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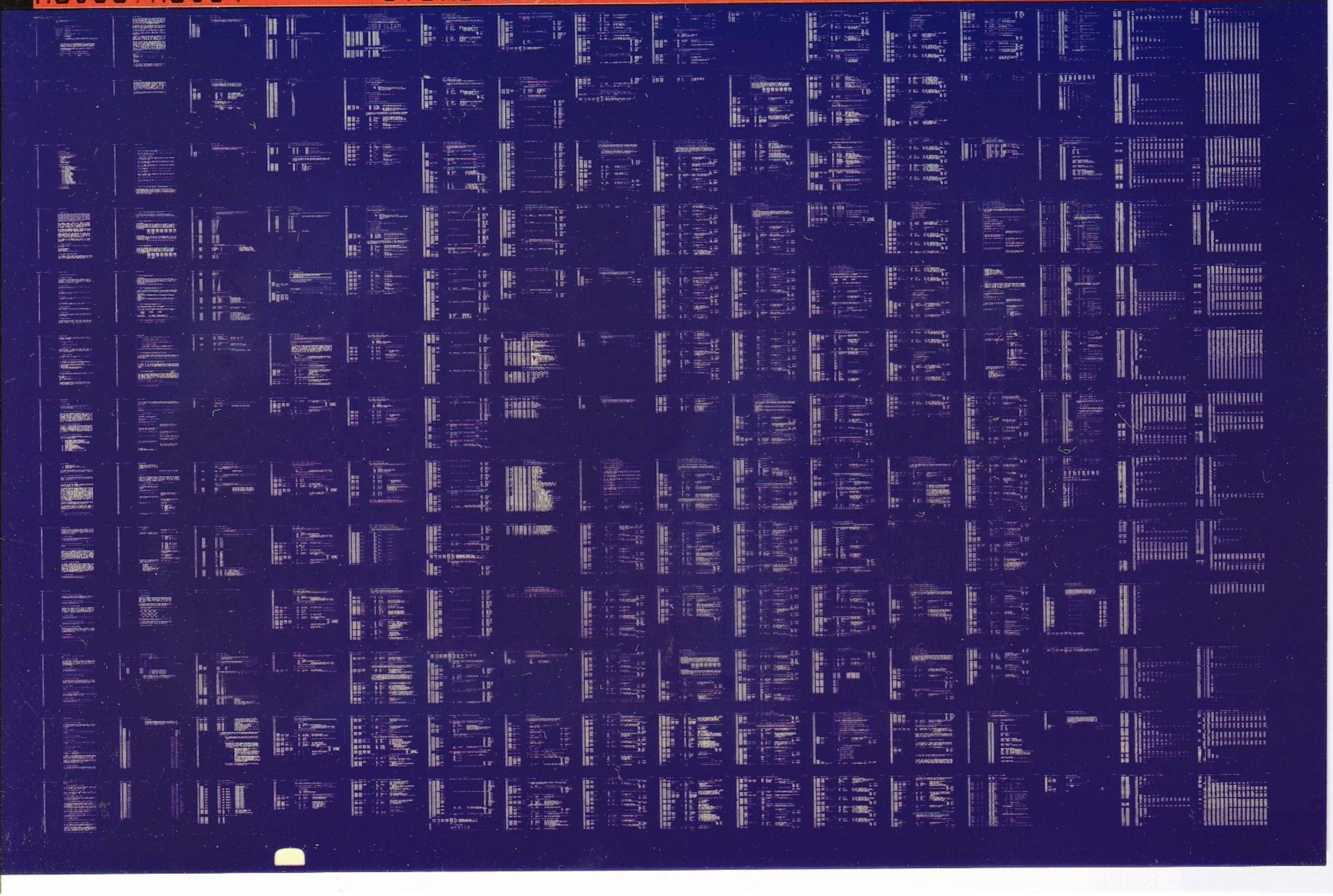

DMV11 DMV11 MCTRL DIAG# 2 AH-F265A-MC MAY 1981
M8053,M8064 CVDMBA0 FICHE 2 OF 2

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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>
**********************************************************************
```

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

<PASS-CNT> IS SAME AS IN START COMMAND, BUT THE DEFAULT IS THE UNSATISFIED PASS-CNT FROM THE PREVIOUS START OR RESTART. IF NONE REMAINS, THE DEFAULT IS NON-ENDING EXECUTION.

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

<FLAG-LIST> IS SAME AS IN START COMMAND, BUT UNSPECIFIED FLAGS RETAIN THEIR CURRENT VALUE.

6.3.3.3 EFFECT OF CONTINUE COMMAND

CONTINUE MUST FOLLOW A START OR RESTART, AND COMMAND MODE MUST HAVE BEEN ENTERED DUE TO A HALT ON ERROR OR A CONTROL/C. THE EFFECT OF THE COMMAND IS TO GO TO THE BEGINNING OF THE TEST THAT WAS BEING EXECUTED WHEN THE HALT OR CONTROL/C TOOK PLACE. SOFTWARE DIALOGUE MAY OPTIONALLY BE REEXECUTED. HARDWARE PARAMETERS MAY NOT BE CHANGED.

6.3.4 PROCEED COMMAND

****
PRO(CEED)/FLAGS:<FLAG-LIST>
****

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

<FLAG-LIST> IS AS IN THE START COMMAND, BUT UNSPECIFIED FLAGS RETAIN THEIR CURRENT VALUE.

6.3.4.2 EFFECT OF PROCEED COMMAND

PROCEED MUST FOLLOW A START, RESTART, OR CONTINUE. COMMAND MODE MUST HAVE BEEN ENTERED VIA A HALT ON ERROR. THE EFFECT OF THE COMMAND IS TO BEGIN EXECUTION AT THE LOCATION FOLLOWING THE ERROR CALL. NEITHER HARDWARE NOR SOFTWARE PARAMETERS MAY BE ALTERED.

6.3.5 ADD COMMAND

****
ADD/UNITS:<UNIT-LIST>
****

6.3.5.1 UNITS SWITCH (/UNITS:<UNIT-LIST>

<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 (SELO) 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).

```
734
735
736   7.0 TEST DESCRIPTIONS
737
738
739   ;*************************************************************************
740   ;*      TEST 1  <VIA TIMER 2 ONE SHOT MODE>
741   ;*
742   ;*    THIS  TEST  VERIFIES  THAT  THE  TIMER 2 COUNTER IS OPERATIONAL IN
743   ;*    INTERVAL-TIMER (ONE-SHOT) MODE.
744   ;*
745   ;*      THE FOLLOWING IS PERFORMED :
746   ;*
747   ;*    A  MASTER CLEAR IS DONE & THE TIMER IS PLACED IN INTERVAL-TIMER MODE
748   ;*    BY  SETTING  ACR5 = 0 AND THE PROGRAM CHECKS FOR 'T2' (BIT 5 IN IFR)
749   ;*    TO BE INITIALLY CLEARED.
750   ;*
751   ;*    T2L-L  (ADR  08)  & T2C-H (ADR 09) ARE BOTH LOADED WITH 252 (OCTAL).
752   ;*    (THIS  IS  EQUIVALENT  TO  AAAA  (HEX) OR 43,690 (DECIMAL).) LOADING
753   ;*    T2C-H STARTS THE COUNTER.
754   ;*
755   ;*    T2L-L  IS  LOADED  WITH 001 AND T2C-H IS LOADED WITH 000 IN ORDER TO
756   ;*    SET  'T2'  WITH  A QUICK UNDERFLOW. THE 'T2' FLAG BIT IN IFR IS READ
757   ;*    AND CHECKED TO BE SET.
758   ;*
759   ;*    T2C-H IS CHECKED TO = 0. CHECKING T2C-H SHOULD NOT HAVE CLEARED 'T2'
760   ;*    -- THIS IS VERIFIED.
761   ;*
762   ;*    T2C-L  IS CHECKED TO = 0. CHECKING T2C-L SHOULD HAVE CLEARED 'T2' --
763   ;*    THIS TOO IS VERIFIED.
764   ;*
765   ;*    T2C-H  IS  LOADED  WITH  0 AGAIN TO INITIATE A NEW COUNT DOWN (WHICH
766   ;*    SHOULD  UNDERFLOW  ALMOST  IMMEDIATELY)  AND  THE 'T2' BIT IN IFR IS
767   ;*    CHECKED TO BE SET AGAIN.
768   ;*
769   ;*    T2L-L IS LOADED WITH 125 (OCTAL) AND 'T2' BIT IS CHECKED TO BE STILL
770   ;*    SET.
771   ;*
772   ;*    T2C-H IS LOADED WITH 125, AND THE 'T2' BIT IS READ AND CHECKED TO BE
773   ;*    CLEARED BY THE LOADING OF T2C-H.
774   ;*
775   ;*
776   ;*************************************************************************
777
778
779   ;*************************************************************************
780   ;*      TEST 2  <VIA'S SR INPUT (MODE 2) - SYSTEM CLOCK MODE>
781   ;*
782   ;* A MASTER CLEAR IS DONE. THEN THE SHIFT REG IS PLACED IN INPUT MODE
783   ;* UNDER CONTROL OF VIA CLK, BY SETTING ACR BIT 4 TO 0, BIT 3 TO 1, AND BIT 2
784   ;* TO 0. THE PROGRAM CHECKS FOR THE SR FLAG (BIT 2) IN THE IFR TO BE INITIALLY
785   ;* CLEARED. THEN, THE SR IS LOADED TO INITIALIZE THE SR OPERATION, AND THE
786   ;* PROGRAM CHECKS FOR SR FLAG = 1 AFTER ABOUT 8 US. AND READS SR REGISTER TO
787   ;* VERIFY THAT SHIFTING OCCURRED.
788   ;*************************************************************************
789
```

```
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     ;*****************************************************************************
```

```
846
847
848                     ;*****************************************************************************
849                     ;*      TEST 6  <NPR XFER ABORT>
850                     ;*
851                     ;* FIRST SUBTEST :
852                     ;* THE PROGRAM PERFORMS AN OUTPUT NPR REQUEST TO A NON-EXISTENT MEMORY
853                     ;* LOCATION, AND CHECKS FOR THE ASSERTION OF ABORT XFER BIT IN THE NPR CONTROL
854                     ;* REGISTER. THEN, AN OUTPUT NPR IS DONE AND CHECKED, TO A LOCATION IN THE
855                     ;* PROGRAM, USING 125252 FOR DATA, AND THE PROGRAM CHECKS FOR ABORT XFER TO
856                     ;* BE CLEARED BY SETTING THE DONE BIT.
857                     ;* SECOND SUBTEST :
858                     ;* THE ABOVE SUBTEST IS REPEATED USING INPUT NPR'S.
859                     ;*****************************************************************************
860
861
862                     ;*****************************************************************************
863                     ;*      TEST 7  <NPR EXTENDED ADDRESS BIT TEST>
864                     ;*
865                     ;* THIS TEST WILL ONLY BE RUN IF THERE IS AT LEAST 32K WORDS OF MEMORY ON THE
866                     ;* SYSTEM. IF THERE IS, THE PROGRAM CHOOSES A LOCATION TO USE IN THE ADDRESS
867                     ;* RANGE 200000-377776 (OCTAL). THEN, THE FOLLOWING 2 SUBTESTS ARE PERFORMED :
868                     ;*
869                     ;* FIRST SUBTEST :
870                     ;* AN INPUT NPR IS PERFORMED AND CHECKED USING THE MEMORY LOCATION, WITH
871                     ;* 125252 FOR DATA. THE PROGRAM CHECKS THAT THE ABORT XFER BIT REMAINS
872                     ;* CLEARED.
873                     ;* SECOND SUBTEST :
874                     ;* AN OUTPUT NPR IS PERFORMED AND CHECKED USING THE MEMORY LOCATION, WITH
875                     ;* 125252 FOR DATA. THE PROGRAM CHECKS THAT THE ABORT XFER BIT REMAINS
876                     ;* CLEARED.
877                     ;*****************************************************************************
878
879
880                     ;*****************************************************************************
881                     ;*      TEST 8  <SPECIAL MFG EXTENDED BIT TEST>
882                     ;*
883                     ;* THIS TEST WAS DESIGNED SPECIFICALLY TO ALLOW MANUFACTURING TO CHECK THE
884                     ;* NPRAIX/NPRAOX BITS WITHOUT A FULL 4 M. OF MEMORY.
885                     ;*
886                     ;* IT WILL CHECK THE 12 DMV EXTENDED ADDRESS BITS (6:NPRAIX/6:NPRAOX) ON
887                     ;* A Q22 SYSTEM IF MEMORY IS PRESENT AT THE FOLLOWING PHYSICAL ADDRESSES:
888                     ;*
889                     ;*      17600000        17400000        17200000
890                     ;*      16600000        15600000        13600000
891                     ;*       7600000
892                     ;*
893                     ;* FIRST SUBTEST :      TEST 'NPRAIX'' EXTENDED ADDRESS BITS
894                     ;* SECOND SUBTEST :     TEST 'NPRAOX'' EXTENDED ADDRESS BITS
895                     ;*****************************************************************************
896
897
898                     ;*****************************************************************************
899                     ;*      TEST 9  <Q-BUS INTERRUPT 'A'' & 'B'' SELECTION>
900                     ;*
901                     ;* 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                     ;*      TEST 11 <MASTER CLEAR WITH DISABLE INIT SET>
930                     ;*
931                     ;* THE 'DISABL INIT'' BIT IN THE NPR CONTROL REGISTER IS SET AND A MASTER CLEAR
932                     ;* IS  ISSUED.  IF  THE  MASTER  CLEAR SUBROUTINE DETECTS AN ERROR, THE MASTER
933                     ;* CLEAR  WILL  NOT  HAVE  FUNCTIONED PROPERLY. WHERE THE NORMAL ERROR MESSAGE
934                     ;* (QUEUED  UP  BY 'MASCLR') IS NORMALLY PRINTED, THIS TEST WILL PRINT ITS OWN
935                     ;* INSTEAD.
936                     ;*****************************************************************************
937
938
939                     ;*****************************************************************************
940                     ;*      TEST 12 <DCOK H LO BIT>
941                     ;*
942                     ;* DCOK H LO IS SET IN THE NPR CONTROL REGISTER WHICH SHOULD CAUSE A VECTOR TO
943                     ;* THE  FIRST  INTERRUPT  HANDLER  WHERE THE VECTOR IS CHANGED TO POINT TO THE
944                     ;* SECOND HANDLER. THIS SECOND HANDLER WILL THEN STALL FOR A WHILE WAITING FOR
945                     ;* THE  POWER-UP  INTERRUPT  WHICH  SHOULD KICK US INTO THE SECOND HANDLER. IN
946                     ;* BOTH  HANDLERS  FLAGS  ARE  SET  TO  SAY THAT WE GOT THERE. WHEN WE FINALLY
947                     ;* RETURN  TO  OUR MAINLINE CODE, WE WILL RESUME THE DELAY FUNCTION WE WERE IN
948                     ;* AND THEN CHECK THE FLAGS.
949                     ;*
950                     ;* IN SUBTEST # 1, WE EXPECT THE DMV TO BE RESET.
951                     ;*
952                     ;*****************************************************************************
953
954
955                     ;*****************************************************************************
956                     ;*      TEST 13 <HALT MODE VERIFICATION>
957
```

```
;*
;* 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  E 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''
```

```
;*
;*                                        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;
;*******************************************************************************
```

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
```

```
CVDMBA.P11    18-DEC-80 15:53          LISTING & ASSEMBLY CONTROL

 1163                                  .SBTTL LISTING & ASSEMBLY CONTROL
 1164
 1165          000000                  HELP=0          ; CONTROL LISTING OF HELP INFORMATION
 1166                                                  ; HELP=0   NO LIST
 1167                                                  ; HELP=1   LIST
 1168
 1169          002000                          .=2000
 1170
 1171                                          .MCALL  SVC
 1172  002000                                  SVC                                     ; INITIALIZE SUPERVISOR MACROS
 1173
 1174  002000                                  BGNMOD  LU1MOD
 1175
 1176
 1177          000001                  $LSTIN= 1
 1178          000001                  $LSTTAG= 1
 1179          000001                  SVCINS= 1       ; LIST INSTRUCTIONS, SHIFTED RIGHT
 1180          000001                  SVCTST= 1       ; LIST TEST TAGS, SHIFTED RIGHT
 1181          000001                  SVCSUB= 1       ; LIST SUBTEST TAGS, SHIFTED RIGHT
 1182          000001                  SVCGBL= 1       ; LIST GLOBAL TAGS, SHIFTED RIGHT
 1183          000001                  SVCTAG= 1       ; LIST OTHER TAGS, SHIFTED RIGHT
 1184
 1185                                  ;       CHANGE THE VALUES OF THE SVC... SYMBOLS TO BE ZERO IF YOU WISH
 1186                                  ;       TO ALIGN THE MACRO CALLS AND THEIR EXPANSIONS.  CHANGE THE
 1187                                  ;       SYMBOLS TO BE MINUS-ONE TO NOT LIST THE EXPANSIONS.  YOU MAY
 1188                                  ;       CHANGE THE SYMBOLS AT ANY POINT IN YOUR PROGRAM.
 1189
 1190  002000                            POINTER BGNAU,BGNDU,ERRTBL
 1191
```

```
                        .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.
                        ;--


                                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   LSHARD
002020                                  LSSPCP::
002020  000000                          .WORD   0
002022                                  LSHPTP::
002022  002160                          .WORD   LSHW
002024                                  LSSPTP::
002024  000000                          .WORD   0
002026                                  LSLADP::
002026  037154                          .WORD   LSLAST
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   LSDISPATCH
002042                                  LSPRIO::
002042  000000                          .WORD   0
002044                                  LSENVI::
002044  000000                          .WORD   0
002046                                  LSEXP1::
002046  000000                          .WORD   0
002050                                  LSMREV::
002050  003                             .BYTE   CSREVISION
```

```
1248  002051      003
1249  002052
1250  002052  000000
1251  002054  000000
1252  002056
1253  002056  000000
1254  002060
1255  002060  003254
1256  002062
1257  002062  000000
1258  002064
1259  002064  000000
1260  002066
1261  002066  000000
1262  002070
1263  002070  023162
1264  002072
1265  002072  023156
1266  002074
1267  002074  000000
1268  002076
1269  002076  003274
1270  002100
1271  002100  104035
1272  002102
1273  002102  002202
1274  002104
1275  002104  022020
1276  002106
1277  002106  023140
1278  002110
1279  002110  023014
1280  002112
1281  002112  022012
1282  002114
1283  002114  000000
1284  002116
1285  002116  000000
1286  002120
1287  002120  000000
1288
1289                        .EVEN
```

```
                .BYTE   C$EDIT
L$EF::
                .WORD   0
                .WORD   0
L$SPC::
                .WORD   0
L$DEVP::
                .WORD   L$DVTYP
L$REPP::
                .WORD   0
L$EXP4::
                .WORD   0
L$EXP5::
                .WORD   0
L$AUT::
                .WORD   L$AU
L$DUT::
                .WORD   L$DU
L$LUN::
                .WORD   0
L$DESP::
                .WORD   L$DESC
L$LOAD::
                EMT     ESLOAD
L$ETP::
                .WORD   L$ERRTBL
L$ICP::
                .WORD   L$INIT
L$CCP::
                .WORD   L$CLEAN
L$ACP::
                .WORD   L$AUTO
L$PRT::
                .WORD   L$PROT
L$TEST::
                .WORD   0
L$DLY::
                .WORD   0
L$HIME::
                .WORD   0
```

