DMV11 DMV11 MCTRL DIAG# 2 AH-F265A MC MAY 1981
M8053 M8064 CVDMBA0 FICHE 1 OF 2 COPYRIGHT © 1981
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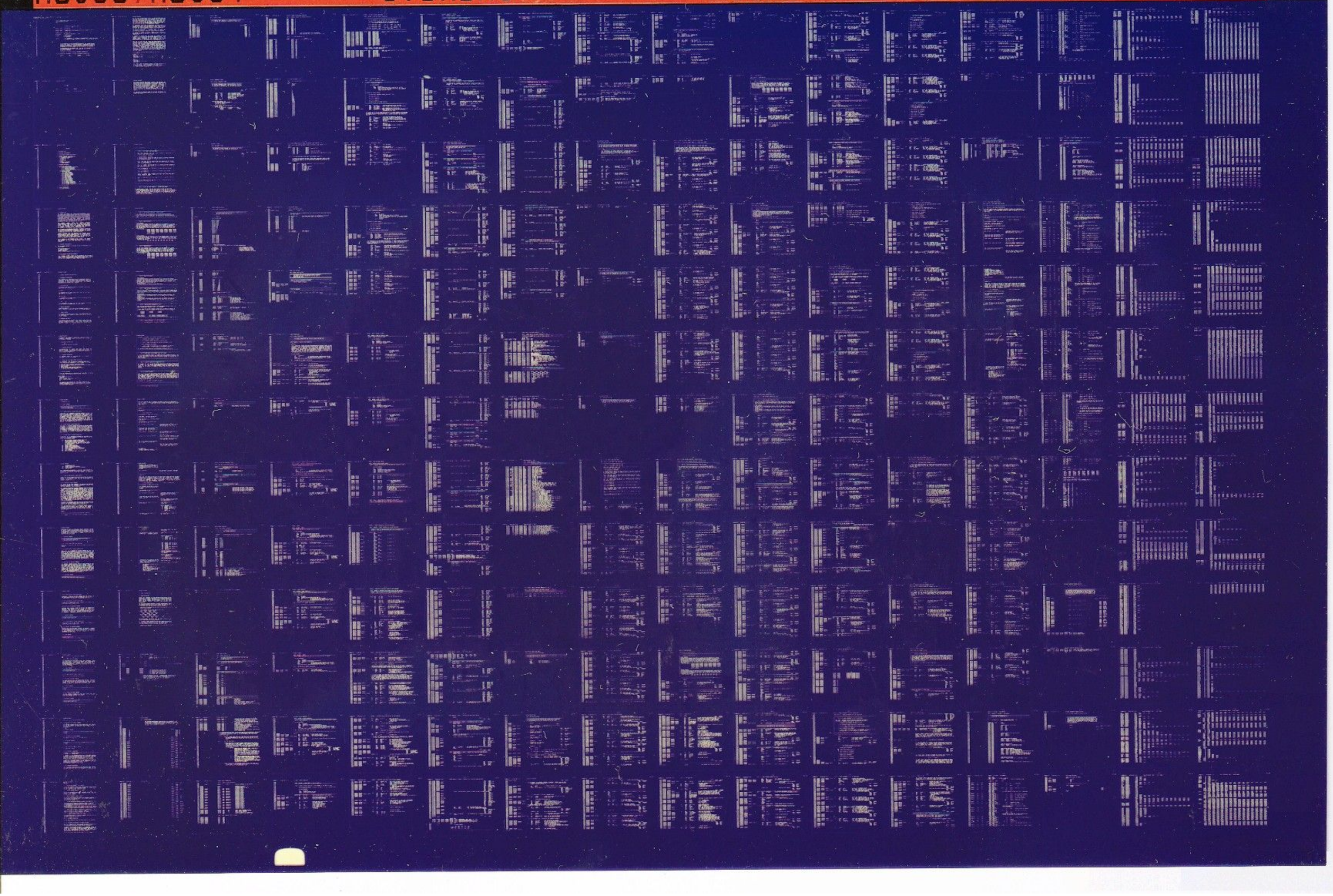

DMV11 DMV11 MCTRL DIAG# 2 AH-F265A-MC MAY 1981
M8053,M8064 CVDMBA0 FICHE 2 OF 2

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                        .TITLE CVDMBA0 DMV11 MCTRL DIAG #2
                        .SBTTL PROGRAM DOCUMENT
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                                        I D E N T I F I C A T I O N
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                        PRODUCT CODE:   AC-F264A-MC

                        PRODUCT NAME:   CVDMBA0 DMV11 MICRO-CONTROLLER STATIC DIAGNOSTIC PART 2

                        PRODUCT DATE:   JANUARY 1981

                        MAINTAINER:     DIAGNOSTICS MERRIMACK  CC:38P

                        AUTHORS:        CHRIS BRIENEN
                                        RAY MARSHALL

                        PURPOSE:        THIS DIAGNOSTIC IS DESIGNED TO PERFORM STATIC LOGIC TESTS FOR
                                        THE M8053 OR M8064 (HEREAFTER REFERRED TO AS THE DMV OR DMV-11)
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HISTORY

REV	DATE	REASON
0	14-JAN-81	INITIAL RELEASE

CONTENTS

1.0 INTRODUCTION

THE M8053 AND M8064 ARE SINGLE-LINE SYNCHRONOUS, MICRO-PROCESSOR BASED COMMUNICATIONS INTERFACES WHICH CAN SUPPORT BOTH CHARACTER-ORIENTED (DDCMP, BSC, ETC.) AND BIT-ORIENTED (SDLC, HDLC, ETC.) PROTOCOLS. THE PURPOSE OF THIS PROGRAM IS TO PERFORM DIAGNOSTIC TESTING OF THE CSRS, RAM, AND BASIC MICRO-PROCESSOR LOGIC ON THESE BOARDS. THE FOLLOWING FUNCTIONS WILL BE PERFORMED: DMV RESIDENT U-DIAG EXECUTION CSR ADDRESSING, VIA REGISTER STATIC BIT INTERACTION AND READ/WRITE TESTING, AND ON-BOARD RAM TESTING.

THE STATIC LOGIC TESTS WILL PROVIDE EXTENSIVE TROUBLESHOOTING CAPABILITIES, SUCH AS TIGHT SCOPE LOOPS, SWITCH OPTIONS, AND ABILITY TO 'LOCK" ONTO INTERMITTENT ERRORS. IN ADDITION TESTS ARE DESIGNED AND STRUCTURED TO ACHIEVE MAXIMUM FAULT RESOLUTION AND FACILITATE REPLACEMENT OF THE SMALLEST FIELD REPLACEABLE UNIT.

THIS PROGRAM IS IMPLEMENTED USING THE DIAGNOSTIC SUPERVISOR AND A STRUCTURED PROGRAMMING APPROACH. BECAUSE THE DESIGN CONFORMS TO THE SUPERVISOR (STANDALONE VERSION) THE PROGRAM IS COMPATIBLE WITH ACT, APT, XXDP+, AND SLIDE.

THROUGH DIALOGUE WITH THE OPERATOR, THE PROGRAM ALLOWS MODIFICATION OF DEVICE PARAMETERS, SUCH AS LSI-BUS ADDRESS, VECTOR ADDRESSES AND DEVICE PRIORITY. IN ADDITION, THE OPERATOR CAN SPECIFY PARTICULAR TESTS TO BE RUN AND A VARIETY OF LOOPING, RUNNING, AND REPORTING MODES.

DEVICE ERRORS WILL BE REPORTED AS THEY OCCUR. THE REPORT WILL INCLUDE A TEST NUMBER AND DESCRIPTION OF THE ERROR, GOOD AND BAD TEST DATA, AND APPLICABLE DEVICE REGISTER CONTENTS.

2.0 HARDWARE REQUIREMENTS

THE FOLLOWING HARDWARE IS REQUIRED TO RUN THE M8053/8064 STATIC LOGIC TESTS:

PDP-11/03 OR PDP-11/23
16K WORDS OF MEMORY
CONSOLE TERMINAL
M8053 OR M8064 COMMUNICATIONS INTERFACE

3.0 PRELIMINARY PROGRAM REQUIREMENTS

THIS PROGRAM (CVDMB) SHOULD BE THE SECOND OF THE FIVE DMV-11 STATIC DIAGNOSTICS TO BE RUN (CVDMA SHOULD BE RUN FIRST). ERRORS FOUND IN THIS PROGRAM SHOULD BE CORRECTED BEFORE RUNNING ANY OF THE LINE UNIT DIAGNOSTICS (CVDMC, CVDMD, OR CVDME).

4.0 GENERAL PROGRAM CONSIDERATIONS

4.1 DIAGNOSTIC SUPERVISOR

THIS PROGRAM IS COMPATIBLE WITH THE STANDALONE DIAGNOSTIC SUPERVISOR, AND MUST BE LOADED TO BE CO-RESIDENT WITH THE SUPERVISOR, OR BE PREVIOUSLY COMBINED WITH THE SUPERVISOR AND LOADED AS A SINGLE FILE. IN EITHER CASE, THE COMBINED PROGRAM WILL NOT EXCEED 16K OF MEMORY.

4.2 EXECUTION TIME

THE MAXIMUM TIME REQUIRED TO RUN THIS PROGRAM IS ABOUT ONE MINUTE PER PASS FOR EACH UNIT.

4.3 XXDP+

THIS PROGRAM MAY BE LOADED UNDER XXDP+, AND MAY BE RUN IN DUMP MODE OR CHAIN MODE.

4.4 ACT/SLIDE

THIS PROGRAM MAY BE LOADED UNDER ACT OR SLIDE AND MAY BE RUN IN DUMP MODE OR CHAIN MODE.

4.5 APT

THIS PROGRAM MAY BE LOADED BY THE APT SYSTEM (INCLUDING APT-RD) AND RUN IN PROGRAM MODE OR SCRIPT MODE.

4.6 MEMORY MANAGEMENT

MEMORY MANAGEMENT IS UTILIZED IN THIS PROGRAM TO VERIFY THE DMV-11'S ABILITY TO NPR INTO (AND OUT OF) EXTENDED MEMORY.

4.7 ERROR LOGGING

AT THE END OF EACH PASS ON ALL UNITS, THE PROGRAM PRINTS OUT THE CUMULATIVE TOTAL NUMBER OF ERRORS SINCE THE LAST START OR RESTART COMMAND.

5.0 PROGRAM LOAD MEDIA

THIS PROGRAM CAN BE LOADED FROM PAPER TAPE USING THE ABSOLUTE LOADER OR FROM ACT, SLIDE, OR APT SYSTEMS, OR FROM ANY MEDIA SUPPORTED BY XXDP+. WHEN USING THE PAPER TAPE ABSOLUTE LOADER, THE PROGRAM SHOULD BE LOADED FIRST,

FOLLOWED BY THE DIAGNOSTIC SUPERVISOR. WHEN USING XXDP+, THE DIAGNOSTIC SUPERVISOR SHOULD BE LOADED FIRST, FOLLOWED BY THE DIAGNOSTIC PROGRAM.

6.0 OPERATING INSTRUCTIONS

6.1 LOADING AND STARTING PROCEDURES

6.1.1 LOADING PROCEDURES

THIS PROGRAM MAY BE LOADED FROM PAPER TAPE USING THE ABSOLUTE LOADER. IT MAY ALSO BE LOADED FROM ANY XXDP+ LOAD MEDIA. WHEN LOADED UNDER XXDP+, THE DIAGNOSTIC SUPERVISOR WILL BE LOADED AUTOMATICALLY.

6.1.2 STARTING PROCEDURES

THE PROGRAM STARTS AT LOCATION 200. USE STANDARD DEC PROCEDURES TO START THE PROGRAM.

6.1.3 STEPS FOR QUICK AND SIMPLE EXECUTION

THE DIAGNOSTIC CAN BE EXECUTED STANDALONE UNDER XXDP+, WITHOUT READING THE REMAINDER OF THIS DOCUMENT, AS FOLLOWS:

A) LOAD AND START DIAGNOSTIC USING RUN COMMAND
B) RECEIVE DIAGNOSTIC SUPERVISOR IDENTIFICATION AND PROMPT (DRS-C>)
C) ENTER STA<CR>
D) ANSWER HARDWARE AND SOFTWARE QUESTIONS
E) GET END OF PASS MESSAGES OR ERROR MESSAGES
F) TO END EXECUTION, ENTER CONTROL/C

6.2 INITIAL DIALOGUE

AFTER THE PROGRAM AND THE SUPERVISOR ARE LOADED AND THE PROGRAM IS STARTED, THE FOLLOWING IDENTIFICATION IS TYPED :

```
DRS LOADED
DIAG. RUN-TIME SERVICES
CVDMB-A-0
DMV-11 U-CONTRL LOGIC DIAG - PART 2 OF 2
UNIT IS M8053 OR M8064
DR>
```

THE OPERATOR THEN PROCEEDS BY TYPING ONE OR MORE OF THE COMMANDS DESCRIBED IN THE FOLLOWING SECTION 6.3. (FOR MORE DETAILED INFORMATION, REFER TO THE DIAGNOSTIC SUPERVISOR FUNCTIONAL SPECIFICATION).

6.3 PROGRAM OPTIONS

6.3.1 START COMMAND

```
**********************************************************************
STA(RT)/TESTS:<TEST-LIST>/PASS:<PASS-CNT>/FLAGS:
   <FLAG-LIST>/EOP:<INCR>
**********************************************************************
```

6.3.1.1 TESTS SWITCH (/TESTS:<TEST-LIST>)

<TEST-LIST> IS A SEQUENCE OF DECIMAL NUMBERS (1:2 ETC.) OR RANGES OF DECIMAL NUMBERS (1-5:8-10 ETC.) THAT SPECIFY THE TESTS TO BE EXECUTED. THE NUMBERS ARE SEPARATED BY COLONS. THE NUMBERS RANGE FROM 1 TO THE LARGEST TEST NUMBER IN THE DIAGNOSTIC. THEY MAY BE SPECIFIED IN ANY ORDER. TESTS WILL BE EXECUTED IN NUMERICAL ORDER REGARDLESS OF THE ORDER OF SPECIFICATION. THE DEFAULT IS TO EXECUTE ALL TESTS. ON THIS AND ALL SWITCHES, THE ANGLE BRACKETS <> ARE PUNCTUATION USED IN THE DEFINITION ONLY, AND ARE NOT TO BE TYPED BY THE OPERATOR. SEE EXAMPLE AT END OF 6.3.1.5.

6.3.1.2 PASS SWITCH (/PASS:<PASS-CNT>)

<PASS-CNT> IS A DECIMAL NUMBER INDICATING THE DESIRED NUMBER OF PASSES. A PASS IS DEFINED AS THE EXECUTION OF THE FULL DIAGNOSTIC (ALL SELECTED TESTS) AGAINST ALL UNITS SUBMITTED. THE DEFAULT IS NON-ENDING EXECUTION. IN THIS CASE EXIT FROM THE PROGRAM IS ACCOMPLISHED EITHER BY TYPING A CONTROL/C OR BY OCCURANCE OF AN ERROR WITH THE HALT ON ERROR FLAG BEING SET. THE EXIT IS A RETURN TO COMMAND MODE. SEE EXAMPLE AT END OF 6.3.1.5.

6.3.1.3 FLAGS SWITCH (/FLAGS:<FLAG-LIST>)

<FLAG-LIST> IS A SEQUENCE OF ELEMENTS OF THE FORM <FLAG>, <FLAG=1>, OR <FLAG=0>, SEPARATED BY COLONS, WHERE <FLAG> HAS ONE OF THE FOLLOWING VALUES:

HOE	HALT ON ERROR, CAUSING COMMAND MODE TO BE ENTERED WHEN AN ERROR IS ENCOUNTERED
LOE	LOOP ON ERROR, CAUSING THE DIAGNOSTIC TO LOOP CONTINUOUSLY WITHIN THE SMALLEST DEFINED BLOCK OF CODING (SEGMENT, SUBTEST, OR TEST) CONTAINING THE ERROR
IER	INHIBIT ERROR REPORTING
IBE	INHIBIT BASIC ERROR REPORTS
IXE	INHIBIT EXTENDED ERROR REPORTS
PRI	DIRECT ALL MESSAGES TO A LINE PRINTER
PNT	PRINT NUMBER OF TEST BEING EXECUTED
BOE	BELL ON ERROR
UAM	RUN IN UNATTENDED MODE, BYPASSING MANUAL

```
                INTERVENTION TESTS
          ISR   INHIBIT STATISTICAL REPORTS
          IDU   INHIBIT DROPPING OF UNITS BY DIAGNOSTIC
          LOT   LOOP ON TEST

THE  FLAGS NAMED OR EQUATED TO 1 ARE SET, THOSE EQUATED TO 0
ARE CLEARED.  A FLAG NOT SPECIFIED IS CLEARED.  IF THE FLAGS
SWITCH  IS  NOT GIVEN ALL FLAGS ARE CLEARED.  SEE EXAMPLE AT
END OF 6.3.1.5.


6.3.1.4 END OF PASS SWITCH (/EOP:<INCR>)

<INCR> IS A DECIMAL NUMBER INDICATING HOW OFTEN (IN TERMS OF
PASSES)  IT  IS  DESIRED  THAT  THE  END  OF PASS MESSAGE BE
PRINTED.  THE DEFAULT IS AT THE  END  OF  EVERY  PASS.  SEE
EXAMPLE AT END OF 6.3.1.5.


6.3.1.5 EFFECT OF START COMMAND

THE  EFFECT OF THE START COMMAND IS TO INITIATE THE HARDWARE
PARAMETER DIALOGUE, THE  SOFTWARE  PARAMETER  DIALOGUE,  AND
THEN THE DIAGNOSTIC TESTS THEMSELVES.

THE  HARDWARE PARAMETER DIALOGUE COMMENCES WITH THE QUESTION
'# UNITS?'' TO WHICH THE  OPERATOR  REPLIES  WITH  A  DECIMAL
NUMBER  N FROM 1 TO 16. THE TERM 'UNIT'' REFERS TO THE DEVICE
TO WHICH THIS SERIES OF DIAGNOSTICS IS DEDICATED.  FOLLOWING
THIS  ARE THE QUESTIONS WHEREBY THE P-TABLES THEMSELVES WILL
BE BUILT.  EACH P-TABLE IS A CORE-RESIDENT TABLE  CONTAINING
ALL  THE  HARDWARE  INFORMATION  FOR ONE UNIT.  THE OPERATOR
MUST SUPPLY N (NUMBER OF UNITS) VALUES  FOR  EACH  QUESTION.
HE  MAY  DO  THIS  BY GIVING ONE ANSWER TO EACH QUESTION (IN
WHICH CASE THE SERIES OF QUESTIONS WILL BE POSED N TIMES) OR
BY  GIVING  N  VALUES, SEPARATED BY COMMAS, TO EACH QUESTION
(SERIES WILL BE POSED ONCE).  EACH QUESTION IS  FOLLOWED  BY
THE  RESPONSE  RADIX  (D  FOR  DECIMAL,  B FOR BINARY, O FOR
OCTAL, L FOR YES/NO) IN PARENTHESES AND  THE  DEFAULT  VALUE
AFTER THE PARENTHESES.

FOLLOWING  THE HARDWARE QUESTIONS ARE THE SOFTWARE QUESTIONS
TO BUILD THE SOFTWARE TABLES, WHICH DEFINE THE  MODE  (QUICK
VERIFY ETC.) THAT THE DIAGNOSTIC WILL EXECUTE IN.

WHEN  THE QUESTION '# UNITS?'' IS ANSWERED, MEMORY STORAGE IS
ALLOCATED FOR THE P-TABLES, AND IF THERE IS  NOT  ENOUGH  TO
ACCOMMODATE THEM THE MESSAGE 'TOO MANY UNITS'' IS ISSUED.  IN
THIS CASE THE DIAGNOSTIC MUST BE EXECUTED MORE THAN ONCE  TO
TEST ALL UNITS.

EXAMPLE:

STA/TESTS:1:2-4:6:8-10/PASS:3/FLAGS:IER:HOE=1:UAM:LOE

THIS  COMMAND  WILL CAUSE THREE PASSES TO BE MADE, EACH PASS
```

CONSISTING OF TESTS 1,2,3,4,6,8,9, AND 10 EXECUTED AGAINST ALL UNITS. THERE IS NO DIFFERENCE BETWEEN SAYING <FLAG> AND SAYING <FLAG=1>. THE NOTATION <FLAG=0> IS MEANINGFUL ONLY ON A COMMAND OTHER THAN START TO CLEAR A FLAG THAT WAS PREVIOUSLY SET. NOTE THAT ON ALL COMMANDS ONLY THE FIRST THREE LETTERS ARE SCANNED.

6.3.2 RESTART COMMAND

```
**********************************************************************
RES(TART)/TESTS:<TEST-LIST>/PASS:<PASS-CNT>/FLAGS:
   <FLAG-LIST>/UNITS:<UNIT-LIST>
**********************************************************************
```

6.3.2.1 TESTS, PASS, AND FLAGS SWITCHES

<TEST-LIST>, <PASS-CNT>, AND <FLAG-LIST> ARE AS IN THE START COMMAND.

6.3.2.2 UNITS SWITCH (/UNITS:<UNIT-LIST>)

<UNIT-LIST> IS A SEQUENCE OF DECIMAL NUMBERS (0,1 ETC.) OR RANGES OF DECIMAL NUMBERS (0-5, 8-10 ETC.) THAT SPECIFY THE UNITS TO BE TESTED. THE NUMBERS ARE SEPARATED BY COLONS. THE NUMBERS MAY RANGE FROM 0 THRU N-1 (N IS THE NUMBER OF UNITS SPECIFIED IN THE PREVIOUS START COMMAND). THE NUMBER INDICATES THE POSITION OF THE P-TABLE AS THE DATA WAS ENTERED DURING THE HARDWARE DIAGLOGUE. THE UNITS WHICH ARE SELECTED MUST NOT HAVE BEEN DROPPED BY THE DROP COMMAND. SEE THE DISCUSSION OF ADD AND DROP COMMANDS BELOW. DEFAULT IS TO TEST ALL UNITS WHICH HAVE NOT BEEN DROPPED BY A DROP COMMAND.

6.3.2.3 EFFECT OF RESTART COMMAND

THE RESTART COMMAND DIFFERS FROM THE START COMMAND IN THAT THE P-TABLES FROM THE PREVIOUS START COMMAND (THERE MUST HAVE BEEN ONE) ARE USED, INSTEAD OF NEW ONES BEING BUILT. THE UNITS SWITCH GIVES THE ABILITY TO SELECT A SUBSET OF THESE. THE SOFTWARE DIALOGUE MAY OPTIONALLY BE REEXECUTED (OPERATOR WILL BE ASKED). THE COMMAND CAN BE USED AFTER COMMAND MODE HAS BEEN REENTERED IN ANY OF THE THREE NORMAL WAYS: A) THE REQUESTED NUMBER OF PASSES HAVE BEEN MADE B) AN ERROR WAS ENCOUNTERED WITH THE HALT ON ERROR FLAG SET C) A CONTROL/C WAS ENTERED BY THE OPERATOR.

6.3.3 CONTINUE COMMAND

```
**********************************************************************
CON(TINUE)/PASS:<PASS-CNT/FLAGS:<FLAG-LIST>
**********************************************************************
```

438
439
440 6.3.3.1 PASS SWITCH (/PASS:<PASS-CNT>)
441
442 <PASS-CNT> IS SAME AS IN START COMMAND, BUT THE DEFAULT IS
443 THE UNSATISFIED PASS-CNT FROM THE PREVIOUS START OR RESTART.
444 IF NONE REMAINS, THE DEFAULT IS NON-ENDING EXECUTION.
445
446
447 6.3.3.2 FLAG SWITCH (/FLAGS:<FLAG-LIST>)
448
449 <FLAG-LIST> IS SAME AS IN START COMMAND, BUT UNSPECIFIED
450 FLAGS RETAIN THEIR CURRENT VALUE.
451
452
453 6.3.3.3 EFFECT OF CONTINUE COMMAND
454
455 CONTINUE MUST FOLLOW A START OR RESTART, AND COMMAND MODE
456 MUST HAVE BEEN ENTERED DUE TO A HALT ON ERROR OR A
457 CONTROL/C. THE EFFECT OF THE COMMAND IS TO GO TO THE
458 BEGINNING OF THE TEST THAT WAS BEING EXECUTED WHEN THE HALT
459 OR CONTROL/C TOOK PLACE. SOFTWARE DIALOGUE MAY OPTIONALLY
460 BE REEXECUTED. HARDWARE PARAMETERS MAY NOT BE CHANGED.
461
462
463 6.3.4 PROCEED COMMAND
464
465 **********
466 PRO(CEED)/FLAGS:<FLAG-LIST>
467 **********
468
469
470 6.3.4.1 FLAGS SWITCH (/FLAGS:<FLAG-LIST>)
471
472 <FLAG-LIST> IS AS IN THE START COMMAND, BUT UNSPECIFIED
473 FLAGS RETAIN THEIR CURRENT VALUE.
474
475
476 6.3.4.2 EFFECT OF PROCEED COMMAND
477
478 PROCEED MUST FOLLOW A START, RESTART, OR CONTINUE. COMMAND
479 MODE MUST HAVE BEEN ENTERED VIA A HALT ON ERROR. THE EFFECT
480 OF THE COMMAND IS TO BEGIN EXECUTION AT THE LOCATION
481 FOLLOWING THE ERROR CALL. NEITHER HARDWARE NOR SOFTWARE
482 PARAMETERS MAY BE ALTERED.
483
484
485 6.3.5 ADD COMMAND
486
487 **********
488 ADD/UNITS:<UNIT-LIST>
489 **********
490
491
492 6.3.5.1 UNITS SWITCH (/UNITS:<UNIT-LIST>
493

<UNIT-LIST> IS AS IN THE RESTART COMMAND.

6.3.5.2 EFFECT OF ADD COMMAND

THE UNITS SPECIFIED ARE ADDED TO THE TEST SEQUENCE. EACH UNIT MUST HAVE A P-TABLE IN MEMORY DUE TO AN EARLIER HARDWARE DIALOGUE. THIS COMMAND MUST BE FOLLOWED BY A RESTART OR CONTINUE. THE UNITS SWITCH MUST BE SPECIFIED. THE ADD COMMAND IS MEANINGFUL ONLY FOR UNITS THAT WERE PREVIOUSLY DROPPED.

6.3.6 DROP COMMAND

****
DRO(P)/UNITS:<UNIT-LIST>
****

6.3.6.1 UNITS SWITCH (/UNITS:<UNIT-LIST>)

<UNIT-LIST> IS AS IN THE RESTART COMMAND.

6.3.6.2 EFFECT OF DROP COMMAND

THE UNITS SPECIFIED WILL BE DROPPED FROM TESTING. THE UNITS WILL BE RESELECTED ONLY BY THE EXECUTION OF AN ADD OR START COMMAND. THE UNITS SWITCH MUST BE ENTERED. THIS COMMAND MUST BE FOLLOWED BY A RESTART OR A CONTINUE COMMAND.

6.3.7 PRINT COMMAND

****
PRI(NT)
****

6.3.7.1 EFFECT OF PRINT COMMAND

THE TOTAL NUMBER OF ERRORS FOR EACH UNIT SINCE THE LAST START OR RESTART COMMAND ARE PRINTED. THE ISR (INHIBIT STATISTICAL REPORTING) FLAG IS CLEARED.

6.3.8 DISPLAY COMMAND

****
DIS(PLAY)/UNITS:<UNIT-LIST>
****

6.3.8.1 UNITS SWITCH (/UNITS:<UNIT-LIST>)

<UNIT-LIST> IS AS IN THE RESTART COMMAND.

6.3.8.2 EFFECT OF DISPLAY COMMAND

THE HARDWARE P-TABLES FOR ALL UNITS UNDER TEST ARE PRINTED OUT IN THE FORMAT IN WHICH THEY WERE ENTERED. ANY UNITS THAT WERE DROPPED BY THE OPERATOR 'DROP'' COMMAND ARE SO DESIGNATED.

6.3.9 FLAGS COMMAND

****
FLA(GS)
****

6.3.9.1 EFFECT OF FLAGS COMMAND

THE CURRENT SETTINGS OF ALL FLAGS ARE PRINTED.

6.3.10 ZFLAGS COMMAND

****
ZFL(AGS)
****

6.3.10.1 EFFECT OF ZFLAGS COMMAND

ALL FLAGS ARE CLEARED.

6.3.11 CONTROL CHARACTERS

A CONTROL C (C) ENTERED DURING THE EXECUTION OF A DIAGNOSTIC CAUSES A RETURN TO COMMAND MODE.

A CONTROL Z (Z) ENTERED DURING ONE OF THE THREE OPERATOR DIALOGUES- HARD CORE QUESTIONS (SEE 6.2),HARDWARE DIALOGUE (SEE 6.3.1.5), OR SOFTWARE DIALOGUE (SEE 6.3.1.5) CAUSES THE DEFAULTS TO BE TAKEN FOR THE REMAINDER OF THAT DIALOGUE.

A CONTROL O (O) ENTERED DURING THE EXECUTION OF A DIAGNOSTIC CAUSES ALL TELETYPE OUTPUT TO BE SURPRESSED FOR THE REMAINDER OF THE DIAGNOSTIC OR UNTIL ANOTHER O IS TYPED, WHICH RESTORES NORMAL TELETYPE OUTPUT.

6.3.12 HARDWARE PARAMETERS

THE FOLLOWING 3 QUESTIONS WILL BE ASKED ON A START COMMAND. THE VALUE LOCATED TO THE LEFT OF THE QUESTION MARK IS THE DEFAULT VALUE THAT WILL BE TAKEN ON A CARRIAGE RETURN

RESPONSE.

1. DEVICE CSR ADDRESS : (O) 160020?

THIS IS THE ADDRESS AT WHICH THE CSR REGISTERS (SEL0) RESIDE ON THE LSI-BUS. THE ALLOWABLE RANGE IS 160020-177760 (OCTAL), AND THE DEFAULT VALUE IS 160020.

2. DEVICE VECTOR ADDRESS : (O) 300 ?

THIS IS THE ADDRESS OF THE INPUT INTERRUPT VECTOR FOR THIS DEVICE. THE ALLOWABLE RANGE IS 000-674 (OCTAL), AND THE DEFAULT VALUE IS 300.

3. DEVICE PRIORITY LEVEL : (O) 4 ?

THIS IS THE CPU PRIORITY AT WHICH THE INTERRUPT HANDLERS OF THIS DEVICE WILL BE EXECUTED. THE ALLOWABLE RANGE IS 0-7, AND THE DEFAULT VALUE IS 4.

4. IS THE PROCESSOR STRAPPED TO MODE 0 ON POWER UP : (L) Y ?

THIS IS THE CPU'S POWER UP STRAPPING. 'MODE 0'' INDICATES THAT THE PROCESSOR WILL POWER UP USING LOCATIONS 24 AND 26.
IF THE ANSWER TO THIS QUESTION IS NO, TESTS WHICH USE ''DCOK'' WILL BE SKIPPED.
(NOTE: MODE 0 IS SELECTED WHEN JUMPERS W5 AND W6 ARE 'REMOVED'- SEE MICROCOMPUTER PROCESSOR HANDBOOK FOR MORE INFORMATION).

5. BOARD TYPE (0=M8064, 1=M8053-V35, 2=M8053-EIA) : (O) 0 ?

THIS IS THE TYPE OF DMV-11 CURRENTLY INSTALLED. NOTE THAT THE M8053 IS SWITCH SELECTABLE BETWEEN V.35 AND EIA.

6. IS THIS A MANUFACTURING TEST STAND : (L) N ?

THIS QUESTION REFERS TO A SPECIFIC MEMORY CONFIGURATION THAT IS REQUIRED TO RUN TEST #8 (SEE SEC. 7.0).

6.3.13 SOFTWARE PARAMETERS

NO SOFTWARE PARAMETER QUESTIONS ARE ASKED BY THIS PROGRAM.

6.3.14 EXTENDED DISCUSSION OF P-TABLE DIALOGUE

THE FULL CAPABILITY OF THE HARDWARE DIALOGUE IS REVEALED BY THE FOLLOWING DISCUSSION OF WHAT HAPPENS INTERNALLY.

AS SOON AS THE QUESTION ''# UNITS?'' IS ANSWERED (WITH THE NUMBER N, SAY) SPACE IN CORE IS ALLOCATED FOR N P-TABLES. ALL OF THE P-TABLES ARE OF THE SAME FORMAT, AND THERE IS A ONE-TO ONE CORRESPONDENCE BETWEEN THE HARDWARE PARAMETER QUESTIONS AND THE SLOTS IN THE P-TABLE FORMAT.

ON THE FIRST TRIP THRU THE QUESTIONS, ALL OF THE SLOTS IN

ALL OF THE P-TABLES ARE FILLED. IF THE OPERATOR TYPES IN LESS THAN N EXPLICIT VALUES IN RESPONSE TO A PARTICULAR QUESTION, THESE VALUES ARE PLACED IN THE P-TABLES (ONE VALUE GOING INTO THE PROPER SLOT OF EACH P-TABLE BEGINNING WITH THE FIRST P-TABLE) UNTIL THE STRING OF VALUES IS EXHAUSTED. THE LAST VALUE IN THE STRING BECOMES THE NEW DEFAULT AND IS USED TO FILL THAT SLOT IN THE REMAINING P-TABLES.

ON SUBSEQUENT TRIPS THRU THE QUESTIONS, THE SAME PROCESS IS CARRIED OUT, EXCEPT THAT THE EARLIEST P-TABLE NOT TO HAVE RECEIVED AN EXPLICIT VALUE IN ANY OF ITS SLOTS NOW ASSUMES THE ROLE THAT TABLE NUMBER ONE PLAYED IN THE FIRST TRIP.

THE SERIES OF QUESTIONS IS REISSUED UNTIL AT LEAST ONE QUESTION HAS RECEIVED N EXPLICIT VALUES FROM THE OPERATOR.

IN GIVING A STRING OF VALUES, COMMAS WITHOUT INTERVENING VALUES MAY BE USED TO INDICATE A REPETITION OF THE LAST NAMED VALUE.

A STRING OF VALUES MAY BE GIVEN AS A RANGE (6-10 FOR EXAMPLE). IF THE VALUES REPRESENT PURE NUMERICAL DATA, THIS SAMPLE RANGE TRANSLATES TO THE STRING 6,7,8,9,10 (AN INCREMENT OF 1). IF THE VALUES ARE ADDRESSES, THE SAMPLE RANGE TRANSLATES TO THE STRING 6,8,10 (AN INCREMENT OF 2).

NOW LET US SEE HOW WE COULD USE THESE CAPABILITIES TO CONSTRUCT A SET OF P-TABLES. ASSUME THAT WE HAVE 16 UNITS, AND THAT THERE ARE THREE HARDWARE PARAMETERS FOR EACH (THREE SLOTS IN THE P-TABLE, THREE HARDWARE QUESTIONS IN THE DIALOGUE). LET THE DESIRED VALUE FOR THE FIRST PARAMETER BE THE NUMBER 75 FOR ALL 16 TABLES. LET THE DESIRED VALUE FOR THE SECOND PARAMETER BE EQUAL TO THE UNIT NUMBER (0,1,2,...,15) EXCEPT FOR UNIT 12, WHICH SHOULD RECEIVE THE VALUE 11. LET THE DESIRED VALUE FOR THE THIRD PARAMETER BE THE NUMBER 76 FOR THE FIRST 7 UNITS AND THE NUMBER 77 FOR THE LAST 9 UNITS.

THE FOLLOWING DIALOGUE WOULD ACCOMPLISH THIS GOAL:

```
# UNITS (D) ? 16
UNIT 0
<QUESTION 1> ? 75
<QUESTION 2> ? 0-6
<QUESTION 3> ? 76

UNIT 7
<QUESTION 1> ?
<QUESTION 2> ? 7-11,,13-15
<QUESTION 3> ? 77
```

THE FIRST TIME THE SERIES IS ASKED, SLOT ONE RECEIVES A 75 IN ALL 16 TABLES. SLOT TWO RECEIVES THE VALUES 0,1,2,...,6 IN TABLES 0 THRU 6 AND A CONSTANT 6 IN TABLES 7 THRU 15. SLOT THREE RECEIVES A CONSTANT 76 IN ALL 16 TABLES.

THE SECOND TIME THRU THE SERIES, TABLES 7 THRU THE END ARE
GOING TO BE AFFECTED (NOTE THAT THIS PIECE OF INFORMATION IS
PRINTED OUT FOR THE THE OPERATOR IN THE FORM 'UNIT XX'' AT
THE BEGINNING OF EACH SERIES). QUESTION 1 IS RESPONDED TO
BY A <CR>, SO SLOT ONE STAYS AT CONSTANT 75 IN TABLES 7
THRU 15, SINCE NO NEW EXPLICIT VALUES ARE TYPED IN. SLOT TWO
GETS THE VALUES 7,8,9,10,11 IN TABLES 7 THRU 11, AND
GETS AN 11 IN SLOT 12, AND GETS THE VALUES 13,14,15 IN
TABLES 13 THRU 15. SLOT THREE GETS THE VALUE 77 IN TABLES 7
THRU 15.

THE DIALOGUE IS TERMINATED WHEN THE SOFTWARE RECOGNIZES THAT
16 EXPLICIT VALUES HAVE BEEN GIVEN FOR AT LEAST ONE QUESTION
(NAMELY QUESTION 2).

7.0 TEST DESCRIPTIONS

```
;************************************************************************
;*      TEST 1  <VIA TIMER 2 ONE SHOT MODE>
;*
;*    THIS  TEST  VERIFIES  THAT  THE  TIMER 2 COUNTER IS OPERATIONAL IN
;*    INTERVAL-TIMER (ONE-SHOT) MODE.
;*
;*      THE FOLLOWING IS PERFORMED :
;*
;*    A  MASTER CLEAR IS DONE & THE TIMER IS PLACED IN INTERVAL-TIMER MODE
;*    BY  SETTING  ACR5 = 0 AND THE PROGRAM CHECKS FOR 'T2'' (BIT 5 IN IFR)
;*    TO BE INITIALLY CLEARED.
;*
;*    T2L-L  (ADR  08)  & T2C-H (ADR 09) ARE BOTH LOADED WITH 252 (OCTAL).
;*    (THIS  IS  EQUIVALENT  TO  AAAA  (HEX) OR 43,690 (DECIMAL).) LOADING
;*    T2C-H STARTS THE COUNTER.
;*
;*    T2L-L  IS  LOADED  WITH 001 AND T2C-H IS LOADED WITH 000 IN ORDER TO
;*    SET  ''T2''  WITH  A QUICK UNDERFLOW. THE ''T2'' FLAG BIT IN IFR IS READ
;*    AND CHECKED TO BE SET.
;*
;*    T2C-H IS CHECKED TO = 0. CHECKING T2C-H SHOULD NOT HAVE CLEARED ''T2''
;*    -- THIS IS VERIFIED.
;*
;*    T2C-L  IS CHECKED TO = 0. CHECKING T2C-L SHOULD HAVE CLEARED ''T2'' --
;*    THIS TOO IS VERIFIED.
;*
;*    T2C-H  IS  LOADED  WITH  0 AGAIN TO INITIATE A NEW COUNT DOWN (WHICH
;*    SHOULD  UNDERFLOW  ALMOST  IMMEDIATELY)  AND  THE ''T2'' BIT IN IFR IS
;*    CHECKED TO BE SET AGAIN.
;*
;*    T2L-L IS LOADED WITH 125 (OCTAL) AND ''T2'' BIT IS CHECKED TO BE STILL
;*    SET.
;*
;*    T2C-H IS LOADED WITH 125, AND THE ''T2'' BIT IS READ AND CHECKED TO BE
;*    CLEARED BY THE LOADING OF T2C-H.
;*
;*
;************************************************************************


;************************************************************************
;*      TEST 2  <VIA'S SR INPUT (MODE 2) - SYSTEM CLOCK MODE>
;*
;* A MASTER CLEAR IS DONE. THEN THE SHIFT REG IS PLACED IN INPUT MODE
;* UNDER CONTROL OF VIA CLK, BY SETTING ACR BIT 4 TO 0, BIT 3 TO 1, AND BIT 2
;* TO 0. THE PROGRAM CHECKS FOR THE SR FLAG (BIT 2) IN THE IFR TO BE INITIALLY
;* CLEARED. THEN, THE SR IS LOADED TO INITIALIZE THE SR OPERATION, AND THE
;* PROGRAM CHECKS FOR SR FLAG = 1 AFTER ABOUT 8 US. AND READS SR REGISTER TO
;* VERIFY THAT SHIFTING OCCURRED.
;************************************************************************
```

```
790
791
792                     ;*****************************************************************************
793                     ;*      TEST 3  <NPR CONTROL REGISTER - MASTER CLEAR>
794                     ;*
795                     ;* THE PROGRAM SETS THE FOLLOWING BITS IN THE NPR CONTROL REGISTER :
796                     ;* IN/OUT, BYTE OPER, AND DISABL INIT. THE REGISTER IS READ AND VERIFIED.
797                     ;* THEN, A MASTER CLEAR IS PERFORMED, AND THE REGISTER IS READ AND CHECKED FOR
798                     ;* 000.
799                     ;*****************************************************************************
800
801
802                     ;*****************************************************************************
803                     ;*      TEST 4  <NPR DATA-OUT>
804                     ;*
805                     ;* FIRST SUBTEST :
806                     ;* THE NPR OUTPUT ADDRESS REGISTER IS LOADED WITH THE ADDRESS OF A 2 BYTE
807                     ;* BUFFER IN THE PROGRAM. THEN, EACH WORD OF DATA PATTERN F IS LOADED INTO THE
808                     ;* NPR OUTPUT DATA REGISTER, A FULLWORD NPR OUTPUT REQUEST IS PERFORMED,
809                     ;* AND THE PROGRAM CHECKS FOR THE CORRECT DATA IN THE PROGRAM BUFFER. ALSO,
810                     ;* THE PROGRAM CHECKS THAT THE ABORT XFER BIT IN THE NPR CONTROL REGISTER
811                     ;* NEVER GETS SET.
812                     ;*   DATA PATTERN F = 125252, 052525, 000000, 177777, 000001, 000002, 000004,
813                     ;*                    000010, 000020, 000040, 000100, 000200, 000400, 001000,
814                     ;*                    002000, 004000, 010000, 020000, 040000, 100000, 177776,
815                     ;*                    177775, 177773, 177767, 177757, 177737, 177677, 177577,
816                     ;*                    177377, 176777, 175777, 173777, 167777, 157777, 137777,
817                     ;*                    077777, 000000
818                     ;*
819                     ;* SECOND SUBTEST:
820                     ;* THE ABOVE OPERATIONS ARE REPEATED IN BYTE NPR TRANSFER MODE, USING THE DATA
821                     ;* BYTES IN DATA PATTERN B. THE LOW BYTE OF THE PROGRAM BUFFER IS USED, AND
822                     ;* THE UPPER BYTE IS CLEARED AT THE START, AND IS CHECKED TO REMAIN UNCHANGED
823                     ;* THROUGHOUT THE SUBTEST.
824                     ;*   DATA PATTERN B = 125, 252, 000, 377, 001, 002, 004, 010, 020, 040, 100,
825                     ;*                    200, 376, 375, 373, 367, 357, 337, 277, 177, 000
826                     ;*
827                     ;*****************************************************************************
828
829
830                     ;*****************************************************************************
831                     ;*      TEST 5  <NPR DATA-IN>
832                     ;*
833                     ;* THE NPR INPUT ADDRESS REGISTER IS LOADED WITH THE ADDRESS OF A 2 BYTE
834                     ;* BUFFER IN THE PROGRAM. THEN, EACH WORD OF DATA PATTERN F IS LOADED INTO THE
835                     ;* PROGRAM BUFFER, A FULLWORD NPR INPUT REQUEST IS ISSUED AND PERFORMED,
836                     ;* AND THE PROGRAM CHECKS FOR THE CORRECT DATA IN THE NPR INPUT DATA REG.
837                     ;* ALSO, THE PROGRAM CHECKS THAT THE ABORT XFER BIT IN THE NPR CONTROL
838                     ;* REGISTER NEVER GETS SET.
839                     ;*   DATA PATTERN F = 125252, 052525, 000000, 177777, 000001, 000002, 000004,
840                     ;*                    000010, 000020, 000040, 000100, 000200, 000400, 001000,
841                     ;*                    002000, 004000, 010000, 020000, 040000, 100000, 177776,
842                     ;*                    177775, 177773, 177767, 177757, 177737, 177677, 177577,
843                     ;*                    177377, 176777, 175777, 173777, 167777, 157777, 137777,
844                     ;*                    077777, 000000
845                     ;*****************************************************************************
```

```
;*****************************************************************************
;*      TEST 6  <NPR XFER ABORT>
;*
;* FIRST SUBTEST :
;* THE PROGRAM PERFORMS AN OUTPUT NPR REQUEST TO A NON-EXISTENT MEMORY
;* LOCATION, AND CHECKS FOR THE ASSERTION OF ABORT XFER BIT IN THE NPR CONTROL
;* REGISTER. THEN, AN OUTPUT NPR IS DONE AND CHECKED, TO A LOCATION IN THE
;* PROGRAM, USING 125252 FOR DATA, AND THE PROGRAM CHECKS FOR ABORT XFER TO
;* BE CLEARED BY SETTING THE DONE BIT.
;* SECOND SUBTEST :
;* THE ABOVE SUBTEST IS REPEATED USING INPUT NPR'S.
;*****************************************************************************


;*****************************************************************************
;*      TEST 7  <NPR EXTENDED ADDRESS BIT TEST>
;*
;* THIS TEST WILL ONLY BE RUN IF THERE IS AT LEAST 32K WORDS OF MEMORY ON THE
;* SYSTEM. IF THERE IS, THE PROGRAM CHOOSES A LOCATION TO USE IN THE ADDRESS
;* RANGE 200000-377776 (OCTAL). THEN, THE FOLLOWING 2 SUBTESTS ARE PERFORMED :
;*
;* FIRST SUBTEST :
;* AN INPUT NPR IS PERFORMED AND CHECKED USING THE MEMORY LOCATION, WITH
;* 125252 FOR DATA. THE PROGRAM CHECKS THAT THE ABORT XFER BIT REMAINS
;* CLEARED.
;* SECOND SUBTEST :
;* AN OUTPUT NPR IS PERFORMED AND CHECKED USING THE MEMORY LOCATION, WITH
;* 125252 FOR DATA. THE PROGRAM CHECKS THAT THE ABORT XFER BIT REMAINS
;* CLEARED.
;*****************************************************************************


;*****************************************************************************
;*      TEST 8  <SPECIAL MFG EXTENDED BIT TEST>
;*
;* THIS TEST WAS DESIGNED SPECIFICALLY TO ALLOW MANUFACTURING TO CHECK THE
;* NPRAIX/NPRAOX BITS WITHOUT A FULL 4 M. OF MEMORY.
;*
;* IT WILL CHECK THE 12 DMV EXTENDED ADDRESS BITS (6:NPRAIX/6:NPRAOX) ON
;* A Q22 SYSTEM IF MEMORY IS PRESENT AT THE FOLLOWING PHYSICAL ADDRESSES:
;*
;*      17600000        17400000        17200000
;*      16600000        15600000        13600000
;*       7600000
;*
;* FIRST SUBTEST :      TEST 'NPRAIX'' EXTENDED ADDRESS BITS
;* SECOND SUBTEST :     TEST 'NPRAOX'' EXTENDED ADDRESS BITS
;*****************************************************************************


;*****************************************************************************
;*      TEST 9  <Q-BUS INTERRUPT 'A'' & 'B'' SELECTION>
;*
;* THIS  TEST  CONTAINS SUBTESTS IN WHICH A SEQUENCE OF STEPS IS
```

```
902                     ;* PERFORMED. IN GENERAL, EACH SUBTEST PERFORMS THE FOLLOWING:
903                     ;*
904                     ;*      1. INTERRUPTS ARE DISABLED FOR BOTH ''A'' & 'B''
905                     ;*
906                     ;*      2. THE INTERRUPT REQUEST REGISTER IS WRITTEN INTO
907                     ;*
908                     ;*      3. A TEST IS MADE TO BE SURE THAT NEITHER INTERRUPT OCCURS
909                     ;*
910                     ;*      4. BOTH INTERRUPTS ARE ENABLES
911                     ;*
912                     ;*      5. A TEST IS MADE TO BE SURE THAT IF AN INTERRUPT IS EXPECTED, IT IS
913                     ;*         RECEIVED AND IF IT ISN'T EXPECTED IT DOESN'T HAPPEN.
914                     ;*
915                     ;* ALL TESTING IS DONE HERE WITH THE PROCESSOR'S PRIORITY SET AT 0.
916                     ;*****************************************************************************
917
918
919                     ;*****************************************************************************
920                     ;*      TEST 10 <BUS RESET WITH DISABLE INIT SET> .PAGE
921                     ;*
922                     ;* A  BYTE SELECT REGISTER (BSEL3) IS LOADED WITH 377, DISABLE INIT BIT IS SET
923                     ;* IN  THE  NPR CONTROL REGISTER, AND A BUS RESET INSTRUCTION IS EXECUTED. THE
924                     ;* PROGRAM  THEN  CHECKS  THAT THE DMV-11 WAS NOT CLEARED, BY CHECKING FOR 377
925                     ;* STILL IN BSEL3
926                     ;*****************************************************************************
927
928
929                     ;*****************************************************************************
930                     ;*      TEST 11 <MASTER CLEAR WITH DISABLE INIT SET>
931                     ;*
932                     ;* THE 'DISABL INIT'' BIT IN THE NPR CONTROL REGISTER IS SET AND A MASTER CLEAR
933                     ;* IS  ISSUED.  IF  THE  MASTER  CLEAR SUBROUTINE DETECTS AN ERROR, THE MASTER
934                     ;* CLEAR  WILL  NOT  HAVE  FUNCTIONED PROPERLY. WHERE THE NORMAL ERROR MESSAGE
935                     ;* (QUEUED  UP  BY 'MASCLR') IS NORMALLY PRINTED, THIS TEST WILL PRINT ITS OWN
936                     ;* INSTEAD.
937                     ;*****************************************************************************
938
939
940                     ;*****************************************************************************
941                     ;*      TEST 12 <DCOK H LO BIT>
942                     ;*
943                     ;* DCOK H LO IS SET IN THE NPR CONTROL REGISTER WHICH SHOULD CAUSE A VECTOR TO
944                     ;* THE  FIRST  INTERRUPT  HANDLER  WHERE THE VECTOR IS CHANGED TO POINT TO THE
945                     ;* SECOND HANDLER. THIS SECOND HANDLER WILL THEN STALL FOR A WHILE WAITING FOR
946                     ;* THE  POWER-UP  INTERRUPT  WHICH  SHOULD KICK US INTO THE SECOND HANDLER. IN
947                     ;* BOTH  HANDLERS  FLAGS  ARE  SET  TO  SAY THAT WE GOT THERE. WHEN WE FINALLY
948                     ;* RETURN  TO  OUR MAINLINE CODE, WE WILL RESUME THE DELAY FUNCTION WE WERE IN
949                     ;* AND THEN CHECK THE FLAGS.
950                     ;*
951                     ;* IN SUBTEST # 1, WE EXPECT THE DMV TO BE RESET.
952                     ;*
953                     ;*****************************************************************************
954
955
956                     ;*****************************************************************************
957                     ;*      TEST 13 <HALT MODE VERIFICATION>
```

```
;*
;* THIS TEST CONTAINS TWO (2) SUBTESTS DESIGNED TO VERIFY THE FUNCTIONALITY
;* OF  THE  'HALT'  CONTROL CONTAINED WITHIN THE NPR CONTROL REGISTER. IN EACH
;* CASE.  MICROCODE  IS  LOADED INTO THE DMV IN ORDER TO CONTROL THE TESTING
;* FROM THERE.
;*
;*-----------------------------------------------------------------------------
;*
;* SUBTEST # 1:
;*
;* HERE WE VERIFY THAT WE CAN CONTROL NPR'S AND DCOK PROPERLY WHILE THE 11 CPU
;* IS HALTED.
;*
;*      11 CPU'S OPERATIONS:                        DMV-11'S OPERATIONS:
;*
;* THE MICROCODE IS MOVED INTO THE DMV.
;*
;* CLEAR TMP0.  THIS WILL BE OUR TEST
;* LOCATION FOR THE NPR OPERATION.
;*
;* SETUP FOR POWER-FAIL VECTORING THROUGH
;* LOCATION 24.
;*
;* THE MICROCODE IS INITIATED & BSEL7 IS
;* SET TO -1 AS A FLAG.
;*
;* WAIT FOR BSEL7 TO BE CLEARED                CLEAR BSEL7 AND WAIT FOR IT TO GO
;*                                             NON-ZERO AGAIN.  THIS PUTS THE
;*                                             DMV IN SYNC. WITH THE 11 CPU
;*
;* SAVE R6 IN OLDSP FOR RECOVERY LATER.
;* CLEAR TMP0, LOAD INTO SEL4 THE
;* ADDRESS OF TMP0, AND SET BSEL7 TO -1.
;*
;* START LOOPING -- INCREMENTING TMP0          GET THE ADDRESS OF TMP0 FROM SEL6
;*                                             AND SAVE IT FOR LATER
;*
;*                                             HALT THE 11 CPU.
;*
;* CONSOLE 'ODT' SHOULD BE ENTERED.            NPR-IN THE CURRENT CONTENTS OF TMP0
;*                                             & PUT IT INTO SEL4 (THE FULL WORD).
;*
;*                                             DELAY FOR ABOUT 100 MICROSECONDS
;*                                             (THE TIME ISN'T CRITICAL).
;*
;* THE 11 CPU SHOULD NOT BE EXECUTING
;* ANYTHING NOW -- NOT EVEN 'ODT'
;*
;*                                             DROP THE 'HALT' SIGNAL TO RELEASE
;*                                             THE 11 CPU AND SET 'DCOK H LO' &
;*                                             'DISABL INIT'. DROP 'DCOK H LO'
;*
;*
;* WE SHOULD GO
;* THROUGH A POWER-UP SEQUENCE.   R6 IS
;* RESTORED FROM OLDSP, INTERRUPT
```

```
1014                    ;* PRIORITY LEVEL IS RESTORED TO 0, &
1015                    ;* INTERRUPT VECTOR 24 IS RETURNED TO
1016                    ;* THE DIAGNOSTIC SUPERVISOR.  SEL4 IS
1017                    ;* COMPARED AGAINST TMP0 -- THEY SHOULD
1018                    ;* BE EQUAL.
1019                    ;*
1020                    ;* NOW CLEAR BSEL7.                    WAIT FOR BSEL7 TO CLEAR. THEN DROP
1021                    ;*                                     'DISABLE INIT'' AND EXIT TO M-LOOP.
1022                    ;*
1023                    ;*-------------------------------------------------------------------------
1024                    ;*
1025                    ;* SUBTEST # 2:
1026                    ;*
1027                    ;* HERE  THE  HALT MODE IS USED IN A WAY WHICH VERY CLOSELY MATCHES THE DMV-11
1028                    ;* MICROCODE'S  UTILIZATION  DURING  A  'MOP  BOOT''  OPERATION. THE INTERRUPT
1029                    ;* VECTOR  AREA  IS COMPLETELY OVERWRITTEN BY THE DMV NPR'S AND IS THEREFORE
1030                    ;* BACKED  UP  ELSEWHERE  IN  THE  11 CPU'S MEMORY. THERE IS ALSO THE POSSIBLE
1031                    ;* CONTENTION  WITH  THE  DIAGNOSTIC  SUPERVISOR  --  TO HELP HERE, AS MUCH AS
1032                    ;* POSSIBLE WILL BE DONE AT INTERRUPT LEVEL 7.
1033                    ;*
1034                    ;*      11 CPU'S OPERATIONS:                        DMV-11'S OPERATIONS:
1035                    ;*
1036                    ;* THE MICROCODE IS MOVED INTO THE DMV.
1037                    ;*
1038                    ;* THE INTERRUPT VECTOR AREA IS BACKED-
1039                    ;* UP IN AN I/O BUFFER FOLLOWING THE
1040                    ;* PROGRAM
1041                    ;*
1042                    ;* THE MICROCODE IS INITIATED & BSEL7 IS
1043                    ;* SET TO -1 AS A FLAG.
1044                    ;*
1045                    ;* WAIT FOR BSEL7 TO BE CLEARED        CLEAR BSEL7 AND WAIT FOR IT TO GO
1046                    ;*                                     NON-ZERO AGAIN PUTTING BOTH
1047                    ;*                                     PROCESSORS IN SYNC. WITH EACH
1048                    ;*                                     OTHER
1049                    ;* CLEAR TMP0 AND SAVE R6 FOR RECOVERY
1050                    ;* LATER.  SET BSEL7 AGAIN AND WAIT FOR
1051                    ;* TMP0 TO BE SET.
1052                    ;*                                     SET HALT, 'DCOK H LO'', & 'DISABL
1053                    ;*                                     INIT'' AND PERFORM 2 NOP'S AS A
1054                    ;*                                     1 MICROSECOND DELAY
1055                    ;*
1056                    ;* ENTRY INTO THE CONSOLE 'ODT'' WILL  CLEAR 'DCOK H LO'', SET 'HALT'' &
1057                    ;* BE INITIATED.                       'DISABL INIT''
1058                    ;*
1059                    ;*                                     NPR-OUT THE FOLLOWING:
1060                    ;*                                      LOC:  CONTENTS
1061                    ;*                                        24  000000  VECTOR TO LOC 0
1062                    ;*                                        26  000340  @ PRIORITY 7
1063                    ;*                                         0  012700  MOV  #-1,R0
1064                    ;*                                         2  177777
1065                    ;*                                         4  000777  BR   .
1066                    ;*                                     ----------------------------
1067                    ;*
1068                    ;* THE ENTRY INTO THE CONSOLE 'ODT''   SET 'DCOK H LO'' & 'DISABL INIT''
1069                    ;* WILL BE ABORTED!                    AND CLEAR 'HALT''
```

```
1070                ;*
1071                ;*                                          DELAY FOR A SHORT TIME (ABOUT 1
1072                ;*                                          MICROSECOND
1073                ;*
1074                ;* THE ROUTINE NPR'D INTO LOC. 0 WILL
1075                ;* BE EXECUTED -- EVENTUALLY HANGING        CLEAR 'DCOK H LO'' AND SET 'DISABL
1076                ;* AT THE 'BR  .'' INSTRUCTION @ LOC. 4.    INIT''
1077                ;*
1078                ;*                                          NPR-OUT THE FOLLOWING:
1079                ;*                                           LOC:  CONTENTS
1080                ;*                                             6   005001  CLR  R1
1081                ;*                                            10   062701  ADD  #(.+2),R1
1082                ;*                                            12   062701  ADD  #(.+2),R1
1083                ;*                                             .     .      .
1084                ;*                                             .     .      .
1085                ;*                                             .     .      .
1086                ;*                                           360   062701  ADD  #(.+2),R1
1087                ;*                                           362   062701  ADD  #(.+2),R1
1088                ;*                                           364   010037  MOV  R0,@#TMP0
1089                ;*                                           366   [TMP0]
1090                ;*                                           370   013706  MOV  @#OLDSP,R6
1091                ;*                                           372   [OLDSP]
1092                ;*                                           374   000137  JMP  HLTST2
1093                ;*                                           376   [HLTST2]
1094                ;*                                          ----------------------------
1095                ;*                                          THIS IS SYNONYMOUS TO THE DMV-11
1096                ;*                                          LOADING A 'MESSAGE'' STARTING AT MEM.
1097                ;*                                          LOC. 000006.
1098                ;*
1099                ;*                                          NPR-OUT THE FOLLOWING:
1100                ;*                                           LOC:  CONTENTS
1101                ;*                                             4   000240  NOP
1102                ;*                                          ----------------------------
1103                ;*                                          THIS IS HOW THE DMV-11 WILL TAKE THE
1104                ;*                                          11 CPU OUT OF THE 'BR  .'' CONDITION.
1105                ;* THE ROUTINE JUST LOADED BY THE DMV
1106                ;* MICROCODE WILL NOW BE EXECUTED (WE       DROP 'DISABL INIT''
1107                ;* HOPE).  WHEN THE SUBROUTINE IS RE-
1108                ;* ENTERED (@ HLTST2),                      AN EXIT IS TAKEN TO THE M-LOOP
1109                ;*
1110                ;*    1  THE INTERRUPT VECTORS WILL BE
1111                ;*       RESTORED;
1112                ;*    2  THE PRIORITY LEVEL WILL BE
1113                ;*       LOWERED BACK TO 0;
1114                ;*    3  R0, R1, & R6 WILL ALL BE CHECKED
1115                ;*       FOR THE PROPER CONTENTS; AND
1116                ;*    4  TMP0 WILL BE CHECKED FOR THE
1117                ;*       PROPER CONTENTS;
1118                ;*************************************************************************************
1119
1120
1121
```

8.0 ERROR INFORMATION

8.1 ERROR REPORTING

ERRORS ARE REPORTED BY THE PROGRAM AS THEY OCCUR (IF NOT INHIBITED). THE REPORT CONFORMS TO THE DIAGNOSTIC SUPERVISOR ERROR REPORT FORMAT, AND CONSISTS OF A DESCRIPTION OF THE ERROR, THE TEST NUMBER, SUBTEST NUMBER, PC OF THE ERROR CALL, DEVICE ADDRESS, AND BASIC AND EXTENDED ERROR INFORMATION.

THE FOLLOWING EXAMPLE PROVIDES A TYPICAL ERROR REPORT, WHICH DESCRIBES A 'MASTER CLEAR FAILURE' ERROR, AND PROVIDES THE PC OF THE ERROR CALL AND THE DEVICE REGISTER CONTENTS :

```
CVDMB DVC FTL ERR 00001 ON UNIT 00 TST 002 SUB 000 PC: 021122
MASTER CLEAR FAILURE

  THE CONTENTS OF ALL BYTE SELECT REG'S ARE:
BSEL0   BSEL1   BSEL2   BSEL3
 000     000     000     000
    BSEL4   BSEL5   BSEL6   BSEL7
     000     000     121     000
BSEL10  BSEL11  BSEL12  BSEL13
 000     000     000     000
    BSEL14  BSEL15  BSEL16  BSEL17
     000     000     000     000
```

FOR OTHER ERRORS, THE REPORT MAY BE MORE EXTENSIVE, AND REQUIRE ADDITIONAL DATA TO BE REPORTED.

IF EXTENDED ERROR INFORMATION HAD BEEN INHIBITED USING THE IXE FLAG PRIOR TO RUNNING THE TEST, THE ABOVE ERROR WOULD HAVE BEEN REPORTED IN THE FOLLOWING SHORTENED FORM :

```
CVDMB DVC FTL ERR 00001 ON UNIT 00 TST 002 SUB 000 PC: 021122
MASTER CLEAR FAILURE
```

▲

```
                                .SBTTL LISTING & ASSEMBLY CONTROL

000000                          HELP=0          ; CONTROL LISTING OF HELP INFORMATION
                                                ; HELP=0   NO LIST
                                                ; HELP=1   LIST

002000                                  .=2000

                                        .MCALL  SVC
002000                                  SVC                             ; INITIALIZE SUPERVISOR MACROS

002000                                  BGNMOD  LU1MOD

000001                          $LSTIN= 1
000001                          $LSTTAG= 1
000001                          SVCINS= 1       ; LIST INSTRUCTIONS, SHIFTED RIGHT
000001                          SVCTST= 1       ; LIST TEST TAGS, SHIFTED RIGHT
000001                          SVCSUB= 1       ; LIST SUBTEST TAGS, SHIFTED RIGHT
000001                          SVCGBL= 1       ; LIST GLOBAL TAGS, SHIFTED RIGHT
000001                          SVCTAG= 1       ; LIST OTHER TAGS, SHIFTED RIGHT

                                ;       CHANGE THE VALUES OF THE SVC... SYMBOLS TO BE ZERO IF YOU WISH
                                ;       TO ALIGN THE MACRO CALLS AND THEIR EXPANSIONS.  CHANGE THE
                                ;       SYMBOLS TO BE MINUS-ONE TO NOT LIST THE EXPANSIONS.  YOU MAY
                                ;       CHANGE THE SYMBOLS AT ANY POINT IN YOUR PROGRAM.

002000                                    POINTER BGNAU,BGNDU,ERRTBL
```

```
                        .SBTTL PROGRAM HEADER
                        ;++
                        ;THE PROGRAM HEADER MACRO CHARACTERIZES THIS DIAGNOSTIC. THE
                        ;HEADER MACRO'S ARGUMENTS ARE FILE NAME, RELEASE LEVEL, PATCH
                        ;DISPOSITION OF THE MOST RECENT PATCH, MAXIMUM TEST TIME IN SEC.,
                        ;AND THE TYPE OF DIAGNOSTIC (0-SEQUENTIAL, 1-EXERCISER).  THESE
                        ;ARGUMENTS ARE IN RESPECTIVE ORDER.
                        ;--

002000                          HEADER CVDMB,A,0,60.,0
002000                  LSNAME::
002000  103                             .ASCII /C/
002001  126                             .ASCII /V/
002002  104                             .ASCII /D/
002003  115                             .ASCII /M/
002004  102                             .ASCII /B/
002005  000                             .BYTE   0
002006  000                             .BYTE   0
002007  000                             .BYTE   0
002010                  LSREV::
002010  101                             .ASCII  /A/
002011                  LSDEPO::
002011  060                             .ASCII  /0/
002012                  LSUNIT::
002012  000000                          .WORD   0
002014                  LSTIML::
002014  000074                          .WORD   60.
002016                  LSHPCP::
002016  036436                          .WORD   L$HARD
002020                  LSSPCP::
002020  000000                          .WORD   0
002022                  LSHPTP::
002022  002160                          .WORD   L$HW
002024                  LSSPTP::
002024  000000                          .WORD   0
002026                  LSLADP::
002026  037154                          .WORD   L$LAST
002030                  LSSTA::
002030  000000                          .WORD   0
002032                  LSCO::
002032  000000                          .WORD   0
002034                  LSDTYP::
002034  000000                          .WORD   0
002036                  LSAPT::
002036  000000                          .WORD   0
002040                  LSDTP::
002040  002124                          .WORD   L$DISPATCH
002042                  LSPRIO::
002042  000000                          .WORD   0
002044                  LSENVI::
002044  000000                          .WORD   0
002046                  LSEXP1::
002046  000000                          .WORD   0
002050                  LSMREV::
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  003254           .WORD   L$DVTYP
002062           L$REPP::
002062  000000           .WORD   0
002064           L$EXP4::
002064  000000           .WORD   0
002066           L$EXP5::
002066  000000           .WORD   0
002070           L$AUT::
002070  023162           .WORD   L$AU
002072           L$DUT::
002072  023156           .WORD   L$DU
002074           L$LUN::
002074  000000           .WORD   0
002076           L$DESP::
002076  003274           .WORD   L$DESC
002100           L$LOAD::
002100  104035           EMT     E$LOAD
002102           L$ETP::
002102  002202           .WORD   L$ERRTBL
002104           L$ICP::
002104  022020           .WORD   L$INIT
002106           L$CCP::
002106  023140           .WORD   L$CLEAN
002110           L$ACP::
002110  023014           .WORD   L$AUTO
002112           L$PRT::
002112  022012           .WORD   L$PROT
002114           L$TEST::
002114  000000           .WORD   0
002116           L$DLY::
002116  000000           .WORD   0
002120           L$HIME::
002120  000000           .WORD   0

                 .EVEN
```

CVDMBA.P11 18-DEC-80 15:53 DISPATCH TABLE

```
1290
1291
1292
1293
1294
1295
1296
1297  002122
1298  002122  000015
1299  002124
1300  002124  023164
1301  002126  024174
1302  002130  025062
1303  002132  025450
1304  002134  026160
1305  002136  026430
1306  002140  027036
1307  002142  031276
1308  002144  032626
1309  002146  034134
1310  002150  034230
1311  002152  034274
1312  002154  035046
1313
```

```
.SBTTL DISPATCH TABLE

;////////////////////////////////////////////////////////////////////////////
;/ THE DISPATCH TABLE CONTAINS THE STARTING ADDRESS OF EACH TEST.
;/ IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
;////////////////////////////////////////////////////////////////////////////

        DISPATCH        13.

                                                .WORD   13
                                        L$DISPATCH::
                                                .WORD   T1
                                                .WORD   T2
                                                .WORD   T3
                                                .WORD   T4
                                                .WORD   T5
                                                .WORD   T6
                                                .WORD   T7
                                                .WORD   T8
                                                .WORD   T9
                                                .WORD   T10
                                                .WORD   T11
                                                .WORD   T12
                                                .WORD   T13
```

