TU58

TU58 PERF EXERCISER

CZTUUA0

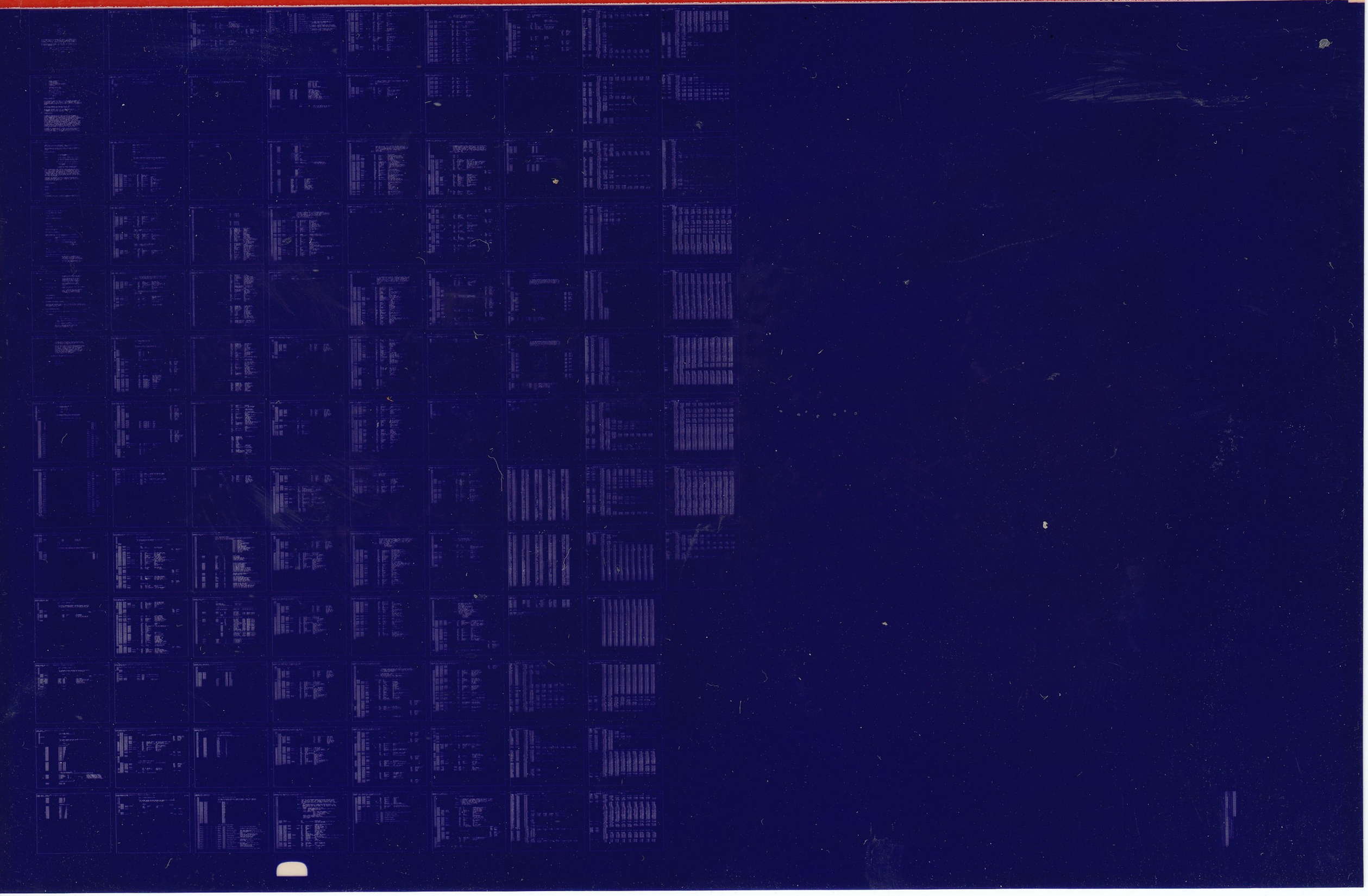
AH-E649A-MC

FICHE 1 OF 1

SEP 1979

digital

MADE IN USA



.REM &

IDENTIFICATION

PRODUCT CODE: AC-E648A-MC

PRODUCT NAME: CZTUUA0 TU58 PERF EXER

PRODUCT DATE: 17-APR-79

MAINTAINER: PERIPHERAL DIAGNOSTIC GROUP

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1.0 GENERAL INFORMATION

THIS DIAGNOSTIC EXERCISES FROM 1 TO 8 TU58 CONTROLLER BOARDS, EACH OF WHICH MAY SUPPORT 1 OR 2 DRIVES. THE PROGRAM IMPLIMENTS THE 'MAINTENANCE MODE'' SWITCH WITHIN ALL PACKET COMMANDS, THUS RETRIEVING MAXIMUM INFORMATION FROM THE DEVICE UPON CERTAIN DEVICE RECOGNIZED ERRORS.

STATISTICAL SUMMARIES ARE PROVIDED FOR ALL UNITS TESTED. RETRIES ARE PERFORMED ON DATA-RELATED ERROR CONDITIONS.

USE OF LOOP ON ERROR FLAG (:LOE) IS IMPLEMENTED BUT NOT RECOMMENDED FOR USE, SINCE THE LOOPS ARE QUITE LENGTHLY DUE TO COMMUNICATIONS PROTOCOL OVERHEAD.

1.1 PROGRAM ABSTRACT

IN ORDER TO EXERCISE MULTIPLE UNITS IN AN EFFICIENT MANNER, A SCHEDULING ALGORITHM BUILDS, THEN SENDS THE NEXT COMMUNICATION PACKET (COMMAND OR DATA) FORMULATED BY EXECUTING MACRO CODE WITHIN THE TEST ALGORITHMS. THE USE OF MACROS TO IMPLIMENT THE COMMUNICATIONS PROTOCOL SIMPLIFIES CONTEXT SWITCHING FROM UNIT TO UNIT BY NOT REQUIRING 8 SEPARATE DEVICE STACKS IN ADDITION TO THE SYSTEM STACK. COMPLETE INDEPENDENCE OF UNITS AND TESTS WAS ALSO ACHIEVED: FOR INSTANCE, UNIT 0 COULD BE PERFORMING TEST 6, WHILE UNIT 7 WAS PUT ON LINE AND STARTED ON TEST 1, OR UNIT 5 ABORTED AND WAS TAKEN OFF LINE, ETC... FOLLOWING CONVERSION TO RUN UNDER THE DIAGNOSTIC SUPERVISOR MONITOR, THIS CAPABILITY WAS DEFEATED. ALL UNITS NOW PERFORM THE TEST ALGORITHM SPECIFIED ON DRIVE 0'S, THEN REPEAT THE TEST AFTER SWITCHING DRIVES, IF ANY DRIVE ''1'S'' WERE SELECTED.

FOLLOWING THE TRANSMISSION OF 1 PACKET TO EACH DEVICE (WITH XOFF PRECEEDING) THE UNITS ARE POLLED, AND THEIR ENTIRE RESPONSES EVALUATED ROUND ROBIN. IF ANY ERROR INITIATES A RETRY, THE SCHED-ULING PROCESS IS MODIFIED TO COMMUNICATE WITH ONLY 1 UNIT UNTIL

COMPLETION OF THE RETRY PROCEDURE. THEN, A RETRY BY ANOTHER UNIT MAY PROCEED, OR THE SYSTEM CONTINUES NORMALLY.

UPON OCCURANCE OF A DEVICE FATAL ERROR, THAT UNIT IS DESCHEDULED (ABORTED) ALLOWING THE REMAINING (IF ANY) TO PROCEED WITH TESTING.

ERROR DESCRIPTIONS:

BLOCK #:	THE RECORD NUMBER (1 PER 512. BYTES) IN LAST COMMAND PACK.
COMMAND:	THE MOST RECENT COMMAND PACKET OP CODE.
EXPCTD:	THE DATA PATTERN USED ON WRITE COMMAND AND FOR DATA COMPARE AFTER READ OP.
SUCCESS:	THE SUCCESS CODE RECEIVED IN END PACKET.
PAK SENT:	TYPE OF PACKET JUST SENT (0 FOR DATA; 1 FOR COMMAND)
FLAG RCVD:	FLAG BYTE OF PACKET CURRENTLY BEING CHECKED, OR 1ST BYTE OF RESPONSE.

SINCE IN MAINTENANCE MODE TU58 WILL SEND A BAD DATA PACK WITH A "DATA CHECK" SUCCESS STATUS IN THE FOLLOWING END PACK, THE HOST WILL, UPON CHECKING THOSE DATA PACK(S), DETERMINE "BAD DATA" IN PACKET ERROR FIRST, THEN INTERPRET THE SUCCESS CODE TO DIFFERENTIATE A COMMUNICATIONS GLITCH (GOOD SUCCESS) VS. TU DATA CHECK CODE. THIS WOULD SEEM TO RESULT IN TWO "ERROR" MESSAGES FOR ONE ERROR CONDITION, BUT ONLY THE SECOND ERROR MESSAGE WILL CONTAIN PERTINENT (NOT ZERO) ERROR NUMBER.

THROUGHOUT THE PROGRAM, R5 POINTS TO ONE OF 8 POSSIBLE DATA STRUCTURES CONTAINING STATUS, TEST PARAMETERS, AND STATISTICAL INFORMATION FOR THE CURRENT UNIT. "START" CLEARS STATISTICS. "RESTART" AND "CONTINUE" DO NOT.

1.2 SYSTEM REQUIREMENTS

1.2.1 HARDWARE

PDP-11/LSI-11 CPU WITH AT LEAST 16K WORDS OF MEMORY AND CONSOLE DEVICE.

1.2.2 SOFTWARE

THE PROGRAM IS REVISION C DIAGNOSTIC SUPERVISOR COMPATIBLE EXCEPT 'LOOP ON ERROR' CAPABILITY IS NOT RECOMMENDED. CONSULT XXDP+

USERS MANUAL FOR OPERATING INSTRUCTIONS.

1.3 RELATED DOCUMENTS AND STANDARDS

XXDP+ USERS MANUAL CHQUS

1.4 DIAGNOSTIC HIERARCY PREREQUISITES

NONE

1.5 ASSUMPTIONS

SYSTEM HARDWARE OTHER THAN TU58(S) IS OPERATIONAL.

2.0 OPERATING INSTRUCTIONS

2.1 HOW TO RUN THIS DIAGNOSTIC

ANSWER ''CHANGE HW?'' WITH YES INITIALLY TO SET UP HARDWARE CONFIGURATION TABLES. THAT INFORMATION IS:

TU58 CSR - ADDRESS OF RCSR OF DLV-11 OR OTHER INTERFACE BOARD.

VECTOR ADDR. - ADDRESS OF INTERRUPT VECTOR LOCATION.

PDT (PARALLFL) INTERFACE -- IS THE TU58 IN A PDT 11/130, OR SYSTEM WHOSE BUFFERS ARE:
RCSR
RCDB (AND XMDB)
XMSR

TEST DR0 - YES OR NO

TEST DR1 - YES OR NO

SUBSEQUENT RESPONSES TO ''CHANGE HW?'' MAY THEN BE 'NO''.

THE SOFTWARE QUESTIONS ARE AS FOLLOWS:

NUMBER OF BLOCKS: TEST 4-7 -- ONE MAY SELECT A MINIMUM OF 8, TO A MAXIMUM OF 512 BLOCKS TO WRITE, READ; WRITE VERIFY; AND READ REDUCED, AS EXPLAINED ELSEWHERE IN THIS DOCUMENT.

ADD DR # TO DATA PATTERN -- FOR THOSE SAME READ AND WRITE TESTS 4-7, THE DRIVE NUMBER (0 OR 1) MAY

BE ADDED TO DATA WRITTEN ON TAPE TO INSURE DRIVE SELECT BIT OPERATION.

STATISTICS PRINTED AT EOP -- SELECTS WHETHER OR NOT TO PRINT INFORMATION AT END OF PASS OR ^C. THESE STATISTICS MAY ALSO BE RETRIEVED WITH THE 'PRI" COMMAND.

COMPARE DATA ON READ -- SELECTS WHETHER OR NOT TO DO A DATA COMPARE ON DATA PACKETS RECEIVED.

PRINT PACKET ON ERROR -- PRINTS 132. BYTE DATA PACKET ON A COMPARE ERROR,IF SELECTED.

ERRORS-DVC FATAL IF 'EVL' SET -- IF USER SETS EVL FLAG (EVALUATE) MODE), HRD OR SFT ERROR MESSAGES BECOME DVC FTL ERRORS AFTER WHEN THE NUMBER SPECIFIED IS EXCEEDED.

3.0 ERROR INFORMATION

ERROR INFORMATION IS PROVIDED ON OCCURRANCE OF ERRORS AS OUTLINED IN SECTION 1.1.

4.0 PERFORMANCE AND PROGRESS REPORTS

STATISTICS ARE AVAILABLE PER SECTION 1.1 AT END OF PASS, CONTROL-C, OR UPON ENTERING A 'PRI" COMMAND. THEY CONSIST OF # BLOCKS WRITTEN AND READ, # OF DATA ERRORS, HARD OR SOFT.

5.0 DEVICE INFORMATION TABLES

CONSULT SECTION SUBTITLED 'DATA BLOCK FORMAT" FURTHER ON IN THIS LISTING.

6.0 TEST SUMMARIES

INIT: INIT IS SENT TO DEVICE IF:

1. INIT CODE IN SUPERVISOR IS EXECUTED

OR

2. INIT IS REQUESTED BY DEVICE AS A RESULT OF ERROR.

TEST 1: INITIATES FIRMWARE DIAGNOSTICS AT DEVICE LEVEL (SELF TEST)

TEST 2: SEEK TEST. SEEKS BOT ON BOTH TRACKS,THEN VERIFIES 60 IPS OPERATION TO SEEK EOT ON ON BOTH TRACKS,ENDING THEN AT BOT.

TEST 3: PERFORMS WRITE, THEN READ OF ADJACENT BLOCKS AT BOT WITH VARYING DATA, THEN SEEKS HALF WAY INTO REMAINING TAPE AND REPEATS THE ABOVE UNTIL EOT.

TESTS 4-7: READS OR WRITES BLOCK # AS DATA INTO SUCCESSIVE BLOCKS ON TAPE, THE LENGTH OF WHICH IS DETERMINED BY SOFTWARE QUESTION #1: DEFAULT IS SHORT TAPE (8.).MINIMUM, (8.) RESULTS IN TRANSFER OF 8. (OR 4 PER TRACK) 512. BYTE BLOCKS OF DATA PER READ (OR WRITE) OPERATION. THE ALGORITHM SWITCHES TRACKS REGARDLESS OF THE NUMBER BLOCKS SELECTED. DRIVE NUMBER IS ADDED TO RECORD AS DEFAULT,SO FOR TAPE INTERCHANGE TESTING, ANSWER (N) TO SOFTWARE (SW) QUESTION #2.

NOTE: THE AMOUNT OF TIME SPENT IN TESTS 4-7 IS QUITE LONG IF THE FULL TAPE (512.) IS SELECTED.

