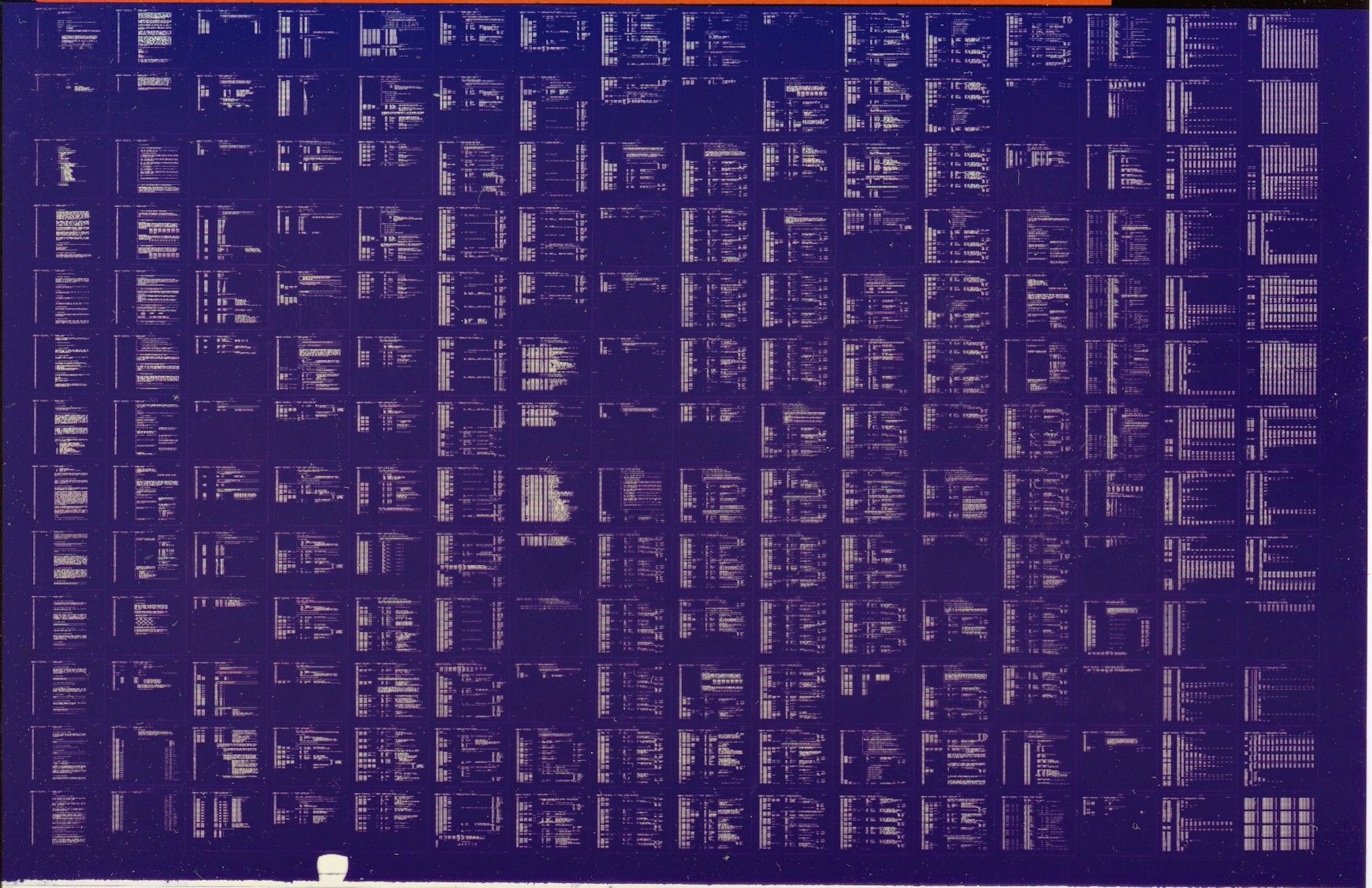
DMV11 MICRO-CTRLR STC 2
CVDMBC0

AH-F265C-MC
FICHE 01 OF 02

FEB 1985
digital
Made In USA



DMV11 MICRO-CTRLR STC Z
CVDMBC0

AH-FZ65C-MC
FICHE 0Z OF 0Z

FEB 1985
digital
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                        .TITLE CVDMBCO 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-F264C-MC

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

                        PRODUCT DATE:   JULY 1983

                        MAINTAINER:     DIAGNOSTICS MERRIMACK  CC:38P

                        AUTHORS:        CHRIS BRIEMEN
                                        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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                                DEC             DECUS           DECTAPE
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43
44
45
46                                        HISTORY
47                                        -------
48
49
50                                REV          DATE          REASON
51                                ---          ----           -----
52
53                                 A           14-JAN-81     INITIAL RELEASE
54                                 B           11-JUL-83     INSTALL OUTSTANDING PATCHES
55                                 C           13-AUG-84     THERE WERE TIMING PROBLEMS
56                                                           ASSOCIATED WITH RUNNING THIS PROGRAM
57                                                           ON AN ORION PROCESSOR (J-11).
58                                                           TIMING DELAYS HAD TO BE INCREASED.
```

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-C-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 TART 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>
****

```
442
443
444                             6.3.3.1 PASS SWITCH (/PASS:<PASS-CNT>)
445
446                             <PASS-CNT> IS SAME AS IN START COMMAND, BUT THE  DEFAULT  IS
447                             THE UNSATISFIED PASS-CNT FROM THE PREVIOUS START OR RESTART.
448                             IF NONE REMAINS, THE DEFAULT IS NON-ENDING EXECUTION.
449
450
451                             6.3.3.2 FLAG SWITCH (/FLAGS:<FLAG-LIST>)
452
453                             <FLAG-LIST> IS SAME AS IN  START  COMMAND,  BUT  UNSPECIFIED
454                             FLAGS RETAIN THEIR CURRENT VALUE.
455
456
457                             6.3.3.3 EFFECT OF CONTINUE COMMAND
458
459                             CONTINUE  MUST  FOLLOW  A START OR RESTART, AND COMMAND MODE
460                             MUST HAVE  BEEN  ENTERED  DUE  TO  A  HALT  ON  ERROR  OR  A
461                             CONTROL/C.  THE  EFFECT  OF  THE  COMMAND  IS  TO  GO TO THE
462                             BEGINNING OF THE TEST THAT WAS BEING EXECUTED WHEN THE  HALT
463                             OR  CONTROL/C  TOOK PLACE.  SOFTWARE DIALOGUE MAY OPTIONALLY
464                             BE REEXECUTED.  HARDWARE PARAMETERS MAY NOT BE CHANGED.
465
466
467                             6.3.4 PROCEED COMMAND
468
469                             ************************************************************
470                             PRO(CEED)/FLAGS:<FLAG-LIST>
471                             ************************************************************
472
473
474                             6.3.4.1 FLAGS SWITCH (/FLAGS:<FLAG-LIST>)
475
476                             <FLAG-LIST> IS AS IN  THE  START  COMMAND,  BUT  UNSPECIFIED
477                             FLAGS RETAIN THEIR CURRENT VALUE.
478
479
480                             6.3.4.2 EFFECT OF PROCEED COMMAND
481
482                             PROCEED  MUST FOLLOW A START, RESTART, OR CONTINUE.  COMMAND
483                             MODE MUST HAVE BEEN ENTERED VIA A HALT ON ERROR.  THE EFFECT
484                             OF  THE  COMMAND  IS  TO  BEGIN  EXECUTION  AT  THE LOCATION
485                             FOLLOWING THE ERROR CALL.  NEITHER  HARDWARE  NOR  SOFTWARE
486                             PARAMETERS MAY BE ALTERED.
487
488
489                             6.3.5 ADD COMMAND
490
491                             ************************************************************
492                             ADD/UNITS:<UNIT-LIST>
493                             ************************************************************
494
495
496                             6.3.5.1 UNITS SWITCH (/UNITS:<UNIT-LIST>
497
```

<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>)

```
554                             <UNIT-LIST> IS AS IN THE RESTART COMMAND.
555
556
557                             6.3.8.2 EFFECT OF DISPLAY COMMAND
558
559                             THE HARDWARE P-TABLES FOR ALL UNITS UNDER TEST  ARE  PRINTED
560                             OUT  IN  THE  FORMAT  IN WHICH THEY WERE ENTERED.  ANY UNITS
561                             THAT WERE DROPPED BY THE  OPERATOR  "DROP"  COMMAND  ARE  SO
562                             DESIGNATED.
563
564
565                             6.3.9 FLAGS COMMAND
566
567                             ****************************************************************
568                             FLA(GS)
569                             ****************************************************************
570
571
572                             6.3.9.1 EFFECT OF FLAGS COMMAND
573
574                             THE CURRENT SETTINGS OF ALL FLAGS ARE PRINTED.
575
576
577                             6.3.10 ZFLAGS COMMAND
578
579                             ****************************************************************
580                             ZFL(AGS)
581                             ****************************************************************
582
583
584                             6.3.10.1 EFFECT OF ZFLAGS COMMAND
585
586                             ALL FLAGS ARE CLEARED.
587
588
589                             6.3.11  CONTROL  CHARACTERS
590
591                             A CONTROL C (C) ENTERED DURING THE EXECUTION OF A DIAGNOSTIC CAUSES
592                             A  RETURN  TO  COMMAND MODE.
593
594                             A  CONTROL  Z  (Z)  ENTERED DURING ONE OF THE THREE OPERATOR
595                             DIALOGUES- HARD CORE QUESTIONS (SEE  6.2),HARDWARE  DIALOGUE
596                             (SEE 6.3.1.5), OR SOFTWARE DIALOGUE (SEE 6.3.1.5) CAUSES THE
597                             DEFAULTS TO BE TAKEN FOR THE REMAINDER OF THAT DIALOGUE.
598
599                             A CONTROL O (O) ENTERED DURING THE EXECUTION OF A DIAGNOSTIC
600                             CAUSES   ALL  TELETYPE  OUTPUT  TO  BE  SURPRESSED  FOR  THE
601                             REMAINDER OF THE DIAGNOSTIC OR UNTIL  ANOTHER  O  IS  TYPED,
602                             WHICH RESTORES NORMAL TELETYPE OUTPUT.
603
604
605                             6.3.12 HARDWARE PARAMETERS
606
607                             THE  FOLLOWING 3 QUESTIONS WILL BE ASKED ON A START COMMAND.
608                             THE VALUE LOCATED TO THE LEFT OF THE QUESTION  MARK  IS  THE
609                             DEFAULT  VALUE  THAT  WILL  BE  TAKEN  ON  A CARRIAGE RETURN
```

RESPONSE.

 1. DEVICE CSR ADDRESS : (O) 160020?

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

 2. DEVICE VECTOR ADDRESS : (O) 300 ?

THIS IS THE ADDRESS OF THE INPUT INTERPUPT 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 O ON POWER UP : (L) Y ?

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

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

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

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

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

6.3.13 SOFTWARE PARAMETERS

NO SOFTWARE PARAMETER QUESTIONS ARE ASKED BY THIS PROGRAM.

6.3.14 EXTENDED DISCUSSION OF P-TABLE DIALOGUE

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

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

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

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

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

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

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

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

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

THE FOLLOWING DIALOGUE WOULD ACCOMPLISH THIS GOAL:

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

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

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

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

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

```
                        7.0 TEST DESCRIPTIONS


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


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

```
794
795
796                     ;*********************************************************************************
797                     ;*      TEST 3  <NPR CONTROL REGISTER - MASTER CLEAR>
798                     ;*
799                     ;* THE PROGRAM SETS THE FOLLOWING BITS IN THE NPR CONTROL REGISTER :
800                     ;* IN/OUT, BYTE OPER, AND DISABL INIT. THE REGISTER IS READ AND VERIFIED.
801                     ;* THEN, A MASTER CLEAR IS PERFORMED, AND THE REGISTER IS READ AND CHECKED FOR
802                     ;* 000.
803                     ;*********************************************************************************
804
805
806                     ;*********************************************************************************
807                     ;*      TEST 4  <NPR DATA-OUT>
808                     ;*
809                     ;* FIRST SUBTEST :
810                     ;* THE NPR OUTPUT ADDRESS REGISTER IS LOADED WITH THE ADDRESS OF A 2 BYTE
811                     ;* BUFFER IN THE PROGRAM. THEN, EACH WORD OF DATA PATTERN F IS LOADED INTO THE
812                     ;* NPR OUTPUT DATA REGISTER, A FULLWORD NPR OUTPUT REQUEST IS PERFORMED,
813                     ;* AND THE PROGRAM CHECKS FOR THE CORRECT DATA IN THE PROGRAM BUFFER. ALSO,
814                     ;* THE PROGRAM CHECKS THAT THE ABORT XFER BIT IN THE NPR CONTROL REGISTER
815                     ;* NEVER GETS SET.
816                     ;*   DATA PATTERN F = 125252, 052525, 000000, 177777, 000001, 000002, 000004,
817                     ;*                    000010, 000020, 000040, 000100, 000200, 000400, 001000,
818                     ;*                    002000, 004000, 010000, 020000, 040000, 100000, 177776,
819                     ;*                    177775, 177773, 177767, 177757, 177737, 177677, 177577,
820                     ;*                    177377, 176777, 175777, 173777, 167777, 157777, 137777,
821                     ;*                    077777, 000000
822                     ;*
823                     ;* SECOND SUBTEST:
824                     ;* THE ABOVE OPERATIONS ARE REPEATED IN BYTE NPR TRANSFER MODE, USING THE DATA
825                     ;* BYTES IN DATA PATTERN B. THE LOW BYTE OF THE PROGRAM BUFFER IS USED, AND
826                     ;* THE UPPER BYTE IS CLEARED AT THE START, AND IS CHECKED TO REMAIN UNCHANGED
827                     ;* THROUGHOUT THE SUBTEST.
828                     ;*   DATA PATTERN B = 125, 252, 000, 377, 001, 002, 004, 010, 020, 040, 100,
829                     ;*                    200, 376, 375, 373, 367, 357, 337, 277, 177, 000
830                     ;*
831                     ;*********************************************************************************
832
833
834                     ;*********************************************************************************
835                     ;*      TEST 5  <NPR DATA-IN>
836                     ;*
837                     ;* THE NPR INPUT ADDRESS REGISTER IS LOADED WITH THE ADDRESS OF A 2 BYTE
838                     ;* BUFFER IN THE PROGRAM. THEN, EACH WORD OF DATA PATTERN F IS LOADED INTO THE
839                     ;* PROGRAM BUFFER, A FULLWORD NPR INPUT REQUEST IS ISSUED AND PERFORMED,
840                     ;* AND THE PROGRAM CHECKS FOR THE CORRECT DATA IN THE NPR INPUT DATA REG.
841                     ;* ALSO, THE PROGRAM CHECKS THAT THE ABORT XFER BIT IN THE NPR CONTROL
842                     ;* REGISTER NEVER GETS SET.
843                     ;*   DATA PATTERN F = 125252, 052525, 000000, 177777, 000001, 000002, 000004,
844                     ;*                    000010, 000020, 000040, 000100, 000200, 000400, 001000,
845                     ;*                    002000, 004000, 010000, 020000, 040000, 100000, 177776,
846                     ;*                    177775, 177773, 177767, 177757, 177737, 177677, 177577,
847                     ;*                    177377, 176777, 175777, 173777, 167777, 157777, 137777,
848                     ;*                    077777, 000000
849                     ;*********************************************************************************
```

```
850
851
852                     ;*****************************************************************************
853                     ;*      TEST 6  <NPR XFER ABORT>
854                     ;*
855                     ;* FIRST SUBTEST :
856                     ;* THE PROGRAM PERFORMS AN OUTPUT NPR REQUEST TO A NON-EXISTENT MEMORY
857                     ;* LOCATION, AND CHECKS FOR THE ASSERTION OF ABORT XFER BIT IN THE NPR CONTROL
858                     ;* REGISTER. THEN, AN OUTPUT NPR IS DONE AND CHECKED, TO A LOCATION IN THE
859                     ;* PROGRAM, USING 125252 FOR DATA, AND THE PROGRAM CHECKS FOR ABORT XFER TO
860                     ;* BE CLEARED BY SETTING THE DONE BIT.
861                     ;* SECOND SUBTEST :
862                     ;* THE ABOVE SUBTEST IS REPEATED USING INPUT NPR'S.
863                     ;*****************************************************************************
864
865
866                     ;*****************************************************************************
867                     ;*      TEST 7  <NPR EXTENDED ADDRESS BIT TEST>
868                     ;*
869                     ;* THIS TEST WILL ONLY BE RUN IF THERE IS AT LEAST 32K WORDS OF MEMORY ON THE
870                     ;* SYSTEM. IF THERE IS, THE PROGRAM CHOOSES A LOCATION TO USE IN THE ADDRESS
871                     ;* RANGE 200000-377776 (OCTAL). THEN, THE FOLLOWING 2 SUBTESTS ARE PERFORMED :
872                     ;*
873                     ;* FIRST SUBTEST :
874                     ;* AN INPUT 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                     ;* SECOND SUBTEST :
878                     ;* AN OUTPUT NPR IS PERFORMED AND CHECKED USING THE MEMORY LOCATION, WITH
879                     ;* 125252 FOR DATA. THE PROGRAM CHECKS THAT THE ABORT XFER BIT REMAINS
880                     ;* CLEARED.
881                     ;*****************************************************************************
882
883
884                     ;*****************************************************************************
885                     ;*      TEST 8  <SPECIAL MFG EXTENDED BIT TEST>
886                     ;*
887                     ;* THIS TEST WAS DESIGNED SPECIFICALLY TO ALLOW MANUFACTURING TO CHECK THE
888                     ;* NPRAIX/NPRAOX BITS WITHOUT A FULL 4 M. OF MEMORY.
889                     ;*
890                     ;* IT WILL CHECK THE 12 DMV EXTENDED ADDRESS BITS (6:NPRAIX/6:NPRAOX) ON
891                     ;* A Q22 SYSTEM IF MEMORY IS PRESENT AT THE FOLLOWING PHYSICAL ADDRESSES:
892                     ;*
893                     ;*      17600000        17400000        17200000
894                     ;*      16600000        15600000        13600000
895                     ;*       7600000
896                     ;*
897                     ;* FIRST SUBTEST :      TEST "NPRAIX" EXTENDED ADDRESS BITS
898                     ;* SECOND SUBTEST :     TEST "NPRAOX" EXTENDED ADDRESS BITS
899                     ;*****************************************************************************
900
901
902                     ;*****************************************************************************
903                     ;*      TEST 9  <Q-BUS INTERRUPT "A" & "B" SELECTION>
904                     ;*
905                     ;* 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.
                        ;*****************************************************************************


                        ;*****************************************************************************
                        ;*      TEST 10 <BUS RESET WITH DISABLE INIT SET> .PAGE
                        ;*
                        ;* 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
                        ;*****************************************************************************


                        ;*****************************************************************************
                        ;*      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.
                        ;*****************************************************************************


                        ;*****************************************************************************
                        ;*      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.
                        ;*
                        ;*****************************************************************************


                        ;*****************************************************************************
                        ;*      TEST 13 <HALT MODE VERIFICATION>
```

