADV	007224	#72-1490	87-2312
P.ADW	007232	#72-1492	87-2313
P.ADX	007240	#72-1494	87-2314
P.ADY	007246	#72-1496	87-2315
P.ADZ	007252	#72-1498	87-2316
P.AEA	007260	#72-1500	87-2317
P.AEB	007272	#72-1504	87-2318
P.AEC	007302	#72-1507	87-2319
P.AED	007310	#72-1509	87-2320
P.AEE	007316	#72-1511	87-2321

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES	
P.AEF	007330	#72-1515	87-2322
P.AEG	007340	#72-1518	87-2323
P.AEH	007346	#72-1520	87-2324
P.AEI	007366	#73-1530	87-2325
P.AEJ	007404	#73-1535	87-2326
P.AEK	007422	#73-1540	87-2327
P.AEL	007454	#73-1549	87-2328
P.AEM	007472	#73-1554	87-2329
P.AEN	007504	#73-1558	87-2330
P.AEO	007516	#73-1562	87-2331
P.AEP	007540	#73-1568	87-2332
P.AEQ	007552	#73-1572	87-2333
P.AER	007564	#73-1576	87-2334
P.AES	007576	#74-1584	87-2335
P.AET	007614	#74-1589	87-2336
P.AEU	007636	#74-1595	87-2337
P.AEV	007662	#74-1602	87-2338
P.AEW	007714	#74-1611	87-2339
P.AEX	007726	#74-1615	87-2340
P.AEY	007742	#74-1619	87-2341
P.AEZ	007750	#74-1621	87-2342
P.AFA	007756	#74-1623	87-2343
P.AFB	007774	#74-1628	87-2344
P.AFC	010004	#74-1631	87-2345
P.AFD	010012	#74-1633	87-2346
P.AFE	010022	#75-1640	87-2347
P.AFF	010036	#75-1644	87-2348
P.AFG	010050	#75-1648	87-2349
P.AFH	010060	#75-1651	87-2350
P.AFI	010100	#75-1657	87-2351
P.AFJ	010112	#75-1661	87-2352
P.AFK	010122	#75-1664	87-2353
P.AFL	010136	#75-1668	87-2354
P.AFM	010150	#75-1672	87-2355
P.AFN	010162	#75-1676	87-2356
P.AFO	010172	#75-1679	87-2357
P.AFP	010204	#75-1683	87-2358
P.AFQ	010216	#75-1687	87-2359
P.AFR	010230	#75-1691	87-2360
P.AFS	010242	#76-1699	87-2361
P.AFT	010256	#76-1703	87-2362
P.AFU	010266	#76-1706	88-2367
P.AFV	010274	#76-1708	88-2368
P.AFW	010302	#76-1710	88-2369
P.AFX	010310	#76-1712	88-2370
P.AFY	010316	#76-1714	88-2371
P.AFZ	010324	#76-1716	88-2372
P.AGA	010332	#76-1718	88-2373
P.AGB	010340	#76-1720	88-2374
P.AGC	010346	#76-1722	88-2375
P.AGD	010354	#76-1724	88-2376
P.AGE	010362	#76-1726	88-2377

SYMBOL		VALUE	REFERENCES							
P.AGF		010370	#76-1728	88-2378						
P.AGG		010376	#76-1730	88-2379						
P.AGH		010404	#76-1732	88-2380						
P.AGI		010412	#76-1734	88-2381						
P.AGJ		010420	#76-1736	88-2382						
P.AGK		010430	#76-1739	88-2383						
P.AGL		010436	#76-1741	88-2384						
P.AGM		010444	#76-1743	88-2385						
P.AGN		010454	#76-1746	88-2386						
P.AGO		010464	#77-1753	88-2387						
P.AGP		010526	#77-1765	88-2388						
P.AGQ		010570	#77-1777	88-2389						
P.AGR		010630	#77-1788	88-2390						
P.AGS		010672	#77-1800	88-2391						
P.AGT		010732	#78-1815	88-2392						
P.AGU		010772	#78-1826	88-2393						
P.AGV		011026	#78-1836	88-2394						
P.AGW		011060	#78-1845	88-2395						
P.AGX		011106	#78-1853	88-2396						
P.CAL		013144	#79-1906	98-2885	*98-2886	*98-2887	101-3013	*453-21008	454-21035	*458-21251
			459-21278							
P.GEN		013152	#79-1909	101-2985	101-3013	*453-21005	454-21028	*458-21248	458-21267	