CVDMBA.P11 18-DEC-80 15:53 DEFAULT HARDWARE P-TABLE

```
1314                                    .SBTTL DEFAULT HARDWARE P-TABLE
1315
1316                                    ;////////////////////////////////////////////////////////////////////////////
1317                                    ;/ THE DEFAULT HARDWARE P-TABLE CONTAINS DEFAULT VALUES OF
1318                                    ;/ THE TEST-DEVICE PARAMETERS.  THE STRUCTURE OF THIS TABLE
1319                                    ;/ IS IDENTICAL TO THE STRUCTURE OF THE RUN-TIME P-TABLE.
1320                                    ;////////////////////////////////////////////////////////////////////////////
1321
1322  002156                                    BGNHW   DFPTBL
1323  002156  000010                                                                   .WORD   L10000-L$HW/2
1324  002160                                                                    L$HW::
1325  002160                                                                    DFPTBL::
1326
1327  002160  160020                            .WORD   160020          ;DMV11 CSR UNIBUS ADDRESS
1328  002162  000300                            .WORD     300           ;DMV11 INTERRUPT VECTOR
1329  002164  004000                            .WORD    4000           ;DMV11 INTERRUPT PRIORITY LEVEL = 4
1330  002166  000000                            .WORD     000           ;SWITCH REG. #1 (BOOT ADDRESS)
1331  002170  000000                            .WORD     000           ;SWITCH REG. #2 (DDCMP ADDRESS)
1332  002172  000000                            .WORD       0           ;MODULE IS M8064
1333  002174  000000                            .WORD       0           ;H3254&H3255 USED
1334  002176  000111                            .WORD   000111          ;MISC. CONTROLS:
1335
1336                                    ; POWER-UP MODE 0 MASK = 100
1337                                    ;   0 = NOT JUMPERED FOR MODE 0 POWER-UP
1338                                    ;   1 = JUMPERED FOR MODE 0 POWER-UP    <=== DEFAULT SETTING
1339                                    ;       BOTH W5 & W6 REMOVED
1340
1341                                    ; MFG EXTENDED MEMORY CONFIGURATION MASK = 200
1342                                    ;   0 = NORMAL TESTING
1343                                    ;   1 = Q22 SYSTEM WITH MEMORY @ FOLLOWING LOCATIONS:
1344                                    ;                 17600000        17400000        17200000
1345                                    ;                 16600000        15600000        13600000
1346                                    ;                  7600000
1347
1348  002200                                        ENDHW
1349  002200                                                                    L10000:
```

```
                                .SBTTL SOFTWARE P-TABLE

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

002200                                  BGNSW   SFPTBL
002200  000000                                                         .WORD   L10001-L$SW/2
002202                                                          L$SW::
002202                                                          SFPTBL::
002202                                  ENDSW
002202                                                          L10001:
```

```
1363                                    .SBTTL GLOBAL EQUATES SECTION
1364
1365
1366                                    ;////////////////////////////////////////////////////////////////////////////////
1367                                    ;/      THE GLOBAL EQUATES SECTION CONTAINS PROGRAM EQUATES THAT
1368                                    ;/      ARE USED IN MORE THAN ONE TEST.
1369                                    ;////////////////////////////////////////////////////////////////////////////////
1370
1371  002202                                    EQUALS
1372                                    ;
1373                                    ; BIT DIFINITIONS
1374                                    ;
1375            100000                  BIT15== 100000
1376            040000                  BIT14== 40000
1377            020000                  BIT13== 20000
1378            010000                  BIT12== 10000
1379            004000                  BIT11== 4000
1380            002000                  BIT10== 2000
1381            001000                  BIT09== 1000
1382            000400                  BIT08== 400
1383            000200                  BIT07== 200
1384            000100                  BIT06== 100
1385            000040                  BIT05== 40
1386            000020                  BIT04== 20
1387            000010                  BIT03== 10
1388            000004                  BIT02== 4
1389            000002                  BIT01== 2
1390            000001                  BIT00== 1
1391                                    ;
1392            001000                  BIT9==  BIT09
1393            000400                  BIT8==  BIT08
1394            000200                  BIT7==  BIT07
1395            000100                  BIT6==  BIT06
1396            000040                  BIT5==  BIT05
1397            000020                  BIT4==  BIT04
1398            000010                  BIT3==  BIT03
1399            000004                  BIT2==  BIT02
1400            000002                  BIT1==  BIT01
1401            000001                  BIT0==  BIT00
1402                                    ;
1403                                    ; EVENT FLAG DEFINITIONS
1404                                    ;   EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
1405                                    ;
1406            000040                  EF.START==      32.                     ; START COMMAND WAS ISSUED
1407            000037                  EF.RESTART==    31.                     ; RESTART COMMAND WAS ISSUED
1408            000036                  EF.CONTINUE==   30.                     ; CONTINUE COMMAND WAS ISSUED
1409            000035                  EF.NEW==        29.                     ; A NEW PASS HAS BEEN STARTED
1410            000034                  EF.PWR==        28.                     ; A POWER-FAIL/POWER-UP OCCURRED
1411                                    ;
1412                                    ;
1413                                    ; PRIORITY LEVEL DEFINITIONS
1414                                    ;
1415            000340                  PRI07== 340
1416            000300                  PRI06== 300
1417            000240                  PRI05== 240
1418            000200                  PRI04== 200
```

```
1419    000140          PRI03== 140
1420    000100          PRI02== 100
1421    000040          PRI01== 40
1422    000000          PRI00== 0
1423                    ;
1424                    ;OPERATOR FLAG BITS
1425                    ;
1426    000004          EVL==       4
1427    000010          LOT==      10
1428    000020          ADR==      20
1429    000040          IDU==      40
1430    000100          ISR==     100
1431    000200          UAM==     200
1432    000400          BOE==     400
1433    001000          PNT==    1000
1434    002000          PRI==    2000
1435    004000          IXE==    4000
1436    010000          IBE==   10000
1437    020000          IER==   20000
1438    040000          LOE==   40000
1439    100000          HOE==  100000
1440
1441                    .SBTTL  DEFINE THE NUMBER OF CSR'S
1442    000010          CSREGS  = 8.
1443
1444                    ;-----------------------------------------------------------------------------
1445
1446                    .SBTTL  NPR ADDRESS REGISTER EQUATES
1447    000070          NPRAOL  = 70                    ;OUT NPR ADRS LO REG
1448    000071          NPRAOH  = NPRAOL+1              ;OUT NPR ADRS HI REG
1449    000072          NPRAOX  = NPRAOL+2              ;OUT NPR EXTENDED ADRS REG
1450    000074          NPRAIL  = NPRAOL+4              ;IN NPR ADRS LO REG
1451    000075          NPRAIH  = NPRAOL+5              ;IN NPR ADRS HI REG
1452    000076          NPRAIX  = NPRAOL+6              ;IN NPR EXTENDED ADRS REG
1453    000200          NPRBS7  = BIT7                  ;'BANK SELECT 7'' BIT -- W/IN EXTENDED ADRS. REG.
1454
1455
1456
1457                    .SBTTL  NPR DATA REG EQUATES
1458    123000          NPRDRL  = 123000                ;NPR DATA REGISTER -- LOW BYTE
1459    123001          NPRDRH  = NPRDRL+1              ;NPR DATA REGISTER -- HIGH BYTE
1460
1461
1462
1463                    .SBTTL  NPR CONTROL REG EQUATES
1464    123004          NPRCTL  = NPRDRL+4              ;NPR CONTROL REGISTER
1465    000200          NPRABT  = BIT7                  ;=1 IF BUS TIME-OUT ON NPR
1466    000100          NPRGO   = BIT6                  ;SET FOR NOP, CLEAR TO 'GO'' / 0=DONE, 1=BUSY
1467    000040          NPRIO   = BIT5                  ;0 = (LSI ==> DMV);  1 = (DMV ==> LSI)
1468    000020          LSIHLT  = BIT4                  ;SETTING THIS WILL 'HALT'' THE LSI-11 !!
1469    000010          NPRBYT  = BIT3                  ;SET TO 1 TO WRITE BYTE ONLY TO LSI-11
1470    000004          DMVPU   = BIT2                  ;SET BY MICRO-DIAG.  MUST REMAIN SET!!!
1471    000002          LSIDCL  = BIT1                  ;IF SET, WILL CAUSE POWER DOWN CONDITION IN LSI!
1472    000001          DMVDAI  = BIT0                  ;'DISABLE INIT'' FROM EFFECTING DMV-11
1473
1474
```

```
1475
1476          000004          .SBTTL  NPR REQUEST FUNCTIONS
1477          000044          NPRLD   = DMVPU                 ;WORD XFER:  LSI ==> DMV
1478          000054          NPRDL   = DMVPU!NPRIO            ;WORD XFER:  DMV ==> LSI
1479                          NPRDLB  = DMVPU!NPRIO!NPRBYT     ;BYTE XFER:  DMV ==> LSI
1480
1481                          ;-----------------------------------------------------------------------------
1482
1483          123005          .SBTTL  INTERRUPT REG EQUATES
1484          000004          IRQREG  = 123005                 ;INTERRUPT REQUEST REG
1485          000002          IRQA    = BIT2                   ;REQUEST BIT FOR XX0 INTERRUPT -- "A"
1486                          IRQB    = BIT1                   ;REQUEST BIT FOR XX4 INTERRUPT -- "B"
1487
1488                          ;-----------------------------------------------------------------------------
1489
1490          000001          .SBTTL  CONTROL FLAGS FROM P-TABLE ENTRIES
1491                          PU24    = BIT0                   ;POWER-FAIL VECTORING MODE.  1 = MODE 0
                                                               ;  (I.E. JUMPERS W5 & W6 BOTH REMOVED)
```

```
CVDMBA.P11    18-DEC-80 15:53          SWITCH PACKS

  1492                                 .SBTTL  SWITCH PACKS
  1493
  1494                                 ;;*****************************************************************************
  1495                                 ;* SWITCH PACKS
  1496                                 ;;*****************************************************************************
  1497
  1498          121000                 SWPBOT  = 121000                ;'BOOT ADDRESS'' SWITCH PACK [A200]
  1499          121400                 SWPDDCMP = 121400               ;'DDCMP ADDRESS'' SWITCH PACK [A300]
  1500
```

```
CVDMBA.P11    18-DEC-80 15:53          CSR REG. DEFINITION FOR MAINT. LOOP

                                       .SBTTL  CSR REG. DEFINITION FOR MAINT. LOOP

                                       ;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                                       .SBTTL          MAINTENANCE REGISTER - BSEL0
                                       ;--------------------------------------------------------------------------------------------
                                       ;       INTERRUPT ENABLE BITS

000001                                 IENBA   = BIT0                  ;INTERRUPT ENABLE "A"
000020                                 IENBB   = BIT4                  ;INTERRUPT ENABLE "B"


                                       ;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                                       .SBTTL          MAINTENANCE REGISTER - BSEL1
                                       ;--------------------------------------------------------------------------------------------
                                       ; MAINT. LOOP CONTROL BITS:

000200                                 RUN     = BIT7
000100                                 MCLR    = BIT6
000001                                 MREQ    = BIT0


                                       ;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                                       .SBTTL          MAINTENANCE REGISTER - BSEL2
                                       ;--------------------------------------------------------------------------------------------
                                       ; MAINTENANCE FUNCTION CODES

000001                                 REDLOC  = 1                     ;FUNCTION CODE FOR READ A 6502 LOCATION
000002                                 WRILOC  = 2                     ;FUNCTION CODE FOR WRITE A 6502 LOCATION
000003                                 REDPAG  = 3                     ;FUNCTION CODE FOR READ A 6502 MEMORY PAGE
000004                                 WRIPAG  = 4                     ;FUNCTION CODE FOR WRITE A 6502 RAM PAGE
000005                                 EXECUT  = 5                     ;FUNCTION CODE FOR EXECUTE AT GIVEN PC

000200                                 MRDY    = BIT7                  ;M-LOOP REDY FOR A COMMAND WHEN SET
```

```
                                .SBTTL  DMV INTERNAL ADDRESSES

                                ;+*************************************************************************
                                ;               DMV INTERNAL ADDRESSES
                                ;-*************************************************************************


                                ;########  <<  MICROPROCESSOR REGISTER ADDRESS EQUATES  >> #########

                                .SBTTL          BYTE & WORD SELECT REGISTERS

          000020                SLT0    =020
          000020                BSLT0   =SLT0
          000021                BSLT1   =SLT0+1
          000022                SLT2    =SLT0+2
          000022                BSLT2   =SLT0+2
          000023                BSLT3   =SLT0+3
          000024                SLT4    =SLT0+4
          000024                BSLT4   =SLT0+4
          000025                BSLT5   =SLT0+5
          000026                SLT6    =SLT0+6
          000026                BSLT6   =SLT0+6
          000027                BSLT7   =SLT0+7

                                .SBTTL          VIA'S REGISTERS

          120000                ORB     =120000
          120001                ORA     =ORB+1
          120002                DDRB    =ORB+2
          120003                DDRA    =ORB+3
          120004                T1CL    =ORB+4
          120005                T1CH    =ORB+5
          120005                T1LHGO  =ORB+5
          120006                T1LL    =ORB+6
          120007                T1LH    =ORB+7
          120010                T2LL    =ORB+10
          120010                T2CL    =T2LL
          120011                T2CH    =ORB+11
          120012                SR      =ORB+12
          120013                ACR     =ORB+13
          120014                PCR     =ORB+14
          120015                IFR     =ORB+15
          120016                IENR    =ORB+16
          120017                ORAM    =ORB+17

                                .SBTTL          VIA'S ''IFR'' REGISTER'S BIT ASSIGNMENTS

          000200                IFRIRQ  =BIT7   ;''IRQ'' HAS BEEN ISSUED -- LOGICAL ''OR'' OF BITS 0 --> 6
          000100                IFRT1   =BIT6   ;''T1'' -- TIMER # 1 TIMED-OUT
          000040                IFRT2   =BIT5   ;''T2'' -- TIMER # 1 TIMED-OUT
          000020                IFRCB1  =BIT4   ;''CB1'' EDGE DETECTED (''K2 LINE UNIT STEP'' O/P SIGNAL FROM SR)
          000010                IFRCB2  =BIT3   ;''CB2'' EDGE DETECTED (UNUSED!)
          000004                IFRSR   =BIT2   ;''SR'' REGISTER COMPLETED SHIFT OPERATION
          000002                IFRCA1  =BIT1   ;''CA1'' EDGE DETECTED (''K6 MOD RDY H'')
          000001                IFRCA2  =BIT0   ;''CA2'' EDGE DETECTED (''K2 CTS H'')
```

```
1590
1591                    ;----------------------------------------------------
```

```
                        .SBTTL GLOBAL DATA SECTION

                        ;////////////////////////////////////////////////////////////////////////////////
                        ;/      THE GLOBAL DATA SECTION CONTAINS DATA THAT ARE USED
                        ;/      IN MORE THAN ONE TEST.
                        ;////////////////////////////////////////////////////////////////////////////////

                        ;+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        .SBTTL  CONTROL BLOCK FOR STACKED ERROR MESSAGES
                        ;---------------------------------------------------------------------------------

002202                          ERRTBL
002202                                                          L$ERRTBL::
002202  000000          ERRTYP::        .WORD   0
002204  000000          ERRNBR::        .WORD   0
002206  000000          ERRMSG::        .WORD   0
002210  000000          ERRBLK::        .WORD   0

                        ;+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        .SBTTL  STORAGE FOR DEVICE REGISTERS
                        ;---------------------------------------------------------------------------------
002212                  WSR0:
002212  000000          BSR0:   .WORD   0
002214                  WSR2:
002214  000000          BSR1:   .WORD   0
002216                  WSR4:
002216  000000          BSR2:   .WORD   0
002220                  WSR6:
002220  000000          BSR3:   .WORD   0
002222                  WSR10:
002222  000000          BSR4:   .WORD   0
002224                  WSR12:
002224  000000          BSR5:   .WORD   0
002226                  WSR14:
002226  000000          BSR6:   .WORD   0
002230                  WSR16:
002230  000000          BSR7:   .WORD   0
002232  000000          BSR10:  .WORD   0
002234  000000          BSR11:  .WORD   0
002236  000000          BSR12:  .WORD   0
002240  000000          BSR13:  .WORD   0
002242  000000          BSR14:  .WORD   0
002244  000000          BSR15:  .WORD   0
002246  000000          BSR16:  .WORD   0
002250  000000          BSR17:  .WORD   0

                        ;+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        .SBTTL  MISCELLANEOUS STORAGE
                        ;---------------------------------------------------------------------------------
002252  000000          TDATA:  .WORD   0               ;TEST DATA
002254  000000          GDATA:  .WORD   0               ;EXPECTED DATA
002256  000000          BDATA:  .WORD   0               ;ACTUAL DATA
002260  000000          XDATA:  .WORD   0               ;EXCLUSIVE OR BETWEEN "GDATA" & "BDATA"
002262  110400          DELAY1: .WORD   110400          ;DELAY TIME, 3 INST., 500 MILLISEC.
002264  000007          DELAY2: .WORD   7               ;DELAY TIME FOR M-LOOP FUNCTION, 100 USEC.APPROX.
002266  000000          LOGDEV: .WORD   0               ;LOGICAL DEVICE NUMBER
```

```
1648  002270  000000  PSTACK: .WORD   0       ;CONTAINS BASE LEVEL PROGRAM STACK POINTER
1649  002272  000000  INTFLG: .WORD   0       ;INTERRUPT RECEIVED FLAG BYTES.  ALLOCATION:
1650                                          ;  LOW BYTE FOR "A" & HIGH BYTE FOR "B"
1651  002274  000000  INTWCH: .WORD   0       ;BYTE IS SET NON-ZERO WHEN HANDLER SHOULD BE
1652                                          ;  WATCHING FOR INT'S.  ALLOCATION: SEE INTFLG
1653  002276  000000  ERRFLG: .WORD   0       ;ERROR FLAG
1654  002300  000000  REGNUM: .WORD   0       ;REGISTER NUMBER -- FOR PASSING ARG. TO "ERR#"
1655  002302  000000  FRSTIM: .WORD   0       ;FLAG=0 IF PROGRAM JUST LOADED
1656  002304  000000  FRSPAS: .WORD   0       ;FLAG=0 IF FIRST PASS AFTER LOAD
1657  002306  000000  STARES: .WORD   0       ;FLAG TO SHOW NO. OF PASSES SINCE STA OR RES
1658  002310  000000  DEVMAP: .WORD   0       ;BIT MAP OF ACTIVE DEVICES
1659  002312  000000  DEVPTR: .WORD   0       ;DEVICE MAP BIT POINTER
1660  002314  000000  CONSOL: .WORD   0       ;CONSOLE DEVICE FLAG -- NON-ZERO = NONE PRESENT
1661  002316  000000  PFLAG:  .WORD   0       ;MISC. PROGRAM FLAGS
1662                                          ;
1663                                          ; THE ABOVE WORD CONTAINS MISC. FLAGS WHICH CAN ONLY BE ACCESSED BY PATCHING.
1664                                          ; IT IS NOT INTENDED THAT THEY BE SET OR CLEARED EXCEPT UNDER VERY UNUSUAL
1665                                          ; CIRCUMSTANCES.  THEREFORE, THEY WILL NOT BE DOCUMENTED ANY OTHER PLACE
1666                                          ; EXCEPT RIGHT HERE.
1667                                          ;
1668                                          ; BIT 0 -- WHEN SET, THOSE TESTS WHICH DO A BUS RESET WILL NOT BE EXECUTED.
1669                                          ;          THIS WAS INPLEMENTED TO SAVE WEAR & TEAR ON THE RX01 IN THE
1670                                          ;          DEVELOPMENT SYSTEM WHILE DOING LONG TERM TESTING OF ALL OTHER
1671                                          ;          TESTS.
1672                                          ;
1673                                          ; BIT 1 -- CPU TYPE (NOT USED).
1674                                          ;
1675                                          ; BIT 2 -- CONTROLS PRINTING OF EXTENDED ERROR INFORMATION DURING "MOVING
1676                                          ;          INVERSIONS TEST" OF RAM.  NORMALLY ONLY ADDRESS, GOOD & BAD
1677                                          ;          DATA, AND XOR WILL BE PRINTED.  IF THIS BIT IS SET HOWEVER,
1678                                          ;          INFORMATION IDENTIFYING WHERE WITHIN THE ALGORITHM THE ERROR
1679                                          ;          WAS DETECTED IS REPORTED.  THE FOLLOWING ABBREVIATIONS ARE USED
1680                                          ;          IN THE HEADING:
1681                                          ;                  BIT --- IDENTIFIES THE INNERMOST LOOP.  WHICH BIT IS
1682                                          ;                          BEING INVERTED AT EACH LOCATION.  BITS ARE
1683                                          ;                          IDENTIFIED AS 0 THROUGH 7.
1684                                          ;                  DATA -- IDENTIFIES THE VALUE TO WHICH THE ABOVE BIT IS
1685                                          ;                          BEING SET (I.E. 0 OR 1).  IT IS FIRST READ AND
1686                                          ;                          CHECKED FOR EXPECTED CONTENTS; THEN THE BIT IS
1687                                          ;                          INVERTED TO THIS STATE (DATA) AND RE-WRITTEN;
1688                                          ;                          THEN IT IS AGAIN READ & CHECKED FOR THE NEW
1689                                          ;                          VALUE.
1690                                          ;                  SEQ --- INDICATES THE DIRECTION (FWD OR BKWD) THE TEST
1691                                          ;                          WAS SCANING THROUGH RAM WHEN THE ERROR OCCURED.
1692                                          ;                  LSB --- THIS IS THE LOGICAL LEAST SIGNIFICANT BIT OF THE
1693                                          ;                          RAM ADDRESS AS WE SCAN THROUGH MEMORY.  BY
1694                                          ;                          VARYING THIS, THE ALGORITHM GENERATES NON-SEQUEN-
1695                                          ;                          TIAL ADDRESSING OF RAM AND EFFECTS A MUCH MORE
1696                                          ;                          THOROUGH TEST OF MEMORY.
1697                                          ;
1698                                          ; BIT 3 -- ENABLES PRINTOUT OF THE MESSAGE WITHIN THE INIT CODE THAT TELLS
1699                                          ;          US HOW LONG IT TOOK (IN LOOPS WITHIN THIS CPU) TO PERFORM ONE
1700                                          ;          NO-OP FUNCTION OF THE MAINTAINENCE LOOP.
1701
1702
1703
```

```
                                .SBTTL  CURRENT DEVICE PARAMETERS

                        160000  $MPCSR  ==      160000          ;INITIAL ASSEMBLED IN CSR ADDRESS

002320                  MPCSR:                                  ;POINTER TO THE DMV11 CSR'S
002320                  BSEL0:                                  ;POINTER TO BSEL0
002320                  BSEL:                                   ;ALTERNATE NAME FOR BSEL0
002320  160000          SEL0:   .WORD   $MPCSR                  ;POINTER TO SEL0
002322  160001          BSEL1:  .WORD   $MPCSR+1                ;POINTER TO BSEL1
002324                  BSEL2:                                  ;POINTER TO BSEL2
002324  160002          SEL2:   .WORD   $MPCSR+2                ;POINTER TO SEL2
002326  160003          BSEL3:  .WORD   $MPCSR+3                ;POINTER TO BSEL3
002330                  BSEL4:                                  ;POINTER TO BSEL4
002330  160004          SEL4:   .WORD   $MPCSR+4                ;POINTER TO SEL4
002332  160005          BSEL5:  .WORD   $MPCSR+5                ;POINTER TO BSEL5
002334                  BSEL6:                                  ;POINTER TO BSEL6
002334  160006          SEL6:   .WORD   $MPCSR+6                ;POINTER TO SEL6
002336  160007          BSEL7:  .WORD   $MPCSR+7                ;POINTER TO BSEL7
002340                  BSEL10:                                 ;POINTER TO BSEL10
002340  160010          SEL10:  .WORD   $MPCSR+10               ;POINTER TO SEL10
002342  160011          BSEL11: .WORD   $MPCSR+11               ;POINTER TO BSEL11
002344                  BSEL12:                                 ;POINTER TO BSEL12
002344  160012          SEL12:  .WORD   $MPCSR+12               ;POINTER TO SEL12
002346  160013          BSEL13: .WORD   $MPCSR+13               ;POINTER TO BSEL13
002350                  BSEL14:                                 ;POINTER TO BSEL14
002350  160014          SEL14:  .WORD   $MPCSR+14               ;POINTER TO SEL14
002352  160015          BSEL15: .WORD   $MPCSR+15               ;POINTER TO BSEL15
002354                  BSEL16:                                 ;POINTER TO BSEL16
002354  160016          SEL16:  .WORD   $MPCSR+16               ;POINTER TO SEL16
002356  160017          BSEL17: .WORD   $MPCSR+17               ;POINTER TO BSEL17

002360  000300          MPIVEC: .WORD       300                 ;DMV11 INPUT INTERRUPT VECTOR
002362  000304          MPOVEC: .WORD       304                 ;DMV11 OUTPUT INTERRUPT VECTOR
002364  000340          MPRIOR: .WORD       340                 ;DMV11 DEVICE PRIORITY
002366  000000          BRDTYP: .WORD         0                 ;0=M8064,1=M8053/V.35,2=M8053/EIA
002370  000000          PT.CTL: .WORD         0                 ;MISC. CONTROL FLAGS FROM P-TABLE

                                .SBTTL  GEN'L PURPOSE SCRATCH STORAGE

002372  000000          REG0:   .WORD   0
002374  000000          REG1:   .WORD   0
002376  000000          REG2:   .WORD   0
002400  000000          REG3:   .WORD   0
002402  000000          REG4:   .WORD   0
002404  000000          REG5:   .WORD   0
002406  000000          REG6:   .WORD   0
002410  000000          REG7:   .WORD   0
```

```
                        .SBTTL  SCRATCH STORAGE FOR MESSAGE REPORTING

002412  000000          TMP0:   .WORD   0
002414  000000          TMP1:   .WORD   0
002416  000000          TMP2:   .WORD   0
002420  000000          TMP3:   .WORD   0
002422  000000          TMP4:   .WORD   0
002424  000000          TMP5:   .WORD   0
002426  000000          TMP6:   .WORD   0
002430  000000          TMP7:   .WORD   0
002432  000000          TMP8:   .WORD   0
002434  000000          TMP9:   .WORD   0
002436  000000          TMPA:   .WORD   0
002440  000000          TMPB:   .WORD   0
002442  000000          TMPC:   .WORD   0
002444  000000          TMPD:   .WORD   0
002446  000000          TMPE:   .WORD   0
002450  000000          TMPF:   .WORD   0
002452  000000          NEWPC:  .WORD   0       ;SAVE LOCATION FOR A 'PC'' VALUE RESET
002454  000000          OLDSP:  .WORD   0       ;SAVE LOCATION FOR A STACK POINTER RESET VALUE


                        .SBTTL  ***** DATA PATTERN B *****

                        .EVEN                           ;USAGE:
002456  000025          PATB:   .WORD   1$-.-2  ;# OF BYTES IN PATTERN
002460    125                   .BYTE   125
002461    252                   .BYTE   252
002462    000                   .BYTE   000
002463    377                   .BYTE   377
002464    001                   .BYTE   001
002465    002                   .BYTE   002
002466    004                   .BYTE   004
002467    010                   .BYTE   010
002470    020                   .BYTE   020
002471    040                   .BYTE   040
002472    100                   .BYTE   100
002473    200                   .BYTE   200
002474    376                   .BYTE   376
002475    375                   .BYTE   375
002476    373                   .BYTE   373
002477    367                   .BYTE   367
002500    357                   .BYTE   357
002501    337                   .BYTE   337
002502    277                   .BYTE   277
002503    177                   .BYTE   177
002504    000                   .BYTE   000
002505                  1$:
```

```
                              .SBTTL  ***** DATA PATTERN F *****

                              .EVEN
                002506
        002506  000045        PATF:   <1$-.-2>/2
        002510  125252                125252
        002512  052525                052525
        002514  000000                0
        002516  177777                -1
        002520  000001                1
        002522  000002                2
        002524  000004                4
        002526  000010                10
        002530  000020                20
        002532  000040                40
        002534  000100                100
        002536  000200                200
        002540  000400                400
        002542  001000                1000
        002544  002000                2000
        002546  004000                4000
        002550  010000                10000
        002552  020000                20000
        002554  040000                40000
        002556  100000                100000
        002560  177776                177776
        002562  177775                177775
        002564  177773                177773
        002566  177767                177767
        002570  177757                177757
        002572  177737                177737
        002574  177677                177677
        002576  177577                177577
        002600  177377                177377
        002602  176777                176777
        002604  175777                175777
        002606  173777                173777
        002610  167777                167777
        002612  157777                157777
        002614  137777                137777
        002616  077777                077777
        002620  000000                0
        002622                1$:
```

```
                        ***** DATA PATTERN RESULTS TABLE FOR MASTER CLEAR (RESFMC) *****

                        .SBTTL  ***** DATA PATTERN RESULTS TABLE FOR MASTER CLEAR (RESFMC) *****

                        .EVEN
002622  000     BSELRS: .BYTE   000             ;BSEL0
002623  200             .BYTE   200             ;BSEL1 -- 'RUN' BIT SET
002624  000             .BYTE   000             ;BSEL2
002625  000             .BYTE   000             ;BSEL3
002626  033             .BYTE   033             ;BSEL4 -- CODE FOR THE DMV-11
002627  000             .BYTE   000             ;BSEL5
002630  305             .BYTE   305             ;BSEL6 -- INDICATING VALID COMPLETION OF U-DIAG.
002631  000             .BYTE   000             ;BSEL7

                        .SBTTL  ***** DATA PATTERN OF NPR REG'S AFTER MASTER CLEAR ****

                        ;       ALTHOUGH THE REGISTERS ARE ONLY 1 BYTE LONG, EACH TABLE ENTRY IS ONE
                        ;       WORD LONG TO SIMPLIFY THE ERROR CHECKING & REPORTING.  THE HIGH BYTE
                        ;       OF EACH ENTRY MUST BE LEFT AT ZERO OR THE TESTING & PRINTING WILL BE
                        ;       IN ERROR!

                        .EVEN
002632  000004  NPRMCR: .WORD   DMVPU   ;ONLY THE 'POWER UP' IS SET (BY MICRO-DIAG.)
002634  000000          .WORD   0       ;'DATA HI'
002636  000000          .WORD   0       ;'DATA LO'
002640  000000          .WORD   0       ;'OUT ADDR. EXTENDED'
002642  000000          .WORD   0       ;'OUT ADDR. HI'
002644  000000          .WORD   0       ;'OUT ADDR. LO'
002646  000000          .WORD   0       ;'IN ADDR. EXTENDED'
002650  000000          .WORD   0       ;'IN ADDR. HI'
002652  000000          .WORD   0       ;'IN ADDR. LO'
```

```
                                .SBTTL  DATA BUFFER AREAS

002654  000400                  BUFAREA:        .BLKB   256.


                                ;  THIS BUFFER HAS SOME ALTERNATE USES TOO.  THE FOLLOWING LABELS ARE PROVIDED
                                ;  FOR THOSE USAGES.

        003054                  W0 = BUFAREA+128.       ;THIS WORD TABLE STARTS IN THE MIDDLE OF 'BUFAREA'
        003056                  W1 = W0+2               ;AND IS USED BY 'ERR6' FOR PRINTING BYTES
        003060                  W2 = W1+2
        003062                  W3 = W2+2
        003064                  W4 = W3+2
        003066                  W5 = W4+2
        003070                  W6 = W5+2
        003072                  W7 = W6+2
        003074                  W8 = W7+2
        003076                  W9 = W8+2
        003100                  WA = W9+2
        003102                  WB = WA+2
        003104                  WC = WB+2
        003106                  WD = WC+2
        003110                  WE = WD+2
        003112                  WF = WE+2

        002654                  BT1 = BUFAREA           ;BYTE TABLE # 1
        002740                  BT2 = BUFAREA+64        ;BYTE TABLE # 2
```

```
                                .SBTTL GLOBAL TEXT SECTION

                                ;%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
                                ;%       THE GLOBAL TEXT SECTION CONTAINS FORMAT STATEMENTS,
                                ;%       MESSAGES, AND ASCII INFORMATION THAT ARE USED IN
                                ;%       MORE THAN ONE TEST.
                                ;%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

                                ;+****************************************************************************
                                ;* NAMES OF DEVICES SUPPORTED BY PROGRAM
                                ;--***************************************************************************
003254                                  DEVTYP  <M8053 OR M8064>
003254                                                                                  L$DVTYP::
003254  034115  032460  020063                                                                  .ASCIZ  /M8053 OR M8064/
003262  051117  046440  030070
003270  032066     000
        003274                                                                                  .EVEN

                                ;+****************************************************************************
                                ;* TITLE OF PROGRAM
                                ;--***************************************************************************

        000012                  .RADIX  10.
003274                                  DESCRIPT   <DMV-11 U-CONTRL LOGIC DIAG - PART 2 OF 2>
003274                                                                                  L$DESC::
003274  046504  026526  030461                                                                  .ASCIZ  /DMV-11 U-CONTRL
003302  052440  041455  047117
003310  051124  020114  047514
003316  044507  020103  044504
003324  043501  026440  050040
003332  051101  020124  020062
003340  043117  031040     000
        003346                                                                                  .EVEN
        000010                  .RADIX  8.