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

```
1290                    .SBTTL DISPATCH TABLE
1291
1292                    ;////////////////////////////////////////////////////////////////////////
1293                    ;/ THE DISPATCH TABLE CONTAINS THE STARTING ADDRESS OF EACH TEST.
1294                    ;/ IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
1295                    ;////////////////////////////////////////////////////////////////////////
1296
1297  002122                    DISPATCH    13.
1298  002122  000015                                   .WORD   13
1299  002124                                  L$DISPATCH::
1300  002124  023164                                   .WORD   T1
1301  002126  024174                                   .WORD   T2
1302  002130  025062                                   .WORD   T3
1303  002132  025450                                   .WORD   T4
1304  002134  026160                                   .WORD   T5
1305  002136  026430                                   .WORD   T6
1306  002140  027036                                   .WORD   T7
1307  002142  031276                                   .WORD   T8
1308  002144  032626                                   .WORD   T9
1309  002146  034134                                   .WORD   T10
1310  002150  034230                                   .WORD   T11
1311  002152  034274                                   .WORD   T12
1312  002154  035046                                   .WORD   T13
1313
```

```
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  00 160  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:
```

```
                                .SBTTL GLOBAL EQUATES SECTION


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

002202                                  EQUALS
                                ;
                                ; BIT DIFINITIONS
                                ;
        100000                  BIT15== 100000
        040000                  BIT14== 40000
        020000                  BIT13== 20000
        010000                  BIT12== 10000
        004000                  BIT11== 4000
        002000                  BIT10== 2000
        001000                  BIT09== 1000
        000400                  BIT08== 400
        000200                  BIT07== 200
        000100                  BIT06== 100
        000040                  BIT05== 40
        000020                  BIT04== 20
        000010                  BIT03== 10
        000004                  BIT02== 4
        000002                  BIT01== 2
        000001                  BIT00== 1
                                ;
        001000                  BIT9==  BIT09
        000400                  BIT8==  BIT08
        000200                  BIT7==  BIT07
        000100                  BIT6==  BIT06
        000040                  BIT5==  BIT05
        000020                  BIT4==  BIT04
        000010                  BIT3==  BIT03
        000004                  BIT2==  BIT02
        000002                  BIT1==  BIT01
        000001                  BIT0==  BIT00
                                ;
                                ; EVENT FLAG DEFINITIONS
                                ;   EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
                                ;
        000040                  EF.START==      32.                     ; START COMMAND WAS ISSUED
        000037                  EF.RESTART==    31.                     ; RESTART COMMAND WAS ISSUED
        000036                  EF.CONTINUE==   30.                     ; CONTINUE COMMAND WAS ISSUED
        000035                  EF.NEW==        29.                     ; A NEW PASS HAS BEEN STARTED
        000034                  EF.PWR==        28.                     ; A POWER-FAIL/POWER-UP OCCURRED
                                ;
                                ;
                                ; PRIORITY LEVEL DEFINITIONS
                                ;
        000340                  PRI07== 340
        000300                  PRI06== 300
        000240                  PRI05== 240
        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          NPRAI.. = 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                            .SBTTL  NPR REQUEST FUNCTIONS
1476        000004              NPRLD   = DMVPU                 ;WORD XFER:  LSI ==> DMV
1477        000044              NPRDL   = DMVPU!NPRIO            ;WORD XFER:  DMV ==> LSI
1478        000054              NPRDLB  = DMVPU!NPRIO.NPRBYT     ;BYTE XFER:  DMV ==> LSI
1479
1480                            ;-----------------------------------------------------------------------
1481
1482                            .SBTTL  INTERRUPT REG EQUATES
1483        123005              IRQREG  = 123005                 ;INTERRUPT REQUEST REG
1484        000004              IRQA    = BIT2                   ;REQUEST BIT FOR XX0 INTERRUPT -- "A"
1485        000002              IRQB    = BIT1                   ;REQUEST BIT FOR XX4 INTERRUPT -- "B"
1486
1487                            ;-----------------------------------------------------------------------
1488
1489                            .SBTTL  CONTROL FLAGS FROM P-TABLE ENTRIES
1490        000001              PU24    = BIT0                   ;POWER-FAIL VECTORING MODE.  1 = MODE 0
1491                                                             ;  (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
```

```
CVDMBA.P11    18-DEC-80 15:53          DMV INTERNAL ADDRESSES

 1534                                  .SBTTL  DMV INTERNAL ADDRESSES
 1535
 1536                                  ;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 1537                                  ;                   DMV INTERNAL ADDRESSES
 1538                                  ;--++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 1539
 1540
 1541                                  ;########  <<  MICROPROCESSOR REGISTER ADDRESS EQUATES  >> ##########
 1542
 1543                                  .SBTTL          BYTE & WORD SELECT REGISTERS
 1544
 1545          000020                  SLT0    =020
 1546          000020                  BSLT0   =SLT0
 1547          000021                  BSLT1   =SLT0+1
 1548          000022                  SLT2    =SLT0+2
 1549          000022                  BSLT2   =SLT0+2
 1550          000023                  BSLT3   =SLT0+3
 1551          000024                  SLT4    =SLT0+4
 1552          000024                  BSLT4   =SLT0+4
 1553          000025                  BSLT5   =SLT0+5
 1554          000026                  SLT6    =SLT0+6
 1555          000026                  BSLT6   =SLT0+6
 1556          000027                  BSLT7   =SLT0+7
 1557
 1558                                  .SBTTL          VIA'S REGISTERS
 1559
 1560          120000                  ORB     =120000
 1561          120001                  ORA     =ORB+1
 1562          120002                  DDRB    =ORB+2
 1563          120003                  DDRA    =ORB+3
 1564          120004                  T1CL    =ORB+4
 1565          120005                  T1CH    =ORB+5
 1566          120005                  T1LHGO  =ORB+5
 1567          120006                  T1LL    =ORB+6
 1568          120007                  T1LH    =ORB+7
 1569          120010                  T2LL    =ORB+10
 1570          120010                  T2CL    =T2LL
 1571          120011                  T2CH    =ORB+11
 1572          120012                  SR      =ORB+12
 1573          120013                  ACR     =ORB+13
 1574          120014                  PCR     =ORB+14
 1575          120015                  IFR     =ORB+15
 1576          120016                  IENR    =ORB+16
 1577          120017                  ORAM    =ORB+17
 1578
 1579                                  .SBTTL          VIA'S ''IFR'' REGISTER'S BIT ASSIGNMENTS
 1580
 1581          000200                  IFRIRQ  =BIT7   ;''IRQ'' HAS BEEN ISSUED -- LOGICAL 'OR'' OF BITS 0 --> 6
 1582          000100                  IFRT1   =BIT6   ;''T1'' -- TIMER # 1 TIMED-OUT
 1583          000040                  IFRT2   =BIT5   ;''T2'' -- TIMER # 1 TIMED-OUT
 1584          000020                  IFRCB1  =BIT4   ;''CB1'' EDGE DETECTED (''K2 LINE UNIT STEP'' O/P SIGNAL FROM SR)
 1585          000010                  IFRCB2  =BIT3   ;''CB2'' EDGE DETECTED (UNUSED!)
 1586          000004                  IFRSR   =BIT2   ;''SR'' REGISTER COMPLETED SHIFT OPERATION
 1587          000002                  IFRCA1  =BIT1   ;''CA1'' EDGE DETECTED (''K6 MOD RDY H'')
 1588          000001                  IFRCA2  =BIT0   ;''CA2'' EDGE DETECTED (''K2 CTS H'')
 1589
```

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

                                        ERRTBL
                                                                                LSERRTBL::
                                ERRTYP::        .WORD   0
                                ERRNBR::        .WORD   0
                                ERRMSG::        .WORD   0
                                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 'ERRA'
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                    ;
1664                    ; THE ABOVE WORD CONTAINS MISC. FLAGS WHICH CAN ONLY BE ACCESSED BY PATCHING.
1665                    ; IT IS NOT INTENDED THAT THEY BE SET OR CLEARED EXCEPT UNDER VERY UNUSUAL
1666                    ; CIRCUMSTANCES.  THEREFORE, THEY WILL NOT BE DOCUMENTED ANY OTHER PLACE
1667                    ; EXCEPT RIGHT HERE.
1668                    ;
1669                    ; BIT 0 -- WHEN SET, THOSE TESTS WHICH DO A BUS RESET WILL NOT BE EXECUTED.
1670                    ;          THIS WAS INPLEMENTED TO SAVE WEAR & TEAR ON THE RX01 IN THE
1671                    ;          DEVELOPMENT SYSTEM WHILE DOING LONG TERM TESTING OF ALL OTHER
1672                    ;          TESTS.
1673                    ;
1674                    ; BIT 1 -- CPU TYPE (NOT USED).
1675                    ;
1676                    ; BIT 2 -- CONTROLS PRINTING OF EXTENDED ERROR INFORMATION DURING 'MOVING
1677                    ;          INVERSIONS TEST" OF RAM.  NORMALLY ONLY ADDRESS, GOOD & BAD
1678                    ;          DATA, AND XOR WILL BE PRINTED.  IF THIS BIT IS SET HOWEVER,
1679                    ;          INFORMATION IDENTIFYING WHERE WITHIN THE ALGORITHM THE ERROR
1680                    ;          WAS DETECTED IS REPORTED.  THE FOLLOWING ABBREVIATIONS ARE USED
1681                    ;          IN THE HEADING:
1682                    ;                  BIT -- IDENTIFIES THE INNERMOST LOOP.  WHICH BIT IS
1683                    ;                         BEING INVERTED AT EACH LOCATION.  BITS ARE
1684                    ;                         IDENTIFIED AS 0 THROUGH 7.
1685                    ;                  DATA -- IDENTIFIES THE VALUE TO WHICH THE ABOVE BIT IS
1686                    ;                         BEING SET (I.E. 0 OR 1).  IT IS FIRST READ AND
1687                    ;                         CHECKED FOR EXPECTED CONTENTS; THEN THE BIT IS
1688                    ;                         INVERTED TO THIS STATE (DATA) AND RE-WRITTEN;
1689                    ;                         THEN IT IS AGAIN READ & CHECKED FOR THE NEW
1690                    ;                         VALUE.
1691                    ;                  SEQ -- INDICATES THE DIRECTION (FWD OR BKWD) THE TEST
1692                    ;                         WAS SCANING THROUGH RAM WHEN THE ERROR OCCURED.
1693                    ;                  LSB -- THIS IS THE LOGICAL LEAST SIGNIFICANT BIT OF THE
1694                    ;                         RAM ADDRESS AS WE SCAN THROUGH MEMORY.  BY
1695                    ;                         VARYING THIS, THE ALGORITHM GENERATES NON-SEQUEN-
1696                    ;                         TIAL ADDRESSING OF RAM AND EFFECTS A MUCH MORE
1697                    ;                         THOROUGH TEST OF MEMORY.
1698                    ;
1699                    ; BIT 3 -- ENABLES PRINTOUT OF THE MESSAGE WITHIN THE INIT CODE THAT TELLS
1700                    ;          US HOW LONG IT TOOK (IN LOOPS WITHIN THIS CPU) TO PERFORM ONE
1701                    ;          NO-OP FUNCTION OF THE MAINTAINENCE LOOP.
1702
1703
```

```
                                .SBTTL  CURRENT DEVICE PARAMETERS

 1704
 1705
 1706           160000          $MPCSR  ==      160000          ;INITIAL ASSEMBLED IN CSR ADDRESS
 1707
 1708  002320                   MPCSR:                          ;POINTER TO THE DMV11 CSR'S
 1709  002320                   BSEL0:                          ;POINTER TO BSEL0
 1710  002320                   BSEL:                           ;ALTERNATE NAME FOR BSEL0
 1711  002320  160000           SEL0:   .WORD   $MPCSR          ;POINTER TO SEL0
 1712  002322  160001           BSEL1:  .WORD   $MPCSR+1        ;POINTER TO BSEL1
 1713  002324                   BSEL2:                          ;POINTER TO BSEL2
 1714  002324  160002           SEL2:   .WORD   $MPCSR+2        ;POINTER TO SEL2
 1715  002326  160003           BSEL3:  .WORD   $MPCSR+3        ;POINTER TO BSEL3
 1716  002330                   BSEL4:                          ;POINTER TO BSEL4
 1717  002330  160004           SEL4:   .WORD   $MPCSR+4        ;POINTER TO SEL4
 1718  002332  160005           BSEL5:  .WORD   $MPCSR+5        ;POINTER TO BSEL5
 1719  002334                   BSEL6:                          ;POINTER TO BSEL6
 1720  002334  160006           SEL6:   .WORD   $MPCSR+6        ;POINTER TO SEL6
 1721  002336  160007           BSEL7:  .WORD   $MPCSR+7        ;POINTER TO BSEL7
 1722  002340                   BSEL10:                         ;POINTER TO BSEL10
 1723  002340  160010           SEL10:  .WORD   $MPCSR+10       ;POINTER TO SEL10
 1724  002342  160011           BSEL11: .WORD   $MPCSR+11       ;POINTER TO BSEL11
 1725  002344                   BSEL12:                         ;POINTER TO BSEL12
 1726  002344  160012           SEL12:  .WORD   $MPCSR+12       ;POINTER TO SEL12
 1727  002346  160013           BSEL13: .WORD   $MPCSR+13       ;POINTER TO BSEL13
 1728  002350                   BSEL14:                         ;POINTER TO BSEL14
 1729  002350  160014           SEL14:  .WORD   $MPCSR+14       ;POINTER TO SEL14
 1730  002352  160015           BSEL15: .WORD   $MPCSR+15       ;POINTER TO BSEL15
 1731  002354                   BSEL16:                         ;POINTER TO BSEL16
 1732  002354  160016           SEL16:  .WORD   $MPCSR+16       ;POINTER TO SEL16
 1733  002356  160017           BSEL17: .WORD   $MPCSR+17       ;POINTER TO BSEL17
 1734
 1735  002360  000300           MPIVEC: .WORD     300           ;DMV11 INPUT INTERRUPT VECTOR
 1736  002362  000304           MPOVEC: .WORD     304           ;DMV11 OUTPUT INTERRUPT VECTOR
 1737  002364  000340           MPRIOR: .WORD     340           ;DMV11 DEVICE PRIORITY
 1738  002366  000000           BRDTYP: .WORD       0           ;0=M8064,1=M8053/V.35,2=M8053/EIA
 1739  002370  000000           PT.CTL: .WORD       0           ;MISC. CONTROL FLAGS FROM P-TABLE
 1740
 1741                           .SBTTL  GEN'L PURPOSE SCRATCH STORAGE
 1742
 1743  002372  000000           REG0:   .WORD   0
 1744  002374  000000           REG1:   .WORD   0
 1745  002376  000000           REG2:   .WORD   0
 1746  002400  000000           REG3:   .WORD   0
 1747  002402  000000           REG4:   .WORD   0
 1748  002404  000000           REG5:   .WORD   0
 1749  002406  000000           REG6:   .WORD   0
 1750  002410  000000           REG7:   .WORD   0
```

```
1751
1752
1753  002412  000000          .SBTTL  SCRATCH STORAGE FOR MESSAGE REPORTING
1754  002414  000000
1755  002416  000000  TMP0:    .WORD   0
1756  002420  000000  TMP1:    .WORD   0
1757  002422  000000  TMP2:    .WORD   0
1758  002424  000000  TMP3:    .WORD   0
1759  002426  000000  TMP4:    .WORD   0
1760  002430  000000  TMP5:    .WORD   0
1761  002432  000000  TMP6:    .WORD   0
1762  002434  000000  TMP7:    .WORD   0
1763  002436  000000  TMP8:    .WORD   0
1764  002440  000000  TMP9:    .WORD   0
1765  002442  000000  TMPA:    .WORD   0
1766  002444  000000  TMPB:    .WORD   0
1767  002446  000000  TMPC:    .WORD   0
1768  002450  000000  TMPD:    .WORD   0
1769  002452  000000  TMPE:    .WORD   0
1770  002454  000000  TMPF:    .WORD   0
1771                  NEWPC:   .WORD   0       ;SAVE LOCATION FOR A 'PC'' VALUE RESET
1772                  OLDSP:   .WORD   0       ;SAVE LOCATION FOR A STACK POINTER RESET VALUE
1773
1774                  .SBTTL  ***** DATA PATTERN B *****
1775
1776  002456  000025  .EVEN                           ;USAGE:
1777  002460     125  PATB:    .WORD   1$-.-2  ;# OF BYTES IN PATTERN
1778  002461     252           .BYTE   125
1779  002462     000           .BYTE   252
1780  002463     377           .BYTE   000
1781  002464     001           .BYTE   377
1782  002465     002           .BYTE   001
1783  002466     004           .BYTE   002
1784  002467     010           .BYTE   004
1785  002470     020           .BYTE   010
1786  002471     040           .BYTE   020
1787  002472     100           .BYTE   040
1788  002473     200           .BYTE   100
1789  002474     376           .BYTE   200
1790  002475     375           .BYTE   376
1791  002476     373           .BYTE   375
1792  002477     367           .BYTE   373
1793  002500     357           .BYTE   367
1794  002501     337           .BYTE   357
1795  002502     277           .BYTE   337
1796  002503     177           .BYTE   277
1797  002504     000           .BYTE   177
1798  002505                   .BYTE   000
                       1$:
```

```
                                        ***** DATA PATTERN F *****

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

                                        .EVEN
1801            002506                  PATF:   <1$-.-2>/2
1802  002506   000045                           125252
1803  002510   125252                           052525
1804  002512   052525                           0
1805  002514   000000                           -1
1806  002516   177777                           1
1807  002520   000001                           2
1808  002522   000002                           4
1809  002524   000004                           10
1810  002526   000010                           20
1811  002530   000020                           40
1812  002532   000040                           100
1813  002534   000100                           200
1814  002536   000200                           400
1815  002540   000400                           1000
1816  002542   001000                           2000
1817  002544   002000                           4000
1818  002546   004000                           10000
1819  002550   010000                           20000
1820  002552   020000                           40000
1821  002554   040000                           100000
1822  002556   100000                           177776
1823  002560   177776                           177775
1824  002562   177775                           177773
1825  002564   177773                           177767
1826  002566   177767                           177757
1827  002570   177757                           177737
1828  002572   177737                           177677
1829  002574   177677                           177577
1830  002576   177577                           177377
1831  002600   177377                           176777
1832  002602   176777                           175777
1833  002604   175777                           173777
1834  002606   173777                           167777
1835  002610   167777                           157777
1836  002612   157777                           137777
1837  002614   137777                           077777
1838  002616   077777                           0
1839  002620   000000                  1$:
1840  002622
```

```
                                        ***** 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, EAC  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
```

```
2041                                    .SBTTL  M-LOOP -- READ
2042                                    ;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
2043                                    ; READ - READ THE SPECIFIED ADDRESS WITHIN THE DMV-11
2044                                    ;
2045                                    ;  CALLING SEQUENCE:
2046                                    ;
2047                                    ;       JSR     R5,READ
2048                                    ;       .WORD   <ADDRESS OF REGISTER WITHIN DMV-11>
2049                                    ;       .WORD   <DESTINATION ADDRESS WITHIN LSI-11>
2050                                    ;       BCC     N$              ;IF NO ERROR OCCURED, PROCEED WITH ROUTINE
2051                                    ;       ERROR                   ;AN ERROR MESSAGE HAS BEEN STACKED:  PRINT IT
2052                                    ;       <ANY OTHER SPECIAL ERROR PROCESSING MAY BE DONE HERE  (I.E. CKLOOP)>
2053                                    ;
2054                                    ; N$:   <RESUMPTION OF NORMAL PROCESSING>
2055                                    ;
2056                                    ;--++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
2057
2058  003616  012577  176506            READ:   MOV     (R5)+,@SEL4     ;SETUP SOURCE POINTER
2059  003622  112777  000001  176474            MOVB    #REDLOC,@BSEL2  ;TELL M-LOOP TO GIVE US THE REQUESTED DATA
2060
2061  003630  010346                            MOV     R3,-(SP)
2062  003632  012703  000032                    MOV     #26.,R3         ;WAIT FOR THE M-LOOP TO FINISH THE OPERATION
2063  003636  077301                    1$:     SOB     R3,1$
2064  003640  012603                            MOV     (SP)+,R3
2065
2066  003642  132777  000200  176454            BITB    #MRDY,@BSEL2    ;DID THE M-LOOP FINISH
2067  003650  001023                            BNE     5$              ;YES,  GOOD.  RETURN
2068
2069  003652  004737  004374                    JSR     PC,GETWSR       ;GET BYTE SELECT REGISTERS
2070  003656  012737  000001  002254            MOV     #REDLOC,GDATA   ;IDENTIFY REQUESTED FUNCTION
2071  003664                                    GTDF    EM4,ERR4        ;''MRDY'' TIMEOUT
2072                                            ;       QUEUE ''DEVICE FATAL'' ERROR # 3
2073  003664  012737  000001  002202                                                    MOV     #T.EDF,ERRTYP
2074  003672  012737  000003  002204                                                    MOV     #3,ERRNBR
2075  003700  012737  016135  002206                                                    MOV     #EM4,ERRMSG
2076  003706  012737  006232  002210                                                    MOV     #ERR4,ERRBLK
2077  003714  000261                            SEC                     ;INDICATE AN ERROR HAS BEEN STACKED
2078  003716  000401                            BR      6$              ;RETURN WITH THAT INDICATION
2079
2080  003720  000241                    5$:     CLC                     ;INDICATE ''NO ERROR''
2081  003722  117735  176406            6$:     MOVB    @BSEL6,@(R5)+   ;PUT DATA WHERE CALLER WANTS IT
2082  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     NS              ;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                                    ; NS:   <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                  1$:     MOV     R3,-(SP)
004074  012703  000050                  MOV     #40.,R3         ;WAIT FOR THE M-LOOP TO FINISH THE OPERATION
004100  077301                          SOB     R3,1$
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,EMSG
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  JR'' 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

002403  004722  120013                ACR                     ;THE VIA'S ACR
002404  004724  002440                TMPB
002405  004726  103424                BCS     63$             ;EXIT ON ERROR
002406
002407  004730  113701  002440        MOVB    TMPB,R1         ;GET THAT VALUE
002408  004734  042701  000040        BIC     #BIT5,R1        ;CLEAR THE CURRENT SETTING OF BIT 5
002409  004740  150137  002441        BISB    R1,TMPB+1       ;SET REMAINING BITS IN THE VALUE TO BE WRITTEN
002410
002411  004744  004537  004042        JSR     R5,WRITE        ;WRITE TO
002412  004750  120013                ACR                     ;THE VIA'S ACR
002413  004752  002441                TMPB+1
002414  004754  103411                BCS     63$             ;EXIT ON ERROR
002415
002416  004756  004537  004042        JSR     R5,WRITE        ;WRITE TO
002417  004762  120010                T2LL                    ;LOW ORDER LATCH & COUNTER (T2L-L)
002418  004764  002433                TMP8+1                  ;THE PASSED VALUE
002419  004766  103404                BCS     63$             ;EXIT ON ERROR
002420
002421  004770  004537  004042        JSR     R5,WRITE        ;WRITE TO
002422  004774  120011                T2CH                    ;HIGH ORDER COUNTER (T2C-H) <ALSO STARTS CTR>
002423  004776  002435                TMP9+1                  ;THE PASSED VALUE
002424
002425                        ; DON'T WAIT AROUND FOR ANYTHING TO HAPPEN -- JUST (JEST) RETURN!
002426
002427  005000  012601        63$:    MOV     (SP)+,R1        ;BUT FIRST RESTORE R1
002428  005002  000205                RTS     R5              ;THEN RETURN
002429
```