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

```
1018                    ;* PRIORITY LEVEL IS RESTORED TO 0, &
1019                    ;* INTERRUPT VECTOR 24 IS RETURNED TO
1020                    ;* THE DIAGNOSTIC SUPERVISOR.  SEL4 IS
1021                    ;* COMPARED AGAINST TMP0 -- THEY SHOULD
1022                    ;* BE EQUAL.
1023                    ;*
1024                    ;* NOW CLEAR BSEL7.                    WAIT FOR BSEL7 TO CLEAR. THEN DROP
1025                    ;*                                     "DISABLE INIT" AND EXIT TO M-LOOP.
1026                    ;*
1027                    ;*-------------------------------------------------------------------
1028                    ;*
1029                    ;* SUBTEST # 2:
1030                    ;*
1031                    ;* HERE  THE  HALT MODE IS USED IN A WAY WHICH VERY CLOSELY MATCHES THE DMV-11
1032                    ;* MICROCODE'S  UTILIZATION  DURING  A  "MOP  BOOT"  OPERATION. THE INTERRUPT
1033                    ;* VECTOR  AREA  IS COMPLETELY OVERWRITTEN BY THE DMV NPR'S AND IS THEREFORE
1034                    ;* BACKED  UP  ELSEWHERE  IN  THE  11 CPU'S MEMORY. THERE IS ALSO THE POSSIBLE
1035                    ;* CONTENTION  WITH  THE  DIAGNOSTIC  SUPERVISOR  --  TO HELP HERE, AS MUCH AS
1036                    ;* POSSIBLE WILL BE DONE AT INTERRUPT LEVEL 7.
1037                    ;*
1038                    ;*      11 CPU'S OPERATIONS:                    DMV-11'S OPERATIONS:
1039                    ;*
1040                    ;* THE MICROCODE IS MOVED INTO THE DMV.
1041                    ;*
1042                    ;* THE INTERRUPT VECTOR AREA IS BACKED-
1043                    ;* UP IN AN I/O BUFFER FOLLOWING THE
1044                    ;* PROGRAM
1045                    ;*
1046                    ;* THE MICROCODE IS INITIATED & BSEL7 IS
1047                    ;* SET TO -1 AS A FLAG.
1048                    ;*
1049                    ;* WAIT FOR BSEL7 TO BE CLEARED        CLEAR BSEL7 AND WAIT FOR IT TO GO
1050                    ;*                                     NON-ZERO AGAIN PUTTING BOTH
1051                    ;*                                     PROCESSORS IN SYNC. WITH EACH
1052                    ;*                                     OTHER
1053                    ;* CLEAR TMP0 AND SAVE R6 FOR RECOVERY
1054                    ;* LATER.  SET BSEL7 AGAIN AND WAIT FOR
1055                    ;* TMP0 TO BE SET.
1056                    ;*                                     SET HALT, "DCOK H LO", & "DISABL
1057                    ;*                                     INIT" AND PERFORM 2 NOP'S AS A
1058                    ;*                                     1 MICROSECOND DELAY
1059                    ;*
1060                    ;* ENTRY INTO THE CONSOLE "ODT" WILL   CLEAR "DCOK H LO", SET "HALT" &
1061                    ;* BE INITIATED.                       "DISABL INIT"
1062                    ;*
1063                    ;*                                     NPR-OUT THE FOLLOWING:
1064                    ;*                                      LOC:  CONTENTS
1065                    ;*                                        24   000000  VECTOR TO LOC 0
1066                    ;*                                        26   000340  @ PRIORITY 7
1067                    ;*                                         0   012700  MOV  #-1,R0
1068                    ;*                                         2   177777
1069                    ;*                                         4   000777  BR   .
1070                    ;*                                     ----------------------------
1071                    ;*
1072                    ;* THE ENTRY INTO THE CONSOLE "ODT"    SET "DCOK H LO" & "DISABL INIT"
1073                    ;* WILL BE ABORTED!                    AND CLEAR "HALT"
```

```
1074                    ;*
1075                    ;*                                      DELAY FOR A SHORT TIME (ABOUT 1
1076                    ;*                                      MICROSECOND
1077                    ;*
1078                    ;* THE ROUTINE NPR'D INTO LOC. 0 WILL   CLEAR "DCOK H LO" AND SET "DISABL
1079                    ;* BE EXECUTED -- EVENTUALLY HANGING    INIT"
1080                    ;* AT THE "BR  ." INSTRUCTION @ LOC. 4.
1081                    ;*
1082                    ;*                                      NPR-OUT THE FOLLOWING:
1083                    ;*                                       LOC:  CONTENTS
1084                    ;*                                         6   005001  CLR  R1
1085                    ;*                                        10   062701  ADD  #(.+2),R1
1086                    ;*                                        12   062701  ADD  #(.+2),R1
1087                    ;*                                         .     .      .
1088                    ;*                                         .     .      .
1089                    ;*                                         .     .      .
1090                    ;*                                       360   062701  ADD  #(.+2),R1
1091                    ;*                                       362   062701  ADD  #(.+2),R1
1092                    ;*                                       364   010037  MOV  R0,@#TMP0
1093                    ;*                                       366   [TMP0]
1094                    ;*                                       370   013706  MOV  @#OLDSP,R6
1095                    ;*                                       372   [OLDSP]
1096                    ;*                                       374   000137  JMP  HLTST2
1097                    ;*                                       376   [HLTST2]
1098                    ;*                                      ----------------------------
1099                    ;*                                      THIS IS SYNONYMOUS TO THE DMV-11
1100                    ;*                                      LOADING A "MESSAGE" STARTING AT MEM.
1101                    ;*                                      LOC. 000006.
1102                    ;*
1103                    ;*                                      NPR-OUT THE FOLLOWING:
1104                    ;*                                       LOC:  CONTENTS
1105                    ;*                                         4   000240  NOP
1106                    ;*                                      ----------------------------
1107                    ;*                                      THIS IS HOW THE DMV-11 WILL TAKE THE
1108                    ;*                                      i1 CPU OUT OF THE "BR  ." CONDITION.
1109                    ;* THE ROUTINE JUST LOADED BY THE DMV
1110                    ;* MICROCODE WILL NOW BE EXECUTED (WE   DROP "DISABL INIT"
1111                    ;* HOPE).  WHEN THE SUBROUTINE IS RE-
1112                    ;* ENTERED (@ HLTST2),                  AN EXIT IS TAKEN TO THE M-LOOP
1113                    ;*
1114                    ;*   1  THE INTERRUPT VECTORS WILL BE
1115                    ;*      RESTORED;
1116                    ;*   2  THE PRIORITY LEVEL WILL BE
1117                    ;*      LOWERED BACK TO 0;
1118                    ;*   3  R0, R1, & R6 WILL ALL BE CHECKED
1119                    ;*      FOR THE PROPER CONTENTS; AND
1120                    ;*   4  TMP0 WILL BE CHECKED FOR THE
1121                    ;*      PROPER CONTENTS;
1122                    ;*************************************************************************
1123
1124
1125
```

8.0 ERROR INFORMATION

8.1 ERROR REPORTING

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

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

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

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

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

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

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

↑

```
                        .SBTTL LISTING & ASSEMBLY CONTROL

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

002000                          .=2000

                                .MCALL  SVC
002000                          SVC                                     ; INITIALIZE SUPERVISOR MACROS

002000                          BGNMOD  LU1MOD

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

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

002000                    POINTER BGNAU,BGNDU,ERRTBL
```

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

                        HEADER CVDMB,C,0,60.,,0
002000                                          L$NAME::
002000  103                                             .ASCII /C/
002001  126                                             .ASCII /V/
002002  104                                             .ASCII /D/
002003  115                                             .ASCII /M/
002004  102                                             .ASCII /B/
002005  000                                             .BYTE   0
002006  000                                             .BYTE   0
002007  000                                             .BYTE   0
002010                                          L$REV::
002010  103                                             .ASCII  /C/
002011                                          L$DEPO::
002011  060                                             .ASCII  /0/
002012                                          L$UNIT::
002012  000000                                          .WORD   0
002014                                          L$TIML::
002014  000074                                          .WORD   60.
002016                                          L$HPCP::
002016  036406                                          .WORD   L$HARD
002020                                          L$SPCP::
002020  000000                                          .WORD   0
002022                                          L$HPTP::
002022  002160                                          .WORD   L$HW
002024                                          L$SPTP::
002024  000000                                          .WORD   0
002026                                          L$LADP::
002026  037124                                          .WORD   L$LAST
002030                                          L$STA::
002030  000000                                          .WORD   0
002032                                          L$CO::
002032  000000                                          .WORD   0
002034                                          L$DTYP::
002034  000000                                          .WORD   0
002036                                          L$APT::
002036  000000                                          .WORD   0
002040                                          L$DTP::
002040  002124                                          .WORD   L$DISPATCH
002042                                          L$PRIO::
002042  000000                                          .WORD   0
002044                                          L$ENVI::
002044  000000                                          .WORD   0
002046                                          L$EXP1::
002046  000000                                          .WORD   0
002050                                          L$MREV::
002050  003                                             .BYTE   C$REVISION
```

```
002051       003                              .BYTE   C$EDIT
002052                               L$EF::
002052   000000                               .WORD   0
002054   000000                               .WORD   0
002056                               L$SPC::
002056   000000                               .WORD   0
002060                               L$DEVP::
002060   003254                               .WORD   L$DVTYP
002062                               L$REPP::
002062   000000                               .WORD   0
002064                               L$EXP4::
002064   000000                               .WORD   0
002066                               L$EXP5::
002066   000000                               .WORD   0
002070                               L$AUT::
002070   023162                               .WORD   L$AU
002072                               L$DUT::
002072   023156                               .WORD   L$DU
002074                               L$LUN::
002074   000000                               .WORD   0
002076                               L$DESP::
002076   003274                               .WORD   L$DESC
002100                               L$LOAD::
002100   104035                               EMT     E$LOAD
002102                               L$ETP::
002102   002202                               .WORD   L$ERRTBL
002104                               L$ICP::
002104   022020                               .WORD   L$INIT
002106                               L$CCP::
002106   023140                               .WORD   L$CLEAN
002110                               L$ACP::
002110   023014                               .WORD   L$AUTO
002112                               L$PRT::
002112   022012                               .WORD   L$PROT
002114                               L$TEST::
002114   000000                               .WORD   0
002116                               L$DLY::
002116   000000                               .WORD   0
002120                               L$HIME::
002120   000000                               .WORD   0

                    .EVEN
```

```
1294                                    .SBTTL DISPATCH TABLE
1295
1296                                    ;//////////////////////////////////////////////////////////////////////////////
1297                                    ;/ THE DISPATCH TABLE CONTAINS THE STARTING ADDRESS OF EACH TEST.
1298                                    ;/ IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
1299                                    ;//////////////////////////////////////////////////////////////////////////////
1300
1301  002122                                    DISPATCH        13.
1302  002122  000015                                                                   .WORD   13
1303  002124                                                                  L$DISPATCH::
1304  002124  023161                                                                   .WORD   T1
1305  002126  024174                                                                   .WORD   T2
1306  002130  025062                                                                   .WORD   T3
1307  002132  025450                                                                   .WORD   T4
1308  002134  026160                                                                   .WORD   T5
1309  002136  026430                                                                   .WORD   T6
1310  002140  027036                                                                   .WORD   T7
1311  002142  031276                                                                   .WORD   T8
1312  002144  032576                                                                   .WORD   T9
1313  002146  034104                                                                   .WORD   T10
1314  002150  034200                                                                   .WORD   T11
1315  002152  034244                                                                   .WORD   T12
1316  002154  035016                                                                   .WORD   T13
1317
```

```
                        .SBTTL DEFAULT HARDWARE P-TABLE

                        ;////////////////////////////////////////////////////////////////////////
                        ;/ THE DEFAULT HARDWARE P-TABLE CONTAINS DEFAULT VALUES OF
                        ;/ THE TEST-DEVICE PARAMETERS.  THE STRUCTURE OF THIS TABLE
                        ;/ IS IDENTICAL TO THE STRUCTURE OF THE RUN-TIME P-TABLE.
                        ;////////////////////////////////////////////////////////////////////////

002156                          BGNHW   DFPTBL
002156  000010                                                          .WORD   L10000-L$HW/2
002160                                                                  L$HW::
002160                                                                  DFPTBL::

002160  160020                  .WORD   160020          ;DMV11 CSR UNIBUS ADDRESS
002162  000300                  .WORD      300          ;DMV11 INTERRUPT VECTOR
002164  004000                  .WORD     4000          ;DMV11 INTERRUPT PRIORITY LEVEL = 4
002166  000000                  .WORD      000          ;SWITCH REG. #1 (BOOT ADDRESS)
002170  000000                  .WORD      000          ;SWITCH REG. #2 (DDCMP ADDRESS)
002172  000000                  .WORD        0          ;MODULE IS M8064
002174  000000                  .WORD        0          ;M3254&M3255 USED
002176  000111                  .WORD   000111          ;MISC. CONTROLS:

                        ; POWER-UP MODE 0 MASK = 100
                        ;   0 = NOT JUMPERED FOR MODE 0 POWER-UP
                        ;   1 = JUMPERED FOR MODE 0 POWER-UP    <--- DEFAULT SETTING
                        ;       BOTH W5 & W6 REMOVED

                        ; MFG EXTENDED MEMORY CONFIGURATION MASK = 200
                        ;   0 = NORMAL TESTING
                        ;   1 = Q22 SYSTEM WITH MEMORY @ FOLLOWING LOCATIONS:
                        ;               17600000        17400000        17200000
                        ;               16600000        15600000        13600000
                        ;                7600000

002200                          ENDHW
002200                                                                  L10000:
```

```
1354                                    .SBTTL SOFTWARE P-TABLE
1355
1356                                    ;////////////////////////////////////////////////////////////////////////
1357                                    ;/ THE SOFTWARE P-TABLE CONTAINS THE VALUES OF THE PROGRAM
1358                                    ;/ PARAMETERS THAT CAN BE CHANGED BY THE OPERATOR.
1359                                    ;////////////////////////////////////////////////////////////////////////
1360
1361  002200                                    BGNSW   SFPTBL
1362  002200  000000                                                                   .WORD   L10001-L$SW/2
1363  002202                                                                    L$SW::
1364  002202                                                                    SFPTBL::
1365  002202                                    ENDSW
1366  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
```

```
1423    000140                  PRIO7== 140
1424    000100                  PRIO2== 100
1425    000040                  PRIO1== 40
1426    000000                  PRIO0== 0
1427                            ;
1428                            ;OPERATOR FLAG BITS
1429                            ;
1430    000004                  EVL==       4
1431    000010                  LOT==      10
1432    000020                  ADR==      20
1433    000040                  IDU==      40
1434    000100                  ISR==     100
1435    000200                  UAM==     200
1436    000400                  BOE==     400
1437    001000                  PNT==    1000
1438    002000                  PRI==    2000
1439    004000                  IXE==    4000
1440    010000                  IBE==   10000
1441    020000                  IER==   20000
1442    040000                  LOE==   40000
1443    100000                  HOE==  100000
1444
1445                            .SBTTL  DEFINE THE NUMBER OF CSR'S
1446    000010                  CSREGS  =  8.
1447
1448                            ;------------------------------------------------------------ ----------
1449
1450                            .SBTTL  NPR ADDRESS REGISTER EQUATES
1451    000070                  NPRAOL  = 70                    ;OUT NPR ADRS LO REG
1452    000071                  NPRAOH  = NPRAOL+1              ;OUT NPR ADRS HI REG
1453    000072                  NPRAOX  = NPRAOL+2              ;OUT NPR EXTENDED ADRS REG
1454    000074                  NPRAIL  = NPRAOL+4              ;IN NPR ADRS LO REG
1455    000075                  NPRAIH  = NPRAOL+5              ;IN NPR ADRS HI REG
1456    000076                  NPRAIX  = NPRAOL+6              ;IN NPR EXTENDED ADRS REG
1457    000200                  NPRBS7  = BIT7                  ;"BANK SELECT 7" BIT -- W/IN EXTENDED ADRS. REG.
1458
1459
1460
1461                            .SBTTL  NPR DATA REG EQUATES
1462    123000                  NPRDRL  = 123000                ;NPR DATA REGISTER -- LOW BYTE
1463    123001                  NPRDRH  = NPRDRL+1              ;NPR DATA REGISTER -- HIGH BYTE
1464
1465
1466
1467                            .SBTTL  NPR CONTROL REG EQUATES
1468    123004                  NPRCTL  = NPRDRL+4              ;NPR CONTROL REGISTER
1469    000200                  NPRABT  = BIT7                  ;=1 IF BUS TIME-OUT ON NPR
1470    000100                  NPRGO   = BIT6                  ;SET FOR NOP. CLEAR TO "GO" / 0=DONE, 1=BUSY
1471    000040                  NPRIO   = BIT5                  ;0 = (LSI ==> DMV);  1 = (DMV ==> LSI)
1472    000020                  LSIHLT  = BIT4                  ;SETTING THIS WILL "HALT" THE LSI-11 !!
1473    000010                  NPRBYT  = BIT3                  ;SET TO 1 TO WRITE BYTE ONLY TO LSI-11
1474    000004                  DMVPU   = BIT2                  ;SET BY MICRO-DIAG.  MUST REMAIN SET!!!
1475    000002                  LSIDCL  = BIT1                  ;IF SET, WILL CAUSE POWER DOWN CONDITION IN LSI!
1476    000001                  DMVDAI  = BIT0                  ;"DISABLE INIT" FROM EFFECTING DMV-11
1477
1478
```

```
1479                            .SBTTL  NPR REQUEST FUNCTIONS
1480            000004          NPRLD   = DMVPU                 ;WORD XFER:  LSI ==> DMV
1481            000044          NPRDL   = DMVPU!NPRIO           ;WORD XFER:  DMV ==> LSI
1482            000054          NPRDLB  = DMVPU!NPRIO!NPRBYT    ;BYTE XFER:  DMV ==> LSI
1483
1484                            ;-------------------------------------------------------------------------
1485
1486                            .SBTTL  INTERRUPT REG EQUATES
1487            123005          IRQREG  = 123005                ;INTERRUPT REQUEST REG
1488            000004          IRQA    = BIT2                  ;REQUEST BIT FOR XX0 INTERRUPT -- "A"
1489            000002          IRQB    = BIT1                  ;REQUEST BIT FOR XX4 INTERRUPT -- "B"
1490
1491                            ;-------------------------------------------------------------------------
1492
1493                            .SBTTL  CONTROL FLAGS FROM P-TABLE ENTRIES
1494            000001          PU24    = BIT0                  ;POWER-FAIL VECTORING MODE.  1 = MODE 0
1495                                                            ;  (I.E. JUMPERS W5 & W6 BOTH REMOVED)
```

```
                        .SBTTL  SWITCH PACKS

                        ;;*****************************************************************************
                        ;* SWITCH PACKS
                        ;;*****************************************************************************

            121000      SWPBOT  = 121000            ;"BOOT ADDRESS" SWITCH PACK [A200]
            121400      SWPDDCMP = 121400           ;"DDCMP ADDRESS" SWITCH PACK [A300]

```

```
1505                                    .SBTTL  CSR REG. DEFINITION FOR MAINT. LOOP
1506
1507                                    ;++*************************************************************************
1508                                    .SBTTL          MAINTENANCE REGISTER - BSEL0
1509                                    ;--*************************************************************************
1510                                    ;       INTERRUPT ENABLE BITS
1511
1512             000001                 IENBA   = BIT0                  ;INTERRUPT ENABLE "A"
1513             000020                 IENBB   = BIT4                  ;INTERRUPT ENABLE "B"
1514
1515
1516                                    ;++*************************************************************************
1517                                    .SBTTL          MAINTENANCE REGISTER - BSEL1
1518                                    ;--*************************************************************************
1519                                    ; MAINT. LOOP CONTROL BITS:
1520
1521             000200                 RUN     = BIT7
1522             000100                 MCLR    = BIT6
1523             000001                 MREQ    = BIT0
1524
1525
1526                                    ;++*************************************************************************
1527                                    .SBTTL          MAINTENANCE REGISTER - BSEL2
1528                                    ;--*************************************************************************
1529                                    ; MAINTENANCE FUNCTION CODES
1530
1531             000001                 REDLOC  = 1                     ;FUNCTION CODE FOR READ A 6502 LOCATION
1532             000002                 WRILOC  = 2                     ;FUNCTION CODE FOR WRITE A 6502 LOCATION
1533             000003                 REDPAG  = 3                     ;FUNCTION CODE FOR READ A 6502 MEMORY PAGE
1534             000004                 WRIPAG  = 4                     ;FUNCTION CODE FOR WRITE A 6502 RAM PAGE
1535             000005                 EXECUT  = 5                     ;FUNCTION CODE FOR EXECUTE AT GIVEN PC
1536
1537             000200                 MRDY    = BIT7                  ;M-LOOP REDY FOR A COMMAND WHEN SET
```

```
                                .SBTTL  DMV INTERNAL ADDRESSES

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


                                ;********  <<  MICROPROCESSOR REGISTER ADDRESS EQUATES  >> *********

                                .SBTTL          BYTE & WORD SELECT REGISTERS

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

                                .SBTTL          VIA'S REGISTERS

            120000              ORB     =120000
            120001              ORA     =ORB+1
            120002              DORB    =ORB+2
            120003              DORA    =ORB+3
            120004              T1CL    =ORB+4
            120005              T1CH    =ORB+5
            120005              T1LMGO  =ORB+5
            120006              T1LL    =ORB+6
            120007              T1LH    =ORB+7
            120010              T2LL    =ORB+10
            120010              T2CL    =T2LL
            120011              T2CH    =ORB+11
            120012              SR      =ORB+12
            120013              ACP     =ORB+13
            120014              PCR     =ORB+14
            120015              IFR     =ORB+15
            120016              IENR    =ORB+16
            120017              ORAM    =ORB+17

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

```
  1585            000200                  IFRIRQ  =BIT7   ;"IRQ" HAS BEEN ISSUED -- LOGICAL "OR" OF BITS 0 --> 6
  1586            000100                  IFRT1   =BIT6   ;"T1" -- TIMER # 1 TIMED-OUT
  1587            000040                  IFRT2   =BIT5   ;"T2" -- TIMER # 1 TIMED-OUT
  1588            000020                  IFRCB1  =BIT4   ;"CB1" EDGE DETECTED ("K2 LINE UNIT STEP" O/P SIGNAL FROM SR)
  1589            000010                  IFRCB2  =BIT3   ;"CB2" EDGE DETECTED (UNUSED!)
  1590            000004                  IFRSR   =BIT2   ;"SR" REGISTER COMPLETED SHIFT OPERATION
  1591            000002                  IFRCA1  =BIT1   ;"CA1" EDGE DETECTED ("K6 MOD RDY H")
  1592            000001                  IFRCA2  =BIT0   ;"CA2" EDGE DETECTED ("K2 CTS H")
  1593
  1594
  1595                                    ;-------------------------------------------------
```

```
                                .SBTTL GLOBAL DATA SECTION

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

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

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

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

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