```

```
                        .SBTTL GLOBAL SUBROUTINES

                        ;////////////////////////////////////////////////////////////////////////////
                        ;/      THE GLOBAL SUBROUTINES ARE CALLED BY MORE THAN ONE TEST
                        ;////////////////////////////////////////////////////////////////////////////

                        ;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        .SBTTL  MASCLR -  MASTER CLEAR SUBROUTINE
                        ;
                        ; FUNCTION:
                        ;
                        ;  THIS  SUBROUTINE  FORCES THE 6502 MICROPROCESSOR TO EXECUTE A MINI 17 PART
                        ;  DIAGNOSTIC OF THE MICRO-PROCESSOR INSTRUCTION SET, RAM DATA AND ADDRESSING
                        ;  VALIDITY,  AND  A  ROM  CRC  TEST.  THE  CLEAR  SUBROUTINE  EXECUTES  IN
                        ;  APPROXIMATELY  500  HUNDRED(S)  MILLISECOND. THIS SUBROUTINE WILL SEND THE
                        ;  MASTER  CLEAR  COMMAND  AND  DELAY FOR APPROX. 500 MSEC. AT WHICH PRINT IN
                        ;  TIME,  THE  STATE  OF  THE  CSR  REGISTERS  IS  TESTED.  IF ANY ONE OF THE
                        ;  REGISTERS CONTAINS ANYTHING THAT IS NOT EXPECTED, AN ERROR IS QUEUE UP AND
                        ;  THE CARRY BIT IS SET. ELSE, THE CARRY BIT IS CLEARED.
                        ;
                        ; CALLING SEQUENCE:
                        ;
                        ;       JSR     PC,MASCLR
                        ;       BCC     N$                      ;IF NO ERROR OCCURED, PROCEED WITH ROUTINE
                        ;       ERROR                           ;AN ERROR MESSAGE HAS BEEN STACKED:  PRINT IT
                        ;       <ANY OTHER SPECIAL ERROR PROCESSING MAY BE DONE HERE  (I.E. CKLOOP)>
                        ;
                        ; N$:   <RESUMPTION OF NORMAL PROCESSING>
                        ;
                        ;--------------------------------------------------------------------------------
                        ;
003346  010146          MASCLR: MOV     R1,-(SP)                ; SAVE REGISTER ONE
003350  112777  000300  176744          MOVB    #RUN!MCLR,@BSEL1 ;SET BOTH THE RUN AND MASTER CLEAR BITS
                                                                ;TO INITIATE THE MICRODIAGNOSTIC
                        ;NOW DELAY LONG ENOUGH FOR THE MICRODIAGNOSTIC TO COMPLETE
003356  013701  002262          MOV     DELAY1,R1               ;INITIALIZE THE LOOP COUNTER FOR DELAY LOOP
003362  001402          2$:     BEQ     1$                      ; EXIT DELAY LOOP IF THE TIME HAS EXPIRED
003364  005301                  DEC     R1                      ;  ELSE, DECREMENT THE LOOP COUNTER AND
003366  000775                  BR      2$                      ;  CONTINUE TO LOOP.
003370                  1$:                                     ; TIME-UP!
003370  132777  000200  176724          BITB    #RUN,@BSEL1     ;CHECK THE RUN BIT --
003376  001410                  BEQ     3$                      ;IF NOT SET, GO REPORT THE ERROR
                        ;IF THE RUN BIT IS SET, MICRODIAGNOSTICS ARE COMPLETE.
                        ;CHECK IF ALL MICRODIAGNOSTICS PASSED.
003400  127737  176730  002630  4$:     CMPB    @BSEL6,BSELRS+6 ;THIS CHECKS THE BYTE IN B-SELECT 6 FOR THE
                                                                ;VALID MICRODIAGNOSTIC COMPLETION CODE.
003406  001004                  BNE     3$                      ;IF BAD, GO REPORT ERROR
003410  127737  176714  002626          CMPB    @BSEL4,BSELRS+4 ;ELSE, CHECK FOR THE VALID CODE FOR A DMV-11
003416  001420                  BEQ     6$                      ;IF THIS TOO IS CORRECT THEN NO ERROR EXISTS
                                                                ;ELSE, FALL INTO THE ERROR REPORTING CODE
```

```
 1989
 1990  003420  004737  004232          3$:     JSR     PC,GETBSR       ;GET THE BSEL REGISTERS FOR DUMPING
 1991  003424                                  GTDF    20$,ERR3        ;MASTER CLEAR ERROR
 1992                                          ;       QUEUE 'DEVICE FATAL'' ERROR # 1
 1993  003424  012737  000001  002202                                          MOV     #T.EDF,ERRTYP
 1994  003432  012737  000001  002204                                          MOV     #1,ERRNBR
 1995  003440  012737  003466  002206                                          MOV     #20$,ERRMSG
 1996  003446  012737  006220  002210                                          MOV     #ERR3,ERRBLK
 1997  003454  000261                          SEC                     ;INDICATE TO THE CALLING ROUTINE THAT
 1998  003456  000401                          BR      7$              ;   AN ERROR WAS DETECTED
 1999
 2000  003460  000241                  6$:     CLC                     ;CLEAR THE CARRY BIT TO INDICATE NO ERROR
 2001  003462  012601                  7$:     MOV     (SP)+,R1        ;RESTORE REGISTER ONE
 2002  003464  000207                          RTS     PC              ; RETURN TO THE CALLER
 2003                                  .NLIST  BEX
       003466  040515  052123  051105  20$:    .ASCIZ  /MASTER CLEAR FAILURE/
                                       .LIST   BEX
 2004          003514                  .EVEN
```

```
                                        .SBTTL  M-LOOP -- MSTCLR -- MASTER CLEAR & ENTER M-LOOP
                                        ;++*************************************************************************
                                        ;  MSTCLR -- MASTER CLEAR & ENTER M-LOOP
                                        ;
                                        ;  CALLING SEQUENCE:
                                        ;
                                        ;       JSR     PC,MSTCLR
                                        ;       BCC     N$                  ;IF NO ERROR OCCURED, PROCEED WITH ROUTINE
                                        ;       ERROR                       ;AN ERROR MESSAGE HAS BEEN STACKED:  PRINT IT
                                        ;       <ANY OTHER SPECIAL ERROR PROCESSING MAY BE DONE HERE  (I.E. CKLOOP)>
                                        ;
                                        ; N$:   <RESUMPTION OF NORMAL PROCESSING>
                                        ;
                                        ;--*************************************************************************

003514  012777  140400  176576  MSTCLR: MOV     #<RUN!MCLR!MREQ>*256.,@SEL0  ;INITIATE M-LOOP

003522  010346                          MOV     R3,-(SP)
003524  012703  000014                  MOV     #12.,R3             ;WAIT FOR THE M-LOOP TO FINISH THE OPERATION
003530  077301                  1$:     SOB     R3,1$
003532  012603                          MOV     (SP)+,R3

003534  132777  000200  176562          BITB    #MRDY,@BSEL2        ;DID THE M-LOOP FINISH
003542  001023                          BNE     5$                  ;YES,  GOOD.  RETURN
003544  004737  004374                  JSR     PC,GETWSR           ;GET BYTE SELECT REGISTERS
003550  012737  000301  002254          MOV     #RUN!MCLR!MREQ,GDATA    ;IDENTIFY REQUESTED FUNCTION
003556                                  GTDF    EM3,ERR4            ;'MRDY'' TIMEOUT
                                                                    ;       QUEUE 'DEVICE FATAL'' ERROR # 2
003556  012737  000001  002202                                                                  MOV     #T.EDF,ERRTYP
003564  012737  000002  002204                                                                  MOV     #2,ERRNBR
003572  012737  016115  002206                                                                  MOV     #EM3,ERRMSG
003600  012737  006232  002210                                                                  MOV     #ERR4,ERRBLK
003606  000261                          SEC                         ;SET CARRY TO INDICATE ERROR
003610  000401                          BR      9$                  ;EXIT WITH THE 'ERROR'' FLAG (CARRY BIT) SET
003612  000241                  5$:     CLC                         ;CLEAR C BIT FOR NO ERRORS
003614  000207                  9$:     RTS     PC                  ;RETURN
```

```
                                        .SBTTL  M-LOOP -- READ
                                        ;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                                        ; READ - READ THE SPECIFIED ADDRESS WITHIN THE DMV-11
                                        ;
                                        ;  CALLING SEQUENCE:
                                        ;
                                        ;       JSR     R5,READ
                                        ;       .WORD   <ADDRESS OF REGISTER WITHIN DMV-11>
                                        ;       .WORD   <DESTINATION ADDRESS WITHIN LSI-11>
                                        ;       BCC     N$              ;IF NO ERROR OCCURED, PROCEED WITH ROUTINE
                                        ;       ERROR                   ;AN ERROR MESSAGE HAS BEEN STACKED:  PRINT IT
                                        ;       <ANY OTHER SPECIAL ERROR PROCESSING MAY BE DONE HERE  (I.E. CKLOOP)>
                                        ;
                                        ; N$:   <RESUMPTION OF NORMAL PROCESSING>
                                        ;
                                        ;--++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

003616  012577  176506          READ:   MOV     (R5)+,@SEL4     ;SETUP SOURCE POINTER
003622  112777  000001  176474          MOVB    #REDLOC,@BSEL2  ;TELL M-LOOP TO GIVE US THE REQUESTED DATA

003630  010346                          MOV     R3,-(SP)
003632  012703  000032                  MOV     #26.,R3         ;WAIT FOR THE M-LOOP TO FINISH THE OPERATION
003636  077301                  1$:     SOB     R3,1$
003640  012603                          MOV     (SP)+,R3

003642  132777  000200  176454          BITB    #MRDY,@BSEL2    ;DID THE M-LOOP FINISH
003650  001023                          BNE     5$              ;YES,  GOOD.  RETURN

003652  004737  004374                  JSR     PC,GETWSR       ;GET BYTE SELECT REGISTERS
003656  012737  000001  002254          MOV     #REDLOC,GDATA   ;IDENTIFY REQUESTED FUNCTION
003664                                  GTDF    EM4,ERR4        ;'MRDY' TIMEOUT
                                        ;       QUEUE 'DEVICE FATAL' ERROR # 3
003664  012737  000001  002202                                          MOV     #T.EDF,ERRTYP
003672  012737  000003  002204                                          MOV     #3,ERRNBR
003700  012737  016135  002206                                          MOV     #EM4,ERRMSG
003706  012737  006232  002210                                          MOV     #ERR4,ERRBLK
003714  000261                          SEC                     ;INDICATE AN ERROR HAS BEEN STACKED
003716  000401                          BR      6$              ;RETURN WITH THAT INDICATION

003720  000241                  5$:     CLC                     ;INDICATE 'NO ERROR'
003722  117735  176406          6$:     MOVB    @BSEL6,@(R5)+   ;PUT DATA WHERE CALLER WANTS IT
003726  000205                          RTS     R5              ;RETURN
```

```
                                        .SBTTL  M-LOOP -- READ IMMEDIATE
                                        ;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                                        ; READI - READ IMMEDIATE THE SPECIFIED ADDRESS WITHIN THE DMV-11
                                        ;
                                        ; CALLING SEQUENCE:
                                        ;
                                        ;       JSR     R5,READI
                                        ;       .WORD   <ADDRESS OF REGISTER WITHIN DMV-11>
                                        ;       .WORD   <DESTINATION -- CONTENTS OF REG. IS PUT HERE>
                                        ;       BCC     N$              ;IF NO ERROR OCCURED, PROCEED WITH ROUTINE
                                        ;       ERROR                   ;AN ERROR MESSAGE HAS BEEN STACKED:  PRINT IT
                                        ;       <ANY OTHER SPECIAL ERROR PROCESSING MAY BE DONE HERE  (I.E. CKLOOP)>
                                        ;
                                        ; N$:   <RESUMPTION OF NORMAL PROCESSING>
                                        ;
                                        ;--++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

003730                                  READI:
003730  012577  176374                          MOV     (R5)+,@SEL4     ;SETUP SOURCE POINTER
003734  112777  000001  176362                  MOVB    #REDLOC,@BSEL2  ;TELL M-LOOP TO GIVE US THE REQUESTED DATA
                                        ;
003742  010346                                  MOV     R3,-(SP)
003744  012703  000015                          MOV     #13.,R3         ;WAIT FOR THE M-LOOP TO FINISH THE OPERATION
003750  077301                          1$:     SOB     R3,1$
003752  012603                                  MOV     (SP)+,R3
                                        ;
003754  132777  000200  176342                  BITB    #MRDY,@BSEL2    ;DID THE M-LOOP FINISH
003762  001023                                  BNE     5$              ;YES,  GOOD.  RETURN
                                        ;
003764  004737  004374                          JSR     PC,GETWSR       ;GET BYTE SELECT REGISTERS
003770  012737  000001  002254                  MOV     #REDLOC,GDATA   ;IDENTIFY REQUESTED FUNCTION
003776                                          GTDF    EM4,ERR4        ;''MRDY'' TIMEOUT
                                        ;               QUEUE ''DEVICE FATAL'' ERROR # 4
003776  012737  000001  002202                                          MOV     #T.EDF,ERRTYP
004004  012737  000004  002204                                          MOV     #4,ERRNBR
004012  012737  016135  002206                                          MOV     #EM4,ERRMSG
004020  012737  006232  002210                                          MOV     #ERR4,ERRBLK
004026  000261                                  SEC                     ;INDICATE AN ERROR HAS BEEN STACKED
004030  000401                                  BR      6$              ;RETURN WITH THAT INDICATION
                                        ;
004032  000241                          5$:     CLC                     ;INDICATE ''NO ERROR''
004034  017725  176274                  6$:     MOV     @SEL6,(R5)+     ;PUT DATA WHERE CALLER WANTS IT
004040  000205                                  RTS     R5              ;RETURN
```

```
2126                                    .SBTTL  M-LOOP -- WRITE
2127                                    ;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
2128                                    ; WRITE - WRITE THE SPECIFIED DATA INTO THE SPECIFIED DMV-11 ADDRESS
2129                                    ;
2130                                    ;  CALLING SEQUENCE:
2131                                    ;
2132                                    ;       JSR     R5,WRITE
2133                                    ;       .WORD   <ADDRESS OF REGISTER WITHIN DMV-11>
2134                                    ;       .WORD   <ADDRESS OF DATA BYTE>
2135                                    ;       BCC     N$              ;IF NO ERROR OCCURED, PROCEED WITH ROUTINE
2136                                    ;       ERROR                   ;AN ERROR MESSAGE HAS BEEN STACKED:  PRINT IT
2137                                    ;       <ANY OTHER SPECIAL ERROR PROCESSING MAY BE DONE HERE  (I.E. CKLOOP)>
2138                                    ;
2139                                    ; N$:   <RESUMPTION OF NORMAL PROCESSING>
2140                                    ;
2141                                    ;--++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
2142
2143  004042  012577  176262  WRITE:  MOV     (R5)+,@SEL4     ;SETUP SOURCE POINTER
2144  004046  113577  176262          MOVB    @(R5)+,@SEL6    ;MAKE DATA AVAILABLE TO M-LOOP
2145  004052  000404                  BR      MLWRI           ;THE REST OF THIS ROUTINE IS THE SAME AS 'WRITEI'
```

```
                                .SBTTL  M-LOOP -- WRITE IMMEDIATE
                                ;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                                ; WRITEI - WRITE IMMEDIATE THE SPECIFIED DATA INTO THE SPECIFIED DMV-11 ADDRESS
                                ;
                                ; CALLING SEQUENCE:
                                ;
                                ;       JSR     R5,WRITEI
                                ;       .WORD   <ADDRESS OF REGISTER WITHIN DMV-11>
                                ;       .WORD   <DATA FIELD -- DATA TO BE WRITTEN IN DMV-11>
                                ;       BCC     N$              ;IF NO ERROR OCCURED, PROCEED WITH ROUTINE
                                ;       ERROR                   ;AN ERROR MESSAGE HAS BEEN STACKED:  PRINT IT
                                ;       <ANY OTHER SPECIAL ERROR PROCESSING MAY BE DONE HERE  (I.E. CKLOOP)>
                                ;
                                ; N$:   <RESUMPTION OF NORMAL PROCESSING>
                                ;
                                ;--++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

004054                          WRITEI:
004054  012577  176250                  MOV     (R5)+,@SEL4     ;SETUP SOURCE POINTER
004060  012577  176250                  MOV     (R5)+,@SEL6     ;MAKE DATA AVAILABLE TO M-LOOP
004064  112777  000002  176232  MLWRI:  MOVB    #WRILOC,@BSEL2  ;TELL M-LOOP TO WRITE THE DATA

004072  010346                  MOV     R3,-(SP)
004074  012703  000050          MOV     #40.,R3         ;WAIT FOR THE M-LOOP TO FINISH THE OPERATION
004100  077301                  1$:     SOB     R3,1$
004102  012603                  MOV     (SP)+,R3

004104  132777  000200  176212          BITB    #MRDY,@BSEL2    ;DID THE M-LOOP FINISH
004112  001023                  BNE     5$              ;YES.  GOOD.  RETURN
004114  004737  004374          JSR     PC,GETWSR       ;GET BYTE SELECT REGISTERS
004120  012737  000002  002254  MOV     #WRILOC,GDATA   ;IDENTIFY REQUESTED FUNCTION
004126                          GTDF    EM4,ERR4        ;'MRDY' TIMEOUT
                                ;       QUEUE 'DEVICE FATAL' ERROR # 5
004126  012737  000001  002202                                  MOV     #T.EDF,ERRTYP
004134  012737  000005  002204                                  MOV     #5,ERRNBR
004142  012737  016135  002206                                  MOV     #EM4,ERRMSG
004150  012737  006232  002210                                  MOV     #ERR4,ERRBLK
004156  000261                  SEC                     ;INDICATE AN ERROR HAS BEEN STACKED
004160  000401                  BR      6$              ;RETURN WITH THAT INDICATION

004162  000241          5$:     CLC                     ;INDICATE 'NO ERROR'
004164  000205          6$:     RTS     R5              ;RETURN
```

```
2188
2189                                    .SBTTL  M-LOOP --- BLOCK MOVE (11 CPU ==> DMV-11)
2190                                    ;*****************************************************************************
2191                                    ;
2192                                    ; MOVE A BLOCK OF BYTES FROM THE 11 CPU'S MEMORY TO THE DMV-11'S RAM
2193                                    ;
2194                                    ;       THE DESTINATION ADDRESS IS ALWAYS THE SAME -- 77 (OCT) OR 003F (HEX)
2195                                    ;
2196                                    ;       CALLING SEQUENCE:
2197                                    ;
2198                                    ;       JSR     R5,MOVLTD
2199                                    ;       .WORD   <SOURCE ADDRESS OF DATA>
2200                                    ;       .WORD   <# OF BYTE TO BE MOVED>
2201                                    ;
2202                                    ;*****************************************************************************
2203  004166  010146                   MOVLTD: MOV     R1,-(SP)        ;SAVE THE REGISTER WE'LL BE A NEED'N
2204
2205  004170  012737  000077  004210            MOV     #77,10$         ;DESTINATION ADDRESS IS ALWAYS THE SAME
2206  004176  012537  004212                   MOV     (R5)+,11$       ;SETUP THE SOURCE ADDRESS
2207  004202  012501                           MOV     (R5)+,R1        ;INITIALIZE THE BYTE COUNT
2208
2209  004204                            5$:
2210  004204  004537  004042                   JSR     R5,WRITE        ;WRITE ONE BYTE INTO THE DMV-11'S RAM
2211  004210  000077                    10$:    77                      ;THE RAM'S LOCATION
2212  004212  000000                    11$:    0                       ;THE DATA BYTE'S LOCATION
2213  004214  005237  004210                   INC     10$             ;POINT TO NEXT RAM BYTE
2214  004220  005237  004212                   INC     11$             ;POINT TO NEXT DATA BYTE
2215  004224  077111                           SOB     R1,5$           ;IF NOT DONE, LOOP
2216                                                                    ;ELSE, CLEAN-UP AND RETURN
2217  004226  012601                           MOV     (SP)+,R1        ;RESTORE R1
2218  004230  000205                           RTS     R5              ;  & RETURN
2219
```

```
                                        .SBTTL  GETBSR -- GET BYTE SELECT REGISTERS

                                        ;+*****************************************************************************
                                        ;
                                        ;          GET THE CONTENTS OF ALL CONTROL AND STATUS REGISTERS
                                        ;
                                        ;          FUNCTION - THIS SUBROUTINE COLLECTS THE CONTENTS OF THE
                                        ;                BYTE SELECT REGISTERS FOR THE PURPOSE OF DISPLAY.
                                        ;
                                        ;          ENTRY CONDITIONS - NONE        ##  #    ####   #   ## #
                                        ;                                        #  # #    #     # #  # # #
                                        ;           EXIT CONDITIONS - NONE       #    #     ##  #   # #  ##
                                        ;                                        #  # #    #    ##### #   #
                                        ;      REGISTERS DESTROYED - NONE         ##  #### #### #   # #   #
                                        ;
                                        ;-*****************************************************************************

004232  117737  176062  002212  GETBSR: MOVB    @BSEL0,BSR0             ;PUT THE CURRENT CSR VALUES INTO THE PRINT-OUT
004240  117737  176056  002214          MOVB    @BSEL1,BSR1             ;TABLE
004246  117737  176052  002216          MOVB    @BSEL2,BSR2
004254  117737  176046  002220          MOVB    @BSEL3,BSR3
004262  117737  176042  002222          MOVB    @BSEL4,BSR4
004270  117737  176036  002224          MOVB    @BSEL5,BSR5
004276  117737  176032  002226          MOVB    @BSEL6,BSR6
004304  117737  176026  002230          MOVB    @BSEL7,BSR7
004312  117737  176022  002232          MOVB    @BSEL10,BSR10
004320  117737  176016  002234          MOVB    @BSEL11,BSR11
004326  117737  176012  002236          MOVB    @BSEL12,BSR12
004334  117737  176006  002240          MOVB    @BSEL13,BSR13
004342  117737  176002  002242          MOVB    @BSEL14,BSR14
004350  117737  175776  002244          MOVB    @BSEL15,BSR15
004356  117737  175772  002246          MOVB    @BSEL16,BSR16
004364  117737  175766  002250          MOVB    @BSEL17,BSR17
004372  000207                          RTS     PC                      ;RETURN TO CALLER

                                .SBTTL  GETWSR -- GET WORD SELECT REGISTERS
                                ; 'WORD'' VERSION OF ABOVE SUBROUTINE

004374  017737  175720  002212  GETWSR: MOV     @SEL0,WSR0              ;MOVE THE 4 WORD REGISTERS TO THE OTHERWISE
004402  017737  175716  002214          MOV     @SEL2,WSR2              ;BYTE TABLE
004410  017737  175714  002216          MOV     @SEL4,WSR4
004416  017737  175712  002220          MOV     @SEL6,WSR6
004424  017737  175710  002222          MOV     @SEL10,WSR10
004432  017737  175706  002224          MOV     @SEL12,WSR12
004440  017737  175704  002226          MOV     @SEL14,WSR14
004446  017737  175702  002230          MOV     @SEL16,WSR16
004454  000207                          RTS     PC                      ;RETURN TO CALLER
```

```
                        .INITT1 -- INITIALIZE TIMER # 1

                        .SBTTL  .INITT1 -- INITIALIZE TIMER # 1

                        ;*****************************************************************************
                        ;* INITT1 - INITIALIZE TIMER # 1
                        ;*
                        ;*       CALLING SEQUENCE:
                        ;*
                        ;*             JSR     R5,INITT1
                        ;*             .WORD   <VALUE LOADED INTO THE T1 LATCH @ T1LL & T1LH>
                        ;*             .WORD   <BITS 6 & 7 WILL BE LOADED INTO 'ACR', BIT 5 WILL BE
                        ;*                      USED TO SET OR CLEAR BIT 6 ('T1') OF THE INTERRUPT
                        ;*                      ENABLE REGISTER ('IER')>
                        ;*
                        ;*
                        ;* SEQUENCE OF EVENTS HEREIN:
                        ;*
                        ;*      SET THE VIA'S INTERRUPT ENABLE REGISTER ('IER')
                        ;*
                        ;*      SET THE VIA'S 'ACR'
                        ;*
                        ;*      SET T1L-L (ADDR 06)
                        ;*
                        ;*      SET T1L-H (ADDR 07)
                        ;*
                        ;*      RETURN WITHOUT ANY ERROR CHECKING
                        ;*
                        ;*****************************************************************************

004456  010146          INITT1: MOV     R1,-(SP)        ;SAVE THE REGISTER WE WILL BE USING
004460  112537  002427          MOVB    (R5)+,TMP6+1    ;SETUP VALUES TO BE LOADED INTO THE LATCHES
004464  112537  002431          MOVB    (R5)+,TMP7+1
004470  111537  002441          MOVB    (R5),TMPB+1     ;GET & PROCESS BITS FOR ACR 6 & 7
004474  142737  177477  002441  BICB    #^C<BIT6+BIT7>,TMPB+1 ;EXTRACT BITS 6 & 7 & SAVE THEM FOR LATER
004502  012501                  MOV     (R5)+,R1        ;NOW, GET THE BIT TO BE USED IN SETTING OR
                                                        ;CLEARING BIT 6 OF ''IER''

                        ; THE PASSED BIT IS IN THE WRONG POSITION BUT, IT SHOULD CONTROL THE OPERATION.
                        ; WE KNOW WE ARE SETTING OR CLEARING BIT 6 -- THUS, THE PASSED BIT WILL BECOME
                        ; THE CONTROLLING BIT 7 AND WE WILL 'OR' IN THE BIT WE WISH TO BE CONTROLLED
                        ; (BIT 6).

004504  106301                  ASLB    R1              ;THIS PUTS THE PASSED BIT INTO BIT 6.
004506  042701  177677          BIC     #^C<BIT6>,R1    ;WHILE HERE, CLEAR ALL OTHER BITS AND
004512  140177  175610          BICB    R1,@#SEL3       ;CLEAR THE INTERRUPT FLAG IN THE SELECT REG.
004516  106301                  ASLB    R1              ;NOW THE BIT IS IN THE CONTROLLING POSITION
004520  052701  000100          BIS     #BIT6,R1        ;SET BIT 6
004524  110137  002447          MOVB    R1,TMPE+1       ;THE CALL WILL NOW WRITE THE APPROPRIATE VALUE

004530  004537  004042          JSR     R5,WRITE        ;WRITE TO
004534  120016                  IENR                    ;THE VIA'S IER
004536  002447                  TMPE+1                  ;INTERRUPT ENABLE/DISABLE INFORMATION
004540  103431                  BCS     63$             ;EXIT ON ERROR

004542  004537  003616          JSR     R5,READ         ;READ THE CURRENT SETTING OF
004546  120013                  ACR                     ;THE VIA'S ACR
004550  002440                  TMPB
```

```
 2323  004552  103424                  BCS     63$             ;EXIT ON ERROR
 2324
 2325  004554  013701  002440          MOV     TMPB,R1         ;GET THAT VALUE
 2326  004560  042701  177477          BIC     #^C<BIT6+BIT7>,R1  ;CLEAR BITS 6 & 7
 2327  004564  150137  002441          BISB    R1,TMPB+1       ;ADD CURRENT BITS 0 --> 5 TO NEW BITS 6 & 7
 2328
 2329  004570  004537  004042          JSR     R5,WRITE        ;WRITE THE NEW REGISTER SETTING TO VIA'S ACR
 2330  004574  120013                  ACR
 2331  004576  002441                  TMPB+1
 2332  004600  103411                  BCS     63$             ;EXIT ON ERROR
 2333
 2334  004602  004537  004042          JSR     R5,WRITE        ;WRITE TO
 2335  004606  120006                  T1LL                    ;LOW ORDER LATCH REGISTER (T1L-L)
 2336  004610  002427                  TMP6+1                  ;THE VALUE PASSED
 2337  004612  103404                  BCS     63$             ;EXIT ON ERROR
 2338
 2339  004614  004537  004042          JSR     R5,WRITE        ;WRITE TO
 2340  004620  120007                  T1LH                    ;HIGH ORDER LATCH REGESTER (T1L-H)
 2341  004622  002431                  TMP7+1                  ;THE VALUE PASSED
 2342
 2343                          ; DON'T WAIT AROUND FOR ANYTHING TO HAPPEN -- JUST (JEST) RETURN!
 2344
 2345  004624  012601          63$:    MOV     (SP)+,R1        ;BUT FIRST RESTORE R1
 2346  004626  000205                  RTS     R5              ;THEN RETURN
```

```
                        .INITT2 -- INITIALIZE TIMER # 2

                        .SBTTL  .INITT2 -- INITIALIZE TIMER # 2

                        ;*****************************************************************************
                        ;* INITT2 - INITIALIZE TIMER # 2
                        ;*
                        ;*       CALLING SEQUENCE:
                        ;*
                        ;*            JSR     R5,INITT2
                        ;*            .WORD   <VALUE LOADED INTO 'T2L-L' & 'T2C-H'>
                        ;*            .BYTE   <BIT 5 WILL BE LOADED INTO 'ACR', BIT 4 WILL BE USED
                        ;*                    TO SET OR CLEAR BIT 5 ('T2') OF THE INTERRUPT ENABLE
                        ;*                    REGISTER ('IER')>
                        ;*            .BYTE   <UNUSED>
                        ;*
                        ;*
                        ;* SEQUENCE OF EVENTS HEREIN:
                        ;*
                        ;*     SET THE VIA'S INTERRUPT ENABLE REGISTER ('IER')
                        ;*
                        ;*     SET THE VIA'S 'ACR'
                        ;*
                        ;*     SET T2L-L (ADDR 08)
                        ;*
                        ;*     SET T2C-H (ADDR 09)
                        ;*
                        ;*     RETURN WITHOUT ANY ERROR CHECKING
                        ;*
                        ;*****************************************************************************

004630  010146          INITT2: MOV     R1,-(SP)        ;SAVE THE REGISTER WE WILL BE USING
004632  112537  002433          MOVB    (R5)+,TMP8+1    ;SETUP VALUES TO BE WRITTEN INTO COUNTER
004636  112537  002435          MOVB    (R5)+,TMP9+1
004642  111537  002441          MOVB    (R5),TMPB+1     ;GET & PROCESS BIT FOR ACR 5
004646  142737  177737  002441        BICB    #^CBIT5,TMPB+1
004654  012501                      MOV     (R5)+,R1        ;NOW, GET THE BIT TO BE USED IN SETTING OR
                                                            ;CLEARING BIT 5 OF ''IER''

                        ; THE PASSED BIT IS IN THE WRONG POSITION BUT, IT SHOULD CONTROL THE OPERATION.
                        ; WELL, WE KNOW WE ARE SETTING OR CLEARING BIT 5.  THUS, THE PASSED BIT WILL
                        ; BECOME THE CONTROLLING BIT 7 AND WE'LL ''OR'' IN THE BIT WE WISH TO BE
                        ; CONTROLLED (BIT 5).

004656  106301                      ASLB    R1              ;THE PASSED BIT IS NOW IN POSITION TO
004660  042701  177737              BIC     #^CBIT5,R1      ;CLEAR ALL UNWANTED BITS AND
004664  140177  175436              BICB    R1,@#SEL3       ;CLEAR THE INT. FLAG IN THE SELECT REGISTER
004670  106301                      ASLB    R1              ;NOW PUT THE BIT INTO THE CONTROL POSITION
004672  106301                      ASLB    R1
004674  052701  000040              BIS     #BIT5,R1        ;THEN SET BIT 5
004700  110137  002447              MOVB    R1,TMPE+1       ;THE CALL WILL NOW WRITE THE APPROPRIATE VALUE

004704  004537  004042              JSR     R5,WRITE        ;WRITE TO
004710  120016                      IENR                    ;THE VIA'S IER
004712  002447                      TMPE+1                  ;INTERRUPT ENABLE/DISABLE INFORMATION
004714  103431                      BCS     63$             ;EXIT ON ERROR

004716  004537  003616              JSR     R5,READ         ;READ THE CURRENT SETTING OF
```

```
                        .INITT2 -- INITIALIZE TIMER # 2

2403  004722  120013                ACR                     ;THE VIA'S ACR
2404  004724  002440                TMPB
2405  004726  103424                BCS     63$             ;EXIT ON ERROR
2406
2407  004730  113701  002440        MOVB    TMPB,R1         ;GET THAT VALUE
2408  004734  042701  000040        BIC     #BIT5,R1        ;CLEAR THE CURRENT SETTING OF BIT 5
2409  004740  150137  002441        BISB    R1,TMPB+1       ;SET REMAINING BITS IN THE VALUE TO BE WRITTEN
2410
2411  004744  004537  004042        JSR     R5,WRITE        ;WRITE TO
2412  004750  120013                ACR                     ;THE VIA'S ACR
2413  004752  002441                TMPB+1
2414  004754  103411                BCS     63$             ;EXIT ON ERROR
2415
2416  004756  004537  004042        JSR     R5,WRITE        ;WRITE TO
2417  004762  120010                T2LL                    ;LOW ORDER LATCH & COUNTER (T2L-L)
2418  004764  002433                TMP8+1                  ;THE PASSED VALUE
2419  004766  103404                BCS     63$             ;EXIT ON ERROR
2420
2421  004770  004537  004042        JSR     R5,WRITE        ;WRITE TO
2422  004774  120011                T2CH                    ;HIGH ORDER COUNTER (T2C-H) <ALSO STARTS CTR>
2423  004776  002435                TMP9+1                  ;THE PASSED VALUE
2424
2425                        ; DON'T WAIT AROUND FOR ANYTHING TO HAPPEN -- JUST (JEST) RETURN!
2426
2427  005000  012601        63$:    MOV     (SP)+,R1        ;BUT FIRST RESTORE R1
2428  005002  000205                RTS     R5              ;THEN RETURN
2429
```

```
                                .SBTTL  MOVSW -- MOVE A STRING OF WORDS
                                ;++*****************************************************************
                                ; MOVSW -- MOVE A STRING OF WORDS
                                ;
                                ;       CALLING SEQUENCE:
                                ;
                                ;       JSR     R5,MOVSW
                                ;       .WORD   <ADDRESS OF SOURCE STRING>
                                ;       .WORD   <ADDRESS OF DESTINATION STRING>
                                ;       .WORD   <# OF WORDS TO MOVE>
                                ;
                                ;--*****************************************************************

005004  010146                  MOVSW:  MOV     R1,-(SP)        ;SAVE THE REGISTERS WE'LL BE USING
005006  010246                          MOV     R2,-(SP)
005010  010346                          MOV     R3,-(SP)

005012  012501                          MOV     (R5)+,R1        ;INITIALIZE SOURCE POINTER
005014  012502                          MOV     (R5)+,R2        ;       DESTINATION POINTER
005016  012503                          MOV     (R5)+,R3        ;       COUNTER

005020  012122                  1$:     MOV     (R1)+,(R2)+     ;MOVE IN 1 WORD OF DATA
005022  077302                          SOB     R3,1$           ;IF MORE DATA, LOOP
                                                                ;ELSE, RESTORE REGISTERS AND RETURN

005024  012603                          MOV     (SP)+,R3        ;RESTORE REGISTERS
005026  012602                          MOV     (SP)+,R2
005030  012601                          MOV     (SP)+,R1

005032  000205                          RTS     R5              ;RETURN TO CALLING ROUTINE
```

```
                                .SBTTL  MOVSB -- MOVE A STRING OF BYTES
                                ;++*********************************************************************
                                ; MOVSB -- MOVE A STRING OF BYTES
                                ;
                                ;       CALLING SEQUENCE:
                                ;
                                ;       JSR     R5,MOVSB
                                ;       .WORD   <ADDRESS OF SOURCE STRING>
                                ;       .WORD   <ADDRESS OF DESTINATION STRING>
                                ;       .WORD   <# OF BYTES TO MOVE>
                                ;
                                ;--*********************************************************************

005034  010146                  MOVSB:  MOV     R1,-(SP)        ;SAVE THE REGISTERS WE'LL BE USING
005036  010246                          MOV     R2,-(SP)
005040  010346                          MOV     R3,-(SP)

005042  012501                          MOV     (R5)+,R1        ;INITIALIZE SOURCE POINTER
005044  012502                          MOV     (R5)+,R2        ;       DESTINATION POINTER
005046  012503                          MOV     (R5)+,R3        ;       COUNTER

005050  112122                  1$:     MOVB    (R1)+,(R2)+     ;MOVE IN 1 BYTE OF DATA
005052  077302                          SOB     R3,1$           ;IF MORE DATA, LOOP
                                                                ;ELSE, RESTORE REGISTERS AND RETURN

005054  012603                          MOV     (SP)+,R3        ;RESTORE REGISTERS
005056  012602                          MOV     (SP)+,R2
005060  012601                          MOV     (SP)+,R1

005062  000205                          RTS     R5              ;RETURN TO CALLING ROUTINE
```

```
                        .SBTTL  XORSW -- XOR TWO WORD TABLES
                        ;++**********************************************************************
                        ; XORSW -- DEVELOP THE EXCLUSIVE OR'S BETWEEN TWO STRINGS OF WORDS
                        ;
                        ;       CALLING SEQUENCE:
                        ;
                        ;       JSR     R5,XORSW
                        ;       .WORD   <ADDRESS OF FIRST SOURCE STRING>
                        ;       .WORD   <ADDRESS OF SECOND SOURCE STRING>
                        ;       .WORD   <ADDRESS OF 'XOR'' STRING>
                        ;       .WORD   <# OF BYTES TO MOVE>
                        ;
                        ;--**********************************************************************

005064  010146          XORSW:  MOV     R1,-(SP)        ;SAVE THE REGISTERS WE'LL BE USING
005066  010246                  MOV     R2,-(SP)
005070  010346                  MOV     R3,-(SP)
005072  010446                  MOV     R4,-(SP)

005074  012501                  MOV     (R5)+,R1        ;INITIALIZE SOURCE POINTER # 1
005076  012502                  MOV     (R5)+,R2        ;       SOURCE POINTER # 2
005100  012503                  MOV     (R5)+,R3        ;       'XOR'' STRING POINTER
005102  012504                  MOV     (R5)+,R4        ;       COUNTER

005104  010546                  MOV     R5,-(SP)        ;NOW WE CAN SAVE R5 FOR THE RETURN

005106  012113          1$:     MOV     (R1)+,(R3)      ;MOVE ONE WORD TO THE DESTINATION FIELD
005110  012205                  MOV     (R2)+,R5        ;GET SECOND WORD & SETUP FOR XOR INSTRUCTION
005112  074523                  XOR     R5,(R3)+        ;PERFORM ACTUAL XOR
005114  077404                  SOB     R4,1$           ;IF MORE DATA, LOOP
                                                        ;ELSE, RESTORE REGISTERS AND RETURN

005116  012605                  MOV     (SP)+,R5        ;RESTORE REGISTERS
005120  012604                  MOV     (SP)+,R4
005122  012603                  MOV     (SP)+,R3
005124  012602                  MOV     (SP)+,R2
005126  012601                  MOV     (SP)+,R1

005130  000205                  RTS     R5              ;RETURN TO CALLING ROUTINE


                        .SBTTL  STALL -- DELAY FOR 10.5 MICRO-SEC'S (ON LSI-11)
                        ;++**********************************************************************
                        ; STALL -- THIS SUBROUTINE STALLS FOR ABOUT 10.5 MICRO-SECONDS
                        ;--**********************************************************************

005132  000207          STALL:  RTS     PC
```

```
                                .SBTTL  NPREAD -- 'READ'' CONTENTS OF ALL NPR REGISTERS

                                ;+*************************************************************************
                                ;   NPREAD -- READ ALL NPR REGISTERS INTO LOC'S STARTING @ 'WO''
                                ;-*************************************************************************

005134  004537  003616          NPREAD: JSR     R5,READ
005140  123004                          NPRCTL
005142  002740                          BT2
005144  103447                          BCS     10$             ;ON ERROR, EXIT
005146  004537  003616                  JSR     R5,READ
005152  123001                          NPRDRH
005154  002742                          BT2+2
005156  103442                          BCS     10$             ;ON ERROR, EXIT
005160  004537  003616                  JSR     R5,READ
005164  123000                          NPRDRL
005166  002744                          BT2+4
005170  103435                          BCS     10$             ;ON ERROR, EXIT
005172  004537  003616                  JSR     R5,READ
005176  000072                          NPRAOX
005200  002746                          BT2+6
005202  103430                          BCS     10$             ;ON ERROR, EXIT
005204  004537  003616                  JSR     R5,READ
005210  000071                          NPRAOH
005212  002750                          BT2+8.
005214  103423                          BCS     10$             ;ON ERROR, EXIT
005216  004537  003616                  JSR     R5,READ
005222  000070                          NPRAOL
005224  002752                          BT2+10.
005226  103416                          BCS     10$             ;ON ERROR, EXIT
005230  004537  003616                  JSR     R5,READ
005234  000076                          NPRAIX
005236  002754                          BT2+12.
005240  103411                          BCS     10$             ;ON ERROR, EXIT
005242  004537  003616                  JSR     R5,READ
005246  000075                          NPRAIH
005250  002756                          BT2+14.
005252  103404                          BCS     10$             ;ON ERROR, EXIT
005254  004537  003616                  JSR     R5,READ
005260  000074                          NPRAIL
005262  002760                          BT2+16.

005264  000207                  10$:    RTS     PC              ;RETURN
```

```
                                        .SBTTL  NPRMOV -- WORD/BYTE BLOCK MOVE USING THE NPR HARDWARE
                                        ;+*************************************************************************
                                        ; NPRMOV -- MOVE A BLOCK OF DATA THROUGH THE DMV'S NPR LOGIC
                                        ;--************************************************************************

                                        ; - - - - - - - - - I N I T I A L I Z A T I O N - - - - - - - - - - - - - - -

005266  010146                          NPRMOV: MOV     R1,-(SP)        ;SAVE THE REGISTERS WE USE
005270  010246                                  MOV     R2,-(SP)
005272  010346                                  MOV     R3,-(SP)

005274  012501                          1$:     MOV     (R5)+,R1        ;POINT TO TEST PATTERN
005276  012502                                  MOV     (R5)+,R2        ;POINT TO THE LSI-11 BUFFER AREA
005300  012503                                  MOV     (R5)+,R3        ;GET COUNT OF # OF WORDS IN TEST PATTERN
005302  012537  005612                          MOV     (R5)+,42$       ;LOAD UP THE COMMAND TO BE USED

005306  005037  002276                          CLR     ERRFLG          ;INITIALIZE ERROR FLAG

005312  032737  000040  005612                  BIT     #NPRIO,42$      ;DETERMINE DIRECTION:
005320  001403                                  BEQ     3$              ;LSI ===> DMV  --  USE 'NPRAIL''
005322  012746  000070                          MOV     #NPRAOL,-(SP)   ;DMV ===> LSI  --  USE 'NPRAOL''
005326  000402                                  BR      4$
005330  012746  000074                  3$:     MOV     #NPRAIL,-(SP)
005334  011637  005400                  4$:     MOV     (SP),10$        ;SETUP LOW BYTE ADDRESS POINTER
005340  005216                                  INC     (SP)            ;INCREMENT TO NEXT DMV ADDRESS
005342  011637  005422                          MOV     (SP),14$        ;SETUP HIGH BYTE ADDRESS POINTER
005346  005216                                  INC     (SP)            ;INCREMENT TO NEXT DMV ADDRESS
005350  012637  005434                          MOV     (SP)+,17$       ;SETUP EXT. BYTE ADDRESS POINTER & RESTORE SP

                                        ; - - - - - - - - - RE-INITIALIZE LOOP'S VARIABLES - - - - - - - - - - - - - - -

005354                                  6$:

                                        ; - - - - - - - - - SETUP APPROPRIATE ADDRESS - - - - - - - - - - - - - - - - -

005354  032737  000040  005612                  BIT     #NPRIO,42$      ;DIRECTION OF TRANSFER?
005362  001002                                  BNE     8$              ;DMV ===> LSI -- ADDR. SHOULD POINT TO BUFFER
005364  010246                                  MOV     R2,-(SP)        ;LSI ===> DMV -- SAVE BUFFER POINTER
005366  010102                                  MOV     R1,R2           ;       & POINT TO TEST DATA TO BE READ
005370  010237  005402                  8$:     MOV     R2,11$          ;SETUP LOW BYTE OF ADDRESS
005374  004537  004054                          JSR     R5,WRITEI       ;LOAD UP DESTINATION ADDRESS
005400  000070                          10$:    NPRAOL                  ;  NPR ADDRESS LOW BYTE
005402  000000                          11$:    0                       ;*** MODIFIED FROM ABOVE ***
005404  103510                                  BCS     45$             ;ON ERROR, EXIT

005406  000302                                  SWAB    R2              ;SETUP HIGH BYTE OF DESTINATION ADDRESS
005410  010237  005424                          MOV     R2,15$
005414  000302                                  SWAB    R2              ;  (RESTORE ADDRESS)
005416  004537  004054                          JSR     R5,WRITEI       ;  SEND IT TO THE DMV
005422  000071                          14$:    NPRAOH                  ;  NPR ADDRESS HIGH BYTE
005424  000000                          15$:    0                       ;*** MODIFIED FROM ABOVE ***
005426  103477                                  BCS     45$             ;ON ERROR, EXIT

005430  004537  004054                          JSR     R5,WRITEI       ;MAKE SURE 'EXTENDED'' BITS ARE CLEARED
005434  000072                          17$:    NPRAOX                  ;  NPR ADDRESS EXTENDED BYTE
005436  000000                                  0                       ;  ACTUAL VALUE LOADED INTO THIS BYTE (WE HOPE!)
```

```
2639  005440  103472                          BCS     45$             ;ON ERROR, EXIT
2640
2641                                          ;---------SETUP  DATA----------------------
2642
2643  005442  112137  005556                  MOVB    (R1)+,30$       ;SETUP ONE BYTE OF DATA TO BE PASSED TO THE DMV
2644  005446  032737  000040  005612          BIT     #NPRIO,42$      ;DIRECTION OF TRANSFER?
2645  005454  001010                          BNE     19$             ;DMV ===> LSI -- 'DATA-OUT'
2646                                                                  ;LSI ===> DMV -- 'DATA-IN'
2647
2648                                          ; ON AN 'LSI ===> DMV', R2 WAS STACKED & IT SHOULD NOW BE RESTORED:
2649
2650  005456  012602                          MOV     (SP)+,R2        ;RESTORE R2
2651
2652                                          ; WHEN WE FALL THROUGH TO HERE, THE DIRECTION IS LSI ===> DMV -- ('DATA-IN').
2653                                          ; THIS MUST ALWAYS BE A WORD TRANSFER SO THAT BOTH HIGH & LOW BYTES MUST BE
2654                                          ; LOADED WITH THE BACKGROUND PATTERN (THE ONE'S COMPLEMENT OF THE TEST PATTERN)
2655
2656  005460  005137  005556                  COM     30$             ;ONE'S COMPLEMENT THE LOW BYTE
2657  005464  112137  005600                  MOVB    (R1)+,35$       ;SETUP THE HIGH BYTE AND
2658  005470  005137  005600                  COM     35$             ;  COMPLEMENT IT ALSO
2659  005474  000425                          BR      28$             ;NO GO AROUND THE 'DATA-OUT' SETUP AND PASS
2660                                                                  ;THE BACKGROUND PATTERN TO THE DMV'S NPR DATA REG'S
2661
2662                                          ; IF WE GET TO HERE, THE DIRECTION IS DMV ===> LSI -- ('DATA-OUT').
2663                                          ; IF THIS IS A WORD XFER, BOTH HIGH & LOW BYTES MUST BE SETUP; IF BYTE, THEN
2664                                          ; WE MUST DETERMINE WHICH ONE (HIGH OR LOW) IS TO BE DONE AND ONLY LOAD THAT
2665                                          ; BYTE.  CONTRARY TO NORMAL PDP-11 OPERATION FOR A BYTE OPERATION FROM A
2666                                          ; REGISTER, THE ODD ADDRESSED BYTE WILL ALWAYS BE WRITTEN FROM THE HIGH DATA
2667                                          ; BYTE REGISTER AND THE EVEN ADDRESSED BYTE WILL ALWAYS BE WRITTEN FROM THE
2668                                          ; LOW DATA BYTE REGISTER.
2669
2670
2671  005476  113712  005556          19$:    MOVB    30$,(R2)        ;SETUP THE BACKGROUND PATTERN IN LSI'S MEM.
2672  005502  105112                          COMB    (R2)            ;  (THIS MAKES IT A 'BACKGROUND' PATTERN)
2673
2674  005504  032737  000010  005612          BIT     #NPRBYT,42$     ;IS THIS A BYTE OR WORD TRANSFER?
2675  005512  001007                          BNE     21$             ;BYTE, GO DETERMINE WHICH ONE
2676  005514  111137  005600                  MOVB    (R1),35$        ;WORD, SETUP THE HIGH BYTE OF NPR DATA
2677  005520  112162  000001                  MOVB    (R1)+,1(R2)     ;ALSO, SETUP THE HIGH BYTE'S BACKGROUND PATTERN
2678  005524  105162  000001                  COMB    1(R2)           ;  (THIS MAKES IT A 'BACKGROUND' PATTERN)
2679  005530  000407                          BR      28$             ;GO LOAD UP THE NPR DATA REG'S NOW
2680
2681  005532  032702  000001          21$:    BIT     #1,R2           ;IS LSI ADDRESS ODD OR EVEN (HIGH OR LOW BYTE)?
2682  005536  001404                          BEQ     28$             ;EVEN (LOW BYTE),  EVERYTHING'S OK -- GO LOAD IT
2683  005540  013737  005556  005600          MOV     30$,35$         ;ODD (HIGH BYTE).  WE SETUP THE WRONG ONE --
2684                                                                  ;       PUT THE DATA BYTE IN THE RIGHT PLACE
2685  005546  000411                          BR      33$             ;  AND GO LOAD IT INTO THE DMV'S NPR HIGH DATA BYTE REG.
2686
2687
2688  005550  004537  004054          28$:    JSR     R5,WRITEI       ;LOAD UP THE
2689  005554  123000                          NPRDRL                  ;  NPR DATA REG. LOW BYTE
2690  005556  000000                  30$:    0                       ;  DATA BYTE -- LOW
2691  005560  103422                          BCS     45$             ;ON ERROR, EXIT
2692
2693  005562  032737  000010  005612          BIT     #NPRBYT,42$     ;IS THIS A BYTE OR WORD TRANSFER?
2694  005570  001005                          BNE     40$             ;BYTE, THEN LEAVE THE NEXT BYTE OF DATA FOR LATER
```

```
2695
2696  005572  004537  004054          33$:    JSR     R5,WRITEI       ;WORD, LOAD UP THE
2697  005576  123001                          NPRDRH                  ;  NPR DATA REG. HIGH BYTE WITH
2698  005600  000000                  35$:    0                       ;  WHAT WE HOPE IS THE APPROPRIATE DATA!
2699  005602  103411                          BCS     45$             ;ON ERROR, EXIT
2700
2701                                  ; - - - - - - - - - INITIATE ONE TRANSFER - - - - - - - - - - - - - - - - - - - -
2702
2703
2704  005604  004537  004054          40$:    JSR     R5,WRITEI       ;MAKE THE 'NPR'' LOGIC DO IT'S THING
2705  005610  123004                          NPRCTL                  ;  BY LOADING THE CONTROL REGISTER WITH
2706  005612  000044                  42$:    NPRDL                   ;  THE PASSED COMMAND
2707  005614  103404                          BCS     45$             ;ON ERROR, EXIT
2708
2709                                  ; - - - - - - - - - MAKE SURE THE XFER RAN OK - - - - - - - - - - - - - - - - - -
2710
2711  005616  004537  003730                  JSR     R5,READI        ;GET THE CONTROL REG. FOR IT'S STATUS
2712  005622  123004                          NPRCTL
2713  005624  000000                  44$:    0
2714  005626  103513                  45$:    BCS     63$             ;ON ERROR, EXIT
2715
2716                                  ;  BY NOW, THE TRANSFER SHOULD BE COMPLETE SO BIT 6 SHOULD BE = 0.  THEREFOR
2717                                  ;  THE ONLY SIGNIFICIANT BIT IS BIT 7 WHICH SHOULD = 0 IF EVERYTHING WENT OK.
2718
2719  005630  132737  000200  005624          BITB    #NPRABT,44$     ;DID THE TRANSFER ABORT?
2720  005636  001436                          BEQ     50$             ;NO,  PROCEED WITH TESTING
2721  005640  005237  002412                  INC     TMP0            ;YES, COUNT THE TIME-OUT
2722  005644  023727  002412  000001          CMP     TMP0,#1         ;IS THIS THE FIRST OCCURANCE OF A TIMEOUT?
2723  005652  001030                          BNE     50$             ;NO,  THEN DON'T STACK THE ERROR MESSAGE
2724                                                                  ;YES, QUEUE UP A FATAL ERROR MESSAGE
2725                                                                  ;PASS TO ERROR HANDLER:
2726  005654  013737  005612  002414          MOV     42$,TMP1        ;       CONTROL REGISTER AS WE SET IT
2727  005662  013737  005624  002416          MOV     44$,TMP2        ;       CONTROL REGISTER AS READ
2728  005670  113737  005424  002421          MOVB    15$,TMP3+1      ;       LSI'S MEMORY ADDRESS
2729  005676  113737  005402  002420          MOVB    11$,TMP3
2730  005704                                  GTDF    EM26E,ERR11     ;IN ORDER TO REPORT THE TIME-OUT ERROR,
2731                                                                  ;       QUEUE 'DEVICE FATAL'' ERROR # 6
2732  005704  012737  000001  002202                                                  MOV     #T.EDF,ERRTYP
2733  005712  012737  000006  002204                                                  MOV     #6,ERRNBR
2734  005720  012737  016316  002206                                                  MOV     #EM26E,ERRMSG
2735  005726  012737  007314  002210                                                  MOV     #ERR11,ERRBLK
2736          000006          NPRTOE = $E                             ;THIS GETS THE ERROR # FOR TESTING LATER
2737
2738                                  ; - - - - - - - - - IF 'LSI ===> DMV'', RETRIEVE DATA - - - - - - - - - - - - - -
2739
2740  005734  032737  000040  005612  50$:    BIT     #NPRIO,42$      ;DIRECTION?
2741  005742  001025                          BNE     54$             ;DMV ===> LSI -- DATA ALREADY IN LSI-11
2742                                                                  ;LSI ===> DMV -- DATA IN REG'S,  RETRIEVE IT
2743
2744  005744  010237  005756                  MOV     R2,51$          ;POINT TO LSI'S INPUT BUFFER
2745  005750  004537  003616                  JSR     R5,READ         ;GET ONE BYTE
2746  005754  123000                          NPRDRL                  ;    FROM THE LOW ORDER HALF OF THE DATA REG.
2747  005756  000000                  51$:    0                       ;*** MODIFIED FROM ABOVE *** DESTINATION ADDR.
2748  005760  103436                          BCS     63$             ;ON ERROR, EXIT
2749  005762  005202                          INC     R2              ;POINT TO NEXT BYTE OF THE BUFFER
2750
```

```
2751  005764  032737  000010  005612          BIT     #NPRBYT,42$     ;WAS A BYTE OF WORD 'NPR' PERFORMED?
2752  005772  001022                          BNE     56$             ;BYTE -- EVERYTHING'S 'KOOL'!
2753                                                                  ;WORD -- MOVE HIGH BYTE INTO BUFFER
2754  005774  010237  006006                  MOV     R2,52$          ;POINT TO LSI'S I/P BUFFER
2755  006000  004537  003616                  JSR     R5,READ         ;GET ONE BYTE
2756  006004  123001                          NPRDRH                  ;    FROM THE HIGH ORDER HALF OF THE DATA REG.
2757  006006  000000                  52$:    0                       ;*** MODIFIED FROM ABOVE *** DESTINATION ADDR.
2758  006010  103422                          BCS     63$             ;ON ERROR, EXIT
2759  006012  005202                          INC     R2              ;POINT TO NEXT BYTE OF THE BUFFER
2760  006014  000411                          BR      56$             ;DONE RETRIEVING DATA -- CHECK FOR MORE
2761
2762                                  ;---------- DMV ===> LSI -- JUST ADVANCE LSI-11 ADDRESS ---------
2763
2764  006016  005202                  54$:    INC     R2              ;BUMP THE LSI-11 ADDRESS
2765  006020  032737  000010  005612          BIT     #NPRBYT,42$     ;IS THIS A BYTE OR WORD TRANSFER?
2766  006026  001004                          BNE     56$             ;BYTE, THEN ADDRESS IS OK AS IS
2767  006030  005202                          INC     R2              ;WORD, BUMP ADDR. -- WE ALREADY DID THE HIGH BYTE
2768  006032  000402                          BR      56$
2769
2770                                  ;---------TEST FOR MORE--------------------
2771
2772  006034  000137  005354          55$:    JMP     6$              ;THIS LITTLE BIT IF CUTE LOGIC IS NECESSARY
2773                                                                  ;BECAUSE '6$' IS TOO FAR AWAY FOR A BRANCH!
2774  006040  077303                  56$:    SOB     R3,55$          ;DO IT AGAIN IF THERE IS MORE DATA
2775  006042  005737  002276                  TST     ERRFLG          ;WAS AN ERROR DETECTED?
2776  006046  001402                          BEQ     61$             ;NO,  TAKE NORMAL EXIT
2777
2778                                  ;---------CLEAN UP & EXIT----------------
2779
2780  006050  000261                  60$:    SEC                     ;INDICATE ERROR CONDITION
2781  006052  000401                          BR      63$
2782
2783  006054  000241                  61$:    CLC                     ;INDICATE NO ERROR
2784
2785  006056  012603                  63$:    MOV     (SP)+,R3        ;RESTORE THE REGISTERS AGAIN
2786  006060  012602                          MOV     (SP)+,R2
2787  006062  012601                          MOV     (SP)+,R1
2788
2789  006064  000205                          RTS     R5              ;RETURN
```

```
                                 .SBTTL  INTERRUPT HANDLER -- MPIHAN

                                 ;++*****************************************************************
                                 ; MPIHAN -- COUNT INTERRUPTS -- USUALLY INTERRUPT 'A'
                                 ;
                                 ;       THIS ROUTINE WILL INCREMENT THE LOW BYTE OF ''INTFLG'' EACH TIME IT IS
                                 ;       ENTERED.  IF ''IHILNK'' IS NON-ZERO, VECTOR TO THE ADDRESS THEREIN USING
                                 ;       A ''JSR  PC''
                                 ;--*****************************************************************

 006066                                  BGNSRV  MPIHAN
 006066                                                                          MPIHAN::
 006066  010046                          MOV     R0,-(SP)        ;SAVE R0
 006070  105737  002274                  TSTB    INTWCH          ;HAVE WE BEEN TOLD TO WATCH FOR TYPE 'A' INT'S?
 006074  001007                          BNE     5$              ;YES, DO NORMAL INTERRUPT PROCESSING
 006076  004737  004232                  JSR     PC,GETBSR       ;NO,  DUMP REGISTERS AND
 006102                                  GEDF    EM34,ERR3       ;       REPORT 'UNEXPECTED INTERRUPT'
                                                                 ;        'DEVICE FATAL' ERROR # 7
 006102  104455                                                                          TRAP    C$ERDF
 006104  000007                                                                          .WORD   7
 006106  016526                                                                          .WORD   EM34
 006110  006220                                                                          .WORD   ERR3
 006112  000407                          BR      10$             ;GO TO EXIT

 006114  105237  002272          5$:     INCB    INTFLG          ;INCREMENT LOW BYTE OF INTERRUPT COUNTER
 006120  005737  006136                  TST     IHILNK          ;ARE WE EXPECTED TO EXECUTE ANOTHER ROUTINE?
 006124  001402                          BEQ     10$             ;NO, GET OUT
 006126  004777  000004                  JSR     PC,@IHILNK      ;YES, GO TO IT -- I HOPE IT'S VALID!
 006132  012600                  10$:    MOV     (SP)+,R0        ;RESTORE R0
 006134                                  ENDSRV                  ;RETURN TO INTERRUPTED PROCESS
 006134                                                                          L10002:
 006134  000002                                                                          RTI

 006136  000000                  IHILNK: .WORD   0               ;POINTER TO AUXILIARY INT. HANDLING ROUTINE
```

```
                              .SBTTL  INTERRUPT HANDLER -- MPOHAN
                              ;+*************************************************************************
                              ; MPOHAN -- SIMPLY COUNT INTERRUPTS -- USUALLY INTERRUPT 'B''
                              ;
                              ;       THIS ROUTINE WILL INCREMENT THE HIGH BYTE OF ''INTFLG'' EACH TIME IT IS
                              ;       ENTERED.  IF ''IHOLNK'' IS NON-ZERO, VECTOR TO THE ADDRESS THEREIN USING
                              ;       A ''JSR  PC''
                              ;
                              ;
                              ;--************************************************************************

006140                                BGNSRV  MPOHAN
006140                                                                        MPOHAN::
006140  010046                        MOV     R0,-(SP)          ;SAVE R0
006142  105737  002275                TSTB    INTWCH+1          ;HAVE WE BEEN TOLD TO WATCH FOR TYPE 'B'' INT'S?
006146  001007                        BNE     5$                ;YES, DO NORMAL INTERRUPT PROCESSING
006150  004737  004232                JSR     PC,GETBSR         ;NO,  DUMP REGISTERS AND
006154                                GEDF    EM348,ERR3        ;        REPORT 'UNEXPECTED INTERRUPT''
                                                                ;         'DEVICE FATAL'' ERROR # 8
006154  104455                                                                          TRAP    C$ERDF
006156  000010                                                                          .WORD   8
006160  016540                                                                          .WORD   EM348
006162  006220                                                                          .WORD   ERR3
006164  000407                        BR      10$               ;GO TO EXIT

006166  105237  002273        5$:     INCB    INTFLG+1          ;INCREMENT HIGH BYTE OF INTERRUPT COUNTER
006172  005737  006210                TST     IHOLNK            ;ARE WE EXPECTED TO EXECUTE ANOTHER ROUTINE?
006176  001402                        BEQ     10$               ;NO, GET OUT
006200  004777  000004                JSR     PC,@IHOLNK        ;YES, GO TO IT -- I HOPE IT'S VALID!
006204  012600                10$:    MOV     (SP)+,R0          ;RESTORE R0
006206                                ENDSRV                    ;RETURN TO INTERRUPTED PROCESS
006206                                                                        L10003:
006206  000002                                                                          RTI

006210  000000                IHOLNK: .WORD   0                 ;POINTER TO AUXILIARY INT. HANDLING ROUTINE
```

```
                                .SBTTL  GLOBAL ERROR REPORT REPORT SECTION

                                ;////////////////////////////////////////////////////////////////////////
                                ;/
                                ;/      THE GLOBAL ERROR REPORT SECTION CONTAINS ERROR MESSAGES
                                ;/      THAT ARE USED IN MORE THAN ONE TEST.
                                ;/
                                ;////////////////////////////////////////////////////////////////////////
                                        .EVEN
                                ;-----------------------------------------------------------------------
                                .SBTTL  ERROR HANDLER -- ERR1 -- 'NO NOTHING'' HANDLER
                                ;-----------------------------------------------------------------------
006212                                  BGNMSG  ERR1
006212                                                                          ERR1::
006212  004737  013076                      JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
006216                                  ENDMSG
006216                                                                  L10004:
006216  104423                                                                  TRAP    C$MSG
                                ;-----------------------------------------------------------------------
                                .SBTTL  ERROR HANDLER -- ERR3 -- DUMP THE BYTE SELECT REGISTERS
                                ;-----------------------------------------------------------------------
006220                                  BGNMSG  ERR3
006220                                                                          ERR3::
006220  004737  012206                      JSR     PC,ERR4$
006224  004737  013076                      JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
006230                                  ENDMSG
006230                                                                  L10005:
006230  104423                                                                  TRAP    C$MSG
                                ;-----------------------------------------------------------------------
                                .SBTTL  ERROR HANDLER -- ERR4 -- M-LOOP TIMEOUT ERROR HANDLING
                                ;-----------------------------------------------------------------------
006232                                  BGNMSG  ERR4
006232                                                                          ERR4::
006232  010146                          MOV     R1,-(SP)                ;SAVE THE WORKING REGISTER
006234  113701  002254                  MOVB    GDATA,R1                ;SAVE THIS FOR LATER
006240  122701  000017                  CMPB    #17,R1                  ;WAS THIS AN M-LOOP REQUEST?
006244  103013                          BHIS    5$                      ;YES, THEN REPORT THE FUNCTION CODE
006246                                  PRINTX  #FMT5,<B,R1>            ;NO,  THEN IT MUST BE A BSEL1 SETTING
006246  005046                                                                  CLR     -(SP)
006250  150116                                                                  BISB    R1,(SP)
006252  012746  013346                                                          MOV     #FMT5,-(SP)
006256  012746  000002                                                          MOV     #2,-(SP)
006262  010600                                                                  MOV     SP,R0
006264  104415                                                                  TRAP    C$PNTX
006266  062706  000006                                                          ADD     #6,SP
006272  000425                          BR      20$

006274  001001                  5$:     BNE     6$                      ;IF IT WAS A 17, THIS IS A 'NOP'' AND
006276  005001                          CLR     R1                      ;  THE TEXT POINTER MUST SO REFLECT.
006300  022701  000007          6$:     CMP     #7,R1                   ;IS FUNCTION CODE > 7?
006304  002002                          BGE     7$                      ;NO,  THAN WE CAN HANDLE IT
006306  012701  000006                  MOV     #6,R1                   ;YES, THAN IT'S UNDEFINED -- SAY SO
006312  006301                  7$:     ASL     R1                      ;CONVERT TO A WORD OFFSET
006314                                  PRINTX  #FMT5A,<B,GDATA>,TXTMLT(R1)     ;REPORT THE FAILING FUNCTION
006314  016146  021746                                                          MOV     TXTMLT(R1),-(SP)
006320  005046                                                                  CLR     -(SP)
006322  153716  002254                                                          BISB    GDATA,(SP)
006326  012746  013411                                                          MOV     #FMT5A,-(SP)
```

```
2914  006332  012746  000003                                          MOV     #3,-(SP)
2915  006336  010600                                                  MOV     SP,R0
2916  006340  104415                                                  TRAP    C$PNTX
2917  006342  062706  000010                                          ADD     #10,SP
2918
2919  006346  012601          20$:    MOV     (SP)+,R1                ;RESTORE THE WORKING REGISTER
2920  006350                          PRINTX  #FMT4,#TXT6,#TXT4
2921  006350  012746  015212                                          MOV     #TXT4,-(SP)
2922  006354  012746  015313                                          MOV     #TXT6,-(SP)
2923  006360  012746  013213                                          MOV     #FMT4,-(SP)
2924  006364  012746  000003                                          MOV     #3,-(SP)
2925  006370  010600                                                  MOV     SP,R0
2926  006372  104415                                                  TRAP    C$PNTX
2927  006374  062706  000010                                          ADD     #10,SP
2928  006400                          PRINTX  #FMT11,WSR0,WSR2,WSR4,WSR6 ;DUMP THE SELECT REGISTERS
2929  006400  013746  002220                                          MOV     WSR6,-(SP)
2930  006404  013746  002216                                          MOV     WSR4,-(SP)
2931  006410  013746  002214                                          MOV     WSR2,-(SP)
2932  006414  013746  002212                                          MOV     WSR0,-(SP)
2933  006420  012746  013770                                          MOV     #FMT11,-(SP)
2934  006424  012746  000005                                          MOV     #5,-(SP)
2935  006430  010600                                                  MOV     SP,R0
2936  006432  104415                                                  TRAP    C$PNTX
2937  006434  062706  000014                                          ADD     #14,SP
2938  006440                          PRINTX  #FMT4B,#TXT4A
2939  006440  012746  015252                                          MOV     #TXT4A,-(SP)
2940  006444  012746  013306                                          MOV     #FMT4B,-(SP)
2941  006450  012746  000002                                          MOV     #2,-(SP)
2942  006454  010600                                                  MOV     SP,R0
2943  006456  104415                                                  TRAP    C$PNTX
2944  006460  062706  000006                                          ADD     #6,SP
2945  006464                          PRINTX  #FMT11,WSR10,WSR12,WSR14,WSR16
2946  006464  013746  002230                                          MOV     WSR16,-(SP)
2947  006470  013746  002226                                          MOV     WSR14,-(SP)
2948  006474  013746  002224                                          MOV     WSR12,-(SP)
2949  006500  013746  002222                                          MOV     WSR10,-(SP)
2950  006504  012746  013770                                          MOV     #FMT11,-(SP)
2951  006510  012746  000005                                          MOV     #5,-(SP)
2952  006514  010600                                                  MOV     SP,R0
2953  006516  104415                                                  TRAP    C$PNTX
2954  006520  062706  000014                                          ADD     #14,SP
2955  006524  004737  013076          JSR     PC,NULERR               ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
2956  006530                          ENDMSG
2957  006530                                                  L10006:
2958  006530  104423                                                  TRAP    C$MSG
2959
2960                  ;-------------------------------------------------------------------------------
2961  .SBTTL  ERROR HANDLER -- ERR8 -- NPR REGISTER ERRORS
2962  006532          ;-------------------------------------------------------------------------------
2963  006532                  BGNMSG  ERR8
2964  006532  113701  002300                                  ERR8::
2965  006536          MOVB    REGNUM,R1       ;THIS WAS CALCULATED TO BE A WORD OFFSET
2966  006536  016146  021770  PRINTB  #FMT07,#TXTNP,TXTNPT(R1)
2967  006542  012746  015745                                          MOV     TXTNPT(R1),-(SP)
2968  006546  012746  013476                                          MOV     #TXTNP,-(SP)
2969  006552  012746  000003                                          MOV     #FMT07,-(SP)
                                                                      MOV     #3,-(SP)
```

```
2970  006556  010600                                    MOV     SP,R0
2971  006560  104414                                    TRAP    C$PNTB
2972  006562  062706  000010                            ADD     #10,SP
2973  006566
2974  006566  012746  013542          PRINTX  #FMT06A   MOV     #FMT06A,-(SP)
2975  006572  012746  000001                            MOV     #1,-(SP)
2976  006576  010600                                    MOV     SP,R0
2977  006600  104415                                    TRAP    C$PNTX
2978  006602  062706  000004                            ADD     #4,SP
2979
2980                              ;       PRINT FIRST SET OF REGISTERS: CONTROL & DATA
2981
2982  006606          PRINTX  #FMT06,#TXT11A
2983  006606  012746  015437                            MOV     #TXT11A,-(SP)
2984  006612  012746  013530                            MOV     #FMT06,-(SP)
2985  006616  012746  000002                            MOV     #2,-(SP)
2986  006622  010600                                    MOV     SP,R0
2987  006624  104415                                    TRAP    C$PNTX
2988  006626  062706  000006                            ADD     #6,SP
2989  006632  010146          MOV     R1,-(SP)          ;PRESERVE R1
2990  006634  013701  002254  MOV     GDATA,R1          ;POINTER TO EXPECTED DATA
2991  006640          PRINTX  #FMT16,#TXT8A,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>
2992  006640  005046                                    CLR     -(SP)
2993  006642  152116                                    BISB    (R1)+,(SP)
2994  006644  005046                                    CLR     -(SP)
2995  006646  152116                                    BISB    (R1)+,(SP)
2996  006650  005046                                    CLR     -(SP)
2997  006652  152116                                    BISB    (R1)+,(SP)
2998  006654  012746  015336                            MOV     #TXT8A,-(SP)
2999  006660  012746  014007                            MOV     #FMT16,-(SP)
3000  006664  012746  000005                            MOV     #5,-(SP)
3001  006670  010600                                    MOV     SP,R0
3002  006672  104415                                    TRAP    C$PNTX
3003  006674  062706  000014                            ADD     #14,SP
3004  006700  013701  002256  MOV     BDATA,R1          ;POINTER TO ACTUAL DATA
3005  006704          PRINTX  #FMT16,#TXT8B,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>
3006  006704  005046                                    CLR     -(SP)
3007  006706  152116                                    BISB    (R1)+,(SP)
3008  006710  005046                                    CLR     -(SP)
3009  006712  152116                                    BISB    (R1)+,(SP)
3010  006714  005046                                    CLR     -(SP)
3011  006716  152116                                    BISB    (R1)+,(SP)
3012  006720  012746  015353                            MOV     #TXT8B,-(SP)
3013  006724  012746  014007                            MOV     #FMT16,-(SP)
3014  006730  012746  000005                            MOV     #5,-(SP)
3015  006734  010600                                    MOV     SP,R0
3016  006736  104415                                    TRAP    C$PNTX
3017  006740  062706  000014                            ADD     #14,SP
3018  006744  004537  005064  JSR     R5,XORSW          ;GENERATE XOR'S
3019  006750  002254          .WORD   GDATA             ;BETWEEN GOOD DATA
3020  006752  002256          .WORD   BDATA             ;AND BAD DATA
3021  006754  003054          .WORD   W0                ;AND PUT THEM HERE
3022  006756  000011          .WORD   9.                ;ONLY DO THIS MANY
3023  006760          PRINTX  #FMT16,#TXT8C,<B,W0>,<B,W1>,<B,W2>
3024  006760  005046                                    CLR     -(SP)
3025  006762  153716  003060                            BISB    W2,(SP)
```

```
3026  006766  005046                                                    CLR     -(SP)
3027  006770  153716  003056                                            BISB    W1,(SP)
3028  006774  005046                                                    CLR     -(SP)
3029  006776  153716  003054                                            BISB    W0,(SP)
3030  007002  012746  015370                                            MOV     #TXT8C,-(SP)
3031  007006  012746  014007                                            MOV     #FMT16,-(SP)
3032  007012  012746  000005                                            MOV     #5,-(SP)
3033  007016  010600                                                    MOV     SP,R0
3034  007020  104415                                                    TRAP    C$PNTX
3035  007022  062706  000014                                            ADD     #14,SP
3036
3037                          ;       PRINT SECOND SET OF REGISTERS: ADDRESS' OUT & IN
3038
3039  007026                  PRINTX  #FMT06,#TXT11B
3040  007026  012746  015460                                            MOV     #TXT11B,-(SP)
3041  007032  012746  013530                                            MOV     #FMT06,-(SP)
3042  007036  012746  000002                                            MOV     #2,-(SP)
3043  007042  010600                                                    MOV     SP,R0
3044  007044  104415                                                    TRAP    C$PNTX
3045  007046  062706  000006                                            ADD     #6,SP
3046  007052  012701  002257         MOV     #GDATA+3,R1     ;POINTER TO EXPECTED DATA
3047  007056                  PRINTX  #FMT16A,#TXT8A,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)
3048  007056  005046                                                    CLR     -(SP)
3049  007060  152116                                                    BISB    (R1)+,(SP)
3050  007062  005046                                                    CLR     -(SP)
3051  007064  152116                                                    BISB    (R1)+,(SP)
3052  007066  005046                                                    CLR     -(SP)
3053  007070  152116                                                    BISB    (R1)+,(SP)
3054  007072  005046                                                    CLR     -(SP)
3055  007074  152116                                                    BISB    (R1)+,(SP)
3056  007076  005046                                                    CLR     -(SP)
3057  007100  152116                                                    BISB    (R1)+,(SP)
3058  007102  005046                                                    CLR     -(SP)
3059  007104  152116                                                    BISB    (R1)+,(SP)
3060  007106  012746  015336                                            MOV     #TXT8A,-(SP)
3061  007112  012746  014032                                            MOV     #FMT16A,-(SP)
3062  007116  012746  000010                                            MOV     #10,-(SP)
3063  007122  010600                                                    MOV     SP,R0
3064  007124  104415                                                    TRAP    C$PNTX
3065  007126  062706  000022                                            ADD     #22,SP
3066  007132  012701  002261         MOV     #BDATA+3,R1     ;POINTER TO ACTUAL DATA
3067  007136                  PRINTX  #FMT16A,#TXT8B,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)
3068  007136  005046                                                    CLR     -(SP)
3069  007140  152116                                                    BISB    (R1)+,(SP)
3070  007142  005046                                                    CLR     -(SP)
3071  007144  152116                                                    BISB    (R1)+,(SP)
3072  007146  005046                                                    CLR     -(SP)
3073  007150  152116                                                    BISB    (R1)+,(SP)
3074  007152  005046                                                    CLR     -(SP)
3075  007154  152116                                                    BISB    (R1)+,(SP)
3076  007156  005046                                                    CLR     -(SP)
3077  007160  152116                                                    BISB    (R1)+,(SP)
3078  007162  005046                                                    CLR     -(SP)
3079  007164  152116                                                    BISB    (R1)+,(SP)
3080  007166  012746  015353                                            MOV     #TXT8B,-(SP)
3081  007172  012746  014032                                            MOV     #FMT16A,-(SP)
```

```
3082  007176  012746  000010                                                  MOV     #10,-(SP)
3083  007202  010600                                                          MOV     SP,R0
3084  007204  104415                                                          TRAP    C$PNTX
3085  007206  062706  000022                                                  ADD     #22,SP
3086  007212  012701  003062          MOV     #W3,R1          ;POINT TO REST OF XOR'S
3087  007216                          PRINTX  #FMT16A,#TXT8C,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)
3088  007216  005046                                                          CLR     -(SP)
3089  007220  152116                                                          BISB    (R1)+,(SP)
3090  007222  005046                                                          CLR     -(SP)
3091  007224  152116                                                          BISB    (R1)+,(SP)
3092  007226  005046                                                          CLR     -(SP)
3093  007230  152116                                                          BISB    (R1)+,(SP)
3094  007232  005046                                                          CLR     -(SP)
3095  007234  152116                                                          BISB    (R1)+,(SP)
3096  007236  005046                                                          CLR     -(SP)
3097  007240  152116                                                          BISB    (R1)+,(SP)
3098  007242  005046                                                          CLR     -(SP)
3099  007244  152116                                                          BISB    (R1)+,(SP)
3100  007246  012746  015370                                                  MOV     #TXT8C,-(SP)
3101  007252  012746  014032                                                  MOV     #FMT16A,-(SP)
3102  007256  012746  000010                                                  MOV     #10,-(SP)
3103  007262  010600                                                          MOV     SP,R0
3104  007264  104415                                                          TRAP    C$PNTX
3105  007266  062706  000022                                                  ADD     #22,SP
3106  007272  004737  013076          JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3107  007276                          ENDMSG
3108  007276                                                          L10007:
3109  007276  104423                                                          TRAP    C$MSG
3110                                  ;-------------------------------------------------------------------------------
3111                                  .SBTTL  ERROR HANDLER -- ERR9 -- WORD NPR I/O ERRORS
3112                                  ;-------------------------------------------------------------------------------
3113  007300                          BGNMSG  ERR9
3114  007300                                                          ERR9::
3115  007300  004737  012614          JSR     PC,ERR9.        ;USE COMMON 'ERROR 9' ROUTINE
3116  007304                          ENDMSG
3117  007304                                                          L10010:
3118  007304  104423                                                          TRAP    C$MSG
3119                                  ;-------------------------------------------------------------------------------
3120                                  .SBTTL  ERROR HANDLER -- ERR10 -- BYTE NPR I/O ERRORS
3121                                  ;-------------------------------------------------------------------------------
3122  007306                          BGNMSG  ERR10
3123  007306                                                          ERR10::
3124  007306  004737  012752          JSR     PC,ERR10.       ;USE COMMON 'ERROR 10' ROUTINE
3125  007312                          ENDMSG
3126  007312                                                          L10011:
3127  007312  104423                                                          TRAP    C$MSG
3128                                  ;-------------------------------------------------------------------------------
3129                                  .SBTTL  ERROR HANDLER -- ERR11 -- NPR TIMEOUT ERRORS
3130                                  ;-------------------------------------------------------------------------------
3131  007314                          BGNMSG  ERR11
3132  007314                                                          ERR11::
3133  007314  023727  002412  000001  CMP     TMP0,#1         ;IF ONLY ONE TIMEOUT,
3134  007322  001412                  BEQ     1$              ;NO NEED TO TELL HOW MANY OCCURED
3135  007324                          PRINTX  #FMT17C,TMP0    ;ELSE,  SAY HOW MANY WERE FOUND IN ALL
3136  007324  013746  002412                                                  MOV     TMP0,-(SP)
3137  007330  012746  014307                                                  MOV     #FMT17C,-(SP)
```

```
3138  007334  012746  000002                                                  MOV     #2,-(SP)
3139  007340  010600                                                          MOV     SP,R0
3140  007342  104415                                                          TRAP    C$PNTX
3141  007344  062706  000006                                                  ADD     #6,SP
3142  007350                  1$:     PRINTX  #FMT17,<3,TMP1> ;NPRCTL SENT
3143  007350  005046                                                          CLR     -(SP)
3144  007352  153716  002414                                                  BISB    TMP1,(SP)
3145  007356  012746  014074                                                  MOV     #FMT17,-(SP)
3146  007362  012746  000002                                                  MOV     #2,-(SP)
3147  007366  010600                                                          MOV     SP,R0
3148  007370  104415                                                          TRAP    C$PNTX
3149  007372  062706  000006                                                  ADD     #6,SP
3150  007376                          PRINTX  #FMT17A,<3,TMP2>  ;NPRCTL       READ
3151  007376  005046                                                          CLR     -(SP)
3152  007400  153716  002416                                                  BISB    TMP2,(SP)
3153  007404  012746  014153                                                  MOV     #FMT17A,-(SP)
3154  007410  012746  000002                                                  MOV     #2,-(SP)
3155  007414  010600                                                          MOV     SP,R0
3156  007416  104415                                                          TRAP    C$PNTX
3157  007420  062706  000006                                                  ADD     #6,SP
3158  007424                          PRINTX  #FMT17B,TMP3    ;LSI-11'S MEMORY ADDRESS
3159  007424  013746  002420                                                  MOV     TMP3,-(SP)
3160  007430  012746  014234                                                  MOV     #FMT17B,-(SP)
3161  007434  012746  000002                                                  MOV     #2,-(SP)
3162  007440  010600                                                          MOV     SP,R0
3163  007442  104415                                                          TRAP    C$PNTX
3164  007444  062706  000006                                                  ADD     #6,SP
3165  007450  004737  013076          JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3166  007454                          ENDMSG
3167  007454                                                          L10012:
3168  007454  104423                                                          TRAP    C$MSG
3169                  ;-------------------------------------------------------------------------------
3170                  .SBTTL  ERROR HANDLER -- ERR12 -- NPR EXTENDED ADDRESSING ERROR HANDLER
3171                  ;-------------------------------------------------------------------------------
3172  007456                  BGNMSG  ERR12
3173  007456                                                          ERR12::
3174  007456                  PRINTX  #FMT12          ;PRINT FIRST HEADING LINE
3175  007456  012746  007672                                                  MOV     #FMT12,-(SP)
3176  007462  012746  000001                                                  MOV     #1,-(SP)
3177  007466  010600                                                          MOV     SP,R0
3178  007470  104415                                                          TRAP    C$PNTX
3179  007472  062706  000004                                                  ADD     #4,SP
3180  007476                  PRINTX  #FMT12A         ;PRINT SECOND HEADING LINE
3181  007476  012746  007732                                                  MOV     #FMT12A,-(SP)
3182  007502  012746  000001                                                  MOV     #1,-(SP)
3183  007506  010600                                                          MOV     SP,R0
3184  007510  104415                                                          TRAP    C$PNTX
3185  007512  062706  000004                                                  ADD     #4,SP
3186                                  ;PRINT ADDRESS, CONTROL, & EXPECTED DATA
3187  007516  004737  012162          JSR     PC,XORGB        ;GENERATE EXCLUSIVE OR OF EXPECTED & READ DATA
3188  007522                  PRINTX  #FMT12D,<3,TMPF+1>,#0,#0,<3,TMP2>,GDATA,BDATA,XDATA
3189  007522  013746  002260                                                  MOV     XDATA,-(SP)
3190  007526  013746  002256                                                  MOV     BDATA,-(SP)
3191  007532  013746  002254                                                  MOV     GDATA,-(SP)
3192  007536  005046                                                          CLR     -(SP)
3193  007540  153716  002416                                                  BISB    TMP2,(SP)
```

```
3194  007544  012746  000000                                                  MOV     #0,-(SP)
3195  007550  012746  000000                                                  MOV     #0,-(SP)
3196  007554  005046                                                          CLR     -(SP)
3197  007556  153716  002451                                                  BISB    TMPF+1,(SP)
3198  007562  012746  010020                                                  MOV     #FMT12D,-(SP)
3199  007566  012746  000010                                                  MOV     #10,-(SP)
3200  007572  010600                                                          MOV     SP,R0
3201  007574  104415                                                          TRAP    C$PNTX
3202  007576  062706  000022                                                  ADD     #22,SP
3203  007602  023737  002256  002420          CMP     BDATA,TMP3      ;DID WE READ THE BACKGROUND PATTERN?
3204  007610  001011                          BNE     4$              ;NO,
3205  007612                                  PRINTX  #FMT12E         ;YES, INDICATE WRONG PAGE READ
3206  007612  012746  010063                                                  MOV     #FMT12E,-(SP)
3207  007616  012746  000001                                                  MOV     #1,-(SP)
3208  007622  010600                                                          MOV     SP,R0
3209  007624  104415                                                          TRAP    C$PNTX
3210  007626  062706  000004                                                  ADD     #4,SP
3211  007632  000414                          BR      60$             ;       AND EXIT ERROR HANDLER
3212
3213  007634  023737  002256  002414  4$:     CMP     BDATA,TMP1      ;DID WE EVEN PERFORM A READ?
3214  007642  001010                          BNE     60$             ;YES, THEN WE CAN GIVE ANY FURTHER ERROR INFO.
3215  007644                                  PRINTX  #FMT12F         ;NO,  THEN WE CAN AT LEAST SAY THAT MUCH
3216  007644  012746  010145                                                  MOV     #FMT12F,-(SP)
3217  007650  012746  000001                                                  MOV     #1,-(SP)
3218  007654  010600                                                          MOV     SP,R0
3219  007656  104415                                                          TRAP    C$PNTX
3220  007660  062706  000004                                                  ADD     #4,SP
3221  007664  004737  013076  60$:    JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3222  007670                          ENDMSG
3223  007670                                                          L10013:
3224  007670  104423                                                          TRAP    C$MSG
3225                                  .NLIST  BEX
      007672  047045  051445  031461  FMT12:  .ASCIZ  /%N%S13%ANPR REGISTERS%S14%ADATA/
      007732  047045  051445  030461  FMT12A: .ASCIZ  /%N%S11%AADDRESS    CONTROL    EXPECTED    READ      XOR%N/
      010020  047045  051445  022470  FMT12D: .ASCIZ  /%N%S8%03%S%03%S%03%S%03%S3%03%010%09%09/
      010063     045  022516  033523  FMT12E: .ASCIZ  /%N%S7%A(NPR OPERATION ACCESSED WRONG MEMORY PAGE)/
      010145     045  022516  031123  FMT12F: .ASCIZ  /%N%S2%A(NPR DATA REGISTER UN-CHANGED FROM BEFORE REQUEST)/
                                      .LIST   BEX
3226          010240                  .EVEN
3227                                  ;-------------------------------------------------------------------------------
3228                                  .SBTTL  ERROR HANDLER -- ERR13 -- 'MMU' ERROR HANDLER
3229                                  ;-------------------------------------------------------------------------------
3230  010240                          BGNMSG  ERR13
3231  010240                                                          ERR13::
3232  010240                          PRINTX  #FMT13A
3233  010240  012746  010546                                                  MOV     #FMT13A,-(SP)
3234  010244  012746  000001                                                  MOV     #1,-(SP)
3235  010250  010600                                                          MOV     SP,R0
3236  010252  104415                                                          TRAP    C$PNTX
3237  010254  062706  000004                                                  ADD     #4,SP
3238  010260                          PRINTX  #FMT13B
3239  010260  012746  010611                                                  MOV     #FMT13B,-(SP)
3240  010264  012746  000001                                                  MOV     #1,-(SP)
3241  010270  010600                                                          MOV     SP,R0
3242  010272  104415                                                          TRAP    C$PNTX
3243  010274  062706  000004                                                  ADD     #4,SP
```

```
3244  010300
3245  010300  012746  010656          PRINTX  #FMT13C
3246  010304  012746  000001                                  MOV     #FMT13C,-(SP)
3247  010310  010600                                          MOV     #1,-(SP)
3248  010312  104415                                          MOV     SP,R0
3249  010314  062706  000004                                  TRAP    C$PNTX
3250  010320                                                  ADD     #4,SP
3251  010320  012746  010721          PRINTX  #FMT13D
3252  010324  012746  000001                                  MOV     #FMT13D,-(SP)
3253  010330  010600                                          MOV     #1,-(SP)
3254  010332  104415                                          MOV     SP,R0
3255  010334  062706  000004                                  TRAP    C$PNTX
3256  010340                                                  ADD     #4,SP
3257  010340  013746  002420          PRINTX  #FMT11,TMP0,TMP1,TMP2,TMP3
3258  010344  013746  002416                                  MOV     TMP3,-(SP)
3259  010350  013746  002414                                  MOV     TMP2,-(SP)
3260  010354  013746  002412                                  MOV     TMP1,-(SP)
3261  010360  012746  013770                                  MOV     TMP0,-(SP)
3262  010364  012746  000005                                  MOV     #FMT11,-(SP)
3263  010370  010600                                          MOV     #5,-(SP)
3264  010372  104415                                          MOV     SP,R0
3265  010374  062706  000014                                  TRAP    C$PNTX
3266  010400                                                  ADD     #14,SP
3267  010400  013746  002430          PRINTX  #FMT13E,TMP4,TMP5,TMP6,TMP7
3268  010404  013746  002426                                  MOV     TMP7,-(SP)
3269  010410  013746  002424                                  MOV     TMP6,-(SP)
3270  010414  013746  002422                                  MOV     TMP5,-(SP)
3271  010420  012746  010764                                  MOV     TMP4,-(SP)
3272  010424  012746  000005                                  MOV     #FMT13E,-(SP)
3273  010430  010600                                          MOV     #5,-(SP)
3274  010432  104415                                          MOV     SP,R0
3275  010434  062706  000014                                  TRAP    C$PNTX
3276  010440                                                  ADD     #14,SP
3277  010440  013746  002400          PRINTX  #FMT11,REG0,REG1,REG2,REG3
3278  010444  013746  002376                                  MOV     REG3,-(SP)
3279  010450  013746  002374                                  MOV     REG2,-(SP)
3280  010454  013746  002372                                  MOV     REG1,-(SP)
3281  010460  012746  013770                                  MOV     REG0,-(SP)
3282  010464  012746  000005                                  MOV     #FMT11,-(SP)
3283  010470  010600                                          MOV     #5,-(SP)
3284  010472  104415                                          MOV     SP,R0
3285  010474  062706  000014                                  TRAP    C$PNTX
3286  010500                                                  ADD     #14,SP
3287  010500  013746  002410          PRINTX  #FMT13E,REG4,REG5,REG6,REG7
3288  010504  013746  002406                                  MOV     REG7,-(SP)
3289  010510  013746  002404                                  MOV     REG6,-(SP)
3290  010514  013746  002402                                  MOV     REG5,-(SP)
3291  010520  012746  010764                                  MOV     REG4,-(SP)
3292  010524  012746  000005                                  MOV     #FMT13E,-(SP)
3293  010530  010600                                          MOV     #5,-(SP)
3294  010532  104415                                          MOV     SP,R0
3295  010534  062706  000014                                  TRAP    C$PNTX
3296  010540  004737  013076          JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3297  010544                          ENDMSG
3298  010544                                          L10014:
3299  010544  104423                                          TRAP    C$MSG
```

```
3300                                    .NLIST  BEX
     010546  047045  040445  020040    FMT13A: .ASCIZ  /%N%A   SR0     SR1     SR2     SR3/
     010611    045   020101  020040    FMT13B: .ASCIZ  /%A     KPAR6   KPDR6   V ADDR  DATA?/
     010656  047045  040445  020040    FMT13C: .ASCIZ  /%N%A    R0      R1      R2      R3/
     010721    045   020101  020040    FMT13D: .ASCIZ  /%A     R4      R5      SP      PC/
     010764  047445  022470  034117    FMT13E: .ASCIZ  /%08%08%08%08/
                                       .LIST   BEX
3301         011002                    .EVEN
3302                                   ;-------------------------------------------------------------------------------
3303                                   .SBTTL  ERROR HANDLER -- ERR14 -- NPR REGISTER LOAD ERROR HANDLER
3304                                   ;-------------------------------------------------------------------------------
3305    011002                                 BGNMSG  ERR14
3306    011002                                                                                 ERR14::
3307    011002  010146                        MOV     R1,-(SP)        ;SAVE GENERAL REGISTER
3308    011004  013701  002300                MOV     REGNUM,R1
3309    011010  006301                        ASL     R1              ;CONVERT REG # TO WORD INDEX
3310    011012                                 PRINTB  #FMT07,#TXTNP,TXTNPT(R1)
3311    011012  016146  021770                                                         MOV     TXTNPT(R1),-(SP)
3312    011016  012746  015745                                                         MOV     #TXTNP,-(SP)
3313    011022  012746  013476                                                         MOV     #FMT07,-(SP)
3314    011026  012746  000003                                                         MOV     #3,-(SP)
3315    011032  010600                                                                 MOV     SP,R0
3316    011034  104414                                                                 TRAP    C$PNTB
3317    011036  062706  000010                                                         ADD     #10,SP
3318    011042  004737  012162                JSR     PC,XORGB
3319                                                           ;DATA: GOOD, BAD, & XOR
3320    011046  023727  002300  000006        CMP     REGNUM,#6       ;IF EXTENDED ADDRESS BYTE, USE BYTE PRINT
3321    011054  001423                        BEQ     5$
3322    011056  023727  002300  000003        CMP     REGNUM,#3
3323    011064  001417                        BEQ     5$
3324                                                           ;ELSE, USE WORD PRINTS
3325    011066                                 PRINTX  #FMT10,GDATA,BDATA,XDATA
3326    011066  013746  002260                                                         MOV     XDATA,-(SP)
3327    011072  013746  002256                                                         MOV     BDATA,-(SP)
3328    011076  013746  002254                                                         MOV     GDATA,-(SP)
3329    011102  012746  013714                                                         MOV     #FMT10,-(SP)
3330    011106  012746  000004                                                         MOV     #4,-(SP)
3331    011112  010600                                                                 MOV     SP,R0
3332    011114  104415                                                                 TRAP    C$PNTX
3333    011116  062706  000012                                                         ADD     #12,SP
3334    011122  000421                        BR      10$             ;BYPASS BYTE PRINTS IF WORD PRINTS USED
3335
3336    011124                          5$:    PRINTX  #FMT02A,<B,GDATA>,<B,BDATA>,<B,XDATA>
3337    011124  005046                                                                 CLR     -(SP)
3338    011126  153716  002260                                                         BISB    XDATA,(SP)
3339    011132  005046                                                                 CLR     -(SP)
3340    011134  153716  002256                                                         BISB    BDATA,(SP)
3341    011140  005046                                                                 CLR     -(SP)
3342    011142  153716  002254                                                         BISB    GDATA,(SP)
3343    011146  012746  013127                                                         MOV     #FMT02A,-(SP)
3344    011152  012746  000004                                                         MOV     #4,-(SP)
3345    011156  010600                                                                 MOV     SP,R0
3346    011160  104415                                                                 TRAP    C$PNTX
3347    011162  062706  000012                                                         ADD     #12,SP
3348    011166  004737  013076        10$:    JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3349    011172  012601                        MOV     (SP)+,R1        ;RESTORE GENERAL REGISTER
```

```
011174                          ENDMSG
011174                                                          L10015:
011174  104423                                                          TRAP    C$MSG
                        ;-------------------------------------------------------------------------
                        .SBTTL  ERROR HANDLER -- ERR51 -- FOR REPORTING TIMER # 2 ERRORS
                        ;-------------------------------------------------------------------------
011176                          BGNMSG  ERR51
011176                                                          ERR51::
011176  010146                  MOV     R1,-(SP)        ;SAVE R1 FOR CALLER
011200  113701  002441          MOVB    TMPB+1,R1       ;GET THE MODE LAST SETUP
011204  000241                  CLC                     ;SEEING AS THE CARRY BIT WILL BE ROTATED INTO
                                                        ;THE DATA, WE HAD BETTER CLEAR IT JUST IN CASE.
011206  042701  177737          BIC     #^C<BIT5>,R1    ;LOOK @ JUST THE TIMER 2 MODE DEFINITION
011212  106101                  ROLB    R1              ;POSITION IT FOR PRINTOUT
011214  106101                  ROLB    R1
011216  106101                  ROLB    R1
011220  106101                  ROLB    R1

                                ;IDENTIFY THE MODE BEING USED AT THE TIME, AND THE VALUES THAT WERE
                                ;LOADED INTO THE LATCHES:

011222                          PRINTX  #FMT51A,R1,<B,TMP9+1>,<B,TMP8+1>
011222  005046                                                          CLR     -(SP)
011224  153716  002433                                                  BISB    TMP8+1,(SP)
011230  005046                                                          CLR     -(SP)
011232  153716  002435                                                  BISB    TMP9+1,(SP)
011236  010146                                                          MOV     R1,-(SP)
011240  012746  014673                                                  MOV     #FMT51A,-(SP)
011244  012746  000004                                                  MOV     #4,-(SP)
011250  010600                                                          MOV     SP,R0
011252  104415                                                          TRAP    C$PNTX
011254  062706  000012                                                  ADD     #12,SP
011260  004737  013076                  JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
011264  012601                          MOV     (SP)+,R1        ;RESTORE R1 FOR CALLER
011266                                  ENDMSG
011266                                                          L10016:
011266  104423                                                          TRAP    C$MSG
                        ;-------------------------------------------------------------------------
                        .SBTTL  ERROR HANDLER -- ERR52 -- PROCESS SHIFT REGISTER ERROR MESSAGES
                        ;-------------------------------------------------------------------------
011270                          BGNMSG  ERR52
011270                                                          ERR52::
011270  004537  003616          JSR     R5,READ         ;GET CURRENT VALUES WITHIN ACR & PCR
011274  120013                  ACR
011276  002440                  TMPB
011300  004537  003616          JSR     R5,READ
011304  120014                  PCR
011306  002442                  TMPC
011310                          PRINTX  #FMT52H
011310  012746  011514                                                  MOV     #FMT52H,-(SP)
011314  012746  000001                                                  MOV     #1,-(SP)
011320  010600                                                          MOV     SP,R0
011322  104415                                                          TRAP    C$PNTX
011324  062706  000004                                                  ADD     #4,SP
011330                          PRINTX  #FMT52A,#TXT8D,<B,TMPA+1>,<B,TMPB+1>,<B,TMPE+1>
```

```
3406  011330  005046                                                        CLR     -(SP)
3407  011332  153716  002447                                                BISB    TMPE+1,(SP)
3408  011336  005046                                                        CLR     -(SP)
3409  011340  153716  002441                                                BISB    TMPB+1,(SP)
3410  011344  005046                                                        CLR     -(SP)
3411  011346  153716  002437                                                BISB    TMPA+1,(SP)
3412  011352  012746  015405                                                MOV     #TXT8D,-(SP)
3413  011356  012746  011557                                                MOV     #FMT52A,-(SP)
3414  011362  012746  000005                                                MOV     #5,-(SP)
3415  011366  010600                                                        MOV     SP,R0
3416  011370  104415                                                        TRAP    C$PNTX
3417  011372  062706  000014                                                ADD     #14,SP
3418  011376                      PRINTX  #FMT52B,#TXT8E,<B,TMPA>,<B,TMPB>,<B,TMPC>,<B,TMPD>,<B,TMPE>
3419  011376  005046                                                        CLR     -(SP)
3420  011400  153716  002446                                                BISB    TMPE,(SP)
3421  011404  005046                                                        CLR     -(SP)
3422  011406  153716  002444                                                BISB    TMPD,(SP)
3423  011412  005046                                                        CLR     -(SP)
3424  011414  153716  002442                                                BISB    TMPC,(SP)
3425  011420  005046                                                        CLR     -(SP)
3426  011422  153716  002440                                                BISB    TMPB,(SP)
3427  011426  005046                                                        CLR     -(SP)
3428  011430  153716  002436                                                BISB    TMPA,(SP)
3429  011434  012746  015422                                                MOV     #TXT8E,-(SP)
3430  011440  012746  011607                                                MOV     #FMT52B,-(SP)
3431  011444  012746  000007                                                MOV     #7,-(SP)
3432  011450  010600                                                        MOV     SP,R0
3433  011452  104415                                                        TRAP    C$PNTX
3434  011454  062706  000020                                                ADD     #20,SP
3435  011460  005737  002252                TST     TDATA           ;HAS 'SR' BEEN WRITTEN YET?
3436  011464  001010                        BNE     10$             ;NO,  THEN JUST FINISH ERROR MESSAGE
3437  011466                                PRINTX  #FMT52C         ;YES, ADD THAT INFORMATION TO MESSAGE
3438  011466  012746  011652                                                MOV     #FMT52C,-(SP)
3439  011472  012746  000001                                                MOV     #1,-(SP)
3440  011476  010600                                                        MOV     SP,R0
3441  011500  104415                                                        TRAP    C$PNTX
3442  011502  062706  000004                                                ADD     #4,SP
3443  011506  004737  013076        10$:    JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3444  011512                                ENDMSG
3445  011512                                                        L10017:
3446  011512  104423                                                        TRAP    C$MSG
3447
3448                                  .NLIST  BEX
      011514  047045  051445  032061  FMT52H: .ASCIZ  /%N%S14%ASR   ACR   PCR   IFR   IER/
      011557    045   022516  030523  FMT52A: .ASCIZ  /%N%S1%T%03%S3%03%S15%03/
      011607    045   022516  030523  FMT52B: .ASCIZ  /%N%S1%T%03%S3%03%S3%03%S3%03%S3%03%S3%03/
      011652  047045  051445  030061  FMT52C: .ASCIZ  /%N%S10%A(SR HASN'T BEEN LOADED YET!)/
                                      .LIST   BEX
3449          011720                  .EVEN
3450                                  ;       SR ERROR FORMATS:
3451                                  ;
3452                                  ;         SR   ACR   PCR   IFR   IER
3453                                  ; LOADED XXX   XXX   ---   ---   XXX
3454                                  ; READ   XXX   XXX   XXX   XXX   XXX
3455                                  ;
3456                                  ;-----------------------------------------------------------------------
```

```
                                          ;-------------------------------------------------------------------------
                                          .SBTTL  ERROR HANDLER -- ERR60 -- NPR WRITE-EXTENDED BIT ERRORS
                                          ;-------------------------------------------------------------------------
 011720                                           BGNMSG  ERR60
 011720                                                                                     ERR60::
 011720                                           PRINTX  #FMT60
 011720  012746  012034                                                                              MOV     #FMT60,-(SP)
 011724  012746  000001                                                                              MOV     #1,-(SP)
 011730  010600                                                                                      MOV     SP,R0
 011732  104415                                                                                      TRAP    C$PNTX
 011734  062706  000004                                                                              ADD     #4,SP
 011740                                           PRINTX  #FMT61
 011740  012746  012073                                                                              MOV     #FMT61,-(SP)
 011744  012746  000001                                                                              MOV     #1,-(SP)
 011750  010600                                                                                      MOV     SP,R0
 011752  104415                                                                                      TRAP    C$PNTX
 011754  062706  000004                                                                              ADD     #4,SP
 011760  005003                                   CLR     R3              ;CLEAR INDEX
 011762                                   10$:    PRINTX  #FMT62,XLOC0(R3),XVAL0(R3),RXVAL0(R3)
 011762  016346  032610                                                                              MOV     RXVAL0(R3),-(SP)
 011766  016346  032572                                                                              MOV     XVAL0(R3),-(SP)
 011772  016346  032554                                                                              MOV     XLOC0(R3),-(SP)
 011776  012746  012134                                                                              MOV     #FMT62,-(SP)
 012002  012746  000004                                                                              MOV     #4,-(SP)
 012006  010600                                                                                      MOV     SP,R0
 012010  104415                                                                                      TRAP    C$PNTX
 012012  062706  000012                                                                              ADD     #12,SP
 012016  005723                                   TST     (R3)+           ;BUMP INDEX
 012020  020327  000016                           CMP     R3,#14.
 012024  001356                                   BNE     10$
 012026  004737  013076                           JSR     PC,NULERR
 012032                                           ENDMSG
 012032                                                                                     L10020:
 012032  104423                                                                                      TRAP    C$MSG
                                          .NLIST  BEX
 012034  047045  051445  022463           FMT60:  .ASCIZ  /%N%S3%AXLOC%S6%AXVAL%S6%ARXVAL/
 012073     045  022516  031523           FMT61:  .ASCIZ  /%N%S3%A----%S6%A----%S6%A-----%N/
 012134  047045  051445  022462           FMT62:  .ASCIZ  /%N%S2%06%S4%06%S4%06/
                                          .LIST   BEX
         012162                           .EVEN
```

```
                        .SBTTL  ERROR HANDLER SUBROUTINES
                        ;-------------------------------------------------------------------------------
                        ;------------ SUBROUTINES USED ONLY BY ERROR HANDLERS ----------------------------
                        ;-------------------------------------------------------------------------------

                        .SBTTL          ERROR HANDLER SUBROUTINE -- XORGB

                        ;       PERFORM EXCLUSIVE OR BETWEEN 'GDATA' & 'BDATA' PUTTING
                        ;       THE RESULT IN 'XDATA'

012162  010146          XORGB:  MOV     R1,-(SP)        ;PRESERVE WORKING REGISTER
012164  013701  002254          MOV     GDATA,R1        ;GET 'GOOD' DATA
012170  013737  002256  002260  MOV     BDATA,XDATA     ;AND 'BAD' DATA
012176  074137  002260          XOR     R1,XDATA        ;PERFORM EXCLUSIVE OR
012202  012601                  MOV     (SP)+,R1        ;RESTORE R1
012204  000207                  RTS     PC              ;RETURN

                        ;-------------------------------------------------------------------------------
                        .SBTTL          ERROR HANDLER SUBROUTINE -- ERR4$
                        ;-------------------------------------------------------------------------------
                        ;       IDENTIFY & DUMP THE BYTE SELECT REGISTERS

012206                  ERR4$:  PRINTX  #FMT4,#TXT3,#TXT1
012206  012746  014761
012212  012746  015162
012216  012746  013213
012222  012746  000003
012226  010600
012230  104415
012232  062706  000010
012236
012236  005046
012240  153716  002220
012244  005046
012246  153716  002216
012252  005046
012254  153716  002214
012260  005046
012262  153716  002212
012266  012746  013253
012272  012746  000005
012276  010600
012300  104415
012302  062706  000014
012306
012306  012746  015017
012312  012746  013306
012316  012746  000002
012322  010600
012324  104415
012326  062706  000006
012332
012332  005046
012334  153716  002230
012340  005046
```

```
                        MOV     #TXT1,-(SP)
                        MOV     #TXT3,-(SP)
                        MOV     #FMT4,-(SP)
                        MOV     #3,-(SP)
                        MOV     SP,R0
                        TRAP    C$PNTX
                        ADD     #10,SP

                PRINTX  #FMT4A,<B,BSR0>,<B,BSR1>,<B,BSR2>,<B,BSR3>

                        CLR     -(SP)
                        BISB    BSR3,(SP)
                        CLR     -(SP)
                        BISB    BSR2,(SP)
                        CLR     -(SP)
                        BISB    BSR1,(SP)
                        CLR     -(SP)
                        BISB    BSR0,(SP)
                        MOV     #FMT4A,-(SP)
                        MOV     #5,-(SP)
                        MOV     SP,R0
                        TRAP    C$PNTX
                        ADD     #14,SP

                PRINTX  #FMT4B,#TXT2

                        MOV     #TXT2,-(SP)
                        MOV     #FMT4B,-(SP)
                        MOV     #2,-(SP)
                        MOV     SP,R0
                        TRAP    C$PNTX
                        ADD     #6,SP

                PRINTX  #FMT4C,<B,BSR4>,<B,BSR5>,<B,BSR6>,<B,BSR7>

                        CLR     -(SP)
                        BISB    BSR7,(SP)
                        CLR     -(SP)
```

```
012342 153716 002226                                    BISB    BSR6,(SP)
012346 005046                                           CLR     -(SP)
012350 153716 002224                                    BISB    BSR5,(SP)
012354 005046                                           CLR     -(SP)
012356 153716 002222                                    BISB    BSR4,(SP)
012362 012746 013313                                    MOV     #FMT4C,-(SP)
012366 012746 000005                                    MOV     #5,-(SP)
012372 010600                                           MOV     SP,R0
012374 104415                                           TRAP    C$PNTX
012376 062706 000014                                    ADD     #14,SP
012402                  PRINTX  #FMT4B,#TXT2A
012402 012746 015061                                    MOV     #TXT2A,-(SP)
012406 012746 013306                                    MOV     #FMT4B,-(SP)
012412 012746 000002                                    MOV     #2,-(SP)
012416 010600                                           MOV     SP,R0
012420 104415                                           TRAP    C$PNTX
012422 062706 000006                                    ADD     #6,SP
012426                  PRINTX  #FMT4A,<B,BSR10>,<B,BSR11>,<B,BSR12>,<B,BSR13>
012426 005046                                           CLR     -(SP)
012430 153716 002240                                    BISB    BSR13,(SP)
012434 005046                                           CLR     -(SP)
012436 153716 002236                                    BISB    BSR12,(SP)
012442 005046                                           CLR     -(SP)
012444 153716 002234                                    BISB    BSR11,(SP)
012450 005046                                           CLR     -(SP)
012452 153716 002232                                    BISB    BSR10,(SP)
012456 012746 013253                                    MOV     #FMT4A,-(SP)
012462 012746 000005                                    MOV     #5,-(SP)
012466 010600                                           MOV     SP,R0
012470 104415                                           TRAP    C$PNTX
012472 062706 000014                                    ADD     #14,SP
012476                  PRINTX  #FMT4B,#TXT2B
012476 012746 015120                                    MOV     #TXT2B,-(SP)
012502 012746 013306                                    MOV     #FMT4B,-(SP)
012506 012746 000002                                    MOV     #2,-(SP)
012512 010600                                           MOV     SP,R0
012514 104415                                           TRAP    C$PNTX
012516 062706 000006                                    ADD     #6,SP
012522                  PRINTX  #FMT4C,<B,BSR14>,<B,BSR15>,<B,BSR16>,<B,BSR17>
012522 005046                                           CLR     -(SP)
012524 153716 002250                                    BISB    BSR17,(SP)
012530 005046                                           CLR     -(SP)
012532 153716 002246                                    BISB    BSR16,(SP)
012536 005046                                           CLR     -(SP)
012540 153716 002244                                    BISB    BSR15,(SP)
012544 005046                                           CLR     -(SP)
012546 153716 002242                                    BISB    BSR14,(SP)
012552 012746 013313                                    MOV     #FMT4C,-(SP)
012556 012746 000005                                    MOV     #5,-(SP)
012562 010600                                           MOV     SP,R0
012564 104415                                           TRAP    C$PNTX
012566 062706 000014                                    ADD     #14,SP
012572 000207           RTS     PC

               ;-----------------------------------------------------------------------
               .SBTTL          ERROR HANDLER SUBROUTINE -- ERR9$ & ERR9.
```

```
3606
3607
3608
3609  012574
3610  012574  012746  013124
3611  012600  012746  000001
3612  012604  010600
3613  012606  104415
3614  012610  062706  000004
3615  012614  005237  002300
3616  012620
3617  012620  013746  002300
3618  012624  012746  013621
3619  012630  012746  000002
3620  012634  010600
3621  012636  104415
3622  012640  062706  000006
3623  012644  004737  012162
3624  012650
3625  012650  013746  002260
3626  012654  013746  002256
3627  012660  013746  002254
3628  012664  012746  013714
3629  012670  012746  000004
3630  012674  010600
3631  012676  104415
3632  012700  062706  000012
3633  012704
3634  012704  013746  002252
3635  012710  012746  013673
3636  012714  012746  000002
3637  012720  010600
3638  012722  104415
3639  012724  062706  000006
3640  012730  000207
3641
3642
3643
3644
3645
3646
3647  012732
3648  012732  012746  013124
3649  012736  012746  000001
3650  012742  010600
3651  012744  104415
3652  012746  062706  000004
3653  012752  005237  002300
3654  012756
3655  012756  013746  002300
3656  012762  012746  013621
3657  012766  012746  000002
3658  012772  010600
3659  012774  104415
3660  012776  062706  000006
3661  013002  004737  012162
```

```
;-------------------------------------------------------------------------
;       COMMON ERROR 9 ROUTINE TO IDENTIFY THE FAILING ADDRESS & DATA
ERR9$:  PRINTX  #NEWLIN         ;WHEN CALLED FROM TEST, START A NEW LINE
                                        MOV     #NEWLIN,-(SP)
                                        MOV     #1,-(SP)
                                        MOV     SP,R0
                                        TRAP    C$PNTX
                                        ADD     #4,SP
ERR9.:  INC     REGNUM          ;CONVERT INDEX TO ELEMENT #
        PRINTX  #FMT09,REGNUM   ;IDENTIFY DATA PATTERN OFFSET
                                        MOV     REGNUM,-(SP)
                                        MOV     #FMT09,-(SP)
                                        MOV     #2,-(SP)
                                        MOV     SP,R0
                                        TRAP    C$PNTX
                                        ADD     #6,SP
        JSR     PC,XORGB
        PRINTX  #FMT10,GDATA,BDATA,XDATA  ;DATA: GOOD, BAD, & XOR
                                        MOV     XDATA,-(SP)
                                        MOV     BDATA,-(SP)
                                        MOV     GDATA,-(SP)
                                        MOV     #FMT10,-(SP)
                                        MOV     #4,-(SP)
                                        MOV     SP,R0
                                        TRAP    C$PNTX
                                        ADD     #12,SP
        PRINTX  #FMT09A,TDATA   ;LSI ADDRESS
                                        MOV     TDATA,-(SP)
                                        MOV     #FMT09A,-(SP)
                                        MOV     #2,-(SP)
                                        MOV     SP,R0
                                        TRAP    C$PNTX
                                        ADD     #6,SP
        RTS     PC
;-------------------------------------------------------------------------
.SBTTL          ERROR HANDLER SUBROUTINE -- ERR10$ & ERR10.
;-------------------------------------------------------------------------
;       COMMON ERROR 10 ROUTINE TO IDENTIFY THE FAILING ADDRESS & DATA
ERR10$: PRINTX  #NEWLIN         ;WHEN CALLED FROM TEST, START A NEW LINE
                                        MOV     #NEWLIN,-(SP)
                                        MOV     #1,-(SP)
                                        MOV     SP,R0
                                        TRAP    C$PNTX
                                        ADD     #4,SP
ERR10.: INC     REGNUM          ;CONVERT INDEX TO ELEMENT #
        PRINTX  #FMT09,REGNUM   ;IDENTIFY DATA PATTERN OFFSET
                                        MOV     REGNUM,-(SP)
                                        MOV     #FMT09,-(SP)
                                        MOV     #2,-(SP)
                                        MOV     SP,R0
                                        TRAP    C$PNTX
                                        ADD     #6,SP
        JSR     PC,XORGB
```

```
                        ERROR HANDLER SUBROUTINE -- ERR10$ & ERR10.

                        PRINTX  #FMT02A,<B,GDATA>,<B,BDATA>,<B,XDATA>  ;DATA: GOOD, BAD, & XOR
013006                                                                          CLR     -(SP)
013006 005046                                                                   BISB    XDATA,(SP)
013010 153716 002260                                                            CLR     -(SP)
013014 005046                                                                   BISB    BDATA,(SP)
013016 153716 002256                                                            CLR     -(SP)
013022 005046                                                                   BISB    GDATA,(SP)
013024 153716 002254                                                            MOV     #FMT02A,-(SP)
013030 012746 013127                                                            MOV     #4,-(SP)
013034 012746 000004                                                            MOV     SP,R0
013040 010600                                                                   TRAP    C$PNTX