RAS.IN		013124	#79-1895	*186-7190	*186-7210	341-15117	411-18787	411-18797		
RD.CS1		017532	#125-4179	177-6706	222-8945					
RD.DA		020066	#131-4494	177-6716	222-8959					
RD.DAT		013130	#79-1897	*125-4194	125-4195	*128-4352	128-4353	*131-4509	131-4510	*134-4667
			134-4668							
			*137-4826	137-4827	*140-4986	140-4987	*144-5170	144-5171	*148-5356	148-5357
			*151-5492							
			151-5493	*154-5625	154-5626	*158-5810	158-5811	*162-5998	162-5999	*167-6211
			167-6212							
			*170-6369	170-6370	204-8083	210-8336	215-8628	223-9011	271-11459	272-11523
			274-11602							
RD.DS		022766	#170-6354	178-6760						
RD.D1		021654	#157-5781	178-6765						
RD.D2		022166	#161-5969	178-6770						
RD.D3		022514	#166-6179	178-6775						
RD.EE		021530	#154-5623	177-6746						
RD.EL		021466	#151-5490	177-6751						
RD.ER		017710	#128-4337	177-6711	222-8952					
RD.E1		020644	#140-4970	177-6726	222-8973					
RD.E2		021064	#144-5153	177-6731	222-8980					
RD.MR		020244	#134-4652	177-6721						
RD.PA		020436	#137-4810	177-6736	222-8966					
RD.PD		021326	#148-5339	177-6741						
RD.REG		023462	#176-6679	204-8044	209-8293	215-8584	271-11442	272-11506	273-11582	
REG.IN		013136	#79-1902	157-5787	161-5975	166-6186	*273-11555	*273-11577	*274-11622	
REG.1	=	010256	#87-2362	180-6867						
REG.10	=	010346	#88-2375							
REG.11	=	010354	#88-2376							
REG.12	=	010362	#88-2377							
REG.13	=	010370	#88-2378							
REG.14	=	010376	#88-2379	181-6948	497-23160	498-23216				
REG.15	=	010404	#88-2380	182-6960	504-23528	505-23582	507-23687			
REG.16	=	010412	#88-2381							
REG.17	=	010420	#88-2382	180-6895	190-7362					
REG.18	=	010430	#88-2383	180-6874						

```
SYMBOL  VALUE          REFERENCES
REG.19  = 010436       #88-2384  180-6881
REG.2   = 010266       #88-2367  181-6906  282-12024
REG.20  = 010444       #88-2385  182-6969
REG.21  = 010454       #88-2386  182-6976
REG.3   = 010274       #88-2368  181-6913  266-11205
REG.4   = 010302       #88-2369  181-6927
REG.5   = 010310       #88-2370  181-6920  283-12107  284-12154
REG.6   = 010316       #88-2371  180-6888  199-7803   430-19765  431-19808  431-19829
REG.7   = 010324       #88-2372  181-6934  216-8662
REG.8   = 010332       #88-2373
REG.9   = 010340       #88-2374  181-6941
REM.TB    013434       #82-2080  98-2883   98-2889    98-2895    105-3204   105-3209   105-3213
RE2       004144        42-66    #42-96
RE3       004142        42-74    #42-95
RE4       004140        42-83    #42-94
RH.ADD    013572       #83-2137  *185-7137  185-7148
RH.ERR  = 011060       #88-2395   190-7358  193-7496
RH.TYP    013574       #83-2138  *185-7139
RH.VEC    013576       #84-2143  *185-7141
SC.SET  = 010772       #88-2393
SEV.FM  = 006120       #85-2237   364-16289  372-16740  383-17282
SFPTBL    002376  G    #4-150
SIX.FM  = 006100       #85-2236   199-7809   204-8079   210-8332   252-10524  260-10929  266-11211  271-11455  272-11519