```
1652  002270  000000                  PSTACK: .WORD   0               ;CONTAINS BASE LEVEL PROGRAM STACK POINTER
1653  002272  000000                  INTFLG: .WORD   0               ;INTERRUPT RECEIVED FLAG BYTES.  ALLOCATION:
1654                                                                  ;  LOW BYTE FOR "A" & HIGH BYTE FOR "B"
1655  002274  000000                  INTWCH: .WORD   0               ;BYTE IS SET NON-ZERO WHEN HANDLER SHOULD BE
1656                                                                  ;  WATCHING FOR INT'S.  ALLOCATION: SEE INTFLG
1657  002276  000000                  ERRFLG: .WORD   0               ;ERROR FLAG
1658  002300  000000                  REGNUM: .WORD   0               ;REGISTER NUMBER -- FOR PASSING ARG. TO "ERR@"
1659  002302  000000                  FRSTIM: .WORD   0               ;FLAG=0 IF PROGRAM JUST LOADED
1660  002304  000000                  FRSPAS: .WORD   0               ;FLAG=0 IF FIRST PASS AFTER LOAD
1661  002306  000000                  STARES: .WORD   0               ;FLAG TO SHOW NO. OF PASSES SINCE STA OR RES
1662  002310  000000                  DEVMAP: .WORD   0               ;BIT MAP OF ACTIVE DEVICES
1663  002312  000000                  DEVPTR: .WORD   0               ;DEVICE MAP BIT POINTER
1664  002314  000000                  CONSOL: .WORD   0               ;CONSOLE DEVICE FLAG -- NON-ZERO = NONE PRESENT
1665  002316  000000                  PFLAG:  .WORD   0               ;MISC. PROGRAM FLAGS
1666                                          ;
1667                                          ; THE ABOVE WORD CONTAINS MISC. FLAGS WHICH CAN ONLY BE ACCESSED BY PATCHING.
1668                                          ; IT IS NOT INTENDED THAT THEY BE SET OR CLEARED EXCEPT UNDER VERY UNUSUAL
1669                                          ; CIRCUMSTANCES.  THEREFORE, THEY WILL NOT BE DOCUMENTED ANY OTHER PLACE
1670                                          ; EXCEPT RIGHT HERE.
1671                                          ;
1672                                          ; BIT 0 -- WHEN SET, THOSE TESTS WHICH DO A BUS RESET WILL NOT BE EXECUTED.
1673                                          ;             THIS WAS INPLEMENTED TO SAVE WEAR & TEAR ON THE RX01 IN THE
1674                                          ;             DEVELOPMENT SYSTEM WHILE DOING LONG TERM TESTING OF ALL OTHER
1675                                          ;             TESTS.
1676                                          ;
1677                                          ; BIT 1 -- CPU TYPE (NOT USED).
1678                                          ;
1679                                          ; BIT 2 -- CONTROLS PRINTING OF EXTENDED ERROR INFORMATION DURING "MOVING
1680                                          ;          INVERSIONS TEST" OF RAM.  NORMALLY ONLY ADDRESS, GOOD & BAD
1681                                          ;          DATA, AND XOR WILL BE PRINTED.  IF THIS BIT IS SET HOWEVER,
1682                                          ;          INFORMATION IDENTIFYING WHERE WITHIN THE ALGORITHM THE ERROR
1683                                          ;          WAS DETECTED IS REPORTED.  THE FOLLOWING ABBREVIATIONS ARE USED
1684                                          ;          IN THE HEADING:
1685                                          ;                  BIT --- IDENTIFIES THE INNERMOST LOOP.  WHICH BIT IS
1686                                          ;                          BEING INVERTED AT EACH LOCATION.  BITS ARE
1687                                          ;                          IDENTIFIED AS 0 THROUGH 7.
1688                                          ;                  DATA -- IDENTIFIES THE VALUE TO WHICH THE ABOVE BIT IS
1689                                          ;                          BEING SET (I.E. 0 OR 1).  IT IS FIRST READ AND
1690                                          ;                          CHECKED FOR EXPECTED CONTENTS; THEN THE BIT IS
1691                                          ;                          INVERTED TO THIS STATE (DATA) AND RE-WRITTEN;
1692                                          ;                          THEN IT IS AGAIN READ & CHECKED FOR THE NEW
1693                                          ;                          VALUE.
1694                                          ;                  SEQ --- INDICATES THE DIRECTION (FWD OR BKWD) THE TEST
1695                                          ;                          WAS SCANING THROUGH RAM WHEN THE ERROR OCCURED.
1696                                          ;                  LSB --- THIS IS THE LOGICAL LEAST SIGNIFICANT BIT OF THE
1697                                          ;                          RAM ADDRESS AS WE SCAN THROUGH MEMORY.  BY
1698                                          ;                          VARYING THIS, THE ALGORITHM GENERATES NON-SEQUEN-
1699                                          ;                          TIAL ADDRESSING OF RAM AND EFFECTS A MUCH MORE
1700                                          ;                          THOROUGH TEST OF MEMORY.
1701                                          ;
1702                                          ; BIT 3 -- ENABLES PRINTOUT OF THE MESSAGE WITHIN THE INIT CODE THAT TELLS
1703                                          ;          US HOW LONG IT TOOK (IN LOOPS WITHIN THIS CPU) TO PERFORM ONE
1704                                          ;          NO-OP FUNCTION OF THE MAINTAINENCE LOOP.
1705
1706
1707
```

```
                                .SBTTL  CURRENT DEVICE PARAMETERS

                        160000  $MPCSR  =       160000          ;INITIAL ASSEMBLED IN CSR ADDRESS

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

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

                                .SBTTL  GEN'L PURPOSE SCRATCH STORAGE

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

```
1755
1756                                    .SBTTL  SCRATCH STORAGE FOR MESSAGE REPORTING
1757                                    .EVEN
1758
1759  002412  000000                    TMP0:   .WORD   0
1760  002414  000000                    TMP1:   .WORD   0
1761  002416  000000                    TMP2:   .WORD   0
1762  002420  000000                    TMP3:   .WORD   0
1763  002422  000000                    TMP4:   .WORD   0
1764  002424  000000                    TMP5:   .WORD   0
1765  002426  000000                    TMP6:   .WORD   0
1766  002430  000000                    TMP7:   .WORD   0
1767  002432  000000                    TMP8:   .WORD   0
1768  002434  000000                    TMP9:   .WORD   0
1769  002436  000000                    TMPA:   .WORD   0
1770  002440  000000                    TMPB:   .WORD   0
1771  002442  000000                    TMPC:   .WORD   0
1772  002444  000000                    TMPD:   .WORD   0
1773  002446  000000                    TMPE:   .WORD   0
1774  002450  000000                    TMPF:   .WORD   0
1775  002452  000000                    NEWPC:  .WORD   0       ;SAVE LOCATION FOR A "PC" VALUE RESET
1776  002454  000000                    OLDSP:  .WORD   0       ;SAVE LOCATION FOR A STACK POINTER RESET VALUE
1777
1778
1779                                    .SBTTL  ***** DATA PATTERN B *****
1780
1781                                    .EVEN                           ;USAGE:
1782  002456  000025                    PATB:   .WORD   1$-.-2  ;# OF BYTES IN PATTERN
1783  002460     125                             .BYTE   125
1784  002461     252                             .BYTE   252
1785  002462     000                             .BYTE   000
1786  002463     377                             .BYTE   377
1787  002464     001                             .BYTE   001
1788  002465     002                             .BYTE   002
1789  002466     004                             .BYTE   004
1790  002467     010                             .BYTE   010
1791  002470     020                             .BYTE   020
1792  002471     040                             .BYTE   040
1793  002472     100                             .BYTE   100
1794  002473     200                             .BYTE   200
1795  002474     376                             .BYTE   376
1796  002475     375                             .BYTE   375
1797  002476     373                             .BYTE   373
1798  002477     367                             .BYTE   367
1799  002500     357                             .BYTE   357
1800  002501     337                             .BYTE   337
1801  002502     277                             .BYTE   277
1802  002503     177                             .BYTE   177
1803  002504     000                             .BYTE   000
1804  002505                             1$:
```

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

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

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

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

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

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


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

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

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

```
                                .SBTTL  DATA BUFFER AREAS

002654  000400                  BUFAREA:        .BLKB   256.


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

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

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

```
1904                                    .SBTTL GLOBAL TEXT SECTION
1905
1906                                    ;*****************************************************************************
1907                                    ;*      THE GLOBAL TEXT SECTION CONTAINS FORMAT STATEMENTS,
1908                                    ;*      MESSAGES, AND ASCII INFORMATION THAT ARE USED IN
1909                                    ;*      MORE THAN ONE TEST.
1910                                    ;*****************************************************************************
1911
1912                                    ;+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1913                                    ;* NAMES OF DEVICES SUPPORTED BY PROGRAM
1914                                    ;---++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1915  003254                                    DEVTYP  <M8053 OR M8064>
1916  003254                                                                    L$DVTYP::
1917  003254  034115  032460  020063                                                    .ASCIZ  /M8053 OR M8064/
1918  003262  051117  046440  030070
1919  003270  032066     000
1920          003274                                                            .EVEN
1921
1922                                    ;+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1923                                    ;* TITLE OF PROGRAM
1924                                    ;---++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1925
1926          000012                    .RADIX  10.
1927  003274                                    DESCRIPT   <DMV-11 U-CONTRL LOGIC DIAG - PART 2 OF 2>
1928  003274                                                                    L$DESC::
1929  003274  046504  026526  030461                                                    .ASCIZ  /DMV-11 U-CONTRL
1930  003302  052440  041455  047117
1931  003310  051124  020114  047514
1932  003316  044507  020103  044504
1933  003324  043501  026440  050040
1934  003332  051101  020124  020062
1935  003340  043117  031040     000
1936          003346                                                    .EVEN
1937          000010                    .RADIX  8.
1938
```

```
1939                                    .SBTTL GLOBAL SUBROUTINES
1940
1941                                    ;////////////////////////////////////////////////////////////////////////////
1942                                    ;/      THE GLOBAL SUBROUTINES ARE CALLED BY MORE THAN ONE TEST
1943                                    ;////////////////////////////////////////////////////////////////////////////
1944
1945                                    ;+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1946                                    .SBTTL  MASCLR -  MASTER CLEAR SUBROUTINE
1947                                    ;
1948                                    ; FUNCTION:
1949                                    ;
1950                                    ;  THIS  SUBROUTINE  FORCES THE 6502 MICROPROCESSOR TO EXECUTE A MINI 17 PART
1951                                    ;  DIAGNOSTIC OF THE MICRO-PROCESSOR INSTRUCTION SET, RAM DATA AND ADDRESSING
1952                                    ;  VALIDITY,   AND   A  ROM  CRC  TEST.  THE  CLEAR  SUBROUTINE  EXECUTES  IN
1953                                    ;  APPROXIMATELY  500  HUNDRED(S)  MILLISECOND. THIS SUBROUTINE WILL SEND THE
1954                                    ;  MASTER  CLEAR  COMMAND  AND  DELAY FOR APPROX. 500 MSEC. AT WHICH PRINT IN
1955                                    ;  TIME,  THE  STATE  OF  THE  CSR  REGISTERS  IS  TESTED.  IF ANY ONE OF THE
1956                                    ;  REGISTERS CONTAINS ANYTHING THAT IS NOT EXPECTED, AN ERROR IS QUEUE UP AND
1957                                    ;  THE CARRY BIT IS SET. ELSE, THE CARRY BIT IS CLEARED.
1958                                    ;
1959                                    ; CALLING SEQUENCE:
1960                                    ;
1961                                    ;       JSR     PC,MASCLR
1962                                    ;       BCC     N$              ;IF NO ERROR OCCURED, PROCEED WITH ROUTINE
1963                                    ;       ERROR                   ;AN ERROR MESSAGE HAS BEEN STACKED:  PRINT IT
1964                                    ;       <ANY OTHER SPECIAL ERROR PROCESSING MAY BE DONE HERE  (I.E. CKLOOP)>
1965                                    ;
1966                                    ; N$:   <RESUMPTION OF NORMAL PROCESSING>
1967                                    ;
1968                                    ;--++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1969                                    ;
1970  003346  010146                    MASCLR: MOV     R1,-(SP)        ; SAVE REGISTER ONE
1971
1972  003350  112777  000300  176744          MOVB    @RUN!MCLR,@BSEL1 ;SET BOTH THE RUN AND MASTER CLEAR BITS
1973                                                                    ;TO INITIATE THE MICRODIAGNOSTIC
1974
1975                                          ;NOW DELAY LONG ENOUGH FOR THE MICRODIAGNOSTIC TO COMPLETE
1976
1977  003356  013701  002262                 MOV     DELAY1,R1       ;INITIALIZE THE LOOP COUNTER FOR DELAY LOOP
1978  003362  001402                  2$:    BEQ     1$              ; EXIT DELAY LOOP IF THE TIME HAS EXPIRED
1979  003364  005301                          DEC     R1              ;  ELSE, DECREMENT THE LOOP COUNTER AND
1980  003366  000775                          BR      2$              ;  CONTINUE TO LOOP.
1981  003370                           1$:                            ; TIME-UP!
1982  003370  132777  000200  176724          BITB    @RUN,@BSEL1     ;CHECK THE RUN BIT --
1983  003376  001410                          BEQ     3$              ;IF NOT SET, GO REPORT THE ERROR
1984
1985                                          ;IF THE RUN BIT IS SET, MICRODIAGNOSTICS ARE COMPLETE.
1986                                          ;CHECK IF ALL MICRODIAGNOSTICS PASSED.
1987
1988  003400  127737  176730  002630  4$:     CMPB    @BSEL6,BSELRS+6 ;THIS CHECKS THE BYTE IN B-SELECT 6 FOR THE
1989                                                                    ;VALID MICRODIAGNOSTIC COMPLETION CODE.
1990  003406  001004                          BNE     3$              ;IF BAD, GO REPORT ERROR
1991
1992  003410  127737  176714  002626          CMPB    @BSEL4,BSELRS+4 ;ELSE, CHECK FOR THE VALID CODE FOR A DMV-11
1993  003416  001420                          BEQ     6$              ;IF THIS TOO IS CORRECT THEN NO ERROR EXISTS
1994                                                                    ;ELSE, FALL INTO THE ERROR REPORTING CODE
```

```
1995
1996  003420  004737  004232          3$:     JSR     PC,GETBSR       ;GET THE BSEL REGISTERS FOR DUMPING
1997  003424                                  GTDF    20$,ERR3        ;MASTER CLEAR ERROR
1998                                          ;       QUEUE "DEVICE FATAL" ERROR # 1
1999  003424  012737  000001  002202                                                  MOV     #T.EDF,ERRTYP
2000  003432  012737  000001  002204                                                  MOV     #1,ERRNBR
2001  003440  012737  003466  002206                                                  MOV     #20$,ERRMSG
2002  003446  012737  006220  002210                                                  MOV     #ERR3,ERRBLK
2003  003454  000261                          SEC                     ;INDICATE TO THE CALLING ROUTINE THAT
2004  003456  000401                          BR      7$              ;   AN ERROR WAS DETECTED
2005
2006  003460  000241                  6$:     CLC                     ;CLEAR THE CARRY BIT TO INDICATE NO ERROR
2007  003462  012601                  7$:     MOV     (SP)+,R1        ;RESTORE REGISTER ONE
2008  003464  000207                          RTS     PC              ; RETURN TO THE CALLER
2009                                  .NLIST  BEX
      003466  040515  052123  051105  20$:    .ASCIZ  /MASTER CLEAR FAILURE/
                                      .LIST   BEX
2010          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.,@SELO  ;INITIATE M-LOOP

003522  010346                          MOV     R3,-(SP)
003524  012703  010000                  MOV     #4096.,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
```

```
2047                                    .SBTTL  M-LOOP -- READ
2048                                    ;++*************************************************************************
2049                                    ; READ - READ THE SPECIFIED ADDRESS WITHIN THE DMV-11
2050                                    ;
2051                                    ;  CALLING SEQUENCE:
2052                                    ;
2053                                    ;       JSR     R5,READ
2054                                    ;       .WORD   <ADDRESS OF REGISTER WITHIN DMV-11>
2055                                    ;       .WORD   <DESTINATION ADDRESS WITHIN LSI-11>
2056                                    ;       BCC     N$              ;IF NO ERROR OCCURED, PROCEED WITH ROUTINE
2057                                    ;       ERROR                   ;AN ERROR MESSAGE HAS BEEN STACKED:  PRINT IT
2058                                    ;       <ANY OTHER SPECIAL ERROR PROCESSING MAY BE DONE HERE  (I.E. CKLOOP)>
2059                                    ;
2060                                    ; N$:   <RESUMPTION OF NORMAL PROCESSING>
2061                                    ;
2062                                    ;--*************************************************************************
2063
2064  003616  012577  176506            READ:   MOV     (R5)+,@SEL4     ;SETUP SOURCE POINTER
2065  003622  112777  000001  176474            MOVB    #REDLOC,@BSEL2  ;TELL M-LOOP TO GIVE US THE REQUESTED DATA
2066
2067  003630  010346                            MOV     R3,-(SP)
2068  003632  012703  000100                    MOV     #64.,R3         ;WAIT FOR THE M-LOOP TO FINISH THE OPERATION
2069  003636  077301                    1$:     SOB     R3,1$
2070  003640  012603                            MOV     (SP)+,R3
2071
2072  003642  132777  000200  176454            BITB    #MRDY,@BSEL2    ;DID THE M-LOOP FINISH
2073  003650  001023                            BNE     5$              ;YES.  GOOD.  RETURN
2074
2075  003652  004737  004374                    JSR     PC,GETWSR       ;GET BYTE SELECT REGISTERS
2076  003656  012737  000001  002254            MOV     #REDLOC,GDATA   ;IDENTIFY REQUESTED FUNCTION
2077  003664                                    GTDF    EM4,ERR4        ;"MRDY" TIMEOUT
2078                                                                    ;       QUEUE "DEVICE FATAL" ERROR # 3
2079  003664  012737  000001  002202                                                    MOV     #T.EDF,ERRTYP
2080  003672  012737  000003  002204                                                    MOV     #3,ERRNBR
2081  003700  012737  016135  002206                                                    MOV     #EM4,ERRMSG
2082  003706  012737  006232  002210                                                    MOV     #ERR4,ERRBLK
2083  003714  000261                            SEC                     ;INDICATE AN ERROR HAS BEEN STACKED
2084  003716  000401                            BR      6$              ;RETURN WITH THAT INDICATION
2085
2086  003720  000241                    5$:     CLC                     ;INDICATE "NO ERROR"
2087  003722  117735  176406            6$:     MOVB    @BSEL6,@(R5)+   ;PUT DATA WHERE CALLER WANTS IT
2088  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  000100                  MOV     #64.,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
```

```
                                .SBTTL  M-LOOP -- WRITE
                                ;++*************************************************************************
                                ; WRITE - WRITE THE SPECIFIED DATA INTO THE SPECIFIED DMV-11 ADDRESS
                                ;
                                ;  CALLING SEQUENCE:
                                ;
                                ;       JSR     R5,WRITE
                                ;       .WORD   <ADDRESS OF REGISTER WITHIN DMV-11>
                                ;       .WORD   <ADDRESS OF DATA BYTE>
                                ;       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>
                                ;
                                ;--*************************************************************************

004042  012577  176262          WRITE:  MOV     (R5)+,@SEL4     ;SETUP SOURCE POINTER
004046  113577  176262                  MOVB    @(R5)+,@SEL6    ;MAKE DATA AVAILABLE TO M-LOOP
004052  000404                          BR      MLWRI           ;THE REST OF THIS ROUTINE IS THE SAME AS "WRITEI"
```