013042 104415                                                                   ADD     #12,SP
013044 062706 000012
013050                  PRINTX  #FMT09A,TDATA   ;LSI ADDRESS
013050 013746 002252                                                            MOV     TDATA,-(SP)
013054 012746 013673                                                            MOV     #FMT09A,-(SP)
013060 012746 000002                                                            MOV     #2,-(SP)
013064 010600                                                                   MOV     SP,R0
013066 104415                                                                   TRAP    C$PNTX
013070 062706 000006                                                            ADD     #6,SP
013074 000207           RTS     PC

                        ;-------------------------------------------------------------------------
                        .SBTTL          SUBROUTINE TO PERFORM 'PRINTB   #ENDEMB'
                        ;-------------------------------------------------------------------------

013076                  NULERR: PRINTB  #ENDEMB         ;TERMINATE ERROR MESSAGE
013076 012746 013120                                                            MOV     #ENDEMB,-(SP)
013102 012746 000001                                                            MOV     #1,-(SP)
013106 010600                                                                   MOV     SP,R0
013110 104414                                                                   TRAP    C$PNTB
013112 062706 000004                                                            ADD     #4,SP
013116 000207           RTS     PC
                        ;-------------------------------------------------------------------------
```

```
3695                                    .SBTTL  FORMAT SPEC'S FOR ERROR HANDLERS -- 'FMT___''
3696                                    ;-----------------------------------------------------------------------
3697                                    ;------------ FORMAT SPEC'S USED BY ERROR HANDLERS ----------------------
3698                                    ;-----------------------------------------------------------------------
3699                                    .NLIST  BEX
013120  047045  000062                  ENDEMB: .ASCIZ  /%N2/
013124  047045     000                  NEWLIN: .ASCIZ  /%N/

013127     045  022516  020101          FMT02A: .ASCIZ  /%N%A  EXPECTED:  %03%A   ACTUAL:  %03%A   XOR:  %03/
013213     045  022516  020101          FMT4:   .ASCIZ  /%N%A  THE CONTENTS OF ALL%T%N%T/
013253     045  022516  030523          FMT4A:  .ASCIZ  /%N%S1%03%S5%03%S5%03%S5%03/
013306  047045  052045     000          FMT4B:  .ASCIZ  /%N%T/
013313     045  022516  032523          FMT4C:  .ASCIZ  /%N%S5%03%S5%03%S5%03%S5%03/
013346  047045  040445  020040          FMT5:   .ASCIZ  /%N%A  WHEN %03%A LOADED INTO BSEL1/
013411     045  022516  020101          FMT5A:  .ASCIZ  /%N%A  ATTEMPTING 'M-LOOP'' FUNCTION CODE %02%A (%T%A)/
013476  040445  020040  042504          FMT07:  .ASCIZ  /%A  DETECTED IN %T%T%A --/
013530  047045  022462  030523          FMT06:  .ASCIZ  /%N2%S13%T/
013542  047045  022462  020101          FMT06A: .ASCIZ  /%N2%A  N  P  R     R  E  G  I  S  T  E  R  S:/
013621     045  020101  042040          FMT09:  .ASCIZ  /%A  DETECTED @ TEST PATTERN ELEMENT # %D2/
013673     045  020101  046040          FMT09A: .ASCIZ  /%A  LSI ADDR:%08/

013714  047045  040445  020040          FMT10:  .ASCIZ  /%N%A  EXPECTED:%08%A  ACTUAL:%08%A  XOR:%08/
013770  047045  047445  022470          FMT11:  .ASCIZ  /%N%08%08%08%08/
014007     045  022516  022524          FMT16:  .ASCIZ  /%N%T%03%S4%03%S%03/
014032  047045  052045  047445          FMT16A: .ASCIZ  /%N%T%03%S%03%S%03%S4%03%S%03%S%03/
014074  040445  020040  020040          FMT17:  .ASCIZ  /%A    VALUE SENT TO NPR CONTROL REGISTER:  %03/
014153     045  022516  020101          FMT17A: .ASCIZ  /%N%A     VALUE READ FROM CONTROL REGISTER:    %03/
014234  047045  040445  020040          FMT17B: .ASCIZ  /%N%A     LSI-11 MEMORY ADDRESS ACCESSED:%08/
014307     045  022516  020101          FMT17C: .ASCIZ  /%N%A  INFORMATION ON THE FIRST OF %D5%A ERRORS:/
014367     045  022516  020101          FMT50A: .ASCIZ  /%N%A  TIMER # 1 MODE:  %01%A   REGISTERS:/
014441     045  022516  030523          FMT50B: .ASCIZ  /%N%S15%AT1CH  T1CL  T1LH  T1LL   ACR   IFR   IER/
014522  047045  051445  022463          FMT50C: .ASCIZ  /%N%S3%T%S1%03%S3%03%S3%03%S3%03/
014562  051445  022463  031517          FMT50D: .ASCIZ  /%S3%03%S9%03/
014577     045  031523  047445          FMT50E: .ASCIZ  /%S3%03%S3%03/
014614  047045  022462  030523          FMT50M: .ASCIZ  /%N2%S10%A(T1CH & T1CL HAVEN'T YET BEEN LOADED)/
014673     045  022516  020101          FMT51A: .ASCIZ  /%N%A  TIMER # 2 MODE:  %01%A   T2CH & T2LL:  %03%S%03/

                                        .SBTTL  TEXT STRINGS FOR ERROR HANDLERS -- 'TXT___''
                                        ;-----------------------------------------------------------------------
                                        ;------------ TEXT USED BY ERROR HANDLERS -------------------------------
                                        ;-----------------------------------------------------------------------

014761     102  042523  030114          TXT1:   .ASCIZ  /BSEL0   BSEL1   BSEL2   BSEL3/
015017     040  020040  041040          TXT2:   .ASCIZ  /    BSEL4   BSEL5   BSEL6   BSEL7/
015061     102  042523  030514          TXT2A:  .ASCIZ  /BSEL10  BSEL11  BSEL12  BSEL13/
015120  020040  041040  042523          TXT2B:  .ASCIZ  /   BSEL14  BSEL15  BSEL16  BSEL17/
015162  041040  052131  020105          TXT3:   .ASCIZ  / BYTE SELECT REG'S ARE:/
015212  020040  051440  046105          TXT4:   .ASCIZ  /   SEL0    SEL2    SEL4    SEL6/
015252  020040  051440  046105          TXT4A:  .ASCIZ  /   SEL10   SEL12   SEL14   SEL16/
015313     040  042523  042514          TXT6:   .ASCIZ  / SELECT REG'S ARE:/
015336  042440  050130  041505          TXT8A:  .ASCIZ  / EXPECTED:  /
015353     040  041501  052524          TXT8B:  .ASCIZ  / ACTUAL:    /
015370  054040  051117  020072          TXT8C:  .ASCIZ  / XOR:       /
015405     040  047514  042101          TXT8D:  .ASCIZ  / LOADED:    /
015422  051040  040505  035104          TXT8E:  .ASCIZ  / READ:      /
```

```
015437   103  047117  051124  TXT11A: .ASCIZ  /CONTROL  D A T A/
015460  020040  047440  052125  TXT11B: .ASCIZ  /   OUT ADDR.      IN ADDR./
015513   021   000             TXTNUL: .BYTE   21,0                    ;CTL-Q -- THIS (WE HOPE) IS HARMLESS

015515   116  050117   000    TXTML0: .ASCIZ  /NOP/
015521   122  040505  020104  TXTML1: .ASCIZ  /READ 1 BYTE/
015535   127  044522  042524  TXTML2: .ASCIZ  /WRITE 1 BYTE/
015552  050116  026522  052517  TXTML3: .ASCIZ  /NPR-OUT 256 BYTES/
015574  050116  026522  047111  TXTML4: .ASCIZ  /NPR-IN 256 BYTES/
015615   123  052105  046440  TXTML5: .ASCIZ  /SET MICROPROCESSOR'S PC/
015645   125  042116  043105  TXTML6: .ASCIZ  /UNDEFINED/
015657   015  051412  052105  TXTML7: .ASCIZ  <15><12>/SET MAINT INTERRUPT & CLR INT DISABLE IN CPU STATUS/

015745   116  051120  000040  TXTNP:  .ASCIZ  /NPR /
015752  047503  052116  047522  TXTNP0: .ASCIZ  /CONTROL/
015762  040504  040524  044040  TXTNP1: .ASCIZ  /DATA HI/
015772  040504  040524  046040  TXTNP2: .ASCIZ  /DATA LO/
016002  042101  051104  020056  TXTNP3: .ASCIZ  /ADDR. OUT EX/
016017   101  042104  027122  TXTNP4: .ASCIZ  /ADDR. OUT HI/
016034  042101  051104  020056  TXTNP5: .ASCIZ  /ADDR. OUT LO/
016051   101  042104  027122  TXTNP6: .ASCIZ  /ADDR. IN EX/
016065   101  042104  027122  TXTNP7: .ASCIZ  /ADDR. IN HI/
016101   101  042104  027122  TXTNP8: .ASCIZ  /ADDR. IN LO/
```

```
                                        .SBTTL  ERROR MESSAGES -- 'EM___''
                                        ;------------------------------------------------------------------
                                        ;------------- ERROR MESSAGES USED BY ERROR CALL'S ----------------
                                        ;------------------------------------------------------------------

016115     125 042055 040511 EM3:    .ASCIZ  /U-DIAG. FAILURE/
016135     115 042122 020131 EM4:    .ASCIZ  /MRDY TIMEOUT/
016152  050116 020122 047514 EM26:   .ASCIZ  /NPR LOGIC M-CLEAR FAILURE/
016204  040502 020104 050116 EM26A:  .ASCIZ  /BAD NPR REG. LOAD/
016226  047527 042122 047040 EM26B:  .ASCIZ  /WORD NPR-OUT ERROR/
016251     102 052131 020105 EM26C:  .ASCIZ  /BYTE NPR-OUT ERROR/
016274  047527 042122 047040 EM26D:  .ASCIZ  /WORD NPR-IN ERROR/
016316  050116 020122 044524 EM26E:  .ASCIZ  /NPR TIMEOUT -- ''ABORT'' SET/
016351     116 051120 041040 EM26F:  .ASCIZ  \NPR BS7 FAILURE ON WRITE\
016402  050116 026522 041101 EM26G:  .ASCIZ  /NPR-ABORT FAILURE/
016424  046515 020125 041101 EM27:   .ASCIZ  /MMU ABORT!/
016437     130 040455 042104 EM27A:  .ASCIZ  /X-ADDR. NPR ABORT/
016461     130 040455 042104 EM27B:  .ASCIZ  /X-ADDR. NPR HUNG/
016502  026530 042101 051104 EM27C:  .ASCIZ  /X-ADDR. NPR FAILURE/
016526  040442 020042 047111 EM34:   .ASCIZ  /''A'' INT.?/
016540  041042 020042 047111 EM34B:  .ASCIZ  /''B'' INT.?/
016552  044515 051523 047111 EM35:   .ASCIZ  /MISSING ''A'' INT./
016573     115 051511 044523 EM35B:  .ASCIZ  /MISSING ''B'' INT./
016614  046504 020126 047111 EM40:   .ASCIZ  /DMV INIT'D BY ''BINIT'' WITH ''DISABL INIT'' SET/
016671     042 040515 052123 EM41:   .ASCIZ  /''MASTER RESET'' FAILED WHEN ''DISABL INIT'' SET/
016746  047516 021040 047520 EM42A:  .ASCIZ  /NO ''POWER UP'' VECTOR ON ''DCOK'' GOING HIGH/
017020  047516 044440 044516 EM42B:  .ASCIZ  /NO INIT ON ''DCOK'' LOW & ''DISABL INIT'' CLEAR/
017074  047111 040526 044514 EM42C:  .ASCIZ  /INVALID INIT ON ''DCOK'' LOW & ''DISABL INIT'' SET/
017153     104 053115 046440 EM43A:  .ASCIZ  \DMV MICRO-CODE HUNG\
017177     042 040510 052114 EM43B:  .ASCIZ  /''HALT'' FAILED/
017215     116 020117 047520 EM43C:  .ASCIZ  /NO POWER-UP SEQUENCE/
017242  046442 050117 041055 EM43D:  .ASCIZ  /''MOP-BOOT'' LOAD FAILED/
017271     042 030524 020042 EM50A:  .ASCIZ  \''T1'' FLAG NOT CLEARED BY LOADING T1LH\
017337     042 030524 020042 EM50B:  .ASCIZ  \''T1'' FLAG NOT CLEARED BY LOADING T1CH\
017405     042 030524 020042 EM50C:  .ASCIZ  \''T1'' FLAG NOT CLEARED BY READING T1CL\
017453     126 040511 051447 EM50D:  .ASCIZ  \VIA'S T1CL NOT DECREMENTING\
017507     126 040511 051447 EM50E:  .ASCIZ  \VIA'S T1CH NOT DECREMENTING\
017543     042 030524 020042 EM50F:  .ASCIZ  \''T1'' FLAG NOT SET ON TIMER 1 TIMEOUT\
017610  052042 021061 043040 EM50G:  .ASCIZ  \''T1'' FLAG CLEARED BY READING T1CH\
017652  044526 023501 020123 EM50H:  .ASCIZ  \VIA'S T1LL IMPROPERLY LOADED BY WRITING T1CL @ ADDR 4\
017740  052042 021061 043040 EM50I:  .ASCIZ  \''T1'' FLAG CLEARED BY READING T1LL\
020002  044526 023501 020123 EM50J:  .ASCIZ  \VIA'S T1LH IMPROPERLY LOADED BY WRITING T1CH @ ADDR 5\
020070  052042 021061 043040 EM50K:  .ASCIZ  \''T1'' FLAG CLEARED BY READING T1LH\
020132  052042 021061 043040 EM50L:  .ASCIZ  \''T1'' FLAG NOT SET AFTER RE-LOADING T1CH & TIMEOUT\
020214  052042 021061 043040 EM50M:  .ASCIZ  \''T1'' FLAG CLEARED BY LOADING T1LL\
020256  052042 021061 043040 EM50N:  .ASCIZ  \''T1'' FLAG NOT CLEARED BY LOADING T1CH\
020324  050042 033502 020042 EM50S:  .ASCIZ  \''PB7'' W/IN VIA NOT SET ON TIMER 1 TIMEOUT\
020376  050042 033502 020042 EM50U:  .ASCIZ  \''PB7'' NOT SET AFTER TIMER 1 TIMEOUT\
020442  050042 033502 020042 EM50V:  .ASCIZ  \''PB7'' NOT DRIVEN LOW BY LOADING T1CH\
020507     042 041120 021067 EM50W:  .ASCIZ  \''PB7'' UNEXPECTEDLY MODIFIED BY TIMER 1\
020556  052042 021061 047040 EM50X:  .ASCIZ  \''T1'' NOT RESET AFTER BEING CLEARED\
020621     042 041120 021067 EM50Y:  .ASCIZ  \''PB7'' PREMATURELY SET DURING T1 COUNTDOWN\
020673     042 041120 021067 EM50Z:  .ASCIZ  \''PB7'' NOT SET AFTER SECOND CYCLE\
020734  052042 021062 043040 EM51B:  .ASCIZ  \''T2'' FLAG NOT CLEARED BY LOADING T2CH\
021002  052042 021062 043040 EM51C:  .ASCIZ  \''T2'' FLAG NOT CLEARED BY READING T2CL\
021050  044526 023501 020123 EM51E:  .ASCIZ  \VIA'S T2CH NOT DECREMENTING\
```

```
021104  052042  021062  043040  EM51F:  .ASCIZ  \'T2'' FLAG NOT SET ON TIMER 2 TIMEOUT\
021151     042  031124  020042  EM51G:  .ASCIZ  \'T2'' FLAG CLEARED BY READING T2CH\
021213     042  031124  020042  EM51L:  .ASCIZ  \'T2'' FLAG NOT SET AFTER RE-LOADING T2CH & TIMEOUT\
021275     042  031124  020042  EM51M:  .ASCIZ  \'T2'' FLAG CLEARED BY LOADING T2LL\
021337     042  031124  020042  EM51N:  .ASCIZ  \'T2'' FLAG NOT CLEARED BY LOADING T2CH\
021405     042  031124  020042  EM51P:  .ASCIZ  \'T2'' FLAG NOT SET AFTER APPROPRIATE DELAY\
021457     042  051123  020042  EM52A:  .ASCIZ  \'SR'' FLAG SET BEFORE ACCESSING SHIFT REGISTER\
021535     116  020117  051442  EM52B:  .ASCIZ  \NO ''SR'' INT. USING MODE 2\
021567     111  041516  046517  EM52C:  .ASCIZ  \INCOMPLETE SHIFTING OPERATION IN MODE 2 -- GOT INT.\
021653     116  020117  051442  EM52D:  .ASCIZ  \NO ''SR'' INT. AFTER READING SR\
021711     104  053115  042440  EM60N:  .ASCIZ  /DMV EXTENDED NPR WRITE ERROR/

                                        .EVEN
```

```
                                        .SBTTL  TEXT ADDRESS TABLES FOR ERROR HANDLERS -- 'TXT__T'
                                        ;-------------------------------------------------------------------
                                        ;---------- TEXT ADDRESS TABLES USED BY ERROR HANDLERS --------------
                                        ;-------------------------------------------------------------------

021746  015515  015521  015535  TXTMLT: .WORD   TXTML0,TXTML1,TXTML2,TXTML3,TXTML4,TXTML5,TXTML6,TXTML7

021766  015745                          .WORD   TXTNP
021770  015752  015762  015772  TXTNPT: .WORD   TXTNP0,TXTNP1,TXTNP2,TXTNP3,TXTNP4,TXTNP5,TXTNP6,TXTNP7,TXTNP8

                                        .LIST   BEX
```

```
                        .SBTTL LOAD DEVICE PROTECTION TABLE

                        ;////////////////////////////////////////////////////////////////////////////////
                        ;/ THIS TABLE IDENTIFIES THE LOAD DEVICE TO THE SUPERVISOR, SO THAT IT CAN BE
                        ;/ PROTECTED FROM TESTING. IF DESIRED.
                        ;////////////////////////////////////////////////////////////////////////////////

022012                          BGNPROT
022012                                                                  L$PROT::
022012  177777                  .WORD   -1      ;DON'T CHK CSR ADRS
022014  177777                  .WORD   -1      ;DON'T CHK MASSBUS UNIT NO.
022016  177777                  .WORD   -1      ;DON'T CHK DRIVE NO.
022020                          ENDPROT
```

```
                        .SBTTL INITIALIZE SECTION

                        ;////////////////////////////////////////////////////////////////////////
                        ;// THE INITIALIZE SECTION CONTAINS THE CODING THAT IS PERFORMED
                        ;// AT THE BEGINNING OF THE TEST SEQUENCE ON THE NEXT UNIT.
                        ;////////////////////////////////////////////////////////////////////////

022020                          BGNINIT
022020                                                                  L$INIT::

022020  010637  002270          MOV     SP,PSTACK       ;SAVE BASE-LEVEL STACK POINTER
                        ;SEE IF PROGRAM JUST STARTED, BR IF YES
022024                          READEF  #EF.START
022024  012700  000040                                                  MOV     #EF.START,R0
022030  104447                                                          TRAP    C$REFG
022032                          BCOMPLETE       STARST
022032  103417                                                          BCS     STARST
                        ;SEE IF PROGRAM JUST RESTARTED, BR IF YES
022034                          READEF  #EF.RESTART
022034  012700  000037                                                  MOV     #EF.RESTART,R0
022040  104447                                                          TRAP    C$REFG
022042                          BCOMPLETE       RESTRT
022042  103454                                                          BCS     RESTRT
                        ;SEE IF THIS IS A NEW PASS, BR IF YES
022044                          READEF  #EF.NEW
022044  012700  000035                                                  MOV     #EF.NEW,R0
022050  104447                                                          TRAP    C$REFG
022052                          BCOMPLETE       NEWST
022052  103454                                                          BCS     NEWST
                        ;SEE IF PROGRAM WAS JUST CONTINUED
022054                          READEF  #EF.CONTINUE
022054  012700  000036                                                  MOV     #EF.CONTINUE,R0
022060  104447                                                          TRAP    C$REFG
022062                          BCOMPLETE       10$
022062  103401                                                          BCS     10$
022064  000461                  BR      GETPRM

022066  000137  022456  10$:    JMP     CONTIN          ;(THIS IS TO FAR AWAY FOR A "BR" INSTRUCTION)

                        ;*** ENTER HERE IF "START" COMMAND ISSUED

022072  005037  002306  STARST: CLR     STARES          ;CLEAR FLAG TO SHOW JUST HAD STA OR RES

                        ; TEST FOR THE PRESENCE OR ABSENCE OF A CONSOLE TERMINAL.

022076  005037  002314          CLR     CONSOL          ;RESET THE CONSOLE TERMINAL FLAG
022102                          SETVEC  #4,#CONTST,#0   ;SETUP BUS TIMEOUT VECTER TO TEST FOR A CONSOLE
022102  012746  000000                                                  MOV     #0,-(SP)
022106  012746  022556                                                  MOV     #CONTST,-(SP)
022112  012746  000004                                                  MOV     #4,-(SP)
022116  012746  000003                                                  MOV     #3,-(SP)
022122  104437                                                          TRAP    C$SVEC
022124  062706  000010                                                  ADD     #10,SP
022130  005737  177564          TST     @#177564        ;TRY TO ACCESS THE CONSOLE TERMINAL'S 'XCSR'
022134                          CLRVEC  #4              ;WE SHOULD BE THROUGH WITH THIS BY NOW
022134  012700  000004                                                  MOV     #4,R0
```

```
022140  104436                                                                   TRAP    C$CVEC

                                   ; AT THIS POINT, IF A CONSOLE TERMINAL IS PRESENT, ''CONSOL'' WILL BE ZERO.
                                   ; IF NO CONSOLE TERMINAL EXISTS (OR AT LEAST NOT AT THE STANDARD ADDRESS),
                                   ;       ''CONSOL'' WILL BE NON-ZERO (-1).

022142  005737  002314                     TST     CONSOL          ;IF CONSOLE TERMINAL ISN'T THERE,
022146  001412                             BEQ     5$
022150                                     PRINTF  #CFMTO,#NPROTS  ;TELL THE OPERATOR WHAT TESTING WON'T BE DONE
022150  012746  000004                                                                   MOV     #NPROTS,-(SP)
022154  012746  022566                                                                   MOV     #CFMTO,-(SP)
022160  012746  000002                                                                   MOV     #2,-(SP)
022164  010600                                                                           MOV     SP,R0
022166  104417                                                                           TRAP    C$PNTF
022170  062706  000006                                                                   ADD     #6,SP
022174                             5$:
                                           ;*** ENTER HERE IF ''RESTART'' COMMAND ISSUED

022174  005037  002306             RESTRT: CLR     STARES          ;CLEAR FLAG TO SHOW JUST HAD STA OR RES
022200  005037  002310                     CLR     DEVMAP          ;CLEAR DEVICE MAP

022204                             NEWST:          ;ENTER HERE BEFORE EACH TEST

022204  012737  177777  002266             MOV     #-1,LOGDEV      ;RESET LOGICAL DEVICE TO -1
022212  005237  002306                     INC     STARES          ;INC # OF PASSES SINCE STA OR RES
022216  005237  002304                     INC     FRSPAS          ;INCREMENT NO. OF PASSES AFTER LOAD
022222  012737  000001  002312             MOV     #BIT0,DEVPTR    ;INIT DEVICE MAP BIT POINTER
                                   ; GET UNIBUS ADDRESS, VECTOR, PRIORITY LEVEL, SWITCH PACKS, TEST
                                   ;   CONNECTOR INFORMATION FOR THIS LOGICAL DEVICE
022230                             GETPRM:
022230  005237  002266                     INC     LOGDEV          ;INCREMENT LOGICAL DEVICE NUMBER
022234                                     GPHARD  LOGDEV,R1       ;GET P-TABLE POINTER INTO R1
022234  013700  002266                                                                   MOV     LOGDEV,R0
022240  104442                                                                           TRAP    C$GPHRD
022242  010001                                                                           MOV     R0,R1
022244                                     BCOMPLETE  10$          ;BR IF DEVICE AVAILABLE
022244  103403                                                                           BCS     10$
022246  006337  002312                     ASL     DEVPTR          ;IF UN-AVAILABLE, SHIFT DEVICE MAP BIT POINTER
022252  000766                             BR      GETPRM          ;          AND SKIP THIS DEVICE

022254  053737  002312  002310     10$:    BIS     DEVPTR,DEVMAP   ;ELSE, SET BIT FOR THIS DEVICE IN DEVICE MAP
022262  006337  002312                     ASL     DEVPTR          ;SHIFT DEVICE MAP BIT POINTER

                                   ;  ''R1'' WAS RETURNED WITH A POINTER TO THE CURRENT ''P-TABLE''

022266  012100                             MOV     (R1)+,R0        ;GET THE DEVICE CSR ADDRESS
022270  012703  000020                     MOV     #16.,R3         ;WE HAVE TO SETUP THIS MANY ADDRESS POINTERS
022274  012702  002320                     MOV     #MPCSR,R2       ;THIS IS THE ADDRESS OF THE FIRST POINTER
022300  010022                     12$:    MOV     R0,(R2)+        ;SETUP ONE CSR POINTER
022302  005200                             INC     R0              ;POINT TO THE NEXT CSR ADDRESS
022304  077303                             SOB     R3,12$          ;LOOP AS LONG AS THERE ARE MORE TABLE ENTRIES
                                                                   ;ELSE, FALL THROUGH TO CONTINUE GETTING MORE
                                                                   ;          P-TABLE DATA

022306  012100                             MOV     (R1)+,R0        ;GET INTERRUPT VECTOR
022310  010037  002360                     MOV     R0,MPIVEC       ;SETUP ''A'' VECTOR POINTER
```

```
3825  022314  022020                        CMP     (R0)+,(R0)+     ;ADD 4 TO VECTOR TO GET ADDRESS OF 'B' VECTOR
3826  022316  010037  002362                MOV     R0,MPOVEC       ;SETUP 'B' VECTOR POINTER
3827
3828  022322  012100                        MOV     (R1)+,R0        ;GET DMV11 DEVICE PRIORITY
3829  022324  006200                        ASR     R0              ;       RE-POSITION IT
3830  022326  006200                        ASR     R0
3831  022330  006200                        ASR     R0
3832  022332  006200                        ASR     R0
3833  022334  010037  002364                MOV     R0,MPRIOR       ;SETUP OUR VARIABLE FOR INT. VECTOR INIT'S
3834
3835  022340  022121                        CMP     (R1)+,(R1)+     ;SKIP OVER SWITCH #'S 1 & 2
3836  022342  012137  002366                MOV     (R1)+,BRDTYP    ;GET DMV-11 BOARD TYPE
3837  022346  022111                        CMP     (R1)+,(R1)      ;SKIP OVER CONNECTOR FLAG
3838
3839  022350  012100                        MOV     (R1)+,R0        ;GET CONTROL FLAGS
3840  022352  012703  000006                MOV     #6,R3           ;POSITION THEM PROPERLY IN THE WORD
3841  022356  006200                15$:    ASR     R0
3842  022360  077302                        SOB     R3,15$
3843  022362  010037  002370                MOV     R0,PT.CTL       ;PUT IT WHERE TESTS EXPECT TO FIND IT
3844
3845                                ;  TEST THE VARIOUS CONTROL FLAGS & REPORT NON-STANDARD ACTION RESULTING FROM
3846                                ;  THEIR SETTINGS
3847
3848  022366  023727  002306  000001          CMP     STARES,#1       ;FIRST PASS SINCE STA OR RES ??
3849  022374  001030                        BNE     40$             ; IF NO: SKIP POSSIBLE PRINTOUT
3850
3851  022376  032737  000001  002370        BIT     #PU24,PT.CTL    ;IF THE PROCESSOR ISN'T STRAPPED TO COME UP
3852  022404  001024                        BNE     40$             ;THROUGH INTERRUPT VECTOR 24 & 26,
3853  022406                                PRINTF  #CFMT2,#DCOKTS,#HLTEST ;TELL THE OPERATOR THAT NO DCOK TESTING
3854  022406  012746  000015                                                MOV     #HLTEST,-(SP)
3855  022412  012746  000014                                                MOV     #DCOKTS,-(SP)
3856  022416  012746  022655                                                MOV     #CFMT2,-(SP)
3857  022422  012746  000003                                                MOV     #3,-(SP)
3858  022426  010600                                                        MOV     SP,R0
3859  022430  104417                                                        TRAP    C$PNTF
3860  022432  062706  000010                                                ADD     #10,SP
3861  022436                                PRINTF  #CFMT3          ;WILL BE DONE
3862  022436  012746  022735                                                MOV     #CFMT3,-(SP)
3863  022442  012746  000001                                                MOV     #1,-(SP)
3864  022446  010600                                                        MOV     SP,R0
3865  022450  104417                                                        TRAP    C$PNTF
3866  022452  062706  000004                                                ADD     #4,SP
3867  022456                        40$:
3868
3869  022456                        CONTIN:         ;ENTER HERE WHEN A 'CONTINUE' COMMAND IS ISSUED
3870
3871  022456                                SETVEC  @#MPIVEC,#MPIHAN,@#MPRIOR  ;SETUP 'A' INT. VECTOR
3872  022456  013746  002364                                                MOV     @#MPRIOR,-(SP)
3873  022462  012746  006066                                                MOV     #MPIHAN,-(SP)
3874  022466  013746  002360                                                MOV     @#MPIVEC,-(SP)
3875  022472  012746  000003                                                MOV     #3,-(SP)
3876  022476  104437                                                        TRAP    C$SVEC
3877  022500  062706  000010                                                ADD     #10,SP
3878  022504  005037  006136                CLR     IHILNK          ;WE DON'T WANT THE HANDLER TO LINK ELSEWHERE
3879  022510                                SETVEC  @#MPOVEC,#MPOHAN,@#MPRIOR  ;SETUP 'B' INT. VECTOR
3880  022510  013746  002364                                                MOV     @#MPRIOR,-(SP)
```

```
3881  022514  012746  006140                                                  MOV     #MPOHAN,-(SP)
3882  022520  013746  002362                                                  MOV     @#MPOVEC,-(SP)
3883  022524  012746  000003                                                  MOV     #3,-(SP)
3884  022530  104437                                                         TRAP    C$SVEC
3885  022532  062706  000010                                                  ADD     #10,SP
3886  022536  005037  006210                 CLR     IHOLNK          ;WE DON'T WANT THE HANDLER TO LINK ELSEWHERE
3887  022542  005037  002274                 CLR     INTWCH          ;RESET ''INTERRUPT WATCH'' FLAGS (BOTH ''A'' & 'B')
3888
3889  022546  012737  000001  002302         MOV     #1,FRSTIM       ;MARK FLAG FOR NEXT TIME THROUGH
3890  022554                                 ENDINIT         ;END OF ''INIT'' CODE
3891  022554                                                                 L10022:
3892  022554  104411                                                         TRAP    C$INIT
3893
3894                                  ; ***** SUBROUTINES USED BY ''INIT'' CODE *****
3895
3896                                  ;       INTERRUPT HANDLER FOR CONSOLE TERMINAL PRESENCE TESTING
3897
3898  022556  012737  177777  002314  CONTST: MOV     #-1,CONSOL      ;INDICATE THAT NO CONSOLE TERMINAL EXISTS!
3899  022564  000002                         RTI                     ;RETURN
3900
3901                                  ;       FORMATS FOR FORCED MESSAGES
3902                                  .NLIST  BEX
        022566  047045  040445  052040  CFMT0:  .ASCIZ  /%N%A TEST %D2%A SUBTEST 3 CAN'T RUN -- NO CSR @ 177564/
        022655     045  022516  020101  CFMT2:  .ASCIZ  /%N%A TESTS %D2%A AND %D2%A CAN'T RUN -- CPU NOT/
        022735     045  022516  032123  CFMT3:  .ASCIZ  /%N%S4%ASTRAPPED TO POWER-UP THROUGH VECTOR 24/
                                        .LIST   BEX
3903            023014                  .EVEN
```

```
                        .SBTTL AUTO DROP UNIT SECTION

                        ;////////////////////////////////////////////////////////////////////////////
                        ;/ THE AUTO DROP CODING DETERMINES WHETHER OR NOT THE DEVICE WHOSE P-TABLE
                        ;/ WAS JUST OBTAINED IS READY FOR TESTING, AND IT IS DROPPED IF NOT READY.
                        ;////////////////////////////////////////////////////////////////////////////

                        ;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        ;
                        ;       THIS ALGORITHM IS THE SAME A CVDMA TEST # 1 EXCEPT THAT TEST
                        ;       WILL JUST REPORT THE FAILURE AND GO ON -- THIS ROUTINE WILL CAUSE THE
                        ;       DEVICE TO BE DROPPED IF A BUS-TIMEOUT OCCURS WHEN ANY OF THE CSR'S
                        ;       ARE ACCESSED WITH EITHER A ''TST'' OR ''TSTB'' INSTRUCTION.
                        ;
                        ;--------------------------------------------------------------------------

023014                          BGNAUTO
023014                                                          L$AUTO::
                        ;
023014                          SETVEC  #4,#AD.HIT,#0   ;SETUP INVALID-ADDRESS TRAP VECTOR
023014  012746  000000                                          MOV     #0,-(SP)
023020  012746  023132                                          MOV     #AD.HIT,-(SP)
023024  012746  000004                                          MOV     #4,-(SP)
023030  012746  000003                                          MOV     #3,-(SP)
023034  104437                                                  TRAP    C$SVEC
023036  062706  000010                                          ADD     #10,SP
023042  005037  002412                  CLR     TMP0            ;INITIALIZE TRAP FLAG REGISTER
023046  012702  000001                  MOV     #1,R2           ;FLAG BIT
023052  013703  002320                  MOV     BSEL0,R3        ;INIT ADDRESS POINTER
                        ;
023056  105723          1$:             TSTB    (R3)+           ;ACCESS THE CSR'S BY BYTES.
023060  006302                          ASL     R2
023062  103375                          BCC     1$
                        ;
023064  013703  002320                  MOV     BSEL0,R3        ;RE-INIT ADDRESS POINTER
023070  012702  000001                  MOV     #1,R2           ;RE-INIT FLAG BIT
023074  005723          2$:             TST     (R3)+           ;ACCESS THE CSR'S BY WORDS.
023076  006302                          ASL     R2
023100  006302                          ASL     R2
023102  103374                          BCC     2$
                        ;
023104                          CLRVEC  #4              ;RESTORE THE VECTOR TO DS
023104  012700  000004                                          MOV     #4,R0
023110  104436                                                  TRAP    C$CVEC
023112  005737  002412                  TST     TMP0            ;DID WE GET HIT WITH AN INVALID ADDRESS TRAP?
023116  001403                          BEQ     AD.OK           ;NO,  EXIT TEST
023120                                  DODU    LOGDEV          ;YES, DROP THIS LOGICAL DEV.
023120  013700  002266                                          MOV     LOGDEV,R0
023124  104451                                                  TRAP    C$DODU
                        ;
023126  000240          AD.OK:          NOP                     ;(FOR PATCHING IN A HALT IF NECESSARY)
                        ;
023130                          ENDAUTO
023130                                                          L10023:
023130  104461                                                  TRAP    C$AUTO
```

```
3960  023132  050237  002412        AD.HIT: BIS     R2,TMP0         ;FLAG THE HIT IF WE GET IT!
3961  023136  000002                        RTI                     ;RETURN
3962
```

```
3963
3964
3965
3966
3967
3968
3969
3970   023140                          .SBTTL CLEANUP CODING SECTION
3971   023140
3972   023140                          ;////////////////////////////////////////////////////////////////////////
3973   023140                          ;/ THE CLEANUP CODING SECTION CONTAINS THE CODING THAT IS PERFORMED
3974   023140                          ;/ AT THE END OF THE TEST SEQUENCE ON A PARTICULAR UNIT.
3975   023140                          ;////////////////////////////////////////////////////////////////////////
3976   023140
3977   023140                                  BGNCLN
3978   023140                                                                          L$CLEAN::
3979   023140                                  CLRVEC  @#MPIVEC        ;RETURN VECTORS TO SUPERVISOR
3980   023140  013700  002360                                                          MOV     @#MPIVEC,R0
3981   023144  104436                                                                  TRAP    C$CVEC
3982   023146
3983   023146                                  CLRVEC  @#MPOVEC
3984   023146  013700  002362                                                        MOV     @#MPOVEC,R0
3985   023152  104436                                                                TRAP    C$CVEC
3986   023154
3987   023154                                  ENDCLN
3988   023154                                                                  L10024:
3989   023154  104412                                                                TRAP    C$CLEAN
```

```
                                .SBTTL DROP UNIT SECTION

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

023156                                  BGNDU
023156                                                                  L$DU::
                                ;ISSUE UNIBUS RESET TO CLEAN UP
023156                                  BRESET
023156  104433                                                                  TRAP    C$RESET
023160                                  ENDDU
023160                                                                  L10025:
023160  104453                                                                  TRAP    C$DU
```

```
                                .SBTTL ADD UNIT SECTION

                                ;////////////////////////////////////////////////////////////////////
                                ;/ THE ADD-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
                                ;/  TO BE (A) TESTED FOR THE FIRST TIME, OR (B) RESUMED IN TESTING.  IF
                                ;/  'EF.AUNIT' IS SET, THE UNIT WILL BE TESTED AS A NEW UNIT.
                                ;////////////////////////////////////////////////////////////////////

                                        BGNAU

                                                                        L$AU::

                                        ENDAU

                                                                        L10026:
023162  104452                                                                    TRAP    C$AU
```

```
                                .SBTTL TEST 1 -- VIA TIMER 2 ONE SHOT MODE

                                ;++*********************************************************************
                                ;*
                                ;*        TEST 1 -- VIA TIMER 2 ONE SHOT MODE
                                ;*
                                ;*      THIS  TEST  VERIFIES  THAT  THE  TIMER 2 COUNTER IS OPERATIONAL IN
                                ;*      INTERVAL-TIMER (ONE-SHOT) MODE.
                                ;*
                                ;*        THE FOLLOWING IS PERFORMED :
                                ;*
                                ;*      A  MASTER CLEAR IS DONE & THE TIMER IS PLACED IN INTERVAL-TIMER MODE
                                ;*      BY  SETTING  ACR5 = 0 AND THE PROGRAM CHECKS FOR 'T2'' (BIT 5 IN IFR)
                                ;*      TO BE INITIALLY CLEARED.
                                ;*
                                ;*      T2L-L  (ADR  08)  & T2C-H (ADR 09) ARE BOTH LOADED WITH 252 (OCTAL).
                                ;*      (THIS  IS  EQUIVALENT  TO  AAAA  (HEX) OR 43,690 (DECIMAL).) LOADING
                                ;*      T2C-H STARTS THE COUNTER.
                                ;*
                                ;*      T2L-L  IS  LOADED  WITH 001 AND T2C-H IS LOADED WITH 000 IN ORDER TO
                                ;*      SET  'T2''  WITH  A QUICK UNDERFLOW. THE 'T2'' FLAG BIT IN IFR IS READ
                                ;*      AND CHECKED TO BE SET.
                                ;*
                                ;*      T2C-H IS CHECKED TO = 0. CHECKING T2C-H SHOULD NOT HAVE CLEARED 'T2''
                                ;*      -- THIS IS VERIFIED.
                                ;*
                                ;*      T2C-L  IS CHECKED TO = 0. CHECKING T2C-L SHOULD HAVE CLEARED 'T2'' --
                                ;*      THIS TOO IS VERIFIED.
                                ;*
                                ;*      T2C-H  IS  LOADED  WITH  0 AGAIN TO INITIATE A NEW COUNT DOWN (WHICH
                                ;*      SHOULD  UNDERFLOW  ALMOST  IMMEDIATELY)  AND  THE 'T2'' BIT IN IFR IS
                                ;*      CHECKED TO BE SET AGAIN.
                                ;*
                                ;*      T2L-L IS LOADED WITH 125 (OCTAL) AND 'T2'' BIT IS CHECKED TO BE STILL
                                ;*      SET.
                                ;*
                                ;*      T2C-H IS LOADED WITH 125, AND THE 'T2'' BIT IS READ AND CHECKED TO BE
                                ;*      CLEARED BY THE LOADING OF T2C-H.
                                ;*
                                ;*
                                ;*
                                ;--*********************************************************************
                                ;
                                        BGNTST
023164                                                                  T1::
023164                                  BGNSUB
023164                                                                  T1.1:
023164  104402                                                                  TRAP    C$BSUB
                                ;-----------------------------------------------------------------------

023166  004737  003514                  JSR     PC,MSTCLR       ;INIT DMV & ENTER M-LOOP
023172  103003                          BCC     1$              ;IF NO ERROR, PROCEED WITH TESTING
023174                                  ERROR                   ;ELSE, REPORT ERROR
023174  104460                                                                  TRAP    C$ERROR
023176                                  ESCAPE  TST             ;   & EXIT TEST
023176  104410                                                                  TRAP    C$ESCAPE
```

```
                                                                        .WORD   L10027-.
1$:     JSR     R5,INITT2       ;INITIALIZE TIMER # 2
        2000                    ;  2000 ==> LATCHES  (PREVENTS IMMED. TIMEOUT)
        0                       ;  MODE 0 & "T2" INT. ENABLE FLAG CLEARED
        BCC     .+10            ;IF NO ERROR, PROCEED
        ERROR                   ;ELSE, REPORT IT
                                                                        TRAP    C$ERROR
        ESCAPE  TST             ;       AND EXIT THIS TEST
                                                                        TRAP    C$ESCAPE
                                                                        .WORD   L10027-.
        JSR     PC,GETT2        ;IS "T2" SET?
        BVC     .+6             ;IF NO ERROR, PROCEED
        ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
                                                                        TRAP    C$ESCAPE
                                                                        .WORD   L10030-.
        BCC     6$              ;NO, GOOD.
        GEDF    EM51B,ERR51     ;YES, REPORT IT'S NOT BEING CLEARED @ INIT.
                                ;       "DEVICE FATAL" ERROR # 9
                                                                        TRAP    C$ERDF
                                                                        .WORD   9
                                                                        .WORD   EM51B
                                                                        .WORD   ERR51

;-----------------------------------------------------------------------------

        MOVB    #2,TMP9+1
        JSR     R5,WRITE        ;INIT TIMER # 2 BY WRITING INTO
        T2CH                    ;T2C-H (ADDR 09)
        TMP9+1
        BCC     .+10            ;IF NO ERROR, PROCEED
        ERROR                   ;ELSE, REPORT IT
                                                                        TRAP    C$ERROR
        ESCAPE  TST             ;       AND EXIT THIS TEST
                                                                        TRAP    C$ESCAPE
                                                                        .WORD   L10027-.
        JSR     PC,GETT2        ;IS "T2" SET?
        BVC     .+6             ;IF NO ERROR, PROCEED
        ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
                                                                        TRAP    C$ESCAPE
                                                                        .WORD   L10030-.
        BCC     6$              ;NO, GOOD.
        GEDF    EM51B,ERR51     ;YES, REPORT IT'S NOT BEING CLEARED @ INIT.
                                ;       "DEVICE FATAL" ERROR # 10
                                                                        TRAP    C$ERDF
                                                                        .WORD   10
                                                                        .WORD   EM51B
                                                                        .WORD   ERR51
        ESCAPE  SUB             ;AND EXIT SUBTEST
                                                                        TRAP    C$ESCAPE
                                                                        .WORD   L10030-.

;-----------------------------------------------------------------------------

6$:     JSR     R5,LODT2C       ;LOAD TIMER # 2
7$:     .BYTE   252
8$:     .BYTE   252
```

```
4121
4122                                    ;-------------------------------------------------------------------------------
4123
4124  023332  004537  003616            JSR     R5,READ         ;READ THE LOW COUNTER
4125  023336  120010                    T2CL
4126  023340  002432                    TMP8
4127  023342  103003                    BCC     .+10            ;IF NO ERROR, PROCEED
4128  023344                            ERROR                   ;ELSE, REPORT IT
4129  023344  104460                                                            TRAP    C$ERROR
4130  023346                            ESCAPE  TST             ;       AND EXIT THIS TEST
4131  023346  104410                                                            TRAP    C$ESCAPE
4132  023350  000530                                                            .WORD   L10027-.
4133  023352  123737  002432  023330    CMPB    TMP8,7$         ;MAKE SURE THE COUNTER IS DECREMENTING
4134  023360  001004                    BNE     12$             ;IT IS, NOW SEE IF THE HIGH COUNTER IS TOO
4135  023362                            GEDF    EM50D,ERR51     ;IT WASN'T -- REPORT THE ERROR
4136                                                            ;       'DEVICE FATAL'' ERROR # 11
4137  023362  104455                                                            TRAP    C$ERDF
4138  023364  000013                                                            .WORD   11
4139  023366  017453                                                            .WORD   EM50D
4140  023370  011176                                                            .WORD   ERR51
4141  023372  012703  000100    12$:    MOV     #100,R3         ;INIT. TIMEOUT VALUE
4142  023376  004537  003616    13$:    JSR     R5,READ         ;READ THE HIGH COUNTER
4143  023402  120011                    T2CH
4144  023404  002434                    TMP9
4145  023406  103003                    BCC     .+10            ;IF NO ERROR, PROCEED
4146  023410                            ERROR                   ;ELSE, REPORT IT
4147  023410  104460                                                            TRAP    C$ERROR
4148  023412                            ESCAPE  TST             ;       AND EXIT THIS TEST
4149  023412  104410                                                            TRAP    C$ESCAPE
4150  023414  000464                                                            .WORD   L10027-.
4151  023416  123737  002434  023331    CMPB    TMP9,8$         ;DID IT CHANGE FROM THE LOADED VALUE?
4152  023424  001007                    BNE     14$             ;YES, PROCEED WITH TESTING
4153  023426  077315                    SOB     R3,13$          ;NO,  IF NO TIMEOUT, TRY AGAIN
4154  023430                            GEDF    EM51E,ERR51     ;ELSE, REPORT THAT HIGH COUNTER ISN'T RUNNING
4155                                                            ;       'DEVICE FATAL'' ERROR # 12
4156  023430  104455                                                            TRAP    C$ERDF
4157  023432  000014                                                            .WORD   12
4158  023434  021050                                                            .WORD   EM51E
4159  023436  011176                                                            .WORD   ERR51
4160  023440                            ESCAPE  SUB             ;       WE CAN'T PROCEED WITH TESTING EITHER
4161  023440  104410                                                            TRAP    C$ESCAPE
4162  023442  000434                                                            .WORD   L10030-.
4163                                    ;-------------------------------------------------------------------------------
4164
4165  023444  005003    14$:    CLR     R3              ;INITIALIZE TIMEOUT COUNTER
4166  023446  004737  024134    15$:    JSR     PC,GETT2        ;WAIT FOR TIMER TO COUNT DOWN
4167  023452  102002                    BVC     .+6             ;IF NO ERROR, PROCEED
4168  023454                            ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4169  023454  104410                                                            TRAP    C$ESCAPE
4170  023456  000420                                                            .WORD   L10030-.
4171  023460  103406                    BCS     16$             ;DONE.
4172  023462  077307                    SOB     R3,15$          ;NOT YET, TIMEOUT?
4173  023464                            GEDF    EM51P,ERR51     ;YES, REPORT NO 'T2'' INT. FLAG
4174                                                            ;       'DEVICE FATAL'' ERROR # 13
4175  023464  104455                                                            TRAP    C$ERDF
4176  023466  000015                                                            .WORD   13
```

```
                                                                        .WORD   EM51P
                                                                        .WORD   ERR51
                        BR      17$             ;     & BYPASS 'T2'-RESET-ON-T2CH-READ CHECK
;-------------------------------------------------------------------------------
16$:    JSR     R5,READ         ;READ T2C-H (ADDR 09)
        T2CH
        TMP9
        BCC     .+10            ;IF NO ERROR, PROCEED
        ERROR                   ;ELSE, REPORT IT
                                                                        TRAP    C$ERROR
        ESCAPE  TST             ;       AND EXIT THIS TEST
                                                                        TRAP    C$ESCAPE
                                                                        .WORD   L10027-.
        JSR     PC,GETT2        ;IS "T2" STILL SET?
        BVC     .+6             ;IF NO ERROR, PROCEED
        ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
                                                                        TRAP    C$ESCAPE
                                                                        .WORD   L10030-.
        BCS     40$             ;YES, ALL'S OK
        GEDF    EM51G,ERR51     ;NO!  BAD VIA CHIP!
                                ;       "DEVICE FATAL" ERROR # 14
                                                                        TRAP    C$ERDF
                                                                        .WORD   14
                                                                        .WORD   EM51G
                                                                        .WORD   ERR51
        BR      17$             ;   & BYPASS 'T2'-RESET-ON-T2LL-WRITE CHECK
;-------------------------------------------------------------------------------
40$:    JSR     R5,WRITE        ;RE-LOAD T2L-L (ADDR 08)
        T2LL
        TMP8+1
        BCC     .+10            ;IF NO ERROR, PROCEED
        ERROR                   ;ELSE, REPORT IT
                                                                        TRAP    C$ERROR
        ESCAPE  TST             ;       AND EXIT THIS TEST
                                                                        TRAP    C$ESCAPE
                                                                        .WORD   L10027-.
        JSR     PC,GETT2        ;IS "T2" STILL SET?
        BVC     .+6             ;IF NO ERROR, PROCEED
        ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
                                                                        TRAP    C$ESCAPE
                                                                        .WORD   L10030-.
        BCS     17$             ;YES, ALL'S STILL OK
        GEDF    EM51M,ERR51     ;NO!  SOMETHING WENT WRONG!  REPORT IT
                                ;       "DEVICE FATAL" ERROR # 15
                                                                        TRAP    C$ERDF
                                                                        .WORD   15
                                                                        .WORD   EM51M
                                                                        .WORD   ERR51
;-------------------------------------------------------------------------------
17$:    JSR     R5,LODT2C       ;RE-LOAD TIMER # 2 WITH A VALUE WHICH CAUSE AN
```

```
4233  023614  001                 18$:    .BYTE   1               ;ALMOST IMMEDIATE TIMEOUT
4234  023615  000                 19$:    .BYTE   0               ; (ADDRESS OF HIGH BYTE FOR T2C-H (ADDR 09))
4235                              ;-------------------------------------------------------------------------------
4236
4237  023616  004737  024134              JSR     PC,GETT2        ;WAS "T2" SET BY THE ABOVE OPERATION?
4238  023622  102002                      BVC     .+6             ;IF NO ERROR, PROCEED
4239  023624                              ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4240  023624  104410                                                              TRAP    C$ESCAPE
4241  023626  000250                                                              .WORD   L10030-.
4242  023630  103406                      BCS     20$             ;YES, OK -- CONTINUE ERROR CHECKING
4243  023632                              GEDF    EM51F,ERR51     ;NO,  BAD NEWS!  REPORT THE FAILURE
4244                                                              ;       "DEVICE FATAL" ERROR # 16
4245  023632  104455                                                              TRAP    C$ERDF
4246  023634  000020                                                              .WORD   16
4247  023636  021104                                                              .WORD   EM51F
4248  023640  011176                                                              .WORD   ERR51
4249  023642                              ESCAPE  SUB             ;  AND GET OUT OF SUBTEST
4250  023642  104410                                                              TRAP    C$ESCAPE
4251  023644  000232                                                              .WORD   L10030-.
4252  023646  004537  003616      20$:    JSR     R5,READ         ;READ T2C-H (ADDR 09) TO SEE IF THIS CLEARS "T2"
4253  023652  120011                      T2CH                    ;(THIS VALUE ISN'T CHECKED BECAUSE IT CAN BE
4254  023654  002434                      TMP9                    ; ALMOST ANYTHING)
4255  023656  103003                      BCC     .+10            ;IF NO ERROR, PROCEED
4256  023660                              ERROR                   ;ELSE, REPORT IT
4257  023660  104460                                                              TRAP    C$ERROR
4258  023662                              ESCAPE  TST             ;       AND EXIT THIS TEST
4259  023662  104410                                                              TRAP    C$ESCAPE
4260  023664  000214                                                              .WORD   L10027-.
4261  023666  004737  024134              JSR     PC,GETT2        ;PUT THE CURRENT "T2" VALUE INTO THE CARRY BIT
4262  023672  102002                      BVC     .+6             ;IF NO ERROR, PROCEED
4263  023674                              ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4264  023674  104410                                                              TRAP    C$ESCAPE
4265  023676  000200                                                              .WORD   L10030-.
4266  023700  103405                      BCS     21$             ;IF SET, READING T2CH DIDN'T CLEAR IT -- OK!
4267  023702                              GEDF    EM50G,ERR51     ;IF CLEARED!  BAD VIA CHIP!
4268                                                              ;       "DEVICE FATAL" ERROR # 17
4269  023702  104455                                                              TRAP    C$ERDF
4270  023704  000021                                                              .WORD   17
4271  023706  017610                                                              .WORD   EM50G
4272  023710  011176                                                              .WORD   ERR51
4273  023712  000400                      BR      28$             ;BYPASS THE REST OF THIS SECTION OF TESTING
4274
4275  023714                      21$:
4276                              ;-------------------------------------------------------------------------------
4277
4278  023714  004537  003616      28$:    JSR     R5,READ         ;READ T2C-L (ADDR 08)
4279  023720  120010                      T2CL                    ;(THIS VALUE ISN'T CHECKED BECAUSE IT CAN BE
4280  023722  002432                      TMP8                    ; ALMOST ANYTHING)
4281  023724  103003                      BCC     .+10            ;IF NO ERROR, PROCEED
4282  023726                              ERROR                   ;ELSE, REPORT IT
4283  023726  104460                                                              TRAP    C$ERROR
4284  023730                              ESCAPE  TST             ;       AND EXIT THIS TEST
4285  023730  104410                                                              TRAP    C$ESCAPE
4286  023732  000146                                                              .WORD   L10027-.
4287  023734  004737  024134              JSR     PC,GETT2        ;IS "T2" CLEARED NOW
4288  023740  102002                      BVC     .+6             ;IF NO ERROR, PROCEED
```

```
4289  023742                          ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4290  023742  104410                                                          TRAP    C$ESCAPE
4291  023744  000132                                                          .WORD   L10030-.
4292  023746  103004                  BCC     29$             ;YES, ALL'S OK
4293  023750                          GEDF    EM51C,ERR51     ;NO!  BAD VIA CHIP!
4294                                                          ;       'DEVICE FATAL'' ERROR # 18
4295  023750  104455                                                          TRAP    C$ERDF
4296  023752  000022                                                          .WORD   18
4297  023754  021002                                                          .WORD   EM51C
4298  023756  011176                                                          .WORD   ERR51
4299
4300                                  ;-------------------------------------------------------------------------------
4301
4302  023760  004537  004042  29$:    JSR     R5,WRITE        ;RE-WRITE INTO T2C-H (ADDR 09) TO SET T2 AGAIN
4303  023764  120011                  T2CH
4304  023766  002435                  TMP9+1
4305  023770  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
4306  023772                          ERROR                   ;ELSE, REPORT IT
4307  023772  104460                                                          TRAP    C$ERROR
4308  023774                          ESCAPE  TST             ;       AND EXIT THIS TEST
4309  023774  104410                                                          TRAP    C$ESCAPE
4310  023776  000102                                                          .WORD   L10027-.
4311  024000  004737  024134          JSR     PC,GETT2        ;IS 'T2'' SET AGAIN
4312  024004  102002                  BVC     .+6             ;IF NO ERROR, PROCEED
4313  024006                          ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4314  024006  104410                                                          TRAP    C$ESCAPE
4315  024010  000066                                                          .WORD   L10030-.
4316  024012  103406                  BCS     32$             ;YES, ALL'S WELL (AGAIN?)
4317  024014                          GEDF    EM51L,ERR51     ;NO!  SOMETHING WENT WRONG!  REPORT IT
4318                                                          ;       'DEVICE FATAL'' ERROR # 19
4319  024014  104455                                                          TRAP    C$ERDF
4320  024016  000023                                                          .WORD   19
4321  024020  021213                                                          .WORD   EM51L
4322  024022  011176                                                          .WORD   ERR51
4323  024024                          ESCAPE  SUB             ;       AND EXIT FROM THIS SUBTEST
4324  024024  104410                                                          TRAP    C$ESCAPE
4325  024026  000050                                                          .WORD   L10030-.
4326
4327                                  ;-------------------------------------------------------------------------------
4328
4329  024030  004537  024102  32$:    JSR     R5,LODT2C       ;AGAIN RE-LOAD TIMER # 2.  THIS TIME WITH
4330  024034     125     125          .BYTE   125,125         ;  LARGER BUT DIFFERENT VALUES
4331
4332                                  ;-------------------------------------------------------------------------------
4333
4334  024036  004737  024134          JSR     PC,GETT2        ;'T2'' SHOULD NOW BE CLEARED
4335  024042  102002                  BVC     .+6             ;IF NO ERROR, PROCEED
4336  024044                          ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4337  024044  104410                                                          TRAP    C$ESCAPE
4338  024046  000030                                                          .WORD   L10030-.
4339  024050  103004                  BCC     34$             ;IT WAS, ALL'S WELL THAT END'S WELL (I THINK!?)
4340  024052                          GEDF    EM51N,ERR51     ;IT WASN'T!  SOMETHING WENT WRONG!  REPORT IT
4341                                                          ;       'DEVICE FATAL'' ERROR # 20
4342  024052  104455                                                          TRAP    C$ERDF
4343  024054  000024                                                          .WORD   20
4344  024056  021337                                                          .WORD   EM51N
```

```
4345  024060  011176                                                        .WORD   ERR51
4346
4347  024062  004537  004630    34$:    JSR     R5,INITT2       ;RE-INITIALIZE TIMER # 1 W/ NORMAL RESET VALUES
4348  024066  000000              0
4349  024070  000000              0
4350  024072  103001              BCC     .+4             ;IF NO ERROR, EXIT
4351  024074                      ERROR                   ;ELSE, REPORT IT
4352  024074  104460                                                      TRAP    C$ERROR
4353
4354  024076                      ENDSUB
4355  024076                                                          L10030:
4356  024076  104403                                                      TRAP    C$ESUB
4357
4358  024100                      ENDTST
4359  024100                                                          L10027:
4360  024100  104401                                                      TRAP    C$ETST
4361
4362                      ;-------------------------------------------------------------------------
4363                      ; LODT2C -- LOAD TIMER TWO AT ADDRESSES 08 & 09
4364                      ;
4365                      ; CALLING SEQUENCE:
4366                      ;
4367                      ;       JSR     R5,LODT2C
4368                      ;       .BYTE   <VALUE FOR T2L-L (ADDRESS 08)>
4369                      ;       .BYTE   <VALUE FOR T2C-H (ADDRESS 09)>
4370                      ;       <NEXT SEQUENCIAL INSTRUCTION
4371                      ;
4372                      ;-------------------------------------------------------------------------
4373
4374  024102  112537  002433    LODT2C: MOVB    (R5)+,TMP8+1    ;SETUP TO LOAD T2LL
4375  024106  112537  002435            MOVB    (R5)+,TMP9+1    ;  AND T2CH
4376  024112  004537  004042            JSR     R5,WRITE        ;LOAD T2L-L (ADDR 08) WITH PASSED PARAMETER
4377  024116  120010                     T2LL
4378  024120  002433                     TMP8+1
4379  024122  004537  004042            JSR     R5,WRITE        ;LOAD T2C-H (ADDR 09) WITH PASSED PARAMETER
4380  024126  120011                     T2CH                    ;  (THIS WILL ALSO RESET "T2" & THE COUNTER)
4381  024130  002435                     TMP9+1
4382  024132  000205                     RTS     R5
4383
4384                      ;-------------------------------------------------------------------------
4385                      ; GETT2 -- GET THE "T2" FLAG FROM THE VIA'S IFR REGISTER AND PUT IT
4386                      ;          INTO THE "CARRY" BIT
4387                      ;
4388                      ;-------------------------------------------------------------------------
4389
4390  024134  004537  003616    GETT2:  JSR     R5,READ         ;GET VIA'S IFR REG.
4391  024140  120015                     IFR
4392  024142  002444                     TMPD
4393  024144  103003                     BCC     1$              ;IF NO ERROR, PROCEED
4394  024146                              ERROR                   ;ELSE, REPORT IT
4395  024146  104460                                                              TRAP    C$ERROR
4396  024150  000262                     SEV                     ;FLAG AN ERROR TO MAINLINE ROUTINE
4397  024152  000207                     RTS     PC              ;  AND TAKE AN ABNORMAL RETURN
4398
4399  024154  010046              1$:     MOV     R0,-(SP)        ;PRESERVE R0
4400  024156  113700  002444            MOVB    TMPD,R0         ;PUT VALUE HERE TO PRESERVE TMP0
```

```
4401   024162   106100                ROLB    R0              ;"IRQ" GOES INTO CARRY BIT
4402   024164   106100                ROLB    R0              ;"T1" GOES INTO CARRY BIT
4403   024166   106100                ROLB    R0              ;"T2" GOES INTO CARRY BIT
4404   024170   012600                MOV     (SP)+,R0        ;RESTORE R0
4405   024172   000207                RTS     PC
4406
```

```
                                   .SBTTL TEST 2 -- VIA'S SR INPUT (MODE 2) - SYSTEM CLOCK MODE

                                   ;++*********************************************************************
                                   ;*
                                   ;*        TEST 2 -- VIA'S SR INPUT (MODE 2) - SYSTEM CLOCK MODE
                                   ;*
                                   ;* A MASTER CLEAR IS DONE. THEN THE SHIFT REG IS PLACED IN INPUT MODE
                                   ;* UNDER CONTROL OF VIA CLK, BY SETTING ACR BIT 4 TO 0, BIT 3 TO 1, AND BIT 2
                                   ;* TO 0. THE PROGRAM CHECKS FOR THE SR FLAG (BIT 2) IN THE IFR TO BE INITIALLY
                                   ;* CLEARED. THEN, THE SR IS LOADED TO INITIALIZE THE SR OPERATION, AND THE
                                   ;* PROGRAM CHECKS FOR SR FLAG = 1 AFTER ABOUT 8 US. AND READS SR REGISTER TO
                                   ;* VERIFY THAT SHIFTING O:CURRED.
                                   ;*
                                   ;--*********************************************************************
                                   ;
                                   ;        BGNTST
 024174                                                                          T2::
 024174  004737  003514                    JSR     PC,MSTCLR        ;INIT DMV & ENTER M-LOOP
 024200  103003                            BCC     1$               ;IF NO ERROR, PROCEED WITH TESTING
 024202                                    ERROR                    ;ELSE, REPORT ERROR
 024202  104460                                                                          TRAP    C$ERROR
 024204                                    ESCAPE  TST              ;    & EXIT TEST
 024204  104410                                                                          TRAP    C$ESCAPE
 024206  000612                                                                          .WORD   L10031-.
 024210  005037  002437            1$:     CLR     TMPA+1           ;CLEAR THE 'WRITE'' DATA FOR ERROR MESSAGES
 024214  005037  002252                    CLR     TDATA            ;THIS IS A FLAG TO INDICATE THAT 'SR'' HASN'T
                                                                    ;BEEN LOADED YET.
 024220  004537  003616                    JSR     R5,READ          ;GET CURRENT 'ACR'' CONTENTS (SHOULD BE 000)
 024224  120013                            ACR
 024226  002440                            TMPB
 024230  103003                            BCC     .+10             ;IF NO ERROR, PROCEED
 024232                                    ERROR                    ;ELSE, REPORT IT
 024232  104460                                                                          TRAP    C$ERROR
 024234                                    ESCAPE  TST              ;        AND EXIT THIS TEST
 024234  104410                                                                          TRAP    C$ESCAPE
 024236  000562                                                                          .WORD   L10031-.
 024240  113737  002440  002441            MOVB    TMPB,TMPB+1      ;MOVE IT FROM I/P BUFFER TO O/P BUFFER
 024246  142737  000034  002441            BICB    #<BIT2+BIT3+BIT4>,TMPB+1  ;MAKE SURE CURRENT MODE IS 0
 024254  004537  004042                    JSR     R5,WRITE         ;FORCE IT TO THAT MODE (MODE 0)
 024260  120013                            ACR
 024262  002441                            TMPB+1
 024264  103003                            BCC     .+10             ;IF NO ERROR, PROCEED
 024266                                    ERROR                    ;ELSE, REPORT IT
 024266  104460                                                                          TRAP    C$ERROR
 024270                                    ESCAPE  TST              ;        AND EXIT THIS TEST
 024270  104410                                                                          TRAP    C$ESCAPE
 024272  000526                                                                          .WORD   L10031-.
 024274  004537  003616                    JSR     R5,READ          ;READ IER INCASE IT'S NEEDED FOR ERROR MESSAGES
 024300  120016                            IENR
 024302  002446                            TMPE
 024304  103003                            BCC     .+10             ;IF NO ERROR, PROCEED
 024306                                    ERROR                    ;ELSE, REPORT IT
 024306  104460                                                                          TRAP    C$ERROR
 024310                                    ESCAPE  TST              ;        AND EXIT THIS TEST
 024310  104410                                                                          TRAP    C$ESCAPE
 024312  000506                                                                          .WORD   L10031-.
```

```
 4463  024314  004737  025022                    JSR     PC,GETSR        ;SAMPLE SR INTERRUPT FLAG -- IT SHOULD BE 0
 4464  024320  102002                            BVC     .+6             ;IF NO ERROR, PROCEED
 4465  024322                                    ESCAPE  TST             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
 4466  024322  104410                                                            TRAP    C$ESCAPE
 4467  024324  000474                                                            .WORD   L10031-.
 4468  024326  103014                            BCC     4$              ;IT IS, GOOD.
 4469  024330  004537  003616                    JSR     R5,READ         ;READ SR FOR ERROR MESSAGE
 4470  024334  120012                            SR
 4471  024336  002436                            TMPA
 4472  024340  103003                            BCC     .+10            ;IF NO ERROR, PROCEED
 4473  024342                                    ERROR                   ;ELSE, REPORT IT
 4474  024342  104460                                                            TRAP    C$ERROR
 4475  024344                                    ESCAPE  TST             ;       AND EXIT THIS TEST
 4476  024344  104410                                                            TRAP    C$ESCAPE
 4477  024346  000452                                                            .WORD   L10031-.
 4478  024350                                    GEDF    EM52A,ERR52     ;IT ISN'T!  REPORT SR NOT INITIALLY CLEARED
 4479                                                                    ;       'DEVICE FATAL'' ERROR # 21
 4480  024350  104455                                                            TRAP    C$ERDF
 4481  024352  000025                                                            .WORD   21
 4482  024354  021457                                                            .WORD   EM52A
 4483  024356  011270                                                            .WORD   ERR52
 4484  024360  152737  000010  002441  4$:       BISB    #BIT3,TMPB+1    ;SET SHIFT REG. TO MODE 2
 4485  024366  004537  004042                    JSR     R5,WRITE
 4486  024372  120013                            ACR
 4487  024374  002441                            TMPB+1
 4488  024376  103003                            BCC     .+10            ;IF NO ERROR, PROCEED
 4489  024400                                    ERROR                   ;ELSE, REPORT IT
 4490  024400  104460                                                            TRAP    C$ERROR
 4491  024402                                    ESCAPE  TST             ;       AND EXIT THIS TEST
 4492  024402  104410                                                            TRAP    C$ESCAPE
 4493  024404  000414                                                            .WORD   L10031-.
 4494  024406  112737  000204  002447            MOVB    #BIT7+BIT2,TMPE+1  ;ENABLE SR INTERRUPTS WITHIN DMV-11
 4495  024414  004537  004042                    JSR     R5,WRITE        ;  (WE WILL NOT BE ALLOWING THEM TO GIVE US
 4496  024420  120016                            IENR                    ;   A Q-BUS INTERRUPT)
 4497  024422  002447                            TMPE+1
 4498  024424  103003                            BCC     .+10            ;IF NO ERROR, PROCEED
 4499  024426                                    ERROR                   ;ELSE, REPORT IT
 4500  024426  104460                                                            TRAP    C$ERROR
 4501  024430                                    ESCAPE  TST             ;       AND EXIT THIS TEST
 4502  024430  104410                                                            TRAP    C$ESCAPE
 4503  024432  000366                                                            .WORD   L10031-.
 4504  024434  004537  003616                    JSR     R5,READ         ;READ IER INCASE IT'S NEEDED FOR ERROR MESSAGES
 4505  024440  120016                            IENR
 4506  024442  002446                            TMPE
 4507  024444  103003                            BCC     .+10            ;IF NO ERROR, PROCEED
 4508  024446                                    ERROR                   ;ELSE, REPORT IT
 4509  024446  104460                                                            TRAP    C$ERROR
 4510  024450                                    ESCAPE  TST             ;       AND EXIT THIS TEST
 4511  024450  104410                                                            TRAP    C$ESCAPE
 4512  024452  000346                                                            .WORD   L10031-.
 4513  024454  105037  002437                    CLRB    TMPA+1          ;LOAD SR WITH PROPER VALUE....
 4514  024460  005737  002366                    TST     BRDTYP          ;  NOTE: THE INPUT LEAD (CB2) WILL EITHER BE
 4515  024464  001403                            BEQ     5$              ;       TIED HI(M8064) OR LO(M8053).
 4516  024466  112737  000377  002437            MOVB    #377,TMPA+1     ; IF M8064, THEN LOAD SR WITH 000.
 4517  024474  004537  004042          5$:       JSR     R5,WRITE        ; IF M8053, THEN LOAD SR WITH 377.
 4518  024500  120012                            SR                      ;  THIS ALSO STARTS THE SHIFTING OPERATION.
```

```
4519  024502  002437                        TMPA+1                  ;
4520
4521  024504  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
4522  024506                                ERROR                   ;ELSE, REPORT IT
4523  024506  104460                                                                TRAP    C$ERROR
4524  024510                                ESCAPE  TST             ;       AND EXIT THIS TEST
4525  024510  104410                                                                TRAP    C$ESCAPE
4526  024512  000306                                                                .WORD   L10031-.
4527
4528  024514  005337  002252                DEC     TDATA           ;INDICATE THAT "SR" HAS BEEN LOADED NOW
4529  024520  012703  000100                MOV     #100,R3         ;GIVE THE INTERRUPT A CHANCE TO HAPPEN
4530  024524  077301                        SOB     R3,.
4531  024526  132777  000004  155572        BITB    #BIT2,@#SEL3    ;DID AN SR INTERRUPT OCCUR WITHIN THE 6502?
4532  024534  001026                        BNE     6$              ;YES, GOOD.
4533  024536  004537  003616                JSR     R5,READ         ;NO,  SETUP TO REPORT THE ERROR:
4534  024542  120015                        IFR                     ;  GET INTERRUPT FLAG REGISTER
4535  024544  002444                        TMPD
4536  024546  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
4537  024550                                ERROR                   ;ELSE, REPORT IT
4538  024550  104460                                                                TRAP    C$ERROR
4539  024552                                ESCAPE  TST             ;       AND EXIT THIS TEST
4540  024552  104410                                                                TRAP    C$ESCAPE
4541  024554  000244                                                                .WORD   L10031-.
4542  024556  004537  003616                JSR     R5,READ         ;  GET FINAL SR CONTENTS -- SHOULD BE 0
4543  024562  120012                        SR
4544  024564  002436                        TMPA
4545  024566  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
4546  024570                                ERROR                   ;ELSE, REPORT IT
4547  024570  104460                                                                TRAP    C$ERROR
4548  024572                                ESCAPE  TST             ;       AND EXIT THIS TEST
4549  024572  104410                                                                TRAP    C$ESCAPE
4550  024574  000224                                                                .WORD   L10031-.
4551  024576                                GEDF    EM52B,ERR52     ;REPORT MISSING SR INTERRUPT WITHIN DMV-11
4552                                                                ;       'DEVICE FATAL" ERROR # 22
4553  024576  104455                                                                TRAP    C$ERDF
4554  024600  000026                                                                .WORD   22
4555  024602  021535                                                                .WORD   EM52B
4556  024604  011270                                                                .WORD   ERR52
4557  024606                                ESCAPE  TST             ;FURTHER TESTING INVALID
4558  024606  104410                                                                TRAP    C$ESCAPE
4559  024610  000210                                                                .WORD   L10031-.
4560  024612  004537  003616          6$:   JSR     R5,READ         ;GET FINAL SR CONTENTS:
4561  024616  120012                        SR                      ; IF M8064, THEN SR SHOULD=377
4562  024620  002436                        TMPA                    ; IF M8053, THEN SR SHOULD=000
4563  024622  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
4564  024624                                ERROR                   ;ELSE, REPORT IT
4565  024624  104460                                                                TRAP    C$ERROR
4566  024626                                ESCAPE  TST             ;       AND EXIT THIS TEST
4567  024626  104410                                                                TRAP    C$ESCAPE
4568  024630  000170                                                                .WORD   L10031-.
4569
4570  024632  005737  002366                TST     BRDTYP          ;CHECK DMV-11 BOARD TYPE
4571  024636  001005                        BNE     9$              ;
4572  024640  122737  000377  002436        CMPB    #377,TMPA       ;M8064::SEE IF CORRECT RESULT
4573  024646  001422                        BEQ     8$              ;       YES:GOOD
4574  024650  000403                        BR      7$              ;       NO: GO REPORT ERROR
```

```
4575  024652  105737  002436  9$:     TSTB    TMPA            ;M8053::SEE IF CORRECT RESULT
4576  024656  001416                  BEQ     8$              ;       YES:GOOD.
4577  024660  004537  003616  7$:     JSR     R5,READ         ; NO: SETUP TO REPORT THE ERROR:
4578  024664  120015                  IFR                     ;  GET INTERRUPT FLAG REGISTER
4579  024666  002444                  TMPD
4580  024670  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
4581  024672                          ERROR                   ;ELSE, REPORT IT
4582  024672  104460                                                          TRAP    C$ERROR
4583  024674                          ESCAPE  TST             ;       AND EXIT THIS TEST
4584  024674  104410                                                          TRAP    C$ESCAPE
4585  024676  000122                                                          .WORD   L10031-.
4586  024700                          GEDF    EM52C,ERR52     ;REPORT INCOMPLETE OR BAD SHIFTING OPERATION
4587                                                          ;       'DEVICE FATAL'' ERROR # 23
4588  024700  104455                                                          TRAP    C$ERDF
4589  024702  000027                                                          .WORD   23
4590  024704  021567                                                          .WORD   EM52C
4591  024706  011270                                                          .WORD   ERR52
4592  024710                          ESCAPE  TST             ;FURTHER TESTING INVALID
4593  024710  104410                                                          TRAP    C$ESCAPE
4594  024712  000106                                                          .WORD   L10031-.
4595  024714  105077  155406  8$:     CLRB    @#SEL3          ;CLEAR THE INTERRUPT FLAGS
4596  024720  004537  003616          JSR     R5,READ         ;HIT THE SHIFT REG. THIS TIME WITH A READ
4597  024724  120012                  SR                      ; (WE DON'T REALLY CARE THIS TIME WHAT THE DATA
4598  024726  002436                  TMPA                    ;  RETURNED IS. BUT, WE HAVE TO PUT IT SOMEWHERE
4599  024730  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
4600  024732                          ERROR                   ;ELSE, REPORT IT
4601  024732  104460                                                          TRAP    C$ERROR
4602  024734                          ESCAPE  TST             ;       AND EXIT THIS TEST
4603  024734  104410                                                          TRAP    C$ESCAPE
4604  024736  000062                                                          .WORD   L10031-.
4605  024740  004737  005132          JSR     PC,STALL        ;DELAY FOR A LITTLE WHILE TO LET THE INTERRUPT
4606  024744  004737  005132          JSR     PC,STALL        ;  GET THROUGH
4607  024750  004737  005132          JSR     PC,STALL
4608  024754  132777  000004  155344  BITB    #BIT2,@#SEL3    ;DID WE GET AN INTERRUPT ON THE READ OPERATION?
4609  024762  001016                  BNE     10$             ;YES, GOOD.
4610  024764  004537  003616          JSR     R5,READ         ;NO,  SETUP TO REPORT THE ERROR:
4611  024770  120015                  IFR                     ;  GET INTERRUPT FLAG REGISTER
4612  024772  002444                  TMPD
4613  024774  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
4614  024776                          ERROR                   ;ELSE, REPORT IT
4615  024776  104460                                                          TRAP    C$ERROR
4616  025000                          ESCAPE  TST             ;       AND EXIT THIS TEST
4617  025000  104410                                                          TRAP    C$ESCAPE
4618  025002  000016                                                          .WORD   L10031-.
4619  025004                          GEDF    EM52D,ERR52     ;REPORT THE FAILURE.
4620                                                          ;       'DEVICE FATAL'' ERROR # 24
4621  025004  104455                                                          TRAP    C$ERDF
4622  025006  000030                                                          .WORD   24
4623  025010  021653                                                          .WORD   EM52D
4624  025012  011270                                                          .WORD   ERR52
4625  025014                          ESCAPE  TST
4626  025014  104410                                                          TRAP    C$ESCAPE
4627  025016  000002                                                          .WORD   L10031-.
4628  025020          10$:
4629  025020                          ENDTST
4630  025020                                                  L10031:
```

```
4631  025020  104401                                                  TRAP    C$ETST
4632  025022  004537  003616    GETSR:  JSR     R5,READ
4633  025026  120015                    IFR                 ;GET CURRENT INTERRUPT FLAG REGISTER SETTINGS
4634  025030  002444                    TMPD
4635  025032  103003                    BCC     1$          ;IF NO ERROR, PROCEED
4636  025034                            ERROR               ;ELSE, REPORT IT
4637  025034  104460                                                  TRAP    C$ERROR
4638  025036  000262                    SEV                 ;FLAG AN ERROR TO MAINLINE ROUTINE
4639  025040  000207                    RTS     PC          ;  AND TAKE AN ABNORMAL RETURN
4640
4641  025042  010046            1$:     MOV     R0,-(SP)    ;SAVE REGISTER FOR CALLER
4642  025044  113700  002444            MOVB    TMPD,R0     ;PUT THEM WHERE WE CAN EASILY MASAGE THEM
4643  025050  106000                    RORB    R0          ;CA2 ===> CARRY BIT
4644  025052  106000                    RORB    R0          ;CA1 ===> CARRY BIT
4645  025054  106000                    RORB    R0          ;SR ===> CARRY BIT
4646  025056  012600                    MOV     (SP)+,R0    ;RESTORE REGISTER
4647  025060  000207                    RTS     PC          ;RETURN WITH SR INTERRUPT FLAG IN CARRY BIT
4648
```

```
                                      .SBTTL TEST 3 -- NPR CONTROL REGISTER - MASTER CLEAR

                                      ;++*********************************************************************
                                      ;*
                                      ;*        TEST 3 -- NPR CONTROL REGISTER - MASTER CLEAR
                                      ;*
                                      ;* THE PROGRAM SETS THE FOLLOWING BITS IN THE NPR CONTROL REGISTER :
                                      ;* IN/OUT, BYTE OPER, AND DISABL INIT. THE REGISTER IS READ AND VERIFIED.
                                      ;* THEN, A MASTER CLEAR IS PERFORMED, AND THE REGISTER IS READ AND CHECKED FOR
                                      ;* 000.
                                      ;*
                                      ;--*********************************************************************
                                      ;
                                      ;             BGNTST
 025062                                                                              T3::
 025062  004737  003514                       JSR     PC,MSTCLR        ;INIT DMV & START UP MAINT. LOOP
 025066  103003                               BCC     1$               ;IF NO ERROR, PROCEED WITH TESTING
 025070                                       ERROR                    ;ELSE REPORT ERROR
 025070  104460                                                                        TRAP    C$ERROR
 025072                                       ESCAPE  TST              ;    & EXIT TEST
 025072  104410                                                                        TRAP    C$ESCAPE
 025074  000352                                                                        .WORD   L10032-.

 025076  004737  005134          1$:          JSR     PC,NPREAD        ;GET CONTENTS OF ALL NPR REGISTERS INTO BT2
 025102  103002                               BCC     30$              ;IF AN ERROR OCCURED,
 025104                                       ERROR                    ;REPORT IT &
 025104  104460                                                                        TRAP    C$ERROR
 025106  000557                               BR      24$              ;  EXIT

 025110  012702  002740          30$:         MOV     #BT2,R2          ;POINT TO NPR REGISTER CONTENTS
 025114  010237  002256                       MOV     R2,BDATA         ;USE IT ALSO FOR ERROR HANDLING
 025120  010237  025234                       MOV     R2,13$           ;SETUP ALSO FOR READ BACK

 025124  004537  005004                       JSR     R5,MOVSW         ;GET THE ''EXPECTED'' RESULTS TOO
 025130  002632                               NPRMCR
 025132  002654                  12$:         BT1
 025134  000011                  11$:         9.
 025136  013701  025132                       MOV     12$,R1           ;POINT TO TABLE OF EXPECTED REGISTER CONTENTS
 025142  010137  002254                       MOV     R1,GDATA         ;USE IT ALSO FOR ERROR HANDLING
 025146  012703  000001                       MOV     #1,R3            ;COUNT OF # OF NPR REGISTERS BEING PROCESSED
                                                                       ;FOR NOW,  ONLY THE CONTROL REGISTER IS CHECKED!!

                                      ;=====================================================================
                                      ; PLEASE NOTE THAT ''GDATA'' & ''BDATA'' NOW CONTAIN POINTERS -- NOT DATA!
                                      ; THIS IS A DEVIANT AND THEREFORE SHOULD BE BORNE IN MIND WHEN TRYING TO
                                      ; FOLLOW THIS DEVIOUS LOGIC.
                                      ;=====================================================================

 025152  121112                  2$:          CMPB    (R1),(R2)        ;CHECK ONE BYTE
 025154  001003                               BNE     3$               ;GO REPORT FAILURE IF ANY ERROR IS FOUND
 025156  022122                               CMP     (R1)+,(R2)+      ;BUMP POINTERS -- TABLES ARE ACTUALLY WORD TABLES
 025160  077304                               SOB     R3,2$            ;LOOP IF NOT DONE YET
 025162  000412                               BR      4$               ;ELSE, PROCEED WITH TESTING

 025164  163701  025132          3$:          SUB     12$,R1           ;CALCULATE THE REGISTER # CAUSING THE FAILURE
 025170  010137  002300                       MOV     R1,REGNUM        ;IDENTIFY FAULTY REGISTER
```

```
4705  025174                          GEDF    EM26,ERR8       ;NPR ERROR -- BAD INITIALIZATION
4706                                                          ;       'DEVICE FATAL'' ERROR # 25
4707  025174  104455                                                    TRAP    C$ERDF
4708  025176  000031                                                    .WORD   25
4709  025200  016152                                                    .WORD   EM26
4710  025202  006532                                                    .WORD   ERR8
4711  025204                          ESCAPE  TST             ;IF IT CAN'T BE INIT'ED, WE CAN'T TEST IT!
4712  025204  104410                                                    TRAP    C$ESCAPE
4713  025206  000240                                                    .WORD   L10032-.
4714  025210  004537  004054    4$:   JSR     R5,WRITEI       ;WRITE THE TEST PATTERN INTO THE CONTROL REG.
4715  025214  123004                  NPRCTL
4716  025216  000355              5$:   355                     ;THIS SET SEVERAL BITS -- BUT NOT ALL!
4717  025220  103002                  BCC     31$             ;IF AN ERROR OCCURED,
4718  025222                          ERROR                   ;REPORT IT &
4719  025222  104460                                                    TRAP    C$ERROR
4720  025224  000510                  BR      24$             ;  EXIT
4721  025226  004537  003616    31$:  JSR     R5,READ         ;READ IT BACK
4722  025232  123004                  NPRCTL
4723  025234  002740              13$:  BT2
4724  025236  103002                  BCC     32$             ;IF AN ERROR OCCURED,
4725  025240                          ERROR                   ;REPORT IT &
4726  025240  104460                                                    TRAP    C$ERROR
4727  025242  000501                  BR      24$             ;  EXIT
4728
4729  025244  013777  025216  155002  32$:  MOV     5$,@GDATA       ;BUILD THE EXPECTED RETURN VALUE
4730  025252  042777  000300  154774        BIC     #NPRABT!NPRGO,@GDATA    ;WE CAN'T WRITE THESE BITS
4731
4732  025260  004737  005134            JSR     PC,NPREAD       ;GET CONTENTS OF ALL NPR REGISTERS INTO BT2
4733  025264  103002                    BCC     33$             ;IF AN ERROR OCCURED,
4734  025266                            ERROR                   ;REPORT IT &
4735  025266  104460                                                    TRAP    C$ERROR
4736  025270  000466                    BR      24$             ;  EXIT
4737  025272  013701  002254    33$:    MOV     GDATA,R1        ;POINT TO TABLE OF EXPECTED REGISTER CONTENTS
4738  025276  013702  002256            MOV     BDATA,R2        ;POINT TO NPR REGISTER CONTENTS
4739  025302  012703  000001            MOV     #1,R3           ;COUNT OF # OF NPR REGISTERS BEING PROCESSED
4740                                                            ;FOR NOW,  ONLY THE CONTROL REGISTER IS CHECKED!!
4741
4742  025306  121112    7$:     CMPB    (R1),(R2)       ;CHECK ONE BYTE
4743  025310  001003            BNE     8$              ;GO REPORT FAILURE IF ANY ERROR IS FOUND
4744  025312  022122            CMP     (R1)+,(R2)+     ;BUMP POINTERS -- TABLES ARE ACTUALLY WORD TABLES
4745  025314  077304            SOB     R3,7$           ;LOOP IF NOT DONE YET
4746  025316  000412            BR      9$              ;ELSE, PROCEED WITH TESTING
4747
4748  025320  163701  025132    8$:     SUB     12$,R1          ;CALCULATE THE REGISTER # CAUSING THE FAILURE
4749  025324  010137  002300            MOV     R1,REGNUM       ;IDENTIFY FAULTY REGISTER
4750  025330                            GEDF    EM26A,ERR8      ;NPR ERROR -- DURING WRITE TO CONTROL REG.
4751                                                            ;       'DEVICE FATAL'' ERROR # 26
4752  025330  104455                                                    TRAP    C$ERDF
4753  025332  000032                                                    .WORD   26
4754  025334  016204                                                    .WORD   EM26A
4755  025336  006532                                                    .WORD   ERR8
4756  025340                            ESCAPE  TST             ;IF IT CAN'T BE INIT'ED, WE CAN'T TEST IT!
4757  025340  104410                                                    TRAP    C$ESCAPE
4758  025342  000104                                                    .WORD   L10032-.
4759  025344  004737  003514    9$:     JSR     PC,MSTCLR       ;RE-INITIALIZE DMV & ENTER M-LOOP
4760  025350  103003            20$:    BCC     20$             ;IF NO ERROR, PROCEED WITH TESTING
```

```
4761  025352
4762  025352  104460                    ERROR                   ;ELSE REPORT IT
4763  025354                                                                          TRAP    C$ERROR
4764  025354  104410                    ESCAPE  TST             ;   & EXIT TEST
4765  025356  000070                                                                  TRAP    C$ESCAPE
4766                                                                                  .WORD   L10032-.
4767                              ;       THE 'MASTER CLEAR'' JUST PERFORMED SHOULD RESET THE NPR CONTROL
4768                              ;       REGISTER.  IT SHOULD NOW EQUAL 004 AGAIN.
4769
4770  025360  013777  002632  154666  20$:    MOV     NPRMCR,@GDATA   ;RESET THE EXPECTED DATA
4771
4772                              ;       ALSO, THE OTHER REGISTERS SHOULD STILL BE AT THEIR INITIAL VALUES
4773
4774  025366  004737  005134            JSR     PC,NPREAD       ;GET CONTENTS OF ALL NPR REGISTERS INTO BT2
4775  025372  103002                    BCC     34$             ;IF AN ERROR OCCURED,
4776  025374                            ERROR                   ;REPORT IT &
4777  025374  104460                                                                  TRAP    C$ERROR
4778  025376  000423                    BR      24$             ;  EXIT
4779  025400  013701  002254    34$:    MOV     GDATA,R1        ;POINT TO TABLE OF EXPECTED REGISTER CONTENTS
4780  025404  013702  002256            MOV     BDATA,R2        ;POINT TO NPR REGISTER CONTENTS
4781  025410  012703  000001            MOV     #1,R3           ;COUNT OF # OF NPR REGISTERS BEING PROCESSED
4782                                                            ;FOR NOW,  ONLY THE CONTROL REGISTER IS CHECKED!!
4783
4784  025414  121112    21$:    CMPB    (R1),(R2)       ;CHECK ONE BYTE
4785  025416  001003            BNE     22$             ;GO REPORT FAILURE IF ANY ERROR IS FOUND
4786  025420  022122            CMP     (R1)+,(R2)+     ;BUMP POINTERS -- TABLES ARE ACTUALLY WORD TABLES
4787  025422  077304            SOB     R3,21$          ;LOOP IF NOT DONE YET
4788  025424  000410            BR      24$             ;ELSE, PROCEED WITH TESTING
4789
4790  025426  163701  025132    22$:    SUB     12$,R1          ;CALCULATE THE REGISTER # CAUSING THE FAILURE
4791  025432  010137  002300            MOV     R1,REGNUM       ;IDENTIFY FAULTY REGISTER
4792  025436                            GEDF    EM26,ERR8       ;NPR ERROR -- BAD INITIALIZATION
4793                                                            ;       'DEVICE FATAL'' ERROR # 27
4794  025436  104455                                                                  TRAP    C$ERDF
4795  025440  000033                                                                  .WORD   27
4796  025442  016152                                                                  .WORD   EM26
4797  025444  006532                                                                  .WORD   ERR8
4798  025446            24$:    ENDTST
4799  025446                                                                  L10032:
4800  025446  104401                                                                  TRAP    C$ETST
```

```
                        .SBTTL TEST 4 -- NPR DATA-OUT

                        ;++*************************************************************************************
                        ;*
                        ;*      TEST 4 -- NPR DATA-OUT
                        ;*
                        ;* FIRST SUBTEST :
                        ;* THE NPR OUTPUT ADDRESS REGISTER IS LOADED WITH THE ADDRESS OF A 2 BYTE
                        ;* BUFFER IN THE PROGRAM. THEN, EACH WORD OF DATA PATTERN F IS LOADED INTO THE
                        ;* NPR OUTPUT DATA REGISTER, A FULLWORD NPR OUTPUT REQUEST IS PERFORMED,
                        ;* AND THE PROGRAM CHECKS FOR THE CORRECT DATA IN THE PROGRAM BUFFER. ALSO,
                        ;* THE PROGRAM CHECKS THAT THE ABORT XFER BIT IN THE NPR CONTROL REGISTER
                        ;* NEVER GETS SET.
                        ;*   DATA PATTERN F = 125252, 052525, 000000, 177777, 000001, 000002, 000004,
                        ;*                    000010, 000020, 000040, 000100, 000200, 000400, 001000,
                        ;*                    002000, 004000, 010000, 020000, 040000, 100000, 177776,
                        ;*                    177775, 177773, 177767, 177757, 177737, 177677, 177577,
                        ;*                    177377, 176777, 175777, 173777, 167777, 157777, 137777,
                        ;*                    077777, 000000
                        ;*
                        ;* SECOND SUBTEST:
                        ;* THE ABOVE OPERATIONS ARE REPEATED IN BYTE NPR TRANSFER MODE, USING THE DATA
                        ;* BYTES IN DATA PATTERN B. THE LOW BYTE OF THE PROGRAM BUFFER IS USED, AND
                        ;* THE UPPER BYTE IS CLEARED AT THE START, AND IS CHECKED TO REMAIN UNCHANGED
                        ;* THROUGHOUT THE SUBTEST.
                        ;*   DATA PATTERN B = 125, 252, 000, 377, 001, 002, 004, 010, 020, 040, 100,
                        ;*                    200, 376, 375, 373, 367, 357, 337, 277, 177, 000
                        ;*
                        ;*
                        ;--*************************************************************************************
                        ;
                        ;       BGNTST
                                                                                        T4::
                        NPROTS = $T
025450 004737 003514            JSR     PC,MSTCLR       ;INIT DMV & START UP MAINT. LOOP
025454 103003                   BCC     1$              ;IF NO ERROR, PROCEED WITH TEST
025456                          ERROR                   ;ELSE, REPORT IT
025456 104460                                                           TRAP    C$ERROR
025460                          ESCAPE  TST             ;   & EXIT TEST
025460 104410                                                           TRAP    C$ESCAPE
025462 000474                                                           .WORD   L10033-.

                        ;-------------------------------------------------------------------------------------
                        1$:     BGNSUB                  ;----- MAIN MEMORY WORD DATA-OUT TESTING -----
                                                                                T4.1:
025464 104402                                                           TRAP    C$BSUB
025466 013737 002506 025504     MOV     PATF,4$         ;SETUP COUNT OF # OF WORDS IN TEST PATTERN

025474 004537 005266            JSR     R5,NPRMOV       ;MOVE DATA THROUGH THE NPR LOGIC
025500 002510           2$:     PATF+2                  ;  ADDRESS OF DATA
025502 002654           3$:     BUFAREA                 ;  BUFFER AREA
025504 000000           4$:     0                       ;*** MODIFIED FROM ABOVE *** -- WORD COUNT
025506 000044                   NPRDL                   ;  OPERATION TO BE UTILIZED

025510 103025                   BCC     7$              ;IF ERROR, REPORT IT
```

```
025512                           13$:   ERROR
025512 104460                                                                     TRAP    C$ERROR
025514 005737 002412                    TST     TMPO            ;WE JUST REPORTED ONE ERROR BUT WAS IT A TIMEOUT
025520 001421                           BEQ     7$              ;ERROR? IF SO, PROCEED WITH TESTING.  ELSE,
025522 022737 000006 002204             CMP     #NPRTOE,ERRNBR  ;WE WILL HAVE TO REPORT IT HERE AND NOW.
025530 001415                           BEQ     7$              ;THE TIMEOUT ERROR WAS ALREADY REPORTED.
025532 012737 000002 002202             MOV     #T.EHRD,ERRTYP  ;IT WASN'T REPORTED YET, SETUP FOR IT NOW:
025540 012737 000006 002204             MOV     #NPRTOE,ERRNBR
025546 012737 016316 002206             MOV     #EM26E,ERRMSG
025554 012737 007314 002210             MOV     #ERR11,ERRBLK
025562 000753                           BR      13$             ;LOOP BACK TO CAUSE REPORT @ PROPER PC LOCATION

025564 013701 025500             7$:    MOV     2$,R1           ;POINT TO GOOD DATA
025570 013702 025502                    MOV     3$,R2           ;       & ACTUAL DATA
025574 013703 025504                    MOV     4$,R3           ;GET WORD COUNT
025600 005037 002276                    CLR     ERRFLG          ;RESET ERROR FLAG

025604 022122                    5$:    CMP     (R1)+,(R2)+     ;CHECK RECEIVED DATA
025606 001007                           BNE     6$              ;ERROR, GO REPORT IT
025610 077303                    11$:   SOB     R3,5$           ;GOOD,  IF MORE DO IT AGAIN
025612 005737 002276                    TST     ERRFLG          ;ELSE, SEE IF WE MUST FINISH AN ERROR MESSAGE
025616 001440                           BEQ     10$             ;NO,  TEST IT AGAIN BUT WITH BYTE TRANSFERS
025620 004737 013076                    JSR     PC,NULERR       ;YES, USE COMMON ROUTINE TO END ERROR MESSAGE
025624 000435                           BR      10$             ;WE CAN TEST IT AGAIN BUT WITH BYTE TRANSFERS

025626 010146                    6$:    MOV     R1,-(SP)        ;SAVE THIS FOR FURTHER TESTING
025630 014137 002254                    MOV     -(R1),GDATA     ;SETUP FOR ERROR REPORT
025634 014237 002256                    MOV     -(R2),BDATA
025640 010237 002252                    MOV     R2,TDATA        ;LSI-11'S MEMORY ADDRESS
025644 163701 025500                    SUB     2$,R1           ;CALCULATE THE OFFSET AT WHICH THE
025650 006201                           ASR     R1              ;  DATA COMPARISON ERROR OCCURED
025652 010137 002300                    MOV     R1,REGNUM       ;THE ERROR MESSAGE WILL REPORT THIS TOO
025656 005737 002276                    TST     ERRFLG          ;HAVE WE ALREADY REPORTED AN ERROR HERE?
025662 001007                           BNE     8$              ;YES, THEN WE ONLY PRINT DATA THIS TIME
025664 005237 002276                    INC     ERRFLG          ;NO,  SET FLAG & REPORT THE WHOLE MESSAGE
025670                                  GEDF    EM26B,ERR9      ;WORD NPR TRANSFER DMV ==> LSI
                                                                ;       "DEVICE FATAL" ERROR # 28
025670 104455                                                                     TRAP    C$ERDF
025672 000034                                                                     .WORD   28
025674 016226                                                                     .WORD   EM26B
025676 007300                                                                     .WORD   ERR9
025700 000402                           BR      9$              ;  RESUME TESTING

025702 004737 012574             8$:    JSR     PC,ERR9$        ;IDENTIFY THE FAILING DATA
025706 012601                    9$:    MOV     (SP)+,R1        ;RESTORE POINTERS
025710 013702 002252                    MOV     TDATA,R2
025714 005722                           TST     (R2)+
025716 000734                           BR      11$             ;AND RESUME TESTING

025720                           10$:   ENDSUB
025720                                                                  L10034:
025720 104403                                                                     TRAP    C$ESUB


                                 ;------------------------------------------------------------------------

025722                                  BGNSUB                  ;----- MAIN MEMORY BYTE DATA-OUT TESTING -----
```

```
025722                                                              T4.2:
025722  104402                                                                      TRAP    C$BSUB
025724  013737  002456  025742          MOV     PATB,4$             ;SETUP COUNT OF # OF WORDS IN TEST PATTERN

025732  004537  005266                  JSR     R5,NPRMOV           ;MOVE DATA THROUGH THE NPR LOGIC
025736  002460                  2$:     PATB+2                      ;  ADDRESS OF DATA
025740  002654                  3$:     BUFAREA                     ;  BUFFER AREA
025742  000000                  4$:     0                           ;*** MODIFIED FROM ABOVE *** -- BYTE COUNT
025744  000054                          NPRDLB                      ;  OPERATION TO BE UTILIZED

025746  103025                          BCC     7$                  ;IF ERROR, REPORT IT
025750                          13$:    ERROR
025750  104460                                                                      TRAP    C$ERROR
025752  005737  002412                  TST     TMPO                ;WE JUST REPORTED ONE ERROR BUT WAS IT A TIMEOUT
025756  001421                          BEQ     7$                  ;ERROR? IF SO, PROCEED WITH TESTING.  ELSE,
025760  022737  000006  002204          CMP     #NPRTOE,ERRNBR      ;WE WILL HAVE TO REPORT IT HERE AND NOW.
025766  001415                          BEQ     7$                  ;THE TIMEOUT ERROR WAS ALREADY REPORTED.
025770  012737  000002  002202          MOV     #T.EHRD,ERRTYP      ;IT WASN'T REPORTED YET, SETUP FOR IT NOW:
025776  012737  000006  002204          MOV     #NPRTOE,ERRNBR
026004  012737  016316  002206          MOV     #EM26E,ERRMSG
026012  012737  007314  002210          MOV     #ERR11,ERRBLK
026020  000753                          BR      13$                 ;LOOP BACK TO CAUSE REPORT @ PROPER PC LOCATION

026022  013701  025736          7$:     MOV     2$,R1               ;POINT TO GOOD DATA
026026  013702  025740                  MOV     3$,R2               ;       & ACTUAL DATA
026032  013703  025742                  MOV     4$,R3               ;GET BYTE COUNT
026036  005037  002276                  CLR     ERRFLG              ;RESET ERROR FLAG

026042  122122                  5$:     CMPB    (R1)+,(R2)+         ;CHECK RECEIVED DATA
026044  001007                          BNE     6$                  ;ERROR, GO REPORT IT
026046  077303                  11$:    SOB     R3,5$               ;GOOD,  IF MORE DO IT AGAIN
026050  005737  002276                  TST     ERRFLG              ;ELSE, SEE IF WE MUST FINISH AN ERROR MESSAGE
026054  001437                          BEQ     10$                 ;NO,  THEN WE CAN EXIT THE TEST
026056  004737  013076                  JSR     PC,NULERR           ;YES, OUTPUT THE REQUIRED BLANK LINES.  NOW
026062  000434                          BR      10$                 ;THEN WE CAN EXIT THE TEST

026064  010146                  6$:     MOV     R1,-(SP)            ;SAVE THIS FOR FURTHER TESTING
026066  114137  002254                  MOVB    -(R1),GDATA         ;SETUP FOR ERROR REPORT
026072  114237  002256                  MOVB    -(R2),BDATA
026076  010237  002252                  MOV     R2,TDATA            ;LSI-11'S MEMORY ADDRESS
026102  163701  025736                  SUB     2$,R1               ;CALCULATE THE OFFSET AT WHICH THE
                                                                    ;  DATA COMPARISON ERROR OCCURED
026106  010137  002300                  MOV     R1,REGNUM           ;THE ERROR MESSAGE WILL REPORT THIS TOO
026112  005737  002276                  TST     ERRFLG              ;HAVE WE ALREADY REPORTED AN ERROR HERE?
026116  001007                          BNE     8$                  ;YES, THEN WE ONLY PRINT DATA THIS TIME
026120  005237  002276                  INC     ERRFLG              ;NO,  SET FLAG & REPORT THE WHOLE MESSAGE
026124                                  GEDF    EM26C,ERR10         ;BYTE NPR TRANSFER DMV ===> LSI
                                                                    ;       'DEVICE FATAL'' ERROR # 29
026124  104455                                                                      TRAP    C$ERDF
026126  000035                                                                      .WORD   29
026130  016251                                                                      .WORD   EM26C
026132  007306                                                                      .WORD   ERR10
026134  000402                          BR      9$                  ;  RESUME TESTING

026136  004737  012732          8$:     JSR     PC,ERR10$           ;IDENTIFY THE FAILING DATA
026142  012601                  9$:     MOV     (SP)+,R1            ;RESTORE POINTERS
```

```
 4969  026144  013702  002252          MOV     TDATA,R2
 4970  026150  005202                  INC     R2
 4971  026152  000735                  BR      11$             ;AND RESUME TESTING
 4972
 4973  026154                  10$:    ENDSUB
 4974  026154                                                          L10035:
 4975  026154  104403                                                          TRAP    C$ESUB
 4976  026156                          ENDTST
 4977  026156                                                          L10033:
 4978  026156  104401                                                          TRAP    C$ETST
```

```
                                .SBTTL TEST 5 -- NPR DATA-IN

                                ;+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                                ;*
                                ;*      TEST 5 -- NPR DATA-IN
                                ;*
                                ;* THE NPR INPUT ADDRESS REGISTER IS LOADED WITH THE ADDRESS OF A 2 BYTE
                                ;* BUFFER IN THE PROGRAM. THEN, EACH WORD OF DATA PATTERN F IS LOADED INTO THE
                                ;* PROGRAM BUFFER, A FULLWORD NPR INPUT REQUEST IS ISSUED AND PERFORMED,
                                ;* AND THE PROGRAM CHECKS FOR THE CORRECT DATA IN THE NPR INPUT DATA REG.
                                ;* ALSO, THE PROGRAM CHECKS THAT THE ABORT XFER BIT IN THE NPR CONTROL
                                ;* REGISTER NEVER GETS SET.
                                ;*   DATA PATTERN F = 125252, 052525, 000000, 177777, 000001, 000002, 000004,
                                ;*                    000010, 000020, 000040, 000100, 000200, 000400, 001000,
                                ;*                    002000, 004000, 010000, 020000, 040000, 100000, 177776,
                                ;*                    177775, 177773, 177767, 177757, 177737, 177677, 177577,
                                ;*                    177377, 176777, 175777, 173777, 167777, 157777, 137777,
                                ;*                    077777, 000000
                                ;*
                                ;--*************************************************************************************

                                        BGNTST
                                                                                T5::
026160
026160  004737  003514                  JSR     PC,MSTCLR       ;INIT DMV & START UP MAINT. LOOP
026164  103003                          BCC     1$              ;IF NO ERROR, PROCEED WITH TEST
026166                                  ERROR                   ;ELSE, REPORT IT
026166  104460                                                                  TRAP    C$ERROR
026170                                  ESCAPE  TST             ;   & EXIT TEST
026170  104410                                                                  TRAP    C$ESCAPE
026172  000234                                                                  .WORD   L10036-.
                                1$:
026174
026174  013737  002506  026212          MOV     PATF,4$         ;SETUP COUNT OF # OF WORDS IN TEST PATTERN

026202  004537  005266                  JSR     R5,NPRMOV       ;MOVE DATA THROUGH THE NPR LOGIC
026206  002510                  2$:     PATF+2                  ;   ADDRESS OF DATA
026210  002654                  3$:     BUFAREA                 ;   BUFFER AREA
026212  000000                  4$:     0                       ;*** MODIFIED FROM ABOVE *** -- WORD COUNT
026214  000004                          NPRLD                   ;   OPERATION TO BE UTILIZED

026216  103025                          BCC     7$              ;IF ERROR, REPORT IT
026220                          13$:    ERROR
026220  104460                                                                  TRAP    C$ERROR
026222  005737  002412                  TST     TMP0            ;WE JUST REPORTED ONE ERROR BUT WAS IT A TIMEOUT
026226  001421                          BEQ     7$              ;ERROR? IF SO, PROCEED WITH TESTING.  ELSE,
026230  022737  000006  002204          CMP     #NPRTOE,ERRNBR  ;WE WILL HAVE TO REPORT IT HERE AND NOW.
026236  001415                          BEQ     7$              ;THE TIMEOUT ERROR WAS ALREADY REPORTED.
026240  012737  000002  002202          MOV     #T.EHRD,ERRTYP  ;IT WASN'T REPORTED YET, SETUP FOR IT NOW:
026246  012737  000006  002204          MOV     #NPRTOE,ERRNBR
026254  012737  016316  002206          MOV     #EM26E,ERRMSG
026262  012737  007314  002210          MOV     #ERR11,ERRBLK
026270  000753                          BR      13$             ;LOOP BACK TO CAUSE REPORT @ PROPER PC LOCATION

026272  013701  026206          7$:     MOV     2$,R1           ;POINT TO GOOD DATA
026276  013702  026210                  MOV     3$,R2           ;       & ACTUAL DATA
026302  013703  026212                  MOV     4$,R3           ;GET WORD COUNT
```

```
5035  026306  005037  002276          CLR     ERRFLG          ;RESET ERROR FLAG
5036
5037  026312  022122          5$:     CMP     (R1)+,(R2)+     ;CHECK RECEIVED DATA
5038  026314  001007                  BNE     6$              ;ERROR, GO REPORT IT
5039  026316  077303          11$:    SOB     R3,5$           ;GOOD,  IF MORE DO IT AGAIN
5040  026320  005737  002276          TST     ERRFLG          ;ELSE, SEE IF WE MUST FINISH AN ERROR MESSAGE
5041  026324  001440                  BEQ     10$             ;NO,  THEN WE CAN EXIT THE TEST
5042  026326  004737  013076          JSR     PC,NULERR       ;YES, USE COMMON ROUTINE TO END ERROR MESSAGE
5043  026332  000435                  BR      10$             ;THEN WE CAN EXIT THE TEST
5044
5045  026334  010246          6$:     MOV     R2,-(SP)        ;SAVE THIS FOR FURTHER TESTING
5046  026336  014137  002254          MOV     -(R1),GDATA     ;SETUP FOR ERROR REPORT
5047  026342  014237  002256          MOV     -(R2),BDATA
5048  026346  010137  002252          MOV     R1,TDATA        ;LSI-11'S MEMORY ADDRESS
5049  026352  163701  026206          SUB     2$,R1           ;CALCULATE THE OFFSET AT WHICH THE
5050  026356  006201                  ASR     R1              ;  DATA COMPARISON ERROR OCCURED
5051  026360  010137  002300          MOV     R1,REGNUM       ;THE ERROR MESSAGE WILL REPORT THIS TOO
5052  026364  005737  002276          TST     ERRFLG          ;HAVE WE ALREADY REPORTED AN ERROR HERE?
5053  026370  001007                  BNE     8$              ;YES, THEN WE ONLY PRINT DATA THIS TIME
5054
5055  026372  005237  002276          INC     ERRFLG          ;NO,  SET FLAG & REPORT THE WHOLE MESSAGE
5056  026376                          GEDF    EM26D,ERR9      ;WORD NPR TRANSFER LSI ===> DMV
5057                                                          ;       "DEVICE FATAL" ERROR # 30
5058  026376  104455                                                          TRAP    C$ERDF
5059  026400  000036                                                          .WORD   30
5060  026402  016274                                                          .WORD   EM26D
5061  026404  007300                                                          .WORD   ERR9
5062  026406  000402                  BR      9$              ;  RESUME TESTING
5063
5064  026410  004737  012574    8$:   JSR     PC,ERR9$        ;IDENTIFY THE FAILING DATA
5065  026414  012602          9$:     MOV     (SP)+,R2        ;RESTORE POINTERS
5066  026416  013701  002252          MOV     TDATA,R1
5067  026422  005721                  TST     (R1)+
5068  026424  000734                  BR      11$             ;AND RESUME TESTING
5069
5070  026426                  10$:
5071  026426                          ENDTST
5072  026426                                                  L10036:
5073  026426  104401                                                  TRAP    C$ETST
```

```
                                            .SBTTL TEST 6 -- NPR XFER ABORT

                                            ;++*********************************************************************
                                            ;*
                                            ;*        TEST 6 -- NPR XFER ABORT
                                            ;*
                                            ;* FIRST SUBTEST :
                                            ;* THE PROGRAM PERFORMS AN OUTPUT NPR REQUEST TO A NON-EXISTENT MEMORY
                                            ;* LOCATION, AND CHECKS FOR THE ASSERTION OF ABORT XFER BIT IN THE NPR CONTROL
                                            ;* REGISTER. THEN, AN OUTPUT NPR IS DONE AND CHECKED, TO A LOCATION IN THE
                                            ;* PROGRAM, USING 125252 FOR DATA, AND THE PROGRAM CHECKS FOR ABORT XFER TO
                                            ;* BE CLEARED BY SETTING THE DONE BIT.
                                            ;* SECOND SUBTEST :
                                            ;* THE ABOVE SUBTEST IS REPEATED USING  NPUT NPR'S.
                                            ;*
                                            ;--*********************************************************************
                                            ;
                                            ;       BGNTST
 026430                                                                                     T6::
                                            ;===  SUBTEST # 1 -- NPR OUTPUT TO NON-EXISTENT LOCATION FORCING NPR-ABORT  ====

 026430                                            BGNSUB
 026430                                                                                     T6.1:
 026430  104402                                                                               TRAP    C$BSUB
 026432  004737  003514                            JSR     PC,MSTCLR       ;INIT DMV & ENTER M-LOOP
 026436  103003                                    BCC     .+10            ;IF NO ERROR, PROCEED WITH TESTING
 026440                                            ERROR                   ;ELSE, REPORT ERROR
 026440  104460                                                                               TRAP    C$ERROR
 026442                                            ESCAPE  SUB             ;   & EXIT TEST
 026442  104410                                                                               TRAP    C$ESCAPE
 026444  000164                                                                               .WORD   L10040-.
 026446  012737  000001  002412                    MOV     #1,TMP0         ;DISABLE PRINTOUT OF TIMEOUT-COUNT BY ERR11

 026454  012737  160000  002420                    MOV     #160000,TMP3    ;SETUP 11'S ADDRESS
 026462  012737  000044  002414                    MOV     #NPRDL,TMP1     ;CONTROL REG. VALUE FOR NPR-OUT COMMAND
 026470  004537  004042                            JSR     R5,WRITE        ;SETUP ADDRESS OUT REGISTERS
 026474  000070                                    NPRAOL
 026476  002420                                    TMP3
 026500  103003                                    BCC     .+10            ;IF NO ERROR, PROCEED
 026502                                            ERROR                   ;ELSE, REPORT IT
 026502  104460                                                                               TRAP    C$ERROR
 026504                                            ESCAPE  SUB             ;       AND EXIT THIS TEST
 026504  104410                                                                               TRAP    C$ESCAPE
 026506  000122                                                                               .WORD   L10040-.
 026510  004537  004042                            JSR     R5,WRITE
 026514  000071                                    NPRAOH
 026516  002421                                    TMP3+1
 026520  103003                                    BCC     .+10            ;IF NO ERROR, PROCEED
 026522                                            ERROR                   ;ELSE, REPORT IT
 026522  104460                                                                               TRAP    C$ERROR
 026524                                            ESCAPE  SUB             ;       AND EXIT THIS TEST
 026524  104410                                                                               TRAP    C$ESCAPE
 026526  000102                                                                               .WORD   L10040-.
 026530  004537  004054                            JSR     R5,WRITEI
 026534  000072                                    NPRAOX
 026536  000200                                    NPRBS7                  ;  (THIS SETS BS7 & CLEARS EXTENDED ADDR. BITS)
```

```
5130  026540  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5131  026542                          ERROR                   ;ELSE, REPORT IT
5132  026542  104460                                                  TRAP    C$ERROR
5133  026544                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5134  026544  104410                                                  TRAP    C$ESCAPE
5135  026546  000062                                                  .WORD   L10040-.
5136  026550  004537  004042          JSR     R5,WRITE        ;INITIATE THE NPR-OUT OPERATION
5137  026554  123004                  NPRCTL
5138  026556  002414                  TMP1
5139  026560  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5140  026562                          ERROR                   ;ELSE, REPORT IT
5141  026562  104460                                                  TRAP    C$ERROR
5142  026564                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5143  026564  104410                                                  TRAP    C$ESCAPE
5144  026566  000042                                                  .WORD   L10040-.
5145  026570  004537  003616          JSR     R5,READ         ;READ BACK THE CONTROL-STATUS REGISTER
5146  026574  123004                  NPRCTL
5147  026576  002416                  TMP2
5148  026600  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5149  026602                          ERROR                   ;ELSE, REPORT IT
5150  026602  104460                                                  TRAP    C$ERROR
5151  026604                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5152  026604  104410                                                  TRAP    C$ESCAPE
5153  026606  000022                                                  .WORD   L10040-.
5154  026610  132737  000200  002416  BITB    #NPRABT,TMP2    ;THE ABORT BIT SHOULD BE SET
5155  026616  001004                  BNE     20$             ;IT IS.  EXIT SUBTEST
5156  026620                          GEDF    EM26G,ERR11     ;IT DIDN'T.  REPORT MISSING NPR ABORT
5157                                                          ;       'DEVICE FATAL'' ERROR # 31
5158  026620  104455                                                  TRAP    C$ERDF
5159  026622  000037                                                  .WORD   31
5160  026624  016402                                                  .WORD   EM26G
5161  026626  007314                                                  .WORD   ERR11
5162  026630                  20$:    ENDSUB
5163  026630                                                  L10040:
5164  026630  104403                                                  TRAP    C$ESUB
5165                          ;===  SUBTEST #2 -- NPR OUTPUT TO EXISTENT LOCATION YIELDING NO NPR-ABORT  ====
5166
5167  026632                          BGNSUB
5168  026632                                                  T6.2:
5169  026632  104402                                                  TRAP    C$BSUB
5170  026634  004737  003514          JSR     PC,MSTCLR       ;INIT DMV & ENTER M-LOOP
5171  026640  103003                  BCC     .+10            ;IF NO ERROR, PROCEED WITH TESTING
5172  026642                          ERROR                   ;ELSE, REPORT ERROR
5173  026642  104460                                                  TRAP    C$ERROR
5174  026644                          ESCAPE  SUB             ;   & EXIT TEST
5175  026644  104410                                                  TRAP    C$ESCAPE
5176  026646  000164                                                  .WORD   L10041-.
5177  026650  012737  000001  002412  MOV     #1,TMP0         ;DISABLE PRINTOUT OF TIMEOUT-COUNT BY ERR11
5178
5179  026656  012737  002654  002420  MOV     #BUFAREA,TMP3   ;SETUP 11'S ADDRESS
5180  026664  012737  000044  002414  MOV     #NPRDL,TMP1     ;CONTROL REG. VALUE FOR NPR-OUT COMMAND
5181  026672  004537  004042          JSR     R5,WRITE        ;SETUP ADDRESS OUT REGISTERS
5182  026676  000070                  NPRAOL
5183  026700  002420                  TMP3
5184  026702  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5185  026704                          ERROR                   ;ELSE, REPORT IT
```

```
5186  026704  104460                                                          TRAP    C$ERROR
5187  026706
                      ESCAPE  SUB             ;       AND EXIT THIS TEST
5188  026706  104410                                                          TRAP    C$ESCAPE
5189  026710  000122                                                          .WORD   L10041-.
5190  026712  004537  004042        JSR     R5,WRITE
5191  026716  000071                NPRAOH
5192  026720  002421                TMP3+1
5193  026722  103003                BCC     .+10            ;IF NO ERROR, PROCEED
5194  026724                        ERROR                   ;ELSE, REPORT IT
5195  026724  104460                                                          TRAP    C$ERROR
5196  026726
                      ESCAPE  SUB             ;       AND EXIT THIS TEST
5197  026726  104410                                                          TRAP    C$ESCAPE
5198  026730  000102                                                          .WORD   L10041-.
5199  026732  004537  004054        JSR     R5,WRITEI
5200  026736  000072                NPRAOX
5201  026740  000000                0                       ;  (THIS CLEARS BS7 & EXTENDED ADDR. BITS)
5202  026742  103003                BCC     .+10            ;IF NO ERROR, PROCEED
5203  026744                        ERROR                   ;ELSE, REPORT IT
5204  026744  104460                                                          TRAP    C$ERROR
5205  026746
                      ESCAPE  SUB             ;       AND EXIT THIS TEST
5206  026746  104410                                                          TRAP    C$ESCAPE
5207  026750  000062                                                          .WORD   L10041-.
5208  026752  004537  004042        JSR     R5,WRITE        ;INITIATE THE NPR-OUT OPERATION
5209  026756  123004                NPRCTL
5210  026760  002414                TMP1
5211  026762  103003                BCC     .+10            ;IF NO ERROR, PROCEED
5212  026764                        ERROR                   ;ELSE, REPORT IT
5213  026764  104460                                                          TRAP    C$ERROR
5214  026766
                      ESCAPE  SUB             ;       AND EXIT THIS TEST
5215  026766  104410                                                          TRAP    C$ESCAPE
5216  026770  000042                                                          .WORD   L10041-.
5217  026772  004537  003616        JSR     R5,READ         ;READ BACK THE CONTROL-STATUS REGISTER
5218  026776  123004                NPRCTL
5219  027000  002416                TMP2
5220  027002  103003                BCC     .+10            ;IF NO ERROR, PROCEED
5221  027004                        ERROR                   ;ELSE, REPORT IT
5222  027004  104460                                                          TRAP    C$ERROR
5223  027006
                      ESCAPE  SUB             ;       AND EXIT THIS TEST
5224  027006  104410                                                          TRAP    C$ESCAPE
5225  027010  000022                                                          .WORD   L10041-.
5226  027012  132737  000200  002416    BITB    #NPRABT,TMP2    ;THE ABORT BIT SHOULD BE SET
5227  027020  001404                BEQ     20$             ;IT IS.  EXIT SUBTEST
5228  027022                        GEDF    EM26E,ERR11     ;IT DIDN'T.  REPORT MISSING NPR ABORT
5229                                                        ;       'DEVICE FATAL'' ERROR # 32
5230  027022  104455                                                          TRAP    C$ERDF
5231  027024  000040                                                          .WORD   32
5232  027026  016316                                                          .WORD   EM26E
5233  027030  007314                                                          .WORD   ERR11
5234  027032                20$:    ENDSUB
5235  027032                                                          L10041:
5236  027032  104403                                                          TRAP    C$ESUB
5237  027034
                      ENDTST
5238  027034                                                          L10037:
5239  027034  104401                                                          TRAP    C$ETST
```