```
                                .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 @ 'W0''
                                ;--++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

2540
2541
2542
2543
2544
2545
2546  005134  004537  003616    NPREAD: JSR     R5,READ
2547  005140  123004                    NPRCTL
2548  005142  002740                    BT2
2549  005144  103447                    BCS     10$             ;ON ERROR, EXIT
2550  005146  004537  003616            JSR     R5,READ
2551  005152  123001                    NPRDRH
2552  005154  002742                    BT2+2
2553  005156  103442                    BCS     10$             ;ON ERROR, EXIT
2554  005160  004537  003616            JSR     R5,READ
2555  005164  123000                    NPRDRL
2556  005166  002744                    BT2+4
2557  005170  103435                    BCS     10$             ;ON ERROR, EXIT
2558  005172  004537  003616            JSR     R5,READ
2559  005176  000072                    NPRAOX
2560  005200  002746                    BT2+6
2561  005202  103430                    BCS     10$             ;ON ERROR, EXIT
2562  005204  004537  003616            JSR     R5,READ
2563  005210  000071                    NPRAOH
2564  005212  002750                    BT2+8.
2565  005214  103423                    BCS     10$             ;ON ERROR, EXIT
2566  005216  004537  003616            JSR     R5,READ
2567  005222  000070                    NPRAOL
2568  005224  002752                    BT2+10.
2569  005226  103416                    BCS     10$             ;ON ERROR, EXIT
2570  005230  004537  003616            JSR     R5,READ
2571  005234  000076                    NPRAIX
2572  005236  002754                    BT2+12.
2573  005240  103411                    BCS     10$             ;ON ERROR, EXIT
2574  005242  004537  003616            JSR     R5,READ
2575  005246  000075                    NPRAIH
2576  005250  002756                    BT2+14.
2577  005252  103404                    BCS     10$             ;ON ERROR, EXIT
2578  005254  004537  003616            JSR     R5,READ
2579  005260  000074                    NPRAIL
2580  005262  002760                    BT2+16.
2581
2582  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                                  ; - - - - - - - - - S E T U P   D A T A - - - - - - - - - - - - - - - - - - - - -
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$,TMP         ;       CONTROL REGISTER AS WE SET IT
2727  005662  013737  005624  002416          MOV     44$,TMP+2       ;       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                                  ;- - - - - - - - - T E S T   F O R   M O R E - - - - - - - - - - - - - - - - -
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                                  ;- - - - - - - - - C L E A N   U P   &   E X I T - - - - - - - - - - - - - - -
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
```

```
2858
2859
2860
2861
2862
2863
2864
2865
2866
2867
2868  006212
2869  006212
2870  006212  004737  013076
2871  006216
2872  006216
2873  006216  104423
2874
2875
2876
2877  006220
2878  006220
2879  006220  004737  012206
2880  006224  004737  013076
2881  006230
2882  006230
2883  006230  104423
2884
2885
2886
2887  006232
2888  006232
2889  006232  010146
2890  006234  113701  002254
2891  006240  122701  000017
2892  006244  103013
2893  006246
2894  006246  005046
2895  006250  150116
2896  006252  012746  013346
2897  006256  012746  000002
2898  006262  010600
2899  006264  104415
2900  006266  062706  000006
2901  006272  000425
2902
2903  006274  001001
2904  006276  005001
2905  006300  022701  000007
2906  006304  002002
2907  006306  012701  000006
2908  006312  006301
2909  006314
2910  006314  016146  021746
2911  006320  005046
2912  006322  153716  002254
2913  006326  012746  013411
```

```
.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
;-----------------------------------------------------------------------
        BGNMSG  ERR1
                                                            ERR1::
        JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
        ENDMSG
                                                            L10004:
                                                                    TRAP    C$MSG
;-----------------------------------------------------------------------
.SBTTL  ERROR HANDLER -- ERR3 -- DUMP THE BYTE SELECT REGISTERS
;-----------------------------------------------------------------------
        BGNMSG  ERR3
                                                            ERR3::
        JSR     PC,ERR4$
        JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
        ENDMSG
                                                            L10005:
                                                                    TRAP    C$MSG
;-----------------------------------------------------------------------
.SBTTL  ERROR HANDLER -- ERR4 -- M-LOOP TIMEOUT ERROR HANDLING
;-----------------------------------------------------------------------
        BGNMSG  ERR4
                                                            ERR4::
        MOV     R1,-(SP)                ;SAVE THE WORKING REGISTER
        MOVB    GDATA,R1                ;SAVE THIS FOR LATER
        CMPB    #17,R1                  ;WAS THIS AN M-LOOP REQUEST?
        BHIS    5$                      ;YES, THEN REPORT THE FUNCTION CODE
        PRINTX  #FMT5,<B,R1>            ;NO,  THEN IT MUST BE A BSEL1 SETTING
                                                                CLR     -(SP)
                                                                BISB    R1,(SP)
                                                                MOV     #FMT5,-(SP)
                                                                MOV     #2,-(SP)
                                                                MOV     SP,R0
                                                                TRAP    C$PNTX
                                                                ADD     #6,SP
        BR      20$

5$:     BNE     6$                      ;IF IT WAS A 17, THIS IS A 'NOP' AND
        CLR     R1                      ;  THE TEXT POINTER MUST SO REFLECT.
6$:     CMP     #7,R1                   ;IS FUNCTION CODE > 7?
        BGE     7$                      ;NO,  THAN WE CAN HANDLE IT
        MOV     #6,R1                   ;YES, THAN IT'S UNDEFINED -- SAY SO
7$:     ASL     R1                      ;CONVERT TO A WORD OFFSET
        PRINTX  #FMT5A,<B,GDATA>,TXTMLT(R1)     ;REPORT THE FAILING FUNCTION
                                                                MOV     TXTMLT(R1),-(SP)
                                                                CLR     -(SP)
                                                                BISB    GDATA,(SP)
                                                                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          .SBTTL  ERROR HANDLER -- ERR8 -- NPR REGISTER ERRORS
2961                  ;-------------------------------------------------------------------------
2962  006532          BGNMSG  ERR8
2963  006532                                                          ERR8::
2964  006532  113701  002300          MOVB    REGNUM,R1       ;THIS WAS CALCULATED TO BE A WORD OFFSET
2965  006536                          PRINTB  #FMT07,#TXTNP,TXTNPT(R1)
2966  006536  016146  021770                                                  MOV     TXTNPT(R1),-(SP)
2967  006542  012746  015745                                                  MOV     #TXTNP,-(SP)
2968  006546  012746  013476                                                  MOV     #FMT07,-(SP)
2969  006552  012746  000003                                                  MOV     #3,-(SP)
```

```
2970  006556  010600                          MOV     SP,R0
2971  006560  104414                          TRAP    C$PNTB
2972  006562  062706  000010                  ADD     #10,SP
2973  006566                  PRINTX  #FMT06A
2974  006566  012746  013542                  MOV     #FMT06A,-(SP)
2975  006572  012746  000001                  MOV     #1,-(SP)
2976  006576  010600                          MOV     SP,R0
2977  006600  104415                          TRAP    C$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$PNTX
3085  007206  062706  000022                                                    ADD     #22,SP
3086  007212  012701  003062          MOV     #W3,R1          ;POINT TO REST OF XOR'S
3087  007216                          PRINTX  #FMT16A,#TXT8C,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<      )+>,<B,(R1)
3088  007216  005046                                                            CLR     -(SP)
3089  007220  152116                                                            BISB    (R1)+,(SP)
3090  007222  005046                                                            CLR     -(SP)
3091  007224  152116                                                            BISB    (R1)+,(SP)
3092  007226  005046                                                            CLR     -(SP)
3093  007230  152116                                                            BISB    (R1)+,(SP)
3094  007232  005046                                                            CLR     -(SP)
3095  007234  152116                                                            BISB    (R1)+,(SP)
3096  007236  005046                                                            CLR     -(SP)
3097  007240  152116                                                            BISB    (R1)+,(SP)
3098  007242  005046                                                            CLR     -(SP)
3099  007244  152116                                                            BISB    (R1)+,(SP)
3100  007246  012746  015370                                                    MOV     #TXT8C,-(SP)
3101  007252  012746  014032                                                    MOV     #FMT16A,-(SP)
3102  007256  012746  000010                                                    MOV     #10,-(SP)
3103  007262  010600                                                            MOV     SP,R0
3104  007264  104415                                                            TRAP    C$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                  ;-------------------------------------------------------------------------
3171                  .SBTTL  ERROR HANDLER -- ERR12 -- NPR EXTENDED ADDRESSING ERROR HANDLER
3172  007456          ;-------------------------------------------------------------------------
3173  007456                  BGNMSG  ERR12
3174  007456                                                          ERR12::
3175  007456  012746  007672          PRINTX  #FMT12          ;PRINT FIRST HEADING LINE
3176  007462  012746  000001                                                  MOV     #FMT12,-(SP)
3177  007466  010600                                                          MOV     #1,-(SP)
3178  007470  104415                                                          MOV     SP,R0
3179  007472  062706  000004                                                  TRAP    C$PNTX
3180  007476                                                                  ADD     #4,SP
3181  007476  012746  007732          PRINTX  #FMT12A         ;PRINT SECOND HEADING LINE
3182  007502  012746  000001                                                  MOV     #FMT12A,-(SP)
3183  007506  010600                                                          MOV     #1,-(SP)
3184  007510  104415                                                          MOV     SP,R0
3185  007512  062706  000004                                                  TRAP    C$PNTX
3186                                                                          ADD     #4,SP
3187  007516  004737  012162                          ;PRINT ADDRESS, CONTROL, & EXPECTED DATA
3188  007522          JSR     PC,XORGB        ;GENERATE EXCLUSIVE OR OF EXPECTED & READ DATA
3189  007522  013746  002260          PRINTX  #FMT12D,<3,TMPF+1>,#0,#0,<3,TMP2>,GDATA,BDATA,XDATA
3190  007526  013746  002256                                                  MOV     XDATA,-(SP)
3191  007532  013746  002254                                                  MOV     BDATA,-(SP)
3192  007536  005046                                                          MOV     GDATA,-(SP)
3193  007540  153716  002416                                                  CLR     -(SP)
                                                                            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
3247  010310  010600
3248  010312  104415
3249  010314  062706  000004
3250  010320
3251  010320  012746  010721          PRINTX  #FMT13D
3252  010324  012746  000001
3253  010330  010600
3254  010332  104415
3255  010334  062706  000004
3256  010340
3257  010340  013746  002420          PRINTX  #FMT11,TMP0,TMP1,TMP2,TMP3
3258  010344  013746  002416
3259  010350  013746  002414
3260  010354  013746  002412
3261  010360  012746  013770
3262  010364  012746  000005
3263  010370  010600
3264  010372  104415
3265  010374  062706  000014
3266  010400
3267  010400  013746  002430          PRINTX  #FMT13E,TMP4,TMP5,TMP6,TMP7
3268  010404  013746  002426
3269  010410  013746  002424
3270  010414  013746  002422
3271  010420  012746  010764
3272  010424  012746  000005
3273  010430  010600
3274  010432  104415
3275  010434  062706  000014
3276  010440                          PRINTX  #FMT11,REG0,REG1,REG2,REG3
3277  010440  013746  002400
3278  010444  013746  002376
3279  010450  013746  002374
3280  010454  013746  002372
3281  010460  012746  013770
3282  010464  012746  000005
3283  010470  010600
3284  010472  104415
3285  010474  062706  000014
3286  010500                          PRINTX  #FMT13E,REG4,REG5,REG6,REG7
3287  010500  013746  002410
3288  010504  013746  002406
3289  010510  013746  002404
3290  010514  013746  002402
3291  010520  012746  010764
3292  010524  012746  000005
3293  010530  010600
3294  010532  104415
3295  010534  062706  000014
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
```

```
                MOV     #FMT13C,-(SP)
                MOV     #1,-(SP)
                MOV     SP,R0
                TRAP    C$PNTX
                ADD     #4,SP

                MOV     #FMT13D,-(SP)
                MOV     #1,-(SP)
                MOV     SP,R0
                TRAP    C$PNTX
                ADD     #4,SP

                MOV     TMP3,-(SP)
                MOV     TMP2,-(SP)
                MOV     TMP1,-(SP)
                MOV     TMP0,-(SP)
                MOV     #FMT11,-(SP)
                MOV     #5,-(SP)
                MOV     SP,R0
                TRAP    C$PNTX
                ADD     #14,SP

                MOV     TMP7,-(SP)
                MOV     TMP6,-(SP)
                MOV     TMP5,-(SP)
                MOV     TMP4,-(SP)
                MOV     #FMT13E,-(SP)
                MOV     #5,-(SP)
                MOV     SP,R0
                TRAP    C$PNTX
                ADD     #14,SP

                MOV     REG3,-(SP)
                MOV     REG2,-(SP)
                MOV     REG1,-(SP)
                MOV     REG0,-(SP)
                MOV     #FMT11,-(SP)
                MOV     #5,-(SP)
                MOV     SP,R0
                TRAP    C$PNTX
                ADD     #14,SP

                MOV     REG7,-(SP)
                MOV     REG6,-(SP)
                MOV     REG5,-(SP)
                MOV     REG4,-(SP)
                MOV     #FMT13E,-(SP)
                MOV     #5,-(SP)
                MOV     SP,R0
                TRAP    C$PNTX
                ADD     #14,SP
```

```
                                .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  /%O8%O8%O8%O8/
                                .LIST   BEX
        011002                  .EVEN
                                ;-----------------------------------------------------------------------
                                .SBTTL  ERROR HANDLER -- ERR14 -- NPR REGISTER LOAD ERROR HANDLER
                                ;-----------------------------------------------------------------------
011002                          BGNMSG  ERR14
011002                                                                          ERR14::
011002 010146                   MOV     R1,-(SP)        ;SAVE GENERAL REGISTER
011004 013701 002300            MOV     REGNUM,R1
011010 006301                   ASL     R1              ;CONVERT REG # TO WORD INDEX
011012                          PRINTB  #FMT07,#TXTNP,TXTNPT(R1)
011012 016146 021770                                                            MOV     TXTNPT(R1),-(SP)
011016 012746 015745                                                            MOV     #TXTNP,-(SP)
011022 012746 013476                                                            MOV     #FMT07,-(SP)
011026 012746 000003                                                            MOV     #3,-(SP)
011032 010600                                                                   MOV     SP,R0
011034 104414                                                                   TRAP    C$PNTB
011036 062706 000010                                                            ADD     #10,SP
011042 004737 012162                    JSR     PC,XORGB
                                                                ;DATA: GOOD, BAD, & XOR
011046 023727 002300 000006             CMP     REGNUM,#6       ;IF EXTENDED ADDRESS BYTE, USE BYTE PRINT
011054 001423                           BEQ     5$
011056 023727 002300 000003             CMP     REGNUM,#3
011064 001417                           BEQ     5$
                                                                ;ELSE, USE WORD PRINTS
011066                                  PRINTX  #FMT10,GDATA,BDATA,XDATA
011066 013746 002260                                                            MOV     XDATA,-(SP)
011072 013746 002256                                                            MOV     BDATA,-(SP)
011076 013746 002254                                                            MOV     GDATA,-(SP)
011102 012746 013714                                                            MOV     #FMT10,-(SP)
011106 012746 000004                                                            MOV     #4,-(SP)
011112 010600                                                                   MOV     SP,R0
011114 104415                                                                   TRAP    C$PNTX
011116 062706 000012                                                            ADD     #12,SP
011122 000421                           BR      10$             ;BYPASS BYTE PRINTS IF WORD PRINTS USED
                                5$:     PRINTX  #FMT02A,<B,GDATA>,<B,BDATA>,<B,XDATA>
011124 005046                                                                   CLR     -(SP)
011126 153716 002260                                                            BISB    XDATA,(SP)
011132 005046                                                                   CLR     -(SP)
011134 153716 002256                                                            BISB    BDATA,(SP)
011140 005046                                                                   CLR     -(SP)
011142 153716 002254                                                            BISB    GDATA,(SP)
011146 012746 013127                                                            MOV     #FMT02A,-(SP)
011152 012746 000004                                                            MOV     #4,-(SP)
011156 010600                                                                   MOV     SP,R0
011160 104415                                                                   TRAP    C$PNTX
011162 062706 000012                                                            ADD     #12,SP
011166 004737 013076            10$:    JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
011172 012601                           MOV     (SP)+,R1        ;RESTORE GENERAL REGISTER
```

```
3350  011174                          ENDMSG
3351  011174                                                                  L10015:
3352  011174  104423                                                                 TRAP    C$MSG
3353
3354                                  ;-------------------------------------------------------------------------
3355                                  .SBTTL  ERROR HANDLER -- ERR51 -- FOR REPORTING TIMER # 2 ERRORS
3356                                  ;-------------------------------------------------------------------------
3357  011176                          BGNMSG  ERR51
3358  011176                                                                  ERR51::
3359  011176  010146                  MOV     R1,-(SP)        ;SAVE R1 FOR CALLER
3360  011200  113701  002441          MOVB    TMPB+1,R1       ;GET THE MODE LAST SETUP
3361  011204  000241                  CLC                     ;SEEING AS THE CARRY BIT WILL BE ROTATED INTO
3362                                                          ;THE DATA, WE HAD BETTER CLEAR IT JUST IN CASE.
3363  011206  042701  177737          BIC     #^C<BIT5>,R1    ;LOOK @ JUST THE TIMER 2 MODE DEFINITION
3364  011212  106101                  ROLB    R1              ;POSITION IT FOR PRINTOUT
3365  011214  106101                  ROLB    R1
3366  011216  106101                  ROLB    R1
3367  011220  106101                  ROLB    R1
3368
3369                                  ;IDENTIFY THE MODE BEING USED AT THE TIME, AND THE VALUES THAT WERE
3370                                  ;LOADED INTO THE LATCHES:
3371
3372  011222                          PRINTX  #FMT51A,R1,<B,TMP9+1>,<B,TMP8+1>
3373  011222  005046                                                                 CLR     -(SP)
3374  011224  153716  002433                                                       BISB    TMP8+1,(SP)
3375  011230  005046                                                                 CLR     -(SP)
3376  011232  153716  002435                                                       BISB    TMP9+1,(SP)
3377  011236  010146                                                                 MOV     R1,-(SP)
3378  011240  012746  014673                                                       MOV     #FMT51A,-(SP)
3379  011244  012746  000004                                                       MOV     #4,-(SP)
3380  011250  010600                                                                 MOV     SP,R0
3381  011252  104415                                                                 TRAP    C$PNTX
3382  011254  062706  000012                                                       ADD     #12,SP
3383  011260  004737  013076                  JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3384  011264  012601                          MOV     (SP)+,R1        ;RESTORE R1 FOR CALLER
3385  011266                                  ENDMSG
3386  011266                                                                  L10016:
3387  011266  104423                                                                 TRAP    C$MSG
3388                                  ;-------------------------------------------------------------------------
3389                                  .SBTTL  ERROR HANDLER -- ERR52 -- PROCESS SHIFT REGISTER ERROR MESSAGES
3390                                  ;-------------------------------------------------------------------------
3391  011270                          BGNMSG  ERR52
3392  011270                                                                  ERR52::
3393  011270  004537  003616          JSR     R5,READ         ;GET CURRENT VALUES WITHIN ACR & PCR
3394  011274  120013                  ACR
3395  011276  002440                  TMPB
3396  011300  004537  003616          JSR     R5,READ
3397  011304  120014                  PCR
3398  011306  002442                  TMPC
3399  011310                          PRINTX  #FMT52H
3400  011310  012746  011514                                                       MOV     #FMT52H,-(SP)
3401  011314  012746  000001                                                       MOV     #1,-(SP)
3402  011320  010600                                                                 MOV     SP,R0
3403  011322  104415                                                                 TRAP    C$PNTX
3404  011324  062706  000004                                                       ADD     #4,SP
3405  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                                      ;-----------------------------------------------------------------
```

```
3457
3458
3459
3460
3461  011720
3462  011720
3463  011720
3464  011720  012746  012034
3465  011724  012746  000001
3466  011730  010600
3467  011732  104415
3468  011734  062706  000004
3469  011740
3470  011740  012746  012073
3471  011744  012746  000001
3472  011750  010600
3473  011752  104415
3474  011754  062706  000004
3475  011760  005003
3476  011762
3477  011762  016346  032610
3478  011766  016346  032572
3479  011772  016346  032554
3480  011776  012746  012134
3481  012002  012746  000004
3482  012006  010600
3483  012010  104415
3484  012012  062706  000012
3485  012016  005723
3486  012020  020327  000016
3487  012024  001356
3488  012026  004737  013076
3489  012032
3490  012032
3491  012032  104423
3492
      012034  047045  051445  022463
      012073     045  022516  031523
      012134  047045  051445  022462
3493          012162
```