```
2152                                    .SBTTL  M-LOOP -- WRITE IMMEDIATE
2153                                    ;++*************************************************************************
2154                                    ; WRITEI - WRITE IMMEDIATE THE SPECIFIED DATA INTO THE SPECIFIED DMV-11 ADDRESS
2155                                    ;
2156                                    ; CALLING SEQUENCE:
2157                                    ;
2158                                    ;       JSR     R5,WRITEI
2159                                    ;       .WORD   <ADDRESS OF REGISTER WITHIN DMV-11>
2160                                    ;       .WORD   <DATA FIELD -- DATA TO BE WRITTEN IN DMV-11>
2161                                    ;       BCC     N$                  ;IF NO ERROR OCCURED, PROCEED WITH ROUTINE
2162                                    ;       ERROR                       ;AN ERROR MESSAGE HAS BEEN STACKED:  PRINT IT
2163                                    ;       <ANY OTHER SPECIAL ERROR PROCESSING MAY BE DONE HERE  (I.E. CKLOOP)>
2164                                    ;
2165                                    ; N$:   <RESUMPTION OF NORMAL PROCESSING>
2166                                    ;
2167                                    ;--*************************************************************************
2168
2169  004054                            WRITEI:
2170  004054  012577  176250                   MOV     (R5)+,@SEL4         ;SETUP SOURCE POINTER
2171  004060  012577  176250                   MOV     (R5)+,@SEL6         ;MAKE DATA AVAILABLE TO M-LOOP
2172  004064  112777  000002  176232  MLWRI:  MOVB    #WRILOC,@BSEL2      ;TELL M-LOOP TO WRITE THE DATA
2173
2174  004072  010346                           MOV     R3,-(SP)
2175  004074  012703  000200                   MOV     #128.,R3                    ;WAIT FOR THE M-LOOP TO FINISH THE OPERATION
2176  004100  077301                   1$:     SOB     R3,1$
2177  004102  012603                           MOV     (SP)+,R3
2178
2179  004104  132777  000200  176212          BITB    #MRDY,@BSEL2        ;DID THE M-LOOP FINISH
2180  004112  001023                           BNE     5$                  ;YES.  GOOD.  RETURN
2181  004114  004737  004374                   JSR     PC,GETWSR           ;GET BYTE SELECT REGISTERS
2182  004120  012737  000002  002254          MOV     #WRILOC,GDATA       ;IDENTIFY REQUESTED FUNCTION
2183  004126                                   GTDF    EM4,ERR4            ;"MRDY" TIMEOUT
2184                                           ;       QUEUE "DEVICE FATAL" ERROR # 5
2185  004126  012737  000001  002202                                                   MOV     #T.EDF,ERRTYP
2186  004134  012737  000005  002204                                                   MOV     #5,ERRNBR
2187  004142  012737  016135  002206                                                   MOV     #EM4,ERRMSG
2188  004150  012737  006232  002210                                                   MOV     #ERR4,ERRBLK
2189  004156  000261                           SEC                         ;INDICATE AN ERROR HAS BEEN STACKED
2190  004160  000401                           BR      6$                  ;RETURN WITH THAT INDICATION
2191
2192  004162  000241                   5$:     CLC                         ;INDICATE "NO ERROR"
2193  004164  000205                   6$:     RTS     R5                  ;RETURN
```

```
2194
2195                                    .SBTTL  M-LOOP --- BLOCK MOVE (11 CPU ==> DMV-11)
2196                                    ;*****************************************************************************
2197                                    ;
2198                                    ; MOVE A BLOCK OF BYTES FROM THE 11 CPU'S MEMORY TO THE DMV-11'S RAM
2199                                    ;
2200                                    ;       THE DESTINATION ADDRESS IS ALWAYS THE SAME -- 77 (OCT) OR 003F (HEX)
2201                                    ;
2202                                    ;       CALLING SEQUENCE:
2203                                    ;
2204                                    ;       JSR     R5,MOVLTD
2205                                    ;       .WORD   <SOURCE ADDRESS OF DATA>
2206                                    ;       .WORD   <# OF BYTE TO BE MOVED>
2207                                    ;
2208                                    ;*****************************************************************************
2209  004166  010146                    MOVLTD: MOV     R1,-(SP)        ;SAVE THE REGISTER WE'LL BE A NEED'N
2210
2211  004170  012737  000077  004210            MOV     #77,10$         ;DESTINATION ADDRESS IS ALWAYS THE SAME
2212  004176  012537  004212                    MOV     (R5)+,11$       ;SETUP THE SOURCE ADDRESS
2213  004202  012501                            MOV     (R5)+,R1        ;INITIALIZE THE BYTE COUNT
2214
2215  004204                            5$:
2216  004204  004537  004042                    JSR     R5,WRITE        ;WRITE ONE BYTE INTO THE DMV-11'S RAM
2217  004210  000077                    10$:    77                      ;THE RAM'S LOCATION
2218  004212  000000                    11$:    0                       ;THE DATA BYTE'S LOCATION
2219  004214  005237  004210                    INC     10$             ;POINT TO NEXT RAM BYTE
2220  004220  005237  004212                    INC     11$             ;POINT TO NEXT DATA BYTE
2221  004224  077111                            SOB     R1,5$           ;IF NOT DONE, LOOP
2222                                                                    ;ELSE, CLEAN-UP AND RETURN
2223  004226  012601                            MOV     (SP)+,R1        ;RESTORE R1
2224  004230  000205                            RTS     R5              ;  & RETURN
2225
```

```
                        .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     @#BSEL0,WSR0    ;MOVE THE 4 WORD REGISTERS TO THE OTHERWISE
004402  017737  175716  002214          MOV     @#BSEL2,WSR2    ;BYTE TABLE
004410  017737  175714  002216          MOV     @#BSEL4,WSR4
004416  017737  175712  002220          MOV     @#BSEL6,WSR6
004424  017737  175710  002222          MOV     @#BSEL10,WSR10
004432  017737  175706  002224          MOV     @#BSEL12,WSR12
004440  017737  175704  002226          MOV     @#BSEL14,WSR14
004446  017737  175702  002230          MOV     @#BSEL16,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),TMP8+1     ;GET & PROCESS BITS FOR ACR 6 & 7
004474  142737  177477  002441  BICB    #^C<BIT6+BIT7>,TMP8+1 ;EXTRACT BITS 6 & 7 & SAVE THEM FOR LATER
004502  012501                  MOV     (R5)+,R1        ;NOW, GET THE BIT TO BE USED IN SETTING OR
                                                        ;CLEARING BIT 6 OF "IER"

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

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

004530  004537  004032          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
```

```
2329  004552  103424                  BCS     63$             ;EXIT ON ERROR
2330
2331  004554  013701  002440          MOV     TMPB,R1         ;GET THAT VALUE
2332  004560  042701  177477          BIC     #^C<BIT6+BIT7>,R1  ;CLEAR BITS 6 & 7
2333  004564  150137  002441          BISB    R1,TMPB+1       ;ADD CURRENT BITS 0 --> 5 TO NEW BITS 6 & 7
2334
2335  004570  004537  004042          JSR     R5,WRITE        ;WRITE THE NEW REGISTER SETTING TO VIA'S ACR
2336  004574  120013                  ACR
2337  004576  002441                  TMPB+1
2338  004600  103411                  BCS     63$             ;EXIT ON ERROR
2339
2340  004602  004537  004042          JSR     R5,WRITE        ;WRITE TO
2341  004606  120006                  T1LL                    ;LOW ORDER LATCH REGISTER (T1L-L)
2342  004610  002427                  TMP6+1                  ;THE VALUE PASSED
2343  004612  103404                  BCS     63$             ;EXIT ON ERROR
2344
2345  004614  004537  004042          JSR     R5,WRITE        ;WRITE TO
2346  004620  120007                  T1LH                    ;HIGH ORDER LATCH REGESTER (T1L-H)
2347  004622  002431                  TMP7+1                  ;THE VALUE PASSED
2348
2349                          ; DON'T WAIT AROUND FOR ANYTHING TO HAPPEN -- JUST (JEST) RETURN!
2350
2351  004624  012601          63$:    MOV     (SP)+,R1        ;BUT FIRST RESTORE R1
2352  004626  000205                  RTS     R5              ;THEN RETURN
```

```
                            .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),TMP8+1     ;GET & PROCESS BIT FOR ACR 5
004646  142737  177737  002441      BICB    #^CBIT5,TMP8+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,@BBSEL3      ;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
```

```
2409  004722  120013                  ACR                     ;THE VIA'S ACR
2410  004724  002440                  TMPB
2411  004726  103424                  BCS     63$             ;EXIT ON ERROR
2412
2413  004730  113701  002440          MOVB    TMPB,R1         ;GET THAT VALUE
2414  004734  042701  000040          BIC     #BIT5,R1        ;CLEAR THE CURRENT SETTING OF BIT 5
2415  004740  150137  002441          BISB    R1,TMPB+1       ;SET REMAINING BITS IN THE VALUE TO BE WRITTEN
2416
2417  004744  004537  004042          JSR     R5,WRITE        ;WRITE TO
2418  004750  120013                  ACR                     ;THE VIA'S ACR
2419  004752  002441                  TMPB+1
2420  004754  103411                  BCS     63$             ;EXIT ON ERROR
2421
2422  004756  004537  004042          JSR     R5,WRITE        ;WRITE TO
2423  004762  120010                  T2LL                    ;LOW ORDER LATCH & COUNTER (T2L-L)
2424  004764  002433                  TMPB+1                  ;THE PASSED VALUE
2425  004766  103404                  BCS     63$             ;EXIT ON ERROR
2426
2427  004770  004537  004042          JSR     R5,WRITE        ;WRITE TO
2428  004774  120011                  T2CH                    ;HIGH ORDER COUNTER (T2C-H) <ALSO STARTS CTR>
2429  004776  002435                  TMP9+1                  ;THE PASSED VALUE
2430
2431                          ; DON'T WAIT AROUND FOR ANYTHING TO HAPPEN -- JUST (JEST) RETURN!
2432
2433  005000  012601          63$:    MOV     (SP)+,R1        ;BUT FIRST RESTORE R1
2434  005002  000205                  RTS     R5              ;THEN RETURN
2435
```

```
                                .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
```

```
2467                                    .SBTTL  MOVSB -- MOVE A STRING OF BYTES
2468                                    ;++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
2469                                    ; MOVSB -- MOVE A STRING OF BYTES
2470                                    ;
2471                                    ;       CALLING SEQUENCE:
2472                                    ;
2473                                    ;       JSR     R5,MOVSB
2474                                    ;       .WORD   <ADDRESS OF SOURCE STRING>
2475                                    ;       .WORD   <ADDRESS OF DESTINATION STRING>
2476                                    ;       .WORD   <# OF BYTES TO MOVE>
2477                                    ;
2478                                    ;--++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
2479
2480  005034  010146                   MOVSB:  MOV     R1,-(SP)        ;SAVE THE REGISTERS WE'LL BE USING
2481  005036  010246                           MOV     R2,-(SP)
2482  005040  010346                           MOV     R3,-(SP)
2483
2484  005042  012501                           MOV     (R5)+,R1        ;INITIALIZE SOURCE POINTER
2485  005044  012502                           MOV     (R5)+,R2        ;       DESTINATION POINTER
2486  005046  012503                           MOV     (R5)+,R3        ;       COUNTER
2487
2488  005050  112122                   1$:     MOVB    (R1)+,(R2)+     ;MOVE IN 1 BYTE OF DATA
2489  005052  077302                           SOB     R3,1$           ;IF MORE DATA, LOOP
2490                                                                    ;ELSE, RESTORE REGISTERS AND RETURN
2491
2492  005054  012603                           MOV     (SP)+,R3        ;RESTORE REGISTERS
2493  005056  012602                           MOV     (SP)+,R2
2494  005060  012601                           MOV     (SP)+,R1
2495
2496  005062  000205                           RTS     R5              ;RETURN TO CALLING ROUTINE
```

```
2497                                    .SBTTL  XORSW -- XOR TWO WORD TABLES
2498                                    ;**************************************************************************
2499                                    ; XORSW -- DEVELOP THE EXCLUSIVE OR'S BETWEEN TWO STRINGS OF WORDS
2500                                    ;
2501                                    ;       CALLING SEQUENCE:
2502                                    ;
2503                                    ;       JSR     R5,XORSW
2504                                    ;       .WORD   <ADDRESS OF FIRST SOURCE STRING>
2505                                    ;       .WORD   <ADDRESS OF SECOND SOURCE STRING>
2506                                    ;       .WORD   <ADDRESS OF "XOR" STRING>
2507                                    ;       .WORD   <# OF BYTES TO MOVE>
2508                                    ;
2509                                    ;--**************************************************************************
2510
2511  005064  010146                    XORSW:  MOV     R1,-(SP)        ;SAVE THE REGISTERS WE'LL BE USING
2512  005066  010246                            MOV     R2,-(SP)
2513  005070  010346                            MOV     R3,-(SP)
2514  005072  010446                            MOV     R4,-(SP)
2515
2516  005074  012501                            MOV     (R5)+,R1        ;INITIALIZE SOURCE POINTER # 1
2517  005076  012502                            MOV     (R5)+,R2        ;       SOURCE POINTER # 2
2518  005100  012503                            MOV     (R5)+,R3        ;       "XOR" STRING POINTER
2519  005102  012504                            MOV     (R5)+,R4        ;       COUNTER
2520
2521  005104  010546                            MOV     R5,-(SP)        ;NOW WE CAN SAVE R5 FOR THE RETURN
2522
2523  005106  012113                    1$:     MOV     (R1)+,(R3)      ;MOVE ONE WORD TO THE DESTINATION FIELD
2524  005110  012205                            MOV     (R2)+,R5        ;GET SECOND WORD & SETUP FOR XOR INSTRUCTION
2525  005112  074523                            XOR     R5,(R3)+        ;PERFORM ACTUAL XOR
2526  005114  077404                            SOB     R4,1$           ;IF MORE DATA, LOOP
2527                                                                    ;ELSE, RESTORE REGISTERS AND RETURN
2528
2529  005116  012605                            MOV     (SP)+,R5        ;RESTORE REGISTERS
2530  005120  012604                            MOV     (SP)+,R4
2531  005122  012603                            MOV     (SP)+,R3
2532  005124  012602                            MOV     (SP)+,R2
2533  005126  012601                            MOV     (SP)+,R1
2534
2535  005130  000205                            RTS     R5              ;RETURN TO CALLING ROUTINE
2536
2537
2538                                    .SBTTL  STALL -- DELAY FOR 10.5 MICRO-SEC'S (ON LSI-11)
2539                                    ;**************************************************************************
2540                                    ; STALL -- THIS SUBROUTINE STALLS FOR ABOUT 10.5 MICRO-SECONDS
2541                                    ;--**************************************************************************
2542
2543  005132  000207                    STALL:  RTS     PC
2544
2545
```

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

                                ;++*************************************************************************
                                ;   NPREAD -- READ ALL NPR REGISTERS INTO LOC'S STARTING @ "W0"
                                ;--*************************************************************************

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

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

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

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

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

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

005306  005037  002276          CLR     ERRFLG          ;INITIALIZE ERROR FLAG

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

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

005354                  6$:

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

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

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

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

```
2645  005440  103472                          BCS     45$             ;ON ERROR, EXIT
2646
2647                                  ; - - - - - - - - - S E T U P   D A T A - - - - - - - - - - - - - - - - - - - - -
2648
2649  005442  112137  005556                  MOVB    (R1)+,30$       ;SETUP ONE BYTE OF DATA TO BE PASSED TO THE DMV
2650  005446  032737  000040  005612          BIT     #NPRIO,42$      ;DIRECTION OF TRANSFER?
2651  005454  001010                          BNE     19$             ;DMV ===> LSI -- "DATA-OUT"
2652                                                                  ;LSI ===> DMV -- "DATA-IN"
2653
2654                                  ; ON AN "LSI ===> DMV", R2 WAS STACKED & IT SHOULD NOW BE RESTORED:
2655
2656  005456  012602                          MOV     (SP)+,R2        ;RESTORE R2
2657
2658                                  ; WHEN WE FALL THROUGH TO HERE, THE DIRECTION IS LSI ===> DMV -- ("DATA-IN").
2659                                  ; THIS MUST ALWAYS BE A WORD TRANSFER SO THAT BOTH HIGH & LOW BYTES MUST BE
2660                                  ; LOADED WITH THE BACKGROUND PATTERN (THE ONE'S COMPLEMENT OF THE TEST PATTERN)
2661
2662  005460  005137  005556                  COM     30$             ;ONE'S COMPLEMENT THE LOW BYTE
2663  005464  112137  005600                  MOVB    (R1)+,35$       ;SETUP THE HIGH BYTE AND
2664  005470  005137  005600                  COM     35$             ;  COMPLEMENT IT ALSO
2665  005474  000425                          BR      28$             ;NO GO AROUND THE "DATA-OUT" SETUP AND PASS
2666                                                                  ;THE BACKGROUND PATTERN TO THE DMV'S NPR DATA REG'S
2667
2668                                  ; IF WE GET TO HERE, THE DIRECTION IS DMV ===> LSI -- ("DATA-OUT").
2669                                  ; IF THIS IS A WORD XFER, BOTH HIGH & LOW BYTES MUST BE SETUP; IF BYTE, THEN
2670                                  ; WE MUST DETERMINE WHICH ONE (HIGH OR LOW) IS TO BE DONE AND ONLY LOAD THAT
2671                                  ; BYTE.  CONTRARY TO NORMAL PDP-11 OPERATION FOR A BYTE OPERATION FROM A
2672                                  ; REGISTER, THE ODD ADDRESSED BYTE WILL ALWAYS BE WRITTEN FROM THE HIGH DATA
2673                                  ; BYTE REGISTER AND THE EVEN ADDRESSED BYTE WILL ALWAYS BE WRITTEN FROM THE
2674                                  ; LOW DATA BYTE REGISTER.
2675
2676
2677  005476  113712  005556          19$:    MOVB    30$,(R2)        ;SETUP THE BACKGROUND PATTERN IN LSI'S MEM.
2678  005502  105112                          COMB    (R2)            ;  (THIS MAKES IT A "BACKGROUND" PATTERN)
2679
2680  005504  032737  000010  005612          BIT     #NPRBYT,42$     ;IS THIS A BYTE OR WORD TRANSFER?
2681  005512  001007                          BNE     21$             ;BYTE, GO DETERMINE WHICH ONE
2682  005514  111137  005600                  MOVB    (R1),35$        ;WORD, SETUP THE HIGH BYTE OF NPR DATA
2683  005520  112162  000001                  MOVB    (R1)+,1(R2)     ;ALSO, SETUP THE HIGH BYTE'S BACKGROUND PATTERN
2684  005524  105162  000001                  COMB    1(R2)           ;  (THIS MAKES IT A "BACKGROUND" PATTERN)
2685  005530  000407                          BR      28$             ;GO LOAD UP THE NPR DATA REG'S NOW
2686
2687  005532  032702  000001          21$:    BIT     #1,R2           ;IS LSI ADDRESS ODD OR EVEN (HIGH OR LOW BYTE)?
2688  005536  001404                          BEQ     28$             ;EVEN (LOW BYTE).  EVERYTHING'S OK -- GO LOAD IT
2689  005540  013737  005556  005600          MOV     30$,35$         ;ODD (HIGH BYTE).  WE SETUP THE WRONG ONE --
2690                                                                  ;       PUT THE DATA BYTE IN THE RIGHT PLACE
2691  005546  000411                          BR      33$             ;  AND GO LOAD IT INTO THE DMV'S NPR HIGH DATA BYTE REG.
2692
2693
2694  005550  004537  004054          28$:    JSR     R5,WRITEI       ;LOAD UP THE
2695  005554  123000                          NPRDRL                  ;  NPR DATA REG. LOW BYTE
2696  005556  000000                  30$:    0                       ;  DATA BYTE -- LOW
2697  005560  103422                          BCS     45$             ;ON ERROR, EXIT
2698
2699  005562  032737  000010  005612          BIT     #NPRBYT,42$     ;IS THIS A BYTE OR WORD TRANSFER?
2700  005570  001005                          BNE     40$             ;BYTE, THEN LEAVE THE NEXT BYTE OF DATA FOR LATER
```