                        284-12159  308-13353  309-13428  322-14046  322-14063  322-14084  323-14105  323-14122  373-16765
                        390-17658  396-17980  402-18276  402-18308  403-18347  444-20493
STACK     012612       #79-1891  *90-2496  *90-2497  *90-2509  *90-2510   97-2843   101-2984   401-18260  402-18282
                        402-18295  402-18318  403-18335  403-18353
STK.OF    012600       #79-1890   88-2409  *93-2653   94-2712  *94-2716
STRIPP    014214       #93-2647   97-2836   401-18248
SVCGBL  = 177777       #4-13     #4-22     4-65       4-65       4-65       4-65       4-65       4-65       4-65
                        4-65       4-65       
```

SYMBOL	VALUE		REFERENCES								
			4-103	4-103	4-103	4-103	4-103	4-103	4-103	4-103	4-103
			4-103	4-103	4-103	4-103	4-103	4-103	4-103	4-103	4-103
			4-103	4-103	4-103	4-103	4-103	4-103	4-103	4-103	4-103
			4-103	4-103	4-103	4-103	4-103	4-103	4-103	4-103	4-103
			4-103	4-103	4-103	4-103	4-103	4-103	4-103	4-103	4-103
			4-103	4-103	4-103	4-103	4-103	4-103	4-103	4-103	4-103
			4-103	4-103	4-103	4-103	4-103	4-103	4-119	4-150	5-226
			5-239	5-239	5-239	5-239	5-240	5-240	5-240	5-240	5-240
			5-241	5-241	5-241	5-241	5-241	5-242	5-242	5-242	5-242
			5-242	5-243	5-243	5-243	5-244	5-244	5-244	5-244	5-244
			5-245	5-245	5-245	5-247	5-274	5-285	5-285	5-285	5-288
SVCSUB	= 177777		#4-13	#4-21							
SVCTAG	= 177777		#4-13	#4-23	4-139	4-139	4-139	4-162	4-162	4-162	5-247
			5-247	5-247	5-288	5-288	5-288				
SVCTST	= 177777		#4-13	#4-20							
SYNC	= 010526		#88-2388	204-8062	209-8311	215-8608	243-10068	244-10115	250-10444	251-10491	258-10849
			259-10896	302-13040	372-16731	379-17058	383-17273	401-18264	402-18300	403-18339	407-18573
			425-19478	425-19500	425-19519	437-20109	440-20281	440-20316	449-20774	454-21019	458-21258
			464-21520	464-21543	465-21610	466-21640	471-21895	471-21919	477-22185	477-22209	484-22551
			491-22852	497-23156	498-23211	504-23524	507-23683	511-23884	516-24121		
S$LSYM	= 010000		#4-13	#4-139	#4-162	#5-247	#5-288				
TEN.FM	= 006214		#85-2240								
THR.FM	= 006034		#85-2233	190-7363	200-7865	223-9007	230-9343	230-9363	230-9383	334-14722	342-15145
			353-15734	355-15847	412-18847	419-19223	430-19746	430-19766	431-19809	439-20253	454-21024
			458-21263	464-21525	466-21619	484-22556	491-22857	497-23161	504-23529	507-23688	516-24131
TIME.O	= 011106		#88-2396								
TRBLE.	= 011026		#88-2394	443-20481							
TST.LN	016146		#113-3569	328-14376	334-14697	341-15092	347-15391	353-15723	355-15836	390-17645	419-19213
			449-20769								
TWO.FM	= 006024		#85-2232	216-8663	231-9399	233-9531	353-15740	505-23583	519-24298		
T$ARGC	= 000003		#4-65	4-65	#4-65	4-65	4-65	#4-65	4-65	4-65	#4-65
			4-65	4-65	#4-65	4-65	4-65				
T$CODE	= 000130		#5-239	5-239	#5-239	5-239	#5-239	5-239	#5-240	5-240	#5-240