TEST 4: WRITE TAPE

TEST 5: READ TAPE

TEST 6: WRITE VERIFY TAPE

TEST 7: READ REDUCED TAPE

```
                        .TITLE PROGRAM HEADER AND TABLES
                        .SBTTL  PROGRAM HEADER

                                .ENABL  ABS,AMA
002000                  .       =       2000

002000                          BGNMOD

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

002000                          POINTER BGNRPT,BGNSW,BGNSFT,BGNAU,BGNDU,

002000                          HEADER  CZTUU,A,0,3600.,1
002000                                                          L$NAME::
002000  103                                                             .ASCII /C/
002001  132                                                             .ASCII /Z/
002002  124                                                             .ASCII /T/
002003  125                                                             .ASCII /U/
002004  125                                                             .ASCII /U/
002005  000                                                             .BYTE   0
002006  000                                                             .BYTE   0
002007  000                                                             .BYTE   0
002010                                                          L$REV::
002010  101                                                             .ASCII  /A/
002011                                                          L$DEPO::
002011  060                                                             .ASCII  /0/
002012                                                          L$UNIT::
002012  000000                                                          .WORD   0
002014                                                          L$TIML::
002014  007020                                                          .WORD   3600.
002016                                                          L$HPCP::
002016  035752                                                          .WORD   L$HARD
002020                                                          L$SPCP::
002020  036130                                                          .WORD   L$SOFT
002022                                                          L$HPTP::
002022  002172                                                          .WORD   L$HW
002024                                                          L$SPTP::
002024  002204                                                          .WORD   L$SW
002026                                                          L$LADP::
002026  036522                                                          .WORD   L$LAST
002030                                                          L$STA::
002030  000000                                                          .WORD   0
002032                                                          L$CO::
002032  000000                                                          .WORD   0
002034                                                          L$DTYP::
002034  000001                                                          .WORD   1
002036                                                          L$APT::
002036  000000                                                          .WORD   0
002040                                                          L$DTP::
002040  002152                                                          .WORD   L$DISPATCH
002042                                                          L$PRIO::
002042  000000                                                          .WORD   0
002044                                                          L$ENVI::
```

```
002044  000000                                          .WORD   0
002046                                          L$EXP1::
002046  000000                                          .WORD   0
002050                                          L$MREV::
002050     003                                          .BYTE   C$REVISION
002051     003                                          .BYTE   C$EDIT
002052                                          L$EF::
002052  000000                                          .WORD   0
002054  000000                                          .WORD   0
002056                                          L$SPC::
002056  000000                                          .WORD   0
002060                                          L$DEVP::
002060  002220                                          .WORD   L$DVTYP
002062                                          L$REPP::
002062  002612                                          .WORD   L$RPT
002064                                          L$EXP4::
002064  000000                                          .WORD   0
002066                                          L$EXP5::
002066  000000                                          .WORD   0
002070                                          L$AUT::
002070  004722                                          .WORD   L$AU
002072                                          L$DUT::
002072  004576                                          .WORD   L$DU
002074                                          L$LUN::
002074  000000                                          .WORD   0
002076                                          L$DESP::
002076  002122                                          .WORD   L$DFSC
002100                                          L$LOAD::
002100  104035                                          EMT     E$LOAD
002102                                          L$ETP::
002102  000000                                          .WORD   0
002104                                          L$ICP::
002104  003626                                          .WORD   L$INIT
002106                                          L$CCP::
002106  004564                                          .WORD   L$CLEAN
002110                                          L$ACP::
002110  004402                                          .WORD   L$AUTO
002112                                          L$PRT::
002112  002142                                          .WORD   L$PROT
002114                                          L$TEST::
002114  000000                                          .WORD   0
002116                                          L$DLY::
002116  000000                                          .WORD   0
002120                                          L$HIME::
002120  000000                                          .WORD   0
406
407 002122                      DESCRIP <TU58 PERF EXER>
002122                                          L$DESC::
002122    124     125     065                           .ASCIZ  /TU58 PERF EXER/
                                                        .EVEN
```

```
    409 002142                          BGNPROT
        002142                                                              L$PROT::
    410 002142  000000                          .WORD   0               ;DEVICE CSR
    411 002144  177777                          .WORD   -1              ;NO MASS BUS
    412 002146  177777                          .WORD   -1              ;NO DRIVE
    413 002150                          ENDPROT
    414
    420
    421                                 .SBTTL  DISPATCH TABLE
    422
    423                                 ;++
    424                                 ; THE DISPATCH TABLE CONTAINS THE STARTING ADDRESS OF EACH TEST.
    425                                 ; IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
    426                                 ;--
    427
    428 002150                                  DISPATCH 7
        002150  000007                                                                  .WORD   7
        002152                                                                  L$DISPATCH::
        002152  010500                                                                  .WORD   T1
        002154  010670                                                                  .WORD   T2
        002156  011130                                                                  .WORD   T3
        002160  012522                                                                  .WORD   T4
        002162  013472                                                                  .WORD   T5
        002164  014252                                                                  .WORD   T6
        002166  015222                                                                  .WORD   T7
    429
```

```
                        .SBTTL  DEFAULT HARDWARE P-TABLE

                        ;++
                        ; 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.
                        ;--

002170                          BGNHW   DFPTBL
002170  000004                                                          .WORD   L10001-L$HW/2
002172                                                          L$HW::
002172                                                          DFPTBL::

002172  176500                  .WORD   176500          ;CSR ADDRESS
002174  000300                  .WORD   300             ;VECTOR ADDR.
002176  000003                  .WORD   3               ;TEST DRIVE ZERO AND ONE
002200  000000                  .WORD   0               ;NOT PDT TYPE INTERFACE

002202                          ENDHW
002202                                                  L10001:
```

```
                        .SBTTL  SOFTWARE P-TABLE

                        ;++
                        ; THE SOFTWARE P-TABLE CONTAINS THE VALUES OF THE PROGRAM
                        ; PARAMETERS THAT CAN BE CHANGED BY THE OPERATOR.
                        ;--

002202                          BGNSW   SFPTBL
002202  000006                                                 .WORD   L10002-L$SW/2
002204                                                      L$SW::
002204                                                      SFPTBL::

002204  000010          LENGTH: .WORD   8.              ;TAPE LENGTH
002206  000001          STAEOP: .WORD   1               ;PRINT STATISTICS AT EOP
002210  000001          PRBUF:  .WORD   1               ;PRINT DATA BUF ON COMP. ERROR
002212  000001          CMPDAT: .WORD   1               ;COMPARE DATA
002214  000001          DRVCHK: .WORD   1               ;ADD DR # TO DATA
002216  000001          EVLTHR: .WORD   1               ;THRESHOLD FOR EVL TEST

002220                          ENDSW
002220                                                      L10002:

002220                          ENDMOD
```

```
                                .TITLE GLOBAL AREAS
                                .SBTTL  GLOBAL EQUATES SECTION


002220                                  BGNMOD

                                ;++
                                ; THE GLOBAL EQUATES SECTION CONTAINS PROGRAM EQUATES THAT
                                ; ARE USED IN MORE THAN ONE TEST.
                                ;--

002220                                  EQUALS
                                ;
                                ; BIT DIFINITIONS
                                ;
                        100000  BIT15== 100000
                        040000  BIT14== 40000
                        020000  BIT13== 20000
                        010000  BIT12== 10000
                        004000  BIT11== 4000
                        002000  BIT10== 2000
                        001000  BIT09== 1000
                        000400  BIT08== 400
                        000200  BIT07== 200
                        000100  BIT06== 100
                        000040  BIT05== 40
                        000020  BIT04== 20
                        000010  BIT03== 10
                        000004  BIT02== 4
                        000002  BIT01== 2
                        000001  BIT00== 1
                                ;
                        001000  BIT9==  BIT09
                        000400  BIT8==  BIT08
                        000200  BIT7==  BIT07
                        000100  BIT6==  BIT06
                        000040  BIT5==  BIT05
                        000020  BIT4==  BIT04
                        000010  BIT3==  BIT03
                        000004  BIT2==  BIT02
                        000002  BIT1==  BIT01
                        000001  BIT0==  BIT00
                                ;
                                ; EVENT FLAG DEFINITIONS
                                ;   EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
                                ;
                        000040  EF.START==      32.                     ; START COMMAND WAS ISSUED
                        000037  EF.RESTART==    31.                     ; RESTART COMMAND WAS ISSUED
                        000036  EF.CONTINUE==   30.                     ; CONTINUE COMMAND WAS ISSUED
                        000035  EF.NEW==        29.                     ; A NEW PASS HAS BEEN STARTED
                        000034  EF.PWR==        28.                     ; A POWER-FAIL/POWER-UP OCCURRED
                                ;
                                ;
                                ; PRIORITY LEVEL DEFINITIONS
                                ;
                        000340  PRI07== 340
                        000300  PRI06== 300
```

```
GLOBAL AREAS    MACRO M1110  12-JUN-79 12:23  PAGE 7-1
GLOBAL EQUATES SECTION                                                  SEQ 0013

                000240                  PRI05== 240
                000200                  PRI04== 200
                000140                  PRI03== 140
                000100                  PRI02== 100
                000040                  PRI01== 40
                000000                  PRI00== 0
                                        ;
                                        ;OPERATOR FLAG BITS
                                        ;
                000004                  EVL==         4
                000010                  LOT==        10
                000020                  ADR==        20
                000040                  IDU==        40
                000100                  ISR==       100
                000200                  UAM==       200
                000400                  BOE==       400
                001000                  PNT==      1000
                002000                  PRI==      2000
                004000                  IXE==      4000
                010000                  IBE==     10000
                020000                  IER==     20000
                040000                  LOE==     40000
                100000                  HOE==    100000
    546
```

```
559                             .SBTTL  GLOBAL DATA SECTION
560
561
568
569
```

```
                                .SBTTL  GLOBAL TEXT SECTION

                                ;
                                ; NAMES OF DEVICES SUPPORTED BY PROGRAM
                                ;
                                        DEVTYP  <TU58 CONTROLLER>
002220
002220
002220  124  125  065                                          LSDVTYP::
                                                                .ASCIZ  /TU58 CONTROLLER/
                                                                .EVEN
```

```
                                .SBTTL  GLOBAL SUBROUTINES SECTION
                                .MACRO  RET
                                        RTS     PC
                                .ENDM

                                .MACRO  PUSH    ,REG
                                        MOV     REG,-(SP)
                                .ENDM
                                .MACRO  POP,REG
                                        MOV     (SP)+,REG
                                .ENDM


                                ;++
                                ; THE GLOBAL SUBROUTINES SECTION CONTAINS THE SUBROUTINES THAT
                                ; ARE USED TO LINK THE DIAGNOSTIC TO THE SUPERVISOR (TSTID).
                                ;--

                                ;++
                                ; SWAPDR
                                ;    SUBROUTINE TO DETERMINE IF TO TEST OTHER DRIVE (FOR ALL UNITS)


                                ; INPUTS:       NONE

                                ; OUTPUTS:      DR(R5) UPDATED TO TEST SAME OR OTHER DRIVE
                                ;               CARRY SET IF SECOND PASS NECESSARY

                                ;--


002240  005002                  SWAPDR:: CLR    R2              ;FOR # DRIVE 1'S.
002242  012737  004724  002340          MOV     #BLKTBL,SWPTR
002250  017705  000064          1$:     MOV     @SWPTR,R5
002254  032715  100000                  BIT     #BIT15,@R5      ;ABORTED?
002260  001013                          BNE     3$              ;YES
002262  032765  000001  000060          BIT     #BIT0,DR(R5)    ;DID DR. 0?
002270  001007                          BNE     3$              ;NO, DIDN'T; NO ZERO
002272  032765  001000  000060          BIT     #BIT9,DR(R5)    ;YES; 1 SELECTED?
002300  001403                          BEQ     3$              ;NO,
002302  105265  000060                  INCB    DR(R5)          ;YES, SWAP
002306  005202                          INC     R2              ;ONE MORE TO TEST
002310  023727  002340  004742  3$:     CMP     SWPTR,#LSTDEV   ;LAST DEVICE?
002316  103004                          BHIS    4$              ;YES
002320  062737  000002  002340          ADD     #2,SWPTR        ;NO-POINT NEXT
002326  000750                          BR      1$              ;DO

002330  005702                  4$:     TST     R2              ;(CLEAR CARRY),MORE TO DO?
002332  001401                          BEQ     5$              ;NO
002334  000261                          SEC                     ;YES
002336                          5$:     RET                     ;RETURN

002340  000000                  SWPTR:  .WORD


                                ;++
                                ;       SETDR - SUBROUTINE TO GET DRIVE FOR 1ST PASS FOR EACH TEST
```

```
                                        ;
                                        ; INPUTS:       NONE
                                        ;
                                        ; OUTPUTS:      DR(R5) IS SET TO TEST DRIVE 0 OR DRIVE 1
                                        ;--


002342  012737  004724  002416  SETDR:: MOV     #BLKTBL,SETPTR
002350  017705  000042          1$:     MOV     @SETPTR,R5
002354  105065  000060                  CLRB    DR(R5)          ;PRESET
002360  032765  000400  000060          BIT     #BIT8,DR(R5)    ;DO DR0?
002366  001002                          BNE     2$              ;YES
002370  105265  000060                  INCB    DR(R5)          ;NO-USE DRIVE 1
002374  023727  002416  004742  2$:     CMP     SETPTR,#LSTDEV
002402  103004                          BHIS    3$
002404  062737  000002  002416          ADD     #2,SETPTR
002412  000756                          BR      1$
002414                          3$:     RET                     .
002416  000000                  SETPTR: .WORD

                                        ;++
                                        ; CLRALL - CLEARS INPUT BUFFER FOR RESPONSE FROM UNIT.
                                        ; INPUTS:  NONE
                                        ; OUTPUTS:  ALL UNITS BUFFERS CLEARED.
                                        ;--

002420  012737  004724  002512  CLRALL:: MOV     #BLKTBL,CLRPTR  ;INIT
002426  017705  000060          1$:     MOV     @CLRPTR,R5      ;GET DATA BLOCKS
002432  004737  002460                  CALL    CLRBUF          ;CLEAR IT'S RECEIVE BUFFER
002436  023727  002512  004742          CMP     CLRPTR,#LSTDEV  ;LAST DEV?
002444  103004                          BHIS    2$              ;YES
002446  062737  000002  002512          ADD     #2,CLRPTR       ;-->NEXT
002454  000764                          BR      1$              ;CONTINUE
002456                          2$:     RET


                                        ;++
                                        ; CLRBUF - CLEARS 1 UNIT'S INPUT BUFFER.
                                        ; INPUTS:  RCVBUF(R5) IS BUFFER START
                                        ; OUTPUTS:  CLEARED AREA.
                                        ;--

002460                          CLRBUF:: PUSH   R0
002462                                   PUSH   R4
002464  016500  000102                   MOV    RCVBUF(R5),R0   ;GET ADDRESS OF BUFFER
002470  012704  001036                   MOV    #RCBFSZ,R4      ;SIZE IN BYTES
002474  005020                  1$:      CLR    (R0)+           ;CLEAR IT
002476  162704  000002                   SUB    #2,R4           ;2 BYTES LESS
002502  001374                           BNE    1$              ;MORE
002504                                   POP    R4
002506                                   POP    R0
002510                                   RET
002512  000000                  CLRPTR: .WORD
```

```
                                        ;++
                                        ; SETUP - CALLED WITHIN EACH TEST TO INSERT BEGINNING ADDRESS OF THE
                                        ;         TEST INTO ALL UNITS TEST PC'S.
                                        ; INPUTS:  TSTTOP LOADED WITH TEST ALGORITHMS STARTING ADDR.
                                        ; OUTPUTS: TSTPC(R5) FOR ALL UNITS
                                        ;--

002514  005037  010140          SETUP:: CLR     DONE            ;NOT DONE YET
002520  012737  004724  010142          MOV     #BLKTBL,IDPTR   ;TABLE TOP ADDR
002526  017705  005410          1$:     MOV     @IDPTR,R5       ;DEVICE'S DATA BLOCK
002532  013765  010144  000020          MOV     TSTTOP,TSTPC(R5);INSERT PC FOR TOP OF TEST
002540  023727  010142  004742          CMP     IDPTR,#LSTDEV   ;ALL UNITS SET?
002546  103004                          BHIS    2$              ;YES
002550  062737  000002  010142          ADD     #2,IDPTR        ;NO,GET NEXT POINTER
002556  000763                          BR      1$              ;SET HIM UP
002560                          2$:     RET                     ;DONE

                                        ;++
                                        ; RUN - IMPLEMENTS THE CALLS TO SEND PACKETS, RECEIVE PACKETS, THEN
                                        ;       CHECK ANSWERS DURING TEST RUN TIME.
                                        ; INPUTS:  NONE
                                        ; OUTPUTS: NONE
                                        ;--

002562  004737  010162          RUN::   CALL    NXTST           ;MAKE AND SEND NEXT PACK TO ALL
                                                                ;UNABORTED UNITS
002566  005737  010140                  TST     DONE            ;COMPLETE?
002572  001006                          BNE     2$              ;YES
002574  004737  016354                  CALL    GETANS          ;NO,GET ALL RESPONSES

002600                                  BREAK                   ;SUPERVISOR CHECK
002600  104422                                                          TRAP    C$BRK

002602  004737  017530                  CALL    CHKANS          ;CHECK ALL RESPONSES
002606  000765                          BR      RUN             ;CONTINUE TILL DONE
002610                          2$:     RET

002612                                  ENDMOD
```

```
                        .TITLE MISCELLANEOUS SECTIONS
                        .SBTTL  REPORT CODING SECTION

002612                          BGNMOD

                        ;++
                        ; THE REPORT CODING SECTION CONTAINS THE
                        ; 'PRINTS' CALLS THAT GENERATE STATISTICAL REPORTS.
                        ;--

002612                          ENRPT
002612                                                                  L$RPT::
002612                          PUSH    R0
002614                          PUSH    R1
002616                          PUSH    R2
002620                          PUSH    R3
002622                          PUSH    R4
002624                          PUSH    R5

002626                          BREAK
002626  104422                                                          TRAP    C$BRK
002630  012737  004724  003240          MOV     #BLKTBL,RPTR    ;GET 1ST DEVICE BLOCK
002636                          PRINTS  #STATHD         ;HEADER
002636  012746  003242                                                  MOV     #STATHD,-(SP)
002642  012746  000001                                                  MOV     #1,-(SP)
002646  010600                                                          MOV     SP,R0
002650  104416                                                          TRAP    C$PNTS
002652  062706  000004                                                  ADD     #4,SP
002656                          BREAK                   ;^C CHECK
002656  104422                                                          TRAP    C$BRK
002660                          PRINTS  #STHD2          ;2ND HEADER
002660  012746  003516                                                  MOV     #STHD2,-(SP)
002664  012746  000001                                                  MOV     #1,-(SP)
002670  010600                                                          MOV     SP,R0
002672  104416                                                          TRAP    C$PNTS
002674  062706  000004                                                  ADD     #4,SP
002700                  1$:     BREAK                   ;^C CHECK
002700  104422                                                          TRAP    C$BRK
002702  017705  000332                  MOV     @RPTR,R5        ;GET DEVICE BLOCK
002706  032715  004000                  BIT     #BIT11,@R5      ;UNIT NOT TESTED?
002712  001131                          BNE     2$              ;TRUE, DON'T PRINT STATISTICS
                                                                ;OK TO PRINT
002714  011537  003236                  MOV     @R5,RLUN        ;SAVE STATUS WORD
002720  042737  177770  003236          BIC     #177770,RLUN    ;MASK UNIT NUM.
002726  116501  000122                  MOVB    SOFTR(R5),R1    ;SOFTREAD
002732  042701  177400                  BIC     #177400,R1      ;SIGN-UNEXTEND
002736  116502  000124                  MOVB    SOFTW(R5),R2    ;SOFT WRITE
002742  042702  177400                  BIC     #177400,R2      ;
002746  116503  000136                  MOVB    HARDR(R5),R3    ;HARD READ
002752  042703  177400                  BIC     #177400,R3      ;
002756  116504  000140                  MOVB    HARDW(R5),R4    ;HARD WRITE
002762  042704  177400                  BIC     #177400,R4      ;
002766                          PRINTS  #FMO,RLUN       ;SUMMARY/UNIT #
002766  013746  003236                                                  MOV     RLUN,-(SP)
002772  012746  003354                                                  MOV     #FMO,-(SP)
002776  012746  000002                                                  MOV     #2,-(SP)
003002  010600                                                          MOV     SP,R0
```

```
        003004  104416                                                                          TRAP    C$PNTS
        003006  062706  000006                                                                  ADD     #6,SP
    910 003012                          PRINTS  #FM,#0,WRTN0(R5),RDN0(R5),<B,BDATA(R5)>,R1,R2,R3,R4
        003012  010446                                                                          MOV     R4,-(SP)
        003014  010346                                                                          MOV     R3,-(SP)
        003016  010246                                                                          MOV     R2,-(SP)
        003020  010146                                                                          MOV     R1,-(SP)
        003022  005046                                                                          CLR     -(SP)
        003024  156516  000134                                                                  BISB    BDATA(R5),(SP)
        003030  016546  000114                                                                  MOV     RDN0(R5),-(SP)
        003034  016546  000110                                                                  MOV     WRTN0(R5),-(SP)
        003040  012746  000000                                                                  MOV     #0,-(SP)
        003044  012746  003372                                                                  MOV     #FM,-(SP)
        003050  012746  000011                                                                  MOV     #11,-(SP)
        003054  010600                                                                          MOV     SP,R0
        003056  104416                                                                          TRAP    C$PNTS
        003060  062706  000024                                                                  ADD     #24,SP
    911 003064  116501  000123                  MOVB    SOFTR+1(R5),R1  ;SAME
    912 003070  042701  177400                  BIC     #177400,R1      ;AS
    913 003074  116502  000125                  MOVB    SOFTW+1(R5),R2  ;ABOVE
    914 003100  042702  177400                  BIC     #177400,R2      ;THIS
    915 003104  116503  000137                  MOVB    HARDR+1(R5),R3  ;TIME
    916 003110  042703  177400                  BIC     #177400,R3      ;FOR
    917 003114  116504  000141                  MOVB    HARDW+1(R5),R4  ;DRIVE
    918 003120  042704  177400                  BIC     #177400,R4      ;ONE
    919
    920 003124                          PRINTS  #FM,#1,WRTN1(R5),RDN1(R5),<B,BDATA+1(R5)>,R1,R2,R3,R4
        003124  010446                                                                          MOV     R4,-(SP)
        003126  010346                                                                          MOV     R3,-(SP)
        003130  010246                                                                          MOV     R2,-(SP)
        003132  010146                                                                          MOV     R1,-(SP)
        003134  005046                                                                          CLR     -(SP)
        003136  156516  000135                                                                  BISB    BDATA+1(R5),(SP)
        003142  016546  000116                                                                  MOV     RDN1(R5),-(SP)
        003146  016546  000112                                                                  MOV     WRTN1(R5),-(SP)
        003152  012746  000001                                                                  MOV     #1,-(SP)
        003156  012746  003372                                                                  MOV     #FM,-(SP)
        003162  012746  000011                                                                  MOV     #11,-(SP)
        003166  010600                                                                          MOV     SP,R0
        003170  104416                                                                          TRAP    C$PNTS
        003172  062706  000024                                                                  ADD     #24,SP
    921 003176  023727  003240  004742  2$:     CMP     RPTR,#LSTDEV    ;ALL UNITS DONE?
    922 003204  103005                          BHIS    3$              ;YES
    923 003206  062737  000002  003240          ADD     #2,RPTR         ;NO-DO
    924
    925 003214  000137  002700                  JMP     1$              ;MORE UNITS
    926
    927 003220                          3$:     POP     R5
    928 003222                                  POP     R4
    929 003224                                  POP     R3
    930 003226                                  POP     R2
    931 003230                                  POP     R1
    932 003232                                  POP     R0
    933 003234                          ENDRPT
        003234                                                                      L10003:
        003234  104425                                                                          TRAP    C$RPT
    934 003236  000000                  RLIN:   .WORD
```

```
    935 003240  000000                RPTR:   .WORD
    936
    937 003242     045     116     045  STATHD: .ASCII  /%N%A      DR BLKS WR  BLKS RD  BDPAK  /
    938 003310     104     103     110          .ASCIZ  @DCHK/RD DCHK/WR  DCHK/RD DCHK/WR%N@
    939                                 .EVEN
    940 003354     045     101     125  FM0:    .ASCIZ  /%AUNIT %D1%N/
    941                                 .EVEN
    942
    943 003372     045     101     040  FM:     .ASCII  /%A       %D1%A %D5%A.   %D5%A.    %D3%A.    /
    944 003446     045     104     063          .ASCIZ  /%D3%A.   %D3%A.     %D3%A.    %D3%A.%N/
    945                                 .EVEN
    946 003516     045     101     040  STHD2:  .ASCII  /%A                                  /
    947 003563     122     105     103          .ASCIZ  /RECOV   RECOV   UNRECOV UNRECOV%N/
    948                                 .EVEN
    949 003626                          ENDMOD
    950
```

```
                                .SBTTL  INITIALIZE SECTION

                                ;++
                                ; THE INITIALIZE SECTION CONTAINS THE CODING THAT IS PERFORMED
                                ; AT THE BEGINNING OF EACH PASS.
                                ;--

003626                                  BGNINIT
003626                                                                          L$INIT::

003626 000240                   INIT:   NOP                             ;
003630 105037 004374                    CLRB    STRT                    ;FOR STATS CLEAR
003634                                  READEF  #EF.START               ;START COMMAND?
003634 012700 000040                                                                    MOV     #EF.START,R0
003640 104447                                                                           TRAP    C$REFG
003642                                  BNCOMPLETE INIT2                ;NO
003642 103002                                                                           BCC     INIT2
003644 005237 004374                    INC     STRT                    ;YES, SET START FLAG
003650 012737 004724 010130     INIT2:  MOV     #BLKTBL,DEVPTR          ;SET ALL UNITS ABORTED:
003656 005004                           CLR     R4                      ;UNIT NUMBER
003660 017705 004244            1$:     MOV     @DEVPTR,R5              ;GET POINTER
003664 010415                           MOV     R4,@R5                  ;INSERT UNIT #
003666 052715 120000                    BIS     #BIT15!BIT13,@R5        ;SET ABORTED, HALTED
003672 052715 004000                    BIS     #BIT11,@R5              ;SET UNIT NOT TESTED
003676 006304                           ASL     R4                      ;*2 FOR LOOK-UP
003700 016465 024310 000102             MOV     BUFTBL(R4),RCVBUF(R5)   ;SETUP POINTER TO UNIT'S BUFFER
003706 006204                           ASR     R4                      ;CORRECT BACK TO UNIT #
003710 023727 010130 004742             CMP     DEVPTR,#LSTDEV          ;LAST DEVICE DONE?
003716 103005                           BHIS    CHECK                   ;YES
003720 062737 000002 010130             ADD     #2,DEVPTR               ;NO-GET
003726 005204                           INC     R4                      ;NEXT DEVICE AND
003730 000753                           BR      1$                      ;SERVICE

003732 022737 000010 002012     CHECK:  CMP     #8.,L$UNIT              ;MAKE SURE NOT
003740 103005                           BHIS    GETHRD                  ;TOO MANY UNITS
003742                                  ERRSF   0,TOMANY                        ;TOMANY-REQUEST ^C
003742 104454                                                                           TRAP    C$ERSF
003744 000000                                                                           .WORD   0
003746 004312                                                                           .WORD   TOMANY
003750 000000                                                                           .WORD   0
003752                                  DOCLN                           ;EXIT
003752 104444                                                                           TRAP    C$DCLN

003754 012737 004724 010130     GETHRD: MOV     #BLKTBL,DEVPTR          ;INIT TABLE POINTER
003762 005004                           CLR     R4                      ;CLEAR DEVICE COUNTER
003764 017705 004140            1$:     MOV     @DEVPTR,R5              ;GET STATUS WORD
003770 010437 002074                    MOV     R4,L$LUN                ;UNIT NUM. IN CASE ERROR
003774                                  GPHARD  R4,R2                   ;GET HARD INFO
003774 010400                                                                           MOV     R4,R0
003776 104442                                                                           TRAP    C$GPHRD
004000 010002                                                                           MOV     R0,R2
004002                                  BNCOMPLETE 3$
004002 103105                                                                           BCC     3$
004004 042715 004000                    BIC     #BIT11,@R5              ;UNIT IS TESTED!
004010 012203                           MOV     (R2)+,R3                ;R3=CSR
004012 012265 000204                    MOV     (R2)+,TUVECT(R5)        ;GET VECTOR ADDRESS
004016 112265 000061                    MOVB    (R2)+,DR+1(R5)          ;SAVE UNIT SUMMARY
```

```
 996 004022  005202                        INC     R2              ;GET TO WORD BOUND
 997 004024  012237  004376                MOV     (R2)+,PDTFLG    ;AND GET PDT FLAG
 998 004030  052715  040000                BIS     #BIT14,@R5      ;SET SEND BREAK FLAG
 999 004034  032765  000400  000060        BIT     #BIT8,DR(R5)    ;DRIVE 0?
1000 004042  001011                        BNE     13$             ;YES
1001 004044  032765  001000  000060        BIT     #BIT9,DR(R5)    ;DRIVE 1?
1002 004052  001005                        BNE     13$             ;OK
1003 004054                                ERRSF   0,NODRVS                ;NEITHER?!
      004054  104454                                                       TRAP    C$ERSF
      004056  000000                                                       .WORD   0
      004060  004342                                                       .WORD   NODRVS
      004062  000000                                                       .WORD   0
1004 004064                                DOCLN                   ;EXIT
      004064  104444                                                       TRAP    C$DCLN
1005
1006 004066  105737  004374        13$:    TSTB    STRT            ;START COMMAND?
1007 004072  001412                        BEQ     14$             ;NO, DONT CLEAR
1008                                                               ;YES-CLEAR STATS
1009 004074  012702  000202                MOV     #BLKEND,R2      ;R2-->END OF STATS
1010 004100  012701  000110                MOV     #WRTNO,R1       ;FORM ADDRESS OF START:
1011 004104  060501                        ADD     R5,R1           ;R1-->START OF STATS.
1012 004106  162702  000110                SUB     #WRTNO,R2       ;FORM # TO CLEAR
1013
1014 004112  105021                2$:     CLRB    (R1)+           ;CLEAR 'EM
1015 004114  005302                        DEC     R2              ;MORE?
1016 004116  001375                        BNE     2$              ;YES
1017 004120  042715  120000        14$:    BIC     #BIT15!BIT13,@R5  ;SET NOT ABORTED NOT HALTED
1018 004124  010365  000022                MOV     R3,RCSR(R5)     ;GET DEVICE REGISTERS:
1019 004130  062703  000002                ADD     #2,R3
1020 004134  010365  000024                MOV     R3,RCDB(R5)
1021 004140  062703  000002                ADD     #2,R3
1022 004144  010365  000026                MOV     R3,XMSR(R5)
1023 004150  062703  000002                ADD     #2,R3
1024 004154  105737  004376                TSTB    PDTFLG          ;UNIT A PDT?
1025 004160  001402                        BEQ     4$              ;NO
1026 004162  162703  000004                SUB     #4,R3           ;YES...RCDB=XMDB
1027 004166  010365  000030        4$:     MOV     R3,XMDB(R5)
1028 004172  005065  000072                CLR     PATTEN(R5)      ;ZERO DATA PATTERN
1029 004176  005065  000002                CLR     RETRY(R5)       ;NO RETRIES
1030 004202  005065  000064                CLR     REC(R5)         ;NO RECORD
1031 004206  005065  000076                CLR     SUCCS(R5)       ;NO SUCCESS
1032 004212  005065  000074                CLR     DLV(R5)         ;NO DLV ERROR
1033 004216  062737  000002  010130  3$:    ADD     #2,DEVPTR       ;-->NEXT DEVICE
1034 004224  005204                        INC     R4              ;INCREMENT UNIT NUMBER
1035 004226  020437  002012                CMP     R4,L$UNIT       ;MORE UNITS?
1036 004232  001254                        BNE     1$              ;YES, GP HARD THE NEXT
1037
1038 004234  005037  010124                CLR     SYSTAT          ;SYSTEM STATUS WORD
1039 004240                                RFLAGS  FLGLOC          ;GET USER FLAGS
      004240  104421                                                       TRAP    C$RFLA
      004242  010037  004400                                               MOV     R0,FLGLOC
1040 004246  005037  010150        5$:     CLR     BLKER           ;NO ERROR
1041 004252  013737  002204  010126  SETLEN: MOV     LENGTH,TAPLEN   ;GET # OF RECORDS
1042 004260  006237  010126                ASR     TAPLEN          ;GET # BLOCKS PER TRACK
1043 004264  012737  000200  010152        MOV     #200,SECREC     ;PRESET SECOND START AT 200
1044 004272  022737  000200  010126        CMP     #200,TAPLEN     ;# BLKS > 128.?
1045 004300  101003                        BHI     3$              ;NO-SWITCH TRACKS 2ND PASS
```

```
1046 004302  012737  000400  010152          MOV     #400,SECREC     ;YES-START AT 400
1056
1068
1069 004310                          3$:     ENDINIT
     004310                                                                L10004:
     004310  104411                                                                TRAP    C$INIT
1070
1071
1072 004312     124     117     117  TOMANY: .ASCIZ  /TOO MANY UNITS MAX.=8 /
1073                                          .EVEN
1074 004342     123     105     114  NODRVS: .ASCIZ  /SELECT AT LEAST 1 DRIVE /
1075                                          .EVEN
1076 004374  000000                  STRT::  .WORD
1077 004376  000000                  PDTFLG::.WORD           ;TU58 IS IN PDT
1078 004400  000000                  FLGLOC::.WORD           ;USER FLAGS
1079
1080
```

```
004402                          BGNAUTO
004402                                                                        L$AUTO::
004402  000240                          NOP             ;AUTO DROP ROUTINE
004404                                  SETVEC  #4,#TRPHND,#PRI07       ;GET BUS TRAP VEC.
004404  012746  000340                                                              MOV     #PRI07,-(SP)
004410  012746  004512                                                              MOV     #TRPHND,-(SP)
004414  012746  000004                                                              MOV     #4,-(SP)
004420  012746  000003                                                              MOV     #3,-(SP)
004424  104437                                                                      TRAP    C$SVEC
004426  062706  000010                                                              ADD     #10,SP
004432  012737  004724  004510          MOV     #BLKTBL,TRPPTR  ;GET TOP OF DATA BLOCK TABLE
004440  017705  000044          1$:     MOV     @TRPPTR,R5      ;GET DATA BLOCK
004444  032715  104000                  BIT     #BIT15!BIT11,@R5  ;NOT TESTED OR ABORTED?
004450  100403                          BMI     2$              ;YES
004452  005775  000022                  TST     @RCSR(R5)       ;NO-VALID ADDRESS?
004456  000240                          NOP                     ;YES...(TRAP IF NOT)
004460  023727  004510  004742  2$:     CMP     TRPPTR,#LSTDEV  ;MORE TO TRY?
004466  103004                          BHIS    3$              ;NO
004470  062737  000002  004510          ADD     #2,TRPPTR       ;ON TO NEXT
004476  000760                          BR      1$              ;GET IT
004500                          3$:     CLRVEC  #4              ;RESTORE
004500  012700  000004                                                              MOV     #4,R0
004504  104436                                                                      TRAP    C$CVEC
004506                          ENDAUTO
004506                                                                        L10005:
004506  104461                                                                      TRAP    C$AUTO
004510  000000                  TRPPTR: .WORD





                                ;ILLEGAL ADDRESS TRAP HANDLER:

004512                          TRPHND: PRINTF  #M$AUTO         ;SAY "AUTO DROPPED"
004512  012746  004544                                                              MOV     #M$AUTO,-(SP)
004516  012746  000001                                                              MOV     #1,-(SP)
004522  010600                                                                      MOV     SP,R0
004524  104417                                                                      TRAP    C$PNTF
004526  062706  000004                                                              ADD     #4,SP
004532  011500                          MOV     @R5,R0          ;GET UNIT #
004534  042700  177770                  BIC     #177770,R0      ;MASK IT OFF
004540                                  DODU    R0              ;DROP HIM
004540  104451                                                                      TRAP    C$DODU
004542  000002                          RTI
004544     045     101     101  M$AUTO: .ASCIZ  /%AAUTO DROP: %N/
```

```
1111
1112                                    .SBTTL  CLEANUP CODING SECTION
1113
1114                                    ;++
1115                                    ; THE CLEANUP CODING SECTION CONTAINS THE CODING THAT IS PERFORMED
1116                                    ; AFTER THE HARDWARE TESTS HAVE BEEN PERFORMED.
1117                                    ;--
1118 004564                                    BGNCLN
     004564                                                                          L$CLEAN::
1119 004564  005737  002206                    TST     STAEOP          ;STATS AT EOP?
1120 004570  001401                            BEQ     1$              ;NO
1121 004572                                    DORPT                   ;YES
     004572  104424                                                                TRAP    C$DRPT
1122
1129
1141
1142 004574                            1$:     ENDCLN
     004574                                                                  L10006:
     004574  104412                                                                TRAP    C$CLEAN
```

```
                        .SBTTL  DROP UNIT SECTION

                        ;++
                        ; THE DROP-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
                        ; TO NO LONGER BE TESTED.
                        ;--

004576                          BGNDU
004576                                                                  L$DU::
                                                ;R0=UNIT NUMBER
004576                  PUSH    R0              ;SAVE IT
004600                  PUSH     R5             ;SAVE PRESENT UNIT POINTER
004602  004737  004642  CALL     GETR5          ;GET POINTER TO UNIT
004606  052715  120000  BIS     #BIT15!BIT13,@R5  ;SET ABORTED, HALTED
004612                  POP     R5              ;RESTORE PRESENT UNIT POINTER
004614                  POP     R0              ;RETRIEVE UNIT NUMBER
004616                  PRINTB  #ABOMSG,R0
004616  010046                                                          MOV     R0,-(SP)
004620  012746  004674                                                  MOV     #ABOMSG,-(SP)
004624  012746  000002                                                  MOV     #2,-(SP)
004630  010600                                                          MOV     SP,R0
004632  104414                                                          TRAP    C$PNTB
004634  062706  000006                                                  ADD     #6,SP

1166
1178
004640                          ENDDU
004640                                                                  L10007:
004640  104453                                                          TRAP    C$DU
004642  012737  004724  004672  GETR5:  MOV     #BLK1BL,PTR     ;-->UNIT 0
004650  017705  000016          1$:     MOV     @PTR,R5         ;GET STATUS WORD
004654  005300                  DEC     R0              ;CORRECT UNIT?
004656  100404                  BMI     2$              ;YES
004660  062737  000002  004672  ADD     #2,PTR          ;NO,-->NEXT
004666  000770                  BR      1$              ;CONTINUE
004670                  2$:     RET
004672  000000          PTR:    .WORD

004674      045     101     104 ABOMSG: .ASCIZ  /%ADROPPED UNIT %D1%N/
                                .EVEN
```

```
                                .SBTTL  ADD UNIT SECTION

                                ;++
                                ; THE ADD-UNIT SECTION CONTAINS ANY CODE THE PROGRAMMER WISHES
                                ;  TO BE EXECUTED IN CONJUNCTION WITH THE ADDING OF A UNIT BACK
                                ;  TO THE TEST CYCLE.
                                ;--

004722                                  BGNAU
004722                                                                  L$AU::

004722                                  ENDAU
004722                                                                  L10010:
004722  104452                                                                  TRAP    C$AU
```

```
   1228                                 .TITLE HARDWARE TESTS
   1272
   1273 004724                                  BGNMOD
   1285                                 .NLIST  ME,BEX
```

```
                        .SBTTL  SYSTEM MACRO DEFINITIONS


                        .MACRO  SWAPIN
                                        MOV     6.(R5),R0
                                        MOV     8.(R5),R1
                                        MOV     10.(R5),R2
                                        MOV     12.(R5),R3