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                                        .SBTTL TEST 7 -- NPR EXTENDED ADDRESS BIT TEST

                                        ;++*********************************************************************
                                        ;*
                                        ;*      TEST 7 -- NPR EXTENDED ADDRESS BIT TEST
                                        ;*
                                        ;* THIS TEST WILL ONLY BE RUN IF THERE IS AT LEAST 32K WORDS OF MEMORY ON THE
                                        ;* SYSTEM. IF THERE IS, THE PROGRAM CHOOSES A LOCATION TO USE IN THE ADDRESS
                                        ;* RANGE 200000-377776 (OCTAL). THEN, THE FOLLOWING 2 SUBTESTS ARE PERFORMED :
                                        ;*
                                        ;* FIRST SUBTEST :
                                        ;* AN INPUT NPR IS PERFORMED AND CHECKED USING THE MEMORY LOCATION, WITH
                                        ;* 125252 FOR DATA. THE PROGRAM CHECKS THAT THE ABORT XFER BIT REMAINS
                                        ;* CLEARED.
                                        ;* SECOND SUBTEST :
                                        ;* AN OUTPUT NPR IS PERFORMED AND CHECKED USING THE MEMORY LOCATION, WITH
                                        ;* 125252 FOR DATA. THE PROGRAM CHECKS THAT THE ABORT XFER BIT REMAINS
                                        ;* CLEARED.
                                        ;*
                                        ;--*********************************************************************
                                        ;
                                        ;       BGNTST
027036                                                                                  T7::
027036  004737  003514                          JSR     PC,MSTCLR       ;INIT DMV & ENTER M-LOOP
027042  103003                                  BCC     1$              ;IF NO ERROR, PROCEED WITH TESTING
027044                                          ERROR                   ;ELSE, REPORT ERROR
027044  104460                                                                                  TRAP    C$ERROR
027046                                          EXIT    TST             ;  & EXIT TEST
027046  104432                                                                                  TRAP    C$EXIT
027050  001506                                                                                  .WORD   L10042-.
027052  013700  002120          1$:             MOV     L$HIMEM,R0      ;GET LAST VALID 'PAR'' VALUE FROM SUPERVISOR
027056  042700  001777                          BIC     #1777,R0        ;THESE BITS CORESPOND TO BITS 6 --> 15 OF THE
                                                                        ;ACTUAL ADDRESS AND AREN'T OUR CONCERN HERE.
027062  001002                                  BNE     2$              ;IF THE RESULT IS ZERO,
027064                                          EXIT    TST             ;       THERE IS NOTHING TO TEST
027064  104432                                                                                  TRAP    C$EXIT
027066  001470                                                                                  .WORD   L10042-.
                                                                        ;ELSE, PROCEED TO SETUP MMU'S PAR AND DMV'S NPR
                                                                        ;       REGISTER MAXIMUM VALUES

027070  010037  002436          2$:             MOV     R0,TMPA         ;THIS IS FOR THE MMU

                                        ;=======================================================================

027074                          12$:            BGNSUB                  ;TEST THE NPR-IN USING EXTENDED ADDR. BITS
027074                                                                                  T7.1:
027074  104402                                                                                  TRAP    C$BSUB
027076  012737  177777  002434                  MOV     #177777,TMP9    ;INITIALIZE TEMP 9
027104  012737  002000  002442                  MOV     #BIT10,TMPC     ;INITIALIZE PAGE ADDRESS REG. VARIABLE
027112  112737  000001  002451                  MOVB    #BIT0,TMPF+1    ;INITIALIZE NPR EXTENDED ADDRESS REG. VARIABLE
027120  004737  030560                          JSR     PC,XMINIT       ;INITIALIZE THE MMU

                                        ;*************** WRITE/READ/VERIFY NPRAIH,NPRAIL ***************
027124  004537  004054                          JSR     R5,WRITEI       ;POINT NPR REGISTERS TO 0
027130  000074                                  NPRAIL
027132  000000                                  0
```

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5296  027134  004537  004054          JSR     R5,WRITEI
5297  027140  000075                  NPRAIH
5298  027142  000000                  0
5299  027144  004537  003616          JSR     R5,READ         ;READ BACK THE ADDRESS & VERIFY IT
5300  027150  000074                  NPRAIL
5301  027152  002434                  TMP9
5302  027154  004537  003616          JSR     R5,READ
5303  027160  000075                  NPRAIH
5304  027162  002435                  TMP9+1
5305  027164  023727  002434  000000  CMP     TMP9,#000000    ;IS IT CORRECT?
5306  027172  001424                  BEQ     2$              ;YES, PROCEED.
5307  027174  013737  002434  002256  MOV     TMP9,BDATA      ;NO, SETUP FOR & REPORT LOADING FAILURE
5308  027202  012737  000000  002254  MOV     #000000,GDATA
5309  027210  012737  000007  002300  MOV     #7,REGNUM       ;IDENTIFY NPRAIH AS THE CULPRIT
5310  027216  105737  002434          TSTB    TMP9            ;IS THAT REALLY TRUE?
5311  027222  001002                  BNE     1$              ;MAYBE.  BUT, NPRAIL IS DEFINITELY AT FAULT
5312  027224  005237  002300          INC     REGNUM          ;       SO IDENTIFY IT AS SUCH
5313  027230                  1$:     GEDF    EM26A,ERR14     ;REPORT THE FAILURE
5314                                                          ;       'DEVICE FATAL" ERROR # 33
5315  027230  104455                                                  TRAP    C$ERDF
5316  027232  000041                                                  .WORD   33
5317  027234  016204                                                  .WORD   EM26A
5318  027236  011002                                                  .WORD   ERR14
5319  027240                  ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5320  027240  104410                                                  TRAP    C$ESCAPE
5321  027242  000506                                                  .WORD   L10043-.
5322                  ;*************************************************************************
5323                  ;****************** MAIN SUBTEST #1 LOOP STARTS HERE *********************
5324                  ;*************************************************************************
5325
5326                  ;**************** COMPLEMENT OF NPRDRH:NPRDRL => TMP3 ****************
5327  027244  004537  003616  2$:     JSR     R5,READ         ;GET THE CURRENT CONTENTS OF THE NPR DATA REG'S
5328  027250  123000                  NPRDRL
5329  027252  002414                  TMP1
5330  027254  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5331  027256                          ERROR                   ;ELSE, REPORT IT
5332  027256  104460                                                  TRAP    C$ERROR
5333  027260                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5334  027260  104410                                                  TRAP    C$ESCAPE
5335  027262  000466                                                  .WORD   L10043-.
5336  027264  004537  003616          JSR     R5,READ
5337  027270  123001                  NPRDRH
5338  027272  002415                  TMP1+1
5339  027274  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5340  027276                          ERROR                   ;ELSE, REPORT IT
5341  027276  104460                                                  TRAP    C$ERROR
5342  027300                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5343  027300  104410                                                  TRAP    C$ESCAPE
5344  027302  000446                                                  .WORD   L10043-.
5345  027304  013737  002414  002420  MOV     TMP1,TMP3       ;USE CURRENT DATA & BUILD BACKGROUND PATTERN
5346  027312  005137  002420          COM     TMP3            ;COMPLEMENT IT TO GENERATE A BACKGROUND PATTERN
5347
5348                  ;********** TMP3 => 1ST LOCATION OF EACH EXTENDED MEMORY BLOCK **********
5349  027316  012737  002000  002446  MOV     #BIT10,TMPE     ;REFILL ALL TEST LOCATIONS STARTING HERE
5350  027324  004537  030700  4$:     JSR     R5,XMWRIT       ;WRITE BACKGROUND PATTERN GENERATED ABOVE
5351  027330  002446                  TMPE                    ; POINTER TO 'PAR' FORMAT ADDERSS
```

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5352  027332  002420                  TMP3                    ; POINTER TO DATA (TO BE WRITTEN)
5353  027334  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5354  027336                          ERROR                   ;ELSE, REPORT IT
5355  027336  104460                                                          TRAP    C$ERROR
5356  027340                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5357  027340  104410                                                          TRAP    C$ESCAPE
5358  027342  000406                                                          .WORD   L10043-.
5359  027344  062737  002000  002446  ADD     #BIT10,TMPE     ;INCREMENT THE PAGE ADDR. REG. VALUE
5360  027352  001404                  BEQ     6$              ;DONE IF IT GOES TO ZERO
5361  027354  023737  002446  002436  CMP     TMPE,TMPA       ;IS THE NEW VALUE WITHIN CURRENT MEMORY?
5362  027362  101760                  BLOS    4$              ;YES, THE WRITE IT TOO.
5363                                                          ;NO,  DONE.
5364                          ;*************** WRITE/READ/VERIFY NPRAIX ***************
5365  027364  004537  004042  6$:     JSR     R5,WRITE        ;SETUP NPR EXTENDED ADDR. REG BITS
5366  027370  000076                  NPRAIX
5367  027372  002451                  TMPF+1
5368  027374  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5369  027376                          ERROR                   ;ELSE, REPORT IT
5370  027376  104460                                                          TRAP    C$ERROR
5371  027400                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5372  027400  104410                                                          TRAP    C$ESCAPE
5373  027402  000346                                                          .WORD   L10043-.
5374  027404  004537  003616          JSR     R5,READ         ;READ IT BACK & VERIFY THAT IT'S CORRECT
5375  027410  000076                  NPRAIX
5376  027412  002450                  TMPF
5377  027414  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5378  027416                          ERROR                   ;ELSE, REPORT IT
5379  027416  104460                                                          TRAP    C$ERROR
5380  027420                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5381  027420  104410                                                          TRAP    C$ESCAPE
5382  027422  000326                                                          .WORD   L10043-.
5383  027424  123737  002450  002451  CMPB    TMPF,TMPF+1     ;DID IT LOAD CORRECTLY?
5384  027432  001417                  BEQ     8$              ;YES, PROCEED
5385  027434  113737  002451  002254  MOVB    TMPF+1,GDATA    ;NO, SETUP FOR ERROR HANDLER
5386  027442  113737  002450  002256  MOVB    TMPF,BDATA
5387  027450  012737  000006  002300  MOV     #6,REGNUM       ;       IDENTIFY NPRAIX AS FAILING REG.
5388  027456                          GEDF    EM26A,ERR14     ;REPORT THE FAILURE
5389                                                          ;       'DEVICE FATAL" ERROR # 34
5390  027456  104455                                                          TRAP    C$ERDF
5391  027460  000042                                                          .WORD   34
5392  027462  016204                                                          .WORD   EM26A
5393  027464  011002                                                          .WORD   ERR14
5394  027466                          ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5395  027466  104410                                                          TRAP    C$ESCAPE
5396  027470  000260                                                          .WORD   L10043-.
5397
5398                          ;*************** GENERATE/WRITE TEST WORD INTO "TMPC" (LSI-11) ***************
5399  027472  013737  002420  002254  8$:     MOV     TMP3,GDATA      ;GENERATE A TEST DATA PATTERN FROM BACKGROUND
5400  027500  062737  125252  002254  ADD     #125252,GDATA   ;PATTERN BY ADDING THIS TO IT.
5401
5402  027506  004537  030700          JSR     R5,XMWRIT       ;LOAD UP THE TEST PATTERN
5403  027512  002442                  TMPC                    ; POINTER TO "PAR" FORMAT ADDRESS
5404  027514  002254                  GDATA                   ; POINTER TO DATA (TO BE WRITTEN)
5405  027516  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5406  027520                          ERROR                   ;ELSE, REPORT IT
5407  027520  104460                                                          TRAP    C$ERROR
```

```
5408  027522                          ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5409  027522  104410                                                          TRAP    C$ESCAPE
5410  027524  000224                                                          .WORD   L10043-.
5411  027526  112737  000004  002417  MOVB    #NPRLD,TMP2+1   ;SETUP CONTROL VALUE TO DO NPR-IN
5412  027534  004537  004042          JSR     R5,WRITE        ;PERFORM THE "EXTENDED" DATA-IN NPR
5413  027540  123004                  NPRCTL
5414  027542  002417                  TMP2+1
5415  027544  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5416  027546                          ERROR                   ;ELSE, REPORT IT
5417  027546  104460                                                          TRAP    C$ERROR
5418  027550                          ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5419  027550  104410                                                          TRAP    C$ESCAPE
5420  027552  000176                                                          .WORD   L10043-.
5421
5422                                ;**************** CHECK THE NPR OPERATION (DATA/NPRCTL) ***************
5423  027554  004537  003616          JSR     R5,READ         ;CHECK THE NPR OPERATION
5424  027560  123004                  NPRCTL
5425  027562  002416                  TMP2
5426  027564  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5427  027566                          ERROR                   ;ELSE, REPORT IT
5428  027566  104460                                                          TRAP    C$ERROR
5429  027570                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5430  027570  104410                                                          TRAP    C$ESCAPE
5431  027572  000156                                                          .WORD   L10043-.
5432  027574  004537  003616          JSR     R5,READ         ;GET THE DATA WE SHOULD HAVE JUST LOADED INTO
5433  027600  123001                  NPRDRH                  ;       THE NPR DATA REGISTERS FROM THE
5434  027602  002257                  BDATA+1                 ;       EXTENDED MEMORY AREA
5435  027604  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5436  027606                          ERROR                   ;ELSE, REPORT IT
5437  027606  104460                                                          TRAP    C$ERROR
5438  027610                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5439  027610  104410                                                          TRAP    C$ESCAPE
5440  027612  000136                                                          .WORD   L10043-.
5441  027614  004537  003616          JSR     R5,READ
5442  027620  123000                  NPRDRL
5443  027622  002256                  BDATA
5444  027624  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5445  027626                          ERROR                   ;ELSE, REPORT IT
5446  027626  104460                                                          TRAP    C$ERROR
5447  027630                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5448  027630  104410                                                          TRAP    C$ESCAPE
5449  027632  000116                                                          .WORD   L10043-.
5450  027634  132737  000300  002416  BITB    #300,TMP2       ;DID IT ABORT OR HANG?
5451  027642  001414                  BEQ     14$             ;NO, GOOD.  PROCEED WITH SUBTEST
5452  027644  100005                  BPL     10$             ;YES, WHICH ONE?
5453  027646                          GEDF    EM27A,ERR12     ;ABORT, REPORT IT AS SUCH.
5454                                                          ;       "DEVICE FATAL" ERROR # 35
5455  027646  104455                                                          TRAP    C$ERDF
5456  027650  000043                                                          .WORD   35
5457  027652  016437                                                          .WORD   EM27A
5458  027654  007456                                                          .WORD   ERR12
5459  027656  000404                  BR      12$             ;AND EXIT
5460  027660                  10$:    GEDF    EM27B,ERR12     ;HANG, REPORT IT AS SUCH.
5461                                                          ;       "DEVICE FATAL" ERROR # 36
5462  027660  104455                                                          TRAP    C$ERDF
5463  027662  000044                                                          .WORD   36
```

```
                                                                        .WORD   EM27B
                                                                        .WORD   ERR12
                        12$:    ESCAPE  SUB             ;  AND EXIT SUBTEST
                                                                        TRAP    C$ESCAPE
                                                                        .WORD   L10043-.
002256  002254  14$:    CMP     BDATA,GDATA     ;DID WE READ THE TEST DATA USING THE NPR?
                        BEQ     20$             ;YES,  WELL THIS ONE WORKED.
                        GEDF    EM27C,ERR12     ;NO!   REPORT THE ERROR.
                                                ;       "DEVICE FATAL" ERROR # 37
                                                                        TRAP    C$ERDF
                                                                        .WORD   37
                                                                        .WORD   EM27C
                                                                        .WORD   ERR12
                        ESCAPE  SUB             ;  EXIT FROM SUBTEST AFTER PRINTING ERROR MSG.
                                                                        TRAP    C$ESCAPE
                                                                        .WORD   L10043-.
002000  002442  20$:    ADD     #BIT10,TMPC     ;POINT TO NEXT PAGE ADDRESS REG. VALUE
                        BEQ     63$             ;IF 0, WE'RE DONE
002442  002436          CMP     TMPC,TMPA       ;IF GREATER THEN MAXIMUM VALUE,
                        BHI     63$             ;       WE'RE DONE TOO.
002451                  INCB    TMPF+1          ;ELSE, INCREMENT NPR'S EXTENDED ADDR. REG.
027244                  JMP     2$              ;AND GO BACK TO DO THIS ADDRESS

                        63$:    ENDSUB
                                                                L10043:
                                                                        TRAP    C$ESUB
                        ;=======================================================================

                        BGNSUB                  ;TEST THE NPR-OUT USING EXTENDED ADDR. BITS
                                                                        T7.2:
                                                                        TRAP    C$BSUB
002000  002442          MOV     #BIT10,TMPC     ;INITIALIZE PAGE ADDRESS REG. VARIABLE
002451                  MOVB    #BIT0,TMPF+1    ;INITIALIZE NPR EXTENDED ADDRESS REG. VARIABLE
030560                  JSR     PC,XMINIT       ;INITIALIZE THE MMU

                        ;**************** WRITE/READ/VERIFY NPRAOH,NPRAOL ****************
004054                  JSR     R5,WRITEI       ;POINT NPR REGISTERS TO 0
                        NPRAOL
                        0
004054                  JSR     R5,WRITEI
                        NPRAOH
                        0
003616                  JSR     R5,READ         ;READ BACK THE ADDRESS & VERIFY IT
                        NPRAOL
                        TMP9
003616                  JSR     R5,READ
                        NPRAOH
                        TMP9+1
002434  000000          CMP     TMP9,#000000    ;IS IT CORRECT?
                        BEQ     2$              ;YES, PROCEED.
002434  002256          MOV     TMP9,BDATA      ;NO, SETUP FOR & REPORT LOADING FAILURE
000000  002254          MOV     #000000,GDATA
000004  002300          MOV     #4,REGNUM       ;IDENTIFY NPRAIH AS THE CULPRIT
002434                  TSTB    TMP9            ;IS THAT REALLY TRUE?
                        BNE     1$              ;MAYBE.  BUT, NPRAIL IS DEFINATELY AT FAULT
002300                  INC     REGNUM          ;       SO IDENTIFY IT AS SUCH
```

```
5520  030100                        1$:     GEDF    EM26A,ERR14     ;REPORT THE FAILURE
5521                                                                  ;       'DEVICE FATAL" ERROR # 38
5522  030100  104455                                                                  TRAP    C$ERDF
5523  030102  000046                                                                  .WORD   38
5524  030104  016204                                                                  .WORD   EM26A
5525  030106  011002                                                                  .WORD   ERR14
5526  030110                                ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5527  030110  104410                                                                  TRAP    C$ESCAPE
5528  030112  000442                                                                  .WORD   L10044-.
5529  030114  012737  123456  002420        MOV     #123456,TMP3    ;USE THIS AS INITIAL BACKGROUND PATTERN
5530
5531                                ;*************************************************************************
5532                                ;****************** MAIN SUBTEST #2 LOOP STARTS HERE *********************
5533                                ;*************************************************************************
5534
5535                                ;********** TMP3 => 1ST LOCATION OF EACH EXTENDED MEMORY BLOCK **********
5536  030122  062737  021475  002420 2$:     ADD     #21475,TMP3     ;GENERATE THE PATTERN WE'LL USE THIS TIME
5537  030130  013737  002420  002414        MOV     TMP3,TMP1       ;PUT HERE FOR ERROR HANDLER
5538  030136  005137  002414                COM     TMP1
5539
5540  030142  012737  002000  002446        MOV     #BIT10,TMPE     ;REFILL ALL TEST LOCATIONS STARTING HERE
5541  030150  004537  030700        4$:     JSR     R5,XMWRIT       ;WRITE BACKGROUND PATTERN GENERATED ABOVE
5542  030154  002446                        TMPE                    ; POINTER TO ADDRESS (IN 'PAR" FORMAT)
5543  030156  002420                        TMP3                    ; POINTER TO DATA (TO BE WRITTEN)
5544  030160  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
5545  030162                                ERROR                   ;ELSE, REPORT IT
5546  030162  104460                                                                  TRAP    C$ERROR
5547  030164                                ESCAPE  SUB             ;       AND EXIT THIS TEST
5548  030164  104410                                                                  TRAP    C$ESCAPE
5549  030166  000366                                                                  .WORD   L10044-.
5550  030170  062737  002000  002446        ADD     #BIT10,TMPE     ;INCREMENT THE PAGE ADDR. REG. VALUE
5551  030176  001404                        BEQ     6$              ;DONE IF IT GOES TO ZERO
5552  030200  023737  002446  002436        CMP     TMPE,TMPA       ;IS THE NEW VALUE WITHIN CURRENT MEMORY?
5553  030206  101760                        BLOS    4$              ;YES, THE WRITE IT TOO.
5554                                                                ;NO,  DONE.
5555
5556                                ;**************** WRITE/READ/VERIFY NPRAIX ****************
5557  030210  004537  004042        6$:     JSR     R5,WRITE        ;SETUP NPR EXTENDED ADDR. REG BITS
5558  030214  000072                        NPRAOX
5559  030216  002451                        TMPF+1
5560  030220  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
5561  030222                                ERROR                   ;ELSE, REPORT IT
5562  030222  104460                                                                  TRAP    C$ERROR
5563  030224                                ESCAPE  SUB             ;       AND EXIT THIS TEST
5564  030224  104410                                                                  TRAP    C$ESCAPE
5565  030226  000326                                                                  .WORD   L10044-.
5566  030230  004537  003616                JSR     R5,READ         ;READ IT BACK & VERIFY THAT IT'S CORRECT
5567  030234  000072                        NPRAOX
5568  030236  002450                        TMPF
5569  030240  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
5570  030242                                ERROR                   ;ELSE, REPORT IT
5571  030242  104460                                                                  TRAP    C$ERROR
5572  030244                                ESCAPE  SUB             ;       AND EXIT THIS TEST
5573  030244  104410                                                                  TRAP    C$ESCAPE
5574  030246  000306                                                                  .WORD   L10044-.
5575  030250  123737  002450  002451        CMPB    TMPF,TMPF+1     ;DID IT LOAD CORRECTLY?
```

```
5576  030256  001417                    BEQ     8$                  ;YES, PROCEED
5577  030260  113737  002451  002254    MOVB    TMPF+1,GDATA        ;NO, SETUP FOR ERROR HANDLER
5578  030266  113737  002450  002256    MOVB    TMPF,BDATA
5579  030274  012737  000003  002300    MOV     #3,REGNUM           ;       IDENTIFY NPRAIX AS FAILING REG.
5580  030302                            GEDF    EM26A,ERR14         ;REPORT THE FAILURE
5581                                                                ;       'DEVICE FATAL" ERROR # 39
5582  030302  104455                                                        TRAP    C$ERDF
5583  030304  000047                                                        .WORD   39
5584  030306  016204                                                        .WORD   EM26A
5585  030310  011002                                                        .WORD   ERR14
5586  030312                            ESCAPE  SUB                 ;       AND EXIT THIS SUBTEST
5587  030312  104410                                                        TRAP    C$ESCAPE
5588  030314  000240                                                        .WORD   L10044-.
5589
5590                                    ;*************** WRITE(LSI-11) TEST LOCATION BACKGROUND PATTERN ***************
5591  030316  004537  030700        8$: JSR     R5,XMWRIT           ;SETUP TEST LOCATION'S BACKGROUND PATTERN
5592  030322  002442                    TMPC
5593  030324  002414                    TMP1
5594  030326  013737  002420  002254    MOV     TMP3,GDATA          ;GENERATE A TEST DATA PATTERN FROM BACKGROUND
5595  030334  062737  052525  002254    ADD     #52525,GDATA        ;PATTERN BY ADDING THIS TO IT.
5596
5597                                    ;*************** LOAD(DMV) TEST PATTERN ***************
5598  030342  004537  004042            JSR     R5,WRITE                    ;LOAD UP THE TEST PATTERN
5599  030346  123001                    NPRDRH
5600  030350  002255                    GDATA+1
5601  030352  004537  004042            JSR     R5,WRITE
5602  030356  123000                    NPRDRL
5603  030360  002254                    GDATA
5604  030362  112737  000044  002417    MOVB    #NPRDL,TMP2+1       ;SETUP CONTROL VALUE TO DO NPR-OUT
5605
5606                                    ;*************** PERFORM/CHECK EXTENDED NPR OPERATION ***************
5607  030370  004537  004042            JSR     R5,WRITE            ;PERFORM THE 'EXTENDED" DATA-OUT NPR
5608  030374  123004                    NPRCTL
5609  030376  002417                    TMP2+1
5610  030400  103003                    BCC     .+10                ;IF NO ERROR, PROCEED
5611  030402                            ERROR                       ;ELSE, REPORT IT
5612  030402  104460                                                        TRAP    C$ERROR
5613  030404                            ESCAPE  SUB                 ;       AND EXIT THIS SUBTEST
5614  030404  104410                                                        TRAP    C$ESCAPE
5615  030406  000146                                                        .WORD   L10044-.
5616  030410  004537  003616            JSR     R5,READ             ;CHECK THE NPR OPERATION
5617  030414  123004                    NPRCTL
5618  030416  002416                    TMP2
5619  030420  103003                    BCC     .+10                ;IF NO ERROR, PROCEED
5620  030422                            ERROR                       ;ELSE, REPORT IT
5621  030422  104460                                                        TRAP    C$ERROR
5622  030424                            ESCAPE  SUB                 ;       AND EXIT THIS SUBTEST
5623  030424  104410                                                        TRAP    C$ESCAPE
5624  030426  000126                                                        .WORD   L10044-.
5625  030430  132737  000300  002416    BITB    #300,TMP2           ;DID IT ABORT OR HANG?
5626  030436  001414                    BEQ     14$                 ;NO, GOOD.  PROCEED WITH SUBTEST
5627  030440  100005                    BPL     10$                 ;YES, WHICH ONE?
5628  030442                            GEDF    EM27A,ERR12         ;ABORT, REPORT IT AS SUCH.
5629                                                                ;       'DEVICE FATAL" ERROR # 40
5630  030442  104455                                                        TRAP    C$ERDF
5631  030444  000050                                                        .WORD   40
```

```
                                                                        .WORD   EM27A
                                                                        .WORD   ERR12
                        BR      12$             ;AND EXIT
10$:    GEDF    EM27B,ERR12     ;HANG, REPORT IT AS SUCH.
                                ;       'DEVICE FATAL" ERROR # 41
                                                                        TRAP    C$ERDF
                                                                        .WORD   41
                                                                        .WORD   EM27B
                                                                        .WORD   ERR12
12$:    ESCAPE  SUB             ;  AND EXIT SUBTEST
                                                                        TRAP    C$ESCAPE
                                                                        .WORD   L10044-.
14$:    JSR     R5,XMREAD       ;GET THE DATA WE SHOULD HAVE JUST LOADED INTO
        TMPC
        BDATA
        CMP     BDATA,GDATA     ;DID WE READ THE TEST DATA USING THE NPR?
        BEQ     20$             ;YES,  WELL THIS ONE WORKED.
        GEDF    EM27C,ERR12     ;NO!   REPORT THE ERROR.
                                ;       'DEVICE FATAL" ERROR # 42
                                                                        TRAP    C$ERDF
                                                                        .WORD   42
                                                                        .WORD   EM27C
                                                                        .WORD   ERR12
        ESCAPE  SUB             ;  EXIT FROM SUBTEST AFTER PRINTING ERROR MSG.
                                                                        TRAP    C$ESCAPE
                                                                        .WORD   L10044-.
20$:    ADD     #BIT10,TMPC     ;POINT TO NEXT PAGE ADDRESS REG. VALUE
        BEQ     63$             ;IF 0, WE'RE DONE
        CMP     TMPC,TMPA       ;IF GREATER THEN MAXIMUM VALUE,
        BHI     63$             ;       WE'RE DONE TOO.
        INCB    TMPF+1          ;ELSE, INCREMENT NPR'S EXTENDED ADDR. REG.
        JMP     2$              ;AND GO BACK TO DO THIS ADDRESS

63$:    ENDSUB
                                                                L10044:
                                                                        TRAP    C$ESUB
        ENDTST
                                                                L10042:
                                                                        TRAP    C$ETST

;*******************************************************************************************
; XMINIT -- SUBROUTINE TO INITIALIZE EXTENDED MEMORY (ALIAS: MEMORY MANAGEMENT
;       UNIT) HARDWARE REGISTERS.
;
;*******************************************************************************************

XMINIT: MOV     R0,-(SP)        ;SAVE WORKING REGISTERS
        MOV     R1,-(SP)
        MOV     R3,-(SP)
        MOV     @#4,XM4HOL      ;SETUP @4 TRAP VALUE (JUST IN CASE)

        MOV     #77406,R0       ;'PDR' INITIALIZATION VALUE
                                ;  774 = FULL PAGE ACCESS
                                ;  0 = UPWARD EXPANSION
                                ;  6 = RESIDENT READ/WRITE
```

```
                        TEST 7 -- NPR EXTENDED ADDRESS BIT TEST

5688  030600  012701  172300            MOV     #172300,R1      ;ADDRESS OF KPDR0
5689  030604  012703  000010            MOV     #8.,R3          ;LOOP VALUE -- # OF PDR'S
5690  030610  010021              1$:   MOV     R0,(R1)+        ;SETUP 1 PDR
5691  030612  077302                    SOB     R3,1$           ;IF ANOTHER PDR, DO IT TOO
5692                                                            ;ELSE, FALL THROUGH & INITIALIZE PAR'S
5693
5694  030614  005000                    CLR     R0              ;INITIALIZATION VALUE FOR KPAR0
5695  030616  012701  172340            MOV     #172340,R1      ;ADDRESS OF KPAR0
5696  030622  012703  000007            MOV     #7,R3           ;LOOP VALUE -- ONLY FIRST 7 PAR'S DONE BY LOOP
5697  030626  010021              2$:   MOV     R0,(R1)+        ;SETUP 1 PAR
5698  030630  062700  000200            ADD     #200,R0         ;CALCULATE NEXT PAR'S INITIALIZATION VALUE
5699  030634  077304                    SOB     R3,2$           ;IF ANOTHEER PAR, DO IT TOO
5700  030636  012721  177600            MOV     #177600,(R1)+   ;ELSE, SETUP KPAR7 FOR I/O PAGE ACCESSING
5701
5702  030642                            SETVEC  #250,#XMINTH,#7 ;SETUP OUR OWN TRAP CATCHER FOR ABORT HANDLING
5703  030642  012746  000007                                                    MOV     #7,-(SP)
5704  030646  012746  031124                                                    MOV     #XMINTH,-(SP)
5705  030652  012746  000250                                                    MOV     #250,-(SP)
5706  030656  012746  000003                                                    MOV     #3,-(SP)
5707  030662  104437                                                            TRAP    C$SVEC
5708  030664  062706  000010                                                    ADD     #10,SP
5709  030670  012603                    MOV     (SP)+,R3        ;RESTORE CALLER'S REGISTERS
5710  030672  012601                    MOV     (SP)+,R1
5711  030674  012600                    MOV     (SP)+,R0
5712  030676  000207                    RTS     PC              ;RETURN
5713
5714                    ;*****************************************************************************
5715                    ; XMWRIT -- SUBROUTINE TO WRITE ONE WORD INTO AN EXTENDED MEMORY LOCATION.
5716                    ;
5717                    ;       CALLING SEQUENCE:
5718                    ;
5719                    ;       JSR     R5,XMWRIT
5720                    ;       <PRINTER TO HIGH ORDER BITS OF ADDRESS IN 'PAR' FORMAT>
5721                    ;       <POINTER TO DATA TO BE WRITTEN>
5722                    ;
5723                    ;*****************************************************************************
5724
5725  030700  010146    XMWRIT: MOV     R1,-(SP)        ;SAVE REGISTER(S)
5726
5727  030702  012701  172354            MOV     #172354,R1      ;ADDRESS OF KPAR6
5728  030706  011146                    MOV     (R1),-(SP)      ;SAVE CURRENT KPAR6 VALUE
5729  030710  013511                    MOV     @(R5)+,(R1)     ;SETUP 'PAR' FOR THIS WRITE
5730  030712  011137  002426            MOV     (R1),TMP6       ;SAVE ADDRESS FOR ERROR MESSAGE
5731  030716  012737  000060  172516    MOV     #BIT4+BIT5,@#172516  ;ENABLE 22 BIT & I/O PAGE ADDRESSING IN SR3
5732  030724  000241                    CLC                     ;CLEAR OUR ERROR FLAG
5733  030726  013737  000004  031122    MOV     @#4,XM4HOL      ;* SETUP TRAP CATCHER @4 (BECAUSE OF MAPPING)
5734  030734  012737  031074  000004    MOV     #XM4INT,@#4     ;*
5735  030742  052737  000001  177572    BIS     #1,@#177572     ;ENABLE MEMORY MANAGEMENT
5736  030750  013537  140000            MOV     @(R5)+,@#140000 ;WRITE ONE WORD IN THE SPECIFIED PAGE
5737  030754  042737  000001  177572    BIC     #1,@#177572     ;TURN OFF MEMORY MANAGEMENT
5738  030762  013737  031122  000004    MOV     XM4HOL,@#4      ;* RESTORE SUPERVISOR TRAP VECTOR @4
5739  030770  012611                    MOV     (SP)+,(R1)      ;RESTORE KPAR6
5740
5741  030772  012601                    MOV     (SP)+,R1        ;RESTORE CALLER'S REGISTER(S)
5742  030774  000205                    RTS     R5              ;RETURN
5743
```

```
                                ;*****************************************************************************
                                ; XMREAD -- SUBROUTINE TO READ FROM AN EXTENDED MEMORY LOCATION.
                                ;
                                ;       CALLING SEQUENCE:
                                ;
                                ;       JSR     R5,XMREAD
                                ;       <PRINTER TO HIGH ORDER BITS OF ADDRESS IN 'PAR' FORMAT>
                                ;       <POINTER TO DATA RECEIVING LOCATION>
                                ;
                                ;*****************************************************************************
030776  010146                XMREAD: MOV     R1,-(SP)        ;SAVE REGISTER(S)

031000  012701  172354                MOV     #172354,R1      ;ADDRESS OF KPAR6
031004  011146                       MOV     (R1),-(SP)      ;SAVE CURRENT KPAR6 VALUE
031006  013511                       MOV     @(R5)+,(R1)     ;SETUP 'PAR' FOR THIS READ
031010  011137  002426               MOV     (R1),TMP6       ;SAVE ADDRESS FOR ERROR MESSAGE
031014  012737  000060  172516       MOV     #BIT4+BIT5,@#172516  ;ENABLE 22 BIT & I/O PAGE ADDRESSING IN SR3
031022  000241                       CLC                     ;CLEAR OUR ERROR FLAG
031024  013737  000004  031122       MOV     @#4,XM4HOL      ;* SETUP TRAP CATCHER @4 (BECAUSE OF MAPPING)
031032  012737  031074  000004       MOV     #XM4INT,@#4     ;*
031040  052737  000001  177572       BIS     #1,@#177572     ;ENABLE MEMORY MANAGEMENT
031046  013735  140000               MOV     @#140000,@(R5)+ ;READ ONE WORD IN THE SPECIFIED PAGE
031052  042737  000001  177572       BIC     #1,@#177572     ;TURN OFF MEMORY MANAGEMENT
031060  013737  031122  000004       MOV     XM4HOL,@#4      ;* RESTORE SUPERVISOR TRAP VECTOR @4
031066  012611                       MOV     (SP)+,(R1)      ;RESTORE KPAR6

031070  012601                       MOV     (SP)+,R1        ;RESTORE CALLER'S REGISTER(S)
031072  000205                       RTS     R5              ;RETURN


                                ;*****************************************************************************
                                ; HANDLER FOR @LOC 4 TRAP PROCESSING (FOR TESTS 7 & 8)
                                ;*****************************************************************************
031074  042737  000001  177572 XM4INT: BIC     #1,@#177572     ;TURN OFF MEMORY MANAGEMENT
031102  013737  031122  000004       MOV     XM4HOL,@#4      ;* RESTORE SUPERVISOR TRAP VECTOR @4
031110  000240                       NOP                     ;*
031112  000240                       NOP                     ;*
031114  000240                       NOP                     ;*
031116  000177  146662               JMP     @4              ;NOW JUMP THRU IT !
031122  000000              XM4HOL:  0


                                ;*****************************************************************************
                                ; INTERRUPT HANDLER FOR MEMORY MANAGEMENT ABORT PROCESSING
                                ;*****************************************************************************

                                        BGNSRV  XMINTH
031124                                                          XMINTH::
031124  010037  002372                MOV     R0,REG0         ;SAVE GENERAL REGISTERS
031130  010137  002374                MOV     R1,REG1
031134  010237  002376                MOV     R2,REG2
031140  010337  002400                MOV     R3,REG3
031144  010437  002402                MOV     R4,REG4
031150  010537  002404                MOV     R5,REG5
031154  016637  000002  002406        MOV     2(SP),REG6      ;SAVE PSW FROM ERROR TRAP
```

```
5800  031162  011637  002410              MOV     (SP),REG7       ;LIKEWISE FOR PC
5801
5802  031166  013737  177572  002412      MOV     @#177572,TMP0   ;SAVE THE MMU'S STATUS/CONTROL REGISTERS
5803  031174  013737  177574  002414      MOV     @#177574,TMP1
5804  031202  013737  177576  002416      MOV     @#177576,TMP2
5805  031210  013737  172516  002420      MOV     @#172516,TMP3
5806
5807  031216  013737  172354  002422      MOV     @#172354,TMP4   ;SAVE KERNEL PAR WE'RE SUPPOSE TO BE USING
5808
5809  031224  013737  172314  002424      MOV     @#172314,TMP5   ;SAVE KERNEL PDR WE'RE SUPPOSE TO BE USING
5810
5811  031232  011537  002430              MOV     (R5),TMP7       ;SAVE DATA READ OR WRITTEN
5812
5813  031236                              GTDF    EM27,ERR13      ;QUEUE UP THE MMU ERROR
5814                                                              ;       QUEUE 'DEVICE FATAL'' ERROR # 43
5815  031236  012737  000001  002202                                              MOV     #T,EDF,ERRTYP
5816  031244  012737  000053  002204                                              MOV     #43,ERRNBR
5817  031252  012737  016424  002206                                              MOV     #EM27,ERRMSG
5818  031260  012737  010240  002210                                              MOV     #ERR13,ERRBLK
5819
5820  031266  052766  000001  000002      BIS     #BIT0,2(SP)     ;SET CARRY BIT (AS ERROR FLAG) IN PSW ON STACK
5821
5822  031274                              ENDSRV
5823  031274                                                              L10045:
5824  031274  000002                                                             RTI
5825
```

```
                                        .SBTTL TEST 8 -- SPECIAL MFG EXTENDED BIT TEST

                                        ;++*************************************************************************
                                        ;*
                                        ;*      TEST 8 -- SPECIAL MFG EXTENDED BIT TEST
                                        ;*
                                        ;* THIS TEST WAS DESIGNED SPECIFICALLY TO ALLOW MANUFACTURING TO CHECK THE
                                        ;* NPRAIX/NPRAOX BITS WITHOUT A FULL 4 M. OF MEMORY.
                                        ;*
                                        ;* IT WILL CHECK THE 12 DMV EXTENDED ADDRESS BITS (6:NPRAIX/6:NPRAOX) ON
                                        ;* A Q22 SYSTEM IF MEMORY IS PRESENT AT THE FOLLOWING PHYSICAL ADDRESSES:
                                        ;*
                                        ;*      17600000        17400000        17200000
                                        ;*      16600000        15600000        13600000
                                        ;*       7600000
                                        ;*
                                        ;* FIRST SUBTEST :      TEST ''NPRAIX'' EXTENDED ADDRESS BITS
                                        ;* SECOND SUBTEST :     TEST ''NPRAOX'' EXTENDED ADDRESS BITS
                                        ;*
                                        ;*
                                        ;--*************************************************************************
                                        ;
                                        ;       BGNTST
031276                                                                                  T8::

031276  032737  000002  002370                  BIT     #2,PT.CTL       ;IS THIS A MFG SPECIAL Q22 SYSTEM?
031304  001002                                  BNE     .+6             ;YES: GO START TEST
031306                                          EXIT    TST             ; NO: SKIP THIS TEST
031306  104432                                                                                  TRAP    C$EXIT
031310  001242                                                                                  .WORD   L10046-.

031312  004737  003514                          JSR     PC,MSTCLR       ;INIT DMV & ENTER M-LOOP
031316  103003                                  BCC     1$              ;IF NO ERROR, PROCEED WITH TESTING
031320                                          ERROR                   ;ELSE, REPORT ERROR
031320  104460                                                                                  TRAP    C$ERROR
031322                                          EXIT    TST             ;   & EXIT TEST
031322  104432                                                                                  TRAP    C$EXIT
031324  001226                                                                                  .WORD   L10046-.
                                        ;============================================================================
                                        ;== SUBTEST #1 : TEST THE NPR-IN EXTENDED ADDRESS BITS
                                        ;============================================================================
031326                                  1$:     BGNSUB
031326                                                                                  T8.1:
031326  104402                                                                                  TRAP    C$BSUB
031330  004737  030560                          JSR     PC,XMINIT       ;INITIALIZE THE MMU
031334  005004                                  CLR     R4              ;CLEAR INDEX

031336  005002                                  CLR     R2              ;SETUP EXTENDED MEM BACKGROUND PATTERN
031340  016262  032554  032572          2$:     MOV     XLOC0(R2),XVAL0(R2)     ;(IN XVAL0 => XVAL6)
031346  005722                                  TST     (R2)+
031350  020227  000016                          CMP     R2,#14.
031354  001371                                  BNE     2$

                                        ;============== MAIN LOOP STARTS HERE ===============

                                        ;*      WRITE XVAL0, XVAL1, XVAL2, ... XVAL6 INTO THE SEVEN SPECIFIC
```

```
                                        ;*      EXTENDED ADDRESSES SPECIFIED BY XLOC0 THRU XLOC6 USING 11/23 MMU
                                        ;*      (XLOC'S SPECIFY THE UPPER TWO BYTES OF THE 3 BYTE EXTENDED ADDR)
                                        
031356  005002                        CLR     R2                      ;CLEAR LOCAL INDEX
031360  016237  032572  002440  11$:   MOV     XVAL0(R2),TMPB          ;SETUP DATA POINTER
031366  016237  032554  002436        MOV     XLOC0(R2),TMPA          ;SETUP/ADJUST PAR VALUE
031374  006337  002436                ASL     TMPA
031400  006337  002436                ASL     TMPA
031404  004537  030700                JSR     R5,XMWRIT               ;WRITE BACKGROUND PATTERN
031410  002436                        TMPA                            ; POINTER TO PAR VALUE
031412  002440                        TMPB                            ; POINTER TO DATA
031414  103003                        BCC     .+10                    ;IF NO ERROR, PROCEED
031416                                ERROR                           ;ELSE, REPORT ERROR
031416  104460                                                                TRAP    C$ERROR
031420                                ESCAPE  SUB                     ;   & EXIT SUBTEST
031420  104410                                                                TRAP    C$ESCAPE
031422  000352                                                                .WORD   L10047-.
                                        
031424  005722                        TST     (R2)+                   ;BUMP INDEX
031426  020227  000016                CMP     R2,#14.                 ;ALL 'XLOC' EXTENDED ADDRESSES WRITTEN?
031432  001352                        BNE     11$                     ; NO:  WRITE ANOTHER
                                        
                                        ;**************** SETUP DMV'S NPR ADDRESSING REGISTERS ****************
                                        ;************** (WRITE/READ/VERIFY NPRAIH,NPRAIL,NPRAIX) **************
031434  116437  032555  031470  3$:    MOVB    XLOC0+1(R4),4$          ;SETUP NPRAIX VALUE.
031442  004537  004054                JSR     R5,WRITEI               ;POINT NPR REGISTERS TO EXTENDED ADDRESS
031446  000074                        NPRAIL
031450  000000                        0
031452  004537  004054                JSR     R5,WRITEI
031456  000075                        NPRAIH
031460  000000                        0
031462  004537  004054                JSR     R5,WRITEI
031466  000076                        NPRAIX
031470  000000                4$:     00
031472  004537  003616                JSR     R5,READ                 ;READ BACK THE ADDRESS
031476  000074                        NPRAIL
031500  002256                        BDATA
031502  004537  003616                JSR     R5,READ
031506  000075                        NPRAIH
031510  002257                        BDATA+1
031512  004537  003616                JSR     R5,READ
031516  000076                        NPRAIX
031520  002434                        TMP9
                                        
                                                                        ;********** NOW CHECK THEM **********
031522  005737  002256                TST     BDATA                   ;NPRAIL,NPRAIH=0 ?
031526  001413                        BEQ     6$                      ; YES: TRY CHECKING NPRAIX
031530  005037  002254                CLR     GDATA                   ; NO:  REPORT ERROR...
031534  012737  000007  002300        MOV     #7,REGNUM               ;
031542  105737  002256                TSTB    BDATA
031546  001020                        BNE     7$
031550  005237  002300                INC     REGNUM
031554  000415                        BR      7$
031556  013737  031470  002254  6$:   MOV     4$,GDATA                ;SET UP NPRAIX EXPECTED
031564  013737  002434  002256        MOV     TMP9,BDATA              ;SET UP NPRAIX READ...
031572  023737  002254  002256        CMP     GDATA,BDATA             ;DOES NPRAIX=EXPECTED ?
031600  001411                        BEQ     9$                      ; YES: CONTINUE
```

```
031602 012737 000006 002300         MOV     #6,REGNUM           ; NO:  REPORT ERROR
031610                      7$:     GEDF    EM26A,ERR14
                                                                ;        'DEVICE FATAL'' ERROR # 44
031610 104455                                                                           TRAP    C$ERDF
031612 000054                                                                           .WORD   44
031614 016204                                                                           .WORD   EM26A
031616 011002                                                                           .WORD   ERR14
031620                              ESCAPE  SUB
031620 104410                                                                           TRAP    C$ESCAPE
031622 000152                                                                           .WORD   L10047-.

                            ;******* SETUP/START/CHECK THE NPR OPERATION (DATA/NPRCTL) *********
031624 112737 000004 002417 9$:     MOVB    #NPRLD,TMP2+1       ;SETUP CONTROL VALUE TO DO NPR-IN

031632 004537 004042                JSR     R5,WRITE            ;PERFORM THE 'EXTENDED'' DATA-IN NPR
031636 123004                       NPRCTL
031640 002417                       TMP2+1
031642 004537 003616                JSR     R5,READ             ;CHECK THE NPR OPERATION
031646 123004                       NPRCTL
031650 002416                       TMP2
031652 004537 003616                JSR     R5,READ             ;GET THE DATA WE SHOULD HAVE JUST LOADED INTO
031656 123001                       NPRDRH                      ;       THE NPR DATA REGISTERS FROM THE
031660 002257                       BDATA+1                     ;       EXTENDED MEMORY AREA
031662 004537 003616                JSR     R5,READ
031666 123000                       NPRDRL
031670 002256                       BDATA
031672 132737 000300 002416         BITB    #300,TMP2           ;DID IT ABORT OR HANG?
031700 001414                       BEQ     14$                 ; NO:  GOOD.  PROCEED WITH SUBTEST
031702 100005                       BPL     10$                 ; YES: WHICH ONE?
031704                              GEDF    EM27A,ERR12         ;ABORT, REPORT IT AS SUCH.
                                                                ;       'DEVICE FATAL'' ERROR # 45
031704 104455                                                                           TRAP    C$ERDF
031706 000055                                                                           .WORD   45
031710 016437                                                                           .WORD   EM27A
031712 007456                                                                           .WORD   ERR12
031714 000404                       BR      12$                 ;AND EXIT
031716                      10$:    GEDF    EM27B,ERR12         ;HANG, REPORT IT AS SUCH.
                                                                ;       'DEVICE FATAL'' ERROR # 46
031716 104455                                                                           TRAP    C$ERDF
031720 000056                                                                           .WORD   46
031722 016461                                                                           .WORD   EM27B
031724 007456                                                                           .WORD   ERR12
031726                      12$:    ESCAPE  SUB                 ;  AND EXIT SUBTEST
031726 104410                                                                           TRAP    C$ESCAPE
031730 000044                                                                           .WORD   L10047-.