```
2701
2702  005572  004537  004054          33$:    JSR     R5,WRITEI       ;WORD, LOAD UP THE
2703  005576  123001                          NPRURH                  ;  NPR DATA REG. HIGH BYTE WITH
2704  005600  000000                  35$:    0                       ;  WHAT WE HOPE IS THE APPROPRIATE DATA!
2705  005602  103411                          BCS     45$             ;0 ERROR, EXIT
2706
2707                                  ; - - - - - - - - - INITIATE ONE TRANSFER - - - - - - - - - - - - - - - - - - -
2708
2709
2710  005604  004537  004054          40$:    JSR     R5,WRITEI       ;MAKE THE "NPR" LOGIC DO IT'S THING
2711  005610  123004                          NPRCTL                  ;  BY LOADING THE CONTROL REGISTER WITH
2712  005612  000044                  42$:    NPRDL                   ;  THE PASSED COMMAND
2713  005614  103404                          BCS     45$             ;ON ERROR, EXIT
2714
2715                                  ; - - - - - - - - - MAKE SURE THE XFER RAN OK - - - - - - - - - - - - - - - - -
2716
2717  005616  004537  003730                  JSR     R5,READI        ;GET THE CONTROL REG. FOR IT'S STATUS
2718  005622  123004                          NPRCTL
2719  005624  000000                  44$:    0
2720  005626  103513                  45$:    BCS     63$             ;ON ERROR, EXIT
2721
2722                                  ;  BY NOW, THE TRANSFER SHOULD BE COMPLETE SO BIT 6 SHOULD BE = 0.  THEREFOR
2723                                  ;  THE ONLY SIGNIFICIANT BIT IS BIT 7 WHICH SHOULD = 0 IF EVERYTHING WENT OK.
2724
2725  005630  132737  000200  005624          BITB    @#NPRABT,44$    ;DID THE TRANSFER ABORT?
2726  005636  001436                          BEQ     50$             ;NO,  PROCEED WITH TESTING
2727  005640  005237  002412                  INC     TMP0            ;YES, COUNT THE TIME-OUT
2728  005644  023727  002412  000001          CMP     TMP0,#1         ;IS THIS THE FIRST OCCURANCE OF A TIMEOUT?
2729  005652  001030                          BNE     50$             ;NO,  THEN DON'T STACK THE ERROR MESSAGE
2730                                                                  ;YES, QUEUE UP A FATAL ERROR MESSAGE
2731                                                                  ;PASS TO ERROR HANDLER:
2732  005654  013737  005612  002414          MOV     42$,TMP1        ;       CONTROL REGISTER AS WE SET IT
2733  005662  013737  005624  002416          MOV     44$,TMP2        ;       CONTROL REGISTER AS READ
2734  005670  113737  005424  002421          MOVB    15$,TMP3+1      ;       LSI'S MEMORY ADDRESS
2735  005676  113737  005402  002420          MOVB    11$,TMP3
2736  005704                                  GTDF    EM26E,ERR11     ;IN ORDER TO REPORT THE TIME-OUT ERROR,
2737                                                                  ;       QUEUE "DEVICE FATAL" ERROR # 6
2738  005704  012737  000001  002202                                                  MOV     #T.EDF,ERRTYP
2739  005712  012737  000006  002204                                                  MOV     #6,ERRNBR
2740  005720  012737  016316  002206                                                  MOV     #EM26E,ERRMSG
2741  005726  012737  007314  002210                                                  MOV     #ERR11,ERRBLK
2742          000006          NPRTOE = $E                             ;THIS GETS THE ERROR # FOR TESTING LATER
2743
2744                                  ; - - - - - - - - - IF "LSI ===> DMV", RETRIEVE DATA - - - - - - - - - - - - - -
2745
2746  005734  032737  000040  005612  50$:    BIT     #NPRIO,42$      ;DIRECTION?
2747  005742  001025                          BNE     54$             ;DMV ===> LSI -- DATA ALREADY IN LSI-11
2748                                                                  ;LSI ===> DMV -- DATA IN REG'S,  RETRIEVE IT
2749
2750  005744  010237  005756                  MOV     R2,51$          ;POINT TO LSI'S INPUT BUFFER
2751  005750  004537  003616                  JSR     R5,READ         ;GET ONE BYTE
2752  005754  123000                          NPRDRL                  ;    FROM THE LOW ORDER HALF OF THE DATA REG.
2753  005756  000000                  51$:    0                       ;*** MODIFIED FROM ABOVE *** DESTINATION ADDR.
2754  005760  103436                          BCS     63$             ;ON ERROR, EXIT
2755  005762  005202                          INC     R2              ;POINT TO NEXT BYTE OF THE BUFFER
2756
```

```
2757  005764  032737  000010  005612          BIT     @#NPRBYT,42$        ;WAS A BYTE OF WORD "NPR" PERFORMED?
2758  005772  001022                          BNE     56$                 ;BYTE -- EVERYTHING'S "KOOL"!
2759                                                                      ;WORD -- MOVE HIGH BYTE INTO BUFFER
2760  005774  010237  006006                  MOV     R2,52$              ;POINT TO LSI'S I/P BUFFER
2761  006000  004537  003616                  JSR     R5,READ             ;GET ONE BYTE
2762  006004  123001                          NPRDRH                      ;    FROM THE HIGH ORDER HALF OF THE DATA REG.
2763  006006  000000              52$:        0                           ;*** MODIFIED FROM ABOVE *** DESTINATION ADDR.
2764  006010  103422                          BCS     63$                 ;ON ERROR, EXIT
2765  006012  005202                          INC     R2                  ;POINT TO NEXT BYTE OF THE BUFFER
2766  006014  000411                          BR      56$                 ;DONE RETRIEVING DATA -- CHECK FOR MORE
2767
2768                          ;- - - - - - - - - DMV ===> LSI -- JUST ADVANCE LSI-11 ADDRESS - - - - - - - -
2769
2770  006016  005202              54$:        INC     R2                  ;BUMP THE LSI-11 ADDRESS
2771  006020  032737  000010  005612          BIT     @#NPRBYT,42$        ;IS THIS A BYTE OR WORD TRANSFER?
2772  006026  001004                          BNE     56$                 ;BYTE, THEN ADDRESS IS OK AS IS
2773  006030  005202                          INC     R2                  ;WORD, BUMP ADDR. -- WE ALREADY DID THE HIGH BYTE
2774  006032  000402                          BR      56$
2775
2776                          ;- - - - - - - - - T E S T   F O R   M O R E - - - - - - - - - - - - - - - - -
2777
2778  006034  000137  005354          55$:    JMP     6$                  ;THIS LITTLE BIT IF CUTE LOGIC IS NECESSARY
2779                                                                      ;BECAUSE "6$" IS TOO FAR AWAY FOR A BRANCH!
2780  006040  077303              56$:        SOB     R3,55$              ;DO IT AGAIN IF THERE IS MORE DATA
2781  006042  005737  002276                  TST     ERRFLG              ;WAS AN ERROR DETECTED?
2782  006046  001402                          BEQ     61$                 ;NO,  TAKE NORMAL EXIT
2783
2784                          ;- - - - - - - - - C L E A N   U P   &   E X I T - - - - - - - - - - - - - - - -
2785
2786  006050  000261              60$:        SEC                         ;INDICATE ERROR CONDITION
2787  006052  000401                          BR      63$
2788
2789  006054  000241              61$:        CLC                         ;INDICATE NO ERROR
2790
2791  006056  012603              63$:        MOV     (SP)+,R3            ;RESTORE THE REGISTERS AGAIN
2792  006060  012602                          MOV     (SP)+,R2
2793  006062  012601                          MOV     (SP)+,R1
2794
2795  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$EROF
006104  000007                                                                       .WORD   7
006106  016526                                                                       .WORD   EM34
006110  006220                                                                       .WORD   ERR3
006112  000407                           BR      10$             ;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
                                                                                TRAP    C$ERDF
                                                                                .WORD   8
                                                                                .WORD   EM348
                                                                                .WORD   ERR3
006154  104455
006156  000010
006160  016540
006162  006220
006164  000407                  BR      10$             ;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
                                                                        L10003:
006206  000002                                                                  RTI