                                        MOV     14.(R5),R4
                        .ENDM

                        .MACRO  SWAPOW
                                        MOV     R0,6.(R5)
                                        MOV     R1,8.(R5)
                                        MOV     R2,10.(R5)
                                        MOV     R3,12.(R5)
                                        MOV     R4,14.(R5)
                        .ENDM

                        .MACRO  TUWRIT  PTRN,REC,BCNT,DR,VER,?A,?B,?C,?D,?E,?F,?G,?H,?T
                                T:      MOV     #$TRBUF,R0      ;MAKE PACKET
                                        MOVB    #R$CMND,@R0     ;COMMAND
                                        MOVB    #R$MSIZ,1(R0)   ;PACKET SIZE
                                        MOVB    #R$$WR,2(R0)    ;OP CODE
                                        MOVB    VER,3.(R0)      ;VERIFY 1 OR 0
                                        MOVB    DR,4.(R0)       ;DRIVE #
                                        MOVB    #020,5.(R0)     ;MAINTENANCE
                                        CLR     6.(R0)          ;NO SEQUENCE #
                                        MOV     BCNT,8.(R0)     ;TOTAL COUNT
                                        MOV     REC,10.(R0)     ;WHICH RECORD
                                        MOV     #R$MSIZ,R1      ;PACKET SIZE PLUS
                                        TST     (R1)+           ;FLAG AND COUNT CORRECTION
                                        MOV     #R$SNSZ,SNDCNT(R5)  ;PACKET SIZE TO SEND
                                        CALL    CHKSUM          ;R0 --> BUFF
                                        MOV     R1,(R0)         ;PUT CHKSUM IN PACKET
                                                                ;SET UP EXPECTATIONS
                                        MOV     #R$CONT,X$FLG(R5)   ;FOR RESPONSE
                                        MOV     #1,X$CNT(R5)    ;FROM TU
                                        MOV     #1,X$PKNM(R5)   ;# PACKETS EXPECTED
                                        CALL    RSVP            ;SEND AND RETURN TO SCHEDULER
                                        BIC     #BIT12,@R5      ;FOR LAST TIME
                                        MOV     BCNT,R2         ;GET # OF DATA BYTES
                                A:      MOV     #$TRBUF,R0      ;POINT TO TOP
                                        CMP     R2,#128.        ;START DATA PACKET(S)
                                        BHI     B               ;BCNT > 128.
                                        MOV     R2,R1           ;OTHERWISE OK
                                        BIS     #BIT12,@R5      ;LAST TIME
                                        BR      C               ;USE REMAINING COUNT
                                B:      MOV     #128.,R1        ;USE 128. BYTES
                                C:      MOVB    R1,1(R0)        ;COPY COUNT TO BUFFER
                                        MOV     R1,R3           ;FOR COUNTER TO LOAD BUFFER
                                        MOVB    #R$DATA,@R0     ;FLAG FIRST
                                        TST     (R0)+           ;SKIP COUNT
                                D:      MOVB    PTRN,(R0)+      ;R3=CNT    R0 --> WHERE
                                        DEC     R3              ;MORE?
                                        BHI     D               ;YES
```

```
1344                                        MOV     #$TRBUF,R0          ;-->TOP
1345                                        MOVB    1(R0),R1            ;GET COUNT
1346                                        BIC     #177400,R1          ;ZERO SIGN EXTEND
1347                                        MOV     R1,SNDCNT(R5)       ;HOW MANY TO SEND PLUS
1348                                        ADD     #4,SNDCNT(R5)       ;FLAG,COUNT,CHKSUM
1349                                        ADD     #2,R1               ;COMPENSATE FOR FLAG + COUNT
1350                                        CALL    CHKSUM              ;FOR CHECKSUM CALC.
1351                                        MOVB    R1,(R0)+            ;CHKSUM INTO PACKET
1352                                        SWAB    R1                  ;EVEN ON A BOUNDARY
1353                                        MOVB    R1,(R0)+            ;BYTE BOUNDARY
1354                                        BIT     #BIT12,@R5          ;LAST DATA PACKET?
1355                                        BEQ     E                   ;NO
1356                                        MOV     #R$END,X$FLG(R5)    ;YES-EXPECT END
1357                                        MOV     #R$NDSZ,X$CNT(R5)   ;OF THIS SIZE
1358                                        MOV     #1,X$PKNM(R5)       ;AND 1 PACKET
1359                                        BR      F                   ;SEND
1360                                E:      MOV     #R$CONT,X$FLG(R5)   ;EXPECT 'CONTINUE'
1361                                        MOV     #1,X$CNT(R5)        ;AND 1 BYTE
1362                                        MOV     #1,X$PKNM(R5)       ;AND 1 PACKET
1363                                F:      CALL    RSVP                ;SEND PACKET
1364                                                                    ;AND RETURN TO SCHEDULER
1365                                        BIT     #BIT10,@R5          ;RETRY?
1366                                        BNE     G                   ;YES
1367                                        SUB     #128.,R2            ;NO, MORE DATA TO SEND?
1368                                        BHI     A                   ;YES
1369                                        BR      H                   ;NO
1370                                G:      TURTRY  REC,BCNT,DR         ;RETRY HERE
1371                                        BIT     #BIT10,@R5          ;RETRY AGAIN?
1372                                        BNE     G                   ;YES
1373                                H:      NOP                         ;DONE
1374                            .ENDM
1375
1376                            .MACRO  TUSEEK  REC,DR
1377
1378                                        MOV     #$TRBUF,R0          ;-->XMIT BUFFER
1379                                        MOVB    #R$CMND,@R0         ;FORM MESSAGE PACK
1380                                        MOVB    #R$MSIZ,1(R0)       ;THIS BIG
1381                                        MOVB    #R$$SEK,2(R0)       ;OP CODE IS SEEK
1382                                        MOV     REC,10.(R0)         ;TO HERE
1383                                        MOVB    DR,4.(R0)           ;AND WHICH DRIVE
1384                                        CLRB    3.(R0)              ;NO MODIFIER
1385                                        CLRB    5.(R0)              ;NO SWITCHES
1386                                        CLR     6.(R0)              ;NO SEQUENCE #
1387                                        CLR     8.(R0)              ;NO BYTE COUNT
1388                                        MOV     #R$MSIZ,R1          ;GET COUNT
1389                                        TST     (R1)+               ;PLUS FLAG + BCNT
1390                                                                    ;FOR CHECKSUM CALC
1391                                        CALL    CHKSUM              ;R0-->TOP   R1=# OF BYTES
1392                                        MOV     R1,(R0)             ;INSERT INTO PACKET
1393
1394                                        MOV     #R$SNSZ,SNDCNT(R5)  ;HOW MANY TO SEND
1395                                        MOVB    #R$CMND,X$FLG(R5)   ;EXPECT END PACK
1396                                        MOV     #R$NDSZ,X$CNT(R5)   ;COUNT WITH THIS
1397                                        MOV     #1.,X$PKNM(R5)      ;EXPECT ONLY 1 PACKET
1398
1399                                        CALL    RSVP                ;SEND
1400                                                                    ;AND RETURN TO SCHEDULER
```

```
1401                                    .ENDM
1402
1403                                    .MACRO  TURTRY  REC,BCNT,DR,?A,?B,?C,?D,?E
1404
1405                                    D:      MOV     #$TRBUF,R0      ;FORM CMND PACK:
1406                                            MOVB    #R$CMND,@R0     ;MESSAGE PACK
1407                                            MOVB    #R$MSIZ,1(R0)   ;THIS BIG
1408                                            MOVB    #R$$RD,2(R0)    ;OP CODE
1409                                            MOV     REC,10.(R0)     ;THIS RECORD
1410                                            MOVB    DR,4.(R0)       ;THIS DRIVE
1411                                            CLRB    3(R0)           ;PRESET NORM THRESHOLD
1412                                            TSTB    @R5             ;REDUCED?
1413                                            BPL     E               ;NO
1414                                            INCB    3(R0)           ;YES-CHANGE THRESHOLD
1415                                    E:      MOV     BCNT,8.(R0)     ;# BYTES DESIRED
1416                                            MOVB    #020,5.(R0)     ;MAINTENANCE
1417                                            CLR     6.(R0)          ;NO SEQUENCE #
1418                                            MOV     #R$MSIZ,R1      ;SIZE
1419                                            TST     (R1)+           ;PLUS FLAG+COUNT INTO R1
1420                                            MOV     #R$SNSZ,SNDCNT(R5)  ;SET UP SIZE TO SEND
1421
1422                                            CALL    CHKSUM          ;FORM CHECKSUM
1423                                            MOV     R1,(R0)         ;INSERT IN PACKET
1424
1425                                            MOV     BCNT,R1         ;SET EXPECTATIONS:
1426                                                                    ;CALC # OF DATA PACKETS TO EXPECT
1427                                            MOV     #X$FLG,R3       ;OFFSET OF FLAG
1428                                            ADD     R5,R3           ;ABS. ADDR. OF X$FLG
1429                                            CLR     R2              ;PRESET
1430                                    A:      INC     R2              ;# PACKETS EXPECTED
1431                                            MOV     #R$DATA,(R3)+   ;LOAD X$FLG
1432                                            MOV     #132.,(R3)+     ;AND EXPECT COUNT
1433                                            SUB     #128.,R1        ;NEG RESULT LAST TIME
1434                                            BLOS    C               ;LAST TIME!
1435                                            BR      A               ;MORE TO DO
1436                                    C:      INC     R2              ;ADD ONE FOR END PACK TO TOTAL
1437                                            MOV     R2,X$PKNM(R5)   ;SAVE # PACKETS TO EXPECT
1438                                            MOV     #R$END,(R3)+    ;EXPECT AN END
1439                                            MOV     #R$NDSZ,(R3)    ;THIS BIG-14. BYTES
1440
1441                                            CALL    RSVP            ;SEND
1442                                                                    ;AND RETURN TO SCHEDULER
1443                                    .ENDM
1444
1445                                    .MACRO  TUREAD  REC,BCNT,DR,VER,?A,?B,?C,?D
1446
1447
1448                                            MOV     #$TRBUF,R0      ;FORM CMND PACK:
1449                                            MOVB    #R$CMND,@R0     ;MESSAGE PACK
1450                                            MOVB    #R$MSIZ,1(R0)   ;THIS BIG
1451                                            MOVB    #R$$RD,2(R0)    ;OP CODE IS READ
1452                                            MOV     REC,10.(R0)     ;THIS RECORD
1453                                            MOVB    DR,4.(R0)       ;THIS DRIVE
1454                                            MOVB    VER,3.(R0)      ;VERIFY=1
1455                                            MOV     BCNT,8.(R0)     ;COUNT
1456                                            MOVB    #020,5.(R0)     ;MAINTENANCE
1457                                            CLR     6.(R0)          ;NO SEQUENCE #
```

```
1458                                            MOV     #R$MSIZ,R1      ;PREPARE
1459                                            TST     (R1)+           ;SIZE FOR CHECKSUM
1460                                            MOV     #R$SNSZ,SNDCNT(R5)  ;SIZE TO SEND
1461
1462                                            CALL    CHKSUM          ;FORM CHECKSUM
1463                                            MOV     R1,(R0)         ;INSERT CHECKSUM
1464
1465                                            MOV     BCNT,R1         ;SET EXPECTATIONS:
1466                                                                    ;CALC # OF DATA PACKETS TO EXPECT
1467                                            MOV     #X$FLG,R3       ;OFFSET
1468                                            ADD     R5,R3           ;ABS. ADDR. OF X$FLG
1469                                            CLR     R2              ;PRESET
1470                                    A:      INC     R2              ;# PACKETS EXPECTED
1471                                            MOV     #R$DATA,(R3)+   ;LOAD X$FLG
1472                                            MOV     #132.,(R3)+     ;AND EXPECTED
1473                                            SUB     #128.,R1        ;NEG RESULT LAST TIME
1474                                            BLOS    C               ;LAST TIME
1475                                            BR      A               ;MORE TO DO
1476                                    C:      INC     R2              ;ADD ONE FOR END PACK TO TOTAL
1477                                            MOV     R2,X$PKNM(R5)   ;SAVE # PACKETS TO EXPECT
1478                                            MOV     #R$END,(R3)+    ;EXPECT AN END
1479                                            MOV     #R$NDSZ,(R3)    ;THIS BIG-14. BYTES
1480
1481                                            CALL    RSVP            ;SEND
1482                                                                    ;AND RETURN TO SCHEDULER
1483                                    D:      BIT     #BIT10,@R5      ;RETRY?
1484                                            BEQ     B               ;NO.
1485                                            TURTRY  REC,BCNT,DR     ;YES
1486                                            BR      D               ;ANOTHER RETRY?
1487                                    B:      NOP                     ;
1488
1489                            .ENDM
1490                            .MACRO  TUSELF
1491
1492                                                    MOV     #$TRBUF,R0      ;FORM COMMAND PACKET
1493                                                    MOVB    #R$CMND,@R0
1494                                                    MOVB    #R$MSIZ,1(R0)
1495                                                    MOVB    #R$$SLF,2(R0)
1496                                                    CLRB    3(R0)
1497                                                    CLR     4(R0)
1498                                                    CLR     6(R0)
1499                                                    CLR     8.(R0)
1500                                                    CLR     10.(R0)
1501                                                    MOV     #R$MSIZ,R1      ;FORM SIZES:
1502                                                    TST     (R1)+           ;CHECKSUM
1503                                                    MOV     #R$SNSZ,SNDCNT(R5)  ;TO SEND
1504                                                    CALL     CHKSUM         ;FORM CHECKSUM
1505
1506                                                    MOV     R1,(R0)         ;INTO PACKET
1507                                                    MOV     #R$END,X$FLG(R5)  ;EXPECT END,
1508                                                    MOV     #R$NDSZ,X$CNT(R5)  ;THIS BIG
1509                                                    MOV     #1,X$PKNM(R5)   ;AND 1 PACKET
1510                                                                            ;SEND
1511                                                    CALL    RSVP            ;RETURN TO SCHEDULER
1512
1513                            .ENDM
1514
```

```
1515                                    .MACRO  TSTID   ADDRES,?A
1516
1517                                    .NLIST
1518                                    .LIST ME
1519                                    .LIST
1520                                            MOV     ADDRES,TSTTOP   ;SAVE ADDR
1521                                            CALL    SETUP           ;INIT UNITS
1522                                            CALL    SETDR           ;GET 1ST DRVS.
1523                                            CALL    RUN             ;DO TEST
1524                                            CALL    SWAPDR          ;GET NEXT DR.
1525                                            BCC     A               ;BR NO 2ND DRVS
1526                                            CALL    SETUP           ;REINIT UNITS
1527                                            CALL    RUN             ;REPEAT TEST
1528                                    A:                              ;DONE
1529                                    .NLIST
1530                                    .NLIST ME
1531                                    .LIST
1532                                    .ENDM
```

```
                        .SBTTL  DATA BLOCK FORMAT
                        ;-------------------------------------------------------------------------
                        ;R5 --> TOP OF 1 OF THE 8 DATA BLOCKS (1 PER UNIT) DURING EXECUTION
                        ;@R5 IS THE STATUS WORD CONTAINING:
                                                        ;BIT15 = ABORTED
                                                        ;BIT14 = SEND 'BREAK''
                                                        ;BIT13 = HALTED
                                                        ;BIT12 = TEMP STOR WRITE MACRO
                                                        ;BIT11 = UNIT NOT BEING TESTED
                                                        ;BIT10 = RETRYING
                                                        ;BIT9  = TU58 CHKSUM ERROR
                                                        ;BIT8  = RD/WR OPERATION
                                                        ;BIT7  = NORMAL/REDUCED THRESHOLD (MACROS)
                                                        ;BIT6  = HOST DATA COMPARE ERROR
                                                        ;BIT5  = WR VERIFY OPERATION
                                                        ;BIT4  = TYPE OF PAK SENT ODATA 1CMD
                                                        ;BIT3  =  NOT USED
                                                        ;BIT0,1,2=UNIT NO.


000000                  STATUS  =       0.              ;DEVICE STATE
000002                  RETRY   =       2.              ;# OF RETRIES
000004                  ABNDX   =       4.              ;ERROR NUMBER FOR LOG
                        ;R0     =       6.              ;STORAGE FOR REGISTERS USED IN TEST BODY
                        ;R1     =       8.              ;STORED WITH SWAPOW
                        ;R2     =       10.             ;RETRIEVED WITH SWAPIN
                        ;R3     =       12.             ;
                        ;R4     =       14.             ;
000020                  TSTPC   =       16.             ;POINTER TO NEXT EXECUTABLE TEST INST.
000022                  RCSR    =       18.             ;DLV RCV STATUS ADDRESS
000024                  RCDB    =       20.             ;DLV RCV DATA ADDRESS
000026                  XMSR    =       22.             ;DLV SND STATUS ADDRESS
000030                  XMDB    =       24.             ;DLV SND DATA ADDRESS
000032                  X$PKNM  =       26.             ;THE NUMBER OF PACKETS TO RECEIVE
000034                  X$FLG   =       28.             ;THE EXPECTED FLAG OF 1ST PACKET
000036                  X$CNT   =       30.             ;THE EXPECTED COUNT OF 1ST PACKET
                                                        ;FOR MULTIPLE PACKET RECIEVES (MAX.4)
                        ;       .BLKW   8.              ;CONSECUTIVE X$FLGS AND X$CNTS

000060                  DR      =       48.             ;DR=0 OR 1; BIT8,9 DRIVE SELECTED BY OPERATOR
000062                  TRK     =       50.             ;COUNTER FOR TRACK NUMBER
000064                  REC     =       52.             ;RECORD (BLOCK #)

000066                  TMP     =       54.             ;TEST MACRO REGISTER
000070                  SNDCNT  =       56.             ;THE # OF BYTES FOR SENDING PACKET
000072                  PATTEN  =       58.             ;DATA PATTERN-LOWER BYTE USED
000074                  DLV     =       60.             ;CONTENTS OF RCDB ON DLV ERROR
000076                  SUCCS   =       62.             ;SUCCESS CODE OF LAST END PACKET
000100                  CMDSNT  =       64.             ;TYPE OF COMMAND CURRENT IN EVEN BYTE; BIT15=VERIFY OP.

000102                  RCVBUF  =       66.             ;POINTER TO 542. BYTE BUFFER (4 DATA PAKS + END PACK)
000104                  PKPTR   =       68.             ;POINTER TO TOP OF PACKET
000106                  X$PTR   =       70.             ;POINTER TO CURRENTLY USED X$FLG OR X$CNT
000110                  WRTN0   =       72.             ;THE # OF 512. BYTE BLOCKS WRITTEN DR0
000112                  WRTN1   =       74.             ;THE # OF 512. BYTE BLOCKS WRITTEN DR1
000114                  RDN0    =       76.             ;THE # OF 512. BYTE BLOCKS READ DR0
```

```
1591    000116                  RDN1    =       78.             ;THE # OF 512. BYTE BLOCKS READ DR1
1592
1593                            ;AND ERROR LOG                      +-----------+
1594                            ;SPLIT INTO BYTES:                  ! DR1 ! DR0 !
1595                            ;THE 1ST SECTION OF NEVER FATAL:    +-----------+
1596
1597                            ;-------------------------------------------------------------------
1598
1599                            ;OFFSET IN DATA BLOCK           ;ERROR TYPE     ;ERRCODE;MSG CODE;SUC. CODE
1600                            ;-------------------------------------------------------------------
1601
1602    000120                  LGOFST  =       80.             ;*RESERVED*
1603    000122                  SOFTR   =       82.             ;SOFT READ      ;SFTRD  ;M$SFRD ;E$CKSM
1604    000124                  SOFTW   =       84.             ;SOFT WRITE     ;SFTWR  ;M$SFWR ;E$SKSM
1605                            ;       .WORD                   ;RECIEVED INIT  ;RCINIT ;M$RNIT ;******
1606                            ;       .WORD                   ;*RESERVED*
1607
1608                            ;THEN THOSE CODES WHICH HAVE N TRIES BEFORE ABORT
1609
1610    000132                  T4TRY   =       90.             ;DLV ERROR      ;OVRN   ;M$OVRN ;*****
1611    000134                  BDATA   =       92.             ;BAD DATA       ;BDCOM  ;M$DATA ;******
1612    000136                  HARDR   =       94.             ;HARD READ      ;HRDRD  ;M$HDRD ;E$CKSM
1613    000140                  HARDW   =       96.             ;HARD WRITE     ;HRDWR  ;M$HDWR ;E$CKSM
1614                            ;       .WORD   98.             ; CHKSM AT HOST ;BDCHK  ;M$HCHK ;******
1615                            ;       .WORD   100.            ;SEEK ERROR TOTAL;SKERR ;M$SKER ;******
1616    000146                  T1TRY   =       102.            ;WRITE PROTECT  ;WRLOCK ;M$WPRO ;E$WLOC
1617                            ;       .WORD   104.            ;NO MOTOR       ;NOMOT  ;M$NOMO;E$NOMO
1618                            ;       .WORD                   ;CANT INIT      ;CNINIT ;M$NIT  ;********
1619                            ;       .WORD                   ;PARTIAL OP     ;PARTL  ;M$PART ;E$PART
1620                            ;       .WORD                   ;NO UNIT        ;NOUNIT ;M$UNIT ;E$NONX
1621                            ;       .WORD                   ;COMMAND ERROR  ;CMNDER ;M$CMD  ;E$CMD
1622                            ;       .WORD                   ;BAD RECORD NO.;RECERR  ;M$REC  ;E$REC
1623                            ;       .WORD                   ;SELF TEST ERROR;SLFER  ;M$SELF ;******
1624
1625                            ;       .WORD                   ;WRONG SUC.CODE ;SUCOTL ;M$WRSP;********
1626                            ;       .WORD                   ;NO RESPONSE    ;TORCVB ;M$NRSP ;********
1627                            ;       .WORD                   ;WEIRD FLAG     ; OTL   ;M$QRSP ;********
1628                            ;       .WORD                   ;NO CARTRIDGE   ;NOCART ;M$NOTP ;E$NCRT
1629                            ;       .WORD                   ;TIME OUT  SEND;TOSNDB  ;M$TOSN ;********
1630
1631
1632    000202                  BLKEND  =       130.            ;OFFSET OF END OF STATISTICS (RESERVED)
1633                            ;WORD                           ;** RESERVED **
1634    000204                  TUVECT  =       132.            ;VECTOR ADDRESS
1635                            ;WORD                           ;** RESERVED **
1636    000210                  BLKSIZ  =       136.            ;** RESERVED **
1637                            ;-------------------------------------------------------------------
```

```
                                .SBTTL  DEVICE DATA BLOCK ALLOCATION


                                ;TABLE OF DEVICE DATA BLOCK ADDRESSES


004724  004744        BLKTBL:         .WORD   DEV0
004726  005154                        .WORD   DEV1
004730  005364                        .WORD   DEV2
004732  005574                        .WORD   DEV3
004734  006004                        .WORD   DEV4
004736  006214                        .WORD   DEV5
004740  006424                        .WORD   DEV6
004742  006634        LSTDEV:         .WORD   DEV7
004744                DEV0:           .BLKB   BLKSIZ
005154                DEV1:           .BLKB   BLKSIZ
005364                DEV2:           .BLKB   BLKSIZ
005574                DEV3:           .BLKB   BLKSIZ
006004                DEV4:           .BLKB   BLKSIZ
006214                DEV5:           .BLKB   BLKSIZ
006424                DEV6:           .BLKB   BLKSIZ
006634                DEV7:           .BLKB   BLKSIZ
```

```
                                .SBTTL  ERROR CODE EQUATES
                                ;-----------------------------------------------------------------

                                ;THE ERROR CODE OFFSET VALUES :
                                ;USED BY 'LOG' TO INDEX BY R5 AND INCREMENT STATISTICS

000002                          SFTRD   =       2
000004                          SFTWR   =       4
000006                          RCINIT  =       6
000012                          OVRN    =       10.
000014                          BDCOM   =       12.
000016                          HRDRD   =       14.
000020                          HRDWR   =       16.
000022                          BDCHK   =       18.
000024                          SKERR   =       20.
000026                          WRLOCK  =       22.
000030                          NOMOT   =       24.
000032                          CNINIT  =       26.
000034                          PARTL   =       28.
000036                          NOUNIT  =       30.
000040                          CMNDER  =       32.
000042                          RECERR  =       34.
000044                          SLFER   =       36.
000046                          SUCOTL  =       38.
000050                          TORCVB  =       40.
000052                          OTL     =       42.
000054                          NCART   =       44.
000056                          TOSNDB  =       46.
```

```
                                        .SBTTL  ERROR MESSAGE DESCRIPTIONS

                                        ;THE TABLE OF REASONS (ADDRESSES) ABORT OCCURRED.  ABNDX (R5) CONTAINS
                                        ;THE OFFSET OF THE REASON.  IT'S ABSOLUTE ADDRESS IS RSNTAB + ABNDX(R5).

007044  007140                          RSNTAB: M$NLOG
007046  007672                                  M$SFRD
007050  007732                                  M$SFWR
007052  007354                                  M$RNIT
007054  007140                                  M$NLOG
007056  010076                                  M$OVRN
007060  007222                                  M$COM
007062  007772                                  M$HDRD
007064  010034                                  M$HDWR
007066  007374                                  M$HCHK
007070  007124                                  M$SKER
007072  007332                                  M$WPRO
007074  007264                                  M$NOMO
007076  007436                                  M$NIT
007100  007452                                  M$PART
007102  007474                                  M$UNIT
007104  007522                                  M$CMD
007106  007536                                  M$REC
007110  007202                                  M$SELF
007112  007556                                  M$WRSP
007114  007602                                  M$NRSP
007116  007616                                  M$QRSP
007120  007302                                  M$NOTP
007122  007650                                  M$TOSN

                                        ;HERE ARE THE MESSAGES PROPER:

007124      123     105     105  M$SKER: .ASCIZ  /SEEK ERROR/              ;DEVICE COULD NOT READ HEADER
                                        .EVEN
007140      123     131     123  M$NLOG: .ASCIZ  /SYSTEM ERROR/            ;DIAGNOSTIC HUNG. BETTER RE-BOOT
                                        .EVEN
007156      102     101     104  M$BDA:  .ASCIZ  /BAD DATA IN PACKET/      ;HOST DATA CHECK FOUND ERROR, DEVICE MAY
                                        .EVEN                             ;HAVE READ CORRECTLY.
007202      123     105     114  M$SELF: .ASCIZ  /SELF TEST ERROR/         ;MICRO DIAGNOSTIC FAILED, BUT DEVICE COULD STILL
                                        .EVEN                             ;SEND.
007222      102     101     104  M$COM:  .ASCIZ  /BAD DATA W-O DATA CHECK ERR AT TU/  ;PREVIOUS DATA CHECK
                                        .EVEN                             ;ERROR NOT DUE TO DEVICE READ OP.
007264      115     117     124  M$NOMO: .ASCIZ  /MOTOR STOPPED/           ;DEVICE COULD NOT GET SIGNAL
                                        .EVEN                             ;FROM TAPE OR MOTOR HUNG
007302      103     101     122  M$NOTP: .ASCIZ  /CARTRIDGE NOT IN PLACE/  ;NO MEDIA OR BAD SWITCH
                                        .EVEN
007332      127     122     111  M$WPRO: .ASCIZ  /WRITE PROTECTION/        ;CARTRIDGE WRITE PROTECT TAB MISSING OR
                                        .EVEN                             ;SWITCH BAD
007354      122     105     103  M$RNIT: .ASCIZ  /RECIEVING INIT/          ;DEVICE SENT INIT REQUEST
                                        .EVEN
007374      110     117     123  M$HCHK: .ASCIZ  /HOST FOUND PACKET CHECKSUM ERROR/  ;DEVICE SENT PACK WITH
                                        .EVEN                             ;BAD CHECKSUM
007436      103     101     116  M$NIT:  .ASCIZ  /CAN'T INIT/              ;DEVICE SENT BYTE OTHER THAN ''CONT''
                                        .EVEN                             ;DURING INITIALIZATION
007452      120     101     122  M$PART: .ASCIZ  /PARTIAL OPERATION/       ;END OF MEDIUM ENCOUNTERED
                                        .EVEN
007474      042     116     117  M$UNIT: .ASCIZ  /''NON-EXISTENT'' DRIVE/  ;DEVICE RECV'D TOO LARGE DRIVE NUMBER
```

```
                                        .EVEN
007522  102  101  104  M$CMD:   .ASCIZ  /BAD COMMAND/           ;DEVICE COULD NOT UNDERSTAND HOST
                                        .EVEN
007536  102  101  104  M$REC:   .ASCIZ  /BAD RECORD NO./        ;DEVICE RECV'D TOO LARGE A RECORD NUMBER
                                        .EVEN
007556  127  122  117  M$WRSP:  .ASCIZ  /WRONG SUCCESS CODE/    ;HOST COULD NOT DECIPHER CODE IN END PACK
                                        .EVEN
007602  116  117  040  M$NRSP:  .ASCIZ  /NO RESPONSE/           ;TIME OUT WAITING FOR BYTE IN BUF ON DLV.
                                        .EVEN
007616  111  116  104  M$QRSP:  .ASCIZ  \INDECIPHERABLE FLAG BYTE\  ;HOST COULD NOT UNDERSTAND 1ST BYTE OF
                                        .EVEN                       ;RESPONSE FROM TU AS PROPER PROTOCOL
007650  124  111  115  M$TOSN:  .ASCIZ  /TIME OUT ON SEND/      ;DLV READY NEVER WENT HIGH
                                        .EVEN
007672  122  105  103  M$SFRD:  .ASCIZ  /RECOV. DATA CHECK ERR ON RD OP/  ;TU58 RESPONDED WITH 'DATA-CHECK''
                                        .EVEN                       ;ERROR ON READ OP. ;HOST RETRY(S) SUCCESSFUL
007732  122  105  103  M$SFWR:  .ASCIZ  /RECOV. DATA CHECK ERR ON WR OP/  ;SAME BUT WR OR WR VERIFY OPERATION
                                        .EVEN
007772  125  116  122  M$HDRD:  .ASCIZ  /UNRECOV. DATA CHECK ERR ON RD OP/  ;TU58 RESPONDED WITH 'DATA-CHECK''
                                        .EVEN                       ;ERROR ON READ OP.  ;COULD NOT RECOVER
010034  125  116  122  M$HDWR:  .ASCIZ  /UNRECOV. DATA CHECK ERR ON WR OP/  ;SAME BUT WR OPERATION
                                        .EVEN
010076  104  114  126  M$OVRN:  .ASCIZ  /DLV ERROR IN RECEIVE/  ;DLV ERROR
                                        .EVEN
```

```
                                .SBTTL  MISC STORAGE AND EQUATES

010124  000000          SYSTAT: .WORD                   ;SYSTEM STATUS WORD
                                                        ;BIT7-BIT15 = 1ST BYTE OF PACK RCVD
                                                        ;BIT05 = NOT USED
                                                        ;BIT04 = NOT USED
                                                        ;BIT03 = NOT USED
                                                        ;BIT02 = NOT USED
                                                        ;BIT01 = RETRY OCCURRING
                                                        ;BIT00 = CHKSUM IS ODD (TEMP STORAGE)

010126  000000          TAPLEN: .WORD                   ;# RECORDS
010130  000000          DEVPTR: .WORD                   ;->NEXT UNIT ADDRESS
010132  000000          RCFLG:  .WORD                   ;TEMP STORE FOR GTBYTE
010134  000000          RCBCNT: .WORD                   ;TEMP STORAGE FOR GTBYTE
010136  000004          FTLNM:  .WORD 4                 ;TRIES BEFORE ABORT
010140  000000          DONE:   .WORD                   ;1 IF TEST ALGORITHM COMPLETE
010142  000000          IDPTR:  .WORD                   ;PTR IN TESTID MACRO
010144  000000          TSTTOP:.WORD                    ;POINTER TO CURRENT TEST
010146  000010          MXRTRY: .WORD   8.              ;NUMBER OF RETRIES, BEFORE 'HARD' ERROR
010150  000000          BLKER:  .WORD                   ;RECORD # FOR ERROR REPORT
010152  000000          SECREC: .WORD                   ;RECORD # TO START AFTER SWITCHING TRACKS
010154  000000          PRNSIZ: .WORD                   ;SIZE OF PACK FOR 'PRNPAK'



                        ;               TIME OUT CONSTANTS:

010156  177777                          C$NRDY:  -1             ;TIME OUT ON SEND DELAY (DLV NOT READY)
010160  000226                          C$RCVB:    150.         ;45 SEC. MULTIPLIER  REWIND TIME
                                                                ;CAN BE OPTIMISED PER CPU
```

```
                                ;RADIAL SERIAL CODES:
                                ;THE FLAG BYTE CODES ARE:
000002                                  R$CMND = 2
000020                                  R$CONT = 20
000020                                  R$XON  = 20
000023                                  R$XOFF = 23
000004                                  R$INIT = 4
000001                                  R$DATA = 1
000002                                  R$END  = R$CMND
                                ;-----------------------------------------------------------------------
                                ;END PACK SIZE:
000016                                  R$NDSZ = 14.
                                ;MESSAGE PACK SIZE:
000012                                  R$MSIZ = 12             ;10. BYTES FOR BYTE COUNT INSIDE CMND PACK
                                ;DATA PACK SIZE:
000204                                  R$DASZ = 132.
                                ;DATA + END PACK SIZE:
000222                                  R$DNSZ = R$DASZ+R$NDSZ

000016                                  R$SNSZ = R$MSIZ + 4     ;SIZE FOR SENDING COMMAND PACK
001036                                  RCBFSZ== 4*R$DASZ+R$NDSZ        ;4 DATA PAKS AND END PACK
                                                                ;IS SIZE OF RCV BUFFERS

                                ;-----------------------------------------------------------------------
                                ;       THE OP CODES ARE:

000100                                  R$$END = 100
000003                                  R$$WR  = 3
000002                                  R$$RD = 2
000005                                  R$$SEK = 5
000000                                  R$$NOP = 0
000001                                  R$$NIT = 1
000007                                  R$$SLF = 7
                                ;-----------------------------------------------------------------------
                                ;THE SUCCESS CODES ARE:

177720                          E$ABO   =-48.           ;BAD COMMAND FROM HOST
177767                          E$NCRT  =-9.            ;NO CARTRIDGE
177770                          E$NONX  =-8.            ;NO DRIVE
000000                          E$OK    =0              ;OP COMPLETE SUCCESS
177776                          E$PART  =-2             ;PARTIAL OP
177740                          E$SK    =-32.           ;SEEK ERROR
000001                          E$TRY   =1              ;RETRY
177765                          E$WLOC  =-11.           ;WRITE PROTECTED
177737                          E$NOMO  =-33.           ;MOTOR STOPPED
177720                          E$CMD   =-48.           ;COMMAND ERROR
177711                          E$REC   =-55.           ;BAD RECORD NUMBER.
177757                          E$CKS   =-17.           ;TU CHKSUM
177777                          E$SLF   =-1.            ;SELF TEST ERROR
177757                          E$CKSM=E$CKS
177757                          E$WR=E$CKS
177757                          E$RD=E$CKS
                                ;-----------------------------------------------------------------------
```

```
                                        .SBTTL  NXTST / THE SCHEDULER
                                        ;++
                                        ; NXTST - USING EACH UN-ABORTED UNIT'S TEST PROGRAM COUNTER
                                        ;         (TSTPC(R5)), EXECUTES THE TEST CODE THAT COMPRISES MAKING A
                                        ;         PACKET AND SENDING IT.  ACTION IS ROUND ROBIN.  CHECKS FIRST
                                        ;         FOR ANY UNIT RETRYING AND IF SO SERVICES ONLY THAT UNIT THIS
                                        ;         PASS.  INITS NON-RETRYING UNITS IF NECESSARY.
                                        ; INPUTS:  (IMPLIED) DATA BLOCKS.
                                        ; OUTPUTS: ERRSF IF ALL UNITS ARE ABORTED.
                                        ;--
010162  012737  004724  010130  NXTST:  MOV     #BLKTBL,DEVPTR  ;UNIT 0 TO START
010170  017705  177734          1$:     MOV     @DEVPTR,R5      ;GET DATA BLOCK
010174  032715  002000                  BIT     #BIT10,@R5      ;RETRYING?
010200  001422                          BEQ     2$              ;NOT THIS GUY
010202  005715                          TST     @R5             ;YES, ABORTED THO?
010204  100420                          BMI     2$              ;YES ON TO NEXT UNIT
010206  052737  000002  010124          BIS     #BIT1,SYSTAT    ;NOT ABORTED-SET RETRY STATUS
010214                                  SWAPIN                  ;GET DEVICE REGISTERS
010240  004775  000020                  JSR     PC,@TSTPC(R5)   ;DO TEST FOR
010244  000475                          BR      NXTRET          ;THIS UNIT ONLY-EXIT
010246  023727  010130  004742  2$:     CMP     DEVPTR,#LSTDEV  ;TRY NEXT UNIT?
010254  103004                          BHIS    NXTST2          ;NO
010256  062737  000002  010130          ADD     #2.,DEVPTR      ;YES,->NEXT
010264  000741                          BR      1$              ;GET BLOCK

010266  005037  010442          NXTST2: CLR     ABONM           ;HERE=NO RETRIES TO DO, NO UNIT ABORTED YET
010272  012737  004724  010130          MOV     #BLKTBL,DEVPTR  ;-->UNIT 0 STORAGE BLOCK
010300  017705  177624          PERDEV: MOV     @DEVPTR,R5      ;R5-->NEXT DEVICE STORAGE BLOCK

010304  005715                  3$:     TST     @R5             ;ABORTED?
010306  100426                          BMI     4$              ;YES
010310  032715  040000                  BIT     #BIT14,@R5      ;SEND BREAK?
010314  001407                          BEQ     6$              ;NO
010316  004737  022640                  CALL    DOBRK           ;YES
010322  032715  040000                  BIT     #BIT14,@R5      ;SUCCESSFUL INIT?
010326  001016                          BNE     4$              ;NO ON TO NEXT UNIT
010330  005715                          TST     @R5             ;ABORTED?
010332  100414                          BMI     4$              ;YES-ON TO NEXT UNIT
010334                          6$:     SWAPIN                  ;NO,GET DEVICE REGISTERS R0-R4 CONTAINING TEST PARAMETERS
010360  004775  000020                  JSR     PC,@TSTPC(R5)   ;INITIATE 1 PACKET TRANSMISSION AND RETURN
010364  005715                  4$:     TST     @R5             ;ABORTED?
010366  100002                          BPL     8$              ;NO-ON TO NEXT UNIT
010370  005237  010442                  INC     ABONM           ;YES...ONE MORE TALLIED
010374  023727  010130  004742  8$:     CMP     DEVPTR,#LSTDEV  ;ALL TU'S TRIED?
010402  103004                          BHIS    5$              ;YES
010404  062737  000002  010130          ADD     #2.,DEVPTR      ;NO THE ADDRESS+2=NEXT ADDRESS
010412  000732                          BR      PERDEV          ;DO NEXT UNIT
010414  022737  000010  010442  5$:     CMP     #8.,ABONM       ;ALL ABORTED?
010422  001006                          BNE     NXTRET          ;NO
010424                                  ERRSF   0.,NOMOR        ;YES!
        010424  104454                                                  TRAP    C$ERSF
        010426  000000                                                  .WORD   0
        010430  010444                                                  .WORD   NOMOR
        010432  000000                                                  .WORD   0
010434                          11$:    BREAK                   ;SUPERVISOR BREAK
```

```
        010434  104422                                                          TRAP    C$BRK
1915    010436  000776                  BR      11$
1916    010440                  NXTRET: RET
1917
1918    010442  000000          ABONM:  .WORD                   ;THE NUMBER OF ABORTED UNITS
1919    010444     101  114  114 NOMOR:  .ASCIZ  /ALL UNITS ABORTED! CNTRL-C/
1920                            .EVEN
```

```
                                .SBTTL  TEST 1 / DEVICE SELF-DIAGNOSTIC EXECUTION

                                        BGNTST
                                                                                T1::
                                        TSTID   #TST1
010500  012737  010542  010144                        MOV     #TST1,TSTTOP    ;SAVE ADDR
010506  004737  002514                                CALL    SETUP           ;INIT UNITS
010512  004737  002342                                CALL    SETDR           ;GET 1ST DRVS.
010516  004737  002562                                CALL    RUN             ;DO TEST
010522  004737  002240                                CALL    SWAPDR          ;GET NEXT DR.
010526  103004                                        BCC     64$             ;BR NO 2ND DRVS
010530  004737  002514                                CALL    SETUP           ;REINIT UNITS
010534  004737  002562                                CALL    RUN             ;REPEAT TEST
010540                                          64$:                          ;DONE
                                        ENDTST
                                                                                L10011:
010540  104401                                                        TRAP    C$ETST

TST1:   TUSELF
010662  005237  010140                        INC     DONE
010666                                      RET
```

```
1932                                    .SBTTL  TEST 2 /SEEK EOT,BOT
1933
1934 010670                                     BGNTST
     010670                                                                                  T2::
1935 010670                                     TSTID   #TST2
     010670  012737  010732  010144                                   MOV     #TST2,TSTTOP    ;SAVE ADDR
     010676  004737  002514                                          CALL    SETUP           ;INIT UNITS
     010702  004737  002342                                          CALL    SETDR           ;GET 1ST DRVS.
     010706  004737  002562                                          CALL    RUN             ;DO TEST
     010712  004737  002240                                          CALL    SWAPDR          ;GET NEXT DR.
     010716  103004                                                 BCC     64$             ;BR NO 2ND DRVS
     010720  004737  002514                                          CALL    SETUP           ;REINIT UNITS
     010724  004737  002562                                          CALL    RUN             ;REPEAT TEST
     010730                                                 64$:                             ;DONE
1936 010730                                     ENDTST
     010730                                                                                  L10012:
     010730  104401                                                                                 TRAP    C$ETST
1937 010732  005004                    TST2:    CLR     R4
1938 010734  016465  011114  000064   1$:      MOV     RECDAT(R4),REC(R5)
1939
1940 010742                                     TUSEEK  REC(R5),DR(R5)
1941
1942 011072  062704  000002                     ADD     #2,R4
1943 011076  026427  011114  177777           CMP     RECDAT(R4),#-1.
1944 011104  001313                           BNE     1$
1945 011106  005237  010140                     INC     DONE
1946 011112                                     RET
1947
1948 011114  000000                    RECDAT: 0.              ;BOT
1949 011116  000200                            200             ;BOT OTHER TRACK
1950 011120  000177                            177             ;EOT
1951 011122  000377                            377             ;EOT OTHER TRACK
1952 011124  000400                            400             ;BOT AGAIN
1953 011126  177777                            -1.
```

```
                                .SBTTL  TEST 3 / HIGH ACTIVITY WRITE/READ

                                        BGNTST                                                  T3::
                                        TSTID   #TST3
011130  012737  011172  010144                        MOV     #TST3,TSTTOP    ;SAVE ADDR
011136  004737  002514                                CALL    SETUP           ;INIT UNITS
011142  004737  002342                                CALL    SETDR           ;GET 1ST DRVS.
011146  004737  002562                                CALL    RUN             ;DO TEST
011152  004737  002240                                CALL    SWAPDR          ;GET NEXT DR.
011156  103004                                        BCC     64$             ;BR NO 2ND DRVS
011160  004737  002514                                CALL    SETUP           ;REINIT UNITS
011164  004737  002562                                CALL    RUN             ;REPEAT TEST
011170                                          64$:                            ;DONE
                                        ENDTST                                                  L10013:
011170                                                                                                  TRAP    C$ETST
011170  104401
011172  012765  000100  000066  TST3:   MOV     #100,TMP(R5)    ;INIT
011200  005004                        CLR     R4              ;FOR INDEX TO DATA
011202  005065  000064                CLR     REC(R5)
011206  016465  012510  000072  1$:    MOV     TST3PT(R4),PATTEN(R5)   ;GET DATA
011214  066565  000060  000072        ADD     DR(R5),PATTEN(R5)       ;ADD DRIVE I.D.
011222                                TUWRIT  PATTEN(R5),REC(R5),#512.,DR(R5),#0
012012                                TUREAD  REC(R5),#512.,DR(R5),#0

012412  062704  000002                ADD     #2,R4           ;NEXT INDEX
012416  005764  012510                TST     TST3PT(R4)      ;END?
012422  001402                        BEQ     2$              ;YES
012424  000137  011206                JMP     1$
012430  005004                2$:     CLR     R4              ;FIRST DATA
012432  062765  000200  000064        ADD     #200,REC(R5)            ;ADJACENT RECORD
012440  032765  001000  000064        BIT     #1000,REC(R5)   ;TOO FAR?
012446  001002                        BNE     3$              ;YES
012450  000137  011206                JMP     1$
012454  162765  001000  000064  3$:    SUB     #1000,REC(R5)   ;BACK UP
012462  066565  000066  000064        ADD     TMP(R5),REC(R5) ;HALF INTO REST OF TAPE
012470  006265  000066                ASR     TMP(R5)                 ;HALF OF HALF
012474  103402                        BCS     4$              ;DONE?
012476  000137  011206                JMP     1$              ;NO
012502  005237  010140          4$:   INC     DONE
012506                                RET
012510  000000                TST3PT: .WORD   000000
012512  125252                        .WORD   125252
012514  177777                        .WORD   177777
012516  052525                        .WORD   052525
012520  000000                        .WORD   000000
```

```
1992
1993                                    .SBTTL  TEST 4 / WRITE SELECTED NUMBER OF BLOCKS
1994
1995 012522                             BGNTST
     012522                                                                 T4::