                            ;************** NOW CHECK DATA READ AGAINST EXPECTED VALUE **************
031732 016437 032554 002254 14$:    MOV     XLOCO(R4),GDATA ;SET UP EXPECTED READ VALUE

031740 023737 002256 002254         CMP     BDATA,GDATA         ;DID WE READ THE TEST DATA USING THE NPR?
031746 001406                       BEQ     15$                 ;
031750                              GEDF    EM27C,ERR12         ; NO:  REPORT THE ERROR.
                                                                ;       'DEVICE FATAL'' ERROR # 47
031750 104455                                                                           TRAP    C$ERDF
031752 000057                                                                           .WORD   47
031754 016502                                                                           .WORD   EM27C
```

```
5994  031756  007456                                                          .WORD   ERR12
5995  031760
5996  031760  104410          ESCAPE  SUB             ;       AND EXIT FROM SUBTEST
5997  031762  000012                                                          TRAP    C$ESCAPE
5998                                                                          .WORD   L10047-.
5999  031764  005724    15$:  TST     (R4)+           ; YES: BUMP INDEX
6000  031766  020427  000016  CMP     R4,#14.         ;ARE WE DONE W/ALL EXTENDED LOCATIONS
6001  031772  001220          BNE     3$              ; NO: DO NEXT EXTENDED LOCATION
6002
6003  031774    63$:  ENDSUB                          ;YES: END SUBROUTINE
6004  031774                                                        L10047:
6005  031774  104403                                                          TRAP    C$ESUB
6006
6007
6008
6009                    ;=============================================================================
6010                    ;==  SUBTEST #2 : TEST THE NPR-OUT EXTENDED ADDRESS BITS
6011                    ;=============================================================================
6012  031776            BGNSUB                        ;TEST THE NPR-OUT USING EXTENDED ADDR. BITS
6013  031776                                                              T8.2:
6014  031776  104402                                                          TRAP    C$BSUB
6015  032000  004737  030560  JSR     PC,XMINIT       ;INITIALIZE THE MMU
6016  032004  005004          CLR     R4              ;CLEAR INDEX
6017
6018                    ;============== MAIN LOOP STARTS HERE ==============
6019  032006  005002  T8LP:   CLR     R2              ;SETUP EXTENDED MEM BACKGROUND PATTERN
6020  032010  012762  125252  032572  3$:   MOV     #125252,XVAL0(R2)       ;(125252 IN XVAL0 => XVAL6)
6021  032016  005722          TST     (R2)+           ; THIS IS DONE FOR ERROR REPORTING
6022  032020  020227  000016  CMP     R2,#14.         ; PURPOSES.
6023  032024  001371          BNE     3$
6024
6025                    ;*      WRITE (USING MMU) XVAL0, XVAL1, XVAL2, ... XVAL6 (IE: 125252) INTO
6026                    ;*      THE SEVEN SPECIFIC EXTENDED ADDRESSES SPECIFIED BY XLOC0 THRU XLOC6
6027                    ;*      (XLOC'S SPECIFY THE UPPER TWO BYTES OF THE 3 BYTE EXTENDED ADDR)
6028
6029  032026  005002          CLR     R2              ;CLEAR LOCAL INDEX
6030  032030  016237  032572  002440  11$:   MOV     XVAL0(R2),TMPB  ;SETUP DATA POINTER
6031  032036  016237  032554  002436          MOV     XLOC0(R2),TMPA  ;SETUP/ADJUST PAR VALUE
6032  032044  006337  002436          ASL     TMPA
6033  032050  006337  002436          ASL     TMPA
6034  032054  004537  030700          JSR     R5,XMWRIT       ;WRITE BACKGROUND PATTERN INTO EXTENDED MEMORY
6035  032060  002436          TMPA                    ; POINTER TO PAR VALUE
6036  032062  002440          TMPB                    ; POINTER TO DATA (@DATA = 125252)
6037  032064  103003          BCC     .+10            ;IF NO ERROR, PROCEED
6038  032066                  ERROR                   ;ELSE, REPORT ERROR
6039  032066  104460                                                          TRAP    C$ERROR
6040  032070          ESCAPE  SUB             ;   & EXIT SUBTEST
6041  032070  104410                                                          TRAP    C$ESCAPE
6042  032072  000456                                                          .WORD   L10050-.
6043
6044  032074  005722          TST     (R2)+           ;BUMP INDEX
6045  032076  020227  000016  CMP     R2,#14.         ;ALL 'XLOC' EXTENDED ADDRESSES WRITTEN?
6046  032102  001352          BNE     11$             ; NO:  WRITE ANOTHER
6047
6048                    ;* WE NOW CHANGE ONE LOCATION IN THE 'XVAL'' BACKGROUND TABLE.
6049                    ;* AFTER OUR DMV NPR OUT, THIS TABLE WILL REPRESENT THE
```

```
                                ;* EXPECTED VALUES OF OUR EXTENDED MEMORY.
032104  012764  052525  032572        MOV     #052525,XVAL0(R4)       ;SETUP EXPECTED PATTERN AFTER NPR-OUT
                                                                      ;XVAL0 => XVAL6 NOW = EXPECTED PATTERN

                                ;*************** SETUP DMV NPR ADDRESSING REGISTERS ***************
                                ;************ (WRITE/READ/VERIFY NPRAOH,NPRAOL,NPRAOX) **************
032112  116437  032555  032146        MOVB    XLOC0+1(R4),5$  ;INIT NPRAOX VALUE
032120  004537  004054                JSR     R5,WRITEI       ;POINT NPR REGISTERS TO EXTENDED ADDRESS
032124  000070                        NPRAOL
032126  000000                        0
032130  004537  004054                JSR     R5,WRITEI
032134  000071                        NPRAOH
032136  000000                        0
032140  004537  004054                JSR     R5,WRITEI
032144  000072                        NPRAOX
032146  000000                5$:     00
032150  004537  003616                JSR     R5,READ         ;READ BACK THE ADDRESS
032154  000070                        NPRAOL
032156  002256                        BDATA
032160  004537  003616                JSR     R5,READ
032164  000071                        NPRAOH
032166  002257                        BDATA+1
032170  004537  003616                JSR     R5,READ
032174  000072                        NPRAOX
032176  002434                        TMP9
                                                        ;********** NOW CHECK THEM **********
032200  005737  002256                TST     BDATA           ;NPRAOL,NPRAOH=0 ?
032204  001413                        BEQ     6$              ; YES: TRY CHECKING NPRAOX
032206  005037  002254                CLR     GDATA           ; NO:  REPORT ERROR...
032212  012737  000004  002300        MOV     #4,REGNUM       ;
032220  105737  002256                TSTB    BDATA
032224  001020                        BNE     7$
032226  005237  002300                INC     REGNUM
032232  000415                        BR      7$
032234  013737  032146  002254  6$:   MOV     5$,GDATA        ;SET UP NPRAOX EXPECTED
032242  013737  002434  002256        MOV     TMP9,BDATA      ;SET UP NPRAOX READ...
032250  023737  002254  002256        CMP     GDATA,BDATA     ;DOES NPRAOX=EXPECTED ?
032256  001411                        BEQ     9$              ; YES: CONTINUE
032260  012737  000003  002300        MOV     #3,REGNUM       ; NO:  REPORT ERROR
032266                          7$:   GEDF    EM26A,ERR14
                                ;       'DEVICE FATAL'' ERROR # 48
032266  104455                                                        TRAP    C$ERDF
032270  000060                                                        .WORD   48
032272  016204                                                        .WORD   EM26A
032274  011002                                                        .WORD   ERR14
032276                          ESCAPE  SUB
032276  104410                                                        TRAP    C$ESCAPE
032300  000250                                                        .WORD   L10050-.

                                ;******** SETUP/START/CHECK THE NPR OPERATION (DATA/NPRCTL) *********
032302  012737  052525  002254  9$:    MOV     #052525,GDATA   ;DATA DMV WILL NPR TO TOP LOC

                                ;************** LOAD (DMV) TEST PATTERN **************
032310  004537  004042                JSR     R5,WRITE                ;LOAD UP THE TEST PATTERN TO BE
032314  123001                        NPRDRH                          ;WRITTEN INTO EXTENDED MEMORY BY
032316  002255                        GDATA+1                         ;THE DMV
```

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6106  032320  004537  004042          JSR     R5,WRITE
6107  032324  123000                  NPRDRL
6108  032326  002254                  GDATA
6109
6110                          ;*************** PERFORM/CHECK NPR OPERATION (BUT NOT DATA) ***************
6111  032330  112737  000044  002417          MOVB    #NPRDL,TMP2+1   ;SETUP CONTROL VALUE TO DO NPR-OUT
6112
6113  032336  004537  004042          JSR     R5,WRITE        ;PERFORM THE 'EXTENDED'' DATA-OUT NPR
6114  032342  123004                  NPRCTL
6115  032344  002417                  TMP2+1
6116  032346  004537  003616          JSR     R5,READ         ;CHECK THE NPR OPERATION
6117  032352  123004                  NPRCTL
6118  032354  002416                  TMP2
6119  032356  132737  000300  002416  BITB    #300,TMP2       ;DID IT ABORT OR HANG?
6120  032364  001414                  BEQ     14$             ;NO, GOOD.  PROCEED WITH SUBTEST
6121  032366  100005                  BPL     10$             ;YES, WHICH ONE?
6122  032370                          GEDF    EM27A,ERR12     ;ABORT, REPORT IT AS SUCH.
6123                                                          ;       'DEVICE FATAL'' ERROR # 49
6124  032370  104455                                                          TRAP    C$ERDF
6125  032372  000061                                                          .WORD   49
6126  032374  016437                                                          .WORD   EM27A
6127  032376  007456                                                          .WORD   ERR12
6128  032400  000404                  BR      12$             ;AND EXIT
6129  032402                  10$:    GEDF    EM27B,ERR12     ;HANG, REPORT IT AS SUCH.
6130                                                          ;       'DEVICE FATAL'' ERROR # 50
6131  032402  104455                                                          TRAP    C$ERDF
6132  032404  000062                                                          .WORD   50
6133  032406  016461                                                          .WORD   EM27B
6134  032410  007456                                                          .WORD   ERR12
6135  032412                  12$:    ESCAPE  SUB             ;  AND EXIT SUBTEST
6136  032412  104410                                                          TRAP    C$ESCAPE
6137  032414  000134                                                          .WORD   L10050-.
6138
6139                          ;********** READ EXTENDED MEM INTO LOCAL RAM (RXVAL0-6) ***************
6140  032416  005002          14$:    CLR     R2              ;CLEAR LOCAL INDEX
6141  032420  016237  032610  002440  15$:    MOV     RXVAL0(R2),TMPB ;SETUP DATA POINTER
6142  032426  016237  032554  002436          MOV     XLOC0(R2),TMPA  ;SETUP/ADJUST PAR VALUE
6143  032434  006337  002436                  ASL     TMPA
6144  032440  006337  002436                  ASL     TMPA
6145  032444  004537  030776          JSR     R5,XMREAD       ;READ EXTENDED MEM BACKGROUND PATTERN
6146  032450  002436                  TMPA                    ; POINTER TO PAR VALUE
6147  032452  002440                  TMPB                    ; POINTER TO DATA STORAGE
6148  032454  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
6149  032456                          ERROR                   ;ELSE, REPORT IT
6150  032456  104460                                                          TRAP    C$ERROR
6151  032460                          ESCAPE  TST             ;       AND EXIT ENTIRE TEST!
6152  032460  104410                                                          TRAP    C$ESCAPE
6153  032462  000070                                                          .WORD   L10046-.
6154  032464  062702  000002          ADD     #2,R2           ;BUMP INDEX
6155  032470  020227  000014          CMP     R2,#12.         ;ALL 'XLOC' EXTENDED ADDRESSES READ?
6156  032474  001351                  BNE     15$             ; NO:  READ ANOTHER
6157
6158                          ;********** NOW CHECK EXPECTED VS. ACTUAL EXT. MEM VALUES **********
6159  032476  005002                  CLR     R2
6160  032500  026262  032610  032572  16$:    CMP     RXVAL0(R2),XVAL0(R2)
6161  032506  001406                  BEQ     17$
```

```
032510                          GEDF    EM60N,ERR60
                                ;       'DEVICE FATAL'' ERROR # 51
                                                                TRAP    C$ERDF
                                                                .WORD   51
                                                                .WORD   EM60N
                                                                .WORD   ERR60
032520                          ESCAPE  SUB
                                                                TRAP    C$ESCAPE
                                                                .WORD   L10050-.
032524 005722           17$:    TST     (R2)+           ;BUMP LOCAL INDEX
032526 020227 000016            CMP     R2,#14.         ;ALL VALUES CHECKED ?
032532 001362                   BNE     16$
032534 005724           20$:    TST     (R4)+           ; YES: BUMP INDEX
032536 020427 000016            CMP     R4,#14.         ;ARE WE DONE W/ALL EXTENDED LOCATIONS
032542 001402                   BEQ     63$             ; YES: END
032544 000137 032006            JMP     T8LP            ; NO:  GO DO SOME MORE
032550                  63$:    ENDSUB
                                                                L10050:
032550 104403                                                   TRAP    C$ESUB
032552                  MFEND:  ENDTST
                                                                L10046:
032552 104401                                                   TRAP    C$ETST

032554 037400           XLOC0:  37400           ;ADDRESS 17600000 POINTER
032556 037000           XLOC1:  37000           ;ADDRESS 17400000 POINTER
032560 036400           XLOC2:  36400           ;ADDRESS 17200000 POINTER
032562 035400           XLOC3:  35400           ;ADDRESS 16600000 POINTER
032564 033400           XLOC4:  33400           ;ADDRESS 15600000 POINTER
032566 027400           XLOC5:  27400           ;ADDRESS 13600000 POINTER
032570 017400           XLOC6:  17400           ;ADDRESS 07600000 POINTER

032572 000000           XVAL0:  0
032574 000000           XVAL1:  0
032576 000000           XVAL2:  0
032600 000000           XVAL3:  0
032602 000000           XVAL4:  0
032604 000000           XVAL5:  0
032606 000000           XVAL6:  0

032610 000000           RXVAL0: 0
032612 000000           RXVAL1: 0
032614 000000           RXVAL2: 0
032616 000000           RXVAL3: 0
032620 000000           RXVAL4: 0
032622 000000           RXVAL5: 0
032624 000000           RXVAL6: 0
```

```
                                .SBTTL TEST 9 -- Q-BUS INTERRUPT ''A'' & 'B'' SELECTION

                                ;+*****************************************************************************
                                ;*
                                ;*      TEST 9 -- Q-BUS INTERRUPT ''A'' & 'B'' SELECTION
                                ;*
                                ;* THIS  TEST  CONTAINS SUBTESTS IN WHICH A SEQUENCE OF STEPS IS
                                ;* PERFORMED. IN GENERAL, EACH SUBTEST PERFORMS THE FOLLOWING:
                                ;*
                                ;*      1. INTERRUPTS ARE DISABLED FOR BOTH ''A'' & 'B''
                                ;*
                                ;*      2. THE INTERRUPT REQUEST REGISTER IS WRITTEN INTO
                                ;*
                                ;*      3. A TEST IS MADE TO BE SURE THAT NEITHER INTERRUPT OCCURS
                                ;*
                                ;*      4. BOTH INTERRUPTS ARE ENABLES
                                ;*
                                ;*      5. A TEST IS MADE TO BE SURE THAT IF AN INTERRUPT IS EXPECTED, IT IS
                                ;*         RECEIVED AND IF IT ISN'T EXPECTED IT DOESN'T HAPPEN.
                                ;*
                                ;* ALL TESTING IS DONE HERE WITH THE PROCESSOR'S PRIORITY SET AT 0.
                                ;*
                                ;--*****************************************************************************
                                ;
                                        BGNTST
032626                                                                  T9::
032626  004737  003514                  JSR     PC,MSTCLR       ;ISSUE MASTER CLEAR & ENTER MAINT. LOOP
032632  103003                          BCC     1$              ;IF NO ERROR, CONTINUE
032634                                  ERROR                   ;ELSE, REPORT IT AND
032634  104460                                                                  TRAP    C$ERROR
032636                                  EXIT    TST             ;EXIT THIS TEST
032636  104432                                                                  TRAP    C$EXIT
032640  001272                                                                  .WORD   L10051-.

                                ;-----------------------------------------------------------------------------
                                ;               TEST FOR NO INTERRUPT WHEN ENABLED
                                ;
                                ;       1. DISABLE BOTH INTERRUPTS
                                ;
                                ;       2. ASSERT BOTH REQUEST BITS TO 1
                                ;
                                ;       3. CHECK FOR NO ''A'' INTERRUPT
                                ;
                                ;       4. CHECK FOR NO 'B'' INTERRUPT
                                ;
                                ;       5. ENABLE BOTH INTERRUPTS
                                ;
                                ;       6. CHECK FOR NO ''A'' INTERRUPT
                                ;
                                ;       7. CHECK FOR NO 'B'' INTERRUPT

032642                          1$:     BGNSUB
032642                                                                  T9.1:
032642  104402                                                                  TRAP    C$BSUB
032644  012737  177777  002274          MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO 'WATCH'' FOR INTERRUPTS
032652  005037  002272                  CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
```

```
6266  032656  112777  000000  147434          MOVB    #0,@BSEL0       ;DISABLE BOTH INTERRUPTS
6267  032664  004537  004054                  JSR     R5,WRITEI       ;LOAD THE INTERRUPT CONTROL REGISTER WITH
6268  032670  123005                          IRQREG                  ;  BOTH BITS SET.  THIS SHOULD NOT CAUSE
6269  032672  000006                          IRQA!IRQB               ;  AN INTERRUPT AT EITHER LEVEL
6270  032674  103003                          BCC     30$             ;IF AN ERROR OCCURED,
6271  032676                                  ERROR                   ;REPORT IT &
6272  032676  104460                                                          TRAP    C$ERROR
6273  032700                                  ESCAPE  TST             ;  QUIT
6274  032700  104410                                                          TRAP    C$ESCAPE
6275  032702  001230                                                          .WORD   L10051-.
6276
6277  032704  105737  002272          30$:    TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
6278  032710  001407                          BEQ     5$              ;NO,  GOOD.  GO TEST THE "B" INTERRUPT
6279  032712  012737  000001  002254          MOV     #1,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6280  032720                                  GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
6281                                                                  ;       "DEVICE FATAL" ERROR # 52
6282  032720  104455                                                          TRAP    C$ERDF
6283  032722  000064                                                          .WORD   52
6284  032724  016526                                                          .WORD   EM34
6285  032726  006212                                                          .WORD   ERR1
6286
6287  032730  105737  002273          5$:     TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
6288  032734  001407                          BEQ     6$              ;NO,  GOOD.  NOW TRY LETTING ONE THROUGH
6289  032736  012737  000002  002254          MOV     #2,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6290  032744                                  GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
6291                                                                  ;       "DEVICE FATAL" ERROR # 53
6292  032744  104455                                                          TRAP    C$ERDF
6293  032746  000065                                                          .WORD   53
6294  032750  016540                                                          .WORD   EM34B
6295  032752  006212                                                          .WORD   ERR1
6296
6297  032754  005037  002272          6$:     CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
6298  032760  112777  000021  147332          MOVB    #IENBA!IENBB,@BSEL0     ;ENABLE BOTH INTERRUPTS
6299  032766  012703  001000                  MOV     #1000,R3        ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
6300  032772  077301                          SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
6301  032774  105737  002272                  TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
6302  033000  001407                          BEQ     7$              ;NO,  GOOD.  GO TEST THE "B" INTERRUPT
6303  033002  012737  000003  002254          MOV     #3,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6304  033010                                  GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
6305                                                                  ;       "DEVICE FATAL" ERROR # 54
6306  033010  104455                                                          TRAP    C$ERDF
6307  033012  000066                                                          .WORD   54
6308  033014  016526                                                          .WORD   EM34
6309  033016  006212                                                          .WORD   ERR1
6310
6311  033020  105737  002273          7$:     TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
6312  033024  001407                          BEQ     8$              ;NO,  GOOD.  NOW TRY LETTING ONE THROUGH
6313  033026  012737  000004  002254          MOV     #4,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6314  033034                                  GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
6315                                                                  ;       "DEVICE FATAL" ERROR # 55
6316  033034  104455                                                          TRAP    C$ERDF
6317  033036  000067                                                          .WORD   55
6318  033040  016540                                                          .WORD   EM34B
6319  033042  006212                                                          .WORD   ERR1
6320
6321  033044                          8$:     ENDSUB
```

```
033044
033044  104403                                          L10052:  TRAP    C$ESUB

                ;-------------------------------------------------------------
                ;               TEST FOR "A" INTERRUPT WHEN ENABLED
                ;
                ;       1. DISABLE BOTH INTERRUPTS
                ;
                ;       2. ASSERT "B" REQUEST BIT TO 1:
                ;               DISABLING "B" & FORCING "A"
                ;
                ;       3. CHECK FOR NO "A" INTERRUPT
                ;
                ;       4. CHECK FOR NO "B" INTERRUPT
                ;
                ;       5. ENABLE BOTH INTERRUPTS
                ;
                ;       6. CHECK FOR "A" INTERRUPT
                ;
                ;       7. CHECK FOR NO "B" INTERRUPT
                ;
033046          BGNSUB
033046                                                  T9.2:  TRAP    C$BSUB
033046  104402
033050  012737  177777  002274      MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
033056  005037  002272              CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
033062  112777  000000  147230      MOVB    #0,@BSEL0       ;DISABLE INTERRUPTS AGAIN
033070  004537  004054              JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON "A"
033074  123005                      IRQREG                  ;   BUT NOT ON "B"
033076  000002                      IRQB
033100  103003                      BCC     31$             ;IF AN ERROR OCCURED,
033102                              ERROR                   ;REPORT IT &
033102  104460                                                          TRAP    C$ERROR
033104                              ESCAPE  TST             ;  QUIT
033104  104410                                                          TRAP    C$ESCAPE
033106  001024                                                          .WORD   L10051-.
033110  105737  002272      31$:    TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
033114  001407                      BEQ     10$             ;NO,  GOOD.  GO TEST THE "B" INTERRUPT
033116  012737  000005  002254      MOV     #5,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
033124                              GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
                                                            ;       "DEVICE FATAL" ERROR # 56
033124  104455                                                          TRAP    C$ERDF
033126  000070                                                          .WORD   56
033130  016526                                                          .WORD   EM34
033132  006212                                                          .WORD   ERR1
033134  105737  002273      10$:    TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
033140  001407                      BEQ     11$             ;NO,  GOOD.  NOW TRY LETTING ONE THROUGH
033142  012737  000006  002254      MOV     #6,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
033150                              GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
                                                            ;       "DEVICE FATAL" ERROR # 57
033150  104455                                                          TRAP    C$ERDF
033152  000071                                                          .WORD   57
033154  016540                                                          .WORD   EM34B
033156  006212                                                          .WORD   ERR1
```

```
                                11$:    CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
                                        MOVB    #IENBA!IENBB,@BSEL0     ;ENABLE BOTH INTERRUPTS
                                        MOV     #1000,R3        ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
                                        SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
                                        TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
                                        BNE     12$             ;YES, GOOD.  GO TEST THE "B" INTERRUPT
                                        MOV     #7,GDATA        ;NO,  TELL ERROR HANDLER WHAT WE HAD DONE
                                        GEDF    EM35,ERR1       ;REPORT MISSING INTERRUPT ON "ENABLE"
                                                                ;       "DEVICE FATAL" ERROR # 58
                                                                                        TRAP    C$ERDF
                                                                                        .WORD   58
                                                                                        .WORD   EM35
                                                                                        .WORD   ERR1

                                12$:    TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
                                        BEQ     13$             ;NO,  GOOD.  NOW TRY HITTING THE "B" INTERRUPT
                                        MOV     #8.,GDATA       ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
                                        GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
                                                                ;       "DEVICE FATAL" ERROR # 59
                                                                                        TRAP    C$ERDF
                                                                                        .WORD   59
                                                                                        .WORD   EM34B
                                                                                        .WORD   ERR1

                                13$:    ENDSUB
                                                                                L10053:
                                                                                        TRAP    C$ESUB

                                ;-------------------------------------------------------------------------
                                ;               TEST FOR "B" INTERRUPT WHEN ENABLED
                                ;
                                ;       1. DISABLE BOTH INTERRUPTS
                                ;
                                ;       2. ASSERT "A" REQUEST BIT TO 1:
                                ;               DISABLING "A" & FORCING "B"
                                ;
                                ;       3. CHECK FOR NO "A" INTERRUPT
                                ;
                                ;       4. CHECK FOR NO "B" INTERRUPT
                                ;
                                ;       5. ENABLE BOTH INTERRUPTS
                                ;
                                ;       6. CHECK FOR NO "A" INTERRUPT
                                ;
                                ;       7. CHECK FOR "B" INTERRUPT

                                        BGNSUB
                                                                                T9.3:
                                                                                        TRAP    C$BSUB
                                        MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
                                        CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
                                        MOVB    #0,@BSEL0       ;DISABLE INTERRUPTS AGAIN
                                        JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON "B"
                                        IRQREG                  ;    BUT NOT ON "A"
                                        IRQA
```

```
6434  033304  103003                  BCC     32$             ;IF AN ERROR OCCURED,
6435  033306                          ERROR                   ;REPORT IT &
6436  033306  104460                                                  TRAP    C$ERROR
6437  033310                          ESCAPE  TST             ;  EXIT
6438  033310  104410                                                  TRAP    C$ESCAPE
6439  033312  000620                                                  .WORD   L10051-.
6440
6441  033314  105737  002272        32$:    TSTB    INTFLG          ;DID AN 'A' INTERRUPT OCCUR?
6442  033320  001407                  BEQ     14$             ;NO,  GOOD.  GO TEST THE 'B' INTERRUPT
6443  033322  012737  000011  002254        MOV     #9.,GDATA       ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6444  033330                          GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
6445                                                          ;       'DEVICE FATAL' ERROR # 60
6446  033330  104455                                                  TRAP    C$ERDF
6447  033332  000074                                                  .WORD   60
6448  033334  016526                                                  .WORD   EM34
6449  033336  006212                                                  .WORD   ERR1
6450
6451  033340  105737  002273        14$:    TSTB    INTFLG+1        ;DID A 'B' INTERRUPT OCCUR?
6452  033344  001407                  BEQ     15$             ;NO,  GOOD.  NOW TRY LETTING ONE THROUGH
6453  033346  012737  000012  002254        MOV     #10.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6454  033354                          GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
6455                                                          ;       'DEVICE FATAL' ERROR # 61
6456  033354  104455                                                  TRAP    C$ERDF
6457  033356  000075                                                  .WORD   61
6458  033360  016540                                                  .WORD   EM34B
6459  033362  006212                                                  .WORD   ERR1
6460
6461  033364  005037  002272        15$:    CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
6462  033370  112777  000021  146722        MOVB    #IENBA!IENBB,@BSEL0     ;ENABLE BOTH INTERRUPTS
6463  033376  012703  001000                MOV     #1000,R3        ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
6464  033402  077301                  SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
6465  033404  105737  002272                TSTB    INTFLG          ;DID AN 'A' INTERRUPT OCCUR?
6466  033410  001407                  BEQ     16$             ;NO,  GOOD.  GO TEST THE 'B' INTERRUPT
6467  033412  012737  000013  002254        MOV     #11.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6468  033420                          GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
6469                                                          ;       'DEVICE FATAL' ERROR # 62
6470  033420  104455                                                  TRAP    C$ERDF
6471  033422  000076                                                  .WORD   62
6472  033424  016526                                                  .WORD   EM34
6473  033426  006212                                                  .WORD   ERR1
6474
6475  033430  105737  002273        16$:    TSTB    INTFLG+1        ;DID A 'B' INTERRUPT OCCUR?
6476  033434  001007                  BNE     17$             ;YES, GOOD.  NOW TRY HITTING THE 'B' INTERRUPT
6477  033436  012737  000014  002254        MOV     #12.,GDATA      ;NO,  TELL ERROR HANDLER WHAT WE HAD DONE
6478  033444                          GEDF    EM35B,ERR1      ;REPORT MISSING INTERRUPT ON 'ENABLE'
6479                                                          ;       'DEVICE FATAL' ERROR # 63
6480  033444  104455                                                  TRAP    C$ERDF
6481  033446  000077                                                  .WORD   63
6482  033450  016573                                                  .WORD   EM35B
6483  033452  006212                                                  .WORD   ERR1
6484
6485  033454                  17$:    ENDSUB
6486  033454                                                  L10054:
6487  033454  104403                                                  TRAP    C$ESUB
6488
6489                          ;-------------------------------------------------------------------------------
```

```
                        ;   TEST FOR 'A' INTERRUPT BUT NO 'B' WHEN BOTH ENABLED & FORCED
                        ;
                        ;      1. DISABLE BOTH INTERRUPTS
                        ;
                        ;      2. ASSERT BOTH 'A' & 'B' REQUEST BITS TO 0:
                        ;            FORCING BOTH 'A' & 'B' (BUT ONLY GETTING 'A')
                        ;
                        ;      3. CHECK FOR NO 'A' INTERRUPT
                        ;
                        ;      4. CHECK FOR NO 'B' INTERRUPT
                        ;
                        ;      5. ENABLE BOTH INTERRUPTS
                        ;
                        ;      6. CHECK FOR 'A' INTERRUPT
                        ;
                        ;      7. CHECK FOR NO 'B' INTERRUPT

033456                          BGNSUB
033456                                                          T9.4:
033456  104402                                                          TRAP    C$BSUB
033460  012737  177777  002274  MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO 'WATCH' FOR INTERRUPTS
033466  005037  002272          CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
033472  112777  000000  146620  MOVB    #0,@BSEL0       ;DISABLE INTERRUPTS AGAIN
033500  004537  004054          JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON BOTH 'A' & 'B'
033504  123005                  IRQREG
033506  000000                  0
033510  103003                  BCC     31$             ;IF AN ERROR OCCURED,
033512                          ERROR                   ;REPORT IT &
033512  104460                                                          TRAP    C$ERROR
033514                          ESCAPE  TST             ;  QUIT
033514  104410                                                          TRAP    C$ESCAPE
033516  000414                                                          .WORD   L10051-.

033520  105737  002272  31$:   TSTB    INTFLG          ;DID AN 'A' INTERRUPT OCCUR?
033524  001407                  BEQ     10$             ;NO,  GOOD.  GO TEST THE 'B' INTERRUPT
033526  012737  000015  002254  MOV     #13.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
033534                          GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
                                ;               'DEVICE FATAL" ERROR # 64
033534  104455                                                          TRAP    C$ERDF
033536  000100                                                          .WORD   64
033540  016526                                                          .WORD   EM34
033542  006212                                                          .WORD   ERR1

033544  105737  002273  10$:   TSTB    INTFLG+1        ;DID A 'B' INTERRUPT OCCUR?
033550  001407                  BEQ     11$             ;NO,  GOOD.  NOW TRY LETTING ONE THROUGH
033552  012737  000016  002254  MOV     #14.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
033560                          GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
                                ;               'DEVICE FATAL" ERROR # 65
033560  104455                                                          TRAP    C$ERDF
033562  000101                                                          .WORD   65
033564  016540                                                          .WORD   EM34B
033566  006212                                                          .WORD   ERR1

033570  005037  002272  11$:   CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
033574  112777  000021  146516  MOVB    #IENBA!IENBB,@BSEL0     ;ENABLE BOTH INTERRUPTS
033602  012703  001000          MOV     #1000,R3        ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
```

```
6546  033606  077301                    SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
6547  033610  105737  002272            TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
6548  033614  001007                    BNE     12$             ;YES, GOOD.  GO TEST THE "B" INTERRUPT
6549  033616  012737  000017  002254    MOV     #15.,GDATA      ;NO,  TELL ERROR HANDLER WHAT WE HAD DONE
6550  033624                            GEDF    EM35,ERR1       ;REPORT MISSING INTERRUPT ON "ENABLE"
6551                                                            ;       "DEVICE FATAL" ERROR # 66
6552  033624  104455                                                            TRAP    C$ERDF
6553  033626  000102                                                            .WORD   66
6554  033630  016552                                                            .WORD   EM35
6555  033632  006212                                                            .WORD   ERR1
6556
6557  033634  105737  002273    12$:    TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
6558  033640  001407                    BEQ     13$             ;NO,  GOOD.  NOW TRY HITTING THE "B" INTERRUPT
6559  033642  012737  000020  002254    MOV     #16.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6560  033650                            GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
6561                                                            ;       "DEVICE FATAL" ERROR # 67
6562  033650  104455                                                            TRAP    C$ERDF
6563  033652  000103                                                            .WORD   67
6564  033654  016540                                                            .WORD   EM34B
6565  033656  006212                                                            .WORD   ERR1
6566
6567  033660                    13$:    ENDSUB
6568  033660                                                          L10055:
6569  033660  104403                                                            TRAP    C$ESUB
6570
6571                            ;-----------------------------------------------------------------
6572                            ;               TEST FOR "A" INTERRUPT WHILE ENABLED
6573                            ;
6574                            ;       1. ENABLE BOTH INTERRUPTS
6575                            ;
6576                            ;       2. ASSERT "B" REQUEST BIT TO 1:
6577                            ;               DISABLING "B" & FORCING "A"
6578                            ;
6579                            ;       3. CHECK FOR "A" INTERRUPT
6580                            ;
6581                            ;       4. CHECK FOR NO "B" INTERRUPT
6582
6583  033662                            BGNSUB
6584  033662                                                          T9.5:
6585  033662  104402                                                            TRAP    C$BSUB
6586  033664  012737  177777  002274    MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
6587  033672  005037  002272            CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
6588  033676  112777  000021  146414    MOVB    #IENBA!IENBB,@BSEL0     ;ENABLE BOTH INTERRUPTS
6589  033704  004537  004054            JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON "A"
6590  033710  123005                    IRQREG                  ;   BUT NOT ON "B"
6591  033712  000002                    IRQB
6592  033714  103003                    BCC     31$             ;IF AN ERROR OCCURED,
6593  033716                            ERROR                   ;REPORT IT &
6594  033716  104460                                                            TRAP    C$ERROR
6595  033720                            ESCAPE  TST             ;  QUIT
6596  033720  104410                                                            TRAP    C$ESCAPE
6597  033722  000210                                                            .WORD   L10051-.
6598
6599  033724  012703  001000    31$:    MOV     #1000,R3        ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
6600  033730  077301                    SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
6601  033732  105737  002272            TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
```

```
6602  033736  001007                    BNE     12$             ;YES, GOOD.  GO TEST THE 'B' INTERRUPT
6603  033740  012737  000023  002254    MOV     #19.,GDATA      ;NO,  TELL ERROR HANDLER WHAT WE HAD DONE
6604  033746                            GEDF    EM35,ERR1       ;REPORT MISSING INTERRUPT ON 'ENABLE'
6605                                                            ;       'DEVICE FATAL'' ERROR # 68
6606  033746  104455                                                            TRAP    C$ERDF
6607  033750  000104                                                            .WORD   68
6608  033752  016552                                                            .WORD   EM35
6609  033754  006212                                                            .WORD   ERR1
6610
6611  033756  105737  002273    12$:    TSTB    INTFLG+1        ;DID A 'B' INTERRUPT OCCUR?
6612  033762  001407                    BEQ     13$             ;NO,  GOOD.  NOW TRY HITTING THE 'B' INTERRUPT
6613  033764  012737  000024  002254    MOV     #20.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6614  033772                            GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
6615                                                            ;       'DEVICE FATAL'' ERROR # 69
6616  033772  104455                                                            TRAP    C$ERDF
6617  033774  000105                                                            .WORD   69
6618  033776  016540                                                            .WORD   EM34B
6619  034000  006212                                                            .WORD   ERR1
6620
6621  034002            13$:    ENDSUB
6622  034002                                                            L10056:
6623  034002  104403                                                            TRAP    C$ESUB
6624
6625                            ;-----------------------------------------------------------------
6626                            ;               TEST FOR 'B' INTERRUPT WHILE ENABLED
6627                            ;
6628                            ;       1. ENABLE BOTH INTERRUPTS
6629                            ;
6630                            ;       2. ASSERT 'A' REQUEST BIT TO 1:
6631                            ;               DISABLING 'A' & FORCING 'B'
6632                            ;
6633                            ;       3. CHECK FOR NO 'A' INTERRUPT
6634                            ;
6635                            ;       4. CHECK FOR 'B' INTERRUPT
6636
6637  034004                    BGNSUB
6638  034004                                                            T9.6:
6639  034004  104402                                                            TRAP    C$BSUB
6640  034006  012737  177777  002274    MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO 'WATCH' FOR INTERRUPTS
6641  034014  005037  002272            CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
6642  034020  112777  000021  146272    MOVB    #IENBA!IENBB,@BSEL0     ;ENABLE BOTH INTERRUPTS
6643  034026  004537  004054            JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON 'B'
6644  034032  123005                    IRQREG                  ;   BUT NOT ON 'A'
6645  034034  000004                    IRQA
6646  034036  103003                    BCC     32$             ;IF AN ERROR OCCURED,
6647  034040                            ERROR                   ;REPORT IT &
6648  034040  104460                                                            TRAP    C$ERROR
6649  034042                            ESCAPE  TST             ;  QUIT
6650  034042  104410                                                            TRAP    C$ESCAPE
6651  034044  000066                                                            .WORD   L10051-.
6652
6653  034046  012703  001000    32$:    MOV     #1000,R3        ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
6654  034052  077301                    SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
6655  034054  105737  002272            TSTB    INTFLG          ;DID AN 'A' INTERRUPT OCCUR?
6656  034060  001407                    BEQ     16$             ;NO,  GOOD.  GO TEST THE 'B' INTERRUPT
6657  034062  012737  000025  002254    MOV     #21.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
```

```
6658  034070                          GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
6659                                                          ;       "DEVICE FATAL" ERROR # 70
6660  034070  104455                                                      TRAP    C$ERDF
6661  034072  000106                                                      .WORD   70
6662  034074  016526                                                      .WORD   EM34
6663  034076  006212                                                      .WORD   ERR1
6664
6665  034100  105737  002273    16$:  TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
6666  034104  001007                  BNE     17$             ;YES, GOOD.  NOW TRY HITTING THE "B" INTERRUPT
6667  034106  012737  000026  002254  MOV     #22.,GDATA      ;NO,  TELL ERROR HANDLER WHAT WE HAD DONE
6668  034114                          GEDF    EM35B,ERR1      ;REPORT MISSING INTERRUPT ON "ENABLE"
6669                                                          ;       "DEVICE FATAL" ERROR # 71
6670  034114  104455                                                      TRAP    C$ERDF
6671  034116  000107                                                      .WORD   71
6672  034120  016573                                                      .WORD   EM35B
6673  034122  006212                                                      .WORD   ERR1
6674
6675  034124                    17$:  ENDSUB
6676  034124                                                  L10057:
6677  034124  104403                                                      TRAP    C$ESUB
6678
6679  034126  005037  002274          CLR     INTWCH          ;TELL HANDLERS TO STOP WATCHING FOR INTERRUPTS
6680  034132                          ENDTST
6681  034132                                                  L10051:
6682  034132  104401                                                      TRAP    C$ETST
```

```
                        .SBTTL TEST 10 -- BUS RESET WITH DISABLE INIT SET

                        ;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        ;*
                        ;*      TEST 10 -- BUS RESET WITH DISABLE INIT SET
                        ;*
                        ;* A  BYTE SELECT REGISTER (BSEL3) IS LOADED WITH 377, DISABLE INIT BIT IS SET
                        ;* IN  THE  NPR CONTROL REGISTER, AND A BUS RESET INSTRUCTION IS EXECUTED. THE
                        ;* PROGRAM  THEN  CHECKS  THAT THE DMV-11 WAS NOT CLEARED, BY CHECKING FOR 377
                        ;* STILL IN BSEL3
                        ;*
                        ;--++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        ;
                        ;       BGNTST
034134                                                                          T10::
034134  032737  000001  002316          BIT     #BIT0,PFLAG     ;IF BUS RESETS ARE NOT ALLOWED,
034142  001031                          BNE     10$             ;  BYPASS THIS TEST
                                                                ;ELSE,
034144  004737  003514                  JSR     PC,MSTCLR       ;INIT DMV & START UP THE MAINT. LOOP
034150  103003                          BCC     1$              ;IF AN ERROR OCCURED,
034152                                  ERROR                   ;REPORT IT &
034152  104460                                                                  TRAP    C$ERROR
034154                                  ESCAPE  TST             ;  EXIT
034154  104410                                                                  TRAP    C$ESCAPE
034156  000050                                                                  .WORD   L10060-.

034160  004537  004054          1$:     JSR     R5,WRITEI       ;NOW SET 'DISABLE INIT'
034164  123004                          NPRCTL
034166  000105                          DMVDAI!DMVPU!NPRGO

                                                                ;THE 'NPRGO' BIT IS SET BECAUSE ASSERTING IT
                                                                ;TO A ZERO WOULD KICK OFF AN NPR OPERATION!
                                                                ;THE 'DMVPU' BIT MUST ALWAYS BE SET WHENEVER
                                                                ;THE NPR-CONTROL REGISTER IS LOADED.

034170  112777  000377  146130          MOVB    #377,@BSEL3     ;THIS REGISTER WILL ONLY GET ALTERED IF THE
                                                                ;DMV-11 IS SUCCESSFULLY RESET:  THE 'DMVPU'
                                                                ;BIT WILL BE CLEARED, THE MICRO-DIAGNOSTIC
                                                                ;WILL BE STARTED, AND FINDING 'DMVPU' CLEARED,
                                                                ;IT WILL CLEAR ALL BSEL REGISTERS (INCLUDING
                                                                ;BSEL3) AND PERFORM THE 17 TESTS IS CONTAINS.
                                                                ;OF COURSE, IF THIS ALL HAPPENS, THAN THIS
                                                                ;TEST WILL HAVE FAILED!

034176                          BRESET                          ;THE 'SUPERVISOR' WILL DO A BUS RESET FOR US
034176  104433                                                                  TRAP    C$RESET
034200  012703  001000                  MOV     #1000,R3        ;DELAY FOR A BIT SO THE MICRO-DIAG. CAN DO
034204  077301                          SOB     R3,.            ;ITS THING IF IT'S GOING TO
034206  122777  000377  146112          CMPB    #377,@BSEL3     ;IF A FAILURE OCCURED, THIS SHOULD HAVE BEEN
034214  001404                          BEQ     10$             ;ALTERED BY NOW.  IF NOT, ALL'S WELL -- EXIT
034216                                  GEDF    EM40,ERR1       ;ELSE, 'DISABL INIT' DIDN'T STOP 'BUS RESET'
                                                                ;       'DEVICE FATAL' ERROR # 72
034216  104455                                                                  TRAP    C$ERDF
034220  000110                                                                  .WORD   72
034222  016614                                                                  .WORD   EM40
034224  006212                                                                  .WORD   ERR1
```

```
6739  034226
6740  034226
6741  034226  104401
                        10$:    ENDTST

                                                L10060:
                                                        TRAP    C$ETST
```

```
                                .SBTTL TEST 11 -- MASTER CLEAR WITH DISABLE INIT SET

                                ;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                                ;*
                                ;*      TEST 11 -- MASTER CLEAR WITH DISABLE INIT SET
                                ;*
                                ;* THE 'DISABL INIT'' BIT IN THE NPR CONTROL REGISTER IS SET AND A MASTER CLEAR
                                ;* IS  ISSUED.  IF  THE  MASTER  CLEAR SUBROUTINE DETECTS AN ERROR, THE MASTER
                                ;* CLEAR  WILL  NOT  HAVE  FUNCTIONED PROPERLY. WHERE THE NORMAL ERROR MESSAGE
                                ;* (QUEUED  UP  BY 'MASCLR') IS NORMALLY PRINTED, THIS TEST WILL PRINT ITS OWN
                                ;* INSTEAD.
                                ;*
                                ;--++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                                ;
034230                          ;       BGNTST                                                  T11::
034230  004737  003514                  JSR     PC,MSTCLR       ;INIT DMV & START UP THE MAINT. LOOP
034234  103003                          BCC     1$              ;IF AN ERROR OCCURED,
034236                                  ERROR                   ;REPORT IT &
034236  104460                                                                  TRAP    C$ERROR
034240                                  ESCAPE  TST             ;  EXIT
034240  104410                                                                  TRAP    C$ESCAPE
034242  000030                                                                  .WORD   L10061-.
034244  004537  004054          1$:     JSR     R5,WRITEI       ;NOW SET 'DISABLE INIT''
034250  123004                          NPRCTL
034252  000105                          DMVDAI!DMVPU!NPRGO
                                                                ;THE 'NPRGO'' BIT IS SET BECAUSE ASSERTING IT
                                                                ;TO A ZERO WOULD KICK OFF AN NPR OPERATION!
                                                                ;THE 'DMVPU'' BIT MUST ALWAYS BE SET WHENEVER
                                                                ;THE NPR-CONTROL REGISTER IS LOADED.

034254  004737  003514                  JSR     PC,MSTCLR       ;INIT THE DMV & RESTART THE M-LOOP
034260  103004                          BCC     2$              ;IF AN ERROR OCCURED, IGNORE QUEUED ERROR AND
034262                                  GEDF    EM41,ERR1       ;REPORT THAT 'DISABL INIT'' STOPPED MASTER CLEAR
                                        ;               'DEVICE FATAL'' ERROR # 73
034262  104455                                                                  TRAP    C$ERDF
034264  000111                                                                  .WORD   73
034266  016671                                                                  .WORD   EM41
034270  006212                                                                  .WORD   ERR1
034272                          2$:     ENDTST
034272                                                                  L10061:
034272  104401                                                                  TRAP    C$ETST
```

```
                                        .SBTTL TEST 12 -- DCOK H LO BIT

                                        ;+****************************************************************************
                                        ;*
                                        ;*      TEST 12 -- DCOK H LO BIT
                                        ;*
                                        ;* DCOK H LO IS SET IN THE NPR CONTROL REGISTER WHICH SHOULD CAUSE A VECTOR TO
                                        ;* THE  FIRST  INTERRUPT  HANDLER  WHERE THE VECTOR IS CHANGED TO POINT TO THE
                                        ;* SECOND HANDLER. THIS SECOND HANDLER WILL THEN STALL FOR A WHILE WAITING FOR
                                        ;* THE  POWER-UP  INTERRUPT  WHICH  SHOULD KICK US INTO THE SECOND HANDLER. IN
                                        ;* BOTH  HANDLERS  FLAGS  ARE  SET  TO  SAY THAT WE GOT THERE. WHEN WE FINALLY
                                        ;* RETURN  TO  OUR MAINLINE CODE, WE WILL RESUME THE DELAY FUNCTION WE WERE IN
                                        ;* AND THEN CHECK THE FLAGS.
                                        ;*
                                        ;* IN SUBTEST # 1, WE EXPECT THE DMV TO BE RESET.
                                        ;*
                                        ;*
                                        ;--****************************************************************************
                                        ;
                                        ;       BGNTST
034274                                                                           T12::
       000014                           DCOKTS  = $T              ;DEFINE TEST # FOR ''INIT'' SECTION
034274 032737  000001  002370                   BIT     #PU24,PT.CTL  ;IS POWER-UP STRAPPED FOR OPTION 0?
034302 001002                                   BNE     1$            ;YES, THEN WE CAN DO THIS TEST
034304                                          EXIT    TST           ;NO,  WE CAN'T DO THIS TEST UNLESS IT IS!
034304 104432                                                                     TRAP    C$EXIT
034306 000476                                                                     .WORD   L10062-.

034310 032737  000001  002316   1$:             BIT     #BITO,PFLAG   ;IF BUS RESETS ARE ALLOWED,
034316 001402                                   BEQ     2$            ;  PERFORM THIS TEST
034320                                          EXIT    TST           ;ELSE, BYPASS IT
034320 104432                                                                     TRAP    C$EXIT
034322 000462                                                                     .WORD   L10062-.

034324                          2$:             DELAY   40.           ;DELAY TO PREVENT TST # ROACH[illegible]
034324 012727  000050                                                             MOV     #40.,(PC)+
034330 000000                                                                     .WORD   0
034332 013727  002116                                                             MOV     L$DLY,(PC)+
034336 000000                                                                     .WORD   0
034340 005367  177772                                                             DEC     -6(PC)
034344 001375                                                                     BNE     .-4
034346 005367  177756                                                             DEC     -22(PC)
034352 001367                                                                     BNE     .-20
                                        ;-----------------------------------------------------------------------
                                        ; SUBTEST #1: DCOK H LO (RESET DMV)
                                        ;-----------------------------------------------------------------------
034354                                          BGNSUB          ; <====>  TEST FOR POWER-DOWN/UP & DMV-11 RESET
034354                                                                           T12.1:
034354 104402                                                                     TRAP    C$BSUB
034356 004737  003514                           JSR     PC,MSTCLR     ;INIT DMV & START UP THE MAINT. LOOP
034362 103003                                   BCC     3$            ;IF AN ERROR OCCURED,
034364                                          ERROR                 ;REPORT IT &
034364 104460                                                                     TRAP    C$ERROR
034366                                          ESCAPE  SUB           ;  EXIT
034366 104410                                                                     TRAP    C$ESCAPE
034370 000220                                                                     .WORD   L10063-.
```

```
                                3$:     SETVEC  #24,#5$,#7      ;SETUP VECTOR FOR POWER FAIL INTERRUPT HANDLER
                                                                        MOV     #7,-(SP)
                                                                        MOV     #5$,-(SP)
                                                                        MOV     #24,-(SP)
                                                                        MOV     #3,-(SP)
                                                                        TRAP    C$SVEC
                                                                        ADD     #10,SP
                                        MOVB    #-1,INTWCH      ;EXPECT AN "A" INTERRUPT (IF "DCOK" FAILS!)
                                        CLRB    INTFLG          ;CLEAR THE FLAG IN CASE WE WANT TO DETECT IT
                                        BISB    #IENBA,@BSEL0   ;NOW ENABLE "A" INTERRUPTS

                                        MOV     SP,OLDSP        ;SAVE THE STACK POINTER

                                ;       SETUP "DISABL INIT" TO ALLOW BINIT TO RESET THE DMV AND THEN CAUSE
                                ;       A POWER-FAIL CONDITION TO BE SIMULATED.

                                        MOV     #177400!LSIDCL!DMVPU!NPRGO,@SEL6  ;VALUE TO BE LOADED INTO
                                        MOV     #NPRCTL,@SEL4           ;THE NPR CONTROL REGISTER
                                        MOVB    #WRILOC!<IRQA*8.>,@BSEL2  ;TELL M-LOOP TO WRITE IT & INTERRUPT
                                                                        ;US JUST BEFORE REQUESTING ANOTHER
                                                                        ;M-LOOP COMMAND.

                                ;       SETTING  "NPRGO" PREVENTS AN "NPR" OPERATION FROM OCCURING. THE HIGH
                                ;       ORDER  BYTE  IS  SET  TO  -1 AND IS USED AS A FLAG -- WHEN THE RESET
                                ;       OCCURS,  THE  SELECT  REGISTERS  WILL  ALL  BE  CLEARED; WE WILL BE
                                ;       LOOKING AT THE RUN BIT TO BE SET AND AT BSEL7 TO BE CLEARED AS POSITIVE
                                ;       PROOF THAT THE DMV GOT RESET.

                                4$:     WAIT                    ;HANG HERE UNTIL INTERRUPTED

                                ;       IF  THE DCOK WORKS AS IT SHOULD, THE NEXT INSTRUCTION TO BE EXECUTED
                                ;       IS AT THE LABEL "5$". IF I DOESN'T WORK, THE DMV SHOULD FINISH THE
                                ;       "WRITE" COMMAND  AND  GENERAT  A Q-BUS INTERRUPT. ON RETURNING FROM
                                ;       THAT INTERRUPT, WE FALL INTO THE ERROR CALL BELOW:

                                        GEDF    EM42A,ERR1      ;REPORT MISSING POWER-UP
                                                                ;       "DEVICE FATAL" ERROR # 74
                                                                        TRAP    C$ERDF
                                                                        .WORD   74
                                                                        .WORD   EM42A
                                                                        .WORD   ERR1

                                5$:

                                ;       IN  EITHER  CASE:  RESTORE THE POWER FAIL VECTOR, STACK POINTER, AND
                                ;       THE FLAGS USED BY THE Q-BUS INTERRUPT SERVICE ROUTINE.

                                ;                               B U T   F I R S T !

                                ;       IN  SOME  CASES  THE  Q-BUS  GETS CONFUSED WHEN WE PERFORM THE ABOVE
                                ;       (HIGHLY  NON-  STANDARD)  "DCOK"  MANIPULATION. EXPERIENCE HAS SHOWN
                                ;       THAT THE INSTRUCTION BEING EXECUTED CAN BE CORRUPTED -- USUALLY (BUT
                                ;       NOT  ALWAYS) BEING CLEARED TO ZERO (A HALT INSTRUCTION). THIS IS NOT
                                ;       A FAILURE OF THE  DMV  AND THEREFORE SHOULD NOT BE OUR CONCERN HERE.
```

```
                                        ;       THE  FAILURE  SHOULD  NOT AFFECT THE TEST WITHIN THE PASS IN WHICH IT
                                        ;       OCCURS  BUT  IN  A  SUBSEQUENT  PASS. IN AN EFFORT TO ELIMINATE ANY
                                        ;       PROBLEMS FROM THIS GLITCH, WE RESTORE THE INSTRUCTION:
034500  012737  000001  034466          MOV     #1,4$           ;RESTORE THE "WAIT" INSTRUCTION -- JUST IN
                                                                ; CASE IT GOT MODIFIED!
034506  013706  002454                  MOV     OLDSP,SP        ;RESTORE THE STACK
034512  142777  000001  145600          BICB    #IENBA,@BSEL0   ;DISABLE THE "A" INTERRUPT
034520  105037  002274                  CLRB    INTWCH          ;STOP EXPECTING Q-BUS INTERRUPTS
034524                                  CLRVEC  #24             ;RETURN THE VECTOR TO THE SUPERVISOR
034524  012700  000024                                                  MOV     #24,R0
034530  104436                                                          TRAP    C$CVEC
034532                                  SETPRI  #0              ;MAKE SURE WE'RE BACK RUNNING AT 0 AGAIN!
034532  012700  000000                                                  MOV     #0,R0
034536  104441                                                          TRAP    C$SPRI
034540  013701  002262                  MOV     DELAY1,R1       ;INITIALIZE TTHE LOOP COUNTER FOR DELAY LOOP
034544  001402          10$:    BEQ     11$             ; EXIT DELAY LOOP IF TIME HAS EXPIRED
034546  005301                  DEC     R1              ;  ELSE, DECREMENT THE LOOP COUNTER AND
034550  000775                  BR      10$             ;  CONTINUE TO LOOP
034552                  11$:                            ; TIME UP !
034552  132777  000200  145542          BITB    #RUN,@BSEL1     ;CHECK RUN BIT
034560  001403                  BEQ     12$             ; NOT SET... REPORT ERROR.
034562  105777  145550                  TSTB    @BSEL7          ;THIS REGISTER SHOULD HAVE BEEN CLEARED
034566  001404                  BEQ     13$             ;IT IS, EVERYTHING HERE IS OK -- EXIT SUBTEST
034570          12$:    GEDF    EM42B,ERR1      ;NO, THEN REPORT THE FAILURE
                                                ;       'DEVICE FATAL" ERROR # 75
034570  104455                                                          TRAP    C$ERDF
034572  000113                                                          .WORD   75
034574  017020                                                          .WORD   EM42B
034576  006212                                                          .WORD   ERR1
034600  004737  003346          13$:    JSR     PC,MASCLR       ;RESTORE DMV-11 TO A NORMAL STATE!
034604  103001                  BCC     14$             ;NO ERRORS, EXIT SUBTEST
034606                          ERROR                   ;REPORT MSTCLR ERROR
034606  104460                                                          TRAP    C$ERROR
034610                  14$:
034610                          ENDSUB
034610                                                          L10063:
034610  104403                                                          TRAP    C$ESUB
                                ;-------------------------------------------------------------------------------
                                ; SUBTEST #2: DCOK H LO (DMV-11 SHOULDN'T BE RESET)
                                ;-------------------------------------------------------------------------------
                                ;
                                ;       SINCE HITTING "DCOK H LO" WITHOUT "HALT" OCCASIONALLY CORRUPTS
                                ;       PROGRAM MEMORY: WE SET BOTH "HALT" AND "DCOK H LO" IN THIS
                                ;       SUB-TEST (IF HALT FAILS, THIS TEST MAY BLOW UP).
034612                          BGNSUB          ; <==>  TEST FOR POWER-DOWN/UP & NO DMV-11 RESET
034612                                                          T12.2:
034612  104402                                                          TRAP    C$BSUB
034614  004737  003514          JSR     PC,MSTCLR       ;INIT DMV & START UP THE MAINT. LOOP
034620  103003                  BCC     2$              ;IF AN ERROR OCCURED,
034622                          ERROR                   ;REPORT IT &
034622  104460                                                          TRAP    C$ERROR
034624                          ESCAPE  SUB             ;  EXIT
034624  104410                                                          TRAP    C$ESCAPE
```

```
034626 000154                                                                          .WORD    L10064-.
034630                          2$:    SETVEC  #24,#5$,#7       ;SETUP VECTOR FOR POWER FAIL INTERRUPT HANDLER
034630 012746 000007                                                                   MOV      #7,-(SP)
034634 012746 034732                                                                   MOV      #5$,-(SP)
034640 012746 000024                                                                   MOV      #24,-(SP)
034644 012746 000003                                                                   MOV      #3,-(SP)
034650 104437                                                                          TRAP     C$SVEC
034652 062706 000010                                                                   ADD      #10,SP
034656 010637 002454                   MOV     SP,OLDSP         ;SAVE THE STACK POINTER

034662 004537 004166                   JSR     R5,MOVLTD        ;MOVE THE MICRO CODE INTO THE DMV
034666 035006                          SMCODE                   ;       THIS IS WHERE IT STARTS
034670 000040                          EMCODE-SMCODE            ;       THIS IS ITS SIZE IN BYTES

034672 112777 000377 145434            MOVB    #377,@BSEL6      ;WRITE ALL 1'S TO BSEL6

034700 012777 000077 145422            MOV     #77,@SEL4        ;START ADDRESS OF MICROCODE
034706 012777 000005 145410            MOV     #EXECUT,@SEL2    ;INITIATE M-CODE

                                ;  *** IF THE RESET GETS THROUGH, THE MICRO-DIAGNOSTIC WILL CLEAR BSEL4 ***

034714 012703 001000                   MOV     #1000,R3         ;STALL FOR A BIT (UCODE SHOULD HALT US HERE)
034720 077301                          SOB     R3,.

                                ; IF WE GET HERE, WE NEVER GOT THE EXPECTED POWER-UP SEQUENCE!

034722                                 GEDF    EM42A,ERR1       ;REPORT MISSING POWER-UP
                                                                ;       'DEVICE FATAL'' ERROR # 76
034722 104455                                                                          TRAP     C$ERDF
034724 000114                                                                          .WORD    76
034726 016746                                                                          .WORD    EM42A
034730 006212                                                                          .WORD    ERR1

                                ;IN EITHER CASE, RESTORE THE VECTOR & STACK AND SEE IF THE DMV GOT RESET

034732 013706 002454            5$:    MOV     OLDSP,SP         ;RESTORE THE STACK
034736                                 CLRVEC  #24              ;RETURN THE VECTOR TO THE SUPERVISOR
034736 012700 000024                                                                   MOV      #24,R0
034742 104436                                                                          TRAP     C$CVEC
034744                                 SETPRI  #0               ;MAKE SURE WE'RE BACK RUNNING AT 0 AGAIN!
034744 012700 000000                                                                   MOV      #0,R0
034750 104441                                                                          TRAP     C$SPRI
034752 122777 000377 145354            CMPB    #377,@BSEL6      ;THIS REGISTER SHOULD NOT HAVE BEEN CLEARED
034760 001404                          BEQ     10$              ;IT ISN'T, ALL IS OK -- EXIT SUBTEST
034762                                 GEDF    EM42C,ERR1       ;IT IS, THEN REPORT THE FAILURE
                                                                ;       'DEVICE FATAL'' ERROR # 77
034762 104455                                                                          TRAP     C$ERDF
034764 000115                                                                          .WORD    77
034766 017074                                                                          .WORD    EM42C
034770 006212                                                                          .WORD    ERR1
                                                                ;* AT THIS POINT 'DINIT'' IS STILL SET *
034772 004737 003346            10$:   JSR     PC,MASCLR        ;MAKE SURE THE DMV IS PROPERLY RESET!
034776 103001                          BCC     11$              ;EVERYTHING OK, EXIT SUBR AND TEST.
035000                                 ERROR                    ;REPORT MASCLR ERROR
035000 104460                                                                          TRAP     C$ERROR
035002                          11$:
```

```
7008  035002                          ENDSUB
7009  035002                                                    L10064:
7010  035002  104403                                                     TRAP    C$ESUB
7011  035004                          ENDTST
7012  035004                                                    L10062:
7013  035004  104401                                                     TRAP    C$ETST
```

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7014
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7018  035006                          .SBTTL  SUBTEST 2'S M-CODE -- COMPLETE
                                      ;-------------------------------------------------------------------------
                                      ; 6502 MICROCODE FOR TEST #11/ SUBTEST #2
                                      ;-------------------------------------------------------------------------
7019  035006                          SMCODE:
7019  035006  251  125                        .BYTE 251,125    ;A9 55     LDA #GOBSY1!HALT!PWRUP!DINIT
7020  035010  215  004  246                   .BYTE 215,4,246  ;8D 04 A6  STA NPRCTL              :SET DISABLE INIT/HALT
7021  035013  251  105                        .BYTE 251,105    ;A9 45     LDA #GOBSY1!PWRUP!DINIT
7022  035015  215  004  246                   .BYTE 215,4,246  ;8D 04 A6  STA NPRCTL              :CLEAR HALT
7023  035020  352                             .BYTE 352        ;EA        NOP                     :WAIT A WHILE
7024  035021  352                             .BYTE 352        ;EA        NOP
7025  035022  352                             .BYTE 352        ;EA        NOP
7026  035023  251  107                        .BYTE 251,107    ;A9 47     LDA #GOBSY1!PWRUP!SDCOK!DINIT
7027  035025  215  004  246                   .BYTE 215,4,246  ;8D 04 A6  STA NPRCTL              :SET DCOK
7028  035030  251  105                        .BYTE 251,105    ;A9 45     LDA #GOBSY1!PWRUP!DINIT
7029  035032  215  004  246                   .BYTE 215,4,246  ;8D 04 A6  STA NPRCTL              :CLEAR DCOK
7030  035035  251  003                        .BYTE 251,3      ;A9 03     LDA #$03                :DELAY FOR 16.8 USEC
7031  035037  205  000                        .BYTE 205,0      ;85 00     STA SP0                 :BUS INIT IS 10 USEC
7032  035041  306  000                        .BYTE 306,0      ;C6 00  5$:DEC SP0                 :
7033  035043  320  374                        .BYTE 320,374    ;D0 FC     BNE 5$                  :
7034  035045  140                             .BYTE 140        ;60        RTS             :RETURN TO M-LOOP
7035                                          .EVEN
7036  035046                          EMCODE:
7037                                  ;-------------------------------------------------------------------------
```