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

```
                        .SBTTL  GLOBAL ERROR REPORT REPORT SECTION

                        ;////////////////////////////////////////////////////////////////////////////
                        ;/    THE GLOBAL ERROR REPORT SECTION CONTAINS ERROR MESSAGES
                        ;/    THAT ARE USED IN MORE THAN ONE TEST.
                        ;////////////////////////////////////////////////////////////////////////////
                                .EVEN
                        ;-----------------------------------------------------------------------------
                        .SBTTL  ERROR HANDLER -- ERR1 -- "NO NOTHING" HANDLER
                        ;-----------------------------------------------------------------------------
006212                          BGNMSG  ERR1
006212                                                                          ERR1::
006212  004737  013076            JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
006216                          ENDMSG
006216                                                                          L10004:
006216  104423                                                                          TRAP    C$MSG
                        ;-----------------------------------------------------------------------------
                        .SBTTL  ERROR HANDLER -- ERR3 -- DUMP THE BYTE SELECT REGISTERS
                        ;-----------------------------------------------------------------------------
006220                          BGNMSG  ERR3
006220                                                                          ERR3::
006220  004737  012206            JSR     PC,ERR4$
006224  004737  013076            JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
006230                          ENDMSG
006230                                                                          L10005:
006230  104423                                                                          TRAP    C$MSG
                        ;-----------------------------------------------------------------------------
                        .SBTTL  ERROR HANDLER -- ERR4 -- M-LOOP TIMEOUT ERROR HANDLING
                        ;-----------------------------------------------------------------------------
006232                          BGNMSG  ERR4
006232                                                                  ERR4::
006232  010146                  MOV     R1,-(SP)                ;SAVE THE WORKING REGISTER
006234  113701  002254          MOVB    GDATA,R1                ;SAVE THIS FOR LATER
006240  122701  000017          CMPB    #17,R1                  ;WAS THIS AN M-LOOP REQUEST?
006244  103013                  BHIS    5$                      ;YES, THEN REPORT THE FUNCTION CODE
006246                          PRINTX  #FMT5,<B,R1>            ;NO.  THEN IT MUST BE A BSEL1 SETTING
006246  005046                                                                  CLR     -(SP)
006250  150116                                                                  BISB    R1,(SP)
006252  012746  013346                                                          MOV     #FMT5,-(SP)
006256  012746  000002                                                          MOV     #2,-(SP)
006262  010600                                                                  MOV     SP,R0
006264  104415                                                                  TRAP    C$PNTX
006266  062706  000006                                                          ADD     #6,SP
006272  000425                  BR      20$
                        
006274  001001          5$:     BNE     6$                      ;IF IT WAS A 17, THIS IS A "NOP" AND
006276  005001                  CLR     R1                      ;  THE TEXT POINTER MUST SO REFLECT.
006300  022701  000007  6$:     CMP     #7,R1                   ;IS FUNCTION CODE > 7?
006304  002002                  BGE     7$                      ;NO.  THAN WE CAN HANDLE IT
006306  012701  000006          MOV     #6,R1                   ;YES, THAN IT'S UNDEFINED -- SAY SO
006312  006301          7$:     ASL     R1                      ;CONVERT TO A WORD OFFSET
006314                          PRINTX  #FMT5A,<B,GDATA>,TXTMLT(R1)     ;REPORT THE FAILING FUNCTION
006314  016146  021746                                                          MOV     TXTMLT(R1),-(SP)
006320  005046                                                                  CLR     -(SP)
006322  153716  002254                                                          BISB    GDATA,(SP)
006326  012746  013411                                                          MOV     #FMT5A,-(SP)
```

```
2920  006332  012746  000003                                                  MOV     #3,-(SP)
2921  006336  010600                                                          MOV     SP,R0
2922  006340  104415                                                          TRAP    C$PNTX
2923  006342  062706  000010                                                  ADD     #10,SP
2924
2925  006346  012601          20$:    MOV     (SP)+,R1                ;RESTORE THE WORKING REGISTER
2926  006350                  PRINTX  #FMT4,#TXT6,#TXT4
2927  006350  012746  015212                                                  MOV     #TXT4,-(SP)
2928  006354  012746  015313                                                  MOV     #TXT6,-(SP)
2929  006360  012746  013213                                                  MOV     #FMT4,-(SP)
2930  006364  012746  000003                                                  MOV     #3,-(SP)
2931  006370  010600                                                          MOV     SP,R0
2932  006372  104415                                                          TRAP    C$PNTX
2933  006374  062706  000010                                                  ADD     #10,SP
2934  006400                  PRINTX  #FMT11,WSR0,WSR2,WSR4,WSR6 ;DUMP THE SELECT REGISTERS
2935  006400  013746  002220                                                  MOV     WSR6,-(SP)
2936  006404  013746  002216                                                  MOV     WSR4,-(SP)
2937  006410  013746  002214                                                  MOV     WSR2,-(SP)
2938  006414  013746  002212                                                  MOV     WSR0,-(SP)
2939  006420  012746  013770                                                  MOV     #FMT11,-(SP)
2940  006424  012746  000005                                                  MOV     #5,-(SP)
2941  006430  010600                                                          MOV     SP,R0
2942  006432  104415                                                          TRAP    C$PNTX
2943  006434  062706  000014                                                  ADD     #14,SP
2944  006440                  PRINTX  #FMT4B,#TXT4A
2945  006440  012746  015252                                                  MOV     #TXT4A,-(SP)
2946  006444  012746  013306                                                  MOV     #FMT4B,-(SP)
2947  006450  012746  000002                                                  MOV     #2,-(SP)
2948  006454  010600                                                          MOV     SP,R0
2949  006456  104415                                                          TRAP    C$PNTX
2950  006460  062706  000006                                                  ADD     #6,SP
2951  006464                  PRINTX  #FMT11,WSR10,WSR12,WSR14,WSR16
2952  006464  013746  002230                                                  MOV     WSR16,-(SP)
2953  006470  013746  002226                                                  MOV     WSR14,-(SP)
2954  006474  013746  002224                                                  MOV     WSR12,-(SP)
2955  006500  013746  002222                                                  MOV     WSR10,-(SP)
2956  006504  012746  013770                                                  MOV     #FMT11,-(SP)
2957  006510  012746  000005                                                  MOV     #5,-(SP)
2958  006514  010600                                                          MOV     SP,R0
2959  006516  104415                                                          TRAP    C$PNTX
2960  006520  062706  000014                                                  ADD     #14,SP
2961  006524  004737  013076          JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
2962  006530                  ENDMSG
2963  006530                                                          L10006:
2964  006530  104423                                                          TRAP    C$MSG
2965                  ;-----------------------------------------------------------------------
2966                  .SBTTL  ERROR HANDLER -- ERR8 -- NPR REGISTER ERRORS
2967                  ;-----------------------------------------------------------------------
2968  006532          BGNMSG  ERR8
2969  006532                                                          ERR8::
2970  006532  113701  002300          MOVB    REGNUM,R1       ;THIS WAS CALCULATED TO BE A WORD OFFSET
2971  006536                  PRINTB  #FMT07,#TXTNP,TXTNPT(R1)
2972  006536  016146  021770                                                  MOV     TXTNPT(R1),-(SP)
2973  006542  012746  015745                                                  MOV     #TXTNP,-(SP)
2974  006546  012746  013476                                                  MOV     #FMT07,-(SP)
2975  006552  012746  000003                                                  MOV     #3,-(SP)
```

```
2976  006556  010600                                                    MOV     SP,R0
2977  006560  104414                                                    TRAP    C$PNTB
2978  006562  062706  000010                                            ADD     #10,SP
2979  006566                        PRINTX  #FMT06A
2980  006566  012746  013542                                            MOV     #FMT06A,-(SP)
2981  006572  012746  000001                                            MOV     #1,-(SP)
2982  006576  010600                                                    MOV     SP,R0
2983  006600  104415                                                    TRAP    C$PNTX
2984  006602  062706  000004                                            ADD     #4,SP
2985
2986                        ;       PRINT FIRST SET OF REGISTERS: CONTROL & DATA
2987
2988  006606                        PRINTX  #FMT06,#TXT11A
2989  006606  012746  015437                                            MOV     #TXT11A,-(SP)
2990  006612  012746  013530                                            MOV     #FMT06,-(SP)
2991  006616  012746  000002                                            MOV     #2,-(SP)
2992  006622  010600                                                    MOV     SP,R0
2993  006624  104415                                                    TRAP    C$PNTX
2994  006626  062706  000006                                            ADD     #6,SP
2995  006632  010146                MOV     R1,-(SP)        ;PRESERVE R1
2996  006634  013701  002254        MOV     GDATA,R1        ;POINTER TO EXPECTED DATA
2997  006640                        PRINTX  #FMT16,#TXT8A,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>
2998  006640  005046                                                    CLR     -(SP)
2999  006642  152116                                                    BISB    (R1)+,(SP)
3000  006644  005046                                                    CLR     -(SP)
3001  006646  152116                                                    BISB    (R1)+,(SP)
3002  006650  005046                                                    CLR     -(SP)
3003  006652  152116                                                    BISB    (R1)+,(SP)
3004  006654  012746  015336                                            MOV     #TXT8A,-(SP)
3005  006660  012746  014007                                            MOV     #FMT16,-(SP)
3006  006664  012746  000005                                            MOV     #5,-(SP)
3007  006670  010600                                                    MOV     SP,R0
3008  006672  104415                                                    TRAP    C$PNTX
3009  006674  062706  000014                                            ADD     #14,SP
3010  006700  013701  002256        MOV     BDATA,R1        ;POINTER TO ACTUAL DATA
3011  006704                        PRINTX  #FMT16,#TXT8B,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>
3012  006704  005046                                                    CLR     -(SP)
3013  006706  152116                                                    BISB    (R1)+,(SP)
3014  006710  005046                                                    CLR     -(SP)
3015  006712  152116                                                    BISB    (R1)+,(SP)
3016  006714  005046                                                    CLR     -(SP)
3017  006716  152116                                                    BISB    (R1)+,(SP)
3018  006720  012746  015353                                            MOV     #TXT8B,-(SP)
3019  006724  012746  014007                                            MOV     #FMT16,-(SP)
3020  006730  012746  000005                                            MOV     #5,-(SP)
3021  006734  010600                                                    MOV     SP,R0
3022  006736  104415                                                    TRAP    C$PNTX
3023  006740  062706  000014                                            ADD     #14,SP
3024  006744  004537  005064        JSR     R5,XORSW        ;GENERATE XOR'S
3025  006750  002254                .WORD   GDATA           ;BETWEEN GOOD DATA
3026  006752  002256                .WORD   BDATA           ;AND BAD DATA
3027  006754  003054                .WORD   W0              ;AND PUT THEM HERE
3028  006756  000011                .WORD   9.              ;ONLY DO THIS MANY
3029  006760                        PRINTX  #FMT16,#TXT8C,<B,W0>,<B,W1>,<B,W2>
3030  006760  005046                                                    CLR     -(SP)
3031  006762  153716  003060                                            BISB    W2,(SP)
```

```
 3032  006766  005046                                                    CLR     -(SP)
 3033  006770  153716  003056                                            BISB    W1,(SP)
 3034  006774  005046                                                    CLR     -(SP)
 3035  006776  153716  003054                                            BISB    W0,(SP)
 3036  007002  012746  015370                                            MOV     #TXT8C,-(SP)
 3037  007006  012746  014007                                            MOV     #FMT16,-(SP)
 3038  007012  012746  000005                                            MOV     #5,-(SP)
 3039  007016  010600                                                    MOV     SP,R0
 3040  007020  104415                                                    TRAP    C$PNTX
 3041  007022  062706  000014                                            ADD     #14,SP
 3042
 3043                                  ;       PRINT SECOND SET OF REGISTERS: ADDRESS' OUT & IN
 3044
 3045  007026                        PRINTX  #FMT06,#TXT11B
 3046  007026  012746  015460                                            MOV     #TXT11B,-(SP)
 3047  007032  012746  013530                                            MOV     #FMT06,-(SP)
 3048  007036  012746  000002                                            MOV     #2,-(SP)
 3049  007042  010600                                                    MOV     SP,R0
 3050  007044  104415                                                    TRAP    C$PNTX
 3051  007046  062706  000006                                            ADD     #6,SP
 3052  007052  012701  002257       MOV     #GDATA+3,R1     ;POINTER TO EXPECTED DATA
 3053  007056                        PRINTX  #FMT16A,#TXT8A,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)
 3054  007056  005046                                                    CLR     -(SP)
 3055  007060  152116                                                    BISB    (R1)+,(SP)
 3056  007062  005046                                                    CLR     -(SP)
 3057  007064  152116                                                    BISB    (R1)+,(SP)
 3058  007066  005046                                                    CLR     -(SP)
 3059  007070  152116                                                    BISB    (R1)+,(SP)
 3060  007072  005046                                                    CLR     -(SP)
 3061  007074  152116                                                    BISB    (R1)+,(SP)
 3062  007076  005046                                                    CLR     -(SP)
 3063  007100  152116                                                    BISB    (R1)+,(SP)
 3064  007102  005046                                                    CLR     -(SP)
 3065  007104  152116                                                    BISB    (R1)+,(SP)
 3066  007106  012746  015336                                            MOV     #TXT8A,-(SP)
 3067  007112  012746  014032                                            MOV     #FMT16A,-(SP)
 3068  007116  012746  000010                                            MOV     #10,-(SP)
 3069  007122  010600                                                    MOV     SP,R0
 3070  007124  104415                                                    TRAP    C$PNTX
 3071  007126  062706  000022                                            ADD     #22,SP
 3072  007132  012701  002261       MOV     #BDATA+3,R1     ;POINTER TO ACTUAL DATA
 3073  007136                        PRINTX  #FMT16A,#TXT8B,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)
 3074  007136  005046                                                    CLR     -(SP)
 3075  007140  152116                                                    BISB    (R1)+,(SP)
 3076  007142  005046                                                    CLR     -(SP)
 3077  007144  152116                                                    BISB    (R1)+,(SP)
 3078  007146  005046                                                    CLR     -(SP)
 3079  007150  152116                                                    BISB    (R1)+,(SP)
 3080  007152  005046                                                    CLR     -(SP)
 3081  007154  152116                                                    BISB    (R1)+,(SP)
 3082  007156  005046                                                    CLR     -(
 3083  007160  152116                                                    BISB    (R1)+,(SP)
 3084  007162  005046                                                    CLR     -(SP)
 3085  007164  152116                                                    BISB    (R1)+,(SP)
 3086  007166  012746  015353                                            MOV     #TXT8B,-(SP)
 3087  007172  012746  014032                                            MOV     #FMT16A,-(SP)
```

```
                                                                                MOV     #10,-(SP)
                                                                                MOV     SP,R0
                                                                                TRAP    C$PNTX
                                                                                ADD     #22,SP
                        MOV     #W3,R1          ;POINT TO REST OF XOR'S
                        PRINTX  #FMT16A,#TXT8C,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)
                                                                                CLR     -(SP)
                                                                                BISB    (R1)+,(SP)
                                                                                CLR     -(SP)
                                                                                BISB    (R1)+,(SP)
                                                                                CLR     -(SP)
                                                                                BISB    (R1)+,(SP)
                                                                                CLR     -(SP)
                                                                                BISB    (R1)+,(SP)
                                                                                CLR     -(SP)
                                                                                BISB    (R1)+,(SP)
                                                                                CLR     -(SP)
                                                                                BISB    (R1)+,(SP)
                                                                                MOV     #TXT8C,-(SP)
                                                                                MOV     #FMT16A,-(SP)
                                                                                MOV     #10,-(SP)
                                                                                MOV     SP,R0
                                                                                TRAP    C$PNTX
                                                                                ADD     #22,SP
                        JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
                        ENDMSG
                                                                        L10007:
                                                                                TRAP    C$MSG
                ;-------------------------------------------------------------------------------
                .SBTTL  ERROR HANDLER -- ERR9 -- WORD NPR I/O ERRORS
                ;-------------------------------------------------------------------------------
                        BGNMSG  ERR9
                                                                        ERR9::
                        JSR     PC,ERR9.        ;USE COMMON "ERROR 9" ROUTINE
                        ENDMSG
                                                                        L10010:
                                                                                TRAP    C$MSG
                ;-------------------------------------------------------------------------------
                .SBTTL  ERROR HANDLER -- ERR10 -- BYTE NPR I/O ERRORS
                ;-------------------------------------------------------------------------------
                        BGNMSG  ERR10
                                                                        ERR10::
                        JSR     PC,ERR10.       ;USE COMMON "ERROR 10" ROUTINE
                        ENDMSG
                                                                        L10011:
                                                                                TRAP    C$MSG
                ;-------------------------------------------------------------------------------
                .SBTTL  ERROR HANDLER -- ERR11 -- NPR TIMEOUT ERRORS
                ;-------------------------------------------------------------------------------
                        BGNMSG  ERR11
                                                                        ERR11::
                        CMP     TMP0,#1         ;IF ONLY ONE TIMEOUT,
                        BEQ     1$              ;NO NEED TO TELL HOW MANY OCCURED
                        PRINTX  #FMT17C,TMP0    ;ELSE.  SAY HOW MANY WERE FOUND IN ALL
                                                                                MOV     TMP0,-(SP)
                                                                                MOV     #FMT17C,-(SP)
```

```
                        ERROR HANDLER -- ERR11 -- NPR TIMEOUT ERRORS

3144  007334  012746  000002                                                    MOV     #2,-(SP)
3145  007340  010600                                                            MOV     SP,R0
3146  007342  104415                                                            TRAP    C$PNTX
3147  007344  062706  000006                                                    ADD     #6,SP
3148  007350                  1$:     PRINTX  #FMT17,<B,TMP1> ;NPRCTL SENT
3149  007350  005046                                                            CLR     -(SP)
3150  007352  153716  002414                                                    BISB    TMP1,(SP)
3151  007356  012746  014074                                                    MOV     #FMT17,-(SP)
3152  007362  012746  000002                                                    MOV     #2,-(SP)
3153  007366  010600                                                            MOV     SP,R0
3154  007370  104415                                                            TRAP    C$PNTX
3155  007372  062706  000006                                                    ADD     #6,SP
3156  007376                          PRINTX  #FMT17A,<B,TMP2>  ;NPRCTL       READ
3157  007376  005046                                                            CLR     -(SP)
3158  007400  153716  002416                                                    BISB    TMP2,(SP)
3159  007404  012746  014153                                                    MOV     #FMT17A,-(SP)
3160  007410  012746  000002                                                    MOV     #2,-(SP)
3161  007414  010600                                                            MOV     SP,R0
3162  007416  104415                                                            TRAP    C$PNTX
3163  007420  062706  000006                                                    ADD     #6,SP
3164  007424                          PRINTX  #FMT17B,TMP3    ;LSI-11'S MEMORY ADDRESS
3165  007424  013746  002420                                                    MOV     TMP3,-(SP)
3166  007430  012746  014234                                                    MOV     #FMT17B,-(SP)
3167  007434  012746  000002                                                    MOV     #2,-(SP)
3168  007440  010600                                                            MOV     SP,R0
3169  007442  104415                                                            TRAP    C$PNTX
3170  007444  062706  000006                                                    ADD     #6,SP
3171  007450  004737  013076          JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3172  007454                          ENDMSG
3173  007454                                                          L10012:
3174  007454  104423                                                            TRAP    C$MSG
3175                  ;-------------------------------------------------------------------------
3176                  .SBTTL  ERROR HANDLER -- ERR12 -- NPR EXTENDED ADDRESSING ERROR HANDLER
3177                  ;-------------------------------------------------------------------------
3178  007456                  BGNMSG  ERR12
3179  007456                                                          ERR12::
3180  007456                  PRINTX  #FMT12          ;PRINT FIRST HEADING LINE
3181  007456  012746  007672                                                    MOV     #FMT12,-(SP)
3182  007462  012746  000001                                                    MOV     #1,-(SP)
3183  007466  010600                                                            MOV     SP,R0
3184  007470  104415                                                            TRAP    C$PNTX
3185  007472  062706  000004                                                    ADD     #4,SP
3186  007476                  PRINTX  #FMT12A         ;PRINT SECOND HEADING LINE
3187  007476  012746  007732                                                    MOV     #FMT12A,-(SP)
3188  007502  012746  000001                                                    MOV     #1,-(SP)
3189  007506  010600                                                            MOV     SP,R0
3190  007510  104415                                                            TRAP    C$PNTX
3191  007512  062706  000004                                                    ADD     #4,SP
3192                                  ;PRINT ADDRESS, CONTROL, & EXPECTED DATA
3193  007516  004737  012162          JSR     PC,XORGB        ;GENERATE EXCLUSIVE OR OF EXPECTED & READ DATA
3194  007522                  PRINTX  #FMT12D,<B,TMPF+1>,#0,#0,<B,TMP2>,GDATA,BDATA,XDATA
3195  007522  013746  002260                                                    MOV     XDATA,-(SP)
3196  007526  013746  002256                                                    MOV     BDATA,-(SP)
3197  007532  013746  002254                                                    MOV     GDATA,-(SP)
3198  007536  005046                                                            CLR     -(SP)
3199  007540  153716  002416                                                    BISB    TMP2,(SP)
```

```
3200  007544  012746  000000                                                          MOV     #0,-(SP)
3201  007550  012746  000000                                                          MOV     #0,-(SP)
3202  007554  005046                                                                 CLR     -(SP)
3203  007556  153716  002451                                                          BISB    TMPF+1,(SP)
3204  007562  012746  010020                                                          MOV     #FMT12D,-(SP)
3205  007566  012746  000010                                                          MOV     #10.,-(SP)
3206  007572  010600                                                                 MOV     SP,R0
3207  007574  104415                                                                 TRAP    C$PNTX
3208  007576  062706  000022                                                          ADD     #22,SP
3209  007602  023737  002256  002420          CMP     BDATA,TMP3      ;DID WE READ THE BACKGROUND PATTERN?
3210  007610  001011                          BNE     4$              ;NO,
3211  007612                                  PRINTX  #FMT12E         ;YES, INDICATE WRONG PAGE READ
3212  007612  012746  010063                                                          MOV     #FMT12E,-(SP)
3213  007616  012746  000001                                                          MOV     #1.-(SP)
3214  007622  010600                                                                 MOV     SP,R0
3215  007624  104415                                                                 TRAP    C$PNTX
3216  007626  062706  000004                                                          ADD     #4,SP
3217  007632  000414                          BR      60$             ;       AND EXIT ERROR HANDLER
3218
3219  007634  023737  002256  002414  4$:     CMP     BDATA,TMP1      ;DID WE EVEN PERFORM A READ?
3220  007642  001010                          BNE     60$             ;YES, THEN WE CAN GIVE ANY FURTHER ERROR INFO.
3221  007644                                  PRINTX  #FMT12F         ;NO,  THEN WE CAN AT LEAST SAY THAT MUCH
3222  007644  012746  010145                                                          MOV     #FMT12F,-(SP)
3223  007650  012746  000001                                                          MOV     #1.-(SP)
3224  007654  010600                                                                 MOV     SP,R0
3225  007656  104415                                                                 TRAP    C$PNTX
3226  007660  062706  000004                                                          ADD     #4,SP
3227  007664  004737  013076          60$:    JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3228  007670                                  ENDMSG
3229  007670                                                                  L10013:
3230  007670  104423                                                                 TRAP    C$MSG
3231                                  .NLIST  BEX
      007672  047045  051445  031461  FMT12:  .ASCIZ  /%N%S13%ANPR REGISTERS%S14%ADATA/
      007732  047045  051445  030461  FMT12A: .ASCIZ  /%N%S11%AADDRESS   CONTROL   EXPECTED   READ     XOR%N/
      010020  047045  051445  022470  FMT12D: .ASCIZ  /%N%S8%03%S%03%S%03%S3%03%010%09%09/
      010063     045  022516  033523  FMT12E: .ASCIZ  /%N%S7%A(NPR OPERATION ACCESSED WRONG MEMORY PAGE)/
      010145     045  022516  031123  FMT12F: .ASCIZ  /%N%S2%A(NPR DATA REGISTER UN-CHANGED FROM BEFORE REQUEST)/
                                      .LIST   BEX
3232          010240                  .EVEN
3233                                  ;-------------------------------------------------------------------------
3234                                  .SBTTL  ERROR HANDLER -- ERR13 -- "MMU" ERROR HANDLER
3235                                  ;-------------------------------------------------------------------------
3236  010240                          BGNMSG  ERR13
3237  010240                                                                  ERR13::
3238  010240                          PRINTX  #FMT13A
3239  010240  012746  010546                                                          MOV     #FMT13A,-(SP)
3240  010244  012746  000001                                                          MOV     #1.-(SP)
3241  010250  010600                                                                 MOV     SP,R0
3242  010252  104415                                                                 TRAP    C$PNTX
3243  010254  062706  000004                                                          ADD     #4,SP
3244  010260                          PRINTX  #FMT13B
3245  010260  012746  010611                                                          MOV     #FMT13B,-(SP)
3246  010264  012746  000001                                                          MOV     #1.-(SP)
3247  010270  010600                                                                 MOV     SP,R0
3248  010272  104415                                                                 TRAP    C$PNTX
3249  010274  062706  000004                                                          ADD     #4,SP
```

```
3250  010300                          PRINTX  #FMT13C
3251  010300  012746  010656                                  MOV     #FMT13C,-(SP)
3252  010304  012746  000001                                  MOV     #1,-(SP)
3253  010310  010600                                          MOV     SP,R0
3254  010312  104415                                          TRAP    C$PNTX
3255  010314  062706  000004                                  ADD     #4,SP
3256  010320                          PRINTX  #FMT13D
3257  010320  012746  010721                                  MOV     #FMT13D,-(SP)
3258  010324  012746  000001                                  MOV     #1,-(SP)
3259  010330  010600                                          MOV     SP,R0