1996 012522                             TSTID   #TST4
     012522  012737  012564  010144                        MOV     #TST4,TSTTOP    ;SAVE ADDR
     012530  004737  002514                                CALL    SETUP           ;INIT UNITS
     012534  004737  002342                                CALL    SETDR           ;GET 1ST DRVS.
     012540  004737  002562                                CALL    RUN             ;DO TEST
     012544  004737  002240                                CALL    SWAPDR          ;GET NEXT DR.
     012550  103004                                        BCC     64$             ;BR NO 2ND DRVS
     012552  004737  002514                                CALL    SETUP           ;REINIT UNITS
     012556  004737  002562                                CALL    RUN             ;REPEAT TEST
     012562                                          64$:                          ;DONE
1997 012562                             ENDTST
     012562                                                                 L10014:
     012562  104401                                                                TRAP    C$ETST
1998 012564  005065  000064            TST4:   CLR     REC(R5)         ;START AT REC 0
1999 012570  013765  010126  000066            MOV     TAPLEN,TMP(R5)  ;# OF BLOCKS
2000 012576  005065  000062                    CLR     TRK(R5)         ;1 OR 2 PASS COUNTER
2001 012602  016565  000064  000072    1$:     MOV     REC(R5),PATTEN(R5)  ;DATA IS RECORD NO.
2002 012610  005737  002214                    TST     DRVCHK                  ;ADD DR #?
2003 012614  001403                            BEQ     10$                     ;NO
2004 012616  066565  000060  000072            ADD     DR(R5),PATTEN(R5)       ;ADD DRIVE ID
2005 012624                            10$:    TUWRIT  PATTEN(R5),REC(R5),#512.,DR(R5),#0
2006 013414  005365  000066                    DEC     TMP(R5)         ;DONE THIS TRACK?
2007 013420  001404                            BEQ     2$              ;YES-GET OTHER TRACK
2008 013422  005265  000064                    INC     REC(R5)         ;NO-NEXT RECORD
2009 013426  000137  012602                    JMP     1$              ;EXECUTE
2010 013432  005765  000062            2$:     TST     TRK(R5)         ;DONE 2 TRACKS?
2011 013436  001012                            BNE     TST4EX          ;YES-EXIT
2012 013440  005265  000062                    INC     TRK(R5)         ;NO-SET FLAG FOR NEXT PASS
2013 013444  013765  010152  000064            MOV     SECREC,REC(R5)  ;GET NEW STARTING BLOCK #
2014 013452  013765  010126  000066            MOV     TAPLEN,TMP(R5)  ;RESET # OF BLOCKS
2015 013460  000137  012602                    JMP     1$              ;AND EXECUTE
2016 013464  005237  010140            TST4EX: INC     DONE            ;DONE
2017 013470                                    RET                     ;RETURN
```

```
2019                                    .SBTTL  TEST 5 / READ SELECTED NUMBER OF BLOCKS
2020
2021 013472                                     BGNTST
     013472                                                                          T5::
2022 013472                                     TSTID   #TST5
     013472  012737  013534  010144                             MOV     #TST5,TSTTOP    ;SAVE ADDR
     013500  004737  002514                                     CALL    SETUP           ;INIT UNITS
     013504  004737  002342                                     CALL    SETDR           ;GET 1ST DRVS.
     013510  004737  002562                                     CALL    RUN             ;DO TEST
     013514  004737  002240                                     CALL    SWAPDR          ;GET NEXT DR.
     013520  103004                                             BCC     64$             ;BR NO 2ND DRVS
     013522  004737  002514                                     CALL    SETUP           ;REINIT UNITS
     013526  004737  002562                                     CALL    RUN             ;REPEAT TEST
     013532                                                 64$:                        ;DONE
2023 013532                                     ENDTST
     013532                                                                          L10015:
     013532  104401                                                         TRAP    C$ETST
2024 013534  005065  000064            TST5:    CLR     REC(R5)         ;START AT REC 0
2025 013540  013765  010126  000066             MOV     TAPLEN,TMP(R5)  ;# OF BLOCKS
2026 013546  005065  000062                     CLR     TRK(R5)         ;1 OR 2 PASS COUNTER
2027 013552  016565  000064  000072     1$:     MOV     REC(R5),PATTEN(R5)  ;DATA IS RECORD NO.
2028 013560  005737  002214                     TST     DRVCHK                  ;ADD DR #?
2029 013564  001403                             BEQ     10$                     ;NO
2030 013566  066565  000060  000072             ADD     DR(R5),PATTEN(R5)       ;ADD IN DRIVE ID
2031 013574                            10$:     TUREAD  REC(R5),#512.,DR(R5),#0
2032 014174  005365  000066                     DEC     TMP(R5)         ;DONE THIS TRACK?
2033 014200  001404                             BEQ     2$              ;YES-GET OTHER TRACK
2034 014202  005265  000064                     INC     REC(R5)         ;NO-NEXT RECORD
2035 014206  000137  013552                     JMP     1$              ;EXECUTE
2036 014212  005765  000062             2$:     TST     TRK(R5)         ;DONE 2 TRACKS?
2037 014216  001012                             BNE     TST5EX          ;YES-EXIT
2038 014220  005265  000062                     INC     TRK(R5)         ;NO-SET FLAG FOR NEXT PASS
2039 014224  013765  010152  000064             MOV     SECREC,REC(R5)  ;GET NEW STARTING BLOCK #
2040 014232  013765  010126  000066             MOV     TAPLEN,TMP(R5)  ;RESET # OF BLOCKS
2041 014240  000137  013552                     JMP     1$              ;AND EXECUTE
2042 014244  005237  010140            TST5EX:  INC     DONE            ;DONE
2043 014250                                     RET                     ;RETURN
2044
```

```
                                .SBTTL  TEST 6 / WRITE-VERIFY SELECTED NUMBER OF BLOCKS

                                        BGNTST

                                                                                T6::
                                        TSTID   #TST6
014252  012737  014314  010144                        MOV     #TST6,TSTTOP    ;SAVE ADDR
014260  004737  002514                                CALL    SETUP           ;INIT UNITS
014264  004737  002342                                CALL    SETDR           ;GET 1ST DRVS.
014270  004737  002562                                CALL    RUN             ;DO TEST
014274  004737  002240                                CALL    SWAPDR          ;GET NEXT DR.
014300  103004                                        BCC     64$             ;BR NO 2ND DRVS
014302  004737  002514                                CALL    SETUP           ;REINIT UNITS
014306  004737  002562                                CALL    RUN             ;REPEAT TEST
014312                                          64$:                          ;DONE
                                        ENDTST
                                                                                L10016:
014312  104401                                                  TRAP    C$ETST
014314  005065  000064          TST6:   CLR     REC(R5)         ;START AT REC 0
014320  013765  010126  000066        MOV     TAPLEN,TMP(R5)  ;# OF BLOCKS
014326  005065  000062                CLR     TRK(R5)         ;1 OR 2 PASS COUNTER
014332  016565  000064  000072  1$:   MOV     REC(R5),PATTEN(R5)  ;DATA IS RECORD NO.
014340  005737  002214                TST     DRVCHK          ;ADD DR #?
014344  001403                        BEQ     10$             ;NO
014346  066565  000060  000072        ADD     DR(R5),PATTEN(R5)       ;ADD DRIVE ID
014354                          10$:  TUWRIT  PATTEN(R5),REC(R5),#512.,DR(R5),#1
015144  005365  000066                DEC     TMP(R5)         ;DONE THIS TRACK?
015150  001404                        BEQ     2$              ;YES-GET OTHER TRACK
015152  005265  000064                INC     REC(R5)         ;NO-NEXT RECORD
015156  000137  014332                JMP     1$              ;EXECUTE
015162  005765  000062          2$:   TST     TRK(R5)         ;DONE 2 TRAXKS?
015166  001012                        BNE     TST6EX          ;YES-EXIT
015170  005265  000062                INC     TRK(R5)         ;NO-SET FLAG FOR NEXT PASS
015174  013765  010152  000064        MOV     SECREC,REC(R5)  ;GET NEW STARTING BLOCK #
015202  013765  010126  000066        MOV     TAPLEN,TMP(R5)  ;RESET # OF BLOCKS
015210  000137  014332                JMP     1$              ;AND EXECUTE
015214  005237  010140          TS16EX: INC     DONE            ;DONE
015220                                  RET                     ;RETURN
```

```
                                .SBTTL  TEST 7 / READ-REDUCED THRESHOLD SELECTED NUMBER OF BLOCKS

                                        BGNTST
                                                                                T7::
                                        TSTID   #TST7
015222  012737  015264  010144                        MOV     #TST7,TSTTOP    ;SAVE ADDR
015230  004737  002514                                CALL    SETUP           ;INIT UNITS
015234  004737  002342                                CALL    SETDR           ;GET 1ST DRVS.
015240  004737  002562                                CALL    RUN             ;DO TEST
015244  004737  002240                                CALL    SWAPDR          ;GET NEXT DR.
015250  103004                                        BCC     64$             ;BR NO 2ND DRVS
015252  004737  002514                                CALL    SETUP           ;REINIT UNITS
015256  004737  002562                                CALL    RUN             ;REPEAT TEST
015262                                          64$:                          ;DONE
                                        ENDTST
                                                                                L10017:
015262  104401                                                    TRAP    C$ETST
015264  005065  000064          TST7:   CLR     REC(R5)         ;START AT REC 0
015270  013765  010126  000066          MOV     TAPLEN,TMP(R5)  ;# OF BLOCKS
015276  005065  000062                  CLR     TRK(R5)         ;1 OR 2 PASS COUNTER
015302  016565  000064  000072  1$:     MOV     REC(R5),PATTEN(R5)  ;DATA IS RECORD NO.
015310  005737  002214                  TST     DRVCHK          ;ADD DR #?
015314  001403                          BEQ      10$            ;NO
015316  066565  000060  000072          ADD     DR(R5),PATTEN(R5)       ;ADD DRIVE ID
015324                          10$:    TUREAD  REC(R5),#512.,DR(R5),#1
015724  005365  000066                  DEC     TMP(R5)         ;DONE THIS TRACK?
015730  001404                          BEQ     2$              ;YES-GET OTHER TRACK
015732  005265  000064                  INC     REC(R5)         ;NO-NEXT RECORD
015736  000137  015302                  JMP     1$              ;EXECUTE
015742  005765  000062          2$:     TST     TRK(R5)         ;DONE 2 TRACKS?
015746  001012                          BNE     TST7EX          ;YES-EXIT
015750  005265  000062                  INC     TRK(R5)         ;NO-SET FLAG FOR NEXT PASS
015754  013765  010152  000064          MOV     SECREC,REC(R5)  ;GET NEW STARTING BLOCK #
015762  013765  010126  000066          MOV     TAPLEN,TMP(R5)  ;RESET # OF BLOCKS
015770  000137  015302                  JMP     1$              ;AND EXECUTE
015774  005237  010140          TST7EX: INC     DONE            ;DONE
016000                                  RET                     ;RETURN
```

```
                                .SBTTL  RSVP / XOFF AND SEND A PACKET TO ALL DEVICES

                                ;++
                                ; RSVP - SAVES TEST CODE PROGRAM COUNTER IN TSTPC(R5) AND UNIT'S REGIS-
                                ;        TERS.  POINTS TO 'XOFF'' THAT PRECEEDS PACKET IN XMIT BUFFER
                                ;        AND SENDS PACKET WITH XOFF.  RETURNS TO SCHEDULER (NXTST) SO
                                ;        THAT OTHER UNITS PACKETS MAY BE FORMED, TO GET ALL UNITS WORKING
                                ;        AT ONCE.
                                ; INPUTS:  (SP) CONTAINS UNITS PC TO SAVE SINCE RSVP WAS CALLED.  THE
                                ;          NUMBER PACKETS EXPECTED (X$PKNM), AND THE EXPECTED FLAGS AND
                                ;          BYTE COUNTS OF EACH (X$FLG, X$CNT...) ARE LOADED BY TEST CODE
                                ;          (MACROS).
                                ; OUTPUTS:  CMDSNT - UPDATED WITH PACKET OP CODE
                                ;           BLKER  - RECORD NUMBER STATUSTICS UPDATED IF NOT RETRYING
                                ;                    AND COMMAND PACKET SENT.
                                ;           SUCCS - PRESET CLEAR
                                ;           STATUS WORD @R5 - BIT9 - DATA CHECK ERROR - CLEARED
                                ;                            BIT5 - 'VERIFY'' OPERATION
                                ;                            BIT4 - 0 = DATA PACK 1 = CMND
                                ;                            BIT8 - RD/WR OPERATION
                                ;           X$PTR - POINTS TO EXPECTED FLAG
                                ;           UPPER BYTE OF X$PKNM IS REPLICATED.
                                ;           PACKET POINTER (PKPTR) POINTS TO TOP OF UNITS RECEIVE BUFFER
                                ;           AREA (RCVBUF).
                                ;--

016002  000240          RSVP:   NOP                     ;FINISH TEST
016004  012665  000020          MOV     (SP)+,TSTPC(R5) ;SAVE WHERE YOU WERE IN TEST BODY AND
016010                          SWAPOW                  ;SAVE TEST REGISTERS

                                                        ;CORRECT FOR RETURN TO SCHEDULER
016034  012700  024331  XFNSND: MOV     #$TRBUF-1,R0    ;POINT TO XOFF
016040  005265  000070          INC     SNDCNT(R5)      ;ONE MORE TO SEND, TOO.
016044  000402                  BR      SND             ;SEND XOFF+PACKET
016046  012700  024332  NOXOFF: MOV     #$TRBUF,R0      ;FOR NORMAL PACKET SEND
016052  004737  016304  SND:    CALL    SNDBYT          ;SEND BYTE
016056  005715                  TST     @R5             ;R5--> TO STATUS BLK
016060  100510                  BMI     6$              ;ABORTED? YES...QUIT
016062  005365  000070          DEC     SNDCNT(R5)      ;NO, SEND MORE
016066  001371                  BNE     SND             ;IF MORE TO SEND
016070  012700  024332          MOV     #$TRBUF,R0      ;-->BUFFER
016074  016537  000064  010150  MOV     REC(R5),BLKER   ;PREPARE FOR RECEIVE
016102  156565  000032  000033  BISB    X$PKNM(R5),X$PKNM+1(R5)  ;REPLICATE LO. BYTE TO HI FOR GTPAKS, CHKANS
016110  005065  000076          CLR     SUCCS(R5)       ;NO SUCCESS YET
016114  042715  001000          BIC     #BIT9,@R5       ;NO DATA CHK ERROR YET
016120  016565  000102  000104  MOV     RCVBUF(R5),PKPTR(R5)  ;TOP OF RCV BUFFER GOES THE 1ST PACKET
016126  012704  000034          MOV     #X$FLG,R4       ;FORM
016132  060504                  ADD     R5,R4           ;ADDRESS
016134  010465  000106          MOV     R4,X$PTR(R5)    ;OF 1ST X$FLG

016140  042715  000020          BIC     #BIT4,@R5       ;PRESET AS DATA PAK
016144  121027  000002          CMPB    @R0,#R$CMND     ;WAS IT COMMAND PAK?
016150  001054                  BNE     6$              ;NO...
016152  116065  000002  000100  MOVB    2(R0),CMDSNT(R5)  ;YES-SAVE COMMAND
016160  052715  000020          BIS     #BIT4,@R5       ;ITS CMND PAK

016164  032715  002000          BIT     #BIT10,@R5      ;RETRYING?
```

```
2157 016170 001044                      BNE     6$              ;YES-DON'T UPDATE ANY STATS OR CONDITION
2158 016172 126027 000002 000002        CMPB    2(R0),#R$$RD    ;NO,A READ?
2159 016200 001012                      BNE     4$              ;NO
2160 016202 042715 000400               BIC     #BIT8,@R5       ;(FOR HARD/SOFT LOGGING) RD/WR FLAG=0
2161 016206 004737 022470               CALL    WHCHDR          ;GET DRIVE
2162 016212 103403                      BCS     8$              ;
2163 016214 005265 000114               INC     RDN0(R5)        ;DRIVE 0
2164 016220 000402                      BR      4$              ;
2165 016222 005265 000116       8$:     INC     RDN1(R5)        ;DRIVE 1
2166
2167 016226 126027 000002 000003 4$:    CMPB    2(R0),#R$$WR    ;A WRITE?
2168 016234 001022                      BNE     6$              ;NO
2169 016236 052715 000400               BIS     #BIT8,@R5       ;YES, RD/WR FLAG=1
2170 016242 105760 000003               TSTB    3(R0)           ;VERIFY TOO?
2171 016246 001403                      BEQ     21$             ;NO
2172 016250 052715 000040               BIS     #BIT5,@R5       ;YES-SET VERIFY FLAG
2173 016254 000402                      BR      22$
2174 016256 042715 000040       21$:    BIC     #BIT5,@R5       ;(NO)-RESET VERIFY FLAG
2175 016262 004737 022470       22$:    CALL    WHCHDR          ;GET DRIVE NO
2176 016266 103403                      BCS     5$              ;CARRY=DR1
2177 016270 005265 000110               INC     WRTN0(R5)       ;# BLKS WRITTEN DR0
2178 016274 000402                      BR      6$              ;EXIT
2179
2180 016276 005265 000112       5$:     INC     WRTN1(R5)       ;# BLKS WRITTEN DRV1
2181 016302                     6$:     RET                     ;RETURN
2182
2183 016304                     SNDBYT: PUSH    R1              ;ENTER R0-->BYTE
2184 016306 013701 010156       4$:     MOV     C$NRDY,R1       ;GET TIMEOUT CONSTANT FOR NOT READY ERROR
2185 016312 105775 000026       1$:     TSTB    @XMSR(R5)       ;READY TO SEND?
2186 016316 100412                      BMI     2$              ;YES
2187 016320                             PUSH    R0              ;NO, SAVE R0
2188 016322                             BREAK                   ;MONITOR BREAK
     016322 104422                                                      TRAP    C$BRK
2189 016324                             POP     R0              ;RESTORE
2190
2191 016326 005301                      DEC     R1              ;ABORTED?
2192 016330 001370                      BNE     1$              ;NO
2193 016332 012704 000056               MOV     #TOSNDB,R4      ;YES,SET CODE FOR TIMEOUT ERROR
2194 016336 004737 021464               CALL    LOG             ;LOG IT
2195 016342 000402                      BR      3$              ;QUIT
2196 016344 112075 000030       2$:     MOVB    (R0)+,@XMDB(R5) ;SEND IT
2197 016350                     3$:     POP     R1              ;RESTORE
2198 016352                             RET                     ;DONE
```

```
                                        .SBTTL  GETANS / GETS RESPONSES ROUND ROBIN USING 'XON'

                                        ;++
                                        ; GETANS - IF A UNIT IS RETRYING CLEAR HIS RECEIVE BUFFER (CLRBUF) AND GET
                                        ;          HIS RESPONSE (GTPKS1), ELSE, CLEAR ALL BUFFERS (CLRALL) AND
                                        ;          GET ALL RESPONSES (GTPKS8).
                                        ; INPUTS:  NONE
                                        ; OUTPUTS: SERVST = -1 IF NO RETRIES.
                                        ;--

016354  000240                  GETANS: NOP                             ;1 UNIT IF RETRY;  ELSE ALL
016356  032737  000002  010124          BIT     #BIT1,SYSTAT            ;RETRY?
016364  001010                          BNE     1$                      ;YES
016366  012737  177777  017274          MOV     #-1,SERVST              ;PRESET NO UNITS SERVICED
016374  004737  002420                  CALL    CLRALL                  ;CLEAR ALL INPUT BUFFERS
016400  004737  016632                  CALL    GTPKS8                  ;GET ALL REPLYS
016404  000404                          BR      2$                      ;EXIT
016406  004737  002460          1$:     CALL    CLRBUF                  ;RETRY-CLEAR 1 UNIT ONLY
                                                                        ;R5->UNIT BY NXTST
016412  004737  016422                  CALL    GTPKS1                  ;GET 1 REPLY
016416                          2$:     RET                             ;DONE

016420  000000                  GETPTR: .WORD
```

```
                                        .SBTTL  GTPKS1 / GET RETRY RESPONSE-1 UNIT

                                        ;++
                                        ; GTPKS1 - SENDS XON TO UNIT, GETS FLAG BYTE (IF ANY), CHECKS IF IT IS
                                        ;          WHAT WAS EXPECTED.  IF IT IS, USE EXPECTED BYTE COUNT.  IF
                                        ;          NOT, CHECK IF PREMATURE-END PACK OR (SINCE MAINTENANCE MODE)
                                        ;          IF IT'S A PREMATURE DATA PACK.  ADJUST COUNT, GET REST OF
                                        ;          PACKET, AND REPEAT ABOVE UNTIL NO MORE PACKETS.
                                        ; INPUTS:  NONE PASSED.
                                        ; OUTPUTS: SYSTAT UPPER BYTE = FLAG BYTE RECEIVED
                                        ;--

016422  000240                  GTPKS1: NOP                             ;R5->THE UNIT
016424  012703  000034                  MOV     #X$FLG,R3               ;THE OFFSET VALUE OF FLAG
016430  060503                          ADD     R5,R3                   ;FORM THE ABSOLUTE ADDRESS
016432  010301                          MOV     R3,R1                   ;R3-->ADDR. OF EXPECTED FLAG
016434  062701  000002                  ADD     #2.,R1                  ,R1-->ADDR. OF EXPECTED COUNT
016440  012700  016630                  MOV     #EXON,R0                ;R0=ADDRESS
016444  004737  016304                  CALL    SNDBYT                  ;XON THE DEVICE
                                                                        ;*** TIME CRITICAL
016450  016500  000102                  MOV     RCVBUF(R5),R0           ;***--> TO THE BUFFER
016454  116502  000033                  MOVB    X$PKNM+1(R5),R2         ;***GET THE # OF PACKETS TO RECEIVE
016460  032702  177400                  BIT     #177400,R2              ;***SIGN UN-EXTEND
016464  011137  010134          1$:     MOV     @R1,RCBCNT              ;***HOW MANY BYTES IT SHOULD BE
016470  011337  010132                  MOV     @R3,RCFLG               ;***WHAT THE FIRST BYTE SHOULD BE
016474  004737  017300                  CALL    GTBYTE                  ;***GET THE ALL IMPORTANT FLAG
016500  032715  100000                  BIT     #BIT15,@R5              ;TIMEOUT?
016504  001050                          BNE     4$                      ;YES
016506  005300                          DEC     R0                      ;-> BYTE RECIEVED
016510  111037  010125                  MOVB    @R0,SYSTAT+1            ;SAVE IT AS FLAG BYTE
016514  121037  010132                  CMPB    @R0,RCFLG               ;1ST BYTE WHAT WAS EXPECTED?
016520  001420                          BEQ     2$                      ;YES
016522  121027  000002                  CMPB    @R0,#R$END              ;NO, WAS IT END PAK?
016526  001006                          BNE     14$                     ;NO
016530  012737  000016  010134          MOV     #R$NDSZ,RCBCNT          ;YES, USE END SIZE FOR COUNT
016536  012702  000001                  MOV     #1,R2                   ;AND ASSUME IT'S LAST PACKET!
016542  000407                          BR      2$                      ;CONTINUE RECEIVE
016544  121027  000001          14$:    CMPB    @R0,#R$DATA             ;WAS IT DATA?
016550  001026                          BNE     4$                      ;NO,CHKANS MAY FIND INIT...
016552  012737  000204  010134          MOV     #R$DASZ,RCBCNT          ;YES, SET FOR DATA PAK SIZE
016560  005202                          INC     R2                      ;ONE MORE PACK THAN EXPECTED (END PACK)

016562  005200                  2$:     INC     R0                      ;RESTORE TO -> NEXT BYTE
016564  005337  010134          5$:     DEC     RCBCNT                  ;THAT'S ONE LESS BYTE TO GO
016570  001411                          BEQ     3$                      ;DONE
016572  004737  017300                  CALL    GTBYTE                  ;GET REST OF PACKET
016576  005765  000074                  TST     DLV(R5)                 ;ERROR
016602  001011                          BNE     4$                      ;YES-ALL OVER
016604  032715  100000                  BIT     #BIT15,@R5              ;UNLESS ABORTED
016610  001006                          BNE     4$                      ;THEN QUIT
016612  000764                          BR      5$                      ;CONTINUE RECEIVE

016614  005302                  3$:     DEC     R2                      ;ONE LESS PACKET TO GO
016616  001403                          BEQ     4$                      ;MORE PACKETS IN TRANSACTION?
                                                                        ;YES
016620  022121                          CMP     (R1)+,(R1)+             ;POINT TO NEW EXPECTED COUNT
016622  022323                          CMP     (R3)+,(R3)+             ;AND FLAG,
```

```
 2281 016624  000717                    BR      1$              ;AND RECEIVE,
 2282 016626                    4$:     RET                     ;RETURN
 2283
 2284 016630      020           EXON:   .BYTE   R$XON
 2285 016631      023           EXOFF:  .BYTE   R$XOFF
```

```
                                        .SBTTL  GTPKS8 / GET RESPONSES (NO RETRIES)

                                        ;++
                                        ; GTPKS8 - SET ALL ABORTED UNITS SERVICED (SERVST: BIT POSITION).  UNTIL
                                        ;          ALL UNITS SERVICED (SERVST=0), IF NO MORE PACKETS, SET UNIT
                                        ;          SERVICED, ELSE, GET A FLAG BYTE FROM UNIT, DECREMENTING THE
                                        ;          NUMBER OF PACKETS LEFT.  CHECK TO SEE IF EXPECTED FLAG,
                                        ;          ADJUST COUNT IF NOT, GET REST OF PACKET.  IF WAS DATA PACK,
                                        ;          SEND 'XOFF'' TO ENHANCE THROUGHPUT AND GO ON TO NEXT UNIT
                                        ;          (IF ANY).
                                        ; INPUTS:  IMPLIED IN DATA BLOCK POINTED BY R5.  NONE PASSED.
                                        ; OUTPUTS: NONE
                                        ;--

016632  000240                  GTPKS8: NOP                     ;GET ALL UNITS RESPONSES XOFF IF DATA PAK (THROUGHPUT)
016634  012737  004724  017276          MOV     #BLKTBL,GTPTR   ;->1ST
016642  017705  000430          GTAGIN: MOV     @GTPTR,R5       ;GET DATA BLOCK
016646  032715  100000                  BIT     #BIT15,@R5      ;ABORTED?
016652  001403                          BEQ     2$              ;NO
016654  004737  017210                  CALL    SETSRV          ;YES-SET' SERVICED' AND
016660  000534                          BR      GTDOWN          ;ON TO NEXT UNIT
016662  105765  000033          2$:     TSTB    X$PKNM+1(R5)    ;NO, ANY PACKETS LEFT?
016666  001003                          BNE     3$              ;YES
016670  004737  017210                  CALL    SETSRV          ;NO-HE'S DONE
016674  000526                          BR      GTDOWN          ;SO ON TO NEXT UNIT
016676  105365  000033          3$:     DECB    X$PKNM+1(R5)    ;NOW ITS ONE LESS PACKET
016702  017537  000106  010132          MOV     @X$PTR(R5),RCFLG  ;GET EXPECTED FLAG
016710  062765  000002  000106          ADD     #2,X$PTR(R5)    ;--> COUNT
016716  017537  000106  010134          MOV     @X$PTR(R5),RCBCNT  ;AND EXPECTED COUNT
016724  012700  016630                  MOV     #EXON,R0        ;-> XON
                                                                ;***TIME CRITICAL
016730  004737  016304                  CALL    SNDBYT          ;***SEND IT
016734  016500  000104                  MOV     PKPTR(R5),R0    ;***->WHERE 1ST BYTE GOES
016740  004737  017300                  CALL    GTBYTE          ;***GET IT
016744  032715  100000                  BIT     #BIT15,@R5      ;ABORTED?
016750  001403                          BEQ     4$              ;NO-CONTINUE
016752  105065  000033                  CLRB    X$PKNM+1(R5)    ;YES-NO MORE PACKETS EXPECTED
016756  000475                          BR      GTDOWN          ;ON TO NEXT
016760  005300                  4$:     DEC     R0              ;-->BYTE JUST RECEIVED
016762  111037  010125                  MOVB    @R0,SYSTAT+1    ;SAVE IT
016766  121037  010132                  CMPB    @R0,RCFLG       ;IS IT WHAT EXPECTED?
016772  001436                          BEQ     GTOK            ;YES
016774  105065  000033          UNXPCT: CLRB    X$PKNM+1(R5)    ;NO, MUST BE LAST REPLY
017000  121027  000002                  CMPB    @R0,#R$END      ;MAYBE AN END PAK?
017004  001004                          BNE     4$              ;NO
017006  012737  000016  010134          MOV     #R$NDSZ,RCBCNT  ;YES, USE PROPER COUNT
017014  000406                          BR      GTUM            ;AND GET IT
017016  121027  000001          4$:     CMPB    @R0,#R$DATA     ;IS IT DATA?
017022  001053                          BNE     GTDOWN          ;NO, ALL OVER, CHKANS WILL INIT UNIT
017024  012737  000222  010134          MOV     #R$DNSZ,RCBCNT  ;YES, USE COUNT OF DATA + END PAK SURE TO FOLLOW
017032  005200                  GTUM:   INC     R0              ;WHERE TO STUFF THE REST
017034  005337  010134          5$:     DEC     RCBCNT          ;ONE DOWN
017040  001444                          BEQ     GTDOWN          ;NONE TO GO
017042  004737  017300                  CALL    GTBYTE          ;MORE TO GO
017046  032715  100000                  BIT     #BIT15,@R5      ;TIMEOUT?
017052  001037                          BNE     GTDOWN          ;YES
017054  005765  000074                  TST     DLV(R5)         ;BUT DLV ERROR?
```

```
2344 017060  001765                        BEQ     5$                ;NO
2345 017062  105065  000033                CLRB    X$PKNM+1(R5)      ;YES-LAST TIME
2346 017066  000431                        BR      GTDOWN            ;ON TO NEXT
2347
2348 017070  005200                GTOK:   INC     R0                ;NEXT PLACE IN BUFFER
2349 017072  005337  010134        1$:     DEC     RCBCNT            ;MORE BYTES?
2350 017076  001413                        BEQ     2$                ;NO-ALL DONE
2351 017100  004737  017300                CALL    GTBYTE            ;YES-GET IT
2352 017104  032715  100000                BIT     #BIT15,@R5        ;TIMEOUT?
2353 017110  001020                        BNE     GTDOWN            ;YES
2354 017112  005765  000074                TST     DLV(R5)           ;ERROR?
2355 017116  001765                        BEQ     1$                ;NO
2356 017120  105065  000033                CLRB    X$PKNM+1(R5)      ;LAST TIME
2357 017124  000412                        BR      GTDOWN            ;EXIT
2358 017126  122775  000001  000104  2$:   CMPB    #R$DATA,@PKPTR(R5)  ;WAS DATA?
2359 017134  001006                        BNE     GTDOWN            ;NO, ALL DONE
2360 017136  010065  000104                MOV     R0,PKPTR(R5)      ;START OF NEXT PACK NEXT TIME
2361 017142  012700  016631                MOV     #EXOFF,R0         ;XOFF AND SEND TO
2362 017146  004737  016304                CALL    SNDBYT            ;ENHANCE THROUGHPUT
2363 017152  062765  000002  000106  GTDOWN: ADD   #2.,X$PTR(R5)     ;NEXT X$FLG FOR NEXT TRY
2364 017160  023727  017276  004742        CMP     GTPTR,#LSTDEV     ;DONE ONE CYCLE ALL UNITS?
2365 017166  103004                        BHIS    1$                ;YES
2366 017170  062737  000002  017276        ADD     #2,GTPTR          ;NEXT UNIT
2367 017176  000621                        BR      GTAGIN            ;CONTINUE RECEIVE
2368 017200  105737  017274        1$:     TSTB    SERVST            ;DONE SERVICING ALL PAKS
2369                                                                  ;FROM ALL UNITS?
2370 017204  001212                        BNE     GTPKS8            ;NO, KEEP TRYING
2371 017206                                RET                       ;YES.
2372
2373 017210                        SETSRV: PUSH    R5                ;SET UNIT SERVICED
2374 017212                                PUSH    R0
2375 017214  011505                        MOV     @R5,R5            ;GET STAT WD
2376 017216  042705  177770                BIC     #177770,R5        ;MASK UNIT #
2377 017222  012700  017254                MOV     #SRVTBL,R0        ;->TOP OF BIT TABLE
2378 017226  005705                1$:     TST     R5                ;RIGHT ONE?
2379 017230  001404                        BEQ     2$                ;YES
2380 017232  062700  000002                ADD     #2,R0             ;NO, ->NEXT
2381 017236  005305                        DEC     R5                ;1 LESS
2382 017240  000772                        BR      1$                ;CONTINUE
2383 017242  041037  017274        2$:     BIC     @R0,SERVST        ;MOW IT DOWN
2384 017246                                POP     R0
2385 017250                                POP     R5
2386 017252                                RET                       ;RETURN
2387
2388 017254  000001                SRVTBL: .WORD   BIT0              ;BIT POSITION LOOKUP TABLE
2389 017256  000002                        .WORD   BIT1
2390 017260  000004                        .WORD   BIT2
2391 017262  000010                        .WORD   BIT3
2392 017264  000020                        .WORD   BIT4
2393 017266  000040                        .WORD   BIT5
2394 017270  000100                        .WORD   BIT6
2395 017272  000200                        .WORD   BIT7
2396
2397 017274  000000                SERVST: .WORD
2398 017276  000000                GTPTR:  .WORD
```

```
 2400 017300  005037  017524          GTBYTE: CLR     GBTMP           ;TIMEOUT REGISTER
 2401
 2402 017304  013704  010160                  MOV     C$RCVB,R4       ;TIMEOUT ERROR CONSTANT (MULTIPLIER)
 2403 017310  105775  000022          1$:     TSTB    @RCSR(R5)       ;READY?
 2404 017314  100013                  BPL     3$              ;NO
 2405 017316  017565  000024  000074          MOV     @RCDB(R5),DLV(R5)  ;GET ERROR + BYTE
 2406 017324  116520  000074                  MOVB    DLV(R5),(R0)+   ;COPY BYTE TO BUFFER
 2407 017330  005765  000074                  TST     DLV(R5)         ;ERROR?
 2408 017334  100472                  BMI     4$              ;YES-EXIT
 2409 017336  005065  000074                  CLR     DLV(R5)         ;NO-RESET
 2410 017342  000467                  BR      4$              ;AND EXIT
 2411
 2412 017344  005337  017524          3$:     DEC     GBTMP           ;DEC T.O. CONSTANT
 2413 017350  001357                  BNE     1$              ;STILL VALID
 2414
 2415                                 ;CODE TO SEE ^C DURING LONG SEEK OR REWIND
 2416
 2417 017352  010037  017526                  MOV     R0,GBTMP2       ;R0 MUST BE PRESERVED!
 2418 017356  012700  016631                  MOV     #EXOFF,R0       ;QUIET THE DEVICE
 2419 017362  004737  016304                  CALL    SNDBYT          ;BY SENDING XOFF
 2420 017366  105775  000022          6$:     TSTB    @RCSR(R5)       ;CHARACTER SLOP OVER?
 2421 017372  100415                  BMI     5$              ;YES
 2422 017374  005337  017524                  DEC     GBTMP           ;NO-WAIT A WHILE
 2423 017400  105737  017524                  TSTB    GBTMP           ;DONE WAITING?
 2424 017404  001370                  BNE     6$              ;NO
 2425 017406                          BREAK                           ;YES-NO SLOP OVER
      017406  104422                                                          TRAP    C$BRK
 2426 017410  012700  016630                  MOV     #EXON,R0        ;START DEVICE TALKING
 2427 017414  004737  016304                  CALL    SNDBYT          ;AGAIN
 2428 017420  013700  017526                  MOV     GBTMP2,R0       ;RESTORE R0
 2429 017424  000426                  BR      7$              ;END KLUGE
 2430 017426  013700  017526          5$:     MOV     GBTMP2,R0       ;RESTORE R0
 2431 017432  017565  000024  000074          MOV     @RCDB(R5),DLV(R5)  ;GET ERROR + BYTE
 2432 017440  116520  000074                  MOVB    DLV(R5),(R0)+   ;COPY BYTE TO BUFFER
 2433 017444  005765  000074                  TST     DLV(R5)         ;ERROR?
 2434 017450  100403                  BMI     17$             ;YES-EXIT
 2435 017452  005065  000074                  CLR     DLV(R5)         ;NO-CLEAR
 2436 017456  000400                  BR      17$             ;EXIT
 2437 017460  010037  017526          17$:    MOV     R0,GBTMP2       ;AGAIN SAVE R0
 2438 017464  012700  016630                  MOV     #EXON,R0        ;RESTORE TO TALKING STATE
 2439 017470  004737  016304                  CALL    SNDBYT
 2440 017474  013700  017526                  MOV     GBTMP2,R0       ;RESTORE R0
 2441 017500  000410                  BR      4$              ;DONE
 2442
 2443 017502  005037  017524          7$:     CLR      GBTMP
 2444 017506  005304                  DEC     R4              ;TIMEOUT?
 2445 017510  001277                  BNE     1$              ;NO
 2446 017512  012704  000050                  MOV     #TORCVB,R4      ;YES
 2447 017516  004737  021464                  CALL    LOG             ;
 2448 017522                          4$:     RET                     ;RETURN
 2449 017524  000000                  GBTMP:  .WORD   0               ;
 2450 017526  000000                  GBTMP2: .WORD   0
```

```
                                .SBTTL  CHKANS / CHECK DEVICE(S) RESPONSE

                                ;++
                                ; CHKANS - AS IN 'GETANS', IF RETRYING DO ONLY 1 UNIT ELSE DO ALL NON-
                                ;          ABORTED UNITS.
                                ; INPUTS:  IMPLIED SYSTAT BIT1 (RETRYING)
                                ; OUTPUTS: NONE PASSED.
                                ;--

017530  000240                  CHKANS: NOP                     ;IF RETRY THEN CHECK ONE
                                                                ;ELSE CHECK ALL
017532  032737  000002  010124          BIT     #BIT1,SYSTAT    ;RETRYING?
017540  001403                        BEQ     CHK8            ;NO DO NORMAL
017542  004737  017620                CALL    CHKPKS          ;YES DO BAZARRE WITH
                                                                ;R5 -> UNIT
017546  000422                        BR      CHKANR          ;ALL DONE

017550  012737  004724  017616  CHK8:   MOV     #BLKTBL,CHKPTR  ;YOU KNOW ... TOP OF TABLE
017556  017705  000034          2$:     MOV     @CHKPTR,R5      ;GET UNIT'S BLOCK ADDRESS
017562  032715  100000                  BIT     #BIT15,@R5      ;ABORTED?
017566  001002                        BNE     3$              ;YES
017570  004737  017620                CALL    CHKPKS          ;NO, DO THIS GUY
017574  023727  017616  004742  3$:     CMP     CHKPTR,#LSTDEV  ;ALL DONE?
017602  103004                        BHIS    CHKANR          ;YES
017604  062737  000002  017616        ADD     #2,CHKPTR       ;NO,-->NEXT DEVICE
017612  000761                        BR      2$              ;DO DA

017614                          CHKANR: RET

017616  000000                  CHKPTR: .WORD
```

```
                                .SBTTL  CHKPKS / DECIPHERS RESPONSE OF UNIT POINTED TO BY R5 /

                                ;++
                                ; CHKPKS - FOR UNIT R5 AND FOR ALL PACKETS, CHECK TO SEE IF PACKET IS DATA OR
                                ;          END PACK, CHECK CHECKSUMS, COMPARE DATA IF DATA PACK, CHECK
                                ;          SUCCESS CODE IF END.  IF UNKNOWN PACKET TYPE, CHECK FOR INTERFACE
                                ;          ERROR.  IF ''CONTINUE'' FALL THROUGH.  IF ''INIT'' SET ''SEND
                                ;          BREAK'' FLAG.  CALL ''LOG'' WITH R4=ERROR NUMBER IF ERROR.
                                ; INPUTS:  IMPLIED BY PREVIOUS ROUTINES.
                                ; OUTPUTS: ERRORS - DLV ERROR
                                ;                - UNKNOWN FLAG BYTE ERROR
                                ;                - CHECKSUM ERROR
                                ;                - DATA COMPARE ERROR
                                ;--

017620  000240                  CHKPKS: NOP                             ;CHECK WHAT WAS RECIEVED
017622  016500  000102                  MOV     RCVBUF(R5),R0          ;GET BUFFER ADDR.
017626  016502  000032                  MOV     X$PKNM(R5),R2          ;AND # OF PACKETS EXPECTED
017632  012703  000034                  MOV     #X$FLG,R3              ;THE OFFSET VALUE
017636  060503                          ADD     R5,R3                  ;R3-->THIS UNIT X$FLG AGAIN
017640  010301                          MOV     R3,R1                  ;COPY TO R1
017642  062701  000002                  ADD     #2,R1                  ;R1-->X$BCNT FOR 1ST PACKET
017646  010065  000104          1$:     MOV     R0,PKPTR(R5)           ;POINT TO PACKET
017652  111037  010125                  MOVB    @R0,SYSTAT+1           ;SAVE RCV'D BYTE
017656  011137  010134                  MOV     @R1,RCBCNT             ;GET COUNT
017662  011337  010132                  MOV     @R3,RCFLG              ;AND FLAG
017666  121013                          CMPB    @R0,@R3                ;1ST BYTE=EXPECTED?
017670  001050                          BNE     5$                     ;UH OH...
017672  121027  000020                  CMPB    @R0,#R$CONT            ;OK, IS IT 1 BYTE?
017676  001516                          BEQ     7$                     ;YES...ONTO NEXT PACK
                                                                       ;NO, SO > 1 BYTE (NEVER EXPECT INIT!)
017700  013704  010134                  MOV     RCBCNT,R4              ;EXPECTED, SO COUNT MUST BE RIGHT
017704  005744                          TST     -(R4)                  ;ADJUST FROM RECEIVE COUNT TO COUNT FOR CHECKSUM
017706  004737  022600                  CALL    CKCKSM                 ;CHECK CHECKSUM
017712  103005                          BCC     2$                     ;NO CARRY...NO INCORRECT
017714  012704  000022                  MOV     #BDCHK,R4              ;ERROR
017720  004737  021464                  CALL    LOG                    ;LOG IT
017724  000503                          ER      7$                     ;ON TO NEXT PACK
017726  122710  000002          2$:     CMPB    #R$END,(R0)            ;END PAK?
017732  001005                          BNE     3$                     ;NO
017734  004737  020154                  CALL    CHKEND                 ;YES-CHECK
017740  012702  000001                  MOV     #1,R2                  ;LAST PACKET
017744  000473                          BR      7$                     ;AND FALL THROUGH
017746  122710  000001          3$:     CMPB    #R$DATA,@R0            ;DATA PAK?
017752  001003                          BNE     4$                     ;NO
017754  004737  023400                  CALL    COMPAR                 ;YES-CHECK DATA
017760  000465                          BR      7$                     ;ALL DONE?

017762  052715  040000          4$:     BIS     #BIT14,@R5             ;SET 'DOBREAK' FLAG
017766  012704  000052                  MOV     #OTL,R4                ;OUT TO LUNCH
017772  005765  000074                  TST     DLV(R5)                ;AH,BUT DLV ERROR?
017776  001402                          BEQ     20$                    ;NO
020000  012704  000012                  MOV     #OVRN,R4               ;YES-USE CORRECT ERROR #
020004  004737  021464          20$:    CALL    LOG                    ;TALLY
020010  000460                          BR      8$                     ;DONE

                                ;HERE CHECKS UNEXPECTED RESPONSE
```

```
2542
2543 020012  122710  000004          5$:     CMPB    #R$INIT,@R0     ;INIT?
2544 020016  001007                          BNE     6$              ;NO
2545 020020  052715  040000                  BIS     #BIT14,@R5      ;YES-SET 'DOBREAK' FLAG
2546 020024  012704  000006                  MOV     #RCINIT,R4      ; WE GOT AN INIT
2547 020030  004737  021464                  CALL    LOG             ;TALLY IT
2548 020034  000446                          BR      8$              ;DONE
2549 020036  122710  000001          6$:     CMPB    #R$DATA,@R0     ;DATA PAK?
2550 020042  001013                          BNE     9$              ;NO
2551 020044  012704  000204                  MOV     #R$DASZ,R4      ;YES, USE DATA SIZE
2552 020050  005744                          TST     -(R4)           ;ADJUST FOR CHKSUM
2553 020052  004737  022600                  CALL    CKCKSM          ;AND CHECK
2554 020056  103421                          BCS     10$             ;GOOF
2555 020060  004737  023400                  CALL    COMPAR          ;OK, HOW'S THE DATA?
2556                                                                 ;EXPECTED END, GOT
2557                                                                 ;DATA + END.
2558 020064  062700  000204                  ADD     #R$DASZ,R0      ;POINT TO END PACK
2559 020070  000666                          BR      1$              ;CHECK IT, USE SAME X$FLG
2560
2561 020072  122710  000002          9$:     CMPB    #R$END,(R0)     ;END?
2562 020076  001331                          BNE     4$              ;NO-OUT TO LUNCH
2563
2564 020100  012704  000016                  MOV     #R$SNSZ,R4      ;YES, TOTAL SIZE MINUS
2565 020104  005744                          TST     -(R4)           ;TWO (THE CHKSUM)
2566 020106  004737  022600                  CALL    CKCKSM          ;CHECK IT
2567 020112  103403                          BCS     10$             ;OOPS
2568 020114  004737  020154                  CALL    CHKEND          ;OK,NOW TEST SUC. CODE
2569
2570 020120  000414                          BR      8$              ;ALL DONE
2571
2572 020122  012704  000022          10$:    MOV     #BDCHK,R4       ;CHECKSUM ERROR
2573 020126  004737  021464                  CALL    LOG
2574 020132  000407                          BR      8$              ;EXIT
2575
2576 020134  005302                  7$:     DEC     R2              ;NO. OF PACKETS LEFT TO CHECK
2577 020136  001405                          BEQ     8$              ;ALL DONE
2578 020140  063700  010134                  ADD     RCBCNT,R0       ;POINT TO NEXT PACKET
2579 020144  022121                          CMP     (R1)+,(R1)+     ;POINT TO NEXT EXPECTED COUNT
2580 020146  022323                          CMP     (R3)+,(R3)+     ;AND EXPECTED FLAG
2581 020150  000636                          BR      1$              ;TRY ANOTHER,THEY'RE SMALL
2582
2583 020152                          8$:     RET                     ;RETURN
2584
```

```
                                .SBTTL  CHKEND / CHECK SUCCESS AND DETERMINE RETRY STATUS /

                                ;++
                                ; CHKEND - IF RETRYING; CHECK SUCCESS CODE AND IF 0, PRINT RECOVERED, LOG
                                ;          SOFT ERROR, END RETRY STATUS.  IF NOT 0 AND WAS STILL 'DATA
                                ;          CHECK'' ERROR - DETERMINE WHETHER TO CONTINUE ANOTHER RETRY OR
                                ;          LOG 'UNRECOVERABLE'' ERROR.
                                ;
                                ;          IF NOT RETRYING;  CHECK IF DATA CHECK ERROR SUCCESS.  IF SO,
                                ;          START RETRY ELSE EXIT.
                                ; INPUTS:  IMPLIED BY PREVIOUS CODE.  NONE PASSED.
                                ; OUTPUTS: RETRY (SYSTAT BIT 1), (BIT10 @R5) SET IF RETRYING.
                                ;          -  DATA COMARE ERROR (BIT6 @R5) CLEARED.
                                ;--

020154                          CHKEND: PUSH    R0              ;R0 --> END PAK
020156                                  PUSH    R4
020160  032737  000002  010124  1$:     BIT     #BIT1,SYSTAT    ;RETRYING?
020166  001052                          BNE     CHKREE          ;YES-BRANCH
020170  004737  021154                  CALL    CHKSUC          ;NO,GET SUCCESS CODE
                                                                ;LOG ERROR...
020174  032715  100000                  BIT     #BIT15,@R5      ;ABORTED?
020200  001402                          BEQ     3$              ;NO,CONTINUE
020202  000137  020660                  JMP     CHKRET          ;YES,EXIT
020206  105765  000077          3$:     TSTB    SUCCS+1(R5)     ;NO; HOW'D WE DO?
020212  001013                          BNE     CHKERR          ;NOT SO GOOD.
020214  032715  000100                  BIT     #BIT6,@R5       ;OK, HOST FIND DATA PAK ERROR?
020220  001002                          BNE     2$              ;YES
020222  000137  020660                  JMP     CHKRET          ;NO
020226  012704  000014          2$:     MOV     #BDCOM,R4       ;YES;  JUST BAD DATA-NO DATACHK ERR
020232  004737  021464                  CALL    LOG             ;BAD DATA IN PACKET
020236  000137  020660                  JMP     CHKRET          ;QUIT
020242  032715  001000          CHKERR: BIT     #BIT9,@R5       ;BAD SUCCESS; TU DATA CHK ERROR?
020246  001002                          BNE     1$              ;YES
020250  000137  020660                  JMP     CHKRET          ;NO. ALL DONE.
020254  052715  002000          1$:     BIS     #BIT10,@R5      ;YES-START RETRY
020260  012765  000001  000002        MOV     #1,RETRY(R5)    ;CALL IT 1ST
020266                                  PRINTX  #RTRYN,RETRY(R5)  ;** PRINT **
020266  016546  000002                                                  MOV     RETRY(R5),-(SP)
020272  012746  021040                                                  MOV     #RTRYN,-(SP)
020276  012746  000002                                                  MOV     #2,-(SP)
020302  010600                                                          MOV     SP,R0
020304  104415                                                          TRAP    C$PNTX
020306  062706  000006                                                  ADD     #6,SP
020312  000562                          BR      CHKRET          ;ALL DONE
020314  004737  021154          CHKREE: CALL    CHKSUC  ;RETRYING,GET SUCCESS
020320  105765  000077                  TSTB    SUCCS+1(R5)     ; SUCCESSFUL YET?
020324  001054                          BNE     UNSUC           ;NO, CHECK COUNT
020326                                  PRINTX  #RECOV,RETRY(R5)
020326  016546  000002                                                  MOV     RETRY(R5),-(SP)