```
;-------------------------------------------------------------
.SBTTL  ERROR HANDLER -- ERR60 -- NPR WRITE-EXTENDED BIT ERRORS
;-------------------------------------------------------------
        BGNMSG  ERR60                                   ERR60::
        PRINTX  #FMT60                                          MOV     #FMT60,-(SP)
                                                                MOV     #1,-(SP)
                                                                MOV     SP,R0
                                                                TRAP    C$PNTX
                                                                ADD     #4,SP
        PRINTX  #FMT61                                          MOV     #FMT61,-(SP)
                                                                MOV     #1,-(SP)
                                                                MOV     SP,R0
                                                                TRAP    C$PNTX
                                                                ADD     #4,SP
        CLR     R3                      ;CLEAR INDEX
10$:    PRINTX  #FMT62,XLOC0(R3),XVAL0(R3),RXVAL0(R3)           MOV     RXVAL0(R3),-(SP)
                                                                MOV     XVAL0(R3),-(SP)
                                                                MOV     XLOC0(R3),-(SP)
                                                                MOV     #FMT62,-(SP)
                                                                MOV     #4,-(SP)
                                                                MOV     SP,R0
                                                                TRAP    C$PNTX
                                                                ADD     #12,SP
        TST     (R3)+                   ;BUMP INDEX
        CMP     R3,#14.
        BNE     10$
        JSR     PC,NULERR
        ENDMSG                                          L10020:
                                                                TRAP    C$MSG
.NLIST  BEX
FMT60:  .ASCIZ /%N%S3%AXLOC%S6%AXVAL%S6%ARXVAL/
FMT61:  .ASCIZ /%N%S3%A----%S6%A----%S6%A-----%N/
FMT62:  .ASCIZ /%N%S2%06%S4%06%S4%06/
.LIST   BEX
.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$:  PRINTX  #FMT4,#TXT3,#TXT1
012206  012746  014761                          MOV     #TXT1,-(SP)
012212  012746  015162                          MOV     #TXT3,-(SP)
012216  012746  013213                          MOV     #FMT4,-(SP)
012222  012746  000003                          MOV     #3,-(SP)
012226  010600                                  MOV     SP,R0
012230  104415                                  TRAP    C$PNTX
012232  062706  000010                          ADD     #10,SP
012236                          PRINTX  #FMT4A,<B,BSR0>,<B,BSR1>,<B,BSR2>,<B,BSR3>
012236  005046                                  CLR     -(SP)
012240  153716  002220                          BISB    BSR3,(SP)
012244  005046                                  CLR     -(SP)
012246  153716  002216                          BISB    BSR2,(SP)
012252  005046                                  CLR     -(SP)
012254  153716  002214                          BISB    BSR1,(SP)
012260  005046                                  CLR     -(SP)
012262  153716  002212                          BISB    BSR0,(SP)
012266  012746  013253                          MOV     #FMT4A,-(SP)
012272  012746  000005                          MOV     #5,-(SP)
012276  010600                                  MOV     SP,R0
012300  104415                                  TRAP    C$PNTX
012302  062706  000014                          ADD     #14,SP
012306                          PRINTX  #FMT4B,#TXT2
012306  012746  015017                          MOV     #TXT2,-(SP)
012312  012746  013306                          MOV     #FMT4B,-(SP)
012316  012746  000002                          MOV     #2,-(SP)
012322  010600                                  MOV     SP,R0
012324  104415                                  TRAP    C$PNTX
012326  062706  000006                          ADD     #6,SP
012332                          PRINTX  #FMT4C,<B,BSR4>,<B,BSR5>,<B,BSR6>,<B,BSR7>
012332  005046                                  CLR     -(SP)
012334  153716  002230                          BISB    BSR7,(SP)
012340  005046                                  CLR     -(SP)
```

```
3550  012342  153716  002226                                        BISB    BSR6,(SP)
3551  012346  005046                                                CLR     -(SP)
3552  012350  153716  002224                                        BISB    BSR5,(SP)
3553  012354  005046                                                CLR     -(SP)
3554  012356  153716  002222                                        BISB    BSR4,(SP)
3555  012362  012746  013313                                        MOV     #FMT4C,-(SP)
3556  012366  012746  000005                                        MOV     #5,-(SP)
3557  012372  010600                                                MOV     SP,R0
3558  012374  104415                                                TRAP    C$PNTX
3559  012376  062706  000014                                        ADD     #14,SP
3560  012402
3561  012402  012746  015061                                        MOV     #TXT2A,-(SP)
3562  012406  012746  013306                                        MOV     #FMT4B,-(SP)
3563  012412  012746  000002                                        MOV     #2,-(SP)
3564  012416  010600                                                MOV     SP,R0
3565  012420  104415                                                TRAP    C$PNTX
3566  012422  062706  000006                                        ADD     #6,SP
3567  012426
3568  012426  005046                                                CLR     -(SP)
3569  012430  153716  002240                                        BISB    BSR13,(SP)
3570  012434  005046                                                CLR     -(SP)
3571  012436  153716  002236                                        BISB    BSR12,(SP)
3572  012442  005046                                                CLR     -(SP)
3573  012444  153716  002234                                        BISB    BSR11,(SP)
3574  012450  005046                                                CLR     -(SP)
3575  012452  153716  002232                                        BISB    BSR10,(SP)
3576  012456  012746  013253                                        MOV     #FMT4A,-(SP)
3577  012462  012746  000005                                        MOV     #5,-(SP)
3578  012466  010600                                                MOV     SP,R0
3579  012470  104415                                                TRAP    C$PNTX
3580  012472  062706  000014                                        ADD     #14,SP
3581  012476
3582  012476  012746  015120                                        MOV     #TXT2B,-(SP)
3583  012502  012746  013306                                        MOV     #FMT4B,-(SP)
3584  012506  012746  000002                                        MOV     #2,-(SP)
3585  012512  010600                                                MOV     SP,R0
3586  012514  104415                                                TRAP    C$PNTX
3587  012516  062706  000006                                        ADD     #6,SP
3588  012522
3589  012522  005046                                                CLR     -(SP)
3590  012524  153716  002250                                        BISB    BSR17,(SP)
3591  012530  005046                                                CLR     -(SP)
3592  012532  153716  002246                                        BISB    BSR16,(SP)
3593  012536  005046                                                CLR     -(SP)
3594  012540  153716  002244                                        BISB    BSR15,(SP)
3595  012544  005046                                                CLR     -(SP)
3596  012546  153716  002242                                        BISB    BSR14,(SP)
3597  012552  012746  013313                                        MOV     #FMT4C,-(SP)
3598  012556  012746  000005                                        MOV     #5,-(SP)
3599  012562  010600                                                MOV     SP,R0
3600  012564  104415                                                TRAP    C$PNTX
3601  012566  062706  000014                                        ADD     #14,SP
3602  012572  000207          RTS     PC
3603
3604
3605
```

```
PRINTX  #FMT4B,#TXT2A

PRINTX  #FMT4A,<B,BSR10>,<B,BSR11>,<B,BSR12>,<B,BSR13>

PRINTX  #FMT4B,#TXT2B

PRINTX  #FMT4C,<B,BSR14>,<B,BSR15>,<B,BSR16>,<B,BSR17>
```

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

```
3606
3607
3608
3609  012574
3610  012574  012746  013124  ERR9$:  PRINTX  #NEWLIN          ;WHEN CALLED FROM TEST, START A NEW LINE
                                        MOV     #NEWLIN,-(SP)
3611  012600  012746  000001          MOV     #1,-(SP)
3612  012604  010600                  MOV     SP,R0
3613  012606  104415                  TRAP    C$PNTX
3614  012610  062706  000004          ADD     #4,SP
3615  012614  005237  002300  ERR9.:  INC     REGNUM           ;CONVERT INDEX TO ELEMENT #
3616  012620                          PRINTX  #FMT09,REGNUM    ;IDENTIFY DATA PATTERN OFFSET
3617  012620  013746  002300          MOV     REGNUM,-(SP)
3618  012624  012746  013621          MOV     #FMT09,-(SP)
3619  012630  012746  000002          MOV     #2,-(SP)
3620  012634  010600                  MOV     SP,R0
3621  012636  104415                  TRAP    C$PNTX
3622  012640  062706  000006          ADD     #6,SP
3623  012644  004737  012162          JSR     PC,XORGB
3624  012650                          PRINTX  #FMT10,GDATA,BDATA,XDATA  ;DATA: GOOD, BAD, & XOR
3625  012650  013746  002260          MOV     XDATA,-(SP)
3626  012654  013746  002256          MOV     BDATA,-(SP)
3627  012660  013746  002254          MOV     GDATA,-(SP)
3628  012664  012746  013714          MOV     #FMT10,-(SP)
3629  012670  012746  000004          MOV     #4,-(SP)
3630  012674  010600                  MOV     SP,R0
3631  012676  104415                  TRAP    C$PNTX
3632  012700  062706  000012          ADD     #12,SP
3633  012704                          PRINTX  #FMT09A,TDATA    ;LSI ADDRESS
3634  012704  013746  002252          MOV     TDATA,-(SP)
3635  012710  012746  013673          MOV     #FMT09A,-(SP)
3636  012714  012746  000002          MOV     #2,-(SP)
3637  012720  010600                  MOV     SP,R0
3638  012722  104415                  TRAP    C$PNTX
3639  012724  062706  000006          ADD     #6,SP
3640  012730  000207                  RTS     PC
3641
3642
3643
3644
3645
3646
3647  012732
3648  012732  012746  013124  ERR10$: PRINTX  #NEWLIN          ;WHEN CALLED FROM TEST, START A NEW LINE
                                        MOV     #NEWLIN,-(SP)
3649  012736  012746  000001          MOV     #1,-(SP)
3650  012742  010600                  MOV     SP,R0
3651  012744  104415                  TRAP    C$PNTX
3652  012746  062706  000004          ADD     #4,SP
3653  012752  005237  002300  ERR10.: INC     REGNUM           ;CONVERT INDEX TO ELEMENT #
3654  012756                          PRINTX  #FMT09,REGNUM    ;IDENTIFY DATA PATTERN OFFSET
3655  012756  013746  002300          MOV     REGNUM,-(SP)
3656  012762  012746  013621          MOV     #FMT09,-(SP)
3657  012766  012746  000002          MOV     #2,-(SP)
3658  012772  010600                  MOV     SP,R0
3659  012774  104415                  TRAP    C$PNTX
3660  012776  062706  000006          ADD     #6,SP
3661  013002  004737  012162          JSR     PC,XORGB
```

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

COMMON ERROR 9 ROUTINE TO IDENTIFY THE FAILING ADDRESS & DATA

COMMON ERROR 10 ROUTINE TO IDENTIFY THE FAILING ADDRESS & DATA

```
3662  013006
3663  013006  005046
3664  013010  153716  002260
3665  013014  005046
3666  013016  153716  002256
3667  013022  005046
3668  013024  153716  002254
3669  013030  012746  013127
3670  013034  012746  000004
3671  013040  010600
3672  013042  104415
3673  013044  062706  000012
3674  013050
3675  013050  013746  002252
3676  013054  012746  013673
3677  013060  012746  000002
3678  013064  010600
3679  013066  104415
3680  013070  062706  000006
3681  013074  000207
3682
3683
3684
3685
3686
3687  013076
3688  013076  012746  013120
3689  013102  012746  000001
3690  013106  010600
3691  013110  104414
3692  013112  062706  000004
3693  013116  000207
3694
```

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

        PRINTX  #FMT02A,<B,GDATA>,<B,BDATA>,<B,XDATA>  ;DATA: GOOD, BAD, & XOR
                                                              CLR     -(SP)
                                                              BISB    XDATA,(SP)
                                                              CLR     -(SP)
                                                              BISB    BDATA,(SP)
                                                              CLR     -(SP)
                                                              BISB    GDATA,(SP)
                                                              MOV     #FMT02A,-(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          SUBROUTINE TO PERFORM 'PRINTB   #ENDEMB'
;-------------------------------------------------------------------------------

NULERR: PRINTB  #ENDEMB         ;TERMINATE ERROR MESSAGE
                                                              MOV     #ENDEMB,-(SP)
                                                              MOV     #1,-(SP)
                                                              MOV     SP,R0
                                                              TRAP    C$PNTB
                                                              ADD     #4,SP
        RTS     PC
;-------------------------------------------------------------------------------
```

```
                                .SBTTL  FORMAT SPEC'S FOR ERROR HANDLERS -- 'FMT___''
                                ;-----------------------------------------------------------------------
                                ;---------- FORMAT SPEC'S USED BY ERROR HANDLERS ------------------------
                                ;-----------------------------------------------------------------------
                                .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%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:      /
```

```
CVDMBA.P11    18-DEC-80 15:53          TEXT STRINGS FOR ERROR HANDLERS -- 'TXT___''

        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
```

```
3769  022140  104436                                                          TRAP    C$CVEC
3770
3771                          ;  AT THIS POINT, IF A CONSOLE TERMINAL IS PRESENT, ''CONSOL'' WILL BE ZERO.
3772                          ;  IF NO CONSOLE TERMINAL EXISTS (OR AT LEAST NOT AT THE STANDARD ADDRESS),
3773                          ;       ''CONSOL'' WILL BE NON-ZERO (-1).
3774
3775  022142  005737  002314          TST     CONSOL          ;IF CONSOLE TERMINAL ISN'T THERE,
3776  022146  001412                  BEQ     5$
3777  022150                          PRINTF  #CFMTO,#NPROTS  ;TELL THE OPERATOR WHAT TESTING WON'T BE DONE
3778  022150  012746  000004                                                  MOV     #NPROTS,-(SP)
3779  022154  012746  022566                                                  MOV     #CFMTO,-(SP)
3780  022160  012746  000002                                                  MOV     #2,-(SP)
3781  022164  010600                                                          MOV     SP,R0
3782  022166  104417                                                          TRAP    C$PNTF
3783  022170  062706  000006                                                  ADD     #6,SP
3784  022174                  5$:
3785                          ;*** ENTER HERE IF ''RESTART'' COMMAND ISSUED
3786
3787  022174  005037  002306  RESTRT: CLR     STARES          ;CLEAR FLAG TO SHOW JUST HAD STA OR RES
3788  022200  005037  002310          CLR     DEVMAP          ;CLEAR DEVICE MAP
3789
3790  022204                  NEWST:          ;ENTER HERE BEFORE EACH TEST
3791
3792  022204  012737  177777  002266          MOV     #-1,LOGDEV      ;RESET LOGICAL DEVICE TO -1
3793  022212  005237  002306                  INC     STARES          ;INC # OF PASSES SINCE STA OR RES
3794  022216  005237  002304                  INC     FRSPAS          ;INCREMENT NO. OF PASSES AFTER LOAD
3795  022222  012737  000001  002312          MOV     #BIT0,DEVPTR    ;INIT DEVICE MAP BIT POINTER
3796                          ; GET UNIBUS ADDRESS, VECTOR, PRIORITY LEVEL, SWITCH PACKS, TEST
3797                          ;   CONNECTOR INFORMATION FOR THIS LOGICAL DEVICE
3798  022230                  GETPRM:
3799  022230  005237  002266          INC     LOGDEV          ;INCREMENT LOGICAL DEVICE NUMBER
3800  022234                          GPHARD  LOGDEV,R1       ;GET P-TABLE POINTER INTO R1
3801  022234  013700  002266                                                  MOV     LOGDEV,R0
3802  022240  104442                                                          TRAP    C$GPHRD
3803  022242  010001                                                          MOV     R0,R1
3804  022244                          BCOMPLETE  10$          ;BR IF DEVICE AVAILABLE
3805  022244  103403                                                          BCS     10$
3806  022246  006337  002312          ASL     DEVPTR          ;IF UN-AVAILABLE, SHIFT DEVICE MAP BIT POINTER
3807  022252  000766                  BR      GETPRM          ;       AND SKIP THIS DEVICE
3808
3809  022254  053737  002312  002310  10$:    BIS     DEVPTR,DEVMAP   ;ELSE, SET BIT FOR THIS DEVICE IN DEVICE MAP
3810  022262  006337  002312          ASL     DEVPTR          ;SHIFT DEVICE MAP BIT POINTER
3811
3812                          ;  ''R1'' WAS RETURNED WITH A POINTER TO THE CURRENT ''P-TABLE''
3813
3814  022266  012100                  MOV     (R1)+,R0        ;GET THE DEVICE CSR ADDRESS
3815  022270  012703  000020          MOV     #16.,R3         ;WE HAVE TO SETUP THIS MANY ADDRESS POINTERS
3816  022274  012702  002320          MOV     #MPCSR,R2       ;THIS IS THE ADDRESS OF THE FIRST POINTER
3817  022300  010022                  12$:    MOV     R0,(R2)+        ;SETUP ONE CSR POINTER
3818  022302  005200                  INC     R0              ;POINT TO THE NEXT CSR ADDRESS
3819  022304  077303                  SOB     R3,12$          ;LOOP AS LONG AS THERE ARE MORE TABLE ENTRIES
3820                                                          ;ELSE,  FALL THROUGH TO CONTINUE GETTING MORE
3821                                                          ;       P-TABLE DATA
3822
3823  022306  012100                  MOV     (R1)+,R0        ;GET INTERRUPT VECTOR
3824  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::
                        
                                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
```

```
                        .SBTTL CLEANUP CODING SECTION

                        ;////////////////////////////////////////////////////////////////////////
                        ;/ THE CLEANUP CODING SECTION CONTAINS THE CODING THAT IS PERFORMED
                        ;/ AT THE END OF THE TEST SEQUENCE ON A PARTICULAR UNIT.
                        ;////////////////////////////////////////////////////////////////////////

023140                          BGNCLN
023140                                                                  L$CLEAN::
023140                          CLRVEC  @#MPIVEC        ;RETURN VECTORS TO SUPERVISOR
023140  013700  002360                                                  MOV     @#MPIVEC,R0
023144  104436                                                          TRAP    C$CVEC
023146                          CLRVEC  @#MPOVEC
023146  013700  002362                                                  MOV     @#MPOVEC,R0
023152  104436                                                          TRAP    C$CVEC
023154                          ENDCLN
023154                                                                  L10024:
023154  104412                                                          TRAP    C$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
                                                                        LSAU::
                                        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
```

```
4065  023200  000700                                                    .WORD   L10027-.
4066  023202  004537  004630        1$:     JSR     R5,INITT2       ;INITIALIZE TIMER # 2
4067  023206  002000                        2000                    ;  2000 ==> LATCHES  (PREVENTS IMMED. TIMEOUT)
4068  023210  000000                        0                       ;  MODE 0 & 'T2' INT. ENABLE FLAG CLEARED
4069  023212  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
4070  023214                                ERROR                   ;ELSE, REPORT IT
4071  023214  104460                                                                TRAP    C$ERROR
4072  023216                                ESCAPE  TST             ;       AND EXIT THIS TEST
4073  023216  104410                                                                TRAP    C$ESCAPE
4074  023220  000660                                                                .WORD   L10027-.
4075  023222  004737  024134                JSR     PC,GETT2        ;IS 'T2' SET?
4076  023226  102002                        BVC     .+6             ;IF NO ERROR, PROCEED
4077  023230                                ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4078  023230  104410                                                                TRAP    C$ESCAPE
4079  023232  000644                                                                .WORD   L10030-.
4080  023234  103033                        BCC     6$              ;NO, GOOD.
4081  023236                                GEDF    EM51B,ERR51     ;YES, REPORT IT'S NOT BEING CLEARED @ INIT.
4082                                                                ;       'DEVICE FATAL' ERROR # 9
4083  023236  104455                                                                TRAP    C$ERDF
4084  023240  000011                                                                .WORD   9
4085  023242  020734                                                                .WORD   EM51B
4086  023244  011176                                                                .WORD   ERR51
4087
4088                                  ;-------------------------------------------------------------------
4089
4090  023246  112737  000002  002435        MOVB    #2,TMP9+1
4091  023254  004537  004042                JSR     R5,WRITE        ;INIT TIMER # 2 BY WRITING INTO
4092  023260  120011                        T2CH                    ;T2C-H (ADDR 09)
4093  023262  002435                        TMP9+1
4094  023264  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
4095  023266                                ERROR                   ;ELSE, REPORT IT
4096  023266  104460                                                                TRAP    C$ERROR
4097  023270                                ESCAPE  TST             ;       AND EXIT THIS TEST
4098  023270  104410                                                                TRAP    C$ESCAPE
4099  023272  000606                                                                .WORD   L10027-.
4100  023274  004737  024134                JSR     PC,GETT2        ;IS 'T2' SET?
4101  023300  102002                        BVC     .+6             ;IF NO ERROR, PROCEED
4102  023302                                ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4103  023302  104410                                                                TRAP    C$ESCAPE
4104  023304  000572                                                                .WORD   L10030-.
4105  023306  103006                        BCC     6$              ;NO, GOOD.
4106  023310                                GEDF    EM51B,ERR51     ;YES, REPORT IT'S NOT BEING CLEARED @ INIT.
4107                                                                ;       'DEVICE FATAL' ERROR # 10
4108  023310  104455                                                                TRAP    C$ERDF
4109  023312  000012                                                                .WORD   10
4110  023314  020734                                                                .WORD   EM51B
4111  023316  011176                                                                .WORD   ERR51
4112  023320                                ESCAPE  SUB             ;AND EXIT SUBTEST
4113  023320  104410                                                                TRAP    C$ESCAPE
4114  023322  000554                                                                .WORD   L10030-.
4115
4116                                  ;-------------------------------------------------------------------
4117
4118  023324  004537  024102    6$:     JSR     R5,LODT2C       ;LOAD TIMER # 2
4119  023330     252    7$:     .BYTE   252
4120  023331     252    8$:     .BYTE   252
```

```
                                        ;------------------------------------------------------------------------
023332  004537  003616                          JSR     R5,READ         ;READ THE LOW COUNTER
023336  120010                                  T2CL
023340  002432                                  TMP8
023342  103003                                  BCC     .+10            ;IF NO ERROR, PROCEED
023344                                          ERROR                   ;ELSE, REPORT IT
023344  104460                                                                                  TRAP    C$ERROR
023346                                          ESCAPE  TST             ;       AND EXIT THIS TEST
023346  104410                                                                                  TRAP    C$ESCAPE
023350  000530                                                                                  .WORD   L10027-.
023352  123737  002432  023330                  CMPB    TMP8,7$         ;MAKE SURE THE COUNTER IS DECREMENTING
023360  001004                                  BNE     12$             ;IT IS, NOW SEE IF THE HIGH COUNTER IS TOO
023362                                          GEDF    EM50D,ERR51     ;IT WASN'T -- REPORT THE ERROR
                                                                        ;       'DEVICE FATAL'' ERROR # 11
023362  104455                                                                                  TRAP    C$ERDF
023364  000013                                                                                  .WORD   11
023366  017453                                                                                  .WORD   EM50D
023370  011176                                                                                  .WORD   ERR51
023372  012703  000100          12$:            MOV     #100,R3         ;INIT. TIMEOUT VALUE
023376  004537  003616          13$:            JSR     R5,READ         ;READ THE HIGH COUNTER
023402  120011                                  T2CH
023404  002434                                  TMP9
023406  103003                                  BCC     .+10            ;IF NO ERROR, PROCEED
023410                                          ERROR                   ;ELSE, REPORT IT
023410  104460                                                                                  TRAP    C$ERROR
023412                                          ESCAPE  TST             ;       AND EXIT THIS TEST
023412  104410                                                                                  TRAP    C$ESCAPE
023414  000464                                                                                  .WORD   L10027-.
023416  123737  002434  023331                  CMPB    TMP9,8$         ;DID IT CHANGE FROM THE LOADED VALUE?
023424  001007                                  BNE     14$             ;YES, PROCEED WITH TESTING
023426  077315                                  SOB     R3,13$          ;NO,  IF NO TIMEOUT, TRY AGAIN
023430                                          GEDF    EM51E,ERR51     ;ELSE, REPORT THAT HIGH COUNTER ISN'T RUNNING
                                                                        ;       'DEVICE FATAL'' ERROR # 12
023430  104455                                                                                  TRAP    C$ERDF
023432  000014                                                                                  .WORD   12
023434  021050                                                                                  .WORD   EM51E
023436  011176                                                                                  .WORD   ERR51
023440                                          ESCAPE  SUB             ;       WE CAN'T PROCEED WITH TESTING EITHER
023440  104410                                                                                  TRAP    C$ESCAPE
023442  000434                                                                                  .WORD   L10030-.
                                        ;------------------------------------------------------------------------

023444  005003                  14$:            CLR     R3              ;INITIALIZE TIMEOUT COUNTER
023446  004737  024134          15$:            JSR     PC,GETT2        ;WAIT FOR TIMER TO COUNT DOWN
023452  102002                                  BVC     .+6             ;IF NO ERROR, PROCEED
023454                                          ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
023454  104410                                                                                  TRAP    C$ESCAPE
023456  000420                                                                                  .WORD   L10030-.
023460  103406                                  BCS     16$             ;DONE.
023462  077307                                  SOB     R3,15$          ;NOT YET, TIMEOUT?
023464                                          GEDF    EM51P,ERR51     ;YES, REPORT NO 'T2'' INT. FLAG
                                                                        ;       'DEVICE FATAL'' ERROR # 13
023464  104455                                                                                  TRAP    C$ERDF
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
4290  023742  104410                ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
                                                                      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
```