			5-240	#5-240	5-240	#5-241	5-241	#5-241	5-241	#5-241	5-241
			#5-242	5-242	#5-242	5-242	#5-242	5-242	#5-243	5-243	#5-243
			5-243	#5-243	5-243	#5-244	5-244	#5-244	5-244	#5-244	5-244
			#5-245	5-245	#5-245	5-245	#5-245	5-245	#5-285	5-285	#5-285
			5-285	#5-285	5-285						
T$ERRN	= 000000		#4-13								
T$EXCP	= 000000		#5-239	5-239	#5-240	5-240	#5-241	5-241	#5-242	5-242	#5-244
			5-244								
T$FREE	105132	G	523-24439	523-24440	#523-24441						
T$GMAN	= 000000		#4-13								
T$HILI	= 000007		#5-239	5-239	#5-240	5-240	#5-241	5-241	#5-242	5-242	#5-244
			5-244								
T$LAST	= 000000		#4-13								
T$LOLI	= 000000		#5-239	5-239	#5-240	5-240	#5-241	5-241	#5-242	5-242	#5-244
			5-244								
T$LSYM	= 010000		#4-13	4-13	4-139	4-162	5-247	5-288			
T$NEST	= 177777		#4-13	4-39	#4-39	4-39	4-119	#4-119	4-119	4-139	4-139
			4-139	#4-139	4-150	#4-150	4-150	4-162	4-162	4-162	#4-162
			5-226	#5-226	5-226	5-247	5-247	5-247	#5-247	5-274	#5-274

SYMBOL	VALUE		REFERENCES								
			5-274	5-288	5-288	5-288	#5-288	5-305	#5-305	5-305	5-311
			5-311	5-311	#5-311	5-337	5-337	5-337	#5-337		
T$NS0	= 000000		#4-39	5-337							
T$NS1	= 000021		#4-119	4-139	#4-150	4-162	#5-226	5-247	#5-274	5-288	#5-305
			5-311								
T$PTHV	= 000000	G	4-65	#523-24445							
T$PTNU	= 000000		#4-13								
T$SAVL	= 177777		#4-13								
T$SEGL	= 177777		#4-13								
T$SUBN	= 000000		#4-13								
T$TAGL	= 177777		#4-13								
T$TAGN	= 010005		#4-13	4-119	4-119	#4-119	4-150	4-150	#4-150	5-226	5-226
			#5-226	5-274	5-274	#5-274	5-305	5-305	#5-305		
T$TEMP	= 000000		#4-103	4-103	4-103	#4-103	4-103	4-103	#4-103	4-103	4-103

SYMBOL	VALUE		REFERENCES	
T13	035042	G	4-103	#245-10159
T14	036310	G	4-103	#252-10553
T15	037556	G	4-103	#260-10958
T16	040456	G	4-103	#266-11243
T17	041652	G	4-103	#274-11646
T18	042110	G	4-103	#278-11815
T19	043260	G	4-103	#285-12199
T2	026322	G	4-103	#194-7546
T20	044220	G	4-103	#291-12500
T21	044614	G	4-103	#294-12670
T22	045262	G	4-103	#299-12892
T23	045620	G	4-103	#303-13079
T24	046774	G	4-103	#311-13492
T25	047552	G	4-103	#316-13741
T26	050676	G	4-103	#324-14171
T27	051454	G	4-103	#329-14436
T28	052440	G	4-103	#335-14768
T29	053552	G	4-103	#342-15171
T3	026530	G	4-103	#197-7684
T30	054346	G	4-103	#348-15447
T31	055742	G	4-103	#356-15896
T32	057500	G	4-103	#367-16449
T33	060512	G	4-103	#373-16788
T34	061446	G	4-103	#380-17121
T35	062100	G	4-103	#384-17337
T36	063136	G	4-103	#391-17715
T37	064044	G	4-103	#397-18028
T38	065050	G	4-103	#404-18406
T39	065476	G	4-103	#408-18630
T4	027222	G	4-103	#201-7908
T40	066464	G	4-103	#414-18939
T41	067516	G	4-103	#420-19279
T42	070270	G	4-103	#426-19559
T43	071224	G	4-103	#432-19884
T44	071434	G	4-103	#435-20027
T45	071620	G	4-103	#437-20137
T46	072316	G	4-103	#441-20360
T47	072610	G	4-103	#444-20519
T48	073502	G	4-103	#450-20831
T49	074206	G	4-103	#455-21086
T5	027644	G	4-103	#205-8134