020332  012746  020700                                                  MOV     #RECOV,-(SP)
020336  012746  000002                                                  MOV     #2,-(SP)
020342  010600                                                          MOV     SP,R0
020344  104415                                                          TRAP    C$PNTX
020346  062706  000006                                                  ADD     #6,SP
020352  105715                          TSTB    (R5)            ;DETERMINE THRESHOLD
020354  100411                          BMI     2$              ;IT'S MODIFIED
```

```
                                        PRINTX  #THRSLO          ;NORMAL
                                                                                MOV     #THRSLO,-(SP)
                                                                                MOV     #1,-(SP)
                                                                                MOV     SP,R0
                                                                                TRAP    C$PNTX
                                                                                ADD     #4,SP
                                        BR      3$
                                2$:     PRINTX  #THRSHI          ;ENHANCED
                                                                                MOV     #THRSHI,-(SP)
                                                                                MOV     #1,-(SP)
                                                                                MOV     SP,R0
                                                                                TRAP    C$PNTX
                                                                                ADD     #4,SP
                                3$:     BIT     #BIT8,@R5        ;WRITE OR READ OPERATION?
                                        BNE     4$               ;WRITE
                                        MOV     #SFTRD,R4        ;READ
                                        BR      5$
                                4$:     MOV     #SFTWR,R4        ;WRITE
                                5$:     CALL    LOG
                                        CLR     RETRY(R5)        ;RESTORE TO HUNKY-DORY STATE
                                        BIC     #BIT10!BIT7,@R5  ;NO RETRY, NORM THRESHOLD
                                        BR      CHKRET           ;QUIT

                                UNSUC:  NOP                      ;RETRYING;  SEE IF HARD YET
                                        BIT     #BIT9,@R5        ;TU DATA CHECK ERROR?
                                        BNE     2$               ;YES
                                        PRINTB  #RETERR          ;NO-''OTHER-ERROR'' ERROR
                                                                                MOV     #RETERR,-(SP)
                                                                                MOV     #1,-(SP)
                                                                                MOV     SP,R0
                                                                                TRAP    C$PNTB
                                                                                ADD     #4,SP
                                        CLR     RETRY(R5)        ;NO RETRIES
                                        BIC     #BIT10!BIT7,@R5  ;NO RETRY, NORM THRESHOLD
                                        BR      CHKRET           ;EXIT
                                2$:     CMP     MXRTRY,RETRY(R5)  ;YES. DID WE GRADUATE TO HARD?
                                        BEQ     HRD1             ;YES
                                        INC     RETRY(R5)        ;NO.  JUST ANOTHER
                                        PRINTX  #RTRYN,RETRY(R5)  ;PRINT OUT
                                                                                MOV     RETRY(R5),-(SP)
                                                                                MOV     #RTRYN,-(SP)
                                                                                MOV     #2,-(SP)
                                                                                MOV     SP,R0
                                                                                TRAP    C$PNTX
                                                                                ADD     #6,SP
                                        BIT     #BIT7,@R5        ;WAS NORMAL THRESHOLD?
                                        BEQ     1$               ;YES-REDUCE GAIN
                                        BIC     #BIT7,@R5        ;NO-NORM
                                        BR      CHKRET
                                1$:     BIS     #BIT7,@R5        ;REDUCED
                                        BR      CHKRET           ;DONE
                                HRD1:   NOP                      ;HERE IS HARD ERROR.
                                        PRINTX  #UNREC
                                                                                MOV     #UNREC,-(SP)
                                                                                MOV     #1,-(SP)
                                                                                MOV     SP,R0
                                                                                TRAP    C$PNTX
```

```
      020620  062706  000004                                                    ADD     #4,SP
 2664 020624  032715  000400                BIT     #BIT8,@R5       ;RD OR WR?
 2665 020630  001003                        BNE     4$              ;WRITE
 2666 020632  012704  000016                MOV     #HRDRD,R4       ;READ
 2667 020636  000402                        BR      5$              ;LOG IT
 2668 020640  012704  000020          4$:   MOV     #HRDWR,R4       ;WRITE
 2669 020644  004737  021464          5$:   CALL    LOG             ;LOG IT
 2670 020650  005065  000002                CLR     RETRY(R5)       ;BACK TO NORMAL
 2671 020654  042715  002200                BIC     #BIT10!BIT7,@R5 ;NO RETRY, NOT REDUCED
 2672
 2673 020660  042737  000002  010124  CHKRET: BIC     #BIT1,SYSTAT    ;NO SYSTEM RETRY NEXT PASS
 2674 020666  042715  000100                BIC     #BIT6,@R5       ;NO MORE HOST DATA CHECK ERROR
 2675 020672                                POP     R4
 2676 020674                                POP     R0
 2677 020676                                RET
 2678
 2679
 2680 020700       045     101     122  RECOV:  .ASCIZ  /%ARECOVERED FROM DATA CHECK ERROR RETRY # %D1%N/
 2681                                    .EVEN
 2682 020760       045     101     040  THRSLO: .ASCIZ  /%A NORMAL THRESHOLD%N/
 2683                                    .EVEN
 2684 021006       045     101     040  THRSHI: .ASCIZ  /%A MODIFIED THRESHOLD %N/
 2685                                    .EVEN
 2686 021040       045     101     122  RTRYN:  .ASCIZ  /%ARETRY # %D1%N/
 2687                                    .EVEN
 2688 021060       045     101     125  UNREC:  .ASCIZ  /%AUNRECOVERABLE%N/
 2689                                    .EVEN
 2690 021102       045     101     117  RETERR: .ASCIZ  /%AOTHER ERROR DURING RETRY : EXIT RETRY%N/
 2691                                    .EVEN
 2692
```

```
                                .SBTTL  CHKSUC / INTERPRET SUCCESS CODE /

                                ;++
                                ; CHKSUC - COPY SUCCESS CODE (BYTE) TO SUCCS+1(R5).  INTERPRET SUCCESS
                                ;          AND IF NOT 0, LOG APPROPRIATE ERROR.
                                ; INPUTS:  R0 POINTS TO END PACKET.
                                ; OUTPUTS: R4 IS ERROR NUMBER IF ERROR.  SUCCS(R5) UPDATED.
                                ;--

021154  000240                  CHKSUC: NOP
021156  016065  000002  000076          MOV     2(R0),SUCCS(R5) ;R0-->END PACKET
021164  122760  000000  000003          CMPB    #E$OK,3(R0)     ;GET SUCCESS BYTE
021172  001533                        BEQ     12$             ;COMPLETE SUCCESS-EXIT

021174  122760  000001  000003          CMPB    #E$TRY,3(R0)    ;OK BUT RETRIES?
021202  001012                        BNE     20$             ;NO
021204  126527  000100  000002          CMPB    CMDSNT(R5),#R$$RD;A READ?
021212  001001                        BNE     22$             ;NO

021214  000516                        BR      10$             ;NO RETRIES IN MAINTENANCE!
021216  126527  000100  000003  22$:   CMPB    CMDSNT(R5),#R$$WR       ;A WRITE?
021224  001001                        BNE     20$             ;NO
021226  000511                        BR      10$             ;LOG IT
021230  122760  177737  000003  20$:   CMPB    #E$NOMO,3(R0)   ;NO MOTOR?
021236  001003                        BNE     1$              ;NO
021240  012704  000030                MOV     #NOMOT,R4       ;YES-
021244  000504                        BR      11$             ;LOG

021246  122760  177757  000003  1$:    CMPB    #E$CKS,3(R0)    ;''DATA CHECK'' ERROR?
021254  001003                        BNE     2$              ;NO
021256  052715  001000                BIS     #BIT9,@R5       ;SET DATA-CHK-ERROR FLAG
021262  000477                        BR      12$             ;DONT LOG

021264  126527  000100  000007  2$:    CMPB    CMDSNT(R5),#R$$SLF  ;SELF TEST?
021272  001006                        BNE     3$              ;NOPE
021274  105760  000003                TSTB    3(R0)           ;YES, NEG. IF ERROR
021300  100070                        BPL     12$             ;OK

021302  012704  000044                MOV     #SLFER,R4       ;YES-ERROR
021306  000463                        BR      11$             ;LOG IT

021310  122760  177740  000003  3$:    CMPB    #E$SK,3(R0)     ;SEEK ERROR?
021316  001003                        BNE     4$              ;NO
021320  012704  000024                MOV     #SKERR,R4       ;YES-
021324  000454                        BR      11$             ;LOG

021326  122760  177767  000003  4$:    CMPB    #E$NCRT,3(R0)   ;NO CART?
021334  001003                        BNE     5$              ;NO
021336  012704  000054                MOV     #NCART,R4       ;YES-
021342  000445                        BR      11$             ;LOG

021344  122760  177720  000003  5$:    CMPB    #E$CMD,3(R0)    ;NO UNDERSTAND HOST?
021352  001003                        BNE     6$              ;NO
021354  012704  000040                MOV     #CMNDER,R4      ;YES-
021360  000436                        BR      11$             ;LOG

021362  122760  177770  000003  6$:    CMPB    #E$NONX,3(R0)   ;NON EXISTENT UNIT?
```

```
2751 021370  001003                        BNE     7$              ;NO
2752 021372  012704  000036                MOV     #NOUNIT,R4      ;YES-
2753 021376  000427                        BR      11$             ;LOG
2754
2755 021400  122760  177765  000003  7$:   CMPB    #E$WLOC,3(R0)   ;WRITE LOCKED?
2756 021406  001003                        BNE     8$              ;NO
2757 021410  012704  000026                MOV     #WRLOCK,R4      ;YES-
2758 021414  000420                        BR      11$             ;LOG
2759
2760 021416  122760  177776  000003  8$:   CMPB    #E$PART,3(R0)   ;PARTIAL OP?
2761 021424  001003                        BNE     9$              ;NO
2762 021426  012704  000034                MOV     #PARTL,R4       ;YES-
2763 021432  000411                        BR      11$             ;LOG
2764
2765 021434  122760  177711  000003  9$:   CMPB    #E$REC,3(R0)    ;WRONG RECORD?
2766 021442  001003                        BNE     10$             ;NO
2767 021444  012704  000042                MOV     #RECERR,R4      ;YES-
2768 021450  000402                        BR      11$             ;LOG
2769
2770 021452  012704  000046          10$:  MOV     #SUCOTL,R4      ;UNDEFINED
2771 021456  004737  021464          11$:  CALL    LOG             ;LOG ERROR
2772 021462                          12$:  RET                     ;RETURN
```

```
                                .SBTTL  LOG / TO LOG ERROR IN CORRECT PLACE

                                ;++
                                ; LOG - DETERMINE IF ERROR IS FATAL, NON-FATAL OR FATAL AFTER N TRIES
                                ;       BY INDEX (ERROR #) INTO DEVICE DATA BLOCK.  ADD THE DRIVE # TO
                                ;       INDICATE UPPER OR LOWER BYTE AND INCREMENT THAT ERROR UNLESS
                                ;       THAT BYTE WOULD OVERFLOW.  DETERMINE IF EVL FLAG SET,AND IF SO,
                                ;       CHECK THRESHOLD (EVLTHR) AND  PRINT APPROPRIATE ERROR MESSAGE
                                ;       DESCRIPTION.  ABORT THE UNIT IF INDICATED THROUGH DODROP CODE.
                                ; INPUTS:  R4 = ERROR CODE
                                ; OUTPUTS: ABNDX(R5) = ERROR CODE.  DLV(R5) = 0
                                ;--

021464                          LOG:    PUSH    R0
021466                                  PUSH    R1
021470                                  PUSH    R3
021472                                  PUSH    R4

021474  011537  002074                  MOV     @R5,L$LUN       ;GET UNIT NUMBER
021500  042737  177770  002074          BIC     #177770,L$LUN   ;MASK IT OFF
021506  010465  000004                  MOV     R4,ABNDX(R5)    ;SAVE INDEX IN CASE OF ABORT MESSAGE
021512  012703  000120                  MOV     #LGOFST,R3      ;OFFSET TO LOW ORDER BYTE (DRIVE0)
021516  060403                          ADD     R4,R3           ;FORM INDEX OF PARAM. TO UPDATE
021520  060503                          ADD     R5,R3           ;FORM ABSOLUTE ADDR. THIS UNIT
021522  004737  022470                  CALL    WHCHDR          ;SEE WHICH DRIVE T'WAS
021526  103001                          BCC     2$              ;WAS DRIVE 0
021530  005203                          INC     R3              ;DRIVE 1; POINT TO UPPER BYTE
021532  122713  000377          2$:     CMPB    #255.,@R3       ;POTENTIAL OVERFLOW POSSIBLE?
021536  001005                          BNE     LOGOK           ;NO
021540                          LOGO:   ERRDF   0.,OVRFLO,ERRDES ;YES
        021540  104455                                                          TRAP    C$ERDF
        021542  000000                                                          .WORD   0
        021544  022364                                                          .WORD   OVRFLO
        021546  022020                                                          .WORD   ERRDES
021550  000512                          BR      ABO             ;ABORT UNIT
021552  105213                  LOGOK:  INCB    @R3             ;INCREMENT THE ERROR
021554  111304                          MOVB    @R3,R4          ;TEMP'LY SAVE IT
021556  016503  000004                  MOV     ABNDX(R5),R3    ;GET INDEX AGAIN
021562  012701  007044                  MOV     #RSNTAB,R1      ;FORM ADRS OF MSG
021566  066501  000004                  ADD     ABNDX(R5),R1    ;LIKE THIS
021572  042701  000001                  BIC     #BIT0,R1        ;INSURE WORD BOUNDARY
021576  032737  000004  004400          BIT     #EVL,FLGLOC     ;EVL SELECTED?
021604  001414                          BEQ     LOGOK2          ;NO-CONT
021606  123704  002216                  CMPB    EVLTHR,R4       ;YES,OVER THRESHOLD?
021612  101011                          BHI     LOGOK2          ;NO
021614  010337  021626                  MOV     R3,DFTL1+2      ;YES,LOAD ERROR #
021620  011137  021630                  MOV     @R1,DFTL1+4     ;AND MESSAGE ADDR
021624                          DFTL1:  ERRDF   0,DFTL1,ERRDES  ;ERROR
        021624  104455                                                          TRAP    C$ERDF
        021626  000000                                                          .WORD   0
        021630  021624                                                          .WORD   DFTL1
        021632  022020                                                          .WORD   ERRDES
021634  000460                          BR      ABO             ;DROP IT
021636  120327  000014          LOGOK2: CMPB    R3,#BDCOM       ;'NEVER FATAL' TYPE?
021642  103011                          BHIS    NTSFT           ;NO
021644  010337  021656                  MOV     R3,LOG1+2       ;YES, ERROR CODE
021650  011137  021660                  MOV     @R1,LOG1+4      ;DESCRIPTION
```

```
2823 021654                          LOG1:   ERRSOFT 0.,LOG1,ERRDES
     021654  104457                                                      TRAP    C$ERSOFT
     021656  000000                                                      .WORD   0
     021660  021654                                                      .WORD   LOG1
     021662  022020                                                      .WORD   ERRDES
2824 021664  000450                          BR      LOGO               ;EXIT
2825
2826 021666  120327  000026      NTSFT:  CMPB    R3,#WRLOCK         ;ONE TRY?
2827 021672  103411                      BLO     MABEE              ;NO, MAYBE A MULTIPLE
2828 021674  010337  021706              MOV     R3,LOG2+2.         ;YES
2829 021700  011137  021710              MOV     @R1,LOG2+4
2830 021704                          LOG2:   ERRHRD  0,LOG2,ERRDES  ;PRINT HARD MESSAGE
     021704  104456                                                      TRAP    C$ERHRD
     021706  000000                                                      .WORD   0
     021710  021704                                                      .WORD   LOG2
     021712  022020                                                      .WORD   ERRDES
2831 021714  000430                          BR      ABO                ;DROP UNIT
2832
2833 021716  042704  177400      MABEE:  BIC     #177400,R4         ;NEGATE SIGN EXTEND
2834 021722  163704  010136      1$:     SUB     FTLNM,R4           ;SEE IF MULTIPLE OF
2835 021726  001413                      BEQ     HRD                ;FTLNM-YES!
2836 021730  103401                      BLO     SFT                ;NO
2837 021732  000773                      BR      1$                 ;NOT THERE YET
2838
2839 021734  010337  021746      SFT:    MOV     R3,LOG3+2          ;ERROR CODE
2840 021740  011137  021750              MOV     @R1,LOG3+4         ;DESCRIPTION
2841 021744                          LOG3:   ERRSOFT 0,LOG3,ERRDES
     021744  104457                                                      TRAP    C$ERSOFT
     021746  000000                                                      .WORD   0
     021750  021744                                                      .WORD   LOG3
     021752  022020                                                      .WORD   ERRDES
2842 021754  000414                          BR      LOGO               ;EXIT
2843 021756  010337  021770      HRD:    MOV     R3,LOG3B+2         ;HARD ERROR CODE
2844 021762  011137  021772              MOV     @R1,LOG3B+4        ;DESCRIPTION
2845 021766                          LOG3B:  ERRHRD  0,LOG3B,ERRDES
     021766  104456                                                      TRAP    C$ERHRD
     021770  000000                                                      .WORD   0
     021772  021766                                                      .WORD   LOG3B
     021774  022020                                                      .WORD   ERRDES
2846
2847 021776  011500      ABO:    MOV     @R5,R0             ;GET UNIT NUMBER
2848 022000  042700  177770      BIC     #177770,R0         ;UN-SIGN EXTEND
2849 022004                          DODU    R0                 ;USE LOGICAL # TO DROP
     022004  104451                                                      TRAP    C$DODU
2850 022006                  LOGO:   POP     R4                 ;RESTORE
2851 022010                          POP     R3
2852 022012                          POP     R1
2853 022014                          POP     R0
2854 022016                          RET                        ;RETURN
2855
```

```
                                        ;++
                                        ; ERRDES - CONTAINS CODE FOR EXTENDED ERROR INFORMATION:  DRIVE #,
                                        ;          BLOCK #, ETC.
                                        ;--

                                                BGNMSG  ERRDES          ;ERROR DESCRIPTION
                                                                                        ERRDES::
                                                PUSH    R0
                                                PUSH    R2
                                                CLR     R2              ;PRESET TO DATA TYPE
                                                BIT     #BIT4,@R5       ;WHAT PACK TYPE?
                                                BEQ     2$              ;DATA
                                                INC     R2              ;COMMAND
                                        2$:     PRINTB  #UNIT,<B,DR(R5)>,R2,<B,SYSTAT+1>
                                                                                        CLR     -(SP)
                                                                                        BISB    SYSTAT+1,(SP)
                                                                                        MOV     R2,-(SP)
                                                                                        CLR     -(SP)
                                                                                        BISB    DR(R5),(SP)
                                                                                        MOV     #UNIT,-(SP)
                                                                                        MOV     #4,-(SP)
                                                                                        MOV     SP,R0
                                                                                        TRAP    C$PNTB
                                                                                        ADD     #12,SP
                                                MOV     REC(R5),R0      ;RECORD NUMBER
                                                MOV     PATTEN(R5),R2   ;DATA EXPECTED
                                                PRINTB  #RECID,R0,<B,CMDSNT(R5)>,<B,R2>,<B,SUCCS+1(R5)>
                                                                                        CLR     -(SP)
                                                                                        BISB    SUCCS+1(R5),(SP)
                                                                                        CLR     -(SP)
                                                                                        BISB    R2,(SP)
                                                                                        CLR     -(SP)
                                                                                        BISB    CMDSNT(R5),(SP)
                                                                                        MOV     R0,-(SP)
                                                                                        MOV     #RECID,-(SP)
                                                                                        MOV     #5,-(SP)
                                                                                        MOV     SP,R0
                                                                                        TRAP    C$PNTB
                                                                                        ADD     #14,SP
                                                TST     DLV(R5)         ;DLV ERROR?
                                                BEQ     3$              ;NO
                                                PRINTB  #RECID2,DLV(R5) ;YES-PRINT
                                                                                        MOV     DLV(R5),-(SP)
                                                                                        MOV     #RECID2,-(SP)
                                                                                        MOV     #2,-(SP)
                                                                                        MOV     SP,R0
                                                                                        TRAP    C$PNTB
                                                                                        ADD     #6,SP
                                                CLR     DLV(R5)         ;RESET
                                        3$:     POP     R2              ;RESTORE
                                                POP     R0
                                                ENDMSG                  ;EXIT
                                                                                L10020:
                                                                                        TRAP    C$MSG
                                        UNIT::  .ASCIZ  /%ADRIVE#  %01%A  PAK SENT %01%A FLAG RCVD %03%N/
                                                .EVEN
                                        RECID:: .ASCIZ  /%ABLOCK#  %04%A COMMAND %02%A EXPCTD %03%A SUCCESS %03%N/
```

```
 2883                                           .EVEN
 2884 022364     103     101     116  OVRFLO:   .ASCIZ  /CAN'T UPDATE ERROR OR STATISTIC:OVERFLOW PENDING/
 2885                                           .EVEN
 2886 022446     045     101     040  RECID2:   .ASCIZ  /%A RCDB WAS %O6%N/
 2887                                           .EVEN
```

```
 2889                                   .SBTTL  WHCHDR /SEE WHICH DRIVE IS ACTIVE
 2890
 2891                                   ;+
 2892                                   ; INPUTS:  NONE
 2893                                   ; OUTPUTS:  CARRY=DRIVE (1 OR 0)
 2894                                   ;-
 2895
 2896
 2897 022470  000241                   WHCHDR: CLC                     ;CLEAR CARRY
 2898
 2899 022472  105765  000060                   TSTB    DR(R5)          ;DR 0?
 2900 022476  001401                           BEQ     2$              ;YES
 2901 022500  000261                           SEC                     ;NO
 2902
 2903 022502                            2$:     RET                     ;RETURN
 2904
```

```
                                .SBTTL  CHKSUM / FORM THE PACKET CHECKSUM

                                ;+
                                ; INPUTS:  R0 -> (POINTS TO) TOP OF PACKET
                                ;          R1 = # OF BYTES
                                ; OUTPUTS:  R0 -> WHERE TO PUT CHECKSUM
                                ;           R1 = CHECKSUM
                                ;-

022504                          CHKSUM: PUSH    R3
022506                                  PUSH    R2
022510  042737  000001  010124          BIC     #BIT0,SYSTAT    ;''CHECKSUM IS ODD'' BIT
022516  032701  000001                  BIT     #BIT0,R1        ;AN ODD # OF BYTES?
022522  001403                          BEQ     1$              ;NO
022524  052737  000001  010124          BIS     #BIT0,SYSTAT    ;YES

022532  006001                  1$:     ROR     R1              ;/2 FOR WORDS

022534  005003                  2$:     CLR     R3              ;PREP CHECKSUM WORD

022536  062003                  3$:     ADD     (R0)+,R3        ;FORM SUM
022540  005503                          ADC     R3              ;WITH CARRY
022542  005301                          DEC     R1              ;MORE WORDS?
022544  001374                          BNE     3$              ;YES

022546  032737  000001  010124          BIT     #BIT0,SYSTAT    ;WAS IT ODD
022554  001405                          BEQ     4$              ;NO
022556  112002                          MOVB    (R0)+,R2        ;YES GET NEXT BYTE
022560  042702  177400                  BIC     #177400,R2      ;UN-SIGN EXTEND
022564  060203                          ADD     R2,R3           ;ADD IT IN
022566  005503                          ADC     R3              ;AND CARRY JUST IN CASE

022570  010301                  4$:     MOV     R3,R1           ;RETURN IT IN CORRECT PLACE
022572                                  POP     R2              ;RESTORE
022574                                  POP     R3
022576                                  RET                     ;RETURN
```

```
                                .SBTTL  CKCKSM /MODULE TO CHECK THE CHKSUMS

                                ;+
                                ; INPUTS:  R4 = THE PACKET BYTE COUNT
                                ;          R0 -> THE PACKET TOP
                                ; OUTPUTS:  CARRY SET IF CHECKSUM CALC'D DOES NOT EQUAL CHECKSUM SENT
                                ;           R0 -> THE PACKET TOP
                                ;-


022600                          CKCKSM: PUSH    R1
022602                                  PUSH    R0              ;SAVE
022604  010401                          MOV     R4,R1           ;COPY BYTE COUNT TO CORRECT
022606  004737  022504                  CALL    CHKSUM          ;REGISTER FOR CHKSUM AND
                                                                ;FORM CHECKSUM

                                ;HERE R0 --> XMITTED CHKSUM, R1=CHKSUM CALC'D

022612  122001                          CMPB    (R0)+,R1        ;LOWER ORDER CHECK
022614  001005                          BNE     2$              ;WRONG

022616  000301                          SWAB    R1              ;OK-PREP FOR

022620  122001                          CMPB    (R0)+,R1        ;HIGH ORDER CHECK
022622  001002                          BNE     2$              ;WRONG
022624  000241                          CLC                     ;OK-CLEAR SAILING

022626  000401                          BR      3$              ;EXIT

022630  000261                  2$:     SEC                     ;LET ERROR BE KNOWN

022632                          3$:     POP     R0
022634                                  POP     R1
022636                                  RET                     ;RETURN
```

```
                                .SBTTL  DOBRK / MODULE TO INIT TU58 AND TEST INTERRUPTS

                                ;++
                                ; DOBRK - SEND RADIAL SERIAL 'BREAK'' TO DEVICE:
                                ;       - SET 'BREAK'' ON INTERFACE.
                                ;       - SEND 8. NULLS
                                ;       - CLEAR 'BREAK'' ON INTERFACE
                                ;       - SET VECTORS FOR RCV AND XMIT
                                ;       - SEND 2 BYTES OF ''INIT''
                                ;       - RECEIVE ''CONTINUE''
                                ;       - IF RECEIVE GARBAGE OR TIMEOUT - ERROR
                                ;       - CLEAR INTERRUPTS AND VECTORS
                                ; INPUTS:  @R5 BIT14 WAS SET - (SEND BREAK)
                                ; OUTPUTS: @R5 BIT14 CLEAR IF SUCCESSFUL INIT.
                                ;          SYSTAT+1 = RECEIVED BYTE
                                ;          ERRORS R4 = ERROR CODE:
                                ;                - SEND NOT READY TIMEOUT (TOSNDB)
                                ;                - NO RESPONSE
                                ;                - DLV ERROR
                                ;                - WRONG RESPONSE
                                ;--

022640  105037  023373          DOBRK:  CLRB    INITWD+1        ;CLEAR BYTE RECEIVE ADDR
022644  005037  023374                  CLR     BRKTO           ;CLEAR TIME OUT CONSTANT
022650  052775  000001  000026        BIS     #BIT0,@XMSR(R5) ;SET 'BREAK'
022656  012765  000001  000100        MOV     #R$$NIT,CMDSNT(R5)  ;SAY WE SENT 'INIT'
022664  052715  000020                BIS     #BIT4,@R5       ;PAK SENT TYPE =COMMAND, SORT OF
022670  012704  000010                MOV     #8.,R4          ;BREAK-IT'S-BACK COUNT=8
022674                          1$:     BREAK                   ;SUPERVISOR TAKE FIVE
022674  104422                                                                  TRAP    C$BRK
                                                                ;FOR ^C CHECK, ETC.
022676  105775  000026                TSTB    @XMSR(R5)       ;READY?
022702  100410                        BMI     4$              ;YES
022704  005337  023374                DEC     BRKTO           ;NO,TIME OUT?
022710  001371                        BNE     1$              ;NO
022712  012704  000056                MOV     #TOSNDB,R4      ;YES, SET ERROR CODE
022716  004737  021464                CALL    LOG             ;LOG IT
022722  000535                        BR      3$              ;EXIT
022724  113775  023370  000030  4$:   MOVB    BRKWD,@XMDB(R5) ;SEND NULL
022732  005037  023374                CLR     BRKTO           ;RESET TIME OUT
022736  005304                        DEC     R4              ;MORE NULLS TO SEND?
022740  001355                        BNE     1$              ;YES
022742  005075  000026                CLR     @XMSR(R5)       ;NO, CLEAR 'BREAK'
022746  017500  000024                MOV     @RCDB(R5),R0    ;HEAVE 'GARBAGE' 1ST BYTE
022752                                SETPRI  #PRI00          ;SET TO INTERRUPT FO SURE
022752  012700  000000                                                    MOV     #PRI00,R0
022756  104441                                                            TRAP    C$SPRI
022760                                SETVEC  TUVECT(R5),#RCVINT,#PRI07 ;SET VECTO INFO
022760  012746  000340                                                    MOV     #PRI07,-(SP)
022764  012746  023300                                                    MOV     #RCVINT,-(SP)
022770  016546  000204                                                    MOV     TUVECT(R5),-(SP)
022774  012746  000003                                                    MOV     #3,-(SP)
023000  104437                                                            TRAP    C$SVEC
023002  062706  000010                                                    ADD     #10,SP
023006  062765  000004  000204        ADD     #4,TUVECT(R5)   ;AND INC TO SND VECTOR
023014                                SETVEC  TUVECT(R5),#SNDINT,#PRI07;AND SET IT
023014  012746  000340                                                    MOV     #PRI07,-(SP)
```

```
        023020  012746  023264                                                          MOV     #SNDINT,-(SP)
        023024  016546  000204                                                          MOV     TUVECT(R5),-(SP)
        023030  012746  000003                                                          MOV     #3,-(SP)
        023034  104437                                                                  TRAP    C$SVEC
        023036  062706  000010                                                          ADD     #10,SP
  3028  023042  162765  000004  000204          SUB     #4,TUVECT(R5)   ;RESET VECTOR ADDR.
  3029  023050  005037  023374                  CLR     BRKTO           ;RESET TIME OUT
  3030  023054  012704  023372                  MOV     #INITWD,R4      ;USE ADDR. FOR SNDBYT
  3031  023060  010437  023376                  MOV     R4,BRKPTR       ;AND SAVE FOR 'WAIT'
  3032  023064  052775  000100  000026          BIS     #BIT6,@XMSR(R5) ;ENABLE INTER.
  3033  023072  004737  023334                  CALL    WAIT            ;AND ENTER LOOP
  3034  023076  005715                          TST     @R5             ;TIME OUT?
  3035  023100  100446                          BMI     3$              ;YES-EXIT
  3036
  3037  023102  005037  023374                  CLR     BRKTO           ;RESET TIME OUT
  3038  023106  012704  023372                  MOV     #INITWD,R4      ;SEND SECOND INIT
  3039  023112  010437  023376                  MOV     R4,BRKPTR       ;SAVE POINTER AGAIN
  3040  023116  052775  000100  000026          BIS     #BIT6,@XMSR(R5) ;AND THEN ENABLE INT
  3041  023124  004737  023334                  CALL    WAIT            ;AND WAIT
  3042  023130  005715                          TST     @R5             ;IF ABORTED
  3043  023132  100431                          BMI     3$              ;THEN EXIT
  3044
  3045  023134  012704  023373                  MOV     #INITWD+1,R4    ;WHERE RESPONSE WILL GO (ADDRESS)
  3046  023140  010437  023376                  MOV     R4,BRKPTR       ;AND FOR 'WAIT'
  3047  023144  052775  000100  000022          BIS     #BIT6,@RCSR(R5) ;ENABLE RECIEVE INT.
  3048  023152  004737  023334                  CALL    WAIT            ;GET ANSWER
  3049  023156  005715                          TST     @R5             ;ABORTED?
  3050  023160  100416                          BMI     3$              ;YES.
  3051
  3052  023162  123727  023373  000020          CMPB    INITWD+1,#R$CONT  ;NO, IS IT 'CONTINUE'?
  3053  023170  001003                          BNE     2$              ;NOPE-ERROR
  3054
  3055  023172  042715  040000                  BIC     #BIT14,@R5      ;SUCCESSFUL, CLEAR DOBREAK FLAG
  3056  023176  000407                          BR      3$              ;EXIT
  3057
  3058  023200  113737  023373  010125  2$:     MOVB    INITWD+1,SYSTAT+1       ;SAVE BUM RESPONSE
  3059  023206  012704  000032                  MOV     #CNINIT,R4              ;CAN'T INIT CODE
  3060  023212  004737  021464                  CALL    LOG             ;LOG IT
  3061                                                                  ;SCHEDULER WILL TRY AGAIN IF NOT ABORTED
  3062
  3063  023216  042775  000100  000026  3$:     BIC     #BIT6,@XMSR(R5) ;CLEAR INTERRUPTS
  3064  023224  042775  000100  000022          BIC     #BIT6,@RCSR(R5) ; AND FOR RECIEVE
  3065  023232                                  CLRVEC  TUVECT(R5)      ;RELEASE RECIEVE VECT.
        023232  016500  000204                                                          MOV     TUVECT(R5),R0
        023236  104436                                                                  TRAP    C$CVEC
  3066  023240  062765  000004  000204          ADD     #4,TUVECT(R5)   ;AND GET SEND ADDR.
  3067  023246                                  CLRVEC  TUVECT(R5)      ;AND RELEASE IT
        023246  016500  000204                                                          MOV     TUVECT(R5),R0
        023252  104436                                                                  TRAP    C$CVEC
  3068  023254  162765  000004  000204          SUB     #4,TUVECT(R5)   ;RESTORE POINTER
  3069  023262                                  RET                     ;RETURN
```

```
                                .SBTTL  INTERRUPT SERVICE ROUTINE

023264                          BGNSRV  SNDINT                  ;''SEND'' INTERRUPT SERVICE:
023264                                                                                  SNDINT::

023264  042775  000100  000026  SNDHND: BIC     #BIT6,@XMSR(R5) ;DISABLE INTERRUPT
023272  112475  000030                 MOVB    (R4)+,@XMDB(R5);OUTPUT BYTE
023276                          ENDSRV
023276                                                                                  L10021:
023276  000002                                                                                  RTI

023300                          BGNSRV  RCVINT                  ;''RCV'' INTERRUPT SERVICE:
023300                                                                                  RCVINT::

023300  042775  000100  000022  RCVHND: BIC     #BIT6,@RCSR(R5) ;DISABLE INTS
023306  017565  000024  000074         MOV     @RCDB(R5),DLV(R5)       ;SAVE BYTE
023314  116524  000074                 MOVB    DLV(R5),(R4)+   ;BYTE TO BUFFER
023320  005765  000074                 TST     DLV(R5)         ;ERROR?
023324  100402                         BMI     10$             ;YES
023326  005065  000074                 CLR     DLV(R5)         ;NO CLEAR ERROR
023332                          10$:
023332                          ENDSRV
023332                                                                                  L10022:
023332  000002                                                                                  RTI

023334  000240                  WAIT:   NOP                     ;WAIT  LOOP FOR
                                                                ;INTERRUPT SERVICING
023336  020437  023376                 CMP     R4,BRKPTR       ;IF=,THEN NO INTERRUPT
023342  001011                         BNE     1$              ;GOT ONE!
023344                                 BREAK                   ;SUPERVISOR BREAK
023344  104422                                                                          TRAP    C$BRK
023346                                 BREAK                   ;KILL SOME TIME
023346  104422                                                                          TRAP    C$BRK
023350  005337  023374                 DEC     BRKTO           ;TIME OUT?
023354  001367                         BNE     WAIT            ;NO...CONT.
023356  012704  000050                 MOV     #TORCVB,R4      ;YES LOAD ERROR #
023362  004737  021464                 CALL    LOG             ;LOG IT
023366                          1$:     RET                     ;RETURN

023370  000000                  BRKWD:  .WORD   0               ;NULL
023372     004                  INITWD: .BYTE   R$INIT          ;INIT COMMAND
023373     000                          .BYTE   0               ;R$CONT IS EXPECTED HERE
023374  000000                  BRKTO:  .WORD   0               ;TIME OUT
023376  000000                  BRKPTR: .WORD   0               ;POINTER TO INITWD
```

```
                                        .SBTTL  COMPAR/DATA COMPARISON MODULE

                                        ;++
                                        ; COMPAR - IF ''COMPARE_DATA'' SELECTED, COMPARE EACH DATA BYTE OF PACKET
                                        ;          TO PATTEN(R5).  SAVE NUMBER OF BYTES NOT CORRECT.  IF NOT
                                        ;          0, PRINT SOFT ERROR AND TOTAL # WRONG BYTES.  SET 'BAD_DATA_
                                        ;          IN_PACKET'' BIT (BIT6 @R5) FOR HIGHER LEVEL MODULES.
                                        ; INPUTS:  - (CMPDAT) FLAG TO NOT COMPARE (=1)
                                        ;          - PKPTR(R5) POINTS TO DATA PACK.
                                        ; OUTPUTS: - BIT6 @R5 ADJUSTED.
                                        ;--

023400                          COMPAR: PUSH    R0              ;COMPARE DATA IS DATA PACKET
023402                                  PUSH    R4              ;TO PATTERN WRITTEN
023404                                  PUSH    R1              ;USING BYTE COUNT IN PACKET
023406  005037  023556                  CLR     BDBYTS          ;CLEAR TOTAL WRONG
023412  016504  000104                  MOV     PKPTR(R5),R4    ;GET TOP OF PACKET
023416  005737  002212                  TST     CMPDAT          ;COMPARE SELECTED?
023422  001451                          BEQ     4$              ;NO-EXIT
023424  005204                          INC     R4              ;YES, LOCATE COUNT
023426  111401                          MOVB    @R4,R1          ;GET IT
023430  042701  177400                  BIC     #177400,R1      ;SIGN-UNEXTEND
                                                                ;MUST TEST BYTE-WISE...
023434  005204                          INC     R4              ;-->FIRST DATA  BYTE
023436  126524  000072          1$:     CMPB    PATTEN(R5),(R4)+  ;DATA-WHAT WAS EXPECTED?
023442  001402                          BEQ     2$              ;YES
023444  005237  023556                  INC     BDBYTS          ;NO, INCREMENT TOTAL WRONG
023450  005301                  2$:     DEC     R1              ;MORE LEFT?
023452  001371                          BNE     1$              ;YES
023454  005737  023556                  TST     BDBYTS          ;ANY WRONG?
023460  001432                          BEQ     4$              ;NO
023462  011537  002074                  MOV     @R5,L$LUN       ;GET UNIT NUMBER
023466  042737  177770  002074          BIC     #177770,L$LUN   ;MASK IT OFF
023474                                  ERRSOFT 0.,M$BDA,ERRDES  ;YES-PRINT 'BAD DATA IN PACKET' ERROR
023474  104457                                                          TRAP    C$ERSOFT
023476  000000                                                          .WORD   0
023500  007156                                                          .WORD   M$BDA
023502  022020                                                          .WORD   ERRDES
023504                                  PRINTB  #DESC,BDBYTS
023504  013746  023556                                                  MOV     BDBYTS,-(SP)
023510  012746  023560                                                  MOV     #DESC,-(SP)
023514  012746  000002                                                  MOV     #2,-(SP)
023520  010600                                                          MOV     SP,R0
023522  104414                                                          TRAP    C$PNTB
023524  062706  000006                                                  ADD     #6,SP
023530  052715  000100                  BIS     #BIT6,@R5       ;LET 'EM KNOW UPSTAIRS-BAD DATA FLAG
023534  012737  000204  010154          MOV     #132.,PRNSIZ    ;SIZE IS ONE DATA PACK
023542  004737  023614                  CALL    PRNPAK          ;AND PRINT THE PACKET
023546                          4$:     POP     R1              ;RESTORE
023550                                  POP     R4
023552                                  POP     R0

023554                                  RET

023556  000000                  BDBYTS: .WORD
023560     045     101     124  DESC:   .ASCIZ  /%ATOTAL BAD BYTES- %D3%A.%N/
                                        .EVEN
```

```
                        .SBTTL  PRNPAK/MODULE TO PRINT DATA PACKET

                        ;++
                        ; PRNPAK - IF PRINT_DATA_PACK_ON_ERROR SELECTED: PRINT EACH BYTE OF PACKET
                        ;          TO BY PKPTR(R5).
                        ; INPUTS:  PRNSIZ - # OF BYTES IN PACKET.
                        ; OUTPUTS: NONE
                        ;--

023614  000240          PRNPAK: NOP                     ;PRINTS 1 PACKET
                                                        ;PKPTR(R5)->TOP OF PACKET
                                                        ;PRNSIZ (PASSED)=BYTE COUNT
023616                          PUSH    R0
023620                          PUSH    R4
023622  105737  002210          TSTB    PRBUF           ;PRINT PACKET SELECTED?
023626  001451                  BEQ     4$              ;NO
023630  016504  000104          MOV     PKPTR(R5),R4    ;YES-GET TOP OF PACK
023634  012737  000020  023760  1$:     MOV     #16.,LNCNT      ;16 BYTES PER LINE
023642  112437  023762          2$:     MOVB    (R4)+,PRDAT     ;AVOID SIGN EXTEND
023646                          PRINTF  #PRFORM,<B,PRDAT>  ;PRINT BYTE
        023646  005046                                                  CLR     -(SP)
        023650  153716  023762                                          BISB    PRDAT,(SP)
        023654  012746  023764                                          MOV     #PRFORM,-(SP)
        023660  012746  000002                                          MOV     #2,-(SP)
        023664  010600                                                  MOV     SP,R0
        023666  104417                                                  TRAP    C$PNTF
        023670  062706  000006                                          ADD     #6,SP
023674  005337  010154                  DEC     PRNSIZ          ;ONE LESS
023700  001414                  BEQ     3$              ;NO MORE
023702  005337  023760          DEC     LNCNT           ;NEW LINE?
023706  001355                  BNE     2$              ;NOT YET
023710                          PRINTF  #CARLF          ;YES
        023710  012746  023774                                          MOV     #CARLF,-(SP)
        023714  012746  000001                                          MOV     #1,-(SP)
        023720  010600                                                  MOV     SP,R0
        023722  104417                                                  TRAP    C$PNTF
        023724  062706  000004                                          ADD     #4,SP
023730  000741                  BR      1$              ;NEXT LINE
023732                  3$:     PRINTF  #CARLF          ;FINISH UP
        023732  012746  023774                                          MOV     #CARLF,-(SP)
        023736  012746  000001                                          MOV     #1,-(SP)
        023742  010600                                                  MOV     SP,R0
        023744  104417                                                  TRAP    C$PNTF
        023746  062706  000004                                          ADD     #4,SP
023752                  4$:     POP     R4
023754                          POP     R0
023756                          RET                     ;RETURN

023760  000000          LNCNT:  .WORD
023762  000000          PRDAT:  .WORD
023764     045     117     063  PRFORM: .ASCIZ  /%03%A /
                                .EVEN
023774     045     116     000  CARLF:  .ASCIZ  /%N/
                                .EVEN
```

```
                                .SBTTL  PATCH AREA
000144                          .REPT   100.
                                .WORD
                                .ENDR
```

```
                                .SBTTL  I/O BUFFER AREAS:

                                ;WHO-GETS-WHAT-SPACE TABLE

024310  025370                BUFTBL: .WORD   BUF0
024312  026426                        .WORD   BUF1
024314  027464                        .WORD   BUF2
024316  030522                        .WORD   BUF3
024320  031560                        .WORD   BUF4
024322  032616                        .WORD   BUF5
024324  033654                        .WORD   BUF6
024326  034712                        .WORD   BUF7

                                ;-----------------------------------------------------------------
                                ;ONLY 1 TRANSMIT BUFFER NECESSARY:

024330      023                         .BYTE R$XOFF
024331      023                         .BYTE R$XOFF    ;SEND XOFF BEFORE EVERY PACKET

024332                                  $TRBUF: .BLKB RCBFSZ
                                ;-----------------------------------------------------------------


025370                          BUF0:   .BLKB   RCBFSZ
026426                          BUF1:   .BLKB   RCBFSZ
027464                          BUF2:   .BLKB   RCBFSZ
030522                          BUF3:   .BLKB   RCBFSZ
031560                          BUF4:   .BLKB   RCBFSZ
032616                          BUF5:   .BLKB   RCBFSZ
033654                          BUF6:   .BLKB   RCBFSZ
034712                          BUF7:   .BLKB   RCBFSZ

                                ;-----------------------------------------------------------------
```