```
.SBTTL TEST 13 -- HALT MODE VERIFICATION

;+*****************************************************************************
;*
;*      TEST 13 -- HALT MODE VERIFICATION
;*
;* THIS TEST CONTAINS TWO (2) SUBTESTS DESIGNED TO VERIFY THE FUNCTIONALITY
;* OF  THE  ''HALT''  CONTROL CONTAINED WITHIN THE NPR CONTROL REGISTER. IN EACH
;* CASE,  MICROCODE  IS  LOADED INTO THE DMV IN ORDER TO CONTROL THE TESTING
;* FROM THERE.
;*
;*-----------------------------------------------------------------------------
;*
;* SUBTEST # 1:
;*
;* HERE WE VERIFY THAT WE CAN CONTROL NPR'S AND DCOK PROPERLY WHILE THE 11 CPU
;* IS HALTED.
;*
;*      11 CPU'S OPERATIONS:                      DMV-11'S OPERATIONS:
;*
;* THE MICROCODE IS MOVED INTO THE DMV.
;*
;* CLEAR TMPO.  THIS WILL BE OUR TEST
;* LOCATION FOR THE NPR OPERATION.
;*
;* SETUP FOR POWER-FAIL VECTORING THROUGH
;* LOCATION 24.
;*
;* THE MICROCODE IS INITIATED & BSEL7 IS
;* SET TO -1 AS A FLAG.
;*
;* WAIT FOR BSEL7 TO BE CLEARED            CLEAR BSEL7 AND WAIT FOR IT TO GO
;*                                         NON-ZERO AGAIN.  THIS PUTS THE
;*                                         DMV IN SYNC. WITH THE 11 CPU
;*
;* SAVE R6 IN OLDSP FOR RECOVERY LATER.
;* CLEAR TMPO, LOAD INTO SEL4 THE
;* ADDRESS OF TMPO, AND SET BSEL7 TO -1.
;*
;* START LOOPING -- INCREMENTING TMPO       GET THE ADDRESS OF TMPO FROM SEL6
;*                                         AND SAVE IT FOR LATER
;*
;*                                         HALT THE 11 CPU.
;*
;* CONSOLE ''ODT'' SHOULD BE ENTERED.       NPR-IN THE CURRENT CONTENTS OF TMPO
;*                                         & PUT IT INTO SEL4 (THE FULL WORD).
;*
;*                                         DELAY FOR ABOUT 100 MICROSECONDS
;*                                         (THE TIME ISN'T CRITICAL).
;*
;* THE 11 CPU SHOULD NOT BE EXECUTING
;* ANYTHING NOW -- NOT EVEN ''ODT''
;*
;*                                         DROP THE ''HALT'' SIGNAL TO RELEASE
;*                                         THE 11 CPU AND SET ''DCOK H LO'' &
;*                                         ''DISABL INIT''. DROP ''DCOK H LO''
```

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;*
;*
;* WE SHOULD GO
;* THROUGH A POWER-UP SEQUENCE.   R6 IS
;* RESTORED FROM OLDSP, INTERRUPT
;* PRIORITY LEVEL IS RESTORED TO 0, &
;* INTERRUPT VECTOR 24 IS RETURNED TO
;* THE DIAGNOSTIC SUPERVISOR.  SEL4 IS
;* COMPARED AGAINST TMP0 -- THEY SHOULD
;* BE EQUAL.
;*
;* NOW CLEAR BSEL7.                        WAIT FOR BSEL7 TO CLEAR. THEN DROP
;*                                         'DISABLE INIT'' AND EXIT TO M-LOOP.
;*
;*-----------------------------------------------------------------------------
;*
;* SUBTEST # 2:
;*
;* HERE  THE  HALT MODE IS USED IN A WAY WHICH VERY CLOSELY MATCHES THE DMV-11
;* MICROCODE'S  UTILIZATION  DURING  A  'MOP  BOOT''  OPERATION. THE INTERRUPT
;* VECTOR  AREA  IS COMPLETELY OVERWRITTEN BY THE DMV NPR'S AND IS THEREFORE
;* BACKED  UP  ELSEWHERE  IN  THE  11 CPU'S MEMORY. THERE IS ALSO THE POSSIBLE
;* CONTENTION  WITH  THE  DIAGNOSTIC  SUPERVISOR  --  TO HELP HERE, AS MUCH AS
;* POSSIBLE WILL BE DONE AT INTERRUPT LEVEL 7.
;*
;*      11 CPU'S OPERATIONS:                        DMV-11'S OPERATIONS:
;*
;* THE MICROCODE IS MOVED INTO THE DMV.
;*
;* THE INTERRUPT VECTOR AREA IS BACKED-
;* UP IN AN I/O BUFFER FOLLOWING THE
;* PROGRAM
;*
;* THE MICROCODE IS INITIATED & BSEL7 IS
;* SET TO -1 AS A FLAG.
;*
;* WAIT FOR BSEL7 TO BE CLEARED            CLEAR BSEL7 AND WAIT FOR IT TO GO
;*                                         NON-ZERO AGAIN PUTTING BOTH
;*                                         PROCESSORS IN SYNC. WITH EACH
;*                                         OTHER
;*
;* CLEAR TMP0 AND SAVE R6 FOR RECOVERY
;* LATER.  SET BSEL7 AGAIN AND WAIT FOR
;* TMP0 TO BE SET.
;*                                         SET HALT, 'DCOK H LO'', & 'DISABL
;*                                         INIT'' AND PERFORM 2 NOP'S AS A
;*                                         1 MICROSECOND DELAY
;*
;* ENTRY INTO THE CONSOLE 'ODT'' WILL      CLEAR 'DCOK H LO'', SET 'HALT'' &
;* BE INITIATED.                           'DISABL INIT''
;*
;*                                         NPR-OUT THE FOLLOWING:
;*                                          LOC:   CONTENTS
;*                                            24   000000  VECTOR TO LOC 0
;*                                            26   000340  @ PRIORITY 7
;*                                             0   012700  MOV  #-1,R0
;*                                             2   177777
```

```
;*                                              4    000777  BR    .
;*                                          ----------------------------
;*
;* THE ENTRY INTO THE CONSOLE 'ODT''        SET 'DCOK H LO'' & 'DISABL INIT''
;* WILL BE ABORTED!                         AND CLEAR 'HALT''
;*
;*                                          DELAY FOR A SHORT TIME (ABOUT 1
;*                                          MICROSECOND
;*
;* THE ROUTINE NPR'D INTO LOC. 0 WILL       CLEAR 'DCOK H LO'' AND SET 'DISABL
;* BE EXECUTED -- EVENTUALLY HANGING        INIT''
;* AT THE 'BR  .'' INSTRUCTION @ LOC. 4.
;*
;*                                          NPR-OUT THE FOLLOWING:
;*                                           LOC:   CONTENTS
;*                                            6     005001  CLR   R1
;*                                           10     062701  ADD   #(.+2),R1
;*                                           12     062701  ADD   #(.+2),R1
;*                                            .        .      .
;*                                            .        .      .
;*                                            .        .      .
;*                                           360    062701  ADD   #(.+2),R1
;*                                           362    062701  ADD   #(.+2),R1
;*                                           364    010037  MOV   R0,@#TMP0
;*                                           366    [TMP0]
;*                                           370    013706  MOV   @#OLDSP,R6
;*                                           372    [OLDSP]
;*                                           374    000137  JMP   HLTST2
;*                                           376    [HLTST2]
;*                                          ----------------------------
;*                                          THIS IS SYNONYMOUS TO THE DMV-11
;*                                          LOADING A 'MESSAGE'' STARTING AT MEM.
;*                                          LOC. 000006.
;*
;*                                          NPR-OUT THE FOLLOWING:
;*                                           LOC:   CONTENTS
;*                                            4     000240  NOP
;*                                          ----------------------------
;*                                          THIS IS HOW THE DMV-11 WILL TAKE THE
;*                                          11 CPU OUT OF THE 'BR  .'' CONDITION.
;* THE ROUTINE JUST LOADED BY THE DMV
;* MICROCODE WILL NOW BE EXECUTED (WE       DROP 'DISABL INIT''
;* HOPE).  WHEN THE SUBROUTINE IS RE-
;* ENTERED (@ HLTST2),                      AN EXIT IS TAKEN TO THE M-LOOP
;*
;*   1  THE INTERRUPT VECTORS WILL BE
;*      RESTORED;
;*   2  THE PRIORITY LEVEL WILL BE
;*      LOWERED BACK TO 0;
;*   3  R0, R1, & R6 WILL ALL BE CHECKED
;*      FOR THE PROPER CONTENTS; AND
;*   4  TMP0 WILL BE CHECKED FOR THE
;*      PROPER CONTENTS;
;*
;--*******************************************************************************
;
```

```
                                        ;       BGNTST
        035046                                                                          T13::
                000015                  HLTEST  = $T                            ;DEFINE TEST # FOR ''INIT'' SECTION
        035046  032737  000001  002370          BIT     #PU24,PT.CTL            ;IS POWER-UP STRAPPED FOR OPTION 0?
        035054  001002                          BNE     5$                      ;YES, THEN WE CAN DO THIS TEST
        035056                                  EXIT    TST                     ;NO, WE CAN'T DO THIS TEST UNLESS IT IS!
        035056  104432                                                                                  TRAP    C$EXIT
        035060  000772                                                                                  .WORD   L10065-.

        035062  032737  000001  002316  5$:     BIT     #BIT0,PFLAG             ;IF BUS RESETS ARE ALLOWED,
        035070  001402                          BEQ     2$                      ;  PERFORM THIS TEST
        035072                                  EXIT    TST                     ;ELSE, BYPASS IT
        035072  104432                                                                                  TRAP    C$EXIT
        035074  000756                                                                                  .WORD   L10065-.

        035076                          2$:     DELAY   40.                     ;DELAY TO PREVENT TST # ROACHING
        035076  012727  000050                                                                          MOV     #40.,(PC)+
        035102  000000                                                                                  .WORD   0
        035104  013727  002116                                                                          MOV     L$DLY,(PC)+
        035110  000000                                                                                  .WORD   0
        035112  005367  177772                                                                          DEC     -6(PC)
        035116  001375                                                                                  BNE     .-4
        035120  005367  177756                                                                          DEC     -22(PC)
        035124  001367                                                                                  BNE     .-20
                                        ;-----------------------------------------------------------------------
        035126                          1$:     BGNSUB
        035126                                                                          T13.1:
        035126  104402                                                                                  TRAP    C$BSUB
        035130  004737  003514                  JSR     PC,MSTCLR               ;RESET DMV & ENTER M-LOOP
        035134  103003                          BCC     2$                      ;IF NO ERROR HERE, CONTINUE
        035136                                  ERROR                           ;ELSE, REPORT THE ERROR
        035136  104460                                                                                  TRAP    C$ERROR
        035140                                  ESCAPE  TST                     ;       & EXIT THE TEST
        035140  104410                                                                                  TRAP    C$ESCAPE
        035142  000710                                                                                  .WORD   L10065-.
        035144                          2$:
        035144  004537  004166                  JSR     R5,MOVLTD               ;MOVE THE MICRO CODE INTO THE DMV
        035150  036054                          MC1                             ;       THIS IS WHERE IT STARTS
        035152  000114                          MC2-MC1                         ;       THIS IS ITS SIZE IN BYTES

        035154  005037  002412                  CLR     TMP0                    ;INITIALIZE THE COUNTER
        035160                                  SETVEC  #24,#24$,#7             ;SETUP POWER-UP VECTOR
        035160  012746  000007                                                                          MOV     #7,-(SP)
        035164  012746  035334                                                                          MOV     #24$,-(SP)
        035170  012746  000024                                                                          MOV     #24,-(SP)
        035174  012746  000003                                                                          MOV     #3,-(SP)
        035200  104437                                                                                  TRAP    C$SVEC
        035202  062706  000010                                                                          ADD     #10,SP
        035206  012777  000077  145114          MOV     #77,@SEL4               ;START ADDRESS OF MICROCODE
        035214  112777  177777  145114          MOVB    #-1,@BSEL7              ;SET FLAG (BSEL7)
        035222  012777  000005  145074          MOV     #EXECUT,@SEL2           ;INITIATE M-CODE

        035230  005002                          CLR     R2
        035232  105777  145100          3$:     TSTB    @BSEL7                  ;WAIT FOR FLAG TO BE CLEARED
        035236  001405                          BEQ     5$
        035240  077204                          SOB     R2,3$
```

```
7262  035242                          GEDF    EM43A,ERR1      ;TIMEOUT...M-CODE IS HUNG!
7263                                                          ;       'DEVICE FATAL'' ERROR # 78
7264  035242  104455                                                          TRAP    C$ERDF
7265  035244  000116                                                          .WORD   78
7266  035246  017153                                                          .WORD   EM43A
7267  035250  006212                                                          .WORD   ERR1
7268
7269  035252  010637  002454    5$:     MOV     SP,OLDSP        ;SAVE STACK POINTER FOR LATER
7270  035256  012777  002412  145044    MOV     #TMP0,@SEL4     ;PASS ADDRESS OF TMP0 TO M-CODE
7271  035264  112777  177777  145044    MOVB    #-1,@BSEL7      ;TELL M-CODE TO PROCEED
7272
7273  035272  005237  002412    4$:     INC     TMP0            ;LOOP HERE UNTIL TMP0 GOES TO 0 AGAIN
7274  035276  001375                    BNE     4$
7275  035300  000240                    NOP
7276  035302  000240                    NOP
7277  035304  000240                    NOP
7278  035306                          GEDF    EM43A,ERR1      ;DMV SEEMS TO HAVE HUNG!
7279                                                          ;       'DEVICE FATAL'' ERROR # 79
7280  035306  104455                                                          TRAP    C$ERDF
7281  035310  000117                                                          .WORD   79
7282  035312  017153                                                          .WORD   EM43A
7283  035314  006212                                                          .WORD   ERR1
7284  035316  000240                    NOP                     ; (FOR PATCHING)
7285  035320  004737  003346            JSR     PC,MASCLR       ;RESET THE DMV
7286  035324  103001                    BCC     9$              ;RESET SUCCEEDED, ESCAPE TEST
7287  035326                          ERROR                   ; REPORT RESET ERROR
7288  035326  104460                                                          TRAP    C$ERROR
7289  035330                  9$:     ESCAPE  TST             ; & GET OUT
7290  035330  104410                                                          TRAP    C$ESCAPE
7291  035332  000520                                                          .WORD   L10065-.
7292
7293  035334  013706  002454    24$:    MOV     OLDSP,SP        ;RESTORE R6 FIRST!
7294  035340                          CLRVEC  #24             ;RETURN THE VECTORE TO THE SUPERVISOR
7295  035340  012700  000024                                                  MOV     #24,R0
7296  035344  104436                                                          TRAP    C$CVEC
7297  035346                          SETPRI  #0              ;RESTORE PRIORITY LEVEL TO 0
7298  035346  012700  000000                                                  MOV     #0,R0
7299  035352  104441                                                          TRAP    C$SPRI
7300  035354  027737  144750  002412      CMP     @SEL4,TMP0      ;THESE SHOULD BE EQUAL
7301  035362  001405                    BEQ     30$             ;THEY ARE -- TEST PASSED
7302  035364                          GEDF    EM43B,ERR1      ;THEY AREN'T -- HALT DIDN'T WORK
7303                                                          ;       'DEVICE FATAL'' ERROR # 80
7304  035364  104455                                                          TRAP    C$ERDF
7305  035366  000120                                                          .WORD   80
7306  035370  017177                                                          .WORD   EM43B
7307  035372  006212                                                          .WORD   ERR1
7308  035374  000240                    NOP                     ; (FOR PATCHING)
7309  035376  105077  144734    30$:    CLRB    @BSEL7          ;TELL M-CODE TO CLEAR DINIT
7310  035402                          ENDSUB
7311  035402                                                                  L10066:
7312  035402  104403                                                          TRAP    C$ESUB
7313                                  ;-----------------------------------------------------------------
7314  035404                          BGNSUB
7315  035404                                                                  T13.2:
7316  035404  104402                                                          TRAP    C$BSUB
7317  035406  004737  003514            JSR     PC,MSTCLR       ;RESET DMV & ENTER M-LOOP
```

```
7318  035412  103003                1$:     BCC     1$              ;IF NO ERROR HERE, CONTINUE
7319  035414                                  ERROR                   ;ELSE, REPORT THE ERROR
7320  035414  104460                                                          TRAP    C$ERROR
7321  035416                                  ESCAPE  TST             ;       & EXIT THE TEST
7322  035416  104410                                                          TRAP    C$ESCAPE
7323  035420  000432                                                          .WORD   L10065-.
7324  035422
7325  035422  004537  004166                JSR     R5,MOVLTD       ;MOVE THE MICRO CODE INTO THE DMV
7326  035426  036170                        MC2                     ;       THIS IS WHERE IT STARTS
7327  035430  000243                        MC2END-MC2              ;       THIS IS ITS SIZE IN BYTES
7328
7329  035432  004537  005004                JSR     R5,MOVSW        ;SAVE THE INTERRUPT VECTORS
7330  035436  000000                        0
7331  035440  002654                        BUFAREA                 ; IN THE BUFFER AREA
7332  035442  000200                        400/2                   ;  LOC'S 0 ==> 377 WILL BE SAVED
7333
7334  035444                                  SETVEC  #376,#0,#7      ;FAKE OUT THE SUPERVISOR,  WE'RE JUST
7335  035444  012746  000007                                                  MOV     #7,-(SP)
7336  035450  012746  000000                                                  MOV     #0,-(SP)
7337  035454  012746  000376                                                  MOV     #376,-(SP)
7338  035460  012746  000003                                                  MOV     #3,-(SP)
7339  035464  104437                                                          TRAP    C$SVEC
7340  035466  062706  000010                                                  ADD     #10,SP
7341                                          ; SETTING LOCATION 376 TO ZERO (0)
7342
7343  035472  012777  000077  144630        MOV     #77,@SEL4       ;START ADDRESS OF MICROCODE
7344  035500  112777  177777  144630        MOVB    #-1,@BSEL7      ;SET FLAG (BSEL7)
7345  035506  012777  000005  144610        MOV     #EXECUT,@SEL2   ;INITIATE M-CODE
7346
7347  035514  005002                        CLR     R2
7348  035516  105777  144614        3$:     TSTB    @BSEL7          ;WAIT FOR FLAG TO BE CLEARED
7349  035522  001406                        BEQ     5$
7350  035524  077204                        SOB     R2,3$
7351  035526                                  GEDF    EM43A,ERR1      ;TIMEOUT...M-CODE IS HUNG!
7352                                          ;       'DEVICE FATAL" ERROR # 81
7353  035526  104455                                                          TRAP    C$ERDF
7354  035530  000121                                                          .WORD   81
7355  035532  017153                                                          .WORD   EM43A
7356  035534  006212                                                          .WORD   ERR1
7357  035536  000447                        BR      22$             ;EXIT
7358
7359  035540  010637  002454        5$:     MOV     SP,OLDSP        ;SAVE STACK POINTER FOR LATER
7360  035544  005037  002412                CLR     TMP0            ;RESET EXECUTION INDICATOR (TMP0)
7361  035550  112777  177777  144560        MOVB    #-1,@BSEL7      ;TELL M-CODE TO PROCEED
7362
7363  035556  005003                        CLR     R3              ;WE'LL WAIT THIS LONG FOR THE M-CODE TO
7364                                                                  ;       INTERRUPT OUR SEQUENCE OF OPERATION
7365  035560  005737  000376        10$:    TST     @#376           ;LOOK FOR THE M-CODE TO LOAD THIS LOCATION
7366  035564  001017                        BNE     20$             ;WE SHOULD NEVER SEE THIS HAPPEN!!!
7367  035566  077304                        SOB     R3,10$          ;LOOP UNTIL WE'RE INTERRUPTED
7368                                                                  ;IF WE AREN'T, WE HAVE A REAL PROBLEM
7369
7370  035570  004537  005004                JSR     R5,MOVSW        ;RESTORE THE INTERRUPT VECTORS
7371  035574  002654                        BUFAREA                 ; FROM THE BUFFER AREA
7372  035576  000000                        0
7373  035600  000200                        400/2                   ; TO LOC'S 0 ==> 377
```

```
7374
7375  035602
7376  035602  012700  000000                SETPRI  #0              ;RESTORE PRIORITY LEVEL TO 0
                                                                              MOV     #0,R0
7377  035606  104441                                                         TRAP    C$SPRI
7378
7379  035610                                GEDF    EM43A,ERR1      ;BUT WE AREN'T SURE WHAT IT IS!!!
7380                                                                ;       'DEVICE FATAL'' ERROR # 82
7381  035610  104455                                                         TRAP    C$ERDF
7382  035612  000122                                                         .WORD   82
7383  035614  017153                                                         .WORD   EM43A
7384  035616  006212                                                         .WORD   ERR1
7385  035620  000240                        NOP                     ; (FOR PATCHING)
7386  035622  000415                        BR      22$             ; GO RESET DMV & EXIT
7387
7388  035624  004537  005004      20$:      JSR     R5,MOVSW        ;RESTORE THE INTERRUPT VECTORS
7389  035630  002654                        BUFAREA                 ; FROM THE BUFFER AREA
7390  035632  000000                        0
7391  035634  000200                        400/2                   ; TO LOC'S 0 ==> 377
7392
7393  035636                                SETPRI  #0              ;RESTORE PRIORITY LEVEL TO 0
7394  035636  012700  000000                                                 MOV     #0,R0
7395  035642  104441                                                         TRAP    C$SPRI
7396
7397  035644                                GEDF    EM43C,ERR1      ;POWER-UP INTERRUPT DIDN'T OCCUR
7398                                                                ;       'DEVICE FATAL'' ERROR # 83
7399  035644  104455                                                         TRAP    C$ERDF
7400  035646  000123                                                         .WORD   83
7401  035650  017215                                                         .WORD   EM43C
7402  035652  006212                                                         .WORD   ERR1
7403  035654  000240                        NOP                     ; (FOR PATCHING)
7404  035656  004737  003346      22$:      JSR     PC,MASCLR       ;RESET THE DMV
7405  035662  103001                        BCC     23$             ; RESET OK, PROCEED
7406  035664                                ERROR                   ; RESET FAILED, REPORT IT
7407  035664  104460                                                         TRAP    C$ERROR
7408  035666                        23$:
7409  035666                                ESCAPE  SUB             ; & GET THE HECK OUT OF HERE!!!
7410  035666  104410                                                         TRAP    C$ESCAPE
7411  035670  000160                                                         .WORD   L10067-.
7412  035672                        HLTST2:
7413
7414  035672  004537  005004                JSR     R5,MOVSW        ;RESTORE THE INTERRUPT VECTORS
7415  035676  002654                        BUFAREA                 ; FROM THE BUFFER AREA
7416  035700  000000                        0
7417  035702  000200                        400/2                   ; TO LOC'S 0 ==> 377
7418
7419  035704  010002                        MOV     R0,R2           ;R0 WILL BE CORRUPTED BY SUPERVISOR CALLS!
7420
7421  035706                                SETPRI  #0              ;RESTORE PRIORITY LEVEL TO 0
7422  035706  012700  000000                                                 MOV     #0,R0
7423  035712  104441                                                         TRAP    C$SPRI
7424  035714  022701  071573                CMP     #071573,R1      ;CHECK RESULTS OF THE ADDITIONS
7425  035720  001412                        BEQ     5$              ;OK -->
7426  035722  010137  002256                MOV     R1,BDATA        ;WHAT!!!  SETUP & REPORT AN
7427  035726  012737  177777  002254        MOV     #-1,GDATA       ;  ADDITION ERROR
7428  035734                                GEDF    EM43D,ERR1      ;ADDITION DIDN'T WORK PROPERLY
7429                                                                ;       'DEVICE FATAL'' ERROR # 84
```

```
7430  035734  104455                                                          TRAP    C$ERDF
7431  035736  000124                                                          .WORD   84
7432  035740  017242                                                          .WORD   EM43D
7433  035742  006212                                                          .WORD   ERR1
7434  035744  000240                NOP                     ; (FOR PATCHING)
7435  035746  020227  177777  5$:   CMP     R2,#-1          ;THE LOADED ROUTINE SHOULD HAVE DONE THIS
7436  035752  001003                BNE     8$              ;IT DIDN'T -- IT FAILED
7437  035754  023702  002412        CMP     TMP0,R2         ;THESE SHOULD BE EQUAL TOO
7438  035760  001412                BEQ     10$             ;OK -->
7439  035762  010237  002256  8$:   MOV     R2,BDATA        ;WHAT!!!  SETUP & REPORT AN ERROR
7440  035766  012737  177777  002254  MOV   #-1,GDATA
7441  035774                      GEDF    EM43D,ERR1      ;LOADED ROUTINE FAILED
7442                                                      ;       'DEVICE FATAL'' ERROR # 85
7443  035774  104455                                                          TRAP    C$ERDF
7444  035776  000125                                                          .WORD   85
7445  036000  017242                                                          .WORD   EM43D
7446  036002  006212                                                          .WORD   ERR1
7447  036004  000240                NOP                     ; (FOR PATCHING)
7448  036006  020637  002454  10$:   CMP     SP,OLDSP        ;THESE SHOULD ALSO BE EQUAL
7449  036012  001412                BEQ     15$             ;OK -->
7450  036014  010637  002256        MOV     SP,BDATA        ;WHAT!!!  SETUP & REPORT AN ERROR
7451  036020  013737  002454  002254  MOV   OLDSP,GDATA
7452  036026                      GEDF    EM43D,ERR1      ;LOADED ROUTINE FAILED
7453                                                      ;       'DEVICE FATAL'' ERROR # 86
7454  036026  104455                                                          TRAP    C$ERDF
7455  036030  000126                                                          .WORD   86
7456  036032  017242                                                          .WORD   EM43D
7457  036034  006212                                                          .WORD   ERR1
7458  036036  000240                NOP                     ; (FOR PATCHING)
7459  036040  004737  003346  15$:   JSR     PC,MASCLR       ;MAKE SURE THE DMV IS RESET
7460  036044  103001                BCC     16$             ; RESET OK, CONTINUE
7461  036046                        ERROR                   ;RESET FAILED, REPORT ERROR
7462  036046  104460                                                          TRAP    C$ERROR
7463  036050                  16$:
7464  036050                      ENDSUB
7465  036050                                                          L10067:
7466  036050  104403                                                          TRAP    C$ESUB
7467  036052                      ENDTST
7468  036052                                                          L10065:
7469  036052  104401                                                          TRAP    C$ETST
```

```
                        .SBTTL  SUBTEST 1'S M-CODE -- ASSIGNMENTS

                        ;*****************************************************************************
                        ;       MICRO-CODE FOR SUBROUTINE # 1
                        ;*****************************************************************************

036054                  MC1:
                        ;       ASSEMBLED BY:  COMPAS MICROSYSTEMS MINMIC (V6A)
                        ;                       (WITH CHANGES EDITED IN)
                        ;
                        ;LINE# LOC   CODE       LINE
                        ;0002  0000             *=$0000
                        ;0003  0000
                        ;0004  0000             ;EQUATES FOR BIT DEFINITIONS
                        ;0005  0000             BIT0    =@1
                        ;0006  0000             BIT1    =@2
                        ;0007  0000             BIT2    =@4
                        ;0008  0000             BIT4    =@20
                        ;0009  0000             BIT5    =@40
                        ;0010  0000             BIT6    =@100
                        ;0011  0000
                        ;0012  0000
                        ;0013  0000             ;ADDRESS EQUATES FOR CSR REGISTERS
                        ;0014  0000             BSEL4   =$14
                        ;0015  0000             BSEL5   =BSEL4+1
                        ;0016  0000             BSEL7   =BSEL4+3
                        ;0017  0000
                        ;0018  0000
                        ;0019  0000             ;NPR ADDRESS REGISTER EQUATES
                        ;0020  0000             NPRAIL  = $003C    ;IN NPR ADRS LO REG
                        ;0021  0000             NPRAIH  = NPRAIL+1 ;IN NPR ADRS HI REG
                        ;0022  0000             NPRAIX  = NPRAIL+2 ;IN NPR EXTENDED ADRS REG
                        ;0023  0000
                        ;0024  0000
                        ;0025  0000             ;NPR DATA REG EQUATES
                        ;0026  0000             NPRDIL  = $A600    ;IN NPR DATA LO REG
                        ;0027  0000             NPRDIH  = NPRDIL+1 ;IN NPR DATA HI REG
                        ;0028  0000
                        ;0029  0000
                        ;0030  0000             ;NPR CONTROL REG EQUATES
                        ;0031  0000             NPRCTL  = $A604 ;NPR CONTROL REGISTER
                        ;0032  0000             NONPR   = BIT6  ;USED TO PREVENT AN NPR
                        ;0033  0000             INOUT   = BIT5  ;SET TO 1 FOR INPUT, SET TO 0 FOR OUTPUT NPR
                        ;0034  0000             HALT    = BIT4  ;SET DURING MOP MODE ONLY
                        ;0035  0000             PWRUP   = BIT2  ;CLEARED BY BUS INIT TO INDICATE PWR UP
                        ;0036  0000             SDCLOW  = BIT1  ;SET TO 1 TO RESET LSI-11 FOR MOP BOOT
                        ;0037  0000             DISINI  = BIT0  ;SET TO 1 TO DISABLE BUS INIT TO 6502
                        ;0038  0000
                        ;0039  0000
                        ;0040  0000             ;NPR REQUEST FUNCTIONS
                        ;0041  0000             NPRRED  = PWRUP ;IN/OUT BIT = 0 FOR READ TO DMV-11
                        ;0042  0000
                        ;0043  0000
                        ;0044  0000             ;MISCELLANEOUS EQUATES
                        ;0045  0000             STARAM  = $003F ;STARTING ADRS OF GEN'L PURPOSE RAM TO TEST
                        ;0046  0000
```

```
7526                                    ;0047  0000
7527                                    .SBTTL  SUBTEST 1'S M-CODE -- ROUTINE
7528                                    ;0048  0000              *=STARAM        ;START OF MICROCODE IN RAM
7529
7530                                    ;LINE# LOC   CODE       LINE
7531
7532  036054    251     000             .BYTE  251,00
7533                                    ;0050  003F  A9 00              LDA     #0      ;CLEAR BSEL7
7534  036056    205     027             .BYTE  205,27
7535                                    ;0051  0041  85 17              STA     BSEL7
7536                                    ;0052  0043
7537  036060    245     027             .BYTE  245,27
7538                                    ;0053  0043  A5 17      WAIT1   LDA     BSEL7   ;WAIT FOR IT TO GO <> 0
7539  036062    360     374             .BYTE  360,374
7540                                    ;0054  0045  F0 FC              BEQ     WAIT1
7541                                    ;0055  0047
7542                                    ;0056  0047             ; WE SHOULD NOW BE IN SYNC WITH THE 11 PROCESSOR
7543                                    ;0057  0047
7544  036064    245     024             .BYTE  245,24
7545                                    ;0058  0047  A5 14              LDA     BSEL4   ;GET & SAVE THE ADDRESS
7546  036066    205     074             .BYTE  205,74
7547                                    ;0059  0049  85 3C              STA     NPRAIL  ;OF ''TMP0'' AND USE IT TO
7548  036070    245     025             .BYTE  245,25
7549                                    ;0060  004B  A5 15              LDA     BSEL5   ;SETUP FOR AN NPR-IN
7550  036072    205     075             .BYTE  205,75
7551                                    ;0061  004D  85 3D              STA     NPRAIH  ;OPERATION LATER
7552                                    ;0062  004F
7553  036074    251     124             .BYTE  251,124
7554                                    ;0063  004F  A9 54              LDA     #NONPR!HALT!PWRUP
7555  036076    215     004     246     .BYTE  215,4,246
7556                                    ;0064  0051  8D 04 A6           STA     NPRCTL  ;HALT THE 11 CPU
7557                                    ;0064  0054
7558                                    ;0064  0054             ; DELAY TO ALLOW ''HALT'' TO TAKE EFFECT (ABOUT
7559                                    ;0064  0054             ; 100 MICROSECONDS).
7560  036101    240     041             .BYTE  240,41
7561                                    ;0064  0054  A0 21              LDY     #$21    ;INITIAL VALUE OF COUNTER
7562  036103    210                     .BYTE  210
7563                                    ;0064  0056  88         DELAY   DEY             ;(33. FOR .6 US CYCLE)
7564  036104    320     375             .BYTE  320,375
7565                                    ;0064  0057  D0 FD              BNE     DELAY
7566                                    ;0065  0059
7567                                    ;0066  0059             ; WE NOW HAVE TO READ THE 11 CPU'S LOCATION WHO'S
7568                                    ;0067  0059             ; ADDRESS WE PREVIOUSLY READ FROM SEL6
7569                                    ;0068  0059
7570  036106    251     000             .BYTE  251,00
7571                                    ;0069  0059  A9 00              LDA     #0      ;CLEAR THE EXTENDED-ADDRESS-IN
7572  036110    205     076             .BYTE  205,76
7573                                    ;0070  005B  85 3E              STA     NPRAIX
7574  036112    251     024             .BYTE  251,24
7575                                    ;0071  005D  A9 14              LDA     #NPRRED!HALT
7576  036114    215     004     246     .BYTE  215,4,246
7577                                    ;0072  005F  8D 04 A6           STA     NPRCTL  ;READ ONE WORD FROM THE 11 CPU
7578                                    ;0073  0062
7579  036117    054     004     246     .BYTE  54,4,246
7580                                    ;0074  0062  2C 04 A6   NPRWAT  BIT     NPRCTL  ;WAIT FOR IT TO ''ALMOST'' COMPLETE
7581  036122    160     373             .BYTE  160,373
```

```
7582                                    ;0075  0065  70 FB              BVS     NPRWAT
7583  036124    352                     .BYTE  352
7584                                    ;0075  0067  EA                 NOP             ;SHOULD COMPLETE HERE
7585                                    ;0076  0068
7586  036125    255     000     246     .BYTE  255,0,246
7587                                    ;0077  0068  AD 00 A6           LDA     NPRDIL  ;MOVE THE WORD JUST READ INTO
7588  036130    205     024             .BYTE  205,24
7589                                    ;0078  006B  85 14              STA     BSEL4   ; SEL4
7590  036132    255     001     246     .BYTE  255,1,246
7591                                    ;0079  006D  AD 01 A6           LDA     NPRDIH
7592  036135    205     025             .BYTE  205,25
7593                                    ;0080  0070  85 15              STA     BSEL5
7594                                    ;0088  0072
7595                                    ;0089  0072                 ; DROP 'HALT' AND SET 'DCOK H LO' & 'DISABL INIT'
7596                                    ;0090  0072
7597  036137    251     125             .BYTE  251,125
7598                                    ;0091  0072  A9 55              LDA     #NONPR!PWRUP!DISINI!HALT
7599  036141    215     004     246     .BYTE  215,4,246
7600                                    ;0092  0074  8D 04 A6           STA     NPCRTL
7601  036144    251     107             .BYTE  251,107
7602                                    ;0093  0077  A9 47              LDA     #NONPR!PWRUP!SDCLOW!DISINI
7603  036146    215     004     246     .BYTE  215,4,246
7604                                    ;0094  0079  8D 04 A6           STA     NPRCTL
7605                                    ;0095  007C
7606                                    ;0096  007C                 ; NOW LET THE 11 CPU GO THROUGH THE POWER-UP SEQUENCE
7607                                    ;0097  007C
7608  036151    251     105             .BYTE  251,105
7609                                    ;0098  007C  A9 45              LDA     #NONPR!PWRUP!DISINI
7610  036153    215     004     246     .BYTE  215,4,246
7611                                    ;0099  007E  8D 04 A6           STA     NPRCTL
7612                                    ;0100  0081
7613                                    ;0101  0081                 ; WHEN BSEL7 IS CLEARED, CLEAR 'DISABL INIT'
7614                                    ;0102  0081
7615  036156    245     027             .BYTE  245,27
7616                                    ;0103  0081  A5 17          WAIT2   LDA     BSEL7
7617  036160    320     374             .BYTE  320,374
7618                                    ;0104  0083  D0 FC              BNE     WAIT2
7619                                    ;0105  0085
7620  036162    251     104             .BYTE  251,104
7621                                    ;0106  0085  A9 44              LDA     #NONPR!PWRUP
7622  036164    215     004     246     .BYTE  215,4,246
7623                                    ;0107  0087  8D 04 A6           STA     NPRCTL
7624                                    ;0108  008A
7625                                    ;0109  008A                 ; USE A STANDARD SUBROUTINE RETURN TO GET BACK INTO
7626                                    ;0110  008A                 ; THE MAINTENANCE LOOP
7627                                    ;0111  008A
7628  036167    140                     .BYTE  140
7629                                    ;0112  008A  60                 RTS
7630                                    ;0113  008B
7631
7632
7633                                    ;ERRORS = 0000
7634
7635                                    .SBTTL  SUBTEST 1'S M-CODE -- SYMBOL   TABLE
7636
7637                                    ; BIT0     0001    BIT1     0002    BIT2     0004    BIT4     0010
```

```
; BIT5    0020   BIT6    0040   BSEL4   0014   BSEL5   0015
; BSEL7   0017   DELAY   006E   DISINI  0001   HALT    0010
; INOUT   0020   NONPR   0040   NPRAIH  003D   NPRAIL  003C
; NPRAIX  003E   NPRCTL  A604   NPRDIH  A601   NPRDIL  A600
; NPRRED  0004   NPRWAT  005D   PWRUP   0004   SDCLOW  0002
; STARAM  003F   WAIT1   0043   WAIT2   0078
;END OF ASSEMBLY(V6A)
;SYMBOLS LEFT = 1473 OUT OF 1500

.SBTTL  SUBTEST 1'S M-CODE -- CROSS REFERENCE TABLE (CREF V01-05 )


;BIT0              5#    37
;BIT1      6#      36
;BIT2      7#      35
;BIT4      8#      34
;BIT5      9#      33
;BIT6     10#      32
;BSEL4    14#      58    78
;BSEL5    15#      60    80
;BSEL7    16#      15    16      51      53      100
;DELAY    86#      87
;DISINI   37#      91    96
;HALT              34#   63      71
;INOUT    33#
;NONPR    32#      63    91      96      103
;NPRAIH   21#      61
;NPRAIL   20#      21    22      59
;NPRAIX   22#      70
;NPRCTL   31#      64    72      74      92      104
;NPRDIH   27#      79
;NPRDIL   26#      27    77
;NPRRED   41#      71
;NPRWAT   74#      75
;PWRUP    35#      41    63      91      96      103
;SDCLOW   36#      91
;STARAM   45#      48
;WAIT1    53#      54
;WAIT2   100#     101
```

```
                                .EVEN
                                .SBTTL  SUBTEST 2'S M-CODE -- ASSIGNMENTS

                                ;*****************************************************************************
                                ;       MICRO-CODE FOR SUBROUTINE # 2
                                ;*****************************************************************************
                                .RADIX  8.
                                MC2:
                                ;LINE# LOC    CODE        LINE
                                ;0002  0000                *=$0000
                                ;0003  0000
                                ;0004  0000                ;EQUATES FOR BIT DEFINITIONS
                                ;0005  0000                BIT0    =@1
                                ;0006  0000                BIT1    =@2
                                ;0007  0000                BIT2    =@4
                                ;0008  0000                BIT4    =@20
                                ;0009  0000                BIT6    =@100
                                ;0010  0000
                                ;0011  0000
                                ;0012  0000                ;ADDRESS EQUATES FOR CSR REGISTERS
                                ;0013  0000                BSEL7   =$17
                                ;0014  0000
                                ;0015  0000
                                ;0016  0000                ;NPR ADDRESS REGISTER EQUATES
                                ;0017  0000                NPRAOL  = $0038 ;OUT NPR ADRS LO REG
                                ;0018  0000                NPRAOH  = NPRAOL+1 ;OUT NPR ADRS HI REG
                                ;0019  0000                NPRAOX  = NPRAOL+2 ;OUT NPR EXTENDED ADRS REG
                                ;0020  0000
                                ;0021  0000
                                ;0022  0000                ;NPR DATA REG EQUATES
                                ;0023  0000                NPRDOL  = $A600 ;OUT NPR DATA LO REG
                                ;0024  0000                NPRDOH  = NPRDOL+1 ;OUT NPR DATA HI REG
                                ;0025  0000
                                ;0026  0000
                                ;0027  0000                ;NPR CONTROL REG EQUATES
                                ;0028  0000                NPRCTL  = $A604 ;NPR CONTROL REGISTER
                                ;0029  0000                NONPR   = BIT6  ;USED TO PREVENT AN NPR
                                ;0030  0000                HALT    = BIT4  ;SET DURING MOP MODE ONLY
                                ;0031  0000                PWRUP   = BIT2  ;CLEARED BY BUS INIT
                                ;0032  0000                SDCLOW  = BIT1  ;SET TO 1 TO RESET LSI-11 FOR MOP BOOT
                                ;0033  0000                DISINI  = BIT0  ;SET TO 1 TO DISABLE BUS INIT TO 6502
                                ;0034  0000
                                ;0035  0000
                                ;0036  0000                ;MISCELLANEOUS EQUATES
                                ;0037  0000                STARAM  = $003F ;STARTING ADRS OF GEN'L PURPOSE RAM
                                ;0038  0000
```

```
                                        .SBTTL  SUBTEST 2'S M-CODE -- ROUTINE
                                        ;0039   0000
                                        ;0040   0000            *=STARAM        ;START OF MICROCODE IN RAM
7726 036170     251     000             .BYTE   251,000
                                        ;0042   003F  A9 00             LDA     #0      ;CLEAR BSEL7
7728 036172     205     027             .BYTE   205,027
                                        ;0043   0041  85 17             STA     BSEL7
                                        ;0044   0043
7731 036174     245     027             .BYTE   245,027
                                        ;0045   0043  A5 17     WAIT1   LDA     BSEL7   ;WAIT FOR IT TO GO <> 0
7733 036176     360     374             .BYTE   360,374
                                        ;0046   0045  F0 FC             BEQ     WAIT1
                                        ;0047   0047
                                        ;0048   0047            ; WE SHOULD NOW BE IN SYNC WITH THE 11 PROCESSOR
                                        ;0049   0047
                                        ;0050   0047            ; THE NEXT SEQUENCE WILL SEND THE 11 CPU THROUGH
                                        ;0051   0047            ; A POWER-UP SEQUENCE AND RESET EVERYTHING ELSE ON THE
                                        ;0052   0047            ; Q-BUS.  WE HAVE PREVENTED OURSELVES FROM BEING RESET
                                        ;0053   0047            ; BY SETTING 'DISABL INIT''.
                                        ;0054   0047
7743 036200     251     125             .BYTE   251,125
                                        ;0054   0047  A9 55             LDA     #NONPR!HALT!PWRUP!DISINI
7745 036202     215     004     246     .BYTE   215,004,246
                                        ;0054   0049  8D 04 A6          STA     NPRCTL
                                        ;0054   004C
                                        ;0054   004C            ; DELAY TO ALLOW 'HALT'' TO TAKE EFFECT (ABOUT
                                        ;0054   004C            ; 100 MICROSECONDS).
7750 036205     240     041             .BYTE   240,41
                                        ;0054   004C  A0 21             LDY     #$21    ;INITIAL VALUE OF COUNTER
7752 036207     210                     .BYTE   210
                                        ;0054   004E  88        DELAY   DEY             ;(33. FOR .6 US CYCLE)
7754 036210     320     375             .BYTE   320,375
                                        ;0054   004F  D0 FD             BNE     DELAY
7756 036212     251     127             .BYTE   251,127
                                        ;0055   0051  A9 57             LDA     #NONPR!HALT!PWRUP!SDCLOW!DISINI
7758 036214     215     004     246     .BYTE   215,004,246
                                        ;0056   0053  8D 04 A6          STA     NPRCTL  ;HANG THE 11 CPU ETC.
7760 036217     251     165             .BYTE   251,165
                                        ;0057   0056  A9 75             LDA     #NONPR!HALT!PWRUP!DISINI!NPROUT
7762 036221     215     004     246     .BYTE   215,004,246
                                        ;0058   0058  8D 04 A6          STA     NPRCTL  ;NOW LET IT 'POWER-UP''
                                        ;0059   005B
7765 036224     251     000             .BYTE   251,000
                                        ;0060   005B  A9 00             LDA     #0      ;SETUP NPR ADDR OUT HIGH FOR
7767 036226     205     071             .BYTE   205,071
                                        ;0061   005D  85 39             STA     NPRAOH  ;  ALL NPR'S
7769 036230     205     072             .BYTE   205,072
                                        ;0062   005F  85 3A             STA     NPRAOX  ;THE EXTENDED BYTE TOO
7771 036232     252                     .BYTE   252
                                        ;0063   0061  AA                TAX             ;INITALIZE DATA TABLE INDEX
                                        ;0064   0062
                                        ;0065   0062            ; WE ARE NOW SETUP TO MOVE THE 'MOV'' INSTRUCTION INTO
                                        ;0066   0062            ; LOCATION 0 OF THE 11'S MEMORY
                                        ;0067   0062
7777 036233     251     024             .BYTE   251,024
                                        ;0068   0062  A9 14             LDA     #@24    ;POINT TO 11'S POWER-UP VEC.
```

```
036235  205  070         .BYTE  205,070
                         ;0069  0064  85 38             STA   NPRAOL
036237  040  305  000    .BYTE  040,305,000
                         ;0070  0066  20 C5 00          JSR   NPR      ;MOVE TO 24
036242  040  305  000    .BYTE  040,305,000
                         ;0071  0069  20 C5 00          JSR   NPR      ;MOVE TO 26
                         ;0072  006C
036245  251  000         .BYTE  251,000
                         ;0073  006C  A9 00             LDA   #0
036247  205  070         .BYTE  205,070
                         ;0074  006E  85 38             STA   NPRAOL   ;POINT TO THE 11'S LOC. 0
036251  040  305  000    .BYTE  040,305,000
                         ;0075  0070  20 C5 00          JSR   NPR      ;MOVE TO LOC 0
036254  040  305  000    .BYTE  040,305,000
                         ;0076  0073  20 C5 00          JSR   NPR      ;MOVE TO LOC 2
036257  040  305  000    .BYTE  040,305,000
                         ;0077  0076  20 C5 00          JSR   NPR      ;MOVE TO 4
                         ;0078  0079
                         ;0079  0079             ; NOW THAT WE'VE TAKEN CONTROL OF THE 11'S POWER-
                         ;0080  0079             ; UP VECTOR, FORCE HIM THROUGH IT.  BUT DON'T LET
                         ;0081  0079             ; HIS BINIT RESET US (BY KEEPING 'DISABL INIT''
                         ;0082  0079             ; SET)
                         ;0083  0079
036262  251  107         .BYTE  251,107
                         ;0084  0079  A9 47             LDA   #NONPR!PWRUP!SDCLOW!DISINI
036264  215  004  246    .BYTE  215,004,246
                         ;0085  007B  8D 04 A6          STA   NPRCTL
036267  251  145         .BYTE  251,145
                         ;0086  007E  A9 65             LDA   #NONPR!PWRUP!DISINI!NPROUT
036271  215  004  246    .BYTE  215,004,246
                         ;0087  0080  8D 04 A6          STA   NPRCTL
036274  352              .BYTE  352
                         ;0087  0083  EA                NOP
036275  352              .BYTE  352
                         ;0087  0084  EA                NOP
                         ;0088  0085
                         ;0089  0085             ; NOW WE CAN NPR-OUT THE REST OF THE DATA WE HAVE
                         ;0090  0085
036276  040  305  000    .BYTE  040,305,000
                         ;0091  0085  20 C5 00          JSR   NPR      ;MOVE TO LOC 6
036301  240  166         .BYTE  240,166
                         ;0092  0088  A0 76             LDY   #@166    ;THIS IS HOW MANY WE'LL DO
036303  040  305  000    .BYTE  040,305,000
                         ;0093  008A  20 C5 00  FILOOP  JSR   NPR      ;WRITE 1 WORD
036306  312              .BYTE  312
                         ;0094  008D  CA                DEX            ;BACK UP THE DATA POINTER
036307  312              .BYTE  312
                         ;0095  008E  CA                DEX            ; -- WE WANT THE SAME WORD
036310  210              .BYTE  210
                         ;0096  008F  88                DEY            ;IF NOT DONE,
036311  320  370         .BYTE  320,370
                         ;0097  0090  D0 F8             BNE   FILOOP   ;                DO IT AGAIN
036313  240  006         .BYTE  240,006
                         ;0098  0092  A0 06             LDY   #@6      ;ELSE, SETUP TO DO 6 MORE
036315  350              .BYTE  350
                         ;0099  0094  E8                INX            ;        WORDS
```

```
036316    350                   .BYTE  350
                                ;0100  0095  E8                     INX               ;POINT TO NEXT WORD
036317    040     305    000    .BYTE  040,305,000
                                ;0101  0096  20 C5 00     ENDLOP    JSR     NPR       ;MOVE THE LAST 6 WORDS
036322    210                   .BYTE  210
                                ;0102  0099  88                     DEY               ;IF NOT DONE,
036323    320     372           .BYTE  320,372
                                ;0103  009A  D0 FA                  BNE     ENDLOP    ;               DO IT AGAIN
                                ;0104  009C                                           ;ELSE, THE SIMULATED 'DOWN-
                                ;0105  009C                                           ;  LINE LOAD'' IS COMPLETE
                                ;0106  009C
036325    251     004           .BYTE  251,004
                                ;0107  009C  A9 04                  LDA     #4        ; AND THE 11'S LOC. 4
036327    205     070           .BYTE  205,070
                                ;0108  009E  85 38                  STA     NPRAOL
036331    040     305    000    .BYTE  040,305,000
                                ;0109  00A0  20 C5 00               JSR     NPR       ;OVER-WRITE THE 'BR  .''
                                ;0110  00A3                                           ;INSTRUCTION TO LET THE JUST
                                ;0111  00A3                                           ;LOADED ROUTINE BE EXECUTED
                                ;0112  00A3
036334    251     104           .BYTE  251,104
                                ;0113  00A3  A9 44                  LDA     #NONPR!PWRUP
036336    215     004    246    .BYTE  215,004,246
                                ;0114  00A5  8D 04 A6               STA     NPRCTL  ;LET BINIT RESET US AGAIN
                                ;0115  00A8
036341    140                   .BYTE  140
                                ;0116  00A8  60                     RTS               ;RETURN TO MAINTENANCE LOOP
                                ;0117  00A9
                                ;0118  00A9
                                ;0119  00A9               ;*****************************************************
                                ;0120  00A9               ;
                                ;0121  00A9               ;         DATABL -- DATA TABLE CONTAINING THE DATA THAT
                                ;0122  00A9               ;                    IS TO BE NPR'D INTO THE 11'S MEMORY
                                ;0123  00A9               ;
                                ;0124  00A9               ;*****************************************************
                                ;0125  00A9
                                ;0126  00A9
                                ;0127  00A9               DATABL
036342    000000                .WORD  000000
                                ;0128  00A9  00 00                  .DBYTE  0,@340   ;LOC'S 24 & 26
036344    000340                .WORD  000340
                                ;0128  00AB  00 E0
036346    012700  177777        MOV    #-1,R0
                                ;0129  00AD  15 C0                  .DBYTE  @012700,-1,@777 ;LOC'S 0 --> 4
                                ;0129  00AF  FF FF
036352    000777                BR     .
                                ;0129  00B1  01 FF
036354    005001                CLR    R1
                                ;0130  00B3  0A 01                  .DBYTE  @005001 ;LOC. 6
036356    062701                .WORD  062701
                                ;0131  00B5  65 C1                  .DBYTE  @062701 ;LOC'S 10 --> 362
036360    010037  002412        MOV    R0,@#TMP0
                                ;0132  00B7  10 1F                  .DBYTE  @010037 ;LOC 364  'MOV''
                                ;0133  00B9  00 00                  .DBYTE  0       ;LOC 366
036364    013706  002454        MOV    @#OLDSP,SP
                                ;0134  00BB  17 C6                  .DBYTE  @013706 ;LOC 370  'MOV''
```

```
 7891
 7892  036370  000137  035672          ;0135  00BD  00 00              .DBYTE  0       ;LOC 372
                                        JMP    @#HLTST2
 7893                                   ;0136  00BF  00 5F              .DBYTE  @000137 ;LOC 374  ''JMP''
 7894                                   ;0137  00C1  00 00              .DBYTE  0       ;LOC 376
 7895  036374  000240                    NOP
 7896                                   ;0138  00C3  00 A0              .DBYTE  @000240 ;'NOP'' FOR LOC 4
 7897                                   ;0139  00C5
 7898                                   ;0140  00C5             ;  THE THREE WORDS FOR LOCATIONS 366, 372, & 376 ARE
 7899                                   ;0141  00C5             ;  ASSEMBLED IN WHEN THIS CODE IS INCLUDED INTO THE
 7900                                   ;0142  00C5             ;  DIAGNOSTIC
 7901                                   ;0143  00C5
 7902                                   ;0144  00C5             ;*************************************************************
 7903                                   ;0145  00C5             ;
 7904                                   ;0146  00C5             ;       'NPR'' SUBROUTINE:
 7905                                   ;0147  00C5             ;
 7906                                   ;0148  00C5             ; 1 TAKE THE DATA FROM THE DATA TABLE AS INDEXED BY
 7907                                   ;0149  00C5             ;       'X'' AND PUT IT INTO THE NPR DATA OUT REGISTERS
 7908                                   ;0150  00C5             ;
 7909                                   ;0151  00C5             ; 2 GET THE CURRENT SETTING OF THE NPR CONTROL REG.
 7910                                   ;0152  00C5             ;       AND WRITE IT BACK TO CAUSE A WORD NPR-OUT
 7911                                   ;0153  00C5             ;
 7912                                   ;0154  00C5             ; 3 INCREMENT THE NPR-OUT-ADDRESS-LOW REGISTER
 7913                                   ;0155  00C5             ;
 7914                                   ;0156  00C5             ; 4 WAIT FOR ''GOBUSY'' TO GO LOW
 7915                                   ;0157  00C5             ;
 7916                                   ;0158  00C5             ; 5 RETURN TO CALLER
 7917                                   ;0159  00C5             ;
 7918                                   ;0160  00C5             ;*************************************************************
 7919                                   ;0161  00C5
 7920  036376  265     251               .BYTE  265,251
 7921                                   ;0162  00C5  B5 A9      NPR     LDA     DATABL,X ;LOAD THE DATA-OUT REG'S
 7922  036400  215     000     246       .BYTE  215,000,246
 7923                                   ;0163  00C7  8D 00 A6           STA     NPRDOL
 7924  036403  265     252               .BYTE  265,252
 7925                                   ;0164  00CA  B5 AA              LDA     DATABL+1,X
 7926  036405  215     001     246       .BYTE  215,001,246
 7927                                   ;0165  00CC  8D 01 A6           STA     NPRDOH
 7928                                   ;0166  00CF
 7929  036410  255     004     246       .BYTE  255,004,246
 7930                                   ;0167  00CF  AD 04 A6           LDA     NPRCTL
 7931  036413  215     004     246       .BYTE  215,004,246
 7932                                   ;0168  00D2  8D 04 A6           STA     NPRCTL  ;KICK OFF A WORD NPR-OUT
 7933                                   ;0169  00D5
 7934  036416  350                       .BYTE  350
 7935                                   ;0170  00D5  E8                 INX             ;POINT TO THE NEXT DATA
 7936  036417  350                       .BYTE  350
 7937                                   ;0171  00D6  E8                 INX             ;  WORD
 7938                                   ;0172  00D7
 7939                                   ;0173  00D7
 7940                                   ;0174  00D7             NPRWAT
 7941  036420  054     004     246       .BYTE  054,004,246
 7942                                   ;0175  00D7  2C 04 A6           BIT     NPRCTL  ;WAIT FOR THE NPR TO
 7943  036423  160     373               .BYTE  160,373
 7944                                   ;0176  00DA  70 FB              BVS     NPRWAT  ; COMPLETE
 7945  036425  352                       .BYTE  352
 7946                                   ;0177  00DC  EA                 NOP
```

```
CVDMBA.P11    18-DEC-80 15:53          SUBTEST 2'S M-CODE -- ROUTINE

  7947  036426      346     070          .BYTE  346,070
  7948
  7949  036430      346     070          .BYTE  346,070
  7950
  7951
  7952  036432      140                  .BYTE  140
  7953
  7954
  7955
  7956
  7957
  7958
  7959
  7960
  7961
  7962
  7963
  7964
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  7989
  7990
  7991
  7992
  7993
  7994
  7995
  7996
  7997
  7998
  7999
  8000
  8001
  8002  036433
```

```
;0178  00DD  E6 38              INC     NPRAOL  ;POINT TO THE NEXT WORD
;0179  00DF  E6 38              INC     NPRAOL  ;OF THE 11'S MEMORY
;0180  00E1
;0181  00E1  60                 RTS             ;RETURN TO CALLER
;0182  00E2
;
;
;ERRORS = 0000
;
.SBTTL  SUBTEST 2'S M-CODE -- SYMBOL   TABLE
;
; BIT0      0001    BIT1      0002    BIT2      0004    BIT4      0010
; BIT6      0040    BSEL7     0017    DATABL    009D    DISINI    0001
; ENDLOP    008A    FILOOP    007E    HALT      0010    NONPR     0040
; NPR       0089    NPRAOH    0039    NPRAOL    0038    NPRAOX    003A
; NPRCTL    A604    NPRDOH    A601    NPRDOL    A600    NPRWAT    00CB
; PWRUP     0004    SDCLOW    0002    STARAM    003F    WAIT1     0043
;
;END OF ASSEMBLY(V6A)
;SYMBOLS LEFT = 1476 OUT OF 1500
;
;COMPAS MICROSYSTEMS MINMIC CROSS ASSEMBLER PAGE C-1
.SBTTL  SUBTEST 2'S M-CODE -- CROSS REFERENCE TABLE (CREF V01-05 )
;
;
;BIT0      5#      33
;BIT1      6#      32
;BIT2      7#      31
;BIT4      8#      30
;BIT6      9#      29
;BSEL7     13#     43      45
;DATABL    127#    162     164
;DISINI    33#     55      57      84      86
;ENDLOP    101#    103
;FILOOP    93#     97
;HALT      30#     55      57
;NONPR     29#     55      57      84      86      113
;NPR       70      71      75      76      77      91      93
;         101     109     162#
;NPRAOH    18#     61
;NPRAOL    17#     18      19      69      74      108     178
;         179
;NPRAOX    19#     62
;NPRCTL    28#     56      58      85      87      114     167
;         168     175
;NPRDOH    24#     165
;NPRDOL    23#     24      163
;NPRWAT    174#    176
;PWRUP     31#     55      57      84      86      113
;SDCLOW    32#     55      84
;STARAM    37#     40
;WAIT1     45#     46
MC2END:
```

```
CVDMBA.P11    18-DEC-80 15:53        SUBTEST 2'S M-CODE -- CROSS REFERENCE TABLE (CREF V01-05 )
  8003          036434               .EVEN
```

```
                        .SBTTL HARDWARE PARAMETER CODING SECTION


                        ;////////////////////////////////////////////////////////////////////////
                        ;/ 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.
                        ;////////////////////////////////////////////////////////////////////////

036434                          BGNHRD
036434  000030                                                  .WORD L10070-L$HARD/2
036436                                                  L$HARD::
036436                          GPRMA   ADDRES,0,0,160020,177776,YES
036436  000031                                                  .WORD   T$CODE
036440  036516                                                  .WORD   ADDRES
036442  160020                                                  .WORD   T$LOLIM
036444  177776                                                  .WORD   T$HILIM
036446                          GPRMA   VECTOR,2,0,0,674,YES
036446  001031                                                  .WORD   T$CODE
036450  036544                                                  .WORD   VECTOR
036452  000000                                                  .WORD   T$LOLIM
036454  000674                                                  .WORD   T$HILIM
036456                          GPRMD   PRIRTY,4,0,7000,0,7,YES
036456  002032                                                  .WORD   T$CODE
036460  036575                                                  .WORD   PRIRTY
036462  007000                                                  .WORD   7000
036464  000000                                                  .WORD   T$LOLIM
036466  000007                                                  .WORD   T$HILIM
036470                          GPRML   PU24.M,16,100,YES
036470  007130                                                  .WORD   T$CODE
036472  036711                                                  .WORD   PU24.M
036474  000100                                                  .WORD   100
036476                          GPRMD   BDTY.M,12,0,7,0,2,YES
036476  005032                                                  .WORD   T$CODE
036500  036626                                                  .WORD   BDTY.M
036502  000007                                                  .WORD   7
036504  000000                                                  .WORD   T$LOLIM
036506  000002                                                  .WORD   T$HILIM
036510                          GPRML   XMFG.M,16,200,YES
036510  007130                                                  .WORD   T$CODE
036512  036773                                                  .WORD   XMFG.M
036514  000200                                                  .WORD   200

036516                          ENDHRD
                                                                .EVEN
036516                                                  L10070:

                                .NLIST  BEX
036516  042504  044526  042503  ADDRES: .ASCIZ  /DEVICE CSR ADDRESS : /
036544  042504  044526  042503  VECTOR: .ASCIZ  /DEVICE VECTOR ADDRESS : /
036575     104  053105  041511  PRIRTY: .ASCIZ  /DEVICE PRIORITY LEVEL : /
```

```
        036626  047502  051101  020104  BDTY.M: .ASCIZ  /BOARD TYPE (0=M8064, 1=M8053-V.35, 2=M8053-EIA) : /
        036711     111  020123  044124  PU24.M: .ASCIZ  /IS THE PROCESSOR STRAPPED TO MODE 0 ON POWER-UP? /
        036773     111  020123  044124  XMFG.M: .ASCIZ  /IS THIS A MANUFACTURING TEST STAND?/
                                         .LIST   BEX
 8057           037040                   .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.
                        ;////////////////////////////////////////////////////////////////////

037040                          BGNSFT
037040 000000                                                   .WORD L10071-L$SOFT/2
037042                                                  L$SOFT::
                                ENDSFT
                                                                .EVEN
037042                                                  L10071:
```

CVDMBA.P11 18-DEC-80 15:53 PATCH AREA FOR DEBUG

```
8077
8078  037042
8079              037142
8080  037142      000240
8081  037144      000240
8082  037146      000240
8083
8084
8085
8086
8087  037150
8088  037150
8089
8090  037150      000000
8091  037152      000000
8092  037154
8093              000001
```

```
.SBTTL PATCH AREA FOR DEBUG
PATCH:
        .=.+100
        NOP
        NOP
        NOP

;*****************************************

.SBTTL 'ENDMOD' & 'LASTAD'
        ENDMOD
        LASTAD
                                                .EVEN
                                                .WORD   0
                                                .WORD   0

L$LAST::
.END
```

CVDMBA.P11 18-DEC-80 15:53 CROSS REFERENCE TABLE -- USER SYMBOLS

```
ACR    = 120013          1573#  2321   2330   2403   2412   3394   4435   4446   4486
ADDRES  036516           8023   8056#
ADR    = 000020 G        1428#
AD.HIT  023132           3925   3960#
AD.OK   023126           3949   3954#
ASSEMB= 000010           1173
BDATA   002256           1643#  3004   3020   3066   3190   3203   3213   3327   3340   3507   3626   3666   4679*
                         4738   4780   4884*  4951*  5047*  5307*  5386*  5434   5443   5469   5514*  5578*  5646
                         5647   5918   5921   5926   5930   5935*  5936   5960   5963   5987   6068   6071   6076
                         6080   6085*  6086   7426*  7439*  7450*
BDTY.M  036626           8043   8056#
BIT0   = 000001 G        1401#  1472   1490   1508   1519   1588   3795   5289   5496   5820   6698   6812   7215
BIT00  = 000001 G        1390#  1401
BIT01  = 000002 G        1389#  1400
BIT02  = 000004 G        1388#  1399
BIT03  = 000010 G        1387#  1398
BIT04  = 000020 G        1386#  1397
BIT05  = 000040 G        1385#  1396
BIT06  = 000100 G        1384#  1395
BIT07  = 000200 G        1383#  1394
BIT08  = 000400 G        1382#  1393
BIT09  = 001000 G        1381#  1392
BIT1   = 000002 G        1400#  1471   1485   1587
BIT10  = 002000 G        1380#  5288   5349   5359   5480   5495   5540   5550   5658
BIT11  = 004000 G        1379#
BIT12  = 010000 G        1378#
BIT13  = 020000 G        1377#
BIT14  = 040000 G        1376#
BIT15  = 100000 G        1375#
BIT2   = 000004 G        1399#  1470   1484   1586   4444   4494   4531   4608
BIT3   = 000010 G        1398#  1469   1585   4444   4484
BIT4   = 000020 G        1397#  1468   1509   1584   4444   5731   5762
BIT5   = 000040 G        1396#  1467   1583   2380   2390   2394   2408   3363   5731   5762
BIT6   = 000100 G        1395#  1466   1518   1582   2299   2309   2312   2326
BIT7   = 000200 G        1394#  1453   1465   1517   1533   1581   2299   2326   4494
BIT8   = 000400 G        1393#
BIT9   = 001000 G        1392#
BOE    = 000400 G        1432#
BRDTYP  002366           1738#  3836*  4514   4570
BSEL    002320           1710#
BSELRS  002622           1844#  1982   1986
BSEL0   002320           1709#  2237   3932   3938   6266*  6298*  6348*  6380*  6430*  6462*  6512*  6544*  6588*
                         6642*  6849*  6903*
BSEL1   002322           1712#  1966*  1976   2238   6917
BSEL10  002340           1722#  2245
BSEL11  002342           1724#  2246
BSEL12  002344           1725#  2247
BSEL13  002346           1727#  2248
BSEL14  002350           1728#  2249
BSEL15  002352           1730#  2250
BSEL16  002354           1731#  2251
BSEL17  002356           1733#  2252
BSEL2   002324           1713#  2027   2059*  2066   2102*  2109   2166*  2173   2239   6858*
BSEL3   002326           1715#  2240   2310*  2391*  4531   4595*  4608   6717*  6730
BSEL4   002330           1716#  1986   2241
BSEL5   002332           1718#  2242
```

CVDMBA.P11 18-DEC-80 15:53 CROSS REFERENCE TABLE -- USER SYMBOLS

```
BSEL6   002334          1719#  1982   2081   2243   6966*  6994
BSEL7   002336          1721#  2244   6919   7255*  7259   7271*  7309*  7344*  7348   7361*
BSLT0 = 000020          1546#
BSLT1 = 000021          1547#
BSLT2 = 000022          1549#
BSLT3 = 000023          1550#
BSLT4 = 000024          1552#
BSLT5 = 000025          1553#
BSLT6 = 000026          1555#
BSLT7 = 000027          1556#
BSR0    002212          1614#  2237*  3533
BSR1    002214          1616#  2238*  3531
BSR10   002232          1629#  2245*  3575
BSR11   002234          1630#  2246*  3573
BSR12   002236          1631#  2247*  3571
BSR13   002240          1632#  2248*  3569
BSR14   002242          1633#  2249*  3596
BSR15   002244          1634#  2250*  3594
BSR16   002246          1635#  2251*  3592
BSR17   002250          1636#  2252*  3590
BSR2    002216          1618#  2239*  3529
BSR3    002220          1620#  2240*  3527
BSR4    002222          1622#  2241*  3554
BSR5    002224          1624#  2242*  3552
BSR6    002226          1626#  2243*  3550
BSR7    002230          1628#  2244*  3548
BT1   = 002654          1896#  4684
BT2   = 002740          1897#  2548   2552   2556   2560   2564   2568   2572   2576   2580   4678   4723
BUFARE  002654          1873#  1879   1896   1897   4852   4919   5015   5179   7331   7371   7389   7415
CFMT0   022566          3779   3902#
CFMT2   022655          3856   3902#
CFMT3   022735          3862   3902#
CONSOL  002314          1660#  3758*  3775   3898*
CONTIN  022456          3750   3869#
CONTST  022556          3761   3898#
CSREGS= 000010          1442#
C$AU  = 000052          1173#  4008
C$AUTO= 000061          1173#  3958
C$BRK = 000022          1173#
C$BSEG= 000004          1173#
C$BSUB= 000002          1173#  4056   4847   4914   5097   5169   5286   5494   5869   6014   6263   6345   6427
                        6509   6585   6639   6832   6944   7233   7316
C$CEFG= 000045          1173#
C$CLCK= 000062          1173#
C$CLEA= 000012          1173#  3980
C$CLOS= 000035          1173#
C$CLP1= 000006          1173#
C$CVEC= 000036          1173#  3769   3947   3974   3977   6907   6990   7296
C$DCLN= 000044          1173#
C$DODU= 000051          1173#  3952
C$DRPT= 000024          1173#
C$DU  = 000053          1173#  3995
C$EDIT= 000003          1173#  1248
C$ERDF= 000055          1173#  2808   2842   4083   4108   4137   4156   4175   4200   4225   4245   4269   4295
                        4319   4342   4480   4553   4588   4621   4707   4752   4794   4894   4961   5058   5158
                        5230   5315   5390   5455   5462   5473   5522   5582   5630   5637   5651   5941   5969
```

```
                5976  5991  6091  6124  6131  6164  6282  6292  6306  6316  6364  6374  6388
                6398  6446  6456  6470  6480  6528  6538  6552  6562  6606  6616  6660  6670
                6734  6777  6879  6923  6980  6998  7264  7280  7304  7353  7381  7399  7430
                7443  7454
C$ERHR= 000056   1173#
C$ERRO= 000060   1173#  4062  4071  4096  4129  4147  4188  4213  4257  4283  4307  4352  4395
                4427  4439  4450  4459  4474  4490  4500  4509  4523  4538  4547  4565  4582
                4601  4615  4637  4667  4675  4719  4726  4735  4762  4777  4838  4858  4925
                5005  5021  5101  5114  5123  5132  5141  5150  5173  5186  5195  5204  5213
                5222  5266  5332  5341  5355  5370  5379  5407  5417  5428  5437  5446  5546
                5562  5571  5612  5621  5860  5895  6039  6150  6239  6272  6354  6436  6518
                6594  6648  6704  6761  6836  6930  6949  7006  7237  7288  7320  7407  7462
C$ERSF= 000054   1173#
C$ERSO= 000057   1173#
C$ESCA= 000010   1173#  4064  4073  4078  4098  4103  4113  4131  4149  4161  4169  4190  4195
                4215  4220  4240  4250  4259  4264  4285  4290  4309  4314  4324  4337  4429
                4441  4452  4461  4466  4476  4492  4502  4511  4525  4540  4549  4558  4567
                4584  4593  4603  4617  4626  4669  4712  4757  4764  4840  5007  5103  5116
                5125  5134  5143  5152  5175  5188  5197  5206  5215  5224  5320  5334  5343
                5357  5372  5381  5395  5409  5419  5430  5439  5448  5467  5478  5527  5548
                5564  5573  5587  5614  5623  5642  5656  5897  5946  5981  5996  6041  6096
                6136  6152  6169  6274  6356  6438  6520  6596  6650  6706  6763  6838  6951
                7239  7290  7322  7410
C$ESEG= 000005   1173#
C$ESUB= 000003   1173#  4356  4908  4975  5164  5236  5489  5668  6005  6181  6323  6405  6487
                6569  6623  6677  6934  7010  7312  7466
C$ETST= 000001   1173#  4360  4631  4800  4978  5073  5239  5671  6184  6682  6741  6783  7013
                7469
C$EXIT= 000032   1173#  5268  5275  5854  5862  6241  6809  6815  7212  7218
C$GETB= 000026   1173#
C$GETV= 000027   1173#
C$GMAN= 000043   1173#
C$GPHR= 000042   1173#  3802
C$GPLO= 000030   1173#
C$GPRI= 000040   1173#
C$INIT= 000011   1173#  3892
C$INLP= 000020   1173#
C$MANI= 000050   1173#
C$MEM = 000031   1173#
C$MSG = 000023   1173#  2873  2883  2958  3109  3118  3127  3168  3224  3299  3352  3387  3446
                3491
C$OPEN= 000034   1173#
C$PNTB= 000014   1173#  2971  3316  3691
C$PNTF= 000017   1173#  3782  3859  3865
C$PNTS= 000016   1173#
C$PNTX= 000015   1173#  2899  2916  2926  2936  2943  2953  2977  2987  3002  3016  3034  3044
                3064  3084  3104  3140  3148  3156  3163  3178  3184  3201  3209  3219  3236
                3242  3248  3254  3264  3274  3284  3294  3332  3346  3381  3403  3416  3433
                3441  3467  3473  3483  3523  3537  3544  3558  3565  3579  3586  3600  3613
                3621  3631  3638  3651  3659  3672  3679
C$QIO = 000377   1173#
C$RDBU= 000007   1173#
C$REFG= 000047   1173#  3727  3733  3739  3745
C$RESE= 000033   1173#  3992  6727
C$REVI= 000003   1173#  1247
C$RFLA= 000021   1173#
```

CVDMBA.P11 18-DEC-80 15:53 CROSS REFERENCE TABLE -- USER SYMBOLS

```
C$RPT = 000025          1173#
C$SEFG= 000046          1173#
C$SPRI= 000041          1173#  6910   6993   7299   7377   7395   7423
C$SVEC= 000037          1173#  3764   3876   3884   3928   5707   6845   6958   7252   7339
C$TPRI= 000013          1173#
DCOKTS= 000014          3855   6805#
DDRA  = 120003          1563#
DDRB  = 120002          1562#
DELAY1  002262          1645#  1971   6912
DELAY2  002264          1646#
DEVMAP  002310          1658#  3788*  3809*
DEVPTR  002312          1659#  3795*  3806*  3809   3810*
DFPTBL  002160 G        1325#
DIAGMC= 000000          1173
DMVDAI= 000001          1472#  6711   6767
DMVPU = 000004          1470#  1476   1477   1478   1862   6711   6767   6856
EF.CON= 000036 G        1408#  3744
EF.NEW= 000035 G        1409#  3738
EF.PWR= 000034 G        1410#
EF.RES= 000037 G        1407#  3732
EF.STA= 000040 G        1406#  3726
EMCODE  035046          6964   7036#
EM26    016152          3699#  4709   4796
EM26A   016204          3699#  4754   5317   5392   5524   5584   5943   6093
EM26B   016226          3699#  4896
EM26C   016251          3699#  4963
EM26D   016274          3699#  5060
EM26E   016316          2734   3699#  4865   4932   5028   5232
EM26F   016351          3699#
EM26G   016402          3699#  5160
EM27    016424          3699#  5817
EM27A   016437          3699#  5457   5632   5971   6126
EM27B   016461          3699#  5464   5639   5978   6133
EM27C   016502          3699#  5475   5653   5993
EM3     016115          2035   3699#
EM34    016526          2810   3699#  6284   6308   6366   6448   6472   6530   6662
EM34B   016540          2844   3699#  6294   6318   6376   6400   6458   6540   6564   6618
EM35    016552          3699#  6390   6554   6608
EM35B   016573          3699#  6482   6672
EM4     016135          2075   2118   2181   3699#
EM40    016614          3699#  6736
EM41    016671          3699#  6779
EM42A   016746          3699#  6881   6982
EM42B   017020          3699#  6925
EM42C   017074          3699#  7000
EM43A   017153          3699#  7266   7282   7355   7383
EM43B   017177          3699#  7306
EM43C   017215          3699#  7401
EM43D   017242          3699#  7432   7445   7456
EM50A   017271          3699#
EM50B   017337          3699#
EM50C   017405          3699#
EM50D   017453          3699#  4139
EM50E   017507          3699#
EM50F   017543          3699#
EM50G   017610          3699#  4271
```

```
EM50H   017652          3699#
EM50I   017740          3699#
EM50J   020002          3699#
EM50K   020070          3699#
EM50L   020132          3699#
EM50M   020214          3699#
EM50N   020256          3699#
EM50S   020324          3699#
EM50U   020376          3699#
EM50V   020442          3699#
EM50W   020507          3699#
EM50X   020556          3699#
EM50Y   020621          3699#
EM50Z   020673          3699#
EM51B   020734          3699#   4085    4110
EM51C   021002          3699#   4297
EM51E   021050          3699#   4158
EM51F   021104          3699#   4247
EM51G   021151          3699#   4202
EM51L   021213          3699#   4321
EM51M   021275          3699#   4227
EM51N   021337          3699#   4344
EM51P   021405          3699#   4177
EM52A   021457          3699#   4482
EM52B   021535          3699#   4555
EM52C   021567          3699#   4590
EM52D   021653          3699#   4623
EM60N   021711          3699#   6166
ENDEMB  013120          3688    3699#
ERRBLK  002210  G       1608#   1996*   2036*   2076*   2119*   2182*   2735*   4866*   4933*   5029*   5818*
ERRFLG  002276          1653#   2599*   2775    4872*   4877    4889    4891*   4939*   4944    4956    4958*   5035*   5040
                        5052    5055*
ERRMSG  002206  G       1607#   1995*   2035*   2075*   2118*   2181*   2734*   4865*   4932*   5028*   5817*
ERRNBR  002204  G       1606#   1994*   2034*   2074*   2117*   2180*   2733*   4861    4864*   4928    4931*   5024    5027*
                        5816*
ERRTYP  002202  G       1605#   1993*   2033*   2073*   2116*   2179*   2732*   4863*   4930*   5026*   5815*
ERR1    006212  G       2869#   6285    6295    6309    6319    6367    6377    6391    6401    6449    6459    6473    6483
                        6531    6541    6555    6565    6609    6619    6663    6673    6737    6780    6882    6926    6983
                        7001    7267    7283    7307    7356    7384    7402    7433    7446    7457
ERR10   007306  G       3123#   4964
ERR10$  012732          3647#   4967
ERR10.  012752          3124    3653#
ERR11   007314  G       2735    3132#   4866    4933    5029    5161    5233
ERR12   007456  G       3173#   5458    5465    5476    5633    5640    5654    5972    5979    5994    6127    6134
ERR13   010240  G       3231#   5818
ERR14   011002  G       3306#   5318    5393    5525    5585    5944    6094
ERR3    006220  G       1996    2811    2845    2878#
ERR4    006232  G       2036    2076    2119    2182    2888#
ERR4$   012206          2879    3517#
ERR51   011176  G       3358#   4086    4111    4140    4159    4178    4203    4228    4248    4272    4298    4322    4345
ERR52   011270  G       3392#   4483    4556    4591    4624
ERR60   011720  G       3462#   6167
ERR8    006532  G       2963#   4710    4755    4797
ERR9    007300  G       3114#   4897    5061
ERR9$   012574          3609#   4900    5064
ERR9.   012614          3115    3615#
```

CVDMBA.P11 18-DEC-80 15:53 CROSS REFERENCE TABLE -- USER SYMBOLS

```
EVL    = 000004 G          1426#
EXECUT= 000005             1531#   6969    7256    7345
ESEND  = 002100            1173#
ESLOAD= 000035             1173#   1271
FMT02A  013127             3343    3669    3699#
FMT06   013530             2984    3041    3699#
FMT06A  013542             2974    3699#
FMT07   013476             2968    3313    3699#
FMT09   013621             3618    3656    3699#
FMT09A  013673             3635    3676    3699#
FMT10   013714             3329    3628    3699#
FMT11   013770             2933    2950    3261    3281    3699#
FMT12   007672             3175    3225#
FMT12A  007732             3181    3225#
FMT12D  010020             3198    3225#
FMT12E  010063             3206    3225#
FMT12F  010145             3216    3225#
FMT13A  010546             3233    3300#
FMT13B  010611             3239    3300#
FMT13C  010656             3245    3300#
FMT13D  010721             3251    3300#
FMT13E  010764             3271    3291    3300#
FMT16   014007             2999    3013    3031    3699#
FMT16A  014032             3061    3081    3101    3699#
FMT17   014074             3145    3699#
FMT17A  014153             3153    3699#
FMT17B  014234             3160    3699#
FMT17C  014307             3137    3699#
FMT4    013213             2923    3520    3699#
FMT4A   013253             3534    3576    3699#
FMT4B   013306             2940    3541    3562    3583    3699#
FMT4C   013313             3555    3597    3699#
FMT5    013346             2896    3699#
FMT5A   013411             2913    3699#
FMT50A  014367             3699#
FMT50B  014441             3699#
FMT50C  014522             3699#
FMT50D  014562             3699#
FMT50E  014577             3699#
FMT50M  014614             3699#
FMT51A  014673             3378    3699#
FMT52A  011557             3413    3448#
FMT52B  011607             3430    3448#
FMT52C  011652             3438    3448#
FMT52H  011514             3400    3448#
FMT60   012034             3464    3492#
FMT61   012073             3470    3492#
FMT62   012134             3480    3492#
FRSPAS  002304             1656#   3794*
FRSTIM  002302             1655#   3889*
F$AU   = 000015            1173#   4005    4007
F$AUTO= 000020             1173#   3921    3957
F$BGN  = 000040            1173#   1175    2801    2835    2869    2878    2888    2963    3114    3123    3132    3173    3231
                           3306    3358    3392    3462    3708    3721    3921    3971    3989    4005    4053    4055    4064
                           4073    4078    4098    4103    4113    4131    4149    4161    4169    4190    4195    4215    4220
                           4240    4250    4259    4264    4285    4290    4309    4314    4324    4337    4355    4359    4423
```

```
                    4429  4441  4452  4461  4466  4476  4492  4502  4511  4525  4540  4549  4558
                    4567  4584  4593  4603  4617  4626  4630  4663  4669  4712  4757  4764  4799
                    4833  4840  4846  4907  4913  4974  4977  5001  5007  5072  5092  5096  5103
                    5116  5125  5134  5143  5152  5163  5168  5175  5188  5197  5206  5215  5224
                    5235  5238  5262  5268  5275  5285  5320  5334  5343  5357  5372  5381  5395
                    5409  5419  5430  5439  5448  5467  5478  5488  5493  5527  5548  5564  5573
                    5587  5614  5623  5642  5656  5667  5670  5792  5849  5854  5862  5868  5897
                    5946  5981  5996  6004  6013  6041  6096  6136  6152  6169  6180  6183  6235
                    6241  6262  6274  6322  6344  6356  6404  6426  6438  6486  6508  6520  6568
                    6584  6596  6622  6638  6650  6676  6681  6697  6706  6740  6757  6763  6782
                    6804  6809  6815  6831  6838  6933  6943  6951  7009  7012  7207  7212  7218
                    7232  7239  7290  7311  7315  7322  7410  7465  7468  8018  8072  8088
F$CLEA= 000007       1173#  3971  3979
F$DU  = 000016       1173#  3989  3994
F$END = 000041       1173#  1175  2822  2856  2874  2884  2959  3110  3119  3128  3169  3225  3300
                    3353  3388  3447  3492  3893  3959  3981  3996  4009  4053  4055  4064  4073
                    4078  4098  4103  4113  4131  4149  4161  4169  4190  4195  4215  4220  4240
                    4250  4259  4264  4285  4290  4309  4314  4324  4337  4355  4357  4359  4361
                    4423  4429  4441  4452  4461  4466  4476  4492  4502  4511  4525  4540  4549
                    4558  4567  4584  4593  4603  4617  4626  4630  4632  4663  4669  4712  4757
                    4764  4799  4801  4833  4840  4846  4907  4909  4913  4974  4976  4977  4979
                    5001  5007  5072  5074  5092  5096  5103  5116  5125  5134  5143  5152  5163
                    5165  5168  5175  5188  5197  5206  5215  5224  5235  5237  5238  5240  5262
                    5268  5275  5285  5320  5334  5343  5357  5372  5381  5395  5409  5419  5430
                    5439  5448  5467  5478  5488  5490  5493  5527  5548  5564  5573  5587  5614
                    5623  5642  5656  5667  5669  5670  5672  5825  5849  5854  5862  5868  5897
                    5946  5981  5996  6004  6006  6013  6041  6096  6136  6152  6169  6180  6182
                    6183  6185  6235  6241  6262  6274  6322  6324  6344  6356  6404  6406  6426
                    6438  6486  6488  6508  6520  6568  6570  6584  6596  6622  6624  6638  6650
                    6676  6678  6681  6683  6697  6706  6740  6742  6757  6763  6782  6784  6804
                    6809  6815  6831  6838  6933  6935  6943  6951  7009  7011  7012  7014  7207
                    7212  7218  7232  7239  7290  7311  7313  7315  7322  7410  7465  7467  7468
                    7470  8055  8077  8088
F$HARD= 000004       1173#  8018  8053
F$HW  = 000013       1173#  1323  1349
F$INIT= 000006       1173#  3721  3891
F$JMP = 000050       1173#  5268  5275  5854  5862  6241  6809  6815  7212  7218
F$MOD = 000000       1173#  1175  8088
F$MSG = 000011       1173#  2869  2872  2878  2882  2888  2957  2963  3108  3114  3117  3123  3126
                    3132  3167  3173  3223  3231  3298  3306  3351  3358  3386  3392  3445  3462
                    3490
F$PROT= 000021       1173#  3708  3713
F$PWR = 000017       1173#
F$RPT = 000012       1173#
F$SEG = 000003       1173#
F$SOFT= 000005       1173#  8072  8075
F$SRV = 000010       1173#  2801  2820  2835  2854  5792  5823
F$SUB = 000002       1173#  4056  4355  4847  4907  4914  4974  5097  5163  5169  5235  5286  5488
                    5494  5667  5869  6004  6014  6180  6263  6322  6345  6404  6427  6486  6509
                    6568  6585  6622  6639  6676  6832  6933  6944  7009  7233  7311  7316  7465
F$SW  = 000014       1173#  1358  1362
F$TEST= 000001       1173#  4054  4359  4424  4630  4664  4799  4834  4977  5002  5072  5093  5238
                    5263  5670  5850  6183  6236  6681  6698  6740  6758  6782  6805  7012  7208
                    7468
GDATA   002254       1642#  2030* 2070* 2113* 2176* 2890  2912  2990  3019  3046  3191  3328  3342
                    3506  3627  3668  4687* 4729* 4730* 4737  4770* 4779  4883* 4950* 5046* 5308*
```

```
                        5385* 5399* 5400* 5404  5469  5515* 5577* 5594* 5595* 5600 5603 5647 5928*
                        5934* 5936  5985* 5987  6078* 6084* 6086  6100* 6105  6108 6279* 6289* 6303*
                        6313* 6361* 6371* 6385* 6395* 6443* 6453* 6467* 6477* 6525* 6535* 6549* 6559*
                        6603* 6613* 6657* 6667* 7427* 7440* 7451*
GETBSR  004232          1990  2237# 2805  2839
GETPRM  022230          3748  3798# 3807
GETSR   025022          4463  4632#
GETT2   024134          4075  4100  4166  4192  4217  4237  4261  4287  4311  4334  4390#
GETWSR  004374          2029  2069  2112  2175  2258#
G$CNTO= 000200          1173#
G$DELM= 000372          1173# 6819  7222
G$DISP= 000003          1173#
G$EXCP= 000400          1173#
G$HILI= 000002          1173#
G$LOLI= 000001          1173#
G$NO  = 000000          1173#
G$OFFS= 000400          1173# 8022  8027  8032  8038  8042  8048
G$OFSI= 000376          1173# 8022  8027  8032  8038  8042  8048
G$PRMA= 000001          1173# 8022  8027
G$PRMD= 000002          1173# 8032  8042
G$PRML= 000000          1173# 8038  8048
G$RADA= 000140          1173#
G$RADB= 000000          1173#
G$RADD= 000040          1173#
G$RADL= 000120          1173# 8038  8048
G$RADO= 000020          1173# 8022  8027  8032  8042
G$XFER= 000004          1173#
G$YES = 000010          1173# 8022  8027  8032  8038  8042  8048
HELP  = 000000          1165# 1192  1289  1314  1933
HLTEST= 000015          3854  7208#
HLTST2  035672          7412# 7892
HOE   = 100000 G        1439#
IBE   = 010000 G        1436#
IDU   = 000040 G        1429#
IENBA = 000001          1508# 6298  6380  6462  6544  6588  6642  6849  6903
IENBB = 000020          1509# 6298  6380  6462  6544  6588  6642
IENR  = 120016          1576# 2316  2398  4455  4496  4505
IER   = 020000 G        1437#
IFR   = 120015          1575# 4391  4534  4578  4611  4633
IFRCA1= 000002          1587#
IFRCA2= 000001          1588#
IFRCB1= 000020          1584#
IFRCB2= 000010          1585#
IFRIRQ= 000200          1581#
IFRSR = 000004          1586#
IFRT1 = 000100          1582#
IFRT2 = 000040          1583#
IHILNK  006136          2815  2817  2823# 3878*
IHOLNK  006210          2849  2851  2857# 3886*
INITT1  004456          2295#
INITT2  004630          2376# 4066  4347
INTFLG  002272          1649# 2814* 2848* 6265* 6277  6287  6297* 6301  6311  6347* 6359 6369 6379*
                        6383  6393  6429* 6441  6451  6461* 6465  6475  6511* 6523  6533 6543* 6547
                        6557  6587* 6601  6611  6641* 6655  6665  6848*
INTWCH  002274          1651# 2803  2837  3887* 6264* 6346* 6428* 6510* 6586* 6640* 6679* 6847* 6904*
IRQA  = 000004          1484# 6269  6433  6645  6858
```

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IRQB   = 000002          1485#  6269   6351   6591
IRQREG= 123005           1483#  6268   6350   6432   6514   6590   6644
ISR    = 000100 G        1430#
IXE    = 004000 G        1435#
I$AU   = 000041          1173#  4005#  4009#
I$AUTO= 000041           1173#  3921#  3959#
I$CLN  = 000041          1173#  3971#  3981#
I$DU   = 000041          1173#  3989#  3996#
I$HRD  = 000041          8018#  8055#
I$INIT= 000041           1173#  3721#  3893#
I$MOD  = 000041          1173#  1175#  8088#
I$MSG  = 000041          1173#  2869#  2874#  2878#  2884#  2888#  2959#  2963#  3110#  3114#  3119#  3123#  3128#
                         3132#  3169#  3173#  3225#  3231#  3300#  3306#  3353#  3358#  3388#  3392#  3447#  3462#
                         3492#
I$PROT= 000040           1173#  3708#
I$PTAB= 000041           1173#
I$PWR  = 000041          1173#
I$RPT  = 000041          1173#
I$SEG  = 000041          1173#  4053   4055   4423   4663   4833   4846   4913   5001   5092   5096   5168   5262
                         5285   5493   5849   5868   6013   6235   6262   6344   6426   6508   6584   6638   6697
                         6757   6804   6831   6943   7207   7232   7315
I$SETU= 000041           1173#
I$SFT  = 000041          8072#  8077#
I$SRV  = 000041          1173#  2801#  2822#  2835#  2856#  5792#  5825#
I$SUB  = 000041          1173#  4053   4055#  4078   4103   4113   4161   4169   4195   4220   4240   4250   4264
                         4290   4314   4324   4337   4355#  4357#  4423   4663   4833   4846#  4907#  4909#  4913#
                         4974#  4976#  5001   5092   5096#  5103   5116   5125   5134   5143   5152   5163#  5165#
                         5168#  5175   5188   5197   5206   5215   5224   5235#  5237#  5262   5285#  5320   5334
                         5343   5357   5372   5381   5395   5409   5419   5430   5439   5448   5467   5478   5488#
                         5490#  5493#  5527   5548   5564   5573   5587   5614   5623   5642   5656   5667#  5669#
                         5849   5868#  5897   5946   5981   5996   6004#  6006#  6013#  6041   6096   6136   6169
                         6180#  6182#  6235   6262#  6322#  6324#  6344#  6404#  6406#  6426#  6486#  6488#  6508#
                         6568#  6570#  6584#  6622#  6624#  6638#  6676#  6678#  6697   6757   6804   6831#  6838
                         6933#  6935#  6943#  6951   7009#  7011#  7207   7232#  7311#  7313#  7315#  7410   7465#
                         7467#
I$TST  = 000041          1173#  4053#  4055   4064   4073   4098   4131   4149   4190   4215   4259   4285   4309
                         4359#  4361#  4423#  4429   4441   4452   4461   4466   4476   4492   4502   4511   4525
                         4540   4549   4558   4567   4584   4593   4603   4617   4626   4630#  4632#  4663#  4669
                         4712   4757   4764   4799#  4801#  4833#  4840   4846   4913   4977#  4979#  5001#  5007
                         5072#  5074#  5092#  5096   5168   5238#  5240#  5262#  5268   5275   5285   5493   5670#
                         5672#  5849#  5854   5862   5868   6013   6152   6183#  6185#  6235#  6241   6262   6274
                         6344   6356   6426   6438   6508   6520   6584   6596   6638   6650   6681#  6683#  6697#
                         6706   6740#  6742#  6757#  6763   6782#  6784#  6804#  6809   6815   6831   6943   7012#
                         7014#  7207#  7212   7218   7232   7239   7290   7315   7322   7468#  7470#
J$JMP  = 000167          1173#
LODT2C  024102           4118   4232   4329   4374#
LOE    = 040000 G        1438#
LOGDEV  002266           1647#  3792*  3799*  3801   3951
LOT    = 000010 G        1427#
LSIDCL= 000002           1471#  6856
LSIHLT= 000020           1468#
LU1MOD  002000 G         1175#
L$ACP   002110 G         1278#
L$APT   002036 G         1236#
L$AU    023162 G         1263   4005#
L$AUT   002070 G         1262#
```