T50	074624	G	4-103	#459-21315
T51	075676	G	4-103	#467-21689
T52	076450	G	4-103	#472-21972
T53	077250	G	4-103	#478-22263
T54	100272	G	4-103	#485-22604
T55	101142	G	4-103	#491-22897
T56	102244	G	4-103	#498-23246
T57	103466	G	4-103	#508-23729
T58	104072	G	4-103	#512-23931
T59	104540	G	4-103	#517-24173
T6	030302	G	4-103	#211-8391

SYMBOL	VALUE		REFERENCES								
T60	105072	G	4-103	#521-24364							
T7	031132	G	4-103	#217-8701							
T8	032116	G	4-103	#224-9066							
T9	032352	G	4-103	#227-9212							
UAM	= 000200	G	#84-2192								
WRD.1	= 006276		#85-2242	237-9714	241-9960	242-9976	242-9993	243-10074	244-10121	248-10336	249-10352
			249-10369	250-10450	251-10497	257-10745	257-10757	257-10774	259-10859	259-10902	264-11114
			264-11126	265-11149	288-12350	293-12595	298-12810				
WRD.10	= 006406		#86-2255	223-9004	308-13351	334-14719	355-15844	366-16405	379-17062	383-17279	390-17655
			396-17977	419-19220	425-19480	425-19502	434-19990	444-20491	449-20776	471-21899	477-22189
			497-23145	507-23685	511-23888	516-24128					
WRD.11	= 006416		#86-2256	237-9712	237-9729	237-9746	243-10072	244-10090	244-10119	250-10448	251-10466
			251-10495	259-10857	259-10871	259-10900	264-11112	282-12004	282-12021	282-12040	283-12076
			283-12109	284-12156	288-12348	288-12365	293-12593	293-12609	293-12625	294-12645	298-12808
			298-12827	302-13028	302-13043	426-19527	431-19831	431-19846	434-19992	437-20112	
WRD.12	= 006426		#86-2257	193-7500	199-7807	204-8077	210-8330	215-8622	241-9958	242-10011	243-10032
			248-10334	249-10387	250-10408	252-10520	256-10739	257-10792	258-10813	260-10925	265-11168
			265-11186	271-11453	272-11517	273-11592	277-11768	288-12381	289-12414	290-12460	298-12848
			308-13350	328-14403	348-15418	364-16285	372-16736	373-16762	379-17061	383-17278	390-17654
			396-17976	402-18272	402-18304	403-18343	444-20490	466-21643	471-21922	477-22212	
WRD.13	= 006436		#86-2258	199-7804	266-11206	353-15732					
WRD.14	= 006442		#86-2259	200-7862	233-9529	266-11207	342-15144	364-16288	412-18846	413-18900	430-19763
			431-19806	496-23139	498-23213	511-23886					
WRD.15	= 006454		#86-2260	282-12006	282-12042	283-12078	284-12115	284-12158			
WRD.16	= 006462		#86-2261	282-12023	289-12387						
WRD.17	= 006470		#86-2262	283-12108	284-12155	431-19830					
WRD.18	= 006502		#86-2263	294-12647							
WRD.19	= 006506		#86-2264	237-9710	237-9727	237-9744	241-9956	242-10009	243-10030	243-10079	244-10088
			244-10117	248-10332	249-10385	250-10406	250-10446	251-10464	251-10493	252-10518	256-10737
			257-10790	258-10811	258-10851	259-10869	259-10898	260-10923	264-11109	265-11165	265-11183
			266-11208	282-12038	283-12074	288-12346	288-12362	288-12379	289-12412	290-12458	293-12591
			293-12607	293-12623	294-12643	298-12806	298-12825	298-12846	315-13688	372-16733	373-16759
			383-17275	390-17652	396-17974	401-18266	402-18302	403-18341	407-18577	425-19481	425-19503