I/O BUFFER AREAS:

SEQ 0082

```
    3256 035750                                 ENDMOD
    3257
```

```
                                .TITLE PARAMETER CODING

                                .SBTTL  HARDWARE PARAMETER CODING SECTION

                                        BGNMOD

                                ;++
                                ; 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.
                                ;--

                                        BGNHRD
035750  000021                                                    .WORD L10023-L$HARD/2
035752                                                      L$HARD::

                                        GPRMA   MSG1,0,0,160000,177777,YES
035752  000031                                                  .WORD   T$CODE
035754  036014                                                  .WORD   MSG1
035756  160000                                                  .WORD   T$LOLIM
035760  177777                                                  .WORD   T$HILIM
                                        GPRMA   MSG1B,2,0,0,776,YES
035762  001031                                                  .WORD   T$CODE
035764  036025                                                  .WORD   MSG1B
035766  000000                                                  .WORD   T$LOLIM
035770  000776                                                  .WORD   T$HILIM
                                        GPRML   MSG1C,6,1,YES
035772  003130                                                  .WORD   T$CODE
035774  036042                                                  .WORD   MSG1C
035776  000001                                                  .WORD   1
                                        GPRML   MSG2,4,1,YES
036000  002130                                                  .WORD   T$CODE
036002  036073                                                  .WORD   MSG2
036004  000001                                                  .WORD   1
                                        GPRML   MSG3,4,2,YES
036006  002130                                                  .WORD   T$CODE
036010  036110                                                  .WORD   MSG3
036012  000002                                                  .WORD   2

                                        ENDHRD

                                                                .EVEN
036014                                                      L10023:

036014  124  125  065  MSG1:   .ASCIZ  /TU58 CSR/
036025  126  105  103  MSG1B:  .ASCIZ  /VECTOR ADDR./
036042  120  104  124  MSG1C:  .ASCIZ  /PDT (PARALLEL) INTERFACE/
036073  124  105  123  MSG2:   .ASCIZ  /TEST DRIVE 0/
036110  124  105  123  MSG3:   .ASCIZ  /TEST DRIVE 1/
                                .EVEN
```

```
                                        .SBTTL  SOFTWARE PARAMETER CODING SECTION

                                        ;++
                                        ; 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.
                                        ;--

                                                BGNSFT
                                                                                .WORD L10024-L$SOFT/2
                                                                        L$SOFT::
                                                GPRMD   MSG4,0,D,1777,8.,,512.,,YES
                                                                                .WORD   T$CODE
                                                                                .WORD   MSG4
                                                                                .WORD   1777
                                                                                .WORD   T$LOLIM
                                                                                .WORD   T$HILIM
                                                GPRML   MSG4B,10,1,YES
                                                                                .WORD   T$CODE
                                                                                .WORD   MSG4B
                                                                                .WORD   1
                                                GPRML   MSG5,2,1,YES
                                                                                .WORD   T$CODE
                                                                                .WORD   MSG5
                                                                                .WORD   1
                                                GPRML   MSG6,6,1,YES
                                                                                .WORD   T$CODE
                                                                                .WORD   MSG6
                                                                                .WORD   1
                                                GPRML   MSG7,4,1,YES
                                                                                .WORD   T$CODE
                                                                                .WORD   MSG7
                                                                                .WORD   1

                                                GPRMD   MSG8,10.,,D,377,1,254.,,YES
                                                                                .WORD   T$CODE
                                                                                .WORD   MSG8
                                                                                .WORD   377
                                                                                .WORD   T$LOLIM
                                                                                .WORD   T$HILIM

                                        SFTOUT: ENDSFT
                                                                                .EVEN
                                                                        L10024:

                                        MSG4:   .ASCIZ  'NUMBER OF BLOCKS:TEST 4-7 (8 TO 512)'
                                        MSG4B:  .ASCIZ  /ADD DR # TO DATA PATTERN:TEST 4-7/
                                        MSG5:   .ASCIZ  /STATISTICS PRINTED AT EOP/
                                        MSG6:   .ASCIZ  /COMPARE DATA ON READ/
                                        MSG7:   .ASCIZ  /PRINT PACKET ON ERROR/
                                        MSG8:   .ASCIZ  /# ERRORS = DVC FATAL IF 'EVL'SET/
                                                .EVEN
                                                .REPT   14.             ;LASTAD CORRECTION
```

```
3382                                    .WORD
3383                                    .ENDR
3390 036516                             LAST'AD

                                                                .EVEN
     036516  000000                                           .WORD   0
     036520  000000                                           .WORD   0
     036522                         L$LAST::
3391 036522                             ENDMOD
3392         000001                     .END
```