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

                                                                        .WORD   ERR51

34$:    JSR     R5,INITT2       ;RE-INITIALIZE TIMER # 1 W/ NORMAL RESET VALUES
        0
        0
        BCC     .+4             ;IF NO ERROR, EXIT
        ERROR                   ;ELSE, REPORT IT
                                                                        TRAP    C$ERROR

        ENDSUB
                                                                L10030:
                                                                        TRAP    C$ESUB

        ENDTST
                                                                L10027:
                                                                        TRAP    C$ETST

;-------------------------------------------------------------------------------
; LODT2C -- LOAD TIMER TWO AT ADDRESSES 08 & 09
;
; CALLING SEQUENCE:
;
;       JSR     R5,LODT2C
;       .BYTE   <VALUE FOR T2L-L (ADDRESS 08)>
;       .BYTE   <VALUE FOR T2C-H (ADDRESS 09)>
;       <NEXT SEQUENCIAL INSTRUCTION
;
;-------------------------------------------------------------------------------

LODT2C: MOVB    (R5)+,TMP8+1    ;SETUP TO LOAD T2LL
        MOVB    (R5)+,TMP9+1    ;  AND T2CH
        JSR     R5,WRITE        ;LOAD T2L-L (ADDR 08) WITH PASSED PARAMETER
        T2LL
        TMP8+1
        JSR     R5,WRITE        ;LOAD T2C-H (ADDR 09) WITH PASSED PARAMETER
        T2CH                    ;  (THIS WILL ALSO RESET "T2" & THE COUNTER)
        TMP9+1
        RTS     R5

;-------------------------------------------------------------------------------
; GETT2 -- GET THE "T2" FLAG FROM THE VIA'S IFR REGISTER AND PUT IT
;          INTO THE "CARRY" BIT
;
;-------------------------------------------------------------------------------

GETT2:  JSR     R5,READ         ;GET VIA'S IFR REG.
        IFR
        TMPD
        BCC     1$              ;IF NO ERROR, PROCEED
        ERROR                   ;ELSE, REPORT IT
                                                                        TRAP    C$ERROR
        SEV                     ;FLAG AN ERROR TO MAINLINE ROUTINE
        RTS     PC              ;  AND TAKE AN ABNORMAL RETURN

1$:     MOV     R0,-(SP)        ;PRESERVE R0
        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 OCCURRED.
                                          ;*
                                          ;--*******************************************************************
                                          ;
                                          ;       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. IO 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$:     JSR     PC,MSTCLR       ;RE-INITIALIZE DMV & ENTER M-LOOP
4760  025350  103003                          BCC     20$             ;IF NO ERROR, PROCEED WITH TESTING
```

```
4761  025352
4762  025352  104460                        ERROR                   ;ELSE REPORT IT
4763  025354                                                                          TRAP    CSERROR
4764  025354  104410                        ESCAPE  TST             ;   & EXIT TEST
4765  025356  000070                                                                  TRAP    CSESCAPE
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    CSERROR
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    CSERDF
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    CSETST
```

```
4801                                    .SBTTL TEST 4 -- NPR DATA-OUT
4802
4803                                    ;++*************************************************************************
4804                                    ;*
4805                                    ;*      TEST 4 -- NPR DATA-OUT
4806                                    ;*
4807                                    ;* FIRST SUBTEST :
4808                                    ;* THE NPR OUTPUT ADDRESS REGISTER IS LOADED WITH THE ADDRESS OF A 2 BYTE
4809                                    ;* BUFFER IN THE PROGRAM. THEN, EACH WORD OF DATA PATTERN F IS LOADED INTO THE
4810                                    ;* NPR OUTPUT DATA REGISTER, A FULLWORD NPR OUTPUT REQUEST IS PERFORMED,
4811                                    ;* AND THE PROGRAM CHECKS FOR THE CORRECT DATA IN THE PROGRAM BUFFER. ALSO,
4812                                    ;* THE PROGRAM CHECKS THAT THE ABORT XFER BIT IN THE NPR CONTROL REGISTER
4813                                    ;* NEVER GETS SET.
4814                                    ;*   DATA PATTERN F = 125252, 052525, 000000, 177777, 000001, 000002, 000004,
4815                                    ;*                    000010, 000020, 000040, 000100, 000200, 000400, 001000,
4816                                    ;*                    002000, 004000, 010000, 020000, 040000, 100000, 177776,
4817                                    ;*                    177775, 177773, 177767, 177757, 177737, 177677, 177577,
4818                                    ;*                    177377, 176777, 175777, 173777, 167777, 157777, 137777,
4819                                    ;*                    077777, 000000
4820                                    ;*
4821                                    ;* SECOND SUBTEST:
4822                                    ;* THE ABOVE OPERATIONS ARE REPEATED IN BYTE NPR TRANSFER MODE, USING THE DATA
4823                                    ;* BYTES IN DATA PATTERN B. THE LOW BYTE OF THE PROGRAM BUFFER IS USED, AND
4824                                    ;* THE UPPER BYTE IS CLEARED AT THE START, AND IS CHECKED TO REMAIN UNCHANGED
4825                                    ;* THROUGHOUT THE SUBTEST.
4826                                    ;*   DATA PATTERN B = 125, 252, 000, 377, 001, 002, 004, 010, 020, 040, 100,
4827                                    ;*                    200, 376, 375, 373, 367, 357, 337, 277, 177, 000
4828                                    ;*
4829                                    ;*
4830                                    ;--*************************************************************************
4831                                    ;
4832                                    ;       BGNTST
4833  025450                                                                          T4::
4834          000004                    NPROTS = $T
4835  025450  004737  003514                   JSR     PC,MSTCLR       ;INIT DMV & START UP MAINT. LOOP
4836  025454  103003                           BCC     1$              ;IF NO ERROR, PROCEED WITH TEST
4837  025456                                    ERROR                   ;ELSE, REPORT IT
4838  025456  104460                                                                  TRAP    C$ERROR
4839  025460                                    ESCAPE  TST             ;   & EXIT TEST
4840  025460  104410                                                                  TRAP    C$ESCAPE
4841  025462  000474                                                                  .WORD   L10033-.
4842
4843                                    ;-------------------------------------------------------------------------
4844
4845  025464                            1$:     BGNSUB                  ;----- MAIN MEMORY WORD DATA-OUT TESTING -----
4846  025464                                                                          T4.1:
4847  025464  104402                                                                  TRAP    C$BSUB
4848  025466  013737  002506  025504            MOV     PATF,4$         ;SETUP COUNT OF # OF WORDS IN TEST PATTERN
4849
4850  025474  004537  005266                   JSR     R5,NPRMOV       ;MOVE DATA THROUGH THE NPR LOGIC
4851  025500  002510                    2$:     PATF+2                  ;  ADDRESS OF DATA
4852  025502  002654                    3$:     BUFAREA                 ;  BUFFER AREA
4853  025504  000000                    4$:     0                       ;*** MODIFIED FROM ABOVE *** -- WORD COUNT
4854  025506  000044                            NPRDL                   ;  OPERATION TO BE UTILIZED
4855
4856  025510  103025                           BCC     7$              ;IF ERROR, REPORT IT
```

```
4857  025512
4858  025512  104460                                                    TRAP    C$ERROR
4859  025514  005737  002412          TST     TMP0            ;WE JUST REPORTED ONE ERROR BUT WAS IT A TIMEOUT
4860  025520  001421                  BEQ     7$              ;ERROR? IF SO, PROCEED WITH TESTING.  ELSE,
4861  025522  022737  000006  002204  CMP     #NPRTOE,ERRNBR  ;WE WILL HAVE TO REPORT IT HERE AND NOW.
4862  025530  001415                  BEQ     7$              ;THE TIMEOUT ERROR WAS ALREADY REPORTED.
4863  025532  012737  000002  002202  MOV     #T.EHRD,ERRTYP  ;IT WASN'T REPORTED YET, SETUP FOR IT NOW:
4864  025540  012737  000006  002204  MOV     #NPRTOE,ERRNBR
4865  025546  012737  016316  002206  MOV     #EM26E,ERRMSG
4866  025554  012737  007314  002210  MOV     #ERR11,ERRBLK
4867  025562  000753                  BR      13$             ;LOOP BACK TO CAUSE REPORT @ PROPER PC LOCATION
4868
4869  025564  013701  025500  7$:     MOV     2$,R1           ;POINT TO GOOD DATA
4870  025570  013702  025502          MOV     3$,R2           ;       & ACTUAL DATA
4871  025574  013703  025504          MOV     4$,R3           ;GET WORD COUNT
4872  025600  005037  002276          CLR     ERRFLG          ;RESET ERROR FLAG
4873
4874  025604  022122          5$:     CMP     (R1)+,(R2)+     ;CHECK RECEIVED DATA
4875  025606  001007                  BNE     6$              ;ERROR, GO REPORT IT
4876  025610  077303          11$:    SOB     R3,5$           ;GOOD,  IF MORE DO IT AGAIN
4877  025612  005737  002276          TST     ERRFLG          ;ELSE, SEE IF WE MUST FINISH AN ERROR MESSAGE
4878  025616  001440                  BEQ     10$             ;NO,  TEST IT AGAIN BUT WITH BYTE TRANSFERS
4879  025620  004737  013076          JSR     PC,NULERR       ;YES, USE COMMON ROUTINE TO END ERROR MESSAGE
4880  025624  000435                  BR      10$             ;WE CAN TEST IT AGAIN BUT WITH BYTE TRANSFERS
4881
4882  025626  010146          6$:     MOV     R1,-(SP)        ;SAVE THIS FOR FURTHER TESTING
4883  025630  014137  002254          MOV     -(R1),GDATA     ;SETUP FOR ERROR REPORT
4884  025634  014237  002256          MOV     -(R2),BDATA
4885  025640  010237  002252          MOV     R2,TDATA        ;LSI-11'S MEMORY ADDRESS
4886  025644  163701  025500          SUB     2$,R1           ;CALCULATE THE OFFSET AT WHICH THE
4887  025650  006201                  ASR     R1              ;  DATA COMPARISON ERROR OCCURED
4888  025652  010137  002300          MOV     R1,REGNUM       ;THE ERROR MESSAGE WILL REPORT THIS TOO
4889  025656  005737  002276          TST     ERRFLG          ;HAVE WE ALREADY REPORTED AN ERROR HERE?
4890  025662  001007                  BNE     8$              ;YES, THEN WE ONLY PRINT DATA THIS TIME
4891  025664  005237  002276          INC     ERRFLG          ;NO,  SET FLAG & REPORT THE WHOLE MESSAGE
4892  025670                          GEDF    EM26B,ERR9      ;WORD NPR TRANSFER DMV ===> LSI
4893                                                          ;       'DEVICE FATAL" ERROR # 28
4894  025670  104455                                                  TRAP    C$ERDF
4895  025672  000034                                                  .WORD   28
4896  025674  016226                                                  .WORD   EM26B
4897  025676  007300                                                  .WORD   ERR9
4898  025700  000402                  BR      9$              ;  RESUME TESTING
4899
4900  025702  004737  012574  8$:     JSR     PC,ERR9$        ;IDENTIFY THE FAILING DATA
4901  025706  012601          9$:     MOV     (SP)+,R1        ;RESTORE POINTERS
4902  025710  013702  002252          MOV     TDATA,R2
4903  025714  005722                  TST     (R2)+
4904  025716  000734                  BR      11$             ;AND RESUME TESTING
4905
4906  025720                  10$:    ENDSUB
4907  025720                                                          L10034:
4908  025720  104403                                                  TRAP    C$ESUB
4909
4910                          ;-----------------------------------------------------------------------
4911
4912  025722                  BGNSUB                  ;----- MAIN MEMORY BYTE DATA-OUT TESTING -----
```

```
4913  025722                                                          T4.2:
4914  025722  104402                                                          TRAP    C$BSUB
4915  025724  013737  002456  025742          MOV     PATB,4$         ;SETUP COUNT OF # OF WORDS IN TEST PATTERN
4916
4917  025732  004537  005266                  JSR     R5,NPRMOV       ;MOVE DATA THROUGH THE NPR LOGIC
4918  025736  002460                  2$:     PATB+2                  ;  ADDRESS OF DATA
4919  025740  002654                  3$:     BUFAREA                 ;  BUFFER AREA
4920  025742  000000                  4$:     0                       ;*** MODIFIED FROM ABOVE *** -- BYTE COUNT
4921  025744  000054                          NPRDLB                  ;  OPERATION TO BE UTILIZED
4922
4923  025746  103025                          BCC     7$              ;IF ERROR, REPORT IT
4924  025750                          13$:    ERROR
4925  025750  104460                                                          TRAP    C$ERROR
4926  025752  005737  002412                  TST     TMP0            ;WE JUST REPORTED ONE ERROR BUT WAS IT A TIMEOUT
4927  025756  001421                          BEQ     7$              ;ERROR? IF SO, PROCEED WITH TESTING.  ELSE,
4928  025760  022737  000006  002204          CMP     #NPRTOE,ERRNBR  ;WE WILL HAVE TO REPORT IT HERE AND NOW.
4929  025766  001415                          BEQ     7$              ;THE TIMEOUT ERROR WAS ALREADY REPORTED.
4930  025770  012737  000002  002202          MOV     #T.EHRD,ERRTYP  ;IT WASN'T REPORTED YET, SETUP FOR IT NOW:
4931  025776  012737  000006  002204          MOV     #NPRTOE,ERRNBR
4932  026004  012737  016316  002206          MOV     #EM26E,ERRMSG
4933  026012  012737  007314  002210          MOV     #ERR11,ERRBLK
4934  026020  000753                          BR      13$             ;LOOP BACK TO CAUSE REPORT @ PROPER PC LOCATION
4935
4936  026022  013701  025736          7$:     MOV     2$,R1           ;POINT TO GOOD DATA
4937  026026  013702  025740                  MOV     3$,R2           ;       & ACTUAL DATA
4938  026032  013703  025742                  MOV     4$,R3           ;GET BYTE COUNT
4939  026036  005037  002276                  CLR     ERRFLG          ;RESET ERROR FLAG
4940
4941  026042  122122                  5$:     CMPB    (R1)+,(R2)+     ;CHECK RECEIVED DATA
4942  026044  001007                          BNE     6$              ;ERROR, GO REPORT IT
4943  026046  077303                  11$:    SOB     R3,5$           ;GOOD,  IF MORE DO IT AGAIN
4944  026050  005737  002276                  TST     ERRFLG          ;ELSE, SEE IF WE MUST FINISH AN ERROR MESSAGE
4945  026054  001437                          BEQ     10$             ;NO,  THEN WE CAN EXIT THE TEST
4946  026056  004737  013076                  JSR     PC,NULERR       ;YES, OUTPUT THE REQUIRED BLANK LINES.  NOW
4947  026062  000434                          BR      10$             ;THEN WE CAN EXIT THE TEST
4948
4949  026064  010146                  6$:     MOV     R1,-(SP)        ;SAVE THIS FOR FURTHER TESTING
4950  026066  114137  002254                  MOVB    -(R1),GDATA     ;SETUP FOR ERROR REPORT
4951  026072  114237  002256                  MOVB    -(R2),BDATA
4952  026076  010237  002252                  MOV     R2,TDATA        ;LSI-11'S MEMORY ADDRESS
4953  026102  163701  025736                  SUB     2$,R1           ;CALCULATE THE OFFSET AT WHICH THE
4954                                                                  ;  DATA COMPARISON ERROR OCCURED
4955  026106  010137  002300                  MOV     R1,REGNUM       ;THE ERROR MESSAGE WILL REPORT THIS TOO
4956  026112  005737  002276                  TST     ERRFLG          ;HAVE WE ALREADY REPORTED AN ERROR HERE?
4957  026116  001007                          BNE     8$              ;YES, THEN WE ONLY PRINT DATA THIS TIME
4958  026120  005237  002276                  INC     ERRFLG          ;NO,  SET FLAG & REPORT THE WHOLE MESSAGE
4959  026124                                  GEDF    EM26C,ERR10     ;BYTE NPR TRANSFER DMV ===> LSI
4960                                                                  ;       'DEVICE FATAL" ERROR # 29
4961  026124  104455                                                                  TRAP    C$ERDF
4962  026126  000035                                                                  .WORD   29
4963  026130  016251                                                                  .WORD   EM26C
4964  026132  007306                                                                  .WORD   ERR10
4965  026134  000402                          BR      9$              ;  RESUME TESTING
4966
4967  026136  004737  012732          8$:     JSR     PC,ERR10$       ;IDENTIFY THE FAILING DATA
4968  026142  012601                  9$:     MOV     (SP)+,R1        ;RESTORE POINTERS
```

CVDMBA.P11 18-DEC-80 15:53 TEST 4 -- NPR DATA-OUT

```
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    CSESUB
4976  026156                          ENDTST
4977  026156                                                          L10033:
4978  026156  104401                                                          TRAP    CSETST
```

```
                                        .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
 026160                                                                                         T5::
 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-.