```
L$AUTO  023014 G        1279    3921#
L$CCP   002106 G        1276#
L$CLEA  023140 G        1277    3971#
L$CO    002032 G        1232#
L$DEPO  002011 G        1214#
L$DESC  003274 G        1269    1922#
L$DESP  002076 G        1268#
L$DEVP  002060 G        1254#
L$DISP  002124 G        1239    1299#
L$DLY   002116 G        1284#   6821    7224
L$DTP   002040 G        1238#
L$DTYP  002034 G        1234#
L$DU    023156 G        1265    3989#
L$DUT   002072 G        1264#
L$DVTY  003254 G        1255    1910#
L$EF    002052 G        1249#
L$ENVI  002044 G        1242#
L$ERRT  002202 G        1273    1604#
L$ETP   002102 G        1272#
L$EXP1  002046 G        1244#
L$EXP4  002064 G        1258#
L$EXP5  002066 G        1260#
L$HARD  036436 G        1221    8018    8019#
L$HIME  002120 G        1286#   5270
L$HPCP  002016 G        1220#
L$HPTP  002022 G        1224#
L$HW    002160 G        1225    1323    1324#
L$ICP   002104 G        1274#
L$INIT  022020 G        1275    3721#
L$LADP  002026 G        1228#
L$LAST  037154 G        1229    8092#
L$LOAD  002100 G        1270#
L$LUN   002074 G        1266#
L$PREV  002050 G        1246#
L$NAME  002000 G        1203#
L$PRIO  002042 G        1240#
L$PROT  022012 G        1281    3708#
L$PRT   002112 G        1280#
L$REPP  002062 G        1256#
L$REV   002010 G        1212#
L$SOFT  037042 G        8072    8073#
L$SPC   002056 G        1252#
L$SPCP  002020 G        1222#
L$SPTP  002024 G        1226#
L$STA   002030 G        1230#
L$SW    002202 G        1358    1359#
L$TEST  002114 G        1282#
L$TIML  002014 G        1218#
L$UNIT  002012 G        1216#
L10000  002200          1323    1349#
L10001  002202          1358    1362#
L10002  006134          2820#
L10003  006206          2854#
L10004  006216          2872#
L10005  006230          2882#
L10006  006530          2957#
```

```
L10007  007276          3108#
L10010  007304          3117#
L10011  007312          3126#
L10012  007454          3167#
L10013  007670          3223#
L10014  010544          3298#
L10015  011174          3351#
L10016  011266          3386#
L10017  011512          3445#
L10020  012032          3490#
L10022  022554          3891#
L10023  023130          3957#
L10024  023154          3979#
L10025  023160          3994#
L10026  023162          4007#
L10027  024100          4065    4074    4099    4132    4150    4191    4216    4260    4286    4310    4359#
L10030  024076          4079    4104    4114    4162    4170    4196    4221    4241    4251    4265    4291    4315    4325
                        4338    4355#
L10031  025020          4430    4442    4453    4462    4467    4477    4493    4503    4512    4526    4541    4550    4559
                        4568    4585    4594    4604    4618    4627    4630#
L10032  025446          4670    4713    4758    4765    4799#
L10033  026156          4841    4977#
L10034  025720          4907#
L10035  026154          4974#
L10036  026426          5008    5072#
L10037  027034          5238#
L10040  026630          5104    5117    5126    5135    5144    5153    5163#
L10041  027032          5176    5189    5198    5207    5216    5225    5235#
L10042  030556          5269    5276    5670#
L10043  027750          5321    5335    5344    5358    5373    5382    5396    5410    5420    5431    5440    5449    5468
                        5479    5488#
L10044  030554          5528    5549    5565    5574    5588    5615    5624    5643    5657    5667#
L10045  031274          5823#
L10046  032552          5855    5863    6153    6183#
L10047  031774          5898    5947    5982    5997    6004#
L10050  032550          6042    6097    6137    6170    6180#
L10051  034132          6242    6275    6357    6439    6521    6597    6651    6681#
L10052  033044          6322#
L10053  033250          6404#
L10054  033454          6486#
L10055  033660          6568#
L10056  034002          6622#
L10057  034124          6676#
L10060  034226          6707    6740#
L10061  034272          6764    6782#
L10062  035004          6810    6816    7012#
L10063  034610          6839    6933#
L10064  035002          6952    7009#
L10065  036052          7213    7219    7240    7291    7323    7468#
L10066  035402          7311#
L10067  036050          7411    7465#
L10070  036516          8018    8054#
L10071  037042          8072    8076#
MASCLR  003346          1964#   6927    7003    7285    7404    7459
MCLR =  000100          1518#   1966    2020    2030
MC1     036054          7243    7244    7476#
```

```
MC2      036170          7244  7326  7327  7684#
MC2END   036433          7327  8002#
MFEND    032552          6182#
MLWRI    004064          2145  2166#
MOVLTD   004166          2203#  6962  7242  7325
MOVSB    005034          2474#
MOVSW    005004          2443#  4682  7329  7370  7388  7414
MPCSR    002320          1708#  3816
MPIHAN   006066  G       2801#  3873
MPIVEC   002360          1735#  3824* 3874  3973
MPOHAN   006140  G       2835#  3881
MPOVEC   002362          1736#  3826* 3882  3976
MPRIOR   002364          1737#  3833* 3872  3880
MRDY   = 000200          1533#  2027  2066  2109  2173
MREQ   = 000001          1519#  2020  2030
MSTCLR   003514          2020#  4059  4424  4664  4759  4835  5002  5098  5170  5263  5857  6236  6701
                         6758  6773  6833  6946  7234  7317
NEWLIN   013124          3610  3648  3699#
NEWPC    002452          1769#
NEWST    022204          3741  3790#
NPRABT=  000200          1465#  2719  4730  5154  5226
NPRAIH=  000075          1451#  2575  5297  5303  5911  5920
NPRAIL=  000074          1450#  2579  2605  5294  5300  5908  5917
NPRAIX=  000076          1452#  2571  5366  5375  5914  5923
NPRAOH=  000071          1448#  2563  2632  5119  5191  5504  5510  6061  6070
NPRAOL=  000070          1447#  1448  1449  1450  1451  1452  2567  2603  2624  5110  5182  5501  5507
                         6058  6067
NPRAOX=  000072          1449#  2559  2637  5128  5200  5558  5567  6064  6073
NPRBS7=  000200          1453#  5129
NPRBYT=  000010          1469#  1478  2674  2693  2751  2765
NPRCTL=  123004          1464#  2547  2705  2712  4715  4722  5137  5146  5209  5218  5413  5424  5608
                         5617  5953  5956  6114  6117  6710  6766  6857
NPRDL  = 000044          1477#  2706  4854  5108  5180  5604  6111
NPRDLB=  000054          1478#  4921
NPRDRH=  123001          1459#  2551  2697  2756  5337  5433  5599  5959  6104
NPRDRL=  123000          1458#  1459  1464  2555  2689  2746  5328  5442  5602  5962  6107
NPREAD   005134          2546#  4672  4732  4774
NPRGO  = 000100          1466#  4730  6711  6767  6856
NPRIO  = 000040          1467#  1477  1478  2601  2618  2644  2740
NPRLD  = 000004          1476#  5017  5411  5950
NPRMCR   002632          1862#  4683  4770
NPRMOV   005266          2590#  4850  4917  5013
NPROTS=  000004          3778  4834#
NPRTOE=  000006          2736#  4861  4864  4928  4931  5024  5027
NULERR   013076          2870  2880  2955  3106  3165  3221  3296  3348  3383  3443  3488  3687#  4879
                         4946  5042
OLDSP    002454          1770#  6851* 6902  6960* 6987  7269* 7293  7359* 7448  7451  7889
ORA    = 120001          1561#
ORAM   = 120017          1577#
ORB    = 120000          1560#  1561  1562  1563  1564  1565  1566  1567  1568  1569  1571  1572  1573
                         1574  1575  1576  1577
O$APTS=  000000          1173#  1230
O$AU   = 000001          1173#  1191#  1262
O$BGNR=  000000          1173#  1256
O$BGNS=  000000          1173#  1222
O$DU   = 000001          1173#  1191#  1264
```

CVDMBA.P11 18-DEC-80 15:53 CROSS REFERENCE TABLE -- USER SYMBOLS

```
OSERRT= 000001          1173#   1191#   1272
OSGNSW= 000000          1173#   1226
OSPOIN= 000001          1173#   1191#   1288
OSSETU= 000000          1173#   1216    8090
PATB    002456          1776#   4915    4918
PATCH   037042          8078#
PATF    002506          1802#   4848    4851    5011    5014
PCR   = 120014          1574#   3397
PFLAG   002316          1661#   6698    6812    7215
PNT   = 001000 G        1433#
PRI   = 002000 G        1434#
PRIRTY  036575          8033    8056#
PRI00 = 000000 G        1422#
PRI01 = 000040 G        1421#
PRI02 = 000100 G        1420#
PRI03 = 000140 G        1419#
PRI04 = 000200 G        1418#
PRI05 = 000240 G        1417#
PRI06 = 000300 G        1416#
PRI07 = 000340 G        1415#
PSTACK  002270          1648#   3723*
PT.CTL  002370          1739#   3843*   3851    5851    6806    7209
PU24  = 000001          1490#   3851    6806    7209
PU24.M  036711          8039    8056#
READ    003616          2058#   2320    2402    2546    2550    2554    2558    2562    2566    2570    2574    2578    2745
                        2755    3393    3396    4124    4142    4183    4252    4278    4390    4434    4454    4469    4504
                        4533    4542    4560    4577    4596    4610    4632    4721    5145    5217    5299    5302    5327
                        5336    5374    5423    5432    5441    5506    5509    5566    5616    5916    5919    5922    5955
                        5958    5961    6066    6069    6072    6116
READI   003730          2100#   2711
REDLOC= 000001          1527#   2059    2070    2102    2113
REDPAG= 000003          1529#
REGNUM  002300          1654#   2964    3308    3320    3322    3615*   3617    3653*   3655    4704*   4749*   4791*   4888*
                        4955*   5051*   5309*   5312*   5387*   5516*   5519*   5579*   5929*   5932*   5938*   6079*   6082*
                        6088*
REG0    002372          1743#   3280    5793*
REG1    002374          1744#   3279    5794*
REG2    002376          1745#   3278    5795*
REG3    002400          1746#   3277    5796*
REG4    002402          1747#   3290    5797*
REG5    002404          1748#   3289    5798*
REG6    002406          1749#   3288    5799*
REG7    002410          1750#   3287    5800*
RESTRT  022174          3735    3787#
RUN   = 000200          1517#   1966    1976    2020    2030    6917
RXVAL0  032610          3477    6141    6160    6203#
RXVAL1  032612          6204#
RXVAL2  032614          6205#
RXVAL3  032616          6206#
RXVAL4  032620          6207#
RXVAL5  032622          6208#
RXVAL6  032624          6209#
SEL0    002320          1711#   2020*   2258
SEL10   002340          1723#   2262
SEL12   002344          1726#   2263
SEL14   002350          1729#   2264
```

CVDMBA.P11 18-DEC-80 15:53 CROSS REFERENCE TABLE -- USER SYMBOLS

```
SEL16   002354          1732#  2265
SEL2    002324          1714#  2259   6969*  7256*  7345*
SEL4    002330          1717#  2058*  2101*  2143*  2164*  2260   6857*  6968*  7254*  7270*  7300   7343*
SEL6    002334          1720#  2124   2144*  2165*  2261   6856*
SFPTBL  002202 G        1360#
SLT0  = 000020          1545#  1546   1547   1548   1549   1550   1551   1552   1553   1554   1555   1556
SLT2  = 000022          1548#
SLT4  = 000024          1551#
SLT6  = 000026          1554#
SMCODE  035006          6963   6964   7018#
SR    = 120012          1572#  4470   4518   4543   4561   4597
STALL   005132          2537#  4605   4606   4607
STARES  002306          1657#  3754*  3787*  3793*  3848
STARST  022072          3729   3754#
SVCGBL= 000000          1173#  1175   1182#  1203   1212   1214   1216   1218   1220   1222   1224   1226   1228
                        1230   1232   1234   1236   1238   1240   1242   1244   1246   1249   1252   1254   1256
                        1258   1260   1262   1264   1266   1268   1270   1272   1274   1276   1278   1280   1282
                        1284   1286   1299   1324   1325   1359   1360   1604   1910   1922   2801   2835   2869
                        2878   2888   2963   3114   3123   3132   3173   3231   3306   3358   3392   3462   3708
                        3721   3921   3971   3989   4005   5792   8019   8073   8092#  8093
SVCINS= 000001          1173#  1179#  1204   1205   1206   1207   1208   1209   1210   1211   1213   1215   1217
                        1219   1221   1223   1225   1227   1229   1231   1233   1235   1237   1239   1241   1243
                        1245   1247   1248   1250   1251   1253   1255   1257   1259   1261   1263   1265   1267
                        1269   1271   1273   1275   1277   1279   1281   1283   1285   1287   1298   1300   1301
                        1302   1303   1304   1305   1306   1307   1308   1309   1310   1311   1312   1323   1358
                        1911   1914   1923   1930   1993   1994   1995   1996   2033   2034   2035   2036   2073
                        2074   2075   2076   2116   2117   2118   2119   2179   2180   2181   2182   2732   2733
                        2734   2735   2808   2809   2810   2811   2821   2842   2843   2844   2845   2855   2873
                        2883   2894   2895   2896   2897   2898   2899   2900   2910   2911   2912   2913   2914
                        2915   2916   2917   2921   2922   2923   2924   2925   2926   2927   2929   2930   2931
                        2932   2933   2934   2935   2936   2937   2939   2940   2941   2942   2943   2944   2946
                        2947   2948   2949   2950   2951   2952   2953   2954   2958   2966   2967   2968   2969
                        2970   2971   2972   2974   2975   2976   2977   2978   2983   2984   2985   2986   2987
                        2988   2992   2993   2994   2995   2996   2997   2998   2999   3000   3001   3002   3003
                        3006   3007   3008   3009   3010   3011   3012   3013   3014   3015   3016   3017   3024
                        3025   3026   3027   3028   3029   3030   3031   3032   3033   3034   3035   3040   3041
                        3042   3043   3044   3045   3048   3049   3050   3051   3052   3053   3054   3055   3056
                        3057   3058   3059   3060   3061   3062   3063   3064   3065   3068   3069   3070   3071
                        3072   3073   3074   3075   3076   3077   3078   3079   3080   3081   3082   3083   3084
                        3085   3088   3089   3090   3091   3092   3093   3094   3095   3096   3097   3098   3099
                        3100   3101   3102   3103   3104   3105   3109   3118   3127   3136   3137   3138   3139
                        3140   3141   3143   3144   3145   3146   3147   3148   3149   3151   3152   3153   3154
                        3155   3156   3157   3159   3160   3161   3162   3163   3164   3168   3175   3176   3177
                        3178   3179   3181   3182   3183   3184   3185   3189   3190   3191   3192   3193   3194
                        3195   3196   3197   3198   3199   3200   3201   3202   3206   3207   3208   3209   3210
                        3216   3217   3218   3219   3220   3224   3233   3234   3235   3236   3237   3239   3240
                        3241   3242   3243   3245   3246   3247   3248   3249   3251   3252   3253   3254   3255
                        3257   3258   3259   3260   3261   3262   3263   3264   3265   3267   3268   3269   3270
                        3271   3272   3273   3274   3275   3277   3278   3279   3280   3281   3282   3283   3284
                        3285   3287   3288   3289   3290   3291   3292   3293   3294   3295   3299   3311   3312
                        3313   3314   3315   3316   3317   3326   3327   3328   3329   3330   3331   3332   3333
                        3337   3338   3339   3340   3341   3342   3343   3344   3345   3346   3347   3352   3373
                        3374   3375   3376   3377   3378   3379   3380   3381   3382   3387   3400   3401   3402
                        3403   3404   3406   3407   3408   3409   3410   3411   3412   3413   3414   3415   3416
                        3417   3419   3420   3421   3422   3423   3424   3425   3426   3427   3428   3429   3430
                        3431   3432   3433   3434   3438   3439   3440   3441   3442   3446   3464   3465   3466
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3467 3468 3470 3471 3472 3473 3474 3477 3478 3479 3480 3481 3482
3483 3484 3491 3518 3519 3520 3521 3522 3523 3524 3526 3527 3528
3529 3530 3531 3532 3533 3534 3535 3536 3537 3538 3540 3541 3542
3543 3544 3545 3547 3548 3549 3550 3551 3552 3553 3554 3555 3556
3557 3558 3559 3561 3562 3563 3564 3565 3566 3568 3569 3570 3571
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3625 3626 3627 3628 3629 3630 3631 3632 3634 3635 3636 3637 3638
3639 3648 3649 3650 3651 3652 3655 3656 3657 3658 3659 3660 3663
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3678 3679 3680 3688 3689 3690 3691 3692 3726 3727 3729 3732 3733
3735 3738 3739 3741 3744 3745 3747 3760 3761 3762 3763 3764 3765
3768 3769 3778 3779 3780 3781 3782 3783 3801 3802 3803 3805 3854
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3874 3875 3876 3877 3880 3881 3882 3883 3884 3885 3892 3924 3925
3926 3927 3928 3929 3946 3947 3951 3952 3958 3973 3974 3976 3977
3980 3992 3995 4008 4056 4062 4064 4065 4071 4073 4074 4078 4079
4083 4084 4085 4086 4096 4098 4099 4103 4104 4108 4109 4110 4111
4113 4114 4129 4131 4132 4137 4138 4139 4140 4147 4149 4150 4156
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4191 4195 4196 4200 4201 4202 4203 4213 4215 4216 4220 4221 4225
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4260 4264 4265 4269 4270 4271 4272 4283 4285 4286 4290 4291 4295
4296 4297 4298 4307 4309 4310 4314 4315 4319 4320 4321 4322 4324
4325 4337 4338 4342 4343 4344 4345 4352 4356 4360 4395 4427 4429
4430 4439 4441 4442 4450 4452 4453 4459 4461 4462 4466 4467 4474
4476 4477 4480 4481 4482 4483 4490 4492 4493 4500 4502 4503 4509
4511 4512 4523 4525 4526 4538 4540 4541 4547 4549 4550 4553 4554
4555 4556 4558 4559 4565 4567 4568 4582 4584 4585 4588 4589 4590
4591 4593 4594 4601 4603 4604 4615 4617 4618 4621 4622 4623 4624
4626 4627 4631 4637 4667 4669 4670 4675 4707 4708 4709 4710 4712
4713 4719 4726 4735 4752 4753 4754 4755 4757 4758 4762 4764 4765
4777 4794 4795 4796 4797 4800 4838 4840 4841 4847 4858 4894 4895
4896 4897 4908 4914 4925 4961 4962 4963 4964 4975 4978 5005 5007
5008 5021 5058 5059 5060 5061 5073 5097 5101 5103 5104 5114 5116
5117 5123 5125 5126 5132 5134 5135 5141 5143 5144 5150 5152 5153
5158 5159 5160 5161 5164 5169 5173 5175 5176 5186 5188 5189 5195
5197 5198 5204 5206 5207 5213 5215 5216 5222 5224 5225 5230 5231
5232 5233 5236 5239 5266 5268 5269 5275 5276 5286 5315 5316 5317
5318 5320 5321 5332 5334 5335 5341 5343 5344 5355 5357 5358 5370
5372 5373 5379 5381 5382 5390 5391 5392 5393 5395 5396 5407 5409
5410 5417 5419 5420 5428 5430 5431 5437 5439 5440 5446 5448 5449
5455 5456 5457 5458 5462 5463 5464 5465 5467 5468 5473 5474 5475
5476 5478 5479 5489 5494 5522 5523 5524 5525 5527 5528 5546 5548
5549 5562 5564 5565 5571 5573 5574 5582 5583 5584 5585 5587 5588
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5640 5642 5643 5651 5652 5653 5654 5656 5657 5668 5671 5703 5704
5705 5706 5707 5708 5815 5816 5817 5818 5824 5854 5855 5860 5862
5863 5869 5895 5897 5898 5941 5942 5943 5944 5946 5947 5969 5970
5971 5972 5976 5977 5978 5979 5981 5982 5991 5992 5993 5994 5996
5997 6005 6014 6039 6041 6042 6091 6092 6093 6094 6096 6097 6124
6125 6126 6127 6131 6132 6133 6134 6136 6137 6150 6152 6153 6164
6165 6166 6167 6169 6170 6181 6184 6239 6241 6242 6263 6272 6274
6275 6282 6283 6284 6285 6292 6293 6294 6295 6306 6307 6308 6309
6316 6317 6318 6319 6323 6345 6354 6356 6357 6364 6365 6366 6367

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                6374  6375  6376  6377  6388  6389  6390  6391  6398  6399  6400  6401  6405
                6427  6436  6438  6439  6446  6447  6448  6449  6456  6457  6458  6459  6470
                6471  6472  6473  6480  6481  6482  6483  6487  6509  6518  6520  6521  6528
                6529  6530  6531  6538  6539  6540  6541  6552  6553  6554  6555  6562  6563
                6564  6565  6569  6585  6594  6596  6597  6606  6607  6608  6609  6616  6617
                6618  6619  6623  6639  6648  6650  6651  6660  6661  6662  6663  6670  6671
                6672  6673  6677  6682  6704  6706  6707  6727  6734  6735  6736  6737  6741
                6761  6763  6764  6777  6778  6779  6780  6783  6809  6810  6815  6816  6819
                6820  6821  6822  6823  6824  6825  6826  6832  6836  6838  6839  6841  6842
                6843  6844  6845  6846  6879  6880  6881  6882  6906  6907  6909  6910  6923
                6924  6925  6926  6930  6934  6944  6949  6951  6952  6954  6955  6956  6957
                6958  6959  6980  6981  6982  6983  6989  6990  6992  6993  6998  6999  7000
                7001  7006  7010  7013  7212  7213  7218  7219  7222  7223  7224  7225  7226
                7227  7228  7229  7233  7237  7239  7240  7248  7249  7250  7251  7252  7253
                7264  7265  7266  7267  7280  7281  7282  7283  7288  7290  7291  7295  7296
                7298  7299  7304  7305  7306  7307  7312  7316  7320  7322  7323  7335  7336
                7337  7338  7339  7340  7353  7354  7355  7356  7376  7377  7381  7382  7383
                7384  7394  7395  7399  7400  7401  7402  7407  7410  7411  7422  7423  7430
                7431  7432  7433  7443  7444  7445  7446  7454  7455  7456  7457  7462  7466
                7469  8018  8022  8023  8024  8025  8027  8028  8029  8030  8032  8033  8034
                8035  8036  8038  8039  8040  8042  8043  8044  8045  8046  8048  8049  8050
                8053  8072  8075  8089  8090  8091
SVCSUB= 000001   1173#  1181#  4055  4846  4913  5096  5168  5285  5493  5868  6013  6262  6344
                6426  6508  6584  6638  6831  6943  7232  7315
SVCTAG= 000001   1173#  1183#  1349  1362  2820  2854  2872  2882  2957  3108  3117  3126  3167
                3223  3298  3351  3386  3445  3490  3891  3957  3979  3994  4007  4355  4359
                4630  4799  4907  4974  4977  5072  5163  5235  5238  5488  5667  5670  5823
                6004  6180  6183  6322  6404  6486  6568  6622  6676  6681  6740  6782  6933
                7009  7012  7311  7465  7468  8054  8076
SVCTST= 000001   1173#  1180#  4053  4423  4663  4833  5001  5092  5262  5849  6235  6697  6757
                6804  7207
SWPBOT= 121000   1498#
SWPDDC= 121400   1499#
SSLSYM= 010000   1173#  1350#  1363#  2821#  2855#  2873#  2883#  2958#  3109#  3118#  3127#  3168#  3224#
                3299#  3352#  3387#  3446#  3491#  3892#  3958#  3980#  3995#  4008#  4356#  4360#  4631#
                4800#  4908#  4975#  4978#  5073#  5164#  5236#  5239#  5489#  5668#  5671#  5824#  6005#
                6181#  6184#  6323#  6405#  6487#  6569#  6623#  6677#  6682#  6741#  6783#  6934#  7010#
                7013#  7312#  7466#  7469#  8055#  8077#
TDATA  002252   1641#  3435  3634  3675  4432*  4528*  4885*  4902  4952*  4969  5048*  5066
TMPA   002436   1763#  3411  3428  4431*  4471  4513*  4516*  4519  4544  4562  4572  4575  4598
                5280*  5361  5482  5552  5660  5887*  5888*  5889*  5891  6031*  6032*  6033*  6035
                6142*  6143*  6144*  6146
TMPB   002440   1764#  2298*  2299*  2322  2325  2327*  2331  2379*  2380*  2404  2407  2409*  2413
                3360  3395  3409  3426  4436  4443*  4444*  4447  4484*  4487  5886*  5892  6030*
                6036  6141*  6147
TMPC   002442   1765#  3398  3424  5288*  5403  5480*  5482  5495*  5592  5645  5658*  5660
TMPD   002444   1766#  3422  4392  4400  4535  4579  4612  4634  4642
TMPE   002446   1767#  2313*  2317  2395*  2399  3407  3420  4456  4494*  4497  4506  5349*  5351
                5359*  5361  5540*  5542  5550*  5552
TMPF   002450   1768#  3197  5289*  5367  5376  5383  5385  5386  5484*  5496*  5559  5568  5575
                5577  5578  5662*
TMP0   002412   1753#  2721*  2722  3133  3136  3260  3930*  3948  3960*  4859  4926  5022  5105*
                5177*  5802*  7246*  7270  7273*  7300  7360*  7437  7886*
TMP1   002414   1754#  2726*  3144  3213  3259  5108*  5138  5180*  5210  5329  5338  5345  5537*
                5538*  5593  5803*
TMP2   002416   1755#  2727*  3152  3193  3258  5147  5154  5219  5226  5411*  5414  5425  5450
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                5604*  5609   5618   5625   5804*  5950*  5954   5957   5964   6111*  6115   6118   6119
TMP3    002420  1756#  2728*  2729*  3159   3203   3257   5107*  5111   5120   5179*  5183   5192   5345*
                5346*  5352   5399   5529*  5536*  5537   5543   5594   5805*
TMP4    002422  1757#  3270   5807*
TMP5    002424  1758#  3269   5809*
TMP6    002426  1759#  2296*  2336   3268   5730*  5761*
TMP7    002430  1760#  2297*  2341   3267   5811*
TMP8    002432  1761#  2377*  2418   3374   4126   4133   4210   4280   4374*  4378
TMP9    002434  1762#  2378*  2423   3376   4090*  4093   4144   4151   4185   4254   4304   4375*  4381
                5287*  5301   5304   5305   5307   5310   5508   5511   5512   5514   5517   5924   5935
                6074   6085
TXTMLT  021746  2910   3699#
TXTML0  015515  3699#
TXTML1  015521  3699#
TXTML2  015535  3699#
TXTML3  015552  3699#
TXTML4  015574  3699#
TXTML5  015615  3699#
TXTML6  015645  3699#
TXTML7  015657  3699#
TXTNP   015745  2967   3312   3699#
TXTNPT  021770  2966   3311   3699#
TXTNP0  015752  3699#
TXTNP1  015762  3699#
TXTNP2  015772  3699#
TXTNP3  016002  3699#
TXTNP4  016017  3699#
TXTNP5  016034  3699#
TXTNP6  016051  3699#
TXTNP7  016065  3699#
TXTNP8  016101  3699#
TXTNUL  015513  3699#
TXT1    014761  3518   3699#
TXT11A  015437  2983   3699#
TXT11B  015460  3040   3699#
TXT2    015017  3540   3699#
TXT2A   015061  3561   3699#
TXT2B   015120  3582   3699#
TXT3    015162  3519   3699#
TXT4    015212  2921   3699#
TXT4A   015252  2939   3699#
TXT6    015313  2922   3699#
TXT8A   015336  2998   3060   3699#
TXT8B   015353  3012   3080   3699#
TXT8C   015370  3030   3100   3699#
TXT8D   015405  3412   3699#
TXT8E   015422  3429   3699#
T$ARGC= 000001  1204#  1205#  1206#  1207#  1208#  1209#  2894#  2900   2910#  2917   2921#  2927   2929#
                2937   2939#  2944   2946#  2954   2966#  2972   2974#  2978   2983#  2988   2992#  3003
                3006#  3017   3024#  3035   3040#  3045   3048#  3065   3068#  3085   3088#  3105   3136#
                3141   3143#  3149   3151#  3157   3159#  3164   3175#  3179   3181#  3185   3189#  3202
                3206#  3210   3216#  3220   3233#  3237   3239#  3243   3245#  3249   3251#  3255   3257#
                3265   3267#  3275   3277#  3285   3287#  3295   3311#  3317   3326#  3333   3337#  3347
                3373#  3382   3400#  3404   3406#  3417   3419#  3434   3438#  3442   3464#  3468   3470#
                3474   3477#  3484   3518#  3524   3526#  3538   3540#  3545   3547#  3559   3561#  3566
                3568#  3580   3582#  3587   3589#  3601   3610#  3614   3617#  3622   3625#  3632   3634#
```

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                3639    3648#   3652    3655#   3660    3663#   3673    3675#   3680    3688#   3692    3778#   3783
                3854#   3860    3862#   3866
T$CODE= 007130  8022#   8027#   8032#   8038#   8042#   8048#
T$ERRN= 000126  1173#   2809#   2843#   4084#   4109#   4138#   4157#   4176#   4201#   4226#   4246#   4270#   4296#
                4320#   4343#   4481#   4554#   4589#   4622#   4708#   4753#   4795#   4895#   4962#   5059#   5159#
                5231#   5316#   5391#   5456#   5463#   5474#   5523#   5583#   5631#   5638#   5652#   5942#   5970#
                5977#   5992#   6092#   6125#   6132#   6165#   6283#   6293#   6307#   6317#   6365#   6375#   6389#
                6399#   6447#   6457#   6471#   6481#   6529#   6539#   6553#   6563#   6607#   6617#   6661#   6671#
                6735#   6778#   6880#   6924#   6981#   6999#   7265#   7281#   7305#   7354#   7382#   7400#   7431#
                7444#   7455#
T$EXCP= 000000  8022#   8026   8027#   8031    8032#   8037    8042#   8047
T$FLAG= 000040  4064#   4073#   4078#   4098#   4103#   4113#   4131#   4149#   4161#   4169#   4190#   4195#   4215#
                4220#   4240#   4250#   4259#   4264#   4285#   4290#   4309#   4314#   4324#   4337#   4429#   4441#
                4452#   4461#   4466#   4476#   4492#   4502#   4511#   4525#   4540#   4549#   4558#   4567#   4584#
                4593#   4603#   4617#   4626#   4669#   4712#   4757#   4764#   4840#   5007#   5103#   5116#   5125#
                5134#   5143#   5152#   5175#   5188#   5197#   5206#   5215#   5224#   5268#   5275#   5320#   5334#
                5343#   5357#   5372#   5381#   5395#   5409#   5419#   5430#   5439#   5448#   5467#   5478#   5527#
                5548#   5564#   5573#   5587#   5614#   5623#   5642#   5656#   5854#   5862#   5897#   5946#   5981#
                5996#   6041#   6096#   6136#   6152#   6169#   6241#   6274#   6356#   6438#   6520#   6596#   6650#
                6706#   6763#   6809#   6815#   6838#   6951#   7212#   7218#   7239#   7290#   7322#   7410#
T$GMAN= 000000  1173#
T$HILI= 000002  8022#   8025    8027#   8030    8032#   8036    8042#   8046
T$LAST= 000001  1173#   8090#
T$LOLI= 000000  8022#   8024    8027#   8029    8032#   8035    8042#   8045
T$LSYM= 010000  1173#   1350    1363    2821    2855    2873    2883    2958    3109    3118    3127    3168    3224
                3299    3352    3387    3446    3491    3892    3958    3980    3995    4008    4356    4360    4631
                4800    4908    4975    4978    5073    5164    5236    5239    5489    5668    5671    5824    6005
                6181    6184    6323    6405    6487    6569    6623    6677    6682    6741    6783    6934    7010
                7013    7312    7466    7469    8055    8077
T$LTNO= 000015  8093#
T$NEST= 177777  1173#   1175#   1323#   1349#   1358#   1362#   2801#   2820#   2835#   2854#   2869#   2872#   2878#
                2882#   2888#   2957#   2963#   3108#   3114#   3117#   3123#   3126#   3132#   3167#   3173#   3223#
                3231#   3298#   3306#   3351#   3358#   3386#   3392#   3445#   3462#   3490#   3708#   3713#   3721#
                3891#   3921#   3957#   3971#   3979#   3989#   3994#   4005#   4007#   4054#   4056#   4355#   4359#
                4424#   4630#   4664#   4799#   4834#   4847#   4907#   4914#   4974#   4977#   5002#   5072#   5093#
                5097#   5163#   5169#   5235#   5238#   5263#   5286#   5488#   5494#   5667#   5670#   5792#   5823#
                5850#   5869#   6004#   6014#   6180#   6183#   6236#   6263#   6322#   6345#   6404#   6427#   6486#
                6509#   6568#   6585#   6622#   6639#   6676#   6681#   6698#   6740#   6758#   6782#   6805#   6832#
                6933#   6944#   7009#   7012#   7208#   7233#   7311#   7316#   7465#   7468#   8018#   8053#   8072#
                8075#   8088#
T$NS0 = 000000  1175#   8088
T$NS1 = 000005  1323#   1349    1358#   1362    2801#   2820    2835#   2854    2869#   2872    2878#   2882    2888#
                2957    2963#   3108    3114#   3117    3123#   3126    3132#   3167    3173#   3223    3231#   3298
                3306#   3351    3358#   3386    3392#   3445    3462#   3490    3708#   3713    3721#   3891    3921#
                3957    3971#   3979    3989#   3994    4005#   4007    4054#   4359    4424#   4630    4664#   4799
                4834#   4977    5002#   5072    5093#   5238    5263#   5670    5792#   5823    5850#   6183    6236#
                6681    6698#   6740    6758#   6782    6805#   7012    7208#   7468    8018#   8053    8072#   8075
T$NS2 = 000002  4056#   4355    4847#   4907    4914#   4974    5097#   5163    5169#   5235    5286#   5488    5494#
                5667    5869#   6004    6014#   6180    6263#   6322    6345#   6404    6427#   6486    6509#   6568
                6585#   6622    6639#   6676    6832#   6933    6944#   7009    7233#   7311    7316#   7465
T$PTNU= 000000  1173#
T$SAVL= 177777  1173#
T$SEGL= 177777  1173#
T$SUBN= 000002  1173#   4053#   4055#   4423#   4663#   4833#   4846#   4913#   5001#   5092#   5096#   5168#   5262#
                5285#   5493#   5849#   5868#   6013#   6235#   6262#   6344#   6426#   6508#   6584#   6638#   6697#
                6757#   6804#   6831#   6943#   7207#   7232#   7315#
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T$TAGL= 177777
1173#

T$TAGN= 010072
1173# 1323# 1358# 2801# 2835# 2869# 2878# 2888# 2963# 3114# 3123# 3132# 3173#
3231# 3306# 3358# 3392# 3462# 3708# 3721# 3921# 3971# 3989# 4005# 4054# 4056#
4424# 4664# 4834# 4847# 4914# 5002# 5093# 5097# 5169# 5263# 5286# 5494# 5792#
5850# 5869# 6014# 6236# 6263# 6345# 6427# 6509# 6585# 6639# 6698# 6758# 6805#
6832# 6944# 7208# 7233# 7316# 8018# 8072#

T$TEMP= 000000
1300# 1301# 1302# 1303# 1304# 1305# 1306# 1307# 1308# 1309# 1310# 1311# 1312#
1313# 1349# 1362# 2820# 2854# 2872# 2882# 2957# 3108# 3117# 3126# 3167# 3223#
3298# 3351# 3386# 3445# 3490# 3713# 3891# 3957# 3979# 3994# 4007# 4064# 4065
4073# 4074 4078# 4079 4098# 4099 4103# 4104 4113# 4114 4131# 4132 4149#
4150 4161# 4162 4169# 4170 4190# 4191 4195# 4196 4215# 4216 4220# 4221
4240# 4241 4250# 4251 4259# 4260 4264# 4265 4285# 4286 4290# 4291 4309#
4310 4314# 4315 4324# 4325 4337# 4338 4355# 4359# 4429# 4430 4441# 4442
4452# 4453 4461# 4462 4466# 4467 4476# 4477 4492# 4493 4502# 4503 4511#
4512 4525# 4526 4540# 4541 4549# 4550 4558# 4559 4567# 4568 4584# 4585
4593# 4594 4603# 4604 4617# 4618 4626# 4627 4630# 4669# 4670 4712# 4713
4757# 4758 4764# 4765 4799# 4840# 4841 4907# 4974# 4977# 5007# 5008 5072#
5103# 5104 5116# 5117 5125# 5126 5134# 5135 5143# 5144 5152# 5153 5163#
5175# 5176 5188# 5189 5197# 5198 5206# 5207 5215# 5216 5224# 5225 5235#
5238# 5268# 5269 5275# 5276 5320# 5321 5334# 5335 5343# 5344 5357# 5358
5372# 5373 5381# 5382 5395# 5396 5409# 5410 5419# 5420 5430# 5431 5439#
5440 5448# 5449 5467# 5468 5478# 5479 5488# 5527# 5528 5548# 5549 5564#
5565 5573# 5574 5587# 5588 5614# 5615 5623# 5624 5642# 5643 5656# 5657
5667# 5670# 5823# 5854# 5855 5862# 5863 5897# 5898 5946# 5947 5981# 5982
5996# 5997 6004# 6041# 6042 6096# 6097 6136# 6137 6152# 6153 6169# 6170
6180# 6183# 6241# 6242 6274# 6275 6322# 6356# 6357 6404# 6438# 6439 6486#
6520# 6521 6568# 6596# 6597 6622# 6650# 6651 6676# 6681# 6706# 6707 6740#
6763# 6764 6782# 6809# 6810 6815# 6816 6838# 6839 6933# 6951# 6952 7009#
7012# 7212# 7213 7218# 7219 7239# 7240 7290# 7291 7311# 7322# 7323 7410#
7411 7465# 7468# 8022# 8027# 8032# 8038# 8042# 8048# 8053# 8075# 8088#

T$TEST= 000015
1173# 4053# 4055 4423# 4663# 4833# 4846 4913 5001# 5092# 5096 5168 5262#
5285 5493 5849# 5868 6013 6235# 6262 6344 6426 6508 6584 6638 6697#
6757# 6804# 6831 6943 7207# 7232 7315 8093

T$TSTM= 177777
1173# 2808 2842 2873 2883 2899 2916 2926 2936 2943 2953 2958 2971
2977 2987 3002 3016 3034 3044 3064 3084 3104 3109 3118 3127 3140
3148 3156 3163 3168 3178 3184 3201 3209 3219 3224 3236 3242 3248
3254 3264 3274 3284 3294 3299 3316 3332 3346 3352 3381 3387 3403
3416 3433 3441 3446 3467 3473 3483 3491 3523 3537 3544 3558 3565
3579 3586 3600 3613 3621 3631 3638 3651 3659 3672 3679 3691 3727
3733 3739 3745 3764 3769 3782 3802 3859 3865 3876 3884 3892 3928
3947 3952 3958 3974 3977 3980 3992 3995 4008 4056 4062 4064 4071
4073 4078 4083 4096 4098 4103 4108 4113 4129 4131 4137 4147 4149
4156 4161 4169 4175 4188 4190 4195 4200 4213 4215 4220 4225 4240
4245 4250 4257 4259 4264 4269 4283 4285 4290 4295 4307 4309 4314
4319 4324 4337 4342 4352 4356 4360 4395 4427 4429 4439 4441 4450
4452 4459 4461 4466 4474 4476 4480 4490 4492 4500 4502 4509 4511
4523 4525 4538 4540 4547 4549 4553 4558 4565 4567 4582 4584 4588
4593 4601 4603 4615 4617 4621 4626 4631 4637 4667 4669 4675 4707
4712 4719 4726 4735 4752 4757 4762 4764 4777 4794 4800 4838 4840
4847 4858 4894 4908 4914 4925 4961 4975 4978 5005 5007 5021 5058
5073 5097 5101 5103 5114 5116 5123 5125 5132 5134 5141 5143 5150
5152 5158 5164 5169 5173 5175 5186 5188 5195 5197 5204 5206 5213
5215 5222 5224 5230 5236 5239 5266 5268 5275 5286 5315 5320 5332
5334 5341 5343 5355 5357 5370 5372 5379 5381 5390 5395 5407 5409
5417 5419 5428 5430 5437 5439 5446 5448 5455 5462 5467 5473 5478
5489 5494 5522 5527 5546 5548 5562 5564 5571 5573 5582 5587 5612

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                    5862  5869  5895  5897  5941  5946  5969  5976  5981  5991  5996  6005  6014
                    6039  6041  6091  6096  6124  6131  6136  6150  6152  6164  6169  6181  6184
                    6239  6241  6263  6272  6274  6282  6292  6306  6316  6323  6345  6354  6356
                    6364  6374  6388  6398  6405  6427  6436  6438  6446  6456  6470  6480  6487
                    6509  6518  6520  6528  6538  6552  6562  6569  6585  6594  6596  6606  6616
                    6623  6639  6648  6650  6660  6670  6677  6682  6704  6706  6727  6734  6741
                    6761  6763  6777  6783  6809  6815  6832  6836  6838  6845  6879  6907  6910
                    6923  6930  6934  6944  6949  6951  6958  6980  6990  6993  6998  7006  7010
                    7013  7212  7218  7233  7237  7239  7252  7264  7280  7288  7290  7296  7299
                    7304  7312  7316  7320  7322  7339  7353  7377  7381  7395  7399  7407  7410
                    7423  7430  7443  7454  7462  7466  7469
T$TSTS= 000001      1173#  4054#  4424#  4664#  4934#  5002#  5093#  5263#  5850#  6236#  6698#  6758#  6805#
                    7208#
T$$AU = 010026      4005#  4007
T$$AUT= 010023      3921#  3957
T$$CLE= 010024      3971#  3979
T$$DU = 010025      3989#  3994
T$$HAR= 010070      8018#  8054
T$$HW = 010000      1323#  1349
T$$INI= 010022      3721#  3891
T$$MSG= 010020      2869#  2872  2878#  2882  2888#  2957  2963#  3108  3114#  3117  3123#  3126  3132#
                    3167  3173#  3223  3231#  3298  3306#  3351  3358#  3386  3392#  3445  3462#  3490
T$$PRO= 010021      3708#
T$$SOF= 010071      8072#  8076
T$$SRV= 010045      2801#  2820  2835#  2854  5792#  5823
T$$SUB= 010067      4056#  4078  4103  4113  4161  4169  4195  4220  4240  4250  4264  4290  4314
                    4324  4337  4355  4847#  4907  4914#  4974  5097#  5103  5116  5125  5134  5143
                    5152  5163  5169#  5175  5188  5197  5206  5215  5224  5235  5286#  5320  5334
                    5343  5357  5372  5381  5395  5409  5419  5430  5439  5448  5467  5478  5488
                    5494#  5527  5548  5564  5573  5587  5614  5623  5642  5656  5667  5869#  5897
                    5946  5981  5996  6004  6014#  6041  6096  6136  6169  6180  6263#  6322  6345#
                    6404  6427#  6486  6509#  6568  6585#  6622  6639#  6676  6832#  6838  6933  6944#
                    6951  7009  7233#  7311  7316#  7410  7465
T$$SW = 010001      1358#  1362
T$$TES= 010065      4054#  4064  4073  4098  4131  4149  4190  4215  4259  4285  4309  4359  4424#
                    4429  4441  4452  4461  4466  4476  4492  4502  4511  4525  4540  4549  4558
                    4567  4584  4593  4603  4617  4626  4630  4664#  4669  4712  4757  4764  4799
                    4834#  4840  4977  5002#  5007  5072  5093#  5238  5263#  5268  5275  5670  5850#
                    5854  5862  6152  6183  6236#  6241  6274  6356  6438  6520  6596  6650  6681
                    6698#  6706  6740  6758#  6763  6782  6805#  6809  6815  7012  7208#  7212  7218
                    7239  7290  7322  7468
T.EDF = 000001      1591#  1993  2033  2073  2116  2179  2732  5815
T.EHRD= 000002      1591#  4863  4930  5026
T.ESF = 000000      1591#
T.ESFT= 000003      1591#
T1      023164 G    1300  4053#
T1CH  = 120005      1565#
T1CL  = 120004      1564#
T1LH  = 120007      1568#  2340
T1LHGO= 120005      1566#
T1LL  = 120006      1567#  2335
T1.1    023164      4055#
T10     034134 G    1309  6697#
T11     034230 G    1310  6757#
T12     034274 G    1311  6804#
```

CVDMBA.P11 18-DEC-80 15:53 CROSS REFERENCE TABLE -- USER SYMBOLS

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T12.1    034354          6831#
T12.2    034612          6943#
T13      035046 G        1312    7207#
T13.1    035126          7232#
T13.2    035404          7315#
T2       024174 G        1301    4423#
T2CH   = 120011          1571#   2422    4092    4143    4184    4253    4303    4380
T2CL   = 120010          1570#   4125    4279
T2LL   = 120010          1569#   1570    2417    4209    4377
T3       025062 G        1302    4663#
T4       025450 G        1303    4833#
T4.1     025464          4846#
T4.2     025722          4913#
T5       026160 G        1304    5001#
T6       026430 G        1305    5092#
T6.1     026430          5096#
T6.2     026632          5168#
T7       027036 G        1306    5262#
T7.1     027074          5285#
T7.2     027752          5493#
T8       031276 G        1307    5849#
T8LP     032006          6019#   6178
T8.1     031326          5868#
T8.2     031776          6013#
T9       032626 G        1308    6235#
T9.1     032642          6262#
T9.2     033046          6344#
T9.3     033252          6426#
T9.4     033456          6508#
T9.5     033662          6584#
T9.6     034004          6638#
UAM    = 000200 G        1431#
VECTOR   036544          8028    8056#
WA     = 003100          1889#   1890
WB     = 003102          1890#   1891
WC     = 003104          1891#   1892
WD     = 003106          1892#   1893
WE     = 003110          1893#   1894
WF     = 003112          1894#
WRILOC= 000002           1528#   2166    2176    6858
WRIPAG= 000004           1530#
WRITE    004042          2143#   2210    2315    2329    2334    2339    2397    2411    2416    2421    4091    4208    4302
                         4376    4379    4445    4485    4495    4517    5109    5118    5136    5181    5190    5208    5365
                         5412    5557    5598    5601    5607    5952    6103    6106    6113
WRITEI   004054          2163#   2623    2631    2636    2688    2696    2704    4714    5127    5199    5293    5296    5500
                         5503    5907    5910    5913    6057    6060    6063    6267    6349    6431    6513    6589    6643
                         6709    6765
WSR0     002212          1613#   2258*   2932
WSR10    002222          1621#   2262*   2949
WSR12    002224          1623#   2263*   2948
WSR14    002226          1625#   2264*   2947
WSR16    002230          1627#   2265*   2946
WSR2     002214          1615#   2259*   2931
WSR4     002216          1617#   2260*   2930
WSR6     002220          1619#   2261*   2929
WO     = 003054          1879#   1880    3021    3029
```

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W1      = 003056            1880#  1881   3027
W2      = 003060            1881#  1882   3025
W3      = 003062            1882#  1883   3086
W4      = 003064            1883#  1884
W5      = 003066            1884#  1885
W6      = 003070            1885#  1886
W7      = 003072            1886#  1887
W8      = 003074            1887#  1888
W9      = 003076            1888#  1889
XDATA   002260              1644#  3189   3326   3338   3507*  3508*  3625   3664
XLOC0   032554              3479   5874   5887   5906   5985   6031   6056   6142   6187#
XLOC1   032556              6188#
XLOC2   032560              6189#
XLOC3   032562              6190#
XLOC4   032564              6191#
XLOC5   032566              6192#
XLOC6   032570              6193#
XMFG.M  036773              8049   8056#
XMINIT  030560              5290   5497   5679#  5870   6015
XMINTH  031124 G            5704   5792#
XMREAD  030776              5644   5756#  6145
XMWRIT  030700              5350   5402   5541   5591   5725#  5890   6034
XM4HOL  031122              5682*  5733*  5738   5764*  5769   5780   5785#
XM4INT  031074              5734   5765   5779#
XORGB   012162              3187   3318   3505#  3623   3661
XORSW   005064              2505#  3018
XVAL0   032572              3478   5874*  5886   6020*  6030   6051*  6160   6195#
XVAL1   032574              6196#
XVAL2   032576              6197#
XVAL3   032600              6198#
XVAL4   032602              6199#
XVAL5   032604              6200#
XVAL6   032606              6201#
XSALWA= 000000              1173#
XSFALS= 000040              1173#
XSOFFS= 000400              1173#
XSTRUE= 000020              1173#
$E      = 000126            1591#  1992#  2032#  2072#  2115#  2178#  2731#  2736   2807#  2841#  4082#  4107#  4136#
                            4155#  4174#  4199#  4224#  4244#  4268#  4294#  4318#  4341#  4479#  4552#  4587#  4620#
                            4706#  4751#  4793#  4893#  4960#  5057#  5157#  5229#  5314#  5389#  5454#  5461#  5472#
                            5521#  5581#  5629#  5636#  5650#  5814#  5940#  5968#  5975#  5990#  6090#  6123#  6130#
                            6163#  6281#  6291#  6305#  6315#  6363#  6373#  6387#  6397#  6445#  6455#  6469#  6479#
                            6527#  6537#  6551#  6561#  6605#  6615#  6659#  6669#  6733#  6776#  6878#  6922#  6979#
                            6997#  7263#  7279#  7303#  7352#  7380#  7398#  7429#  7442#  7453#
$LSTIN= 000001              1177#
$LSTTA= 000001              1178#
$MPCSR= 160000 G            1706#  1711   1712   1714   1715   1717   1718   1720   1721   1723   1724   1726   1727
                            1729   1730   1732   1733
$T      = 000015            1591#  4009#  4407#  4649#  4801#  4834   4979#  5074#  5240#  5826#  6210#  6683#  6742#
                            6784#  6805   7038#  7208
.       = 037154            1169#  1776   1801#  1802   1873#  1914#  1930#  2004#  3226#  3301#  3449#  3493#  3903#
                            4065   4069   4074   4076   4079   4094   4099   4101   4104   4114   4127   4132   4145
                            4150   4162   4167   4170   4186   4191   4193   4196   4211   4216   4218   4221   4238
                            4241   4251   4255   4260   4262   4265   4281   4286   4288   4291   4305   4310   4312
                            4315   4325   4335   4338   4350   4430   4437   4442   4448   4453   4457   4462   4464
                            4467   4472   4477   4488   4493   4498   4503   4507   4512   4521   4526   4530   4536
```

```
4541    4545    4550    4559    4563    4568    4580    4585    4594    4599    4604    4613    4618
4627    4670    4713    4758    4765    4841    5008    5099    5104    5112    5117    5121    5126
5130    5135    5139    5144    5148    5153    5171    5176    5184    5189    5193    5198    5202
5207    5211    5216    5220    5225    5269    5276    5321    5330    5335    5339    5344    5353
5358    5368    5373    5377    5382    5396    5405    5410    5415    5420    5426    5431    5435
5440    5444    5449    5468    5479    5528    5544    5549    5560    5565    5569    5574    5588
5610    5615    5619    5624    5643    5657    5852    5855    5863    5893    5898    5947    5982
5997    6037    6042    6097    6137    6148    6153    6170    6242    6275    6300    6357    6382
6439    6464    6521    6546    6597    6600    6651    6654    6707    6729    6764    6810    6816
6824    6826    6839    6952    6974    7213    7219    7227    7229    7240    7291    7323    7411
7880    8003#   8057#   8079#
```

```
BCOMPL      1#  1173#  3728  3734  3740  3746  3804
BERROR      1#  1173#
BGNAU       1#  1173#  4004
BGNAUT      1#  1173#  3920
BGNCLN      1#  1173#  3970
BGNDU       1#  1173#  3988
BGNHRD      1#  1173#  8017
BGNHW       1#  1173#  1322
BGNINI      1#  1173#  3720
BGNMOD      1#  1173#  1174
BGNMSG      1#  1173#  2868  2877  2887  2962  3113  3122  3131  3172  3230  3305  3357  3391  3461
BGNPRO      1#  1173#  3707
BGNPTA      1#  1173#
BGNRPT      1#  1173#
BGNSEG      1#  1173#
BGNSET      1#  1173#
BGNSFT      1#  1173#  8071
BGNSRV      1#  1173#  2800  2834  5791
BGNSUB      1#  1173#  4054  4845  4912  5095  5167  5284  5492  5867  6012  6261  6343  6425  6507
          6583  6637  6830  6942  7231  7314
BGNSW       1#  1173#  1357
BGNTST      1#  1173#  4053  4423  4663  4833  5001  5092  5262  5849  6235  6697  6757  6804  7207
BNCOMP      1#  1173#
BNERRO      1#  1173#
BREAK       1#  1173#
BRESET      1#  1173#  3991  6726
CKLOOP      1#  1173#
CLOCK       1#  1173#
CLOSE       1#  1173#
CLRVEC      1#  1173#  3767  3945  3972  3975  6905  6988  7294
COMMEN      1#  1173#
DELAY       1#  1173#  6818  7221
DESCRI      1#  1173#  1921
DEVTYP      1#  1173#  1909
DISPAT      1#  1173#  1297
DISPLA      1#  1173#
DOCLN       1#  1173#
DODU        1#  1173#  3950
DORPT       1#  1173#
ENDAU       1#  1173#  4006
ENDAUT      1#  1173#  3956
ENDCLN      1#  1173#  3978
ENDCOM      1#  1173#
ENDDU       1#  1173#  3993
ENDHRD      1#  1173#  8052
ENDHW       1#  1173#  1348
ENDINI      1#  1173#  3890
ENDMOD      1#  1173#  8087
ENDMSG      1#  1173#  2871  2881  2956  3107  3116  3125  3166  3222  3297  3350  3385  3444  3489
ENDPRO      1#  1173#  3712
ENDPTA      1#  1173#
ENDRPT      1#  1173#
ENDSEG      1#  1173#
ENDSET      1#  1173#
ENDSFT      1#  1173#  8074
ENDSRV      1#  1173#  2819  2853  5822
```

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ENDSUB      1#  1173#  4354  4906  4973  5162  5234  5487  5666  6003  6179  6321  6403  6485  6567
         6621   6675   6932  7008  7310  7464
ENDSW       1#  1173#  1361
ENDTST      1#  1173#  4358  4629  4798  4976  5071  5237  5669  6182  6680  6739  6781  7011  7467
EQUALS      1#  1173#  1371
ERRDF       1#  1173#  2808  2842  4083  4108  4137  4156  4175  4200  4225  4245  4269  4295  4319
         4342   4480   4553  4588  4621  4707  4752  4794  4894  4961  5058  5158  5230  5315  5390
         5455   5462   5473  5522  5582  5630  5637  5651  5941  5969  5976  5991  6091  6124  6131
         6164   6282   6292  6306  6316  6364  6374  6388  6398  6446  6456  6470  6480  6528  6538
         6552   6562   6606  6616  6660  6670  6734  6777  6879  6923  6980  6998  7264  7280  7304
         7353   7381   7399  7430  7443  7454
ERRHRD      1#  1173#
ERROR       1#  1173#  4061  4070  4095  4128  4146  4187  4212  4256  4282  4306  4351  4394  4426
         4438   4449   4458  4473  4489  4499  4508  4522  4537  4546  4564  4581  4600  4614  4636
         4666   4674   4718  4725  4734  4761  4776  4837  4857  4924  5004  5020  5100  5113  5122
         5131   5140   5149  5172  5185  5194  5203  5212  5221  5265  5331  5340  5354  5369  5378
         5406   5416   5427  5436  5445  5545  5561  5570  5611  5620  5859  5894  6038  6149  6238
         6271   6353   6435  6517  6593  6647  6703  6760  6835  6929  6948  7005  7236  7287  7319
         7406   7461
ERRSF       1#  1173#
ERRSOF      1#  1173#
ERRTBL      1#  1173#  1603
ESCAPE      1#  1173#  4063  4072  4077  4097  4102  4112  4130  4148  4160  4168  4189  4194  4214
         4219   4239   4249  4258  4263  4284  4289  4308  4313  4323  4336  4428  4440  4451  4460
         4465   4475   4491  4501  4510  4524  4539  4548  4557  4566  4583  4592  4602  4616  4625
         4668   4711   4756  4763  4839  5006  5102  5115  5124  5133  5142  5151  5174  5187  5196
         5205   5214   5223  5319  5333  5342  5356  5371  5380  5394  5408  5418  5429  5438  5447
         5466   5477   5526  5547  5563  5572  5586  5613  5622  5641  5655  5896  5945  5980  5995
         6040   6095   6135  6151  6168  6273  6355  6437  6519  6595  6649  6705  6762  6837  6950
         7238   7289   7321  7409
EXIT        1#  1173#  5267  5274  5853  5861  6240  6808  6814  7211  7217
FEQUAL      1#  1173#
GEDF     1591#  2806   2840  4081  4106  4135  4154  4173  4198  4223  4243  4267  4293  4317  4340
         4478   4551   4586  4619  4705  4750  4792  4892  4959  5056  5156  5228  5313  5388  5453
         5460   5471   5520  5580  5628  5635  5649  5939  5967  5974  5989  6089  6122  6129  6162
         6280   6290   6304  6314  6362  6372  6386  6396  6444  6454  6468  6478  6526  6536  6550
         6560   6604   6614  6658  6668  6732  6775  6877  6921  6978  6996  7262  7278  7302  7351
         7379   7397   7428  7441  7452
GEHRD    1591#
GESF     1591#
GESFT    1591#
GETBYT      1#  1173#
GETPRI      1#  1173#
GETWOR      1#  1173#
GMANIA      1#  1173#
GMANID      1#  1173#
GMANIL      1#  1173#
GPHARD      1#  1173#  3800
GPRMA       1#  1173#  8021  8026
GPRMD       1#  1173#  8031  8041
GPRML       1#  1173#  8037  8047
GTDF     1591#  1991   2031  2071  2114  2177  2730  5813
GTHRD    1591#
GTSF     1591#
GTSFT    1591#
HEADER      1#  1173#  1202
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CVDMBA.P11 18-DEC-80 15:53 CROSS REFERENCE TABLE -- MACRO NAMES

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INLOOP      1#  1173#
IOSETU      1#  1173#
IOSTAR      1#  1173#
KT11        1#  1173#
LASTAD      1#  1173#  8088
MANUAL      1#  1173#
MEMORY      1#  1173#
MSG      4009#  4015   4407#  4413   4649#  4655   4801#  4807   4979#  4985   5074#  5080   5240#  5246   5826#
         5832   6210#  6216   6683#  6689   6742#  6748   6784#  6790   7038#  7044
MSBYTE      1#  1173#  1203#  1209   1210   1211
MSCHEC      1#  1173#  5268#  5275#  5854#  5862#  6241#  6809#  6815#  7212#  7218#
MSCNTO      1#  1173#  8022#  8027#  8032#  8038#  8042#  8048#
MSCOUN      1#  1173#  2894#  2910#  2921#  2929#  2939#  2946#  2966#  2974#  2983#  2992#  3006#  3024#  3040#
         3048#  3068#  3088#  3136#  3143#  3151#  3159#  3175#  3181#  3189#  3206#  3216#  3233#  3239#  3245#
         3251#  3257#  3267#  3277#  3287#  3311#  3326#  3337#  3373#  3400#  3406#  3419#  3438#  3464#  3470#
         3477#  3518#  3526#  3540#  3547#  3561#  3568#  3582#  3589#  3610#  3617#  3625#  3634#  3648#  3655#
         3663#  3675#  3688#  3778#  3854#  3862#
MSDATA      1#  1173#  1203#  1212   1214   1216   1218   1220   1222   1224   1226   1228   1230   1232   1234
         1236   1238   1240   1242#  1244   1246   1249   1252   1254   1256   1258   1260   1262   1264   1266
         1268   1270   1272   1274   1276   1278   1280   1282   1284   1286   1910#  1922#
MSDECR      1#  1173#  1349#  1362#  2820#  2854#  2872#  2882#  2957#  3108#  3117#  3126#  3167#  3223#  3298#
         3351#  3386#  3445#  3490#  3713#  3891#  3957#  3979#  3994#  4007#  4355#  4359#  4630#  4799#  4907#
         4974#  4977#  5072#  5163#  5235#  5238#  5488#  5667#  5670#  5823#  6004#  6180#  6183#  6322#  6404#
         6486#  6568#  6622#  6676#  6681#  6740#  6782#  6933#  7009#  7012#  7311#  7465#  7468#  8053#  8075#
         8088#
MSDEFA      1#  1173#  8022#  8027#  8032#  8038#  8042#  8048#
MSENDE      1#  1173#  1349#  1362#  2820#  2854#  2872#  2882#  2957#  3108#  3117#  3126#  3167#  3223#  3298#
         3351#  3386#  3445#  3490#  3891#  3957#  3979#  3994#  4007#  4355#  4359#  4630#  4799#  4907#  4974#
         4977#  5072#  5163#  5235#  5238#  5488#  5667#  5670#  5823#  6004#  6180#  6183#  6322#  6404#  6486#
         6568#  6622#  6676#  6681#  6740#  6782#  6933#  7009#  7012#  7311#  7465#  7468#  8053#  8075#  8088#
MSERRI      1#  1173#  2808#  2842#  4083#  4108#  4137#  4156#  4175#  4200#  4225#  4245#  4269#  4295#  4319#
         4342#  4480#  4553#  4588#  4621#  4707#  4752#  4794#  4894#  4961#  5058#  5158#  5230#  5315#  5390#
         5455#  5462#  5473#  5522#  5582#  5630#  5637#  5651#  5941#  5969#  5976#  5991#  6091#  6124#  6131#
         6164#  6282#  6292#  6306#  6316#  6364#  6374#  6388#  6398#  6446#  6456#  6470#  6480#  6528#  6538#
         6552#  6562#  6606#  6616#  6660#  6670#  6734#  6777#  6879#  6923#  6980#  6998#  7264#  7280#  7304#
         7353#  7381#  7399#  7430#  7443#  7454#
MSESCA      1#  1173#  4064#  4065   4073#  4074   4078#  4079   4098#  4099   4103#  4104   4113#  4114   4131#
         4132   4149#  4150   4161#  4162   4169#  4170   4190#  4191   4195#  4196   4215#  4216   4220#  4221
         4240#  4241   4250#  4251   4259#  4260   4264#  4265   4285#  4286   4290#  4291   4309#  4310   4314#
         4315   4324#  4325   4337#  4338   4429#  4430   4441#  4442   4452#  4453   4461#  4462   4466#  4467
         4476#  4477   4492#  4493   4502#  4503   4511#  4512   4525#  4526   4540#  4541   4549#  4550   4558#
         4559   4567#  4568   4584#  4585   4593#  4594   4603#  4604   4617#  4618   4626#  4627   4669#  4670
         4712#  4713   4757#  4758   4764#  4765   4840#  4841   5007#  5008   5103#  5104   5116#  5117   5125#
         5126   5134#  5135   5143#  5144   5152#  5153   5175#  5176   5188#  5189   5197#  5198   5206#  5207
         5215#  5216   5224#  5225   5320#  5321   5334#  5335   5343#  5344   5357#  5358   5372#  5373   5381#
         5382   5395#  5396   5409#  5410   5419#  5420   5430#  5431   5439#  5440   5448#  5449   5467#  5468
         5478#  5479   5527#  5528   5548#  5549   5564#  5565   5573#  5574   5587#  5588   5614#  5615   5623#
         5624   5642#  5643   5656#  5657   5897#  5898   5946#  5947   5981#  5982   5996#  5997   6041#  6042
         6096#  6097   6136#  6137   6152#  6153   6169#  6170   6274#  6275   6356#  6357   6438#  6439   6520#
         6521   6596#  6597   6650#  6651   6706#  6707   6763#  6764   6838#  6839   6951#  6952   7239#  7240
         7290#  7291   7322#  7323   7410#  7411
MSESCS      1#  1173#  4064#  4073#  4078#  4098#  4103#  4113#  4131#  4149#  4161#  4169#  4190#  4195#  4215#
         4220#  4240#  4250#  4259#  4264#  4285#  4290#  4309#  4314#  4324#  4337#  4429#  4441#  4452#  4461#
         4466#  4476#  4492#  4502#  4511#  4525#  4540#  4549#  4558#  4567#  4584#  4593#  4603#  4617#  4626#
         4669#  4712#  4757#  4764#  4840#  5007#  5103#  5116#  5125#  5134#  5143#  5152#  5175#  5188#  5197#
         5206#  5215#  5224#  5320#  5334#  5343#  5357#  5372#  5381#  5395#  5409#  5419#  5430#  5439#  5448#
```

CVDMBA.P11 18-DEC-80 15:53 CROSS REFERENCE TABLE -- MACRO NAMES

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                5467#  5478#  5527#  5548#  5564#  5573#  5587#  5614#  5623#  5642#  5656#  5897#  5946#  5981#  5996#
                6041#  6096#  6136#  6152#  6169#  6274#  6356#  6438#  6520#  6596#  6650#  6706#  6763#  6838#  6951#
                7239#  7290#  7322#  7410#
M$EXCP             1#  1173#  8022#  8027#  8032#  8042#
M$EXIT             1#  1173#  5268#  5269   5275#  5276   5854#  5855   5862#  5863   6241#  6242   6809#  6810   6815#
                6816   7212#  7213   7218#  7219
M$EXSE             1#  1173#  5268#  5275#  5854#  5862#  6241#  6809#  6815#  7212#  7218#
M$EXTJ             1#  1173#  5268#  5275#  5854#  5862#  6241#  6809#  6815#  7212#  7218#
M$GEN              1#  1173#  1175#  1203#  1212#  1214#  1216#  1218#  1220#  1222#  1224#  1226#  1228#  1230#  1232#
                1234#  1236#  1238#  1240#  1242#  1244#  1246#  1249#  1252#  1254#  1256#  1258#  1260#  1262#  1264#
                1266#  1268#  1270#  1272#  1274#  1276#  1278#  1280#  1282#  1284#  1286#  1299#  1324#  1325#  1349#
                1359#  1360#  1362#  1604#  1910#  1922#  2801#  2820#  2835#  2854#  2869#  2872#  2878#  2882#  2888#
                2957#  2963#  3108#  3114#  3117#  3123#  3126#  3132#  3167#  3173#  3223#  3231#  3298#  3306#  3351#
                3358#  3386#  3392#  3445#  3462#  3490#  3708#  3721#  3891#  3921#  3957#  3971#  3979#  3989#  3994#
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CVDMBA.P11 18-DEC-80 15:53 CROSS REFERENCE TABLE -- MACRO NAMES

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	5614#	5621#	5623#	5630#	5637#	5642#	5651#	5656#	5668#	5671#	5707#	5854#	5860#	5862#	5869#
	5895#	5897#	5941#	5946#	5969#	5976#	5981#	5991#	5996#	6005#	6014#	6039#	6041#	6091#	6096#
	6124#	6131#	6136#	6150#	6152#	6164#	6169#	6181#	6184#	6239#	6241#	6263#	6272#	6274#	6282#
	6292#	6306#	6316#	6323#	6345#	6354#	6356#	6364#	6374#	6388#	6398#	6405#	6427#	6436#	6438#
	6446#	6456#	6470#	6480#	6487#	6509#	6518#	6520#	6528#	6538#	6552#	6562#	6569#	6585#	6594#
	6596#	6606#	6616#	6623#	6639#	6648#	6650#	6660#	6670#	6677#	6682#	6704#	6706#	6727#	6734#
	6741#	6761#	6763#	6777#	6783#	6809#	6815#	6832#	6836#	6838#	6845#	6879#	6907#	6910#	6923#
	6930#	6934#	6944#	6949#	6951#	6958#	6980#	6990#	6993#	6998#	7006#	7010#	7013#	7212#	7218#	7322#
	7233#	7237#	7239#	7252#	7264#	7280#	7288#	7290#	7296#	7299#	7304#	7312#	7316#	7320#	7322#
	7339#	7353#	7377#	7381#	7395#	7399#	7407#	7410#	7423#	7430#	7443#	7454#	7462#	7466#	7469#
M$TSTL	1#	1173#	2808#	2842#	2873#	2883#	2899#	2916#	2926#	2936#	2943#	2953#	2958#	2971#	2977#
	2987#	3002#	3016#	3034#	3044#	3064#	3084#	3104#	3109#	3118#	3127#	3140#	3148#	3156#	3163#
	3168#	3178#	3184#	3201#	3209#	3219#	3224#	3236#	3242#	3248#	3254#	3264#	3274#	3284#	3294#
	3299#	3316#	3332#	3346#	3352#	3381#	3387#	3403#	3416#	3433#	3441#	3446#	3467#	3473#	3483#
	3491#	3523#	3537#	3544#	3558#	3565#	3579#	3586#	3600#	3613#	3621#	3631#	3638#	3651#	3659#
	3672#	3679#	3691#	3727#	3733#	3739#	3745#	3764#	3769#	3782#	3802#	3859#	3865#	3876#	3884#
	3892#	3928#	3947#	3952#	3958#	3974#	3977#	3980#	3992#	3995#	4008#	4056#	4062#	4064#	4071#
	4073#	4078#	4083#	4096#	4098#	4103#	4108#	4113#	4129#	4131#	4137#	4147#	4149#	4156#	4161#
	4169#	4175#	4188#	4190#	4195#	4200#	4213#	4215#	4220#	4225#	4240#	4245#	4250#	4257#	4259#
	4264#	4269#	4283#	4285#	4290#	4295#	4307#	4309#	4314#	4319#	4324#	4337#	4342#	4352#	4356#
	4360#	4395#	4427#	4429#	4439#	4441#	4450#	4452#	4459#	4461#	4466#	4474#	4476#	4480#	4490#
	4492#	4500#	4502#	4509#	4511#	4523#	4525#	4538#	4540#	4547#	4549#	4553#	4558#	4565#	4567#
	4582#	4584#	4588#	4593#	4601#	4603#	4615#	4617#	4621#	4626#	4631#	4637#	4667#	4669#	4675#
	4707#	4712#	4719#	4726#	4735#	4752#	4757#	4762#	4764#	4777#	4794#	4800#	4838#	4840#	4847#
	4858#	4894#	4908#	4914#	4925#	4961#	4975#	4978#	5005#	5007#	5021#	5058#	5073#	5097#	5101#
	5103#	5114#	5116#	5123#	5125#	5132#	5134#	5141#	5143#	5150#	5152#	5158#	5164#	5169#	5173#
	5175#	5186#	5188#	5195#	5197#	5204#	5206#	5213#	5215#	5222#	5224#	5230#	5236#	5239#	5266#
	5268#	5275#	5286#	5315#	5320#	5332#	5334#	5341#	5343#	5355#	5357#	5370#	5372#	5379#	5381#
	5390#	5395#	5407#	5409#	5417#	5419#	5428#	5430#	5437#	5439#	5446#	5448#	5455#	5462#	5467#

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                5473#  5478#  5489#  5494#  5522#  5527#  5546#  5548#  5562#  5564#  5571#  5573#  5582#  5587#  5612#
                5614#  5621#  5623#  5630#  5637#  5642#  5651#  5656#  5668#  5671#  5707#  5854#  5860#  5862#  5869#
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                7339#  7353#  7377#  7381#  7395#  7399#  7407#  7410#  7423#  7430#  7443#  7454#  7462#  7466#  7469#
MSWORD             1#  1173#  1242#  1251   1298#  1300   1301   1302   1303   1304   1305   1306   1307   1308   1309
                1310   1311   1312   2808#  2809   2810   2911   2842#  2843   2844   2845   4083#  4084   4085   4086
                4108#  4109   4110   4111   4137#  4138   4139   4140   4156#  4157   4158   4159   4175#  4176   4177
                4178   4200#  4201   4202   4203   4225#  4226   4227   4228   4245#  4246   4247   4248   4269#  4270
                4271   4272   4295#  4296   4297   4298   4319#  4320   4321   4322   4342#  4343   4344   4345   4480#
                4481   4482   4483   4553#  4554   4555   4556   4588#  4589   4590   4591   4621#  4622   4623   4624
                4707#  4708   4709   4710   4752#  4753   4754   4755   4794#  4795   4796   4797   4894#  4895   4896
                4897   4961#  4962   4963   4964   5058#  5059   5060   5061   5158#  5159   5160   5161   5230#  5231
                5232   5233   5268#  5275#  5315#  5316   5317   5318   5390#  5391   5392   5393   5455#  5456   5457
                5458   5462#  5463   5464   5465   5473#  5474   5475   5476   5522#  5523   5524   5525   5582#  5583
                5584   5585   5630#  5631   5632   5633   5637#  5638   5639   5640   5651#  5652   5653   5654   5854#
                5862#  5941#  5942   5943   5944   5969#  5970   5971   5972   5976#  5977   5978   5979   5991#  5992
                5993   5994   6091#  6092   6093   6094   6124#  6125   6126   6127   6131#  6132   6133   6134   6164#
                6165   6166   6167   6241#  6282#  6283   6284   6285   6292#  6293   6294   6295   6306#  6307   6308
                6309   6316#  6317   6318   6319   6364#  6365   6366   6367   6374#  6375   6376   6377   6388#  6389
                6390   6391   6398#  6399   6400   6401   6446#  6447   6448   6449   6456#  6457   6458   6459   6470#
                6471   6472   6473   6480#  6481   6482   6483   6528#  6529   6530   6531   6538#  6539   6540   6541
                6552#  6553   6554   6555   6562#  6563   6564   6565   6606#  6607   6608   6609   6616#  6617   6618
                6619   6660#  6661   6662   6663   6670#  6671   6672   6673   6734#  6735   6736   6737   6777#  6778
                6779   6780   6809#  6815#  6879#  6880   6881   6882   6923#  6924   6925   6926   6980#  6981   6982
                6983   6998#  6999   7000   7001   7212#  7218#  7264#  7265   7266   7267   7280#  7281   7282   7283
                7304#  7305   7306   7307   7353#  7354   7355   7356   7381#  7382   7383   7384   7399#  7400   7401
                7402   7430#  7431   7432   7433   7443#  7444   7445   7446   7454#  7455   7456   7457   8022#  8027#
                8032#  8038#  8042#  8048#  8090   8091
MSXFER             1#  1173#
NEWTST          1591#  4009   4407   4649   4801   4979   5074   5240   5826   6210   6683   6742   6784   7038
NTST            1591#  4009   4407   4649   4801   4979   5074   5240   5826   6210   6683   6742   6784   7038
OPEN               1#  1173#
POINTE             1#  1173#  1190
PRINTB             1#  1173#  2965   3310   3687
PRINTF             1#  1173#  3777   3853   3861
PRINTS             1#  1173#
PRINTX             1#  1173#  2893   2909   2920   2928   2938   2945   2973   2982   2991   3005   3023   3039   3047
                3067   3087   3135   3142   3150   3158   3174   3180   3188   3205   3215   3232   3238   3244   3250
                3256   3266   3276   3286   3325   3336   3372   3399   3405   3418   3437   3463   3469   3476   3517
                3525   3539   3546   3560   3567   3581   3588   3609   3616   3624   3633   3647   3654   3662   3674
READBU             1#  1173#
READEF             1#  1173#  3725   3731   3737   3743
RFLAGS             1#  1173#
SETDF           1591#  1993   2033   2073   2116   2179   2732   5815
SETHRD          1591#
SETPRI             1#  1173#  6908   6991   7297   7375   7393   7421
SETSF           1591#
SETSFT          1591#
SETVEC             1#  1173#  3759   3871   3879   3923   5702   6840   6953   7247   7334
```

CVDMBA.P11 18-DEC-80 15:53 CROSS REFERENCE TABLE -- MACRO NAMES

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SLASH       1#   1173#
STARS       1#   1173#
SVC         1#   1171#  1172
T$GEN    1591#   1993   2033   2073   2116   2179   2732   5815
XFER        1#   1173#  5268#  5275#  5854#  5862#  6241#  6809#  6815#  7212#  7218#
XFERF       1#   1173#
XFERT       1#   1173#
$GEDF    1591#   2807   2841   4082   4107   4136   4155   4174   4199   4224   4244   4268   4294   4318   4341
         4479    4552   4587   4620   4706   4751   4793   4893   4960   5057   5157   5229   5314   5389   5454
         5461    5472   5521   5581   5629   5636   5650   5940   5968   5975   5990   6090   6123   6130   6163
         6281    6291   6305   6315   6363   6373   6387   6397   6445   6455   6469   6479   6527   6537   6551
         6561    6605   6615   6659   6669   6733   6776   6878   6922   6979   6997   7263   7279   7303   7352
         7380    7398   7429   7442   7453
$GEHRD   1591#
$GESF    1591#
$GESFT   1591#
$GTDF    1591#   1992   2032   2072   2115   2178   2731   5814
$GTHRD   1591#
$GTSF    1591#
$GTSFT   1591#


. ABS.  037154     000


 ERRORS DETECTED:  0

 CVDMBA.BIN,CVDMBA.SEQ/CRF/SOL=SVC34R.MAC,CVDMBA.P11
 RUN-TIME: 40 49 5 SECONDS
 RUN-TIME RATIO: 156/95=1.6
 CORE USED:  21K  (41 PAGES)
```