3260  010332  104415                                          TRAP    C$PNTX
3261  010334  062706  000004                                  ADD     #4,SP
3262  010340                          PRINTX  #FMT11,TMP0,TMP1,TMP2,TMP3
3263  010340  013746  002420                                  MOV     TMP3,-(SP)
3264  010344  013746  002416                                  MOV     TMP2,-(SP)
3265  010350  013746  002414                                  MOV     TMP1,-(SP)
3266  010354  013746  002412                                  MOV     TMP0,-(SP)
3267  010360  012746  013770                                  MOV     #FMT11,-(SP)
3268  010364  012746  000005                                  MOV     #5,-(SP)
3269  010370  010600                                          MOV     SP,R0
3270  010372  104415                                          TRAP    C$PNTX
3271  010374  062706  000014                                  ADD     #14,SP
3272  010400                          PRINTX  #FMT13E,TMP4,TMP5,TMP6,TMP7
3273  010400  013746  002430                                  MOV     TMP7,-(SP)
3274  010404  013746  002426                                  MOV     TMP6,-(SP)
3275  010410  013746  002424                                  MOV     TMP5,-(SP)
3276  010414  013746  002422                                  MOV     TMP4,-(SP)
3277  010420  012746  010764                                  MOV     #FMT13E,-(SP)
3278  010424  012746  000005                                  MOV     #5,-(SP)
3279  010430  010600                                          MOV     SP,R0
3280  010432  104415                                          TRAP    C$PNTX
3281  010434  062706  000014                                  ADD     #14,SP
3282  010440                          PRINTX  #FMT11,REG0,REG1,REG2,REG3
3283  010440  013746  002400                                  MOV     REG3,-(SP)
3284  010444  013746  002376                                  MOV     REG2,-(SP)
3285  010450  013746  002374                                  MOV     REG1,-(SP)
3286  010454  013746  002372                                  MOV     REG0,-(SP)
3287  010460  012746  013770                                  MOV     #FMT11,-(SP)
3288  010464  012746  000005                                  MOV     #5,-(SP)
3289  010470  010600                                          MOV     SP,R0
3290  010472  104415                                          TRAP    C$PNTX
3291  010474  062706  000014                                  ADD     #14,SP
3292  010500                          PRINTX  #FMT13E,REG4,REG5,REG6,REG7
3293  010500  013746  002410                                  MOV     REG7,-(SP)
3294  010504  013746  002406                                  MOV     REG6,-(SP)
3295  010510  013746  002404                                  MOV     REG5,-(SP)
3296  010514  013746  002402                                  MOV     REG4,-(SP)
3297  010520  012746  010764                                  MOV     #FMT13E,-(SP)
3298  010524  012746  000005                                  MOV     #5,-(SP)
3299  010530  010600                                          MOV     SP,R0
3300  010532  104415                                          TRAP    C$PNTX
3301  010534  062706  000014                                  ADD     #14,SP
3302  010540  004737  013076  JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3303  010544                  ENDMSG
3304  010544                                          L10014:
3305  010544  104423                                          TRAP    C$MSG
```

```
                                .NLIST  BEX
      010546  047045  040445  020040 FMT13A: .ASCIZ  /%N%A   SR0     SR1     SR2     SR3/
      010611     045  020101  020040 FMT13B: .ASCIZ  /%A     KPAR6   KPDR6  V ADDR   DATA?/
      010656  047045  040445  020040 FMT13C: .ASCIZ  /%N%A    R0      R1      R2      R3/
      010721     045  020101  020040 FMT13D: .ASCIZ  /%A     R4      R5      SP      PC/
      010764  047445  022470  034117 FMT13E: .ASCIZ  /%08%08%08%08/
                                .LIST   BEX
      011002                    .EVEN
                                ;-------------------------------------------------------------------------
                                .SBTTL  ERROR HANDLER -- ERR14 -- NPR REGISTER LOAD ERROR HANDLER
                                ;-------------------------------------------------------------------------
                                        BGNMSG  ERR14
                                                                                        ERR14::
      010146                            MOV     R1,-(SP)        ;SAVE GENERAL REGISTER
      013701  002300                    MOV     REGNUM,R1
      006301                            ASL     R1              ;CONVERT REG # TO WORD INDEX
                                        PRINTB  #FMT07,#TXTNP,TXTNPT(R1)
      016146  021770                                                            MOV     TXTNPT(R1),-(SP)
      012746  015745                                                            MOV     #TXTNP,-(SP)
      012746  013476                                                            MOV     #FMT07,-(SP)
      012746  000003                                                            MOV     #3,-(SP)
      010600                                                                    MOV     SP,R0
      104414                                                                    TRAP    C$PNTB
      062706  000010                                                            ADD     #10,SP
      004737  012162                    JSR     PC,XORGB
                                                        ;DATA: GOOD, BAD, & XOR
      023727  002300  000006           CMP     REGNUM,#6       ;IF EXTENDED ADDRESS BYTE, USE BYTE PRINT
      001423                            BEQ     5$
      023727  002300  000003           CMP     REGNUM,#3
      001417                            BEQ     5$
                                                        ;ELSE, USE WORD PRINTS
                                        PRINTX  #FMT10,GDATA,BDATA,XDATA
      013746  002260                                                            MOV     XDATA,-(SP)
      013746  002256                                                            MOV     BDATA,-(SP)
      013746  002254                                                            MOV     GDATA,-(SP)
      012746  013714                                                            MOV     #FMT10,-(SP)
      012746  000004                                                            MOV     #4,-(SP)
      010600                                                                    MOV     SP,R0
      104415                                                                    TRAP    C$PNTX
      062706  000012                                                            ADD     #12,SP
      000421                            BR      10$             ;BYPASS BYTE PRINTS IF WORD PRINTS USED

                                5$:     PRINTX  #FMT02A,<B,GDATA>,<B,BDATA>,<B,XDATA>
      005046                                                                    CLR     -(SP)
      153716  002260                                                            BISB    XDATA,(SP)
      005046                                                                    CLR     -(SP)
      153716  002256                                                            BISB    BDATA,(SP)
      005046                                                                    CLR     -(SP)
      153716  002254                                                            BISB    GDATA,(SP)
      012746  013127                                                            MOV     #FMT02A,-(SP)
      012746  000004                                                            MOV     #4,-(SP)
      010600                                                                    MOV     SP,R0
      104415                                                                    TRAP    C$PNTX
      062706  000012                                                            ADD     #12,SP
      004737  013076            10$:    JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
      012601                            MOV     (SP)+,R1        ;RESTORE GENERAL REGISTER
```

```
                        ENDMSG
                                                                L10015:
                                                                        TRAP    C$MSG

                ;-------------------------------------------------------------------------
                .SBTTL  ERROR HANDLER -- ERR51 -- FOR REPORTING TIMER # 2 ERRORS
                ;-------------------------------------------------------------------------
                        BGNMSG  ERR51
                                                                ERR51::
                        MOV     R1,-(SP)        ;SAVE R1 FOR CALLER
                        MOVB    TMPB+1,R1       ;GET THE MODE LAST SETUP
                        CLC                     ;SEEING AS THE CARRY BIT WILL BE ROTATED INTO
                                                ;THE DATA, WE HAD BETTER CLEAR IT JUST IN CASE.
                        BIC     #^C<BIT5>,R1    ;LOOK @ JUST THE TIMER 2 MODE DEFINITION
                        ROLB    R1              ;POSITION IT FOR PRINTOUT
                        ROLB    R1
                        ROLB    R1
                        ROLB    R1

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

                        PRINTX  #FMT51A,R1,<@,TMP9+1>,<@,TMP8+1>
                                                                        CLR     -(SP)
                                                                        BISB    TMP8+1,(SP)
                                                                        CLR     -(SP)
                                                                        BISB    TMP9+1,(SP)
                                                                        MOV     R1,-(SP)
                                                                        MOV     #FMT51A,-(SP)
                                                                        MOV     #4,-(SP)
                                                                        MOV     SP,R0
                                                                        TRAP    C$PNTX
                                                                        ADD     #12,SP
                        JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
                        MOV     (SP)+,R1        ;RESTORE R1 FOR CALLER
                        ENDMSG
                                                                L10016:
                                                                        TRAP    C$MSG
                ;-------------------------------------------------------------------------
                .SBTTL  ERROR HANDLER -- ERR52 -- PROCESS SHIFT REGISTER ERROR MESSAGES
                ;-------------------------------------------------------------------------
                        BGNMSG  ERR52
                                                                ERR52::
                        JSR     R5,READ         ;GET CURRENT VALUES WITHIN ACR & PCR
                        ACR
                        TMPB
                        JSR     R5,READ
                        PCR
                        TMPC
                        PRINTX  #FMT52H
                                                                        MOV     #FMT52H,-(SP)
                                                                        MOV     #1,-(SP)
                                                                        MOV     SP,R0
                                                                        TRAP    C$PNTX
                                                                        ADD     #4,SP
                        PRINTX  #FMT52A,#TXT8D,<@,TMPA+1>,<@,TMPB+1>,<@,TMPE+1>
```

```
                                                                                        CLR     -(SP)
                                                                                        BISB    TMPE+1,(SP)
                                                                                        CLR     -(SP)
                                                                                        BISB    TMPB+1,(SP)
                                                                                        CLR     -(SP)
                                                                                        BISB    TMPA+1,(SP)
                                                                                        MOV     #TXT8D,-(SP)
                                                                                        MOV     #FMT52A,-(SP)
                                                                                        MOV     #5,-(SP)
                                                                                        MOV     SP,R0
                                                                                        TRAP    C$PNTX
                                                                                        ADD     #14,SP
                        PRINTX  #FMT528,#TXT8E,<B,TMPA>,<B,TMPB>,<B,TMPC>,<B,TMPD>,<B,TMPE>
                                                                                        CLR     -(SP)
                                                                                        BISB    TMPE,(SP)
                                                                                        CLR     -(SP)
                                                                                        BISB    TMPD,(SP)
                                                                                        CLR     -(SP)
                                                                                        BISB    TMPC,(SP)
                                                                                        CLR     -(SP)
                                                                                        BISB    TMPB,(SP)
                                                                                        CLR     -(SP)
                                                                                        BISB    TMPA,(SP)
                                                                                        MOV     #TXT8E,-(SP)
                                                                                        MOV     #FMT528,-(SP)
                                                                                        MOV     #7,-(SP)
                                                                                        MOV     SP,R0
                                                                                        TRAP    C$PNTX
                                                                                        ADD     #20,SP
                        TST     TDATA           ;HAS "SR" BEEN WRITTEN YET?
                        BNE     10$             ;NO,  THEN JUST FINISH ERROR MESSAGE
                        PRINTX  #FMT52C         ;YES, ADD THAT INFORMATION TO MESSAGE
                                                                                        MOV     #FMT52C,-(SP)
                                                                                        MOV     #1,-(SP)
                                                                                        MOV     SP,R0
                                                                                        TRAP    C$PNTX
                                                                                        ADD     #4,SP
10$:                    JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
                        ENDMSG
                                                                                L10017:
                                                                                        TRAP    C$MSG

                        .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/
011652 047045 051445 030061 FMT52C: .ASCIZ  /#N#S10#A(SR HASN'T BEEN LOADED YET!)/
                        .LIST   BEX
011720                  .EVEN
                        ;       SR ERROR FORMATS:
                        ;
                        ;         SR    ACR    PCR    IFR    IER
                        ; LOADED XXX    XXX    ---    ---    XXX
                        ; READ   XXX    XXX    XXX    XXX    XXX
                        ;
                        ;-------------------------------------------------------------------------
```

```
3463
3464                            ;-------------------------------------------------------------
3465                            .SBTTL  ERROR HANDLER -- ERR60 -- NPR WRITE-EXTENDED BIT ERRORS
3466                            ;-------------------------------------------------------------
3467  011720                            BGNMSG  ERR60
3468  011720                                                                    ERR60::
3469  011720                            PRINTX  #FMT60
3470  011720  012746  012034                                                           MOV     #FMT60,-(SP)
3471  011724  012746  000001                                                           MOV     #1.,-(SP)
3472  011730  010600                                                                   MOV     SP,R0
3473  011732  104415                                                                   TRAP    C$PNTX
3474  011734  062706  000004                                                           ADD     #4,SP
3475  011740                            PRINTX  #FMT61
3476  011740  012746  012073                                                           MOV     #FMT61,-(SP)
3477  011744  012746  000001                                                           MOV     #1.,-(SP)
3478  011750  010600                                                                   MOV     SP,R0
3479  011752  104415                                                                   TRAP    C$PNTX
3480  011754  062706  000004                                                           ADD     #4,SP
3481  011760  005003                   CLR     R3                      ;CLEAR INDEX
3482  011762                    10$:    PRINTX  #FMT62,XLOCO(R3),XVALO(R3),RXVALO(R3)
3483  011762  016346  032560                                                           MOV     RXVALO(R3),-(SP)
3484  011766  016346  032542                                                           MOV     XVALO(R3),-(SP)
3485  011772  016346  032524                                                           MOV     XLOCO(R3),-(SP)
3486  011776  012746  012134                                                           MOV     #FMT62,-(SP)
3487  012002  012746  000004                                                           MOV     #4.,-(SP)
3488  012006  010600                                                                   MOV     SP,R0
3489  012010  104415                                                                   TRAP    C$PNTX
3490  012012  062706  000012                                                           ADD     #12.SP
3491  012016  005723                   TST     (R3)+                   ;BUMP INDEX
3492  012020  020327  000016           CMP     R3,#14.
3493  012024  001356                   BNE     10$
3494  012026  004737  013076           JSR     PC,NULERR
3495  012032                            ENDMSG
3496  012032                                                                  L10020:
3497  012032  104423                                                                   TRAP    C$MSG
3498                                    .NLIST  BEX
      012034  047045  051445  022463  FMT60:  .ASCIZ /#N#S3#AXLOC#S6#AXVAL#S6#ARλVAL/
      012073    045   022516  031523  FMT61:  .ASCIZ /#N#S3#A----#S6#A----#S6#A-----#N./
      012134  047045  051445  022462  FMT62:  .ASCIZ /#N#S2#O6#S4#O6#S4#O6/
                                    .LIST   BEX
3499          012162                .EVEN
```

```
3500                                    .SBTTL  ERROR HANDLER SUBROUTINES
3501
3502                                    ;-------------------------------------------------------------------
3503                                    ;------------ SUBROUTINES USED ONLY BY ERROR HANDLERS ---------------
3504                                    ;-------------------------------------------------------------------
3505
3506                                    .SBTTL          ERROR HANDLER SUBROUTINE -- XORGB
3507
3508                                    ;       PERFORM EXCLUSIVE OR BETWEEN "GDATA" & "BDATA" PUTTING
3509                                    ;       THE RESULT IN "XDATA"
3510
3511  012162  010146                    XORGB:  MOV     R1,-(SP)        ;PRESERVE WORKING REGISTER
3512  012164  013701  002254                    MOV     GDATA,R1        ;GET "GOOD" DATA
3513  012170  013737  002256  002260            MOV     BDATA,XDATA     ;AND "BAD" DATA
3514  012176  074137  002260                    XOR     R1,XDATA        ;PERFORM EXCLUSIVE OR
3515  012202  012601                            MOV     (SP)+,R1        ;RESTORE R1
3516  012204  000207                            RTS     PC              ;RETURN
3517
3518                                    ;-------------------------------------------------------------------
3519                                    .SBTTL          ERROR HANDLER SUBROUTINE -- ERR4$
3520                                    ;-------------------------------------------------------------------
3521                                    ;       IDENTIFY & DUMP THE BYTE SELECT REGISTERS
3522
3523  012206                            ERR4$:  PRINTX  #FMT4,#TXT3,#TXT1
3524  012206  012746  014761                                                    MOV     #TXT1,-(SP)
3525  012212  012746  015162                                                    MOV     #TXT3,-(SP)
3526  012216  012746  013213                                                    MOV     #FMT4,-(SP)
3527  012222  012746  000003                                                    MOV     #3,-(SP)
3528  012226  010600                                                            MOV     SP,R0
3529  012230  104415                                                            TRAP    C$PNTX
3530  012232  062706  000010                                                    ADD     #10,SP
3531  012236                    PRINTX  #FMT4A,<B,BSR0>,<B,BSR1>,<B,BSR2>,<B,BSR3>
3532  012236  005046                                                            CLR     -(SP)
3533  012240  153716  002220                                                    BISB    BSR3,(SP)
3534  012244  005046                                                            CLR     -(SP)
3535  012246  153716  002216                                                    BISB    BSR2,(SP)
3536  012252  005046                                                            CLR     -(SP)
3537  012254  153716  002214                                                    BISB    BSR1,(SP)
3538  012260  005046                                                            CLR     -(SP)
3539  012262  153716  002212                                                    BISB    BSR0,(SP)
3540  012266  012746  013253                                                    MOV     #FMT4A,-(SP)
3541  012272  012746  000005                                                    MOV     #5,-(SP)
3542  012276  010600                                                            MOV     SP,R0
3543  012300  104415                                                            TRAP    C$PNTX
3544  012302  062706  000014                                                    ADD     #14,SP
3545  012306                    PRINTX  #FMT4B,#TXT2
3546  012306  012746  015017                                                    MOV     #TXT2,-(SP)
3547  012312  012746  013306                                                    MOV     #FMT4B,-(SP)
3548  012316  012746  000002                                                    MOV     #2,-(SP)
3549  012322  010600                                                            MOV     SP,R0
3550  012324  104415                                                            TRAP    C$PNTX
3551  012326  062706  000006                                                    ADD     #6,SP
3552  012332                    PRINTX  #FMT4C,<B,BSR4>,<B,BSR5>,<B,BSR6>,<B,BSR7>
3553  012332  005046                                                            CLR     -(SP)
3554  012334  153716  002230                                                    BISB    BSR7,(SP)
3555  012340  005046                                                            CLR     -(SP)
```

```
3556  012342  153716  002226                                                  BISB    BSR6,(SP)
3557  012346  005046                                                          CLR     -(SP)
3558  012350  153716  002224                                                  BISB    BSR5,(SP)
3559  012354  005046                                                          CLR     -(SP)
3560  012356  153716  002222                                                  BISB    BSR4,(SP)
3561  012362  012746  013313                                                  MOV     #FMT4C,-(SP)
3562  012366  012746  000005                                                  MOV     #5,-(SP)
3563  012372  010600                                                          MOV     SP,R0
3564  012374  104415                                                          TRAP    C$PNTX
3565  012376  062706  000014                                                  ADD     #14,SP
3566  012402                          PRINTX  #FMT4B,#TXT2A
3567  012402  012746  015061                                                  MOV     #TXT2A,-(SP)
3568  012406  012746  013306                                                  MOV     #FMT4B,-(SP)
3569  012412  012746  000002                                                  MOV     #2,-(SP)
3570  012416  010600                                                          MOV     SP,R0
3571  012420  104415                                                          TRAP    C$PNTX
3572  012422  062706  000006                                                  ADD     #6,SP
3573  012426                          PRINTX  #FMT4A,<B,BSR10>,<B,BSR11>,<B,BSR12>,<B,BSR13>
3574  012426  005046                                                          CLR     -(SP)
3575  012430  153716  002240                                                  BISB    BSR13,(SP)
3576  012434  005046                                                          CLR     -(SP)
3577  012436  153716  002236                                                  BISB    BSR12,(SP)
3578  012442  005046                                                          CLR     -(SP)
3579  012444  153716  002234                                                  BISB    BSR11,(SP)
3580  012450  005046                                                          CLR     -(SP)
3581  012452  153716  002232                                                  BISB    BSR10,(SP)
3582  012456  012746  013253                                                  MOV     #FMT4A,-(SP)
3583  012462  012746  000005                                                  MOV     #5,-(SP)
3584  012466  010600                                                          MOV     SP,R0
3585  012470  104415                                                          TRAP    C$PNTX
3586  012472  062706  000014                                                  ADD     #14,SP
3587  012476                          PRINTX  #FMT4B,#TXT2B
3588  012476  012746  015120                                                  MOV     #TXT2B,-(SP)
3589  012502  012746  013306                                                  MOV     #FMT4B,-(SP)
3590  012506  012746  000002                                                  MOV     #2,-(SP)
3591  012512  010600                                                          MOV     SP,R0
3592  012514  104415                                                          TRAP    C$PNTX
3593  012516  062706  000006                                                  ADD     #6,SP
3594  012522                          PRINTX  #FMT4C,<B,BSR14>,<B,BSR15>,<B,BSR16>,<B,BSR17>
3595  012522  005046                                                          CLR     -(SP)
3596  012524  153716  002250                                                  BISB    BSR17,(SP)
3597  012530  005046                                                          CLR     -(SP)
3598  012532  153716  002246                                                  BISB    BSR16,(SP)
3599  012536  005046                                                          CLR     -(SP)
3600  012540  153716  002244                                                  BISB    BSR15,(SP)
3601  012544  005046                                                          CLR     -(SP)
3602  012546  153716  002242                                                  BISB    BSR14,(SP)
3603  012552  012746  013313                                                  MOV     #FMT4C,-(SP)
3604  012556  012746  000005                                                  MOV     #5,-(SP)
3605  012562  010600                                                          MOV     SP,R0
3606  012564  104415                                                          TRAP    C$PNTX
3607  012566  062706  000014                                                  ADD     #14,SP
3608  012572  000207                  RTS     PC
3609
3610                    ;------ ----------------------------------------------------------------
3611                    .SBTTL          ERROR HANDLER SUBROUTINE -- ERR9$ & ERR9.
```

```
3612                                    ;-------------------------------------------------------------------------
3613                                    ;       COMMON ERROR 9 ROUTINE TO IDENTIFY THE FAILING ADDRESS & DATA
3614
3615  012574                            ERR9$:  PRINTX  #NEWLIN         ;WHEN CALLED FROM TEST, START A NEW LINE
3616  012574  012746  013124                                                    MOV     #NEWLIN,-(SP)
3617  012600  012746  000001                                                    MOV     #1,-(SP)
3618  012604  010600                                                            MOV     SP,R0
3619  012606  104415                                                            TRAP    C$PNTX
3620  012610  062706  000004                                                    ADD     #4,SP
3621  012614  005237  002300            ERR9.:  INC     REGNUM          ;CONVERT INDEX TO ELEMENT #
3622  012620                                    PRINTX  #FMT09,REGNUM   ;IDENTIFY DATA PATTERN OFFSET
3623  012620  013746  002300                                                    MOV     REGNUM,-(SP)
3624  012624  012746  013621                                                    MOV     #FMT09,-(SP)
3625  012630  012746  000002                                                    MOV     #2,-(SP)
3626  012634  010600                                                            MOV     SP,R0
3627  012636  104415                                                            TRAP    C$PNTX
3628  012640  062706  000006                                                    ADD     #6,SP
3629  012644  004737  012162                    JSR     PC,XORGB
3630  012650                                    PRINTX  #FMT10,GDATA,BDATA,XDATA  ;DATA: GOOD, BAD, & XOR
3631  012650  013746  002260                                                    MOV     XDATA,-(SP)
3632  012654  013746  002256                                                    MOV     BDATA,-(SP)
3633  012660  013746  002254                                                    MOV     GDATA,-(SP)
3634  012664  012746  013714                                                    MOV     #FMT10,-(SP)
3635  012670  012746  000004                                                    MOV     #4,-(SP)
3636  012674  010600                                                            MOV     SP,R0
3637  012676  104415                                                            TRAP    C$PNTX
3638  012700  062706  000012                                                    ADD     #12,SP
3639  012704                                    PRINTX  #FMT09A,TDATA   ;LSI ADDRESS
3640  012704  013746  002252                                                    MOV     TDATA,-(SP)
3641  012710  012746  013673                                                    MOV     #FMT09A,-(SP)
3642  012714  012746  000002                                                    MOV     #2,-(SP)
3643  012720  010600                                                            MOV     SP,R0
3644  012722  104415                                                            TRAP    C$PNTX
3645  012724  062706  000006                                                    ADD     #6,SP
3646  012730  000207                            RTS     PC
3647
3648                                    ;-------------------------------------------------------------------------
3649                                    .SBTTL          ERROR HANDLER SUBROUTINE -- ERR10$ & ERR10.
3650                                    ;-------------------------------------------------------------------------
3651                                    ;       COMMON ERROR 10 ROUTINE TO IDENTIFY THE FAILING ADDRESS & DATA
3652
3653  012732                            ERR10$: PRINTX  #NEWLIN         ;WHEN CALLED FROM TEST, START A NEW LINE
3654  012732  012746  013124                                                    MOV     #NEWLIN,-(SP)
3655  012736  012746  000001                                                    MOV     #1,-(SP)
3656  012742  010600                                                            MOV     SP,R0
3657  012744  104415                                                            TRAP    C$PNTX
3658  012746  062706  000004                                                    ADD     #4,SP
3659  012752  005237  002300            ERR10.: INC     REGNUM          ;CONVERT INDEX TO ELEMENT #
3660  012756                                    PRINTX  #FMT09,REGNUM   ;IDENTIFY DATA PATTERN OFFSET
3661  012756  013746  002300                                                    MOV     REGNUM,-(SP)
3662  012762  012746  013621                                                    MOV     #FMT09,-(SP)
3663  012766  012746  000002                                                    MOV     #2,-(SP)
3664  012772  010600                                                            MOV     SP,R0
3665  012774  104415                                                            TRAP    C$PNTX
3666  012776  062706  000006                                                    ADD     #6,SP
3667  013002  004737  012162                    JSR     PC,XORGB
```