 026174                                 1$:
 026174  013737  002506  026212                 MOV     PATF,4$         ;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  PUT NPR'S.
                                ;*
                                ;--++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                                ;
                                ;       BGNTST
                                                                                T6::
026430                          ;===  SUBTEST # 1 -- NPR OUTPUT TO NON-EXISTENT LOCATION FORCING NPR-ABORT  ====

                                        BGNSUB
                                                                                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$ESUB
5165                          ;===  JBTEST #2 -- NPR OUTPUT TO EXISTENT LOCATION YIELDING NO NPR-ABORT  ====
5166
5167  026632                        BGNSUB
5168  026632                                                  T6.2:
5169  026632  104402                                                TRAP    C$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                                  L10041:
5235  027032                                                                  TRAP    C$ESUB
5236  027032  104403
5237  027034                  ENDTST                  L10037:
5238  027034                                                                  TRAP    C$ETST
5239  027034  104401
```

```
                        .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.
                        ;*
                        ;--++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        ;
027036                  ;       BGNTST
                                                                        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
027062                                                  ;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
```

```
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
```

```
5464  027664  016461                                                          .WORD   EM27B
5465  027666  007456                                                          .WORD   ERR12
5466  027670                          12$:    ESCAPE  SUB             ;  AND EXIT SUBTEST
5467  027670  104410                                                          TRAP    C$ESCAPE
5468  027672  000056                                                          .WORD   L10043-.
5469  027674  023737  002256  002254  14$:    CMP     BDATA,GDATA     ;DID WE READ THE TEST DATA USING THE NPR?
5470  027702  001406                  BEQ     20$             ;YES,  WELL THIS ONE WORKED.
5471  027704                          GEDF    EM27C,ERR12     ;NO!   REPORT THE ERROR.
5472                                                          ;       'DEVICE FATAL'' ERROR # 37
5473  027704  104455                                                          TRAP    C$ERDF
5474  027706  000045                                                          .WORD   37
5475  027710  016502                                                          .WORD   EM27C
5476  027712  007456                                                          .WORD   ERR12
5477  027714                          ESCAPE  SUB             ;  EXIT FROM SUBTEST AFTER PRINTING ERROR MSG.
5478  027714  104410                                                          TRAP    C$ESCAPE
5479  027716  000032                                                          .WORD   L10043-.
5480  027720  062737  002000  002442  20$:    ADD     #BIT10,TMPC     ;POINT TO NEXT PAGE ADDRESS REG. VALUE
5481  027726  001410                  BEQ     63$             ;IF 0, WE'RE DONE
5482  027730  023737  002442  002436          CMP     TMPC,TMPA       ;IF GREATER THEN MAXIMUM VALUE,
5483  027736  101004                  BHI     63$             ;       WE'RE DONE TOO.
5484  027740  105237  002451                  INCB    TMPF+1          ;ELSE, INCREMENT NPR'S EXTENDED ADDR. REG.
5485  027744  000137  027244                  JMP     2$              ;AND GO BACK TO DO THIS ADDRESS
5486
5487  027750                          63$:    ENDSUB
5488  027750                                                                  L10043:
5489  027750  104403                                                          TRAP    C$ESUB
5490                                  ;=============================================================================
5491
5492  027752                          BGNSUB                          ;TEST THE NPR-OUT USING EXTENDED ADDR. BITS
5493  027752                                                                  T7.2:
5494  027752  104402                                                          TRAP    C$BSUB
5495  027754  012737  002000  002442          MOV     #BIT10,TMPC     ;INITIALIZE PAGE ADDRESS REG. VARIABLE
5496  027762  112737  000001  002451          MOVB    #BIT0,TMPF+1    ;INITIALIZE NPR EXTENDED ADDRESS REG. VARIABLE
5497  027770  004737  030560                  JSR     PC,XMINIT       ;INITIALIZE THE MMU
5498
5499                                  ;*************** WRITE/READ/VERIFY NPRAOH,NPRAOL ***************
5500  027774  004537  004054                  JSR     R5,WRITEI       ;POINT NPR REGISTERS TO 0
5501  030000  000070                          NPRAOL
5502  030002  000000                          0
5503  030004  004537  004054                  JSR     R5,WRITEI
5504  030010  000071                          NPRAOH
5505  030012  000000                          0
5506  030014  004537  003616                  JSR     R5,READ         ;READ BACK THE ADDRESS & VERIFY IT
5507  030020  000070                          NPRAOL
5508  030022  002434                          TMP9
5509  030024  004537  003616                  JSR     R5,READ
5510  030030  000071                          NPRAOH
5511  030032  002435                          TMP9+1
5512  030034  023727  002434  000000          CMP     TMP9,#000000    ;IS IT CORRECT?
5513  030042  001427                  BEQ     2$              ;YES, PROCEED.
5514  030044  013737  002434  002256          MOV     TMP9,BDATA      ;NO, SETUP FOR & REPORT LOADING FAILURE
5515  030052  012737  000000  002254          MOV     #000000,GDATA
5516  030060  012737  000004  002300          MOV     #4,REGNUM       ;IDENTIFY NPRAIH AS THE CULPRIT
5517  030066  105737  002434                  TSTB    TMP9            ;IS THAT REALLY TRUE?
5518  030072  001002                  BNE     1$              ;MAYBE.  BUT, NPRAIL IS DEFINATELY AT FAULT
5519  030074  005237  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
5577  030260  113737  002451  002254          BEQ     8$                      ;YES, PROCEED
5578  030266  113737  002450  002256          MOVB    TMPF+1,GDATA            ;NO, SETUP FOR ERROR HANDLER
5579  030274  012737  000003  002300          MOVB    TMPF,BDATA
5580  030302                                  MOV     #3,REGNUM               ;       IDENTIFY NPRAIX AS FAILING REG.
5581                                          GEDF    EM26A,ERR14             ;REPORT THE FAILURE
5582  030302  104455                                                          ;       'DEVICE FATAL'' ERROR # 39
5583  030304  000047                                                                  TRAP    C$ERDF
5584  030306  016204                                                                  .WORD   39
5585  030310  011002                                                                  .WORD   EM26A
5586  030312                                                                          .WORD   ERR14
5587  030314  104410                          ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5588  030316  000240                                                                  TRAP    C$ESCAPE
5589                                                                                  .WORD   L10044-.
5590                                  ;*************** WRITE(LSI-11) TEST LOCATION BACKGROUND PATTERN ***************
5591  030320  004537  030700          8$:     JSR     R5,XMWRIT               ;SETUP TEST LOCATION'S BACKGROUND PATTERN
5592  030324  002442                          TMPC
5593  030326  002414                          TMP1
5594  030330  013737  002420  002254          MOV     TMP3,GDATA              ;GENERATE A TEST DATA PATTERN FROM BACKGROUND
5595  030336  062737  052525  002254          ADD     #52525,GDATA            ;PATTERN BY ADDING THIS TO IT.
5596
5597                                  ;*************** LOAD(DMV) TEST PATTERN ***************
5598  030344  004537  004042                  JSR     R5,WRITE                ;LOAD UP THE TEST PATTERN
5599  030350  123001                          NPRDRH
5600  030352  002255                          GDATA+1
5601  030354  004537  004042                  JSR     R5,WRITE
5602  030360  123000                          NPRDRL
5603  030362  002254                          GDATA
5604  030364  112737  000044  002417          MOVB    #NPRDL,TMP2+1           ;SETUP CONTROL VALUE TO DO NPR-OUT
5605
5606                                  ;*************** PERFORM/CHECK EXTENDED NPR OPERATION ***************
5607  030372  004537  004042                  JSR     R5,WRITE                ;PERFORM THE 'EXTENDED'' DATA-OUT NPR
5608  030376  123004                          NPRCTL
5609  030400  002417                          TMP2+1
5610  030402  103003                          BCC     .+10                    ;IF NO ERROR, PROCEED
5611  030404                                  ERROR                           ;ELSE, REPORT IT
5612  030404  104460                                                                  TRAP    C$ERROR
5613  030406                                  ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5614  030406  104410                                                                  TRAP    C$ESCAPE
5615  030410  000146                                                                  .WORD   L10044-.
5616  030412  004537  003616                  JSR     R5,READ                 ;CHECK THE NPR OPERATION
5617  030416  123004                          NPRCTL
5618  030420  002416                          TMP2
5619  030422  103003                          BCC     .+10                    ;IF NO ERROR, PROCEED
5620  030424                                  ERROR                           ;ELSE, REPORT IT
5621  030424  104460                                                                  TRAP    C$ERROR
5622  030426                                  ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5623  030426  104410                                                                  TRAP    C$ESCAPE
5624  030430  000126                                                                  .WORD   L10044-.
5625  030432  132737  000300  002416          BITB    #300,TMP2               ;DID IT ABORT OR HANG?
5626  030440  001414                          BEQ     14$                     ;NO, GOOD.  PROCEED WITH SUBTEST
5627  030442  100005                          BPL     10$                     ;YES, WHICH ONE?
5628  030444                                  GEDF    EM27A,ERR12             ;ABORT, REPORT IT AS SUCH.
5629                                                                          ;       'DEVICE FATAL'' ERROR # 40
5630  030444  104455                                                                  TRAP    C$ERDF
5631  030446  000050                                                                  .WORD   40
```