			426-19526								
WRD.2	= 006302		#85-2243	242-9979	242-9996	244-10092	249-10355	249-10372	251-10468	257-10760	257-10777
			259-10873	264-11129	265-11152						
WRD.20	= 006514		#86-2265	252-10522	260-10927	302-13045					
WRD.21	= 006522		#86-2266	302-13027	302-13030	302-13042					
WRD.22	= 006530		#86-2267	328-14405	348-15420	372-16739					
WRD.23	= 006544		#86-2268	372-16735	373-16761	383-17277	402-18275	402-18307	403-18346	407-18579	440-20286
			441-20325								
WRD.24	= 006552		#86-2269	322-14040	322-14057	322-14078	323-14099	323-14116	379-17064	383-17281	449-20778
WRD.25	= 006560		#86-2270	379-17063	383-17280						
WRD.26	= 006574		#86-2271	437-20114							
WRD.27	= 006602		#86-2272	429-19741	431-19833	431-19845	431-19848				
WRD.29	= 006610		#86-2273	429-19739							
WRD.3	= 006314		#85-2244	237-9731	242-10013	249-10389	257-10794	265-11170	288-12367	293-12611	298-12829
WRD.30	= 006624		#86-2274	434-19991	434-19994						
WRD.31	= 006632		#86-2275	430-19764	431-19807						
WRD.32	= 006646		#86-2276	322-14043	322-14060	322-14081	323-14102	323-14119			
WRD.33	= 006654		#86-2277	322-14041	322-14058	322-14079	323-14100	323-14117			
WRD.34	= 006660		#86-2278	322-14045	322-14062	322-14083	323-14104	323-14121			

SYMBOL	VALUE	REFERENCES
WRD.35	= 006666	#86-2279 308-13348 315-13690 334-14721 519-24297
WRD.36	= 006674	#86-2280 315-13689
WRD.37	= 006700	#86-2281 199-7805 200-7863 223-9005 334-14720 364-16283 366-16406 439-20250
WRD.38	= 006710	#86-2282 223-9006
WRD.39	= 006716	#86-2283 366-16408 402-18274 402-18306 403-18345 407-18576
WRD.4	= 006322	#85-2245 237-9748 243-10034 250-10410 258-10815 265-11188 289-12416 290-12462 294-12631 298-12850
WRD.40	= 006726	#86-2284 309-13422 310-13438
WRD.41	= 006732	#86-2285 419-19222
WRD.42	= 006746	#86-2286 309-13423 310-13439
WRD.43	= 006754	#86-2287 242-9977 242-9994 249-10353 249-10370 257-10758 257-10775 264-11127 265-11150
WRD.44	= 006764	#86-2288
WRD.45	= 006772	#86-2289 308-13349 328-14402
WRD.46	= 007004	#86-2290 309-13425 310-13441 419-19221
WRD.47	= 007016	#86-2291 310-13440
WRD.48	= 007026	#86-2292 347-15412
WRD.49	= 007036	#86-2293
WRD.5	= 006330	#85-2246 229-9338 322-14080 323-14101 323-14118 454-21023 458-21262
WRD.50	= 007046	#86-2294 355-15846 390-17656 396-17978 412-18837 413-18902
WRD.51	= 007054	#86-2295 309-13424 355-15845
WRD.52	= 007066	#86-2296 193-7499 204-8074 210-8327 215-8621 271-11450 272-11514 273-11591 497-23159 498-23215 504-23527
WRD.53	= 007074	#86-2297 230-9393
WRD.54	= 007104	#86-2298 309-13426
WRD.55	= 007114	#86-2299 309-13427
WRD.56	= 007122	#86-2300 204-8073 210-8326 215-8619 271-11449 272-11513 273-11589 353-15738 364-16282 412-18835
WRD.57	= 007130	#86-2301
WRD.58	= 007140	#86-2302
WRD.59	= 007152	#86-2303 426-19529
WRD.6	= 006336	#85-2247 230-9362 230-9382 322-14042 322-14059 440-20285 441-20324