PARAMETER CODING MACRO M1110 12-JUN-79 12:23 PAGE 60-2
SYMBOL TABLE SEQ 0086

```
ABNDX = 000004          CHKEND  020154          C$PNTB= 000014          E$SK   = 177740          G$RADB= 000000
ABO     021776          CHKERR  020242          C$PNTF= 000017          E$SLF  = 177777          G$RADD= 000040
ABOMSG  004674          CHKPKS  017620          C$PNTS= 000016          E$TRY  = 000001          G$RADL= 000120
ABONM   010442          CHKPTR  017616          C$PNTX= 000015          E$WLOC= 177765          G$RADO= 000020
ADR   = 000020 G        CHKREE  020314          C$QIO  = 000377         E$WR   = 177757          G$XFER= 000004
ASSEMB= 000010          CHKRET  020660          C$RCVB  010160          FLGLOC  004400 G        G$YES  = 000010
BDATA = 000134          CHKSUC  021154          C$RDBU= 000007          FM      003372          HARDR  = 000136
BDBYTS  023556          CHKSUM  022504          C$REFG= 000047          FMO     003354          HARDW  = 000140
BDCHK = 000022          CHK8    017550          C$RESE= 000033          FTLNM   010136          HELP   = 000000
BDCOM = 000014          CKCKSM  022600          C$REVI= 000003          F$AU   = 000015         HOE    = 100000 G
BIT0  = 000001 G        CLRALL  002420 G        C$RFLA= 000021          F$AUTO= 000020          HRD     021756
BIT00 = 000001 G        CLRBUF  002460 G        C$RPT  = 000025         F$BGN  = 000040         HRDRD  = 000016
BIT01 = 000002 G        CLRPTR  002512          C$SEFG= 000046          F$CLEA= 000007          HRDWR  = 000020
BIT02 = 000004 G        CMDSNT= 000100          C$SPRI= 000041          F$DU   = 000016         HRD1    020602
BIT03 = 000010 G        CMNDER= 000040          C$SVEC= 000037          F$END  = 000041         IBE    = 010000 G
BIT04 = 000020 G        CMPDAT  002212          C$TPRI= 000013          F$HARD= 000004          IDPTR   010142
BIT05 = 000040 G        CNINIT= 000032          DESC    023560          F$HW   = 000013         IDU    = 000040 G
BIT06 = 000100 G        COMPAR  023400          DEVPTR  010130          F$INIT= 000006          IER    = 020000 G
BIT07 = 000200 G        C$AU   = 000052         DEV0    004744          F$JMP  = 000050         INIT    003626
BIT08 = 000400 G        C$AUTO= 000061          DEV1    005154          F$MOD  = 000000         INITWD  023372
BIT09 = 001000 G        C$BRK  = 000022         DEV2    005364          F$MSG  = 000011         INIT2   003650
BIT1  = 000002 G        C$BSEG= 000004          DEV3    005574          F$PROT= 000021          ISR    = 000100 G
BIT10 = 002000 G        C$BSUB= 000002          DEV4    006004          F$PWR  = 000017         IXE    = 004000 G
BIT11 = 004000 G        C$CEFG= 000045          DEV5    006214          F$RPT  = 000012         I$AU   = 000041
BIT12 = 010000 G        C$CLCK= 000062          DEV6    006424          F$SEG  = 000003         I$AUTO= 000041
BIT13 = 020000 G        C$CLEA= 000012          DEV7    006634          F$SOFT= 000005          I$CLN  = 000041
BIT14 = 040000 G        C$CLOS= 000035          DFPTBL  002172 G        F$SRV  = 000010         I$DU   = 000041
BIT15 = 100000 G        C$CLP1= 000006          DFTL1   021624          F$SUB  = 000002         I$HRD  = 000041
BIT2  = 000004 G        C$CVEC= 000036          DIAGMC= 000000          F$SW   = 000014         I$INIT= 000041
BIT3  = 000010 G        C$DCLN= 000044          DLV    = 000074         F$TEST= 000001          I$MOD  = 000041
BIT4  = 000020 G        C$DODU= 000051          DOBRK   022640          GBTMP   017524          I$MSG  = 000041
BIT5  = 000040 G        C$DRPT= 000024          DONE    010140          GBTMP2  017526          I$PROT= 000040
BIT6  = 000100 G        C$DU   = 000053         DR     = 000060         GETANS  016354          I$PTAB= 000041
BIT7  = 000200 G        C$EDIT= 000003          DRVCHK  002214          GETHRD  003754          I$PWR  = 000041
BIT8  = 000400 G        C$ERDF= 000055          EF.CON= 000036 G        GETPTR  016420          I$RPT  = 000041
BIT9  = 001000 G        C$ERHR= 000056          EF.NEW= 000035 G        GETR5   004642          I$SEG  = 000041
BLKEND= 000202          C$ERRO= 000060          EF.PWR= 000034 G        GTAGIN  016642          I$SETU= 000041
BLKER   010150          C$ERSF= 000054          EF.RES= 000037 G        GTBYTE  017300          I$SFT  = 000041
BLKSIZ= 000210          C$ERSO= 000057          EF.STA= 000040 G        GTDOWN  017152          I$SRV  = 000041
BLKTBL  004724          C$ESCA= 000010          ERRDES  022020 G        GTOK    017070          I$SUB  = 000041
BOE   = 000400 G        C$ESEG= 000005          EVL    = 000004 G       GTPKS1  016422          I$TST  = 000041
BRKPTR  023376          C$ESUB= 000003          EVLTHR  002216          GTPKS8  016632          J$JMP  = 000167
BRKTO   023374          C$ETST= 000001          EXOFF   016631          GTPTR   017276          LENGTH  002204
BRKWD   023370          C$EXIT= 000032          EXON    016630          GTUM    017032          LGOFST= 000120
BUFTBL  024310          C$GETB= 000026          E$ABO  = 177720         G$CNTO= 000200          LNCNT   023760
BUF0    025370          C$GETW= 000027          E$CKS  = 177757         G$DELM= 000372          LOE    = 040000 G
BUF1    026426          C$GMAN= 000043          E$CKSM= 177757          G$DISP= 000003          LOG     021464
BUF2    027464          C$GPHR= 000042          E$CMD  = 177720         G$EXCP= 000400          LOGO    022006
BUF3    030522          C$GPLO= 000030          E$END  = 002100         G$HILI= 000002          LOGOK   021552
BUF4    031560          C$GPRI= 000040          E$LOAD= 000035          G$LOLI= 000001          LOGOK2  021636
BUF5    032616          C$INIT= 000011          E$NCRT= 177767          G$NO   = 000000         LOG0    021540
BUF6    033654          C$INLP= 000020          E$NOMO= 177737          G$OFFS= 000400          LOG1    021654
BUF7    034712          C$MANI= 000050          E$NONX= 177770          G$OFSI= 000376          LOG2    021704
CARLF   023774          C$MEM  = 000031         E$OK   = 000000         G$PRMA= 000001          LOG3    021744
CHECK   003732          C$MSG  = 000023         E$PART= 177776          G$PRMD= 000002          LOG3B   021766
CHKANR  017614          C$NRDY  010156          E$RD   = 177757         G$PRML= 000000          LOT    = 000010 G
CHKANS  017530          C$OPEN= 000034          E$REC  = 177711         G$RADA= 000140          LSTDEV  004742
```

```
L$ACP   002110 G    L10005  004506    NOMOT = 000030    RECOV   020700    SVCGBL= 000000
L$APT   002036 G    L10006  004574    NOUNIT= 000036    RETERR  021102    SVCINS= 000001
L$AU    004722 G    L10007  004640    NOXOFF  016046   RETRY = 000002    SVCSUB= 000001
L$AUT   002070 G    L10010  004722    NTSFT   021666   RLUN    003236    SVCTAG= 000001
L$AUTO  004402 G    L10011  010540    NXTRET  010440   RPTR    003240    SVCTST= 000001
L$CCP   002106 G    L10012  010730    NXTST   010162   RSNTAB  007044    SWAPDR  002240 G
L$CLEA  004564 G    L10013  011170    NXTST2  010266   RSVP    016002    SWPTR   002340
L$CO    002032 G    L10014  012562    ONEFIL= 000001    RTRYN   021040    SYSTAT  010124
L$DEPO  002011 G    L10015  013532    OTL   = 000052    RUN     002562 G  S$LSYM= 010000
L$DESC  002122 G    L10016  014312    OVRFLO  022364   R$CMND= 000002    TAPLEN  010126
L$DESP  002076 G    L10017  015262    OVRN  = 000012    R$CONT= 000020    THRSHI  021006
L$DEVP  002060 G    L10020  022210    O$APTS= 000000    R$DASZ= 000204    THRSLO  020760
L$DISP  002152 G    L10021  023276    O$AU  = 000001    R$DATA= 000001    TMP   = 000066
L$DLY   002116 G    L10022  023332    O$BGNR= 000001    R$DNSZ= 000222    TOMANY  004312
L$DTP   002040 G    L10023  036014    O$BGNS= 000001    R$END = 000002    TORCVB= 000050
L$DTYP  002034 G    L10024  036204    O$DU  = 000001    R$INIT= 000004    TOSNDB= 000056
L$DU    004576 G    MABEE   021716    O$ERRT= 000000    R$MSIZ= 000012    TRK   = 000062
L$DUT   002072 G    MSG1    036014    O$GNSW= 000001    P$NDSZ= 000016    TRPHND  004512
L$DVTY  002220 G    MSG1B   036025    O$POIN= 000001    R$SNSZ= 000016    TRPPTR  004510
L$EF    002052 G    MSG1C   036042    O$SETU= 000000    R$XOFF= 000023    TSTPC = 000020
L$ENVI  002044 G    MSG2    036073    PARTL = 000034    R$XON = 000020    TSTTOP  010144
L$ETP   002102 G    MSG3    036110    PATTEN= 000072    R$$END= 000100    TST1    010542
L$EXP1  002046 G    MSG4    036204    PDTFLG  004376 G  R$$NIT= 000001    TST2    010732
L$EXP4  002064 G    MSG4B   036251    PERDEV  010300    R$$NOP= 000000    TST3    011172
L$EXP5  002066 G    MSG5    036313    PKPTR = 000104    R$$RD = 000002    TST3PT  012510
L$HARD  035752 G    MSG6    036345    PNT   = 001000 G  R$$SEK= 000005    TST4    012564
L$HIME  002120 G    MSG7    036372    PRBUF   002210    R$$SLF= 000007    TST4EX  013464
L$HPCP  002016 G    MSG8    036420    PRDAT   023762    R$$WR = 000003    TST5    013534
L$HPTP  002022 G    MXRTRY  010146    PRFORM  023764    SECREC  010152    TST5EX  014244
L$HW    002172 G    M$AUTO  004544    PRI   = 002000 G  SERVST  017274    TST6    014314
L$ICP   002104 G    M$BDA   007156    PRI00 = 000000 G  SETDR   002342 G  TST6EX  015214
L$INIT  003626 G    M$CMD   007522    PRI01 = 000040 G  SETLEN  004252    TST7    015264
L$LADP  002026 G    M$COM   007222    PRI02 = 000100 G  SETPTR  002416    TST7EX  015774
L$LAST  036522 G    M$HCHK  007374    PRI03 = 000140 G  SETSRV  017210    TUVECT= 000204
L$LOAD  002100 G    M$HDRD  007772    PRI04 = 000200 G  SETUP   002514 G  T$ARGC= 000001
L$LUN   002074 G    M$HDWR  010034    PRI05 = 000240 G  SFPTBL  002204 G  T$CODE= 005052
L$MREV  002050 G    M$NIT   007436    PRI06 = 000300 G  SFT     021734    T$ERRN= 000000
L$NAME  002000 G    M$NLOG  007140    PRI07 = 000340 G  SFTOUT  036204    T$EXCP= 000000
L$PRIO  002042 G    M$NOMO  007264    PRNPAK  023614    SFTRD = 000002    T$GMAN= 000000
L$PROT  002142 G    M$NOTP  007302    PRNSIZ  010154    SFTWR = 000004    T$HILI= 000376
L$PRT   002112 G    M$NRSP  007602    PTR     004672    SKERR = 000024    T$LAST= 000001
L$REPP  002062 G    M$OVRN  010076    RCBCNT  010134    SLFER = 000044    T$LOLI= 000001
L$REV   002010 G    M$PART  007452    RCBFSZ= 001036 G  SND     016052    T$LSYM= 010000
L$RPT   002612 G    M$QRSP  007616    RCDB  = 000024    SNDBYT  016304    T$LTNO= 000007
L$SOFT  036130 G    M$REC   007536    RCFLG   010132    SNDCNT= 000070    T$NEST= 177777
L$SPC   002056 G    M$RNIT  007354    RCINIT= 000006    SNDHND  023264    T$NS0 = 000000
L$SPCP  002020 G    M$SELF  007202    RCSR  = 000022    SNDINT  023264 G  T$NS1 = 000005
L$SPTP  002024 G    M$SFRD  007672    RCVBUF= 000102    SOFTR = 000122    T$PTNU= 000000
L$STA   002030 G    M$SFWR  007732    RCVHND  023300    SOFTW = 000124    T$SAVL= 177777
L$SW    002204 G    M$SKER  007124    RCVINT  023300 G  SRVTBL  017254    T$SEGL= 177777
L$TEST  002114 G    M$TOSN  007650    RDN0  = 000114    STAEOP  002206    T$SUBN= 000000
L$TIML  002014 G    M$UNIT  007474    RDN1  = 000116    STATHD  003242    T$TAGL= 177777
L$UNIT  002012 G    M$WPRO  007332    REC   = 000064    STATUS= 000000    T$TAGN= 010025
L10001  002202      M$WRSP  007556    RECDAT  011114    STHD2   003516    T$TEMP= 000000
L10002  002220      NCART = 000054    RECERR= 000042    STRT    004374 G  T$TEST= 000007
L10003  003234      NODRVS  004342    RECID   022272 G  SUCCS = 000076    T$TSTM= 177777
L10004  004310      NOMOR   010444    RECID2  022446    SUCOTL= 000046    T$TSTS= 000001
```

```
T$$AU = 010010          T$$RPT= 010003          T4      012522 G        UNXPCT  016774          X$ALWA= 000000
T$$AUT= 010005          T$$SOF= 010024          T4TRY = 000132          WAIT    023334          X$CNT = 000036
T$$CLE= 010006          T$$SRV= 010022          T5      013472 G        WHCHDR  022470          X$FALS= 000040
T$$DU = 010007          T$$SW = 010002          T6      014252 G        WRLOCK= 000026          X$FLG = 000034
T$$HAR= 010023          T$$TES= 010017          T7      015222 G        WRTN0 = 000110          X$OFFS= 000400
T$$HW = 010001          T1      010500 G        UAM   = 000200 G        WRTN1 = 000112          X$PKNM= 000032
T$$INI= 010004          T1TRY = 000146          UNIT    022212 G        XFNSND  016034          X$PTR = 000106
T$$MSG= 010020          T2      010670 G        UNREC   021060          XMDB  = 000030          X$TRUE= 000020
T$$PRO= 010000          T3      011130 G        UNSUC   020456          XMSR  = 000026          $TRBUF  024332

. ABS.  036522     000
ERRORS DETECTED:  0

VIRTUAL MEMORY USED:  32864 WORDS  ( 129 PAGES)
DYNAMIC MEMORY:  20308 WORDS  ( 78 PAGES)
ELAPSED TIME:  00:06:43
Z.BIN/FN:ABS:AMA,Z/NL:BEX/CR/-SP=LB1:[1,1]SVC/MLB,SY:[203,230]CZTUU
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Z CREATED BY MACRO ON 12-JUN-79 AT 12:26 PAGE 1
SYMBOL CROSS REFERENCE CREF V01 SEQ 0089

SYMBOL		VALUE		REFERENCES								
ABNDX	=	000004		#20-1557	*47-2794	47-2807	47-2809					
ABO		021776		47-2804	47-2818	47-2831	#47-2847					
ABOMSG		004674		16-1159	#16-1189							
ABONM		010442		*26-1889	*26-1906	26-1911	#26-1918					
ADR	=	000020	G	#7-545								
ASSEMB	=	000010		3-362	3-362							
BDATA	=	000134		12-910	12-920	#20-1611						
BDBYTS		023556		*54-3123	*54-3134	54-3137	54-3142	#54-3152				
BDCHK	=	000022		#22-1675	43-2520	43-2572						
BDCOM	=	000014		#22-1672	45-2616	47-2819						
BIT0	-	000001	G	#7-545	10-721	38-2388	47-2810	50-2918	50-2919	50-2921	50-2932	52-3005
BIT00	=	000001	G	#7-545	7-545							
BIT01	=	000002	G	#7-545	7-545							
BIT02	=	000004	G	#7-545	7-545							
BIT03	=	000010	G	#7-545	7-545							
BIT04	=	000020	G	#7-545	7-545							
BIT05	=	000040	G	#7-545	7-545							
BIT06	=	000100	G	#7-545	7-545							
BIT07	=	000200	G	#7-545	7-545							
BIT08	=	000400	G	#7-545	7-545							
BIT09	=	001000	G	#7-545	7-545							
BIT1	=	000002	G	#7-545	26-1880	36-2211	38-2389	41-2464	45-2604	45-2673		
BIT10	-	002000	G	#7-545	26-1876	29-1965	29-1965	29-1966	30-2005	30-2005	31-2031	32-2058
				32-2058	33-2085	35-2156	45-2622	45-2642	45-2650	45-2671		
BIT11		004000	G	#7-545	12-896	13-971	13-992	14-1087				
BIT12	-	010000	G	#7-545	29-1965	29-1965	29-1965	30-2005	30-2005	30-2005	32-2058	32-2058
				32-2058								
BIT13	-	020000	G	#7-545	13-970	13-1017	16-1156					
BIT14		040000	G	#7-545	13-998	26-1895	26-1898	43-2533	43-2545	52-3055		
BIT15		100000	G	#7-545	10-719	13-970	13-1017	14-1087	16-1156	37-2250	37-2272	38-2304
				38-2321	38-2341	38-2352	41-2472	45-2608				
BIT2	-	000004	G	#7-545	38-2390							
BIT3	-	000010	G	#7-545	38-2391							
BIT4	-	000020	G	#7-545	35-2150	35-2154	38-2392	48-2866	52-3007			
BIT5		000040	G	#7-545	35-2172	35-2174	38-2393					
BIT6	-	000100	G	#7-545	38-2394	45-2613	45-2674	52-3032	52-3040	52-3047	52-3063	52-3064
				53-3075	53-3081	54-3143						
BIT7	-	000200	G	#7-545	38-2395	45-2642	45-2650	45-2656	45-2658	45-2660	45-2671	
BIT8		000400	G	#7-545	10-751	13-999	35-2160	35-2169	45-2635	45-2664		
BIT9		001000	G	#7-545	10-723	13-1001	35-2144	45-2619	45-2646	46-2724		
BLKEND		000202		13-1009	#20-1632							
BLKER		010150		*13-1040	#24-1793	*35-2141						
BLKSIZ	-	000210		#20-1636	21-1653	21-1654	21-1655	21-1656	21-1657	21-1658	21-1659	21-1660
BLKTBL		004724		10-717	10-748	10-767	11-803	12-890	13-966	13-986	14-1085	16-1180
				#21-1645	26-1874	26-1890	38-2302	41-2470				
BOE	-	000400	G	#7-545								
BRKPTR		023376		*52-3031	*52-3039	*52-3046	53-3092	#53-3106				
BRKTO		023374		*52-3004	*52-3013	*52-3019	*52-3029	*52-3037	*53-3096	#53-3105		
BRKWD		023370		52-3018	#53-3102							
BUFTBL		024310		13-973	#57-3204							
BUF0		025370		57-3204	#57-3224							
BUF1		026426		57-3205	#57-3225							

SYMBOL		VALUE		REFERENCES								
BUF2		027464		57-3206	#57-3226							
BUF3		030522		57-3207	#57-3227							
BUF4		031560		57-3208	#57-3228							
BUF5		032616		57-3209	#57-3229							
BUF6		033654		57-3210	#57-3230							
BUF7		034712		57-3211	#57-3231							
CARLF		023774		55-3180	55-3182	#55-3191						
CHECK		003732		13-976	#13-981							
CHKANR		017614		41-2468	41-2476	#41-2480						
CHKANS		017530		11-826	#41-2462							
CHKEND		020154		43-2525	43-2568	#45-2602						
CHKERR		020242		45-2612	#45-2619							
CHKPKS		017620		41-2466	41-2474	#43-2500						
CHKPTR		017616		*41-2470	41-2471	41-2475	*41-2477	#41-2482				
CHKREE		020314		45-2605	#45-2626							
CHKRET		020660		45-2610	45-2615	45-2618	45-2621	45-2625	45-2643	45-2651	45-2659	45-2661
				#45-2673								
CHKSUC		021154		45-2606	45-2626	#46-2703						
CHKSUM		022504		27-1928	28-1940	29-1965	29-1965	29-1965	29-1966	29-1966	30-2005	30-2005
				30-2005	31-2031	31-2031	32-2058	32-2058	32-2058	33-2085	33-2085	#50-2916
				51-2957								
CHK8		017550		41-2465	#41-2470							
CKCKSM		022600		43-2518	43-2553	43-2566	#51-2954					
CLRALL		002420	G	#10-767	36-2214							
CLRBUF		002460	G	10-769	#10-783	36-2217						
CLRPTR		002512		*10-767	10-768	10-770	*10-772	#10-793				
CMDSNT	=	000100		#20-1583	*35-2153	46-2710	46-2714	46-2727	48-2872	*52-3006		
CMNDER	=	000040		#22-1682	46-2747							
CMPDAT		002212		#6-472	54-3125							
CNINIT	=	000032		#22-1679	52-3059							
COMPAR		023400		43-2530	43-2555	#54-3120						
C$AU	=	000052		#3-362	17-1224							
C$AUTO	=	000061		#3-362	14-1096							
C$BRK	=	000022		#3-362	11-824	12-889	12-892	12-894	26-1914	35-2188	39-2425	52-3009
				53-3094	53-3095							
C$BSEG	=	000004		#3-362								
C$BSUB	=	000002		#3-362								
C$CEFG	=	000045		#3-362								
C$CLCK	=	000062		#3-362								
C$CLEA	=	000012		#3-362	15-1142							
C$CLOS	=	000035		#3-362								
C$CLP1	=	000006		#3-362								
C$CVEC	=	000036		#3-362	14-1095	52-3065	52-3067					
C$DCLN	=	000044		#3-362	13-984	13-1004						
C$DODU	=	000051		#3-362	14-1107	47-2849						
C$DRPT	=	000024		#3-362	15-1121							
C$DU	=	000053		#3-362	16-1179							
C$EDIT	=	000003		#3-362	3-405							
C$ERDF	=	000055		#3-362	47-2803	47-2817						
C$ERHR	=	000056		#3-362	47-2830	47-2845						
C$ERRO	=	000060		#3-362								
C$ERSF	=	000054		#3-362	13-983	13-1003	26-1913					

SYMBOL	VALUE	REFERENCES							
C$ERSO	= 000057	#3-362	47-2823	47-2841	54-3141				
C$ESCA	= 000010	#3-362							
C$ESEG	= 000005	#3-362							
C$ESUB	= 000003	#3-362							
C$ETST	= 000001	#3-362	27-1926	28-1936	29-1959	30-1997	31-2023	32-2050	33-2077
C$EXIT	= 000032	#3-362							
C$GETB	= 000026	#3-362							
C$GETW	= 000027	#3-362							
C$GMAN	= 000043	#3-362							
C$GPHR	= 000042	#3-362	13-990						
C$GPLO	= 000030	#3-362							
C$GPRI	= 000040	#3-362							
C$INIT	= 000011	#3-362	13-1069						
C$INLP	= 000020	#3-362							
C$MANI	= 000050	#3-362							
C$MEM	= 000031	#3-362							
C$MSG	= 000023	#3-362	48-2879						
C$NRDY	010156	#24-1802	35-2184						
C$OPEN	= 000034	#3-362							
C$PNTB	= 000014	#3-362	16-1159	45-2648	48-2869	48-2872	48-2875	54-3142	
C$PNTF	= 000017	#3-362	14-1104	55-3175	55-3180	55-3182			
C$PNTS	= 000016	#3-362	12-891	12-893	12-909	12-910	12-920		
C$PNTX	= 000015	#3-362	45-2624	45-2629	45-2632	45-2634	45-2655	45-2663	
C$QIO	= 000377	#3-362							
C$RCVB	010160	#24-1803	39-2402						
C$RDBU	= 000007	#3-362							
C$REFG	= 000047	#3-362	13-963						
C$RESE	= 000033	#3-362	#3-362						
C$REVI	= 000003	#3-362	3-405						
C$RFLA	= 000021	#3-362	13-1039						
C$RPT	= 000025	#3-362	12-933						
C$SEFG	= 000046	#3-362							
C$SPRI	= 000041	#3-362	52-3024						
C$SVEC	= 000037	#3-362	14-1084	52-3025	52-3027				
C$TPRI	= 000013	#3-362							
DESC	023560	54-3142	#54-3153						
DEVPTR	010130	*13-966	13-968	13-975	*13-977	*13-986	13-988	*13-1033	#24-1785
		26-1875	26-1884	*26-1886	*26-1890	26-1891	26-1907	*26-1909	*26-1874
DEV0	004744	21-1645	#21-1653						
DEV1	005154	21-1646	#21-1654						
DEV2	005364	21-1647	#21-1655						
DEV3	005574	21-1648	#21-1656						
DEV4	006004	21-1649	#21-1657						
DEV5	006214	21-1650	#21-1658						
DEV6	006424	21-1651	#21-1659						
DEV7	006634	21-1652	#21-1660						
DFPTBL	002172 G	#5-445							
DFTL1	021624	*47-2815	*47-2816	#47-2817	47-2817				
DIAGMC	= 000000	3-362	3-362						
DLV	= 000074	*13-1032	#20-1581	37-2270	38-2343	38-2354	*39-2405	39-2406	39-2407
		*39-2431	39-2432	39-2433	*39-2435	43-2535	48-2873	48-2875	*48-2876
		53-3083	53-3084	*53-3086					*53-3082

SYMBOL	VALUE		REFERENCES								
DOBRK	022640		26-1897	#52-3003							
DONE	010140		*11-802	11-820	#24-1789	*27-1929	*28-1945	*29-1982	*30-2016	*31-2042	*32-2069
			*33-2096								
DR	= 000060		10-721	10-723	*10-725	*10-750	10-751	*10-753	*13-995	13-999	13-1001
			#20-1574	28-1940	29-1964	29-1965	29-1965	29-1966	29-1966	30-2004	30-2005
			30-2005	31-2030	31-2031	31-2031	32-2057	32-2058	32-2058	33-2084	33-2085
			33-2085	48-2869	49-2899						
DRVCHK	002214		#6-473	30-2002	31-2028	32-2055	33-2082				
EF.CON	= 000036	G	#7-545								
EF.NEW	= 000035	G	#7-545								
EF.PWR	= 000034	G	#7-545								
EF.RES	= 000037	G	#7-545								
EF.STA	= 000040	G	#7-545	13-963							
ERRDES	022020	G	47-2803	47-2817	47-2823	47-2830	47-2841	47-2845	#48-2862	54-3141	
EVL	= 000004	G	#7-545	47-2811							
EVLTHR	002216		#6-474	47-2813							
EXOFF	016631		#37-2285	38-2361	39-2418						
EXON	016630		37-2241	#37-2284	38-2316	39-2426	39-2438				
E$ABO	= 177720		#25-1844								
E$CKS	= 177757		#25-1855	25-1857	25-1858	25-1859	46-2722				
E$CKSM	= 177757		#25-1857								
E$CMD	= 177720		#25-1853	46-2745							
E$END	= 002100		#3-362								
E$LOAD	= 000035		#3-362	3-405							
E$NCRT	= 177767		#25-1845	46-2740							
E$NOMO	= 177737		#25-1852	46-2717							
E$NONX	= 177770		#25-1846	46-2750							
E$OK	= 000000		#25-1847	46-2705							
E$PART	= 177776		#25-1848	46-2760							
E$RD	- 177757		#25-1859								
E$REC	= 177711		#25-1854	46-2765							
E$SK	= 177740		#25-1849	46-2735							
E$SLF	= 177777		#25-1856								
E$TRY	= 000001		#25-1850	46-2708							
E$WLOC	= 177765		#25-1851	46-2755							
E$WR	- 177757		#25-1858								
FLGLOC	004400	G	*13-1039	#13-1078	47-2811						
FM	003372		12-910	12-920	#12-943						
FMO	003354		12-909	#12-940							
FTLNM	010136		#24-1788	47-2834							
F$AU	= 000015		#3-362	17-1201	17-1224						
F$AUTO	= 000020		#3-362	14-1082	14-1096						
F$BGN	= 000040		#3-362	3-388	4-409	6-485	7-538	11-830	12-874	12-881	12-949
			13-959	14-1082	15-1118	16-1151	17-1201	18-1273	27-1924	27-1926	28-1934
			28-1936	29-1957	29-1959	30-1995	30-1997	31-2021	31-2023	32-2048	32-2050
			33-2075	53-2077	48-2862	53-3073	53-3079	58-3256	59-3301	59-3312	60-3356
			60-3391								
F$CLEA	= 000007		#3-362	15-1118	15-1142						
F$DU	= 000016		#3-362	16-1151	16-1179						
F$END	= 000041		#3-362	3-362	3-362	3-362	3-362	3-362	3-362	3-362	3-362
			3-362	3-362	3-362	3-362	3-362	3-362	3-362	3-362	3-388
			6-485	7-538	11-830	12-874	12-933	12-949	13-1069	14-1096	15-1142

SYMBOL	VALUE	REFERENCES								
		16-1179	17-1224	18-1273	27-1924	27-1924	27-1924	27-1926	27-1926	28-1934
		28-1934	28-1934	28-1936	28-1936	29-1957	29-1957	29-1957	29-1959	29-1959
		30-1995	30-1995	30-1995	30-1997	30-1997	31-2021	31-2021	31-2021	31-2023
		31-2023	32-2048	32-2048	32-2048	32-2050	32-2050	33-2075	33-2075	33-2075
		33-2077	33-2077	48-2879	53-3077	53-3088	58-3256	59-3301	59-3327	60-3372
		60-3391								
F$HARD	= 000004	#3-362	59-3312	59-3327						
F$HW	= 000013	#3-362	5-445	5-458						
F$INIT	= 000006	#3-362	13-959	13-1069						
F$JMP	= 000050	#3-362								
F$MOD	= 000000	#3-362	3-388	6-485	7-538	11-830	12-874	12-949	18-1273	58-3256
		59-3301	60-3391							
F$MSG	= 000011	#3-362	48-2862	48-2879						
F$PROT	= 000021	#3-362	4-409	4-413						
F$PWR	= 000017	#3-362								
F$RPT	= 000012	#3-362	12-881	12-933						
F$SEG	= 000003	#3-362								
F$SOFT	= 000005	#3-362	60-3356	60-3372						
F$SRV	= 000010	#3-362	53-3073	53-3077	53-3079	53-3088				
F$SUB	= 000002	#3-362								
F$SW	= 000014	#3-362	6-467	6-483						
F$TEST	= 000001	#3-362	27-1924	27-1926	28-1934	28-1936	29-1957	29-1959	30-1995	30-1997
		31-2021	31-2023	32-2048	32-2050	33-2075	33-2077			
GBTMP	017524	*39-2400	*39-2412	*39-2422	39-2423	*39-2443	#39-2449			
GBTMP2	017526	*39-2417	39-2428	39-2430	*39-2437	39-2440	#39-2450			
GETANS	016354	11-822	#36-2210							
GFTHRD	003754	13-982	#13-986							
GLTPTR	016420	#36-2222								
GETR5	004642	16-1155	#16-1180							
GTAGIN	016642	#38-2303	38-2367							
GTBYTE	017300	37-2249	37-2269	38-2320	38-2340	38-2351	#39-2400			
GTDOWN	017152	38-2307	38-2311	38-2324	38-2335	38-2339	38-2342	38-2346	38-2353	38-2357
		38-2359	#38-2363							
GTOK	017070	38-2328	#38-2348							
GTPKS1	016422	36-2219	#37-2236							
GTPKS8	016632	36-2215	#38-2301	38-2370						
GTPTR	017276	*38-2302	38-2303	38-2364	*38-2366	#38-2398				
GTUM	017032	38-2333	#38-2337							
G$CNTO	= 000200	#3-362								
G$DELM	= 000372	#3-362								
G$DISP	= 000003	#3-362								
G$EXCP	= 000400	#3-362								
G$HILI	= 000002	#3-362								
G$LOLI	= 000001	#3-362								
G$NO	= 000000	#3-362								
G$OFFS	= 000400	#3-362	59-3315	59-3316	59-3317	59-3318	59-3319	60-3358	60-3359	60-3360
		60-3361	60-3362	60-3364						
G$OFSI	= 000376	#3-362	59-3315	59-3316	59-3317	59-3318	59-3319	60-3358	60-3359	60-3360
		60-3361	60-3362	60-3364						
G$PRMA	= 000001	#3-362	59-3315	59-3316						
G$PRMD	= 000002	#3-362	60-3358	60-3364						
G$PRML	= 000000	#3-362	59-3317	59-3318	59-3319	60-3359	60-3360	60-3361	60-3362	

SYMBOL	VALUE		REFERENCES
G$RADA	= 000140		#3-362
G$RADB	= 000000		#3-362
G$RADD	= 000040		#3-362 60-3358 60-3364
G$RADL	= 000120		#3-362 59-3317 59-3318 59-3319 60-3359 60-3360 60-3361 60-3362
G$RADO	= 000020		#3-362 59-3315 59-3316
G$XFER	= 000004		#3-362
G$YES	= 000010		#3-362 59-3315 59-3316 59-3317 59-3318 59-3319 60-3358 60-3359 60-3360 60-3361 60-3362 60-3364
HARDR	= 000136		12-905 12-915 #20-1612
HARDW	= 000140		12-907 12-917 #20-1613
HELP	= 000000		#3-347 3-357 3-379 3-397 4-415 4-430 5-452 6-476 #7-490 7-528 7-547 8-562 8-570 9-585 9-590 9-598 9-605 9-610 9-616 10-647 10-659 10-664 10-670 10-675 10-681 10-689 10-696 10-703 10-710 #12-836 13-1047 13-1057 15-1123 15-1130 16-1161 16-1167 17-1203 17-1210 #18-1231 18-1274 18-1280 57-3234 57-3239 57-3250 #59-3263 59-3321 59-3337 60-3365 60-3384
HOE	= 100000	G	#7-545
HRD	021756		47-2835 #47-2843
HRDRD	= 000016		#22-1673 45-2666
HRDWR	= 000020		#22-1674 45-2668
HRD1	020602		45-2653 #45-2662
IBE	= 010000	G	#7-545
IDPTR	010142		*11-803 11-804 11-806 *11-808 #24-1790
IDU	= 000040	G	#7-545
IER	= 020000	G	#7-545
INIT	003626		#13-961
INITWD	023372		*52-3003 52-3030 52-3038 52-3045 52-3052 52-3058 #53-3103
INIT2	003650		13-964 #13-966
ISR	= 000100	G	#7-545
IXE	= 004000	G	#7-545
I$AU	= 000041		#3-362 #17-1201 #17-1224
I$AUTO	= 000041		#3-362 #14-1082 #14-1096
I$CLN	= 000041		#3-362 #15-1118 #15-1142
I$DU	= 000041		#3-362 #16-1151 #16-1179
I$HRD	= 000041		#59-3312 #59-3327
I$INIT	= 000041		#3-362 #13-959 #13-1069
I$MOD	000041		#3-362 3-388 #3-388 6-485 #6-485 7-538 #7-538 11-830 #11-830 12-874 #12-874 12-949 #12-949 18-1273 #18-1273 58-3256 #58-3256 59-3301 #59-3301 60-3391 #60-3391
I$MSG	= 000041		#3-362 #48-2862 #48-2879
I$PROT	= 000040		#3-362 #4-409
I$PTAB	= 000041		#3-362
I$PWR	= 000041		#3-362
I$RPT	= 000041		#3-362 #12-881 #12-933
I$SEG	= 000041		#3-362 27-1924 28-1934 29-1957 30-1995 31-2021 32-2048 33-2075
I$SETU	= 000041		#3-362
I$SFT	= 000041		#60-3356 #60-3372
I$SRV	= 000041		#3-362 #53-3073 #53-3077 #53-3079 #53-3088
I$SUB	= 000041		#3-362 27-1924 28-1934 29-1957 30-1995 31-2021 32-2048 33-2075
I$TST	= 000041		#3-362 27-1924 #27-1924 27-1926 #27-1926 #27-1926 28-1934 #28-1934 28-1936 #28-1936 #28-1936 29-1957 #29-1957 29-1959 #29-1959 #29-1959 30-1995 #30-1995 30-1997 #30-1997 #30-1997 31-2021 #31-2021 31-2023 #31-2023 #31-2023 32-2048

SYMBOL	VALUE		REFERENCES								
			#32-2048	32-2050	#32-2050	#32-2050	33-2075	#33-2075	33-2077	#33-2077	#33-2077
J$JMP	= 000167		#3-362								
LENGTH	002204		#6-469	13-1041							
LGOFST	= 000120		#20-1602	47-2795							
LNCNT	023760		*55-3173	*55-3178	#55-3187						
LOE	= 040000	G	#7-545								
LOG	021464		35-2194	39-2447	43-2521	43-2538	43-2547	43-2573	45-2617	45-2640	45-2669
			46-2771	#47-2787	52-3016	52-3060	53-3099				
LOGO	022006		47-2824	47-2842	#47-2850						
LOGOK	021552		47-2802	#47-2805							
LOGOK2	021636		47-2812	47-2814	#47-2819						
LOGO	021540		#47-2803								
LOG1	021654		*47-2821	*47-2822	#47-2823	47-2823					
LOG2	021704		*47-2828	*47-2829	#47-2830	47-2830					
LOG3	021744		*47-2839	*47-2840	#47-2841	47-2841					
LOG3B	021766		*47-2843	*47-2844	#47-2845	47-2845					
LOT	= 000010	G	#7-545								
LSTDEV	004742		10-727	10-754	10-770	11-806	12-921	13-975	14-1091	#21-1652	26-1884
			26-1907	38-2364	41-2475						
L$ACP	002110	G	#3-405								
L$APT	002036	G	#3-405								
L$AU	004722	G	3-405	#17-1201							
L$AUT	002070	G	#3-405								
L$AUTO	004402	G	3-405	#14-1082							
L$CCP	002106	G	#3-405								
L$CLEA	004564	G	3-405	#15-1118							
L$CO	002032	G	#3-405								
L$DEPO	002011	G	#3-405								
L$DESC	002122	G	3-405	#3-407							
L$DESP	002076	G	#3-405								
L$DEVP	002060	G	#3-405								
L$DISP	002152	G	3-405	#4-428							
L$DLY	002116	G	#3-405								
L$DTP	002040	G	#3-405								
L$DTYP	002034	G	#3-405								
L$DU	004576	G	3-405	#16-1151							
L$DUT	002072	G	#3-405								
L$DVTY	002220	G	3-405	#9-583							
L$EF	002052	G	#3-405								
L$ENVI	002044	G	#3-405								
L$ETP	002102	G	#3-405								
L$EXP1	002046	G	#3-405								
L$EXP4	002064	G	#3-405								
L$EXP5	002066	G	#3-405								
L$HARD	035752	G	3-405	59-3312	#59-3312						
L$HIME	002120	G	#3-405								
L$HPCP	002016	G	#3-405								
L$HPTP	002022	G	#3-405								
L$HW	002172	G	3-405	5-445	#5-445						
L$ICP	002104	G	#3-405								
L$INIT	003626	G	3-405	#13-959							
L$LADP	002026	G	#3-405								

SYMBOL	VALUE		REFERENCES					
L$LAST	036522	G	3-405	#60-3390				
L$LOAD	002100	G	#3-405					
L$LUN	002074	G	#3-405	*13-989	*47-2792	*47-2793	*54-3139	*54-3140
L$MREV	002050	G	#3-405					
L$NAME	002000	G	#3-405					
L$PRIO	002042	G	#3-405					
L$PROT	002142	G	3-405	#4-409				
L$PRT	002112	G	#3-405					
L$REPP	002062	G	#3-405					
L$REV	002010	G	#3-405					
L$RPT	002612	G	3-405	#12-881				
L$SOFT	036130	G	3-405	60-3356	#60-3356			
L$SPC	002056	G	#3-405					
L$SPCP	002020	G	#3-405					
L$SPTP	002024	G	#3-405					
L$STA	002030	G	#3-405					
L$SW	002204	G	3-405	6-467	#6-467			
L$TEST	002114	G	#3-405					
L$TIML	002014	G	#3-405					
L$UNIT	002012	G	#3-405	13-981	13-1035			
L10001	002202		5-445	#5-458				
L10002	002220		6-467	#6-483				
L10003	003234		#12-933					
L10004	004310		#13-1069					
L10005	004506		#14-1096					
L10006	004574		#15-1142					
L10007	004640		#16-1179					
L10010	004722		#17-1224					
L10011	010540		#27-1926					
L10012	010730		#28-1936					
L10013	011170		#29-1959					
L10014	012562		#30-1997					
L10015	013532		#31-2023					
L10016	014312		#32-2050					
L10017	015262		#33-2077					
L10020	022210		#48-2879					
L10021	023276		#53-3077					
L10022	023332		#53-3088					
L10023	036014		59-3312	#59-3327				
L10024	036204		60-3356	#60-3372				
MABEE	021716		47-2827	#47-2833				
MSG1	036014		59-3315	#59-3329				
MSG1B	036025		59-3316	#59-3330				
MSG1C	036042		59-3317	#59-3331				
MSG2	036073		59-3318	#59-3332				
MSG3	036110		59-3319	#59-3333				
MSG4	036204		60-3358	#60-3374				
MSG4B	036251		60-3359	#60-3375				
MSG5	036313		60-3360	#60-3376				
MSG6	036345		60-3361	#60-3377				
MSG7	036372		60-3362	#60-3378				
MSG8	036420		60-3364	#60-3379				

SYMBOL		VALUE	REFERENCES							
MXRTRY		010146	#24-1792	45-2652						
M$AUTO		004544	14-1104	#14-1109						
M$BDA		007156	#23-1727	54-3141						
M$CMD		007522	23-1712	#23-1749						
M$COM		007222	23-1702	#23-1731						
M$HCHK		007374	23-1705	#23-1741						
M$HDRD		007772	23-1703	#23-1765						
M$HDWR		010034	23-1704	#23-1767						
M$NIT		007436	23-1709	#23-1743						
M$NLOG		007140	23-1696	23-1700	#23-1725					
M$NOMO		007264	23-1708	#23-1733						
M$NOTP		007302	23-1718	#23-1735						
M$NRSP		007602	23-1716	#23-1755						
M$OVRN		010076	23-1701	#23-1769						
M$PART		007452	23-1710	#23-1745						
M$QRSP		007616	23-1717	#23-1757						
M$REC		007536	23-1713	#23-1751						
M$RNIT		007354	23-1699	#23-1739						
M$SELF		007202	23-1714	#23-1729						
M$SFRD		007672	23-1697	#23-1761						
M$SFWR		007732	23-1698	#23-1763						
M$SKER		007124	23-1706	#23-1723						
M$TOSN		007650	23-1719	#23-1759						
M$UNIT		007474	23-1711	#23-1747						
M$WPRO		007332	23-1707	#23-1737						
M$WRSP		007556	23-1715	#23-1753						
NCART	-	000054	#22-1688	46-2742						
NODRVS		004342	13-1003	#13-1074						
NOMOR		010444	26-1913	#26-1919						
NOMOT	-	000030	#22-1678	46-2719						
NOUNIT	=	000036	#22-1681	46-2752						
NOXOFF		016046	#35-2134							
NTSFT		021666	47-2820	#47-2826						
NXTRET		010440	26-1883	26-1912	#26-1916					
NXTST		010162	11-818	#26-1874						
NXTST2		010266	26-1885	#26-1889						
ONEFIL	=	000001	#2-4	2-8	2-343	3-344	3-383	6-486	7-487	7-500	11-832
			12-833	12-846	17-1226	18-1227	18-1239	58-3258	59-3259	59-3273	
OTL	=	000052	#22-1687	43-2534							
OVRFLO		022364	47-2803	#48-2884							
OVRN	-	000012	#22-1671	43-2537							
O$APTS	=	000000	#3-362	3-405							
O$AU	=	000001	#3-362	#3-395	3-405						
O$BGNR	=	000001	#3-362	#3-395	3-405						
O$BGNS	=	000001	#3-362	#3-395	3-405						
O$DU	=	000001	#3-362	#3-395	3-405						
O$ERRT	=	000000	#3-362	3-405							
O$GNSW	=	000001	#3-362	#3-395	3-405						
O$POIN	=	000001	#3-362	#3-395	#3-395	#3-395	#3-395	#3-395	3-395	3-405	
O$SETU	=	000000	#3-362	3-405	60-3390						
PARTL	=	000034	#22-1680	46-2762							
PATTEN	=	000072	*13-1028	#20-1580	*29-1963	*29-1964	29-1965	*30-2001	*30-2004	30-2005	*31-2027

SYMBOL	VALUE		REFERENCES								
			*31-2030	*32-2054	*32-2057	32-2058	*33-2081	*33-2084	48-2871	54-3132	
PDTFLG	004376	G	*13-997	13-1024	#13-1077						
PERDEV	010300		#26-1891	26-1910							
PKPTR	= 000104		#20-1586	*35-2145	38-2319	38-2358	*38-2360	*43-2507	54-3124	55-3172	
PNT	= 001000	G	#7-545								
PRBUF	002210		#6-471	55-3170							
PRDAT	023762		*55-3174	55-3175	#55-3188						
PRFORM	023764		55-3175	#55-3189							
PRI	= 002000	G	#7-545								
PRI00	= 000000	G	#7-545	52-3024							
PRI01	= 000040	G	#7-545								
PRI02	= 000100	G	#7-545								
PRI03	= 000140	G	#7-545								
PRI04	= 000200	G	#7-545								
PRI05	= 000240	G	#7-545								
PRI06	= 000300	G	#7-545								
PRI07	= 000340	G	#7-545	14-1084	52-3025	52-3027					
PRNPAK	023614		54-3145	#55-3165							
PRNSIZ	010154		#24-1795	*54-3144	*55-3176						
PTR	004672		*16-1180	16-1181	*16-1184	#16-1187					
RCBCNT	010134		#24-1787	*37-2247	*37-2258	*37-2263	*37-2267	*38-2315	*38-2332	*38-2336	*38-2338
			*38-2349	*43-2509	43-2516	43-2578					
RCBFSZ	001036	G	10-786	#25-1827	57-3220	57-3224	57-3225	57-3226	57-3227	57-3228	57-3229
			57-3230	57-3231							
RCDB	= 000024		*13-1020	#20-1565	39-2405	39-2431	52-3023	53-3082			
RCFLG	010132		#24-1786	*37-2248	37-2254	*38-2313	38-2327	*43-2510			
RCINIT	= 000006		#22-1670	43-2546							
RCSR	= 000022		*13-1018	14-1089	#20-1564	39-2403	39-2420	52-3047	52-3064	53-3081	
RCVBUF	= 000102		10-785	*13-973	#20-1585	35-2145	37-2244	43-2501			
RCVHND	023300		#53-3081								
RCVINT	023300	G	52-3025	#53-3079							
RDN0	= 000114		12-910	#20-1590	*35-2163						
RDN1	000116		12-920	#20-1591	*35-2165						
REC	= 000064		*13-1030	#20-1576	*28-1938	28-1940	*29-1962	29-1965	29-1965	29-1966	29-1966
			*29-1973	29-1974	*29-1977	*29-1978	*30-1998	30-2001	30-2005	30-2005	*30-2008
			*30-2013	*31-2024	31-2027	31-2031	31-2031	*31-2034	*31-2039	*32-2051	32-2054
			32-2058	32-2058	*32-2061	*32-2066	*33-2078	33-2081	33-2085	33-2085	*33-2088
			*33-2093	35-2141	48-2870						
RECDAT	011114		28-1938	28-1943	#28-1948						
RECERR	= 000042		#22-1683	46-2767							
RECID	022272	G	48-2872	#48-2882							
RECID2	022446		48-2875	#48-2886							
RECOV	020700		45-2629	#45-2680							
RETERR	021102		45-2648	#45-2690							
RETRY	= 000002		*13-1029	#20-1556	*45-2623	45-2624	45-2629	*45-2641	*45-2649	45-2652	*45-2654
			45-2655	*45-2670							
RLUN	003236		*12-899	*12-900	12-909	#12-934					
RPTR	003240		*12-890	12-895	12-921	*12-923	#12-935				
RSNTAB	007044		#23-1696	47-2808							
RSVP	016002		27-1928	28-1940	29-1965	29-1965	29-1965	29-1966	29-1966	30-2005	30-2005
			30-2005	31-2031	31-2031	32-2058	32-2058	32-2058	33-2085	33-2085	#35-2126
RTRYN	021040		45-2624	45-2655	#45-2686						

SYMBOL	VALUE		REFERENCES								
RUN	002562	G	#11-818	11-827	27-1925	27-1925	28-1935	28-1935	29-1958	29-1958	30-1996
			30-1996	31-2022	31-2022	32-2049	32-2049	33-2076	33-2076		
R$CMND	= 000002		#25-1809	25-1815	27-1928	28-1940	28-1940	29-1965	29-1965	29-1966	29-1966
			30-2005	30-2005	31-2031	31-2031	32-2058	32-2058	33-2085	33-2085	35-2151
R$CONT	= 000020		#25-1810	29-1965	29-1965	30-2005	30-2005	32-2058	32-2058	43-2513	52-3052
R$DASZ	= 000204		#25-1822	25-1824	25-1827	37-2263	43-2551	43-2558			
R$DATA	= 000001		#25-1814	29-1965	29-1965	29-1966	29-1966	30-2005	30-2005	31-2031	31-2031
			32-2058	32-2058	33-2085	33-2085	37-2261	38-2334	38-2358	43-2528	43-2549
R$DNSZ	= 000222		#25-1824	38-2336							
R$END	= 000002		#25-1815	27-1928	29-1965	29-1965	29-1966	29-1966	30-2005	30-2005	31-2031
			31-2031	32-2058	32-2058	33-2085	33-2085	37-2256	38-2330	43-2523	43-2561
R$INIT	= 000004		#25-1813	43-2543	53-3103						
R$MSIZ	= 000012		#25-1820	25-1826	27-1928	27-1928	28-1940	28-1940	29-1965	29-1965	29-1965
			29-1965	29-1966	29-1966	29-1966	29-1966	30-2005	30-2005	30-2005	30-2005
			31-2031	31-2031	31-2031	31-2031	32-2058	32-2058	32-2058	32-2058	33-2085
			33-2085	33-2085	33-2085						
R$NDSZ	= 000016		#25-1818	25-1824	25-1827	27-1928	28-1940	29-1965	29-1965	29-1966	29-1966
			30-2005	30-2005	31-2031	31-2031	32-2058	32-2058	33-2085	33-2085	37-2258
			38-2332								
R$SNSZ	= 000016		#25-1826	27-1928	28-1940	29-1965	29-1965	29-1966	29-1966	30-2005	30-2005
			31-2031	31-2031	32-2058	32-2058	33-2085	33-2085	43-2564		
R$XOFF	- 000023		#25-1812	37-2285	57-3217	57-3218					
R$XON	= 000020		#25-1811	37-2284							
R$$END	= 000100		#25-1834								
R$$NIT	= 000001		#25-1839	52-3006							
R$$NOP	= 000000		#25-1838								
R$$RD	= 000002		#25-1836	29-1965	29-1966	29-1966	30-2005	31-2031	31-2031	32-2058	33-2085
			33-2085	35-2158	46-2710						
R$$SEK	= 000005		#25-1837	28-1940							
R$$SLF	= 000007		#25-1840	27-1928	46-2727						
R$$WR	= 000003		#25-1835	29-1965	30-2005	32-2058	35-2167	46-2714			
SECREC	010152		*13-1043	*13-1046	#24-1794	30-2013	31-2039	32-2066	33-2093		
SERVST	017274		*36-2213	38-2368	*38-2383	#38-2397					
SETDR	002342	G	#10-748	27-1925	28-1935	29-1958	30-1996	31-2022	32-2049	33-2076	
SETLEN	004252		#13-1041								
SETPTR	002416		*10-748	10-749	10-754	*10-756	#10-759				
SETSRV	017210		38-2306	38-2310	#38-2373						
SETUP	002514	G	#11-802	27-1925	27-1925	28-1935	28-1935	29-1958	29-1958	30-1996	30-1996
			31-2022	31-2022	32-2049	32-2049	33-2076	33-2076			
SFPTBL	002204	G	#6-467								
SFT	021734		47-2836	#47-2839							
SFTOUT	036204		#60-3372								
SFTRD	= 000002		#22-1668	45-2637							
SFTWR	= 000004		#22-1669	45-2639							
SKERR	= 000024		#22-1676	46-2737							
SLFER	= 000044		#22-1684	46-2732							
SND	016052		35-2133	#35-2135	35-2139						
SNDBYT	016304		35-2135	#35-2183	37-2242	38-2318	38-2362	39-2419	39-2427	39-2439	
SNDCNT	- 000070		#20-1579	*27-1928	*28-1940	*29-1965	*29-1965	*29-1965	*29-1965	*29-1966	*29-1966
			*30-2005	*30-2005	*30-2005	*30-2005	*31-2031	*31-2031	*32-2058	*32-2058	*32-2058
			*32-2058	*33-2085	*33-2085	*35-2132	*35-2138				
SNDHND	023264		#53-3075								