```
5632  030446  016437                                                                  .WORD   EM27A
5633  030450  007456                                                                  .WORD   ERR12
5634  030452  000404                      BR      12$             ;AND EXIT
5635  030454                      10$:    GEDF    EM27B,ERR12     ;HANG, REPORT IT AS SUCH.
5636                                                              ;       'DEVICE FATAL" ERROR # 41
5637  030454  104455                                                                  TRAP    C$ERDF
5638  030456  000051                                                                  .WORD   41
5639  030460  016461                                                                  .WORD   EM27B
5640  030462  007456                                                                  .WORD   ERR12
5641  030464                      12$:    ESCAPE  SUB             ;  AND EXIT SUBTEST
5642  030464  104410                                                                  TRAP    C$ESCAPE
5643  030466  000066                                                                  .WORD   L10044-.
5644  030470  004537  030776      14$:    JSR     R5,XMREAD       ;GET THE DATA WE SHOULD HAVE JUST LOADED INTO
5645  030474  002442                      TMPC
5646  030476  002256                      BDATA
5647  030500  023737  002256  002254      CMP     BDATA,GDATA     ;DID WE READ THE TEST DATA USING THE NPR?
5648  030506  001406                      BEQ     20$             ;YES,  WELL THIS ONE WORKED.
5649  030510                              GEDF    EM27C,ERR12     ;NO!   REPORT THE ERROR.
5650                                                              ;       'DEVICE FATAL" ERROR # 42
5651  030510  104455                                                                  TRAP    C$ERDF
5652  030512  000052                                                                  .WORD   42
5653  030514  016502                                                                  .WORD   EM27C
5654  030516  007456                                                                  .WORD   ERR12
5655  030520                              ESCAPE  SUB             ;  EXIT FROM SUBTEST AFTER PRINTING ERROR MSG.
5656  030520  104410                                                                  TRAP    C$ESCAPE
5657  030522  000032                                                                  .WORD   L10044-.
5658  030524  062737  002000  002442  20$:    ADD     #BIT10,TMPC     ;POINT TO NEXT PAGE ADDRESS REG. VALUE
5659  030532  001410                      BEQ     63$             ;IF 0, WE'RE DONE
5660  030534  023737  002442  002436      CMP     TMPC,TMPA       ;IF GREATER THEN MAXIMUM VALUE,
5661  030542  101004                      BHI     63$             ;       WE'RE DONE TOO.
5662  030544  105237  002451              INCB    TMPF+1          ;ELSE, INCREMENT NPR'S EXTENDED ADDR. REG.
5663  030550  000137  030122              JMP     2$              ;AND GO BACK TO DO THIS ADDRESS
5664
5665
5666  030554                      63$:    ENDSUB
5667  030554                                                                  L10044:
5668  030554  104403                                                                  TRAP    C$ESUB
5669  030556                              ENDTST
5670  030556                                                                  L10042:
5671  030556  104401                                                                  TRAP    C$ETST
5672
5673                                      ;*****************************************************************************
5674                                      ; XMINIT -- SUBROUTINE TO INITIALIZE EXTENDED MEMORY (ALIAS: MEMORY MANAGEMENT
5675                                      ;       UNIT) HARDWARE REGISTERS.
5676                                      ;
5677                                      ;*****************************************************************************
5678
5679  030560  010046              XMINIT: MOV     R0,-(SP)        ;SAVE WORKING REGISTERS
5680  030562  010146                      MOV     R1,-(SP)
5681  030564  010346                      MOV     R3,-(SP)
5682  030566  013737  000004  031122      MOV     @#4,XM4HOL      ;SETUP @4 TRAP VALUE (JUST IN CASE)
5683
5684  030574  012700  077406              MOV     #77406,R0       ;'PDR' INITIALIZATION VALUE
5685                                                              ;  774 = FULL PAGE ACCESS
5686                                                              ;  0 = UPWARD EXPANSION
5687                                                              ;  6 = RESIDENT READ/WRITE
```

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

030600  012701  172300            MOV     #172300,R1      ;ADDRESS OF KPDR0
030604  012703  000010            MOV     #8.,R3          ;LOOP VALUE -- # OF PDR'S
030610  010021              1$:   MOV     R0,(R1)+        ;SETUP 1 PDR
030612  077302                    SOB     R3,1$           ;IF ANOTHER PDR, DO IT TOO
                                                        ;ELSE, FALL THROUGH & INITIALIZE PAR'S

030614  005000                    CLR     R0              ;INITIALIZATION VALUE FOR KPAR0
030616  012701  172340            MOV     #172340,R1      ;ADDRESS OF KPAR0
030622  012703  000007            MOV     #7,R3           ;LOOP VALUE -- ONLY FIRST 7 PAR'S DONE BY LOOP
030626  010021              2$:   MOV     R0,(R1)+        ;SETUP 1 PAR
030630  062700  000200            ADD     #200,R0         ;CALCULATE NEXT PAR'S INITIALIZATION VALUE
030634  077304                    SOB     R3,2$           ;IF ANOTHEER PAR, DO IT TOO
030636  012721  177600            MOV     #177600,(R1)+   ;ELSE, SETUP KPAR7 FOR I/O PAGE ACCESSING

030642                            SETVEC  #250,#XMINTH,#7 ;SETUP OUR OWN TRAP CATCHER FOR ABORT HANDLING
030642  012746  000007                                                    MOV     #7,-(SP)
030646  012746  031124                                                    MOV     #XMINTH,-(SP)
030652  012746  000250                                                    MOV     #250,-(SP)
030656  012746  000003                                                    MOV     #3,-(SP)
030662  104437                                                            TRAP    C$SVEC
030664  062706  000010                                                    ADD     #10,SP
030670  012603                    MOV     (SP)+,R3        ;RESTORE CALLER'S REGISTERS
030672  012601                    MOV     (SP)+,R1
030674  012600                    MOV     (SP)+,R0
030676  000207                    RTS     PC              ;RETURN

                        ;*****************************************************************************
                        ; XMWRIT -- SUBROUTINE TO WRITE ONE WORD INTO AN EXTENDED MEMORY LOCATION.
                        ;
                        ;       CALLING SEQUENCE:
                        ;
                        ;       JSR     R5,XMWRIT
                        ;       <PRINTER TO HIGH ORDER BITS OF ADDRESS IN 'PAR' FORMAT>
                        ;       <POINTER TO DATA TO BE WRITTEN>
                        ;
                        ;*****************************************************************************

030700  010146          XMWRIT: MOV     R1,-(SP)        ;SAVE REGISTER(S)

030702  012701  172354            MOV     #172354,R1      ;ADDRESS OF KPAR6
030706  011146                    MOV     (R1),-(SP)      ;SAVE CURRENT KPAR6 VALUE
030710  013511                    MOV     @(R5)+,(R1)     ;SETUP 'PAR' FOR THIS WRITE
030712  011137  002426            MOV     (R1),TMP6       ;SAVE ADDRESS FOR ERROR MESSAGE
030716  012737  000060  172516    MOV     #BIT4+BIT5,@#172516  ;ENABLE 22 BIT & I/O PAGE ADDRESSING IN SR3
030724  000241                    CLC                     ;CLEAR OUR ERROR FLAG
030726  013737  000004  031122    MOV     @#4,XM4HOL      ;* SETUP TRAP CATCHER @4 (BECAUSE OF MAPPING)
030734  012737  031074  000004    MOV     #XM4INT,@#4     ;*
030742  052737  000001  177572    BIS     #1,@#177572     ;ENABLE MEMORY MANAGEMENT
030750  013537  140000            MOV     @(R5)+,@#140000 ;WRITE ONE WORD IN THE SPECIFIED PAGE
030754  042737  000001  177572    BIC     #1,@#177572     ;TURN OFF MEMORY MANAGEMENT
030762  013737  031122  000004    MOV     XM4HOL,@#4      ;* RESTORE SUPERVISOR TRAP VECTOR @4
030770  012611                    MOV     (SP)+,(R1)      ;RESTORE KPAR6

030772  012601                    MOV     (SP)+,R1        ;RESTORE CALLER'S REGISTER(S)
030774  000205                    RTS     R5              ;RETURN
```

```
                                ;*****************************************************************************
                                ; 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
                                ;*****************************************************************************

031124                                  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
                                                                                        T8::
031276
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                        11$:    CLR     R2              ;CLEAR LOCAL INDEX
031360  016237  032572  002440                MOV     XVAL0(R2),TMPB  ;SETUP DATA POINTER
031366  016237  032554  002436                MOV     XLOC0(R2),TMPA  ;SETUP/ADJUST PAR VALUE
031374  006337  002436                        ASL     TMPA
031400  006337  002436                        ASL     TMPA
031404  004537  030700                        JSR     R5,XMWRIT       ;WRITE BACKGROUND PATTERN
031410  002436                              TMPA                    ; POINTER TO PAR VALUE
031412  002440                              TMPB                    ; POINTER TO DATA
031414  103003                              BCC     .+10            ;IF NO ERROR, PROCEED
031416                                      ERROR                   ;ELSE, REPORT ERROR
031416  104460                                                                  TRAP    C$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
```

```
5938  031602  012737  000006  002300          MOV     #6,REGNUM       ; NO:  REPORT ERROR
5939  031610                          7$:     GEDF    EM26A,ERR14
5940                                                                    ;       'DEVICE FATAL'' ERROR # 44
5941  031610  104455                                                                          TRAP    C$ERDF
5942  031612  000054                                                                          .WORD   44
5943  031614  016204                                                                          .WORD   EM26A
5944  031616  011002                                                                          .WORD   ERR14
5945  031620                          ESCAPE  SUB
5946  031620  104410                                                                          TRAP    C$ESCAPE
5947  031622  000152                                                                          .WORD   L10047-.
5948
5949                                  ;******* SETUP/START/CHECK THE NPR OPERATION (DATA/NPRCTL) *********
5950  031624  112737  000004  002417  9$:     MOVB    #NPRLD,TMP2+1   ;SETUP CONTROL VALUE TO DO NPR-IN
5951
5952  031632  004537  004042          JSR     R5,WRITE        ;PERFORM THE 'EXTENDED'' DATA-IN NPR
5953  031636  123004                  NPRCTL
5954  031640  002417                  TMP2+1
5955  031642  004537  003616          JSR     R5,READ         ;CHECK THE NPR OPERATION
5956  031646  123004                  NPRCTL
5957  031650  002416                  TMP2
5958  031652  004537  003616          JSR     R5,READ         ;GET THE DATA WE SHOULD HAVE JUST LOADED INTO
5959  031656  123001                  NPRDRH                  ;       THE NPR DATA REGISTERS FROM THE
5960  031660  002257                  BDATA+1                 ;       EXTENDED MEMORY AREA
5961  031662  004537  003616          JSR     R5,READ
5962  031666  123000                  NPRDRL
5963  031670  002256                  BDATA
5964  031672  132737  000300  002416  BITB    #300,TMP2       ;DID IT ABORT OR HANG?
5965  031700  001414                  BEQ     14$             ; NO:  GOOD.  PROCEED WITH SUBTEST
5966  031702  100005                  BPL     10$             ; YES: WHICH ONE?
5967  031704                          GEDF    EM27A,ERR12     ;ABORT, REPORT IT AS SUCH.
5968                                                          ;       'DEVICE FATAL'' ERROR # 45
5969  031704  104455                                                                          TRAP    C$ERDF
5970  031706  000055                                                                          .WORD   45
5971  031710  016437                                                                          .WORD   EM27A
5972  031712  007456                                                                          .WORD   ERR12
5973  031714  000404                  BR      12$             ;AND EXIT
5974  031716                  10$:    GEDF    EM27B,ERR12     ;HANG, REPORT IT AS SUCH.
5975                                                          ;       'DEVICE FATAL'' ERROR # 46
5976  031716  104455                                                                          TRAP    C$ERDF
5977  031720  000056                                                                          .WORD   46
5978  031722  016461                                                                          .WORD   EM27B
5979  031724  007456                                                                          .WORD   ERR12
5980  031726                  12$:    ESCAPE  SUB             ;  AND EXIT SUBTEST
5981  031726  104410                                                                          TRAP    C$ESCAPE
5982  031730  000044                                                                          .WORD   L10047-.
5983
5984                                  ;************** NOW CHECK DATA READ AGAINST EXPECTED VALUE *************
5985  031732  016437  032554  002254  14$:     MOV     XLOCO(R4),GDATA ;SET UP EXPECTED READ VALUE
5986
5987  031740  023737  002256  002254          CMP     BDATA,GDATA     ;DID WE READ THE TEST DATA USING THE NPR?
5988  031746  001406                  BEQ     15$             ;
5989  031750                          GEDF    EM27C,ERR12     ; NO:  REPORT THE ERROR.
5990                                                          ;       'DEVICE FATAL'' ERROR # 47
5991  031750  104455                                                                          TRAP    C$ERDF
5992  031752  000057                                                                          .WORD   47
5993  031754  016502                                                                          .WORD   EM27C
```

```
                                                                                .WORD   ERR12
                        ESCAPE  SUB             ;       AND EXIT FROM SUBTEST
                                                                                TRAP    C$ESCAPE
                                                                                .WORD   L10047-.

                15$:    TST     (R4)+           ; YES: BUMP INDEX
                        CMP     R4,#14.         ;ARE WE DONE W/ALL EXTENDED LOCATIONS
                        BNE     3$              ; NO: DO NEXT EXTENDED LOCATION

                63$:    ENDSUB                  ;YES: END SUBROUTINE
                                                                        L10047:
                                                                                TRAP    C$ESUB


                ;=======================================================================
                ;==  SUBTEST #2 : TEST THE NPR-OUT EXTENDED ADDRESS BITS
                ;=======================================================================
                        BGNSUB                  ;TEST THE NPR-OUT USING EXTENDED ADDR. BITS
                                                                        T8.2:
                                                                                TRAP    C$BSUB
                        JSR     PC,XMINIT       ;INITIALIZE THE MMU
                        CLR     R4              ;CLEAR INDEX

                ;============== MAIN LOOP STARTS HERE ==============
                T8LP:   CLR     R2              ;SETUP EXTENDED MEM BACKGROUND PATTERN
                3$:     MOV     #125252,XVAL0(R2)       ;(125252 IN XVAL0 => XVAL6)
                        TST     (R2)+           ; THIS IS DONE FOR ERROR REPORTING
                        CMP     R2,#14.         ; PURPOSES.
                        BNE     3$

                ;*      WRITE (USING MMU) XVAL0, XVAL1, XVAL2, ... XVAL6 (IE: 125252) INTO
                ;*      THE SEVEN SPECIFIC EXTENDED ADDRESSES SPECIFIED BY XLOC0 THRU XLOC6
                ;*      (XLOC'S SPECIFY THE UPPER TWO BYTES OF THE 3 BYTE EXTENDED ADDR)

                        CLR     R2              ;CLEAR LOCAL INDEX
                11$:    MOV     XVAL0(R2),TMPB  ;SETUP DATA POINTER
                        MOV     XLOC0(R2),TMPA  ;SETUP/ADJUST PAR VALUE
                        ASL     TMPA
                        ASL     TMPA
                        JSR     R5,XMWRIT       ;WRITE BACKGROUND PATTERN INTO EXTENDED MEMORY
                        TMPA                    ; POINTER TO PAR VALUE
                        TMPB                    ; POINTER TO DATA (@DATA = 125252)
                        BCC     .+10            ;IF NO ERROR, PROCEED
                        ERROR                   ;ELSE, REPORT ERROR
                                                                                TRAP    C$ERROR
                        ESCAPE  SUB             ;   & EXIT SUBTEST
                                                                                TRAP    C$ESCAPE
                                                                                .WORD   L10050-.

                        TST     (R2)+           ;BUMP INDEX
                        CMP     R2,#14.         ;ALL 'XLOC' EXTENDED ADDRESSES WRITTEN?
                        BNE     11$             ; NO:  WRITE ANOTHER

                ;* WE NOW CHANGE ONE LOCATION IN THE 'XVAL' BACKGROUND TABLE.
                ;* 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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CVDMBA.P11    18-DEC-80 15:53          TEST 8 -- SPECIAL MFG EXTENDED BIT TEST

 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$:    CMP     RXVAL0(R2),XVAL0(R2)
 6161  032506  001406                         BEQ     17$
```

```
6162  032510
6163
6164  032510  104455                    GEDF    EM60N,ERR60
6165  032512  000063                                    ;       'DEVICE FATAL'' ERROR # 51
6166  032514  021711                                                            TRAP    C$ERDF
6167  032516  011720                                                            .WORD   51
6168  032520                                                                    .WORD   EM60N
6169  032520  104410                    ESCAPE  SUB                             .WORD   ERR60
6170  032522  000026                                                            TRAP    C$ESCAPE
6171  032524  005722            17$:    TST     (R2)+           ;BUMP LOCAL INDEX       .WORD   L10050-.
6172  032526  020227  000016            CMP     R2,#14.         ;ALL VALUES CHECKED ?
6173  032532  001362                    BNE     16$
6174
6175  032534  005724            20$:    TST     (R4)+           ; YES: BUMP INDEX
6176  032536  020427  000016            CMP     R4,#14.         ;ARE WE DONE W/ALL EXTENDED LOCATIONS
6177  032542  001402                    BEQ     63$             ; YES: END
6178  032544  000137  032006            JMP     T8LP            ; NO:  GO DO SOME MORE
6179  032550            63$:    ENDSUB
6180  032550                                                            L10050:
6181  032550  104403                                                            TRAP    C$ESUB
6182  032552           MFEND:   ENDTST
6183  032552                                                            L10046:
6184  032552  104401                                                            TRAP    C$ETST
6185
6186
6187  032554  037400            XLOC0:  37400           ;ADDRESS 17600000 POINTER
6188  032556  037000            XLOC1:  37000           ;ADDRESS 17400000 POINTER
6189  032560  036400            XLOC2:  36400           ;ADDRESS 17200000 POINTER
6190  032562  035400            XLOC3:  35400           ;ADDRESS 16600000 POINTER
6191  032564  033400            XLOC4:  33400           ;ADDRESS 15600000 POINTER
6192  032566  027400            XLOC5:  27400           ;ADDRESS 13600000 POINTER
6193  032570  017400            XLOC6:  17400           ;ADDRESS 07600000 POINTER
6194
6195  032572  000000            XVAL0:  0
6196  032574  000000            XVAL1:  0
6197  032576  000000            XVAL2:  0
6198  032600  000000            XVAL3:  0
6199  032602  000000            XVAL4:  0
6200  032604  000000            XVAL5:  0
6201  032606  000000            XVAL6:  0
6202
6203  032610  000000            RXVAL0: 0
6204  032612  000000            RXVAL1: 0
6205  032614  000000            RXVAL2: 0
6206  032616  000000            RXVAL3: 0
6207  032620  000000            RXVAL4: 0
6208  032622  000000            RXVAL5: 0
6209  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  0326 0  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 DC
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                                                              L10052:
033044  104403                                                                  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:
033046  104402                                                                  TRAP    C$BSUB
033050  012737  177777  002274          MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO 'WATCH'' FOR INTERRUPTS
033056  005037  002272                  CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
033062  112777  000000  147230          MOVB    #0,@BSEL0       ;DISABLE INTERRUPTS AGAIN
033070  004537  004054                  JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON ''A''
033074  123005                          IRQREG                  ;   BUT NOT ON 'B''
033076  000002                          IRQB
033100  103003                          BCC     31$             ;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
```

```
6378
6379  033160  005037  002272          11$:    CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
6380  033164  112777  000021  147126          MOVB    #IENBA!IENBB,@BSEL0     ;ENABLE BOTH INTERRUPTS
6381  033172  012703  001000                  MOV     #1000,R3        ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
6382  033176  077301                          SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
6383  033200  105737  002272                  TSTB    INTFLG          ;DID AN ''A'' INTERRUPT OCCUR?
6384  033204  001007                          BNE     12$             ;YES, GOOD.  GO TEST THE 'B' INTERRUPT
6385  033206  012737  000007  002254          MOV     #7,GDATA        ;NO,  TELL ERROR HANDLER WHAT WE HAD DONE
6386  033214                                  GEDF    EM35,ERR1       ;REPORT MISSING INTERRUPT ON 'ENABLE''
6387                                                                  ;       ''DEVICE FATAL'' ERROR # 58
6388  033214  104455                                                                  TRAP    C$ERDF
6389  033216  000072                                                                  .WORD   58
6390  033220  016552                                                                  .WORD   EM35
6391  033222  006212                                                                  .WORD   ERR1
6392
6393  033224  105737  002273          12$:    TSTB    INTFLG+1        ;DID A 'B'' INTERRUPT OCCUR?
6394  033230  001407                          BEQ     13$             ;NO,  GOOD.  NOW TRY HITTING THE 'B'' INTERRUPT
6395  033232  012737  000010  002254          MOV     #8.,GDATA       ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6396  033240                                  GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
6397                                                                  ;       ''DEVICE FATAL'' ERROR # 59
6398  033240  104455                                                                  TRAP    C$ERDF
6399  033242  000073                                                                  .WORD   59
6400  033244  016540                                                                  .WORD   EM34B
6401  033246  006212                                                                  .WORD   ERR1
6402
6403  033250                          13$:    ENDSUB
6404  033250                                                                  L10053:
6405  033250  104403                                                                  TRAP    C$ESUB
6406
6407                                  ;-----------------------------------------------------------------------
6408                                  ;               TEST FOR ''B'' INTERRUPT WHEN ENABLED
6409
6410                                  ;       1. DISABLE BOTH INTERRUPTS
6411
6412                                  ;       2. ASSERT ''A'' REQUEST BIT TO 1:
6413                                  ;             DISABLING ''A'' & FORCING 'B''
6414
6415                                  ;       3. CHECK FOR NO ''A'' INTERRUPT
6416
6417                                  ;       4. CHECK FOR NO 'B'' INTERRUPT
6418
6419                                  ;       5. ENABLE BOTH INTERRUPTS
6420
6421                                  ;       6. CHECK FOR NO ''A'' INTERRUPT
6422
6423                                  ;       7. CHECK FOR 'B'' INTERRUPT
6424
6425  033252                          BGNSUB
6426  033252                                                                  T9.3:
6427  033252  104402                                                                  TRAP    C$BSUB
6428  033254  012737  177777  002274          MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO 'WATCH'' FOR INTERRUPTS
6429  033262  005037  002272                  CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
6430  033266  112777  000000  147024          MOVB    #0,@BSEL0       ;DISABLE INTERRUPTS AGAIN
6431  033274  004537  004054                  JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON 'B''
6432  033300  123005                          IRQREG                  ;    BUT NOT ON ''A''
6433  033302  000004                          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
                        ;
                                BGNSUB
                                                                                T9.4:
                                                                                        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                          ERRO@                   ;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, TELI 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 &
                                                                                TRAP    C$ERROR
034152  104460                          ESCAPE  TST             ;  EXIT
                                                                                TRAP    C$ESCAPE
034154                                                                          .WORD   L10060-.
034156  000050
                                1$:     JSR     R5,WRITEI       ;NOW SET 'DISABLE INIT'
034160  004537  004054                  NPRCTL
034164  123004                          DMVDAI!DMVPU!NPRGO
034166  000105
                                                                ;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                10$:    ENDTST
6740 034226                                                                L10060:
6741 034226 104401                                                                 TRAP    C$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.
                                ;*
                                ;--++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                                ;
                                ;       BGNTST
                                                                                        T11::
034230  004737  003514          1$:     JSR     PC,MSTCLR       ;INIT DMV & START UP THE MAINT. LOOP
034234  103003                          BCC     1$              ;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$:             BIT     #BIT0,PFLAG     ;IF BUS RESETS ARE ALLOWED,
034316  001402                                  BEQ     2$              ;  PERFORM THIS TEST
034320                                          EXIT    TST             ;ELSE, BYPASS IT
034320  104432                                                                                  TRAP    C$EXIT
034322  000462                                                                                  .WORD   L10062-.

034324                                  2$:     DELAY   40.             ;DELAY TO PREVENT TST # ROACH
034324  012727  000050                                                                          MOV     #40.,(PC)+
034330  000000                                                                                  .WORD   0
034332  013727  002116                                                                          MOV     L$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-.
```

```
6840  034372                        3$:     SETVEC  #24,#5$,#7      ;SETUP VECTOR FOR POWER FAIL INTERRUPT HANDLER
6841  034372  012746  000007                                                MOV     #7,-(SP)
6842  034376  012746  034500                                                MOV     #5$,-(SP)
6843  034402  012746  000024                                                MOV     #24,-(SP)
6844  034406  012746  000003                                                MOV     #3,-(SP)
6845  034412  104437                                                        TRAP    C$SVEC
6846  034414  062706  000010                                                ADD     #10,SP
6847  034420  112737  177777  002274          MOVB    #-1,INTWCH      ;EXPECT AN "A" INTERRUPT (IF "DCOK" FAILS!)
6848  034426  105037  002272                  CLRB    INTFLG          ;CLEAR THE FLAG IN CASE WE WANT TO DETECT IT
6849  034432  152777  000001  145660          BISB    #IENBA,@BSEL0   ;NOW ENABLE "A" INTERRUPTS
6850
6851  034440  010637  002454                  MOV     SP,OLDSP        ;SAVE THE STACK POINTER
6852
6853                                ;       SETUP "DISABL INIT" TO ALLOW BINIT TO RESET THE DMV AND THEN CAUSE
6854                                ;       A POWER-FAIL CONDITION TO BE SIMULATED.
6855
6856  034444  012777  177506  145662          MOV     #177400!LSIDCL!DMVPU!NPRGO,@SEL6  ;VALUE TO BE LOADED INTO
6857  034452  012777  123004  145650          MOV     #NPRCTL,@SEL4           ;THE NPR CONTROL REGISTER
6858  034460  112777  000042  145636          MOVB    #WRILOC!<IRQA*8.>,@BSEL2  ;TELL M-LOOP TO WRITE IT & INTERRUPT
6859                                                                          ;US JUST BEFORE REQUESTING ANOTHER
6860                                                                          ;M-LOOP COMMAND.
6861
6862                                ;       SETTING  "NPRGO" PREVENTS AN "NPR" OPERATION FROM OCCURING. THE HIGH
6863                                ;       ORDER  BYTE  IS  SET  TO  -1 AND IS USED AS A FLAG -- WHEN THE RESET
6864                                ;       OCCURS,  THE  SELECT  REGISTERS  WILL  ALL  BE  CLEARED; WE WILL BE
6865                                ;       LOOKING AT THE RUN BIT TO BE SET AND AT BSEL7 TO BE CLEARED AS POSITIVE
6866                                ;       PROOF THAT THE DMV GOT RESET.
6867
6868
6869  034466  000001                4$:     WAIT                    ;HANG HERE UNTIL INTERRUPTED
6870
6871
6872                                ;       IF  THE DCOK WORKS AS IT SHOULD, THE NEXT INSTRUCTION TO BE EXECUTED
6873                                ;       IS AT THE LABEL "5$". IF I DOESN'T WORK, THE DMV SHOULD FINISH THE
6874                                ;       "WRITE" COMMAND  AND  GENERAT  A Q-BUS INTERRUPT. ON RETURNING FROM
6875                                ;       THAT INTERRUPT, WE FALL INTO THE ERROR CALL BELOW:
6876
6877  034470                                GEDF    EM42A,ERR1      ;REPORT MISSING POWER-UP
6878                                                                  ;       "DEVICE FATAL" ERROR # 74
6879  034470  104455                                                        TRAP    C$ERDF
6880  034472  000112                                                        .WORD   74
6881  034474  016746                                                        .WORD   EM42A
6882  034476  006212                                                        .WORD   ERR1
6883
6884  034500                        5$:
6885
6886                                ;       IN  EITHER  CASE:  RESTORE THE POWER FAIL VECTOR, STACK POINTER, AND
6887                                ;       THE FLAGS USED BY THE Q-BUS INTERRUPT SERVICE ROUTINE.
6888
6889                                ;                               B U T   F I R S T !
6890
6891                                ;       IN  SOME  CASES  THE  Q-BUS  GETS CONFUSED WHEN WE PERFORM THE ABOVE
6892                                ;       (HIGHLY  NON-  STANDARD)  "DCOK" MANIPULATION. EXPERIENCE HAS SHOWN
6893                                ;       THAT THE INSTRUCTION BEING EXECUTED CAN BE CORRUPTED -- USUALLY (BUT
6894                                ;       NOT  ALWAYS) BEING CLEARED TO ZERO (A HALT INSTRUCTION). THIS IS NOT
6895                                ;       A FAILURE OF THE  DMV  AND THEREFORE SHOULD NOT BE OUR CONCERN HERE.
```

```
6896                                    ;       THE  FAILURE  SHOULD  NOT AFFECT THE TEST WITHIN THE PASS IN WHICH IT
6897                                    ;       OCCURS  BUT  IN  A  SUBSEQUENT  PASS. IN AN EFFORT TO ELIMINATE ANY
6898                                    ;       PROBLEMS FROM THIS GLITCH, WE RESTORE THE INSTRUCTION:
6899
6900  034500  012737  000001  034466            MOV     #1,4$           ;RESTORE THE "WAIT" INSTRUCTION -- JUST IN
6901                                                                    ; CASE IT GOT MODIFIED!
6902  034506  013706  002454                    MOV     OLDSP,SP        ;RESTORE THE STACK
6903  034512  142777  000001  145600            BICB    #IENBA,@BSEL0   ;DISABLE THE "A" INTERRUPT
6904  034520  105037  002274                    CLRB    INTWCH          ;STOP EXPECTING Q-BUS INTERRUPTS
6905  034524                                    CLRVEC  #24             ;RETURN THE VECTOR TO THE SUPERVISOR
6906  034524  012700  000024                                                    MOV     #24,R0
6907  034530  104436                                                           TRAP    C$CVEC
6908  034532                                    SETPRI  #0              ;MAKE SURE WE'RE BACK RUNNING AT 0 AGAIN!
6909  034532  012700  000000                                                    MOV     #0,R0
6910  034536  104441                                                           TRAP    C$SPRI
6911
6912  034540  013701  002262                    MOV     DELAY1,R1       ;INITIALIZE TTHE LOOP COUNTER FOR DELAY LOOP
6913  034544  001402            10$:            BEQ     11$             ; EXIT DELAY LOOP IF TIME HAS EXPIRED
6914  034546  005301                            DEC     R1              ;  ELSE, DECREMENT THE LOOP COUNTER AND
6915  034550  000775                            BR      10$             ;  CONTINUE TO LOOP
6916  034552                    11$:                                    ; TIME UP !
6917  034552  132777  000200  145542            BITB    #RUN,@BSEL1     ;CHECK RUN BIT
6918  034560  001403                            BEQ     12$             ; NOT SET... REPORT ERROR.
6919  034562  105777  145550                    TSTB    @BSEL7          ;THIS REGISTER SHOULD HAVE BEEN CLEARED
6920  034566  001404                            BEQ     13$             ;IT IS, EVERYTHING HERE IS OK -- EXIT SUBTEST
6921  034570                    12$:            GEDF    EM42B,ERR1      ;NO, THEN REPORT THE FAILURE
6922                                                                    ;       "DEVICE FATAL" ERROR # 75
6923  034570  104455                                                           TRAP    C$ERDF
6924  034572  000113                                                           .WORD   75
6925  034574  017020                                                           .WORD   EM42B
6926  034576  006212                                                           .WORD   ERR1
6927  034600  004737  003346            13$:    JSR     PC,MASCLR       ;RESTORE DMV-11 TO A NORMAL STATE!
6928  034604  103001                            BCC     14$             ;NO ERRORS, EXIT SUBTEST
6929  034606                                    ERROR                   ;REPORT MSTCLR ERROR
6930  034606  104460                                                           TRAP    C$ERROR
6931  034610                    14$:
6932  034610                                    ENDSUB
6933  034610                                                        L10063:
6934  034610  104403                                                           TRAP    C$ESUB
6935                                    ;-------------------------------------------------------------------------
6936                                    ; SUBTEST #2: DCOK H LO (DMV-11 SHOULDN'T BE RESET)
6937                                    ;-------------------------------------------------------------------------
6938                                    ;
6939                                    ;       SINCE HITTING 'DCOK H LO' WITHOUT 'HALT' OCCASIONALLY CORRUPTS
6940                                    ;       PROGRAM MEMORY: WE SET BOTH 'HALT' AND 'DCOK H LO' IN THIS
6941                                    ;       SUB-TEST (IF HALT FAILS, THIS TEST MAY BLOW UP).
6942  034612                                    BGNSUB          ; <==>  TEST FOR POWER-DOWN/UP & NO DMV-11 RESET
6943  034612                                                                    T12.2:
6944  034612  104402                                                           TRAP    C$BSUB
6945
6946  034614  004737  003514                    JSR     PC,MSTCLR       ;INIT DMV & START UP THE MAINT. LOOP
6947  034620  103003                            BCC     2$              ;IF AN ERROR OCCURED,
6948  034622                                    ERROR                   ;REPORT IT &
6949  034622  104460                                                           TRAP    C$ERROR
6950  034624                                    ESCAPE  SUB             ;  EXIT
6951  034624  104410                                                           TRAP    C$ESCAPE
```