WRD.60	= 007156	#86-2304 412-18836 413-18901
WRD.61	= 007174	#86-2305 252-10523 260-10928 464-21548 466-21646 471-21925 478-22219
WRD.62	= 007210	#86-2306 193-7502
WRD.63	= 007216	#87-2311
WRD.64	= 007224	#87-2312 449-20779 454-21022 458-21261
WRD.65	= 007232	#87-2313
WRD.67	= 007240	#87-2314 466-21642 471-21900 471-21921 477-22211 497-23146 511-23889
WRD.68	= 007246	#87-2315
WRD.69	= 007252	#87-2316 497-23144 511-23887
WRD.7	= 006344	#85-2248 229-9337 230-9361 230-9381 230-9394 439-20251 440-20284 440-20319
WRD.70	= 007260	#87-2317
WRD.71	= 007272	#87-2318 507-23686
WRD.72	= 007302	#87-2319 516-24130
WRD.73	= 007310	#87-2320 449-20777
WRD.74	= 007316	#87-2321 464-21524 464-21547 466-21618 466-21645 471-21924 477-22214
WRD.75	= 007330	#87-2322 464-21523 464-21546 465-21613 466-21644 471-21923 477-22213
WRD.76	= 007340	#87-2323 471-21898 477-22188 484-22554 491-22855
WRD.77	= 007346	#87-2324 477-22190
WRD.8	= 006360	#85-2249 230-9380 440-20318 454-21021 458-21260
WRD.9	= 006374	#85-2250 229-9336 230-9360 372-16737 373-16763 440-20283 471-21897 477-22187 484-22553 491-22854

SYMBOL	VALUE		REFERENCES									
WRT.CS	017462		#123-4082	173-6508	220-8875	221-8907						
WRT.DA	020016		#129-4397	173-6518	220-8881	221-8915						
WRT.DS	022764		#168-6268	174-6562								
WRT.D1	021570		#155-5668	174-6567								
WRT.D2	022102		#159-5858	174-6572								
WRT.D3	022414		#163-6060	174-6577								
WRT.EE	021526		#152-5542	173-6548								
WRT.EL	021464		#149-5407	174-6557								
WRT.ER	017640		#126-4239	173-6513	220-8878	221-8911						
WRT.E1	020560		#138-4870	173-6528	221-8891	221-8923						
WRT.E2	020766		#141-5043	173-6533	221-8894							
WRT.MR	020174		#132-4554	173-6523								
WRT.PA	020352		#135-4710	173-6538	221-8888	221-8919						
WRT.PD	021220		#145-5228	173-6543	418-19147							
WRT.RE	023074		#172-6481	204-8039	209-8288	214-8562	271-11437	272-11501	273-11569			
WT.DAT	013126		#79-1896	*125-4191	125-4195	*128-4349	128-4353	*131-4506	131-4510	*134-4664	134-4668	
			*137-4823	137-4827	*140-4983	140-4987	*144-5167	144-5171	*148-5353	148-5357	*151-5491	
			151-5493	*154-5624	154-5626	*158-5809	158-5811	*162-5997	162-5999	*167-6208	167-6212	
			*170-6366	170-6370	204-8084	210-8337	223-9012	271-11460	272-11524			
W.C.SI	013122		#79-1893	*186-7189	*186-7209	411-18798	411-18807	413-18887				
XOR.LN	016642		#117-3796	372-16708	379-17053							
X$ALWA	= 000000		#4-13									
X$FALS	= 000040		#4-13									
X$OFFS	= 000400		#4-13									
X$TRUE	= 000020		#4-13									
$END.L	105134	G	#523-24451									
$PATCH	002756	G	#5-327									
$SAVE2	004044	G	34-128	39-371	#42-61	102-3082	113-3570	123-4082	125-4179	126-4239	128-4337	
			129-4397	131-4494	132-4554	134-4652	135-4710	137-4810	138-4870	140-4970	141-5043	
			144-5153	145-5228	148-5339	155-5668	157-5781	159-5858	161-5969	163-6060	166-6179	