```
SYMBOL    VALUE          REFERENCES
SNDINT      023264  G     52-3027   #53-3073
SOFTR     = 000122        12-901     12-911    #20-1603
SOFTW     = 000124        12-903     12-913    #20-1604
SRVTBL      017254        38-2377   #38-2388
STAEOP      002206       #6-470      15-1119
STATHD      003242        12-89'    #12-937
STATUS    = 000000       #20-1555
STHD2       003516        12-893    #12-946
STRT        004374  G    *13-962    *13-965     13-1006   #13-1076
SUCCS     = 000076       *13-1031   #20-1582   *35-2143    45-2611    45-2627   *46-2704    48-2872
SUCOTL    = 000046       #22-1685    46-2770
SVCGBL    = 000000       #3-362     #3-371      3-405      3-405      3-405      3-405      3-405      3-405      3-405
                          3-405      3-405      3-405      3-405      3-405      3-405      3-405      3-405      3-405
                          3-405      3-405      3-405      3-405      3-405      3-405      3-405      3-405      3-405
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SVCTST = 000001 #3-362 #3-369 27-1924 28-1934 29-1957 30-1995 31-2021 32-2048 33-2075
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SWPTR 002340 *10-717 10-718 10-727 *10-729 #10-737
SYSTAT 010124 *13-1038 #24-1775 *26-1880 36-2211 *37-2253 *38-2326 41-2464 *43-2508 45-2604
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#53-3088 #59-3327 #60-3372
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THRSLO 020760 45-2632 #45-2682
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TRK     = 000062       #20-1575    *30-2000    30-2010   *30-2012   *31-2026    31-2036   *31-2038   *32-2053    32-2063
                       *32-2065    *33-2080    33-2090   *33-2092
TRPHND    004512        14-1084    #14-1104
TRPPTR    004510       *14-1085     14-1086    14-1091   *14-1093   #14-1097
TSTPC   = 000020       *11-805     #20-1563    26-1882    26-1903   *35-2127
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TST2      010732        28-1935    #28-1937
TST3      011172        29-1958    #29-1960
TST3PT    012510        29-1963     29-1969   #29-1984
TST4      012564        30-1996    #30-1998
TST4EX    013464        30-2011    #30-2016
TST5      013534        31-2022    #31-2024
TST5EX    014244        31-2037    #31-2042
TST6      014314        32-2049    #32-2051
TST6EX    015214        32-2064    #32-2069
TST7      015264        33-2076    #33-2078
TST7EX    015774        33-2091    #33-2096
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		#29-1959	30-1995	#30-1995	30-1995	30-1997	30-1997	30-1997	#30-1997	31-2021
		#31-2021	31-2021	31-2023	31-2023	31-2023	#31-2023	32-2048	#32-2048	32-2048
		32-2050	32-2050	32-2050	#32-2050	33-2075	#33-2075	33-2075	33-2077	33-2077
		33-2077	#33-2077	48-2862	#48-2862	48-2862	48-2879	48-2879	48-2879	#48-2879
		53-3073	#53-3073	53-3073	53-3077	53-3077	53-3077	#53-3077	53-3079	#53-3079
		53-3079	53-3088	53-3088	53-3088	#53-3088	58-3256	58-3256	58-3256	#58-3256
		59-3301	#59-3301	59-3301	59-3312	#59-3312	59-3312	59-3327	59-3327	59-3327
		#59-3327	60-3356	#60-3356	60-3356	60-3372	60-3372	60-3372	#60-3372	60-3391
		60-3391	60-3391	#60-3391						
T$NS0	= 000000	#3-388	6-485	#7-538	11-830	#12-874	12-949	#13-959	13-1069	#14-1082
		14-1096	#15-1118	15-1142	#16-1151	16-1179	#17-1201	17-1224	#18-1273	58-3256
		#59-3301	60-3391							
T$NS1	= 000005	#4-409	4-413	#5-445	5-458	#6-467	6-483	#12-881	12-933	#27-1924
		27-1926	#28-1934	28-1936	#29-1957	29-1959	#30-1995	30-1997	#31-2021	31-2023
		#32-2048	32-2050	#33-2075	33-2077	#48-2862	48-2879	#53-3073	53-3077	#53-3079
		53-3088	#59-3312	59-3327	#60-3356	60-3372				
T$PTNU	= 000000	#3-362								
T$SAVL	= 177777	#3-362								
T$SEGL	= 177777	#3-362								
T$SUBN	= 000000	#3-362	#27-1924	#28-1934	#29-1957	#30-1995	#31-2021	#32-2048	#33-2075	
T$TAGL	= 177777	#3-362								
T$TAGN	= 010025	#3-362	4-409	4-409	#4-409	5-445	5-445	#5-445	6-467	6-467
		#6-467	12-881	12-881	#12-881	13-959	13-959	#13-959	14-1082	14-1082
		#14-1082	15-1118	15-1118	#15-1118	16-1151	16-1151	#16-1151	17-1201	17-1201
		#17-1201	27-1924	27-1924	#27-1924	28-1934	28-1934	#28-1934	29-1957	29-1957
		#29-1957	30-1995	30-1995	#30-1995	31-2021	31-2021	#31-2021	32-2048	32-2048
		#32-2048	33-2075	33-2075	#33-2075	48-2862	48-2862	#48-2862	53-3073	53-3073
		#53-3073	53-3079	53-3079	#53-3079	59-3312	59-3312	#59-3312	60-3356	60-3356
		#60-3356								
T$TEMP	= 000000	#4-413	4-413	#4-428	4-428	4-428	#4-428	4-428	4-428	#4-428
		4-428	4-428	#4-428	4-428	4-428	#4-428	4-428	4-428	#4-428
		4-428	4-428	#4-428	4-428	4-428	#4-428	#5-458	5-458	#6-483
		6-483	#6-485	6-485	#11-830	11-830	#12-933	12-933	#12-949	12-949

SYMBOL	VALUE		REFERENCES								
			#13-1069	13-1069	#14-1096	14-1096	#15-1142	15-1142	#16-1179	16-1179	#17-1224
			17-1224	#27-1926	27-1926	#28-1936	28-1936	#29-1959	29-1959	#30-1997	30-1997
			#31-2023	31-2023	#32-2050	32-2050	#33-2077	33-2077	#48-2879	48-2879	#53-3077
			53-3077	#53-3088	53-3088	#58-3256	58-3256	#59-3315	59-3315	#59-3315	59-3315
			#59-3315	59-3315	#59-3316	59-3316	#59-3316	59-3316	#59-3316	59-3316	#59-3317
			59-3317	#59-3317	59-3317	#59-3317	59-3317	#59-3318	59-3318	#59-3318	59-3318
			#59-3318	59-3318	#59-3319	59-3319	#59-3319	59-3319	#59-3319	59-3319	#59-3327
			59-3327	#60-3358	60-3358	#60-3358	60-3358	#60-3358	60-3358	#60-3359	60-3359
			#60-3359	60-3359	#60-3359	60-3359	#60-3360	60-3360	#60-3360	60-3360	#60-3360
			60-3360	#60-3361	60-3361	#60-3361	60-3361	#60-3361	60-3361	#60-3362	60-3362
			#60-3362	60-3362	#60-3362	60-3362	#60-3364	60-3364	#60-3364	60-3364	#60-3364
			60-3364	#60-3372	60-3372	#60-3391	60-3391				
T$TEST	= 000007		#3-362	27-1924	#27-1924	27-1924	28-1934	#28-1934	28-1934	29-1957	#29-1957
			29-1957	30-1995	#30-1995	30-1995	31-2021	#31-2021	31-2021	32-2048	#32-2048
			32-2048	33-2075	#33-2075	33-2075	60-3390				
T$TSTM	= 177777		#3-362	11-824	12-889	12-891	12-892	12-893	12-894	12-909	12-910
			12-920	12-933	13-963	13-983	13-984	13-990	13-1003	13-1004	13-1039
			13-1069	14-1084	14-1095	14-1096	14-1104	14-1107	15-1121	15-1142	16-1159
			16-1179	17-1224	26-1913	26-1914	27-1926	28-1936	29-1959	30-1997	31-2023
			32-2050	33-2077	35-2188	39-2425	45-2624	45-2629	45-2632	45-2634	45-2648
			45-2655	45-2663	47-2803	47-2817	47-2823	47-2830	47-2841	47-2845	47-2849
			48-2869	48-2872	48-2875	48-2879	52-3009	52-3024	52-3025	52-3027	52-3065
			52-3067	53-3094	53-3095	54-3141	54-3142	55-3175	55-3180	55-3182	
T$TSTS	= 000001		#3-362	#27-1924	#28-1934	#29-1957	#30-1995	#31-2021	#32-2048	#33-2075	
T$$AU	= 010010		#17-1201	17-1224							
T$$AUT	= 010005		#14-1082	14-1096							
T$$CLE	= 010006		#15-1118	15-1142							
T$$DU	= 010007		#16-1151	16-1179							
T$$HAR	= 010023		#59-3312	59-3312	59-3327						
T$$HW	= 010001		#5-445	5-445	5-458						
T$$INI	= 010004		#13-959	13-1069							
T$$MSG	= 010020		#48-2862	48-2879							
T$$PRO	= 010000		#4-409								
T$$RPT	= 010003		#12-881	12-933							
T$$SOF	= 010024		#60-3356	60-3356	60-3372						
T$$SRV	= 010022		#53-3073	53-3077	#53-3079	53-3088					
T$$SW	= 010002		#6-467	6-467	6-483						
T$$TES	= 010017		#27-1924	27-1926	#28-1934	28-1936	#29-1957	29-1959	#30-1995	30-1997	#31-2021
			31-2023	#32-2048	32-2050	#33-2075	33-2077				
T1	010500	G	4-428	#27-1924							
T1TRY	= 000146		#20-1616								
T2	010670	G	4-428	#28-1934							
T3	011130	G	4-428	#29-1957							
T4	012522	G	4-428	#30-1995							
T4TRY	= 000132		#20-1610								
T5	013472	G	4-428	#31-2021							
T6	014252	G	4-428	#32-2048							
T7	015222	G	4-428	#33-2075							
UAM	= 000200	G	#7-545								
UNIT	022212	G	48-2869	#48-2880							
UNREC	021060		45-2663	#45-2688							
UNSUC	020456		45-2628	#45-2645							

SYMBOL	VALUE	REFERENCES								
JNXPCT	016774	#38-2329								
WAIT	023334	52-3033	52-3041	52-3048	#53-3090	53-3097				
WHCHDR	022470	35-2161	35-2175	47-2798	#49-2897					
WRLOCK	= 000026	#22-1677	46-2757	47-2826						
WRTN0	= 000110	12-910	13-1010	13-1012	#20-1588	*35-2177				
WRTN1	= 000112	12-920	#20-1589	*35-2180						
XFNSND	016034	#35-2131								
XMDB	= 000030	*13-1027	#20-1567	35-2196	52-3018	53-3076				
XMSR	= 000026	*13-1022	#20-1566	35-2185	52-3005	52-3011	52-3022	52-3032	52-3040	52-3063
		53-3075								
X$ALWA	= 000000	#3-362								
X$CNT	= 000036	#20-1570	*27-1928	*28-1940	*29-1965	*29-1965	*29-1965	*30-2005	*30-2005	*30-2005
		*32-2058	*32-2058	*32-2058						
X$FALS	= 000040	#3-362								
X$FLG	= 000034	#20-1569	*27-1928	*28-1940	*29-1965	*29-1965	*29-1965	29-1965	29-1966	29-1966
		*30-2005	*30-2005	*30-2005	30-2005	31-2031	31-2031	*32-2058	*32-2058	*32-2058
		32-2058	33-2085	33-2085	35-2146	37-2237	43-2503			
X$OFFS	= 000400	#3-362								
X$PKNM	= 000032	#20-1568	*27-1928	*28-1940	*29-1965	*29-1965	*29-1965	*29-1965	*29-1966	*29-1966
		*30-2005	*30-2005	*30-2005	*30-2005	*31-2031	*31-2031	*32-2058	*32-2058	*32-2058
		*32-2058	*33-2085	*33-2085	35-2142	*35-2142	37-2245	38-2308	*38-2312	*38-2323
		*38-2329	*38-2345	*38-2356	43-2502					
X$PTR	= 000106	#20-1587	*35-2148	38-2313	*38-2314	38-2315	*38-2363			
X$TRUE	= 000020	#3-362								
$TRBUF	024332	27-1928	28-1940	29-1965	29-1965	29-1965	29-1965	29-1966	29-1966	30-2005
		30-2005	30-2005	30-2005	31-2031	31-2031	32-2058	32-2058	32-2058	32-2058
		33-2085	33-2085	35-2131	35-2134	35-2140	#57-3220			

MACRO NAME	REFERENCES									
BGNAU	#17-1201									
BGNAUT	14-1082									
BGNCLN	#15-1118									
BGNDU	#16-1151									
BGNHRD	59-3312									
BGNHW	#5-445									
BGNINI	13-959									
BGNMOD	3-388	7-538	12-874	18-1273	59-3301					
BGNMSG	#48-2862									
BGNPRO	4-409									
BGNRPT	12-881									
BGNSFT	#60-3356									
BGNSRV	53-3073	53-3079								
BGNSW	#6-467									
BGNTST	27-1924	28-1934	29-1957	30-1995	31-2021	32-2048	33-2075			
BNCOMP	13-964	13-991								
BREAK	11-824	12-889	12-892	12-894	26-1914	35-2188	39-2425	52-3009	53-3094	53-3095
CLRVEC	14-1095	52-3065	52-3067							
DESCRI	#3-407									
DEVTYP	#9-583									
DISPAT	4-428									
DOCLN	#13-984	#13-1004								
DODU	14-1107	47-2849								
DORPT	15-1121									
ENDAU	17-1224									
ENDAUT	#14-1096									
ENDCLN	15-1142									
ENDDU	16-1179									
ENDHRD	#59-3327									
ENDHW	5- 58									
ENDINI	#15-1069									
ENDMOD	6-485	11-830	12-949	58-3256	60-3391					
ENDMSG	48-2879									
ENDPRO	#4-413									
ENDRPT	#12-933									
ENDSFT	60-3372									
ENDSRV	#53-3077	#53-3088								
ENDSW	6-483									
ENDTST	27-1926	28-1936	29-1959	30-1997	31-2023	32-2050	33-2077			
EQUALS	7-545									
ERRDF	47-2803	47-2817								
ERRHRD	#47-2830	#47-2845								
ERRSF	#13-983	#13-1003	#26-1913							
ERRSOF	47-2823	47-2841	54-3141							
GPHARD	13-990									
GPRMA	#59-3315	#59-3316								
GPRMD	60-3358	60-3364								
GPRML	#59-3317	#59-3318	#59-3319	#60-3359	#60-3360	#60-3361	#60-3362			
HEADER	3-405									
LASTAD	60-3390									
M$BYTE	#3-405	#3-405	#3-405	#3-405						
M$CNTO	#59-3315	59-3315	#59-3316	59-3316	#59-3317	59-3317	#59-3318	59-3318	#59-3319	59-3319

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MACRO NAME   REFERENCES
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             #60-3364   60-3364
M$COUN       #12-891    12-891    #12-893    12-893    #12-909    12-909    #12-910    12-910    12-910     12-910
              12-910    12-910     12-910    12-910     12-910   #12-920     12-920    12-920    12-920     12-920
              12-920    12-920     12-920    12-920    #14-1104   14-1104   #16-1159   16-1159   #45-2624   45-2624
             #45-2629   45-2629   #45-2632   45-2632   #45-2634   45-2634   #45-2648   45-2648   #45-2655   45-2655
             #45-2663   45-2663   #48-2869   48-2869    48-2869   48-2869   #48-2872   48-2872    48-2872   48-2872
              48-2872  #48-2875    48-2875  #54-3142    54-3142  #55-3175    55-3175  #55-3180    55-3180  #55-3182
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              3-407    #9-583     9-583
M$DECR       #4-413     4-413    #5-458     5-458    #6-483     6-483    #6-485     6-485    #11-830    11-830
             #12-933    12-933   #12-949    12-949   #13-1069   13-1069  #14-1096   14-1096  #15-1142   15-1142
             #16-1179   16-1179  #17-1224   17-1224  #27-1926   27-1926  #28-1936   28-1936  #29-1959   29-1959
             #30-1997   30-1997  #31-2023   31-2023  #32-2050   32-2050  #33-2077   33-2077  #48-2879   48-2879
             #53-3077   53-3077  #53-3088   53-3088  #58-3256   58-3256  #59-3327   59-3327  #60-3372   60-3372
             #60-3391   60-3391
M$DEFA       #59-3315  #59-3315  #59-3316  #59-3316  #59-3317  #59-3317  #59-3318  #59-3318  #59-3319  #59-3319
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             #60-3364  #60-3364
M$ENDE       #5-458    #6-483    #6-485    #11-830   #12-933   #12-949   #13-1069  #14-1096  #15-1142  #16-1179
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             #53-3088  #58-3256  #59-3327  #60-3372  #60-3391
M$ERRI       #13-983   #13-983   #13-1003  #13-1003  #26-1913  #26-1913  #47-2803  #47-2803  #47-2817  #47-2817
             #47-2823  #47-2823  #47-2830  #47-2830  #47-2841  #47-2841  #47-2845  #47-2845  #54-3141  #54-3141
M$EXCP       #59-3315   59-3315    59-3315  #59-3316    59-3316   59-3316  #60-3358   60-3358    60-3358  #60-3364
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             #48-2879  #48-2879  #53-3073  #53-3073  #53-3077  #53-3077  #53-3079  #53-3079  #53-3088  #53-3088
             #59-3312  #59-3312  #59-3327  #59-3327  #60-3356  #60-3356  #60-3372  #60-3372  #60-3390  #60-3390
M$GETS       #4-413     4-413    #5-458     5-458    #6-483     6-483    #6-485     6-485    #11-830    11-830
             #12-933    12-933   #12-949    12-949   #13-1069   13-1069  #14-1096   14-1096  #15-1142   15-1142
             #16-1179   16-1179  #17-1224   17-1224  #27-1926   27-1926  #28-1936   28-1936  #29-1959   29-1959
             #30-1997   30-1997  #31-2023   31-2023  #32-2050   32-2050  #33-2077   33-2077  #48-2879   48-2879
             #53-3077   53-3077  #53-3088   53-3088  #58-3256   58-3256  #59-3327   59-3327  #60-3372   60-3372
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M$SETS	#3-388	#3-388	#4-409	#4-409	#5-445	#5-445	#6-467	#6-467	#7-538	#7-538
	#12-874	#12-874	#12-881	#12-881	#13-959	#13-959	#14-1082	#14-1082	#15-1118	#15-1118
	#16-1151	#16-1151	#17-1201	#17-1201	#18-1273	#18-1273	#27-1924	#27-1924	#28-1934	#28-1934
	#29-1957	#29-1957	#30-1995	#30-1995	#31-2021	#31-2021	#32-2048	#32-2048	#33-2075	#33-2075
	#48-2862	#48-2862	#53-3073	#53-3073	#53-3079	#53-3079	#59-3301	#59-3301	#59-3312	#59-3312
	#60-3356	#60-3356								
M$SVC	#11-824	11-824	#12-889	12-889	#12-891	12-891	#12-892	12-892	#12-893	12-893
	#12-894	12-894	#12-909	12-909	#12-910	12-910	#12-920	12-920	#12-933	12-933
	#13-963	13-963	13-983	#13-984	13-984	#13-990	13-990	13-1003	#13-1004	13-1004
	#13-1039	13-1039	#13-1069	13-1069	#14-1084	14-1084	#14-1095	14-1095	#14-1096	14-1096
	#14-1104	14-1104	#14-1107	14-1107	#15-1121	15-1121	#15-1142	15-1142	#16-1159	16-1159
	#16-1179	16-1179	#17-1224	17-1224	26-1913	#26-1914	26-1914	#27-1926	27-1926	#28-1936
	28-1936	#29-1959	29-1959	#30-1997	30-1997	#31-2023	31-2023	#32-2050	32-2050	#33-2077
	33-2077	#35-2188	35-2188	#39-2425	39-2425	#45-2624	45-2624	#45-2629	45-2629	#45-2632
	45-2632	#45-2634	45-2634	#45-2648	45-2648	#45-2655	45-2655	#45-2663	45-2663	47-2803
	47-2817	47-2823	47-2830	47-2841	47-2845	#47-2849	47-2849	#48-2869	48-2869	#48-2872
	48-2872	#48-2875	48-2875	#48-2879	48-2879	#52-3009	52-3009	#52-3024	52-3024	#52-3025
	52-3025	#52-3027	52-3027	#52-3065	52-3065	#52-3067	52-3067	#53-3094	53-3094	#53-3095
	53-3095	54-3141	#54-3142	54-3142	#55-3175	55-3175	#55-3180	55-3180	#55-3182	55-3182
M$TLAB	#11-824	#12-889	#12-891	#12-892	#12-893	#12-894	#12-909	#12-910	#12-920	#12-933
	#13-963	#13-983	#13-984	#13-990	#13-1003	#13-1004	#13-1039	#13-1069	#14-1084	#14-1095
	#14-1096	#14-1104	#14-1107	#15-1121	#15-1142	#16-1159	#16-1179	#17-1224	#26-1913	#26-1914
	#27-1926	#28-1936	#29-1959	#30-1997	#31-2023	#32-2050	#33-2077	#35-2188	#39-2425	#45-2624
	#45-2629	#45-2632	#45-2634	#45-2648	#45-2655	#45-2663	#47-2803	#47-2817	#47-2823	#47-2830
	#47-2841	#47-2845	#47-2849	#48-2869	#48-2872	#48-2875	#48-2879	#52-3009	#52-3024	#52-3025
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	#15-1142	15-1142	#16-1159	16-1159	#16-1179	16-1179	#17-1224	17-1224	#26-1913	#26-1913
	26-1913	#26-1914	26-1914	#27-1926	27-1926	#28-1936	28-1936	#29-1959	29-1959	#30-1997
	30-1997	#31-2023	31-2023	#32-2050	32-2050	#33-2077	33-2077	#35-2188	35-2188	#39-2425
	39-2425	#45-2624	45-2624	#45-2629	45-2629	#45-2632	45-2632	#45-2634	45-2634	#45-2648
	45-2648	#45-2655	45-2655	#45-2663	45-2663	#47-2803	#47-2803	47-2803	#47-2817	#47-2817
	47-2817	#47-2823	#47-2823	47-2823	#47-2830	#47-2830	47-2830	#47-2841	#47-2841	47-2841
	#47-2845	#47-2845	47-2845	#47-2849	47-2849	#48-2869	48-2869	#48-2872	48-2872	#48-2875
	48-2875	#48-2879	48-2879	#52-3009	52-3009	#52-3024	52-3024	#52-3025	52-3025	#52-3027
	52-3027	#52-3065	52-3065	#52-3067	52-3067	#53-3094	53-3094	#53-3095	53-3095	#54-3141
	#54-3141	54-3141	#54-3142	54-3142	#55-3175	55-3175	#55-3180	55-3180	#55-3182	55-3182
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	#4-428	#13-983	#13-983	#13-983	#13-983	#13-1003	#13-1003	#13-1003	#13-1003	#26-1913
	#26-1913	#26-1913	#26-1913	#47-2803	#47-2803	#47-2803	#47-2803	#47-2817	#47-2817	#47-2817
	#47-2817	#47-2823	#47-2823	#47-2823	#47-2823	#47-2830	#47-2830	#47-2830	#47-2830	#47-2841
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	#54-3141	#59-3315	#59-3315	#59-3316	#59-3316	#59-3317	#59-3317	#59-3318	#59-3318	#59-3319
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MACRO NAME	REFERENCES									
POINTE	3-395									
POP	#10-633	10-790	10-791	12-927	12-928	12-929	12-930	12-931	12-932	16-1157
	16-1158	35-2189	35-2197	38-2384	38-2385	45-2675	45-2676	47-2850	47-2851	47-2852
	47-2853	48-2877	48-2878	50-2940	50-2941	51-2976	51-2977	54-3146	54-3147	54-3148
	55-3183	55-3184								
PRINTB	#16-1159	#45-2648	#48-2869	#48-2872	#48-2875	#54-3142				
PRINTF	14-1104	55-3175	55-3180	55-3182						
PRINTS	#12-891	#12-893	#12-909	#12-910	#12-920					
PRINTX	45-2624	45-2629	45-2632	45-2634	45-2655	45-2663				
PUSH	#10-630	10-783	10-784	12-882	12-883	12-884	12-885	12-886	12-887	16-1153
	16-1154	35-2183	35-2187	38-2373	38-2374	45-2602	45-2603	47-2787	47-2788	47-2789
	47-2790	48-2863	48-2864	50-2916	50-2917	51-2954	51-2955	54-3120	54-3121	54-3122
	55-3168	55-3169								
READEF	#13-963									
RET	#10-626	10-735	10-758	10-774	10-792	11-810	11-828	16-1186	26-1916	27-1930
	28-1946	29-1983	30-2017	31-2043	32-2070	33-2097	35-2181	35-2198	36-2220	37-2282
	38-2371	38-2386	39-2448	41-2480	43-2583	45-2677	46-2772	47-2854	49-2903	50-2942
	51-2978	52-3069	53-3100	54-3150	55-3185					
RFLAGS	#13-1039									
SETPRI	52-3024									
SETVEC	14-1084	52-3025	52-3027							
SVC	#3-361	3-362								
SWAPIN	#19-1290	26-1881	26-1902							
SWAPOW	#19-1299	#35-2128								
TSTID	#19-1515	27-1925	28-1935	29-1958	30-1996	31-2022	32-2049	33-2076		
TUREAD	#19-1445	29-1966	31-2031	33-2085						
TURTRY	#19-1403	#29-1965	#29-1966	#30-2005	#31-2031	#32-2058	#33-2085			
TUSEEK	#19-1376	#28-1940								
TUSELF	#19-1490	27-1928								