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6952  034626  000154                                                                  .WORD   L10064-.
6953  034630                  2$:     SETVEC  #24,#5$,#7      ;SETUP VECTOR FOR POWER FAIL INTERRUPT HANDLER
6954  034630  012746  000007                                                         MOV     #7,-(SP)
6955  034634  012746  034732                                                         MOV     #5$,-(SP)
6956  034640  012746  000024                                                         MOV     #24,-(SP)
6957  034644  012746  000003                                                         MOV     #3,-(SP)
6958  034650  104437                                                                 TRAP    C$SVEC
6959  034652  062706  000010                                                         ADD     #10,SP
6960  034656  010637  002454                  MOV     SP,OLDSP        ;SAVE THE STACK POINTER
6961
6962  034662  004537  004166                  JSR     R5,MOVLTD       ;MOVE THE MICRO CODE INTO THE DMV
6963  034666  035006                          SMCODE                  ;       THIS IS WHERE IT STARTS
6964  034670  000040                          EMCODE-SMCODE           ;       THIS IS ITS SIZE IN BYTES
6965
6966  034672  112777  000377  145434          MOVB    #377,@BSEL6     ;WRITE ALL 1'S TO BSEL6
6967
6968  034700  012777  000077  145422          MOV     #77,@SEL4       ;START ADDRESS OF MICROCODE
6969  034706  012777  000005  145410          MOV     #EXECUT,@SEL2   ;INITIATE M-CODE
6970
6971                          ;  *** IF THE RESET GETS THROUGH, THE MICRO-DIAGNOSTIC WILL CLEAR BSEL4 ***
6972
6973  034714  012703  001000                  MOV     #1000,R3        ;STALL FOR A BIT (UCODE SHOULD HALT US HERE)
6974  034720  077301                          SOB     R3,.
6975
6976                          ; IF WE GET HERE, WE NEVER GOT THE EXPECTED POWER-UP SEQUENCE!
6977
6978  034722                                  GEDF    EM42A,ERR1      ;REPORT MISSING POWER-UP
6979                                                                  ;       'DEVICE FATAL'' ERROR # 76
6980  034722  104455                                                                  TRAP    C$ERDF
6981  034724  000114                                                                  .WORD   76
6982  034726  016746                                                                  .WORD   EM42A
6983  034730  006212                                                                  .WORD   ERR1
6984
6985                          ;IN EITHER CASE, RESTORE THE VECTOR & STACK AND SEE IF THE DMV GOT RESET
6986
6987  034732  013706  002454          5$:     MOV     OLDSP,SP        ;RESTORE THE STACK
6988  034736                                  CLRVEC  #24             ;RETURN THE VECTOR TO THE SUPERVISOR
6989  034736  012700  000024                                                         MOV     #24,R0
6990  034742  104436                                                                 TRAP    C$CVEC
6991  034744                                  SETPRI  #0              ;MAKE SURE WE'RE BACK RUNNING AT 0 AGAIN!
6992  034744  012700  000000                                                         MOV     #0,R0
6993  034750  104441                                                                 TRAP    C$SPRI
6994  034752  122777  000377  145354          CMPB    #377,@BSEL6     ;THIS REGISTER SHOULD NOT HAVE BEEN CLEARED
6995  034760  001404                          BEQ     10$             ;IT ISN'T, ALL IS OK -- EXIT SUBTEST
6996  034762                                  GEDF    EM42C,ERR1      ;IT IS, THEN REPORT THE FAILURE
6997                                                                  ;       'DEVICE FATAL'' ERROR # 77
6998  034762  104455                                                                  TRAP    C$ERDF
6999  034764  000115                                                                  .WORD   77
7000  034766  017074                                                                  .WORD   EM42C
7001  034770  006212                                                                  .WORD   ERR1
7002                                                                  ;* AT THIS POINT 'DINIT'' IS STILL SET *
7003  034772  004737  003346          10$:    JSR     PC,MASCLR       ;MAKE SURE THE DMV IS PROPERLY RESET!
7004  034776  103001                          BCC     11$             ;EVERYTHING OK, EXIT SUBR AND TEST.
7005  035000                                  ERROR                   ;REPORT MASCLR ERROR
7006  035000  104460                                                                  TRAP    C$ERROR
7007  035002                          11$:
```

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7008  035002                        ENDSUB
7009  035002
7010  035002  104403
7011  035004                        ENDTST
7012  035004
7013  035004  104401

L10064:
                TRAP    C$ESUB
L10062:
                TRAP    C$ETST
```

```
                                        .SBTTL  SUBTEST 2'S M-CODE -- COMPLETE
                                        ;-------------------------------------------------------------------------
                                        ; 6502 MICROCODE FOR TEST #11/ SUBTEST #2
                                        ;-------------------------------------------------------------------------
                                        SMCODE:
7014
7015
7016
7017
7018  035006                            
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 MPRCTL          :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 MPRCTL          :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 MPRCTL          :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 MPRCTL          :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,@#TMPO
;*                                           366   [TMPO]
;*                                           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  TMPO WILL BE CHECKED FOR THE
;*       PROPER CONTENTS;
;*
;--*****************************************************************************
;
```

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                                          ;       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
```

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7318  035412  103003                  BCC     1$              ;IF NC 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                  1$:
7325  035422  004537  004166          JSR     R5,MOVLTD       ;MOVE THE MICRO CODE INTO THE DMV
7326  035426  036170                  MC2                     ;       THIS IS WHERE IT STARTS
7327  035430  000243                  MC2END-MC2              ;       THIS IS ITS SIZE IN BYTES
7328
7329  035432  004537  005004          JSR     R5,MOVSW        ;SAVE THE INTERRUPT VECTORS
7330  035436  000000                  0
7331  035440  002654                  BUFAREA                 ; IN THE BUFFER AREA
7332  035442  000200                  400/2                   ;  LOC'S 0 ==> 377 WILL BE SAVED
7333
7334  035444                          SETVEC  #376,#0,#7      ;FAKE OUT THE SUPERVISOR,  WE'RE JUST
7335  035444  012746  000007                                                  MOV     #7,-(SP)
7336  035450  012746  000000                                                  MOV     #0,-(SP)
7337  035454  012746  000376                                                  MOV     #376,-(SP)
7338  035460  012746  000003                                                  MOV     #3,-(SP)
7339  035464  104437                                                          TRAP    C$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  0068  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
```

7677
7678
7679
7680
7681
7682
7683 000010
7684 036170
7685
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7698
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7700
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7722

```
                                        .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     #a24    ;POINT TO 11'S POWER-UP VEC.
```

```
7779  036235  205  070          .BYTE  205,070
7780                          ;0069  0064  85 38          STA     NPRAOL
7781  036237  040  305  000    .BYTE  040,305,000
7782                          ;0070  0066  20 C5 00       JSR     NPR     ;MOVE TO 24
7783  036242  040  305  000    .BYTE  040,305,000
7784                          ;0071  0069  20 C5 00       JSR     NPR     ;MOVE TO 26
7785                          ;0072  006C
7786  036245  251  000          .BYTE  251,000
7787                          ;0073  006C  A9 00          LDA     #0
7788  036247  205  070          .BYTE  205,070
7789                          ;0074  006E  85 38          STA     NPRAOL  ;POINT TO THE 11'S LOC. 0
7790  036251  040  305  000    .BYTE  040,305,000
7791                          ;0075  0070  20 C5 00       JSR     NPR     ;MOVE TO LOC 0
7792  036254  040  305  000    .BYTE  040,305,000
7793                          ;0076  0073  20 C5 00       JSR     NPR     ;MOVE TO LOC 2
7794  036257  040  305  000    .BYTE  040,305,000
7795                          ;0077  0076  20 C5 00       JSR     NPR     ;MOVE TO 4
7796                          ;0078  0079
7797                          ;0079  0079             ; NOW THAT WE'VE TAKEN CONTROL OF THE 11'S POWER-
7798                          ;0080  0079             ; UP VECTOR, FORCE HIM THROUGH IT.  BUT DON'T LET
7799                          ;0081  0079             ; HIS BINIT RESET US (BY KEEPING 'DISABL INIT''
7800                          ;0082  0079             ; SET)
7801                          ;0083  0079
7802  036262  251  107          .BYTE  251,107
7803                          ;0084  0079  A9 47          LDA     #NONPR!PWRUP!SDCLOW!DISINI
7804  036264  215  004  246    .BYTE  215,004,246
7805                          ;0085  007B  8D 04 A6       STA     NPRCTL
7806  036267  251  145          .BYTE  251,145
7807                          ;0086  007E  A9 65          LDA     #NONPR!PWRUP!DISINI!NPROUT
7808  036271  215  004  246    .BYTE  215,004,246
7809                          ;0087  0080  8D 04 A6       STA     NPRCTL
7810  036274  352                .BYTE  352
7811                          ;0087  0083  EA             NOP
7812  036275  352                .BYTE  352
7813                          ;0087  0084  EA             NOP
7814                          ;0088  0085
7815                          ;0089  0085             ; NOW WE CAN NPR-OUT THE REST OF THE DATA WE HAVE
7816                          ;0090  0085
7817  036276  040  305  000    .BYTE  040,305,000
7818                          ;0091  0085  20 C5 00       JSR     NPR     ;MOVE TO LOC 6
7819  036301  240  166          .BYTE  240,166
7820                          ;0092  0088  A0 76          LDY     #@166   ;THIS IS HOW MANY WE'LL DO
7821  036303  040  305  000    .BYTE  040,305,000
7822                          ;0093  008A  20 C5 00  FILOOP JSR     NPR     ;WRITE 1 WORD
7823  036306  312                .BYTE  312
7824                          ;0094  008D  CA             DEX             ;BACK UP THE DATA POINTER
7825  036307  312                .BYTE  312
7826                          ;0095  008E  CA             DEX             ; -- WE WANT THE SAME WORD
7827  036310  210                .BYTE  210
7828                          ;0096  008F  88             DEY             ;IF NOT DONE,
7829  036311  320  370          .BYTE  320,370
7830                          ;0097  0090  D0 F8          BNE     FILOOP  ;                 DO IT AGAIN
7831  036313  240  006          .BYTE  240,006
7832                          ;0098  0092  A0 06          LDY     #@6     ;ELSE, SETUP TO DO 6 MORE
7833  036315  350                .BYTE  350
7834                          ;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       ;0178  00DD  E6 38              INC     NPRAOL  ;POINT TO THE NEXT WORD
 7950                                  .BYTE  346,070
 7951                                 ;0179  00DF  E6 38              INC     NPRAOL  ;OF THE 11'S MEMORY
 7952  036432      140                ;0180  00E1
 7953                                  .BYTE  140
 7954                                 ;0181  00E1  60                 RTS             ;RETURN TO CALLER
 7955                                 ;0182  00E2
 7956                                 ;
 7957                                 ;ERRORS = 0000
 7958                                 ;
 7959                                 .SBTTL  SUBTEST 2'S M-CODE -- SYMBOL   TABLE
 7960                                 ;
 7961                                 ; BIT0     0001    BIT1     0002    BIT2     0004    BIT4     0010
 7962                                 ; BIT6     0040    BSEL7    0017    DATABL   009D    DISINI   0001
 7963                                 ; ENDLOP   008A    FILOOP   007E    HALT     0010    NONPR    0040
 7964                                 ; NPR      0089    NPRAOH   0039    NPRAOL   0038    NPRAOX   003A
 7965                                 ; NPRCTL   A604    NPRDOH   A601    NPRDOL   A600    NPRWAT   00CB
 7966                                 ; PWRUP    0004    SDCLOW   0002    STARAM   003F    WAIT1    0043
 7967                                 ;
 7968                                 ;END OF ASSEMBLY(V6A)
 7969                                 ;SYMBOLS LEFT = 1476 OUT OF 1500
 7970                                 ;
 7971                                 ;COMPAS MICROSYSTEMS MINMIC CROSS ASSEMBLER PAGE C-1
 7972                                 .SBTTL  SUBTEST 2'S M-CODE -- CROSS REFERENCE TABLE (CREF V01-05 )
 7973                                 ;
 7974                                 ;
 7975                                 ;BIT0     5#     33
 7976                                 ;BIT1     6#     32
 7977                                 ;BIT2     7#     31
 7978                                 ;BIT4     8#     30
 7979                                 ;BIT6     9#     29
 7980                                 ;BSEL7   13#     43      45
 7981                                 ;DATABL 127#    162     164
 7982                                 ;DISINI  33#     55      57      84      86
 7983                                 ;ENDLOP 101#    103
 7984                                 ;FILOOP  93#     97
 7985                                 ;HALT    30#     55      57
 7986                                 ;NONPR   29#     55      57      84      86      113
 7987                                 ;NPR      70     71      75      76      77      91      93
 7988                                 ;        101    109     162#
 7989                                 ;NPRAOH  18#     61
 7990                                 ;NPRAOL  17#     18      19      69      74      108     178
 7991                                 ;        179
 7992                                 ;NPRAOX  19#     62
 7993                                 ;NPRCTL  28#     56      58      85      87      114     167
 7994                                 ;        168     175
 7995                                 ;NPRDOH  24#     165
 7996                                 ;NPRDOL  23#     24      163
 7997                                 ;NPRWAT 174#    176
 7998                                 ;PWRUP   31#     55      57      84      86      113
 7999                                 ;SDCLOW  32#     55      84
 8000                                 ;STARAM  37#     40
 8001                                 ;WAIT1   45#     46
 8002  036433                         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 : /
```

```
CVDMBA.P11    18-DEC-80 15:53          HARDWARE PARAMETER CODING SECTION

        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
```

```
8058                            .SBTTL SOFTWARE PARAMETER CODING SECTION
8059
8060
8061
8062                            ;////////////////////////////////////////////////////////////////
8063                            ;/  THE SOFTWARE PARAMETER CODING SECTION CONTAINS MACROS
8064                            ;/  THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
8065                            ;/  MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
8066                            ;/  INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
8067                            ;/  MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
8068                            ;/  WITH THE OPERATOR.
8069                            ;////////////////////////////////////////////////////////////////
8070
8071  037040                        BGNSFT
8072  037040  000000                                                .WORD L10071-L$SOFT/2
8073  037042                                                L$SOFT::
8074  037042                        ENDSFT
8075                                                                .EVEN
8076  037042                                                L10071:
```

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

 8077
 8078  037042
 8079              037142              .SBTTL PATCH AREA FOR DEBUG
 8080  037142      000240              PATCH:
 8081  037144      000240                      .=.+100
 8082  037146      000240                      NOP
 8083                                            NOP
 8084                                            NOP
 8085
 8086                                  ;*****************************************
 8087  037150                          .SBTTL 'ENDMOD'' & 'LASTAD''
 8088  037150                                  ENDMOD
 8089                                            LASTAD
 8090  037150      000000                                                  .EVEN
 8091  037152      000000                                                  .WORD   0
 8092  037154                                                              .WORD   0
 8093              000001              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
```

```
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
```

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                    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$GETW= 000027       1173#
C$GPAN= 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$RFLA= 000021       1173#
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C$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
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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#
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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
```

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                    4429  4441  4452  4461  4466  4476  4492  4502  4511  4525  4540  4549  45 8
                    4567  4584  4593  4603  4617  4626  4630  4663  4669  4712  4757  4764  4 9
                    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
FSCLEA= 000007       1173#  3971  3979
FSDU  = 000016       1173#  3989  3994
FSEND = 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  4737
                    4764  4779  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
FSHARD= 000004       1173#  8018  8053
FSHW  = 000013       1173#  1323  1349
FSINIT= 000006       1173#  3721  3891
FSJMP = 000050       1173#  5268  5275  5854  5862  6241  6809  6815  7212  7218
FSMOD = 000000       1173#  1175  8088
FSMSG = 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
FSPROT= 000021       1173#  3708  3713
FSPWR = 000017       1173#
FSRPT = 000012       1173#
FSSEG = 000003       1173#
FSSOFT= 000005       1173#  8072  8075
FSSRV = 000010       1173#  2801  2820  2835  2854  5792  5823
FSSUB = 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
FSSW  = 000014       1173#  1358  1362
FSTEST= 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*
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                        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#
GSCNTO= 000200           1173#
GSDELM= 000372           1173# 6819  7222
GSDISP= 000003           1173#
GSEXCP= 000400           1173#
GSHILI= 000002           1173#
GSLOLI= 000001           1173#
GSNO  = 000000           1173#
GSOFFS= 000400           1173# 8022  8027  8032  8038  8042  8048
GSOFSI= 000376           1173# 8022  8027  8032  8038  8042  8048
GSPRMA= 000001           1173# 8022  8027
GSPRMD= 000002           1173# 8032  8042
GSPRML= 000000           1173# 8038  8048
GSRADA= 000140           1173#
GSRADB= 000000           1173#
GSRADD= 000040           1173#
GSRADL= 000120           1173# 8038  8048
GSRADO= 000020           1173# 8022  8027  8032  8042
GSXFER= 000004           1173#
GSYES = 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
```

```
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$SUB = 000041          1173#  4053   4055#  4078   4103   4113   4161   4169   4195   4220   4240   4250   4264
                        4290   4314   4324   4337   4355#  4357#  4423   4663   4833   4846#  4907#  4909#  4913#
                        4974#  4976#  5001   5092   5096#  5103   5116   5125   5134   5143   5152   5163#  5165#
                        5168#  5175   5188   5197   5206   5215   5224   5235#  5237#  5262   5285#  5320   533?
                        5343   5357   5372   5381   5395   5409   5419   5430   5439   5448   5467   5478   5488#
                        5490#  5493#  5527   5548   5564   5573   5587   5614   5623   56?    5656   5667#  5669#
                        5849   5868#  5897   5946   5981   5996   6004#  6006#  6013#  6041   6096   6136   6169
                        6180#  6182#  6235   6262#  6322#  6324#  6344#  6404#  6406#  6426#  6486#  6488#  6508#
                        6568#  6570#  6584#  6622#  6624#  6638#  6676#  6678#  6697   6757   6804   6831#  6838
                        6933#  6935#  6943#  6951   7009#  7011#  7207   7232#  7311#  7313#  7315#  7410   7465#
                        7467#
I$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
                        507?#  5074#  5092#  5096   5168   5238#  5240#  5262#  5268   5275   5285   5493   5670#
                        567?#  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#
```

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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#
```

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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#
```

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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    4654    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
OSAPTS=  000000          1173#   1230
OSAU   = 000001          1173#   1191#   1262
OSBGNR=  000000          1173#   1256
OSBGNS=  000000          1173#   1222
OSDU   = 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
```

```
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
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                        3178   3179   3181   3182   3183   3184   3185   3189   3190   3191   3192   3193   3194
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3733 3739 3745 3764 3769 3782 3802 3859 3865 3876 3884 3892 3928
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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

```
                        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  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#  4834#  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#
```

```
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
```

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

```
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#									

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

```
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
```

```
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
```

```
                5549#  5562#  5564#  5565#  5571#  5573#  5574#  5582#  5583#  5584#  5585#  5587#  5588#  5612#  5614#
                5615#  5621#  5623#  5624#  5630#  5631#  5632#  5633#  5637#  5638#  5639#  5640#  5642#  5643#  5651#
                5652#  5653#  5654#  5656#  5657#  5668#  5671#  5703#  5704#  5705#  5706#  5707#  5708   5815   5816
                5817   5818   5823#  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#  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#
MSGNLS            1#   1173#
MSGNSU            1#   1173#  4055#  4846#  4913#  5096#  5168#  5285#  5493#  5868#  6013#  6262#  6344#  6426#  6508#
                6584#  6638#  6831#  6943#  7232#  7315#
MSGNTA            1#   1173#  1349#  1362#  2820#  2854#  2872#  2882#  2957#  3108#  3117#  3126#  3167#  3223#  3298#
                3351#  3386#  3445#  3490#  3891#  3957#  3979#  3904#  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#  8054   8075#
                8076
MSGNTE            1#   1173#  4053#  4423#  4663#  4833#  5001#  5092#  5262#  5849#  6235#  6697#  6757#  6804#  7207#
MSHAPT            1#   1173#  1203#
MSHNAP            1#   1173#  1203#  1242
MSINCR            1#   1173#  1175#  1323#  1358#  2801#  2808#  2835#  2842#  2869#  2873#  2878#  2883#  2888#  2899#
                2916#  2926#  2936#  2943#  2953#  2958#  2963#  2971#  2977#  2987#  3002#  3016#  3034#  3044#  3064#
                3084#  3104#  3109#  3114#  3118#  3123#  3127#  3132#  3140#  3148#  3156#  3163#  3168#  3173#  3178#
                3184#  3201#  3209#  3219#  3224#  3231#  3236#  3242#  3248#  3254#  3264#  3274#  3284#  3294#  3299#
                3306#  3316#  3332#  3346#  3352#  3358#  3381#  3387#  3392#  3403#  3416#  3433#  3441#  3446#  3462#
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                3638#  3651#  3659#  3672#  3679#  3691#  3708#  3721#  3727#  3733#  3739#  3745#  3764#  3769#  3782#
                3802#  3859#  3865#  3876#  3884#  3892#  3921#  3928#  3947#  3952#  3958#  3971#  3974#  3977#  3980#
                3989#  3992#  3995#  4005#  4008#  4053#  4054#  4055#  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#  4423#
                4424#  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#  4663#  4664#  4667#  4669#
                4675#  4707#  4712#  4719#  4726#  4735#  4752#  4757#  4762#  4764#  4777#  4794#  4800#  4833#  4834#
```

```
                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#
                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#
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                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#
MSWORD             1#  1173#  1242#  1251   1298#  1300   1301   1302   1303   1304   1305   1306   1307   1308   1309
                1310   1311   1312   2808#  2809   2810   2811   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

```
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)
```