			170-6354	172-6481	176-6679	236-9681	241-9939	248-10315	256-10720	263-11079	301-12987	
			411-18785	443-20453	519-24273	523-24471						
$SAVE3	004060	G	9-143	10-191	15-153	16-207	28-183	29-234	#42-68	88-2407	100-2975	
			104-3184	185-7119	226-9144	229-9318	233-9506	281-11971	288-12332	424-19426	510-23837	
			515-24062	523-24470								
$SAVE4	004076	G	#42-76	117-3797	196-7624	203-8019	277-11747	429-19713	523-24470			
$SAVE5	004116	G	35-196	39-371	#42-85	93-2648	97-2832	193-7475	199-7786	209-8271	214-8545	
			220-8863	270-11417	297-12778	306-13254	313-13604	320-13956	327-14305	332-14598	339-14973	
			346-15308	352-15638	361-16133	370-16607	377-16953	382-17228	387-17512	394-17865	401-18223	
			406-18519	417-19098	447-20675	453-20964	457-21208	463-21477	470-21832	476-22118	482-22421	
			489-22745	495-23041	504-23501	523-24470						
$T1	025670		#189-7332	190-7391								
$T10	032366		#229-9318	231-9422								
$T11	033030		#233-9506	234-9580								
$T12	033274		#236-9681	238-9786								
$T13	033704		#241-9939	245-10160								
$T14	035056		#248-10315	252-10554								
$T15	036324		#256-10720	260-10959								
$T16	037572		#263-11079	266-11244								
$T17	040472		#270-11417	274-11647								
$T18	041666		#277-11747	278-11816								
$T19	042124		#281-11971	285-12200								

SYMBOL	VALUE	REFERENCES	
$T2	026072	#193-7475	194-7547
$T20	043274	#288-12332	291-12501
$T21	044234	#293-12579	294-12671
$T22	044630	#297-12778	299-12893
$T23	045276	#301-12987	303-13080
$T24	045634	#306-13254	311-13493
$T25	047010	#313-13604	316-13742
$T26	047566	#320-13956	324-14172
$T27	050712	#327-14305	329-14437
$T28	051470	#332-14598	335-14769
$T29	052454	#339-14973	342-15172
$T3	026336	#196-7624	197-7685
$T30	053566	#346-15308	348-15448
$T31	054362	#352-15638	356-15897
$T32	055756	#361-16133	367-16450
$T33	057514	#370-16607	373-16789
$T34	060526	#377-16953	380-17122
$T35	061462	#382-17228	384-17338
$T36	062114	#387-17512	391-17716
$T37	063152	#394-17865	397-18029
$T38	064060	#401-18223	404-18407
$T39	065064	#406-18519	408-18631
$T4	026544	#199-7786	201-7909
$T40	065512	#411-18785	414-18940
$T41	066500	#417-19098	420-19280
$T42	067532	#424-19426	426-19560
$T43	070304	#429-19713	432-19885
$T44	071240	#434-19971	435-20028
$T45	071450	#436-20090	437-20138
$T46	071634	#439-20247	441-20361
$T47	072332	#443-20453	444-20520
$T48	072624	#447-20675	450-20832
$T49	073516	#453-20964	455-21087
$T5	027236	#203-8019	205-8135
$T50	074222	#457-21208	459-21316
$T51	074640	#463-21477	467-21690
$T52	075712	#470-21832	472-21973
$T53	076464	#476-22118	478-22264
$T54	077264	#482-22421	485-22605
$T55	100306	#489-22745	491-22898
$T56	101156	#495-23041	498-23247
$T57	102260	#504-23501	508-23730
$T58	103502	#510-23837	512-23932
$T59	104106	#515-24062	517-24174
$T6	027660	#209-8271	211-8392
$T60	104554	#519-24273	521-24365
$T7	030316	#214-8545	217-8702
$T8	031146	#220-8863	224-9067