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

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

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

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

```
3701                                    .SBTTL  FORMAT SPEC'S FOR ERROR HANDLERS -- "FMT___"
3702                                    ;-------------------------------------------------------------------------
3703                                    ;------------ FORMAT SPEC'S USED BY ERROR HANDLERS -----------------------
3704                                    ;-----------------------------------------  ----------------------------------
3705                                    .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 B 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  / HEAD:      /
```

```
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
```

```
3719                                    .SBTTL INITIALIZE SECTION
3720
3721                                    ;////////////////////////////////////////////////////////////////
3722                                    ;/ THE INITIALIZE SECTION CONTAINS THE CODING THAT IS PERFORMED
3723                                    ;/ AT THE BEGINNING OF THE TEST SEQUENCE ON THE NEXT UNIT.
3724                                    ;////////////////////////////////////////////////////////////////
3725
3726  022020                                    BGNINIT
3727  022020                                                                          L$INIT::
3728
3729  022020  010637  002270                    MOV     SP,PSTACK       ;SAVE BASE-LEVEL STACK POINTER
3730                                    ;SEE IF PROGRAM JUST STARTED, BR IF YES
3731  022024                                    READEF  #EF.START
3732  022024  012700  000C40                                                         MOV     #EF.START,R0
3733  022030  104447                                                                 TRAP    C$REFG
3734  022032                                    BCOMPLETE       STARST
3735  022032  103417                                                                 BCS     STARST
3736                                    ;SEE IF PROGRAM JUST RESTARTED, BR IF YES
3737  022034                                    READEF  #EF.RESTART
3738  022034  012700  000037                                                         MOV     #EF.RESTART,R0
3739  022040  104447                                                                 TRAP    C$REFG
3740  022042                                    BCOMPLETE       RESTRT
3741  022042  103454                                                                 BCS     RESTRT
3742                                    ;SEE IF THIS IS A NEW PASS, BR IF YES
3743  022044                                    READEF  #EF.NEW
3744  022044  012700  000035                                                         MOV     #EF.NEW,R0
3745  022050  104447                                                                 TRAP    C$REFG
3746  022052                                    BCOMPLETE       NEWST
3747  022052  103454                                                                 BCS     NEWST
3748                                    ;SEE IF PROGRAM WAS JUST CONTINUED
3749  022054                                    READEF  #EF.CONTINUE
3750  022054  012700  000036                                                         MOV     #EF.CONTINUE,R0
3751  022060  104447                                                                 TRAP    C$REFG
3752  022062                                    BCOMPLETE       10$
3753  022062  103401                                                                 BCS     10$
3754  022064  000461                           BR      GETPRM
3755
3756  022066  000137  022456          10$:     JMP     CONTIN          ;(THIS IS TO FAR AWAY FOR A "BR" INSTRUCTION)
3757
3758                                          ;*** ENTER HERE IF "START" COMMAND ISSUED
3759
3760  022072  005037  002306          STARST: CLR     STARES          ;CLEAR FLAG TO SHOW JUST HAD STA OR RES
3761
3762                                  ; TEST FOR THE PRESENCE OR ABSENCE OF A CONSOLE TERMINAL.
3763
3764  022076  005037  002314                   CLR     CONSOL          ;RESET THE CONSOLE TERMINAL FLAG
3765  022102                                    SETVEC  #4,#CONTST,#0   ;SETUP BUS TIMEOUT VECTER TO TEST FOR A CONSOLE
3766  022102  012746  000000                                                         MOV     #0,-(SP)
3767  022106  012746  022556                                                         MOV     #CONTST,-(SP)
3768  022112  012746  000004                                                         MOV     #4,-(SP)
3769  022116  012746  000003                                                         MOV     #3,-(SP)
3770  022122  104437                                                                 TRAP    C$SVEC
3771  022124  062706  000010                                                         ADD     #10,SP
3772  022130  005737  177564                   TST     @#177564        ;TRY TO ACCESS THE CONSOLE TERMINAL'S "XCSR"
3773  022134                                    CLRVEC  #4              ;WE SHOULD BE THROUGH WITH THIS BY NOW
3774  022134  012700  000004                                                         MOV     #4,R0
```

```
3775  022140  104436                                                          TRAP    C$CVEC
3776
3777                          ;  AT THIS POINT, IF A CONSOLE TERMINAL IS PRESENT, "CONSOL" WILL BE ZERO.
3778                          ;  IF NO CONSOLE TERMINAL EXISTS (OR AT LEAST NOT AT THE STANDARD ADDRESS),
3779                          ;       "CONSOL" WILL BE NON-ZERO (-1).
3780
3781  022142  005737  002314          TST     CONSOL          ;IF CONSOLE TERMINAL ISN'T THERE,
3782  022146  001412                  BEQ     5$
3783  022150                          PRINTF  @CFMTO,@NPROTS  ;TELL THE OPERATOR WHAT TESTING WON'T BE DONE
3784  022150  012746  000004                                                  MOV     @NPROTS,-(SP)
3785  022154  012746  022566                                                  MOV     @CFMTO,-(SP)
3786  022160  012746  000002                                                  MOV     #2,-(SP)
3787  022164  010600                                                          MOV     SP,R0
3788  022166  104417                                                          TRAP    C$PNTF
3789  022170  062706  000006                                                  ADD     #6,SP
3790  022174                  5$:
3791                          ;*** ENTER HERE IF "RESTART" COMMAND ISSUED
3792
3793  022174  005037  002306  RESTRT: CLR     STARES          ;CLEAR FLAG TO SHOW JUST HAD STA OR RES
3794  022200  005037  002310          CLR     DEVMAP          ;CLEAR DEVICE MAP
3795
3796  022204                  NEWST:          ;ENTER HERE BEFORE EACH TEST
3797
3798  022204  012737  177777  002266          MOV     #-1,LOGDEV      ;RESET LOGICAL DEVICE TO -1
3799  022212  005237  002306                  INC     STARES          ;INC # OF PASSES SINCE STA OR RES
3800  022216  005237  002304                  INC     FRSPAS          ;INCREMENT NO. OF PASSES AFTER LOAD
3801  022222  012737  000001  002312          MOV     #BIT0,DEVPTR    ;INIT DEVICE MAP BIT POINTER
3802                  ; GET UNIBUS ADDRESS, VECTOR, PRIORITY LEVEL, SWITCH PACKS, TEST
3803                  ;   CONNECTOR INFORMATION FOR THIS LOGICAL DEVICE
3804  022230          GETPRM:
3805  022230  005237  002266          INC     LOGDEV          ;INCREMENT LOGICAL DEVICE NUMBER
3806  022234                  GPHARD  LOGDEV,R1       ;GET P-TABLE POINTER INTO R1
3807  022234  013700  002266                                                  MOV     LOGDEV,R0
3808  022240  104442                                                          TRAP    C$GPHRD
3809  022242  010001                                                          MOV     R0,R1
3810  022244                  BCOMPLETE  10$          ;BR IF DEVICE AVAILABLE
3811  022244  103403                                                          BCS     10$
3812  022246  006337  002312          ASL     DEVPTR          ;IF UN-AVAILABLE, SHIFT DEVICE MAP BIT POINTER
3813  022252  000766                  BR      GETPRM          ;       AND SKIP THIS DEVICE
3814
3815  022254  053737  002312  002310  10$:    BIS     DEVPTR,DEVMAP   ;ELSE, SET BIT FOR THIS DEVICE IN DEVICE MAP
3816  022262  006337  002312          ASL     DEVPTR          ;SHIFT DEVICE MAP BIT POINTER
3817
3818                  ;  "R1" WAS RETURNED WITH A POINTER TO THE CURRENT "P-TABLE"
3819
3820  022266  012100                  MOV     (R1)+,R0        ;GET THE DEVICE CSR ADDRESS
3821  022270  012703  000020          MOV     #16.,R3         ;WE HAVE TO SETUP THIS MANY ADDRESS POINTERS
3822  022274  012702  002320          MOV     #MPCSR,R2       ;THIS IS THE ADDRESS OF THE FIRST POINTER
3823  022300  010022          12$:    MOV     R0,(R2)+        ;SETUP ONE CSR POINTER
3824  022302  005200                  INC     R0              ;POINT TO THE NEXT CSR ADDRESS
3825  022304  077303                  SOB     R3,12$          ;LOOP AS LONG AS THERE ARE MORE TABLE ENTRIES
3826                                                          ;ELSE,  FALL THROUGH TO CONTINUE GETTING MORE
3827                                                          ;       P-TABLE DATA
3828
3829  022306  012100                  MOV     (R1)+,R0        ;GET INTERRUPT VECTOR
3830  022310  010037  002360          MOV     R0,MPIVEC       ;SETUP "A" VECTOR POINTER
```

```
3831  022314  022020                      CMP     (R0)+,(R0)+     ;ADD 4 TO VECTOR TO GET ADDRESS OF "B" VECTOR
3832  022316  010037  002362              MOV     R0,MPOVEC       ;SETUP "B" VECTOR POINTER
3833
3834  022322  012100                      MOV     (R1)+,R0        ;GET DMV11 DEVICE PRIORITY
3835  022324  006200                      ASR     R0              ;       RE-POSITION IT
3836  022326  006200                      ASR     R0
3837  022330  006200                      ASR     R0
3838  022332  006200                      ASR     R0
3839  022334  010037  002364              MOV     R0,MPRIOR       ;SETUP OUR VARIABLE FOR INT. VECTOR INIT'S
3840
3841  022340  022121                      CMP     (R1)+,(R1)+     ;SKIP OVER SWITCH #'S 1 & 2
3842  022342  012137  002366              MOV     (R1)+,BRDTYP    ;GET DMV-11 BOARD TYPE
3843  022346  022111                      CMP     (R1)+,(R1)      ;SKIP OVER CONNECTOR FLAG
3844
3845  022350  012100                      MOV     (R1)+,R0        ;GET CONTROL FLAGS
3846  022352  012703  000006              MOV     #6,R3           ;POSITION THEM PROPERLY IN THE WORD
3847  022356  006200              15$:    ASR     R0
3848  022360  077302                      SOB     R3,15$
3849  022362  010037  002370              MOV     R0,PT.CTL       ;PUT IT WHERE TESTS EXPECT TO FIND IT
3850
3851                              ;  TEST THE VARIOUS CONTROL FLAGS & REPORT NON-STANDARD ACTION RESULTING FROM
3852                              ;  THEIR SETTINGS
3853
3854  022366  023727  002306  000001        CMP     STARES,#1       ;FIRST PASS SINCE STA OR RES ??
3855  022374  001030                      BNE     40$             ; IF NO: SKIP POSSIBLE PRINTOUT
3856
3857  022376  032737  000001  002370        BIT     #PU24,PT.CTL    ;IF THE PROCESSOR ISN'T STRAPPED TO COME UP
3858  022404  001024                      BNE     40$             ;THROUGH INTERRUPT VECTOR 24 & 26,
3859  022406                              PRINTF  #CFMT2,#DCOKTS,#HLTEST ;TELL THE OPERATOR THAT NO DCOK TESTING
3860  022406  012746  000015                                                    MOV     #HLTEST,-(SP)
3861  022412  012746  000014                                                    MOV     #DCOKTS,-(SP)
3862  022416  012746  022655                                                    MOV     #CFMT2,-(SP)
3863  022422  012746  000003                                                    MOV     #3,-(SP)
3864  022426  010600                                                            MOV     SP,R0
3865  022430  104417                                                            TRAP    C$PNTF
3866  022432  062706  000010                                                    ADD     #10,SP
3867  022436                      PRINTF  #CFMT3          ;WILL BE DONE
3868  022436  012746  022735                                                    MOV     #CFMT3,-(SP)
3869  022442  012746  000001                                                    MOV     #1,-(SP)
3870  022446  010600                                                            MOV     SP,R0
3871  022450  104417                                                            TRAP    C$PNTF
3872  022452  062706  000004                                                    ADD     #4,SP
3873  022456                      40$:
3874
3875  022456                      CONTIN:         ;ENTER HERE WHEN A "CONTINUE" COMMAND IS ISSUED
3876
3877  022456                              SETVEC  #MPIVEC,#MPIHAN,#MPRIOR  ;SETUP "A" INT. VECTOR
3878  022456  013746  002364                                                    MOV     @#MPRIOR,-(SP)
3879  022462  012746  006066                                                    MOV     #MPIHAN,-(SP)
3880  022466  013746  002360                                                    MOV     @#MPIVEC,-(SP)
3881  022472  012746  000003                                                    MOV     #3,-(SP)
3882  022476  104437                                                            TRAP    C$SVEC
3883  022500  062706  000010                                                    ADD     #10,SP
3884  022504  005037  006136              CLR     IMILNK          ;WE DON'T WANT THE HANDLER TO LINK ELSEWHERE
3885  022510                              SETVEC  #MPOVEC,#MPOHAN,#MPRIOR  ;SETUP "B" INT  VECTOR
3886  022510  013746  002364                                                    MOV     @#MPRIOR,-(SP)
```

```
3887  022514  012746  006140                                                    MOV     @#POWAN,-(SP)
3888  022520  013746  002362                                                    MOV     @#POVEC,-(SP)
3889  022524  012746  000003                                                    MOV     #3,-(SP)
3890  022530  104437                                                           TRAP    C$SVEC
3891  022532  062706  000010                                                    ADD     #10,SP
3892  022536  005037  006210                CLR     IHOLNK          ;WE DON'T WANT THE HANDLER TO LINK ELSEWHERE
3893  022542  005037  002274                CLR     INTWCH          ;RESET "INTERRUPT WATCH" FLAGS (BOTH "A" & "B")
3894
3895  022546  012737  000001  002302        MOV     #1,FRSTIM       ;MARK FLAG FOR NEXT TIME THROUGH
3896  022554                                ENDINIT         ;END OF "INIT" CODE
3897  022554                                                          L10022:
3898  022554  104411                                                           TRAP    C$INIT
3899
3900                                ; ***** SUBROUTINES USED BY "INIT" CODE *****
3901
3902                                ;       INTERRUPT HANDLER FOR CONSOLE TERMINAL PRESENCE TESTING
3903
3904  022556  012737  177777  002314  CONTST: MOV     #-1,CONSOL      ;INDICATE THAT NO CONSOLE TERMINAL EXISTS!
3905  022564  000002                        RTI                     ;RETURN
3906
3907                                ;       FORMATS FOR FORCED MESSAGES
3908                                .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
3909          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.
                        ;
                        ;-*************************************************************************

                                BGNAUTO
                                                                                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
                                CLR     TMP0            ;INITIALIZE TRAP FLAG REGISTER
                                MOV     #1,R2           ;FLAG BIT
                                MOV     BSEL0,R3        ;INIT ADDRESS POINTER

                        1$:     TSTB    (R3)+           ;ACCESS THE CSR'S BY BYTES.
                                ASL     R2
                                BCC     1$

                                MOV     BSEL0,R3        ;RE-INIT ADDRESS POINTER
                                MOV     #1,R2           ;RE-INIT FLAG BIT
                        2$:     TST     (R3)+           ;ACCESS THE CSR'S BY WORDS.
                                ASL     R2
                                ASL     R2
                                BCC     2$

                                CLRVEC  #4              ;RESTORE THE VECTOR TO DS
                                                                                MOV     #4,R0
                                                                                TRAP    C$CVEC
                                TST     TMP0            ;DID WE GET HIT WITH AN INVALID ADDRESS TRAP?
                                BEQ     AD.OK           ;NO.  EXIT TEST
                                DODU    LOGDEV          ;YES, DROP THIS LOGICAL DEV.
                                                                                MOV     LOGDEV,R0
                                                                                TRAP    C$DODU
```

```
 3960  023126  000240                  AD.OK:  NOP                     ;(FOR PATCHING IN A HALT IF NECESSARY)
 3961
 3962  023130                          ENDAUTO
 3963  023130                                                                  L10023:
 3964  023130  104461                                                                 TRAP    C$AUTO
 3965
 3966  023132  050237  002412          AD.HIT: BIS     R2,TMP0         ;FLAG THE HIT IF WE GET IT!
 3967  023136  000002                          RTI                     ;RETURN
 3968
```

```
                                .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
                                                                        L$AU::
                                ENDAU
                                                                        L10026:
023162  104452                                                                TRAP    C$AU
```

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

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

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

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

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

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

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

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

```
4127
4128                                    ;-------------------------------------------------------------------------
4129
4130  023332  004537  003616                JSR     R5,READ         ;READ THE LOW COUNTER
4131  023336  120010                        T2CL
4132  023340  002432                        TMP8
4133  023342  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
4134  023344                                ERROR                   ;ELSE, REPORT IT
4135  023344  104460                                                                       TRAP    C$ERROR
4136  023346                                ESCAPE  TST             ;       AND EXIT THIS TEST
4137  023346  104410                                                                       TRAP    C$ESCAPE
4138  023350  000530                                                                       .WORD   L10027-.
4139  023352  123737  002432  023330        CMPB    TMP8,7$         ;MAKE SURE THE COUNTER IS DECREMENTING
4140  023360  001004                        BNE     12$             ;IT IS, NOW SEE IF THE HIGH COUNTER IS TOO
4141  023362                                GEDF    EM500,ERR51     ;IT WASN'T -- REPORT THE ERROR
4142                                                                ;       "DEVICE FATAL" ERROR # 11
4143  023362  104455                                                                       TRAP    C$ERDF
4144  023364  000013                                                                       .WORD   11
4145  023366  017453                                                                       .WORD   EM500
4146  023370  011176                                                                       .WORD   ERR51
4147  023372  012703  000100        12$:    MOV     #100,R3         ;INIT. TIMEOUT VALUE
4148  023376  004537  003616        13$:    JSR     R5,READ         ;READ THE HIGH COUNTER
4149  023402  120011                        T2CH
4150  023404  002434                        TMP9
4151  023406  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
4152  023410                                ERROR                   ;ELSE, REPORT IT
4153  023410  104460                                                                       TRAP    C$ERROR
4154  023412                                ESCAPE  TST             ;       AND EXIT THIS TEST
4155  023412  104410                                                                       TRAP    C$ESCAPE
4156  023414  000464                                                                       .WORD   L10027-.
4157  023416  123737  002434  023331        CMPB    TMP9,8$         ;DID IT CHANGE FROM THE LOADED VALUE?
4158  023424  001007                        BNE     14$             ;YES, PROCEED WITH TESTING
4159  023426  077315                        SOB     R3,13$          ;NO.  IF NO TIMEOUT, TRY AGAIN
4160  023430                                GEDF    EM51E,ERR51     ;ELSE, REPORT THAT HIGH COUNTER ISN'T RUNNING
4161                                                                ;       "DEVICE FATAL" ERROR # 12
4162  023430  104455                                                                       TRAP    C$ERDF
4163  023432  000014                                                                       .WORD   12
4164  023434  021050                                                                       .WORD   EM51E
4165  023436  011176                                                                       .WORD   ERR51
4166  023440                                ESCAPE  SUB             ;       WE CAN'T PROCEED WITH TESTING EITHER
4167  023440  104410                                                                       TRAP    C$ESCAPE
4168  023442  000434                                                                       .WORD   L10030-.
4169                                  ;-------------------------------------------------------------------------
4170
4171  023444  005003                14$:    CLR     R3              ;INITIALIZE TIMEOUT COUNTER
4172  023446  004737  024134        15$:    JSR     PC,GETT2        ;WAIT FOR TIMER TO COUNT DOWN
4173  023452  102002                        BVC     .+6             ;IF NO ERROR, PROCEED
4174  023454                                ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4175  023454  104410                                                                       TRAP    C$ESCAPE
4176  023456  000420                                                                       .WORD   L10030-.
4177  023460  103406                        BCS     16$             ;DONE.
4178  023462  077307                        SOB     R3,15$          ;NOT YET, TIMEOUT?
4179  023464                                GEDF    EM51P,ERR51     ;YES, REPORT NO "T2" INT. FLAG
4180                                                                ;       "DEVICE FATAL" ERROR # 13
4181  023464  104455                                                                       TRAP    C$ERDF
4182  023466  000015                                                                       .WORD   13
```

```
4183  023470  021405                                                          .WORD   EM51P
4184  023472  011176                                                          .WORD   ERR51
4185  023474  000445                  BR      17$             ;     & BYPASS "T2"-RESET-ON-T2CH-READ CHECK
4186
4187                          ;-----------------------------------------------------------------------
4188
4189  023476  004537  003616  16$:    JSR     R5,READ         ;READ T2C-H (ADDR 09)
4190  023502  120011                  T2CH
4191  023504  002434                  TMP9
4192  023506  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
4193  023510                          ERROR                   ;ELSE, REPORT IT
4194  023510  104460                                                          TRAP    C$ERROR
4195  023512                          ESCAPE  TST             ;       AND EXIT THIS TEST
4196  023512  104410                                                          TRAP    C$ESCAPE
4197  023514  000364                                                          .WORD   L10027-.
4198  023516  004737  024134          JSR     PC,GETT2        ;IS "T2" STILL SET?
4199  023522  102002                  BVC     .+6             ;IF NO ERROR, PROCEED
4200  023524                          ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4201  023524  104410                                                          TRAP    C$ESCAPE
4202  023526  000350                                                          .WORD   L10030-.
4203  023530  103405                  BCS     40$             ;YES, ALL'S OK
4204  023532                          GEDF    EM51G,ERR51     ;NO!  BAD VIA CHIP!
4205                                                          ;       "DEVICE FATAL" ERROR # 14
4206  023532  104455                                                          TRAP    C$ERDF
4207  023534  000016                                                          .WORD   14
4208  023536  021151                                                          .WORD   EM51G
4209  023540  011176                                                          .WORD   ERR51
4210  023542  000422                  BR      17$             ;   & BYPASS "T2"-RESET-ON-T2LL-WRITE CHECK
4211
4212                          ;-----------------------------------------------------------------------
4213
4214  023544  004537  004042  40$:    JSR     R5,WRITE        ;RE-LOAD T2L-L (ADDR 08)
4215  023550  120010                  T2LL
4216  023552  002433                  TMP8+1
4217  023554  103003                  BCC     .+10            ;IF NO ERROR  PROCEED
4218  023556                          ERROR                   ;ELSE, REPOR; IT
4219  023556  104460                                                          TRAP    C$ERROR
4220  023560                          ESCAPE  TST             ;       AND EXIT THIS TEST
4221  023560  104410                                                          TRAP    C$ESCAPE
4222  023562  000316                                                          .WORD   L10027-.
4223  023564  004737  024134          JSR     PC,GETT2        ;IS "T2" STILL SET?
4224  023570  102002                  BVC     .+6             ;IF NO ERROR, PROCEED
4225  023572                          ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4226  023572  104410                                                          TRAP    C$ESCAPE
4227  023574  000302                                                          .WORD   L10030-.
4228  023576  103404                  BCS     17$             ;YES, ALL'S STILL OK
4229  023600                          GEDF    EM51M,ERR51     ;NO!  SOMETHING WENT WRONG!  REPORT IT
4230                                                          ;       "DEVICE FATAL" ERROR # 15
4231  023600  104455                                                          TRAP    C$ERDF
4232  023602  000017                                                          .WORD   15
4233  023604  021275                                                          .WORD   EM51M
4234  023606  011176                                                          .WORD   ERR51
4235
4236                          ;-----------------------------------------------------------------------
4237
4238  023610  004537  024102  17$:    JSR     R5,LODT2C       ;RE-LOAD TIMER # 2 WITH A VALUE WHICH CAUSE AN
```

```
4239  023614  001                 18$:    .BYTE   1               ;ALMOST IMMEDIATE TIMEOUT
4240  023615  000                 19$:    .BYTE   0               ; (ADDRESS OF HIGH BYTE FOR T2C-H (ADDR 09))
4241                                ;-------------------------------------------------------------------------
4242
4243  023616  004737  024134            JSR     PC,GETT2        ;WAS "T2" SET BY THE ABOVE OPERATION?
4244  023622  102002                    BVC     .+6             ;IF NO ERROR, PROCEED
4245  023624                            ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4246  023624  104410                                                            TRAP    C$ESCAPE
4247  023626  000250                                                            .WORD   L10030-.
4248  023630  103406                    BCS     20$             ;YES, OK -- CONTINUE ERROR CHECKING
4249  023632                            GEDF    EM51F,ERR51     ;NO,  BAD NEWS!  REPORT THE FAILURE
4250                                                            ;       "DEVICE FATAL" ERROR # 16
4251  023632  104455                                                            TRAP    C$ERDF
4252  023634  000020                                                            .WORD   16
4253  023636  021104                                                            .WORD   EM51F
4254  023640  011176                                                            .WORD   ERR51
4255  023642                            ESCAPE  SUB             ;  AND GET OUT OF SUBTEST
4256  023642  104410                                                            TRAP    C$ESCAPE
4257  023644  000232                                                            .WORD   L10030-.
4258  023646  004537  003616      20$:    JSR     R5,READ         ;READ T2C-H (ADDR 09) TO SEE IF THIS CLEARS "T2"
4259  023652  120011                    T2CH                    ;(THIS VALUE ISN'T CHECKED BECAUSE IT CAN BE
4260  023654  002434                    TMP9                    ; ALMOST ANYTHING)
4261  023656  103003                    BCC     .+10            ;IF NO ERROR, PROCEED
4262  023660                            ERROR                   ;ELSE, REPORT IT
4263  023660  104460                                                            TRAP    C$ERROR
4264  023662                            ESCAPE  TST             ;       AND EXIT THIS TEST
4265  023662  104410                                                            TRAP    C$ESCAPE
4266  023664  000214                                                            .WORD   L10027-.
4267  023666  004737  024134            JSR     PC,GETT2        ;PUT THE CURRENT "T2" VALUE INTO THE CARRY BIT
4268  023672  102002                    BVC     .+6             ;IF NO ERROR, PROCEED
4269  023674                            ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4270  023674  104410                                                            TRAP    C$ESCAPE
4271  023676  000200                                                            .WORD   L10030-.
4272  023700  103405                    BCS     21$             ;IF SET, READING T2CH DIDN'T CLEAR IT -- OK!
4273  023702                            GEDF    EM50G,ERR51     ;IF CLEARED!  BAD VIA CHIP!
4274                                                            ;       "DEVICE FATAL" ERROR # 17
4275  023702  104455                                                            TRAP    C$ERDF
4276  023704  000021                                                            .WORD   17
4277  023706  017610                                                            .WORD   EM50G
4278  023710  011176                                                            .WORD   ERR51
4279  023712  000400                    BR      28$             ;BYPASS THE REST OF THIS SECTION OF TESTING
4280
4281  023714                      21$:
4282                                ;-------------------------------------------------------------------------
4283
4284  023714  004537  003616      28$:    JSR     R5,READ         ;READ T2C-L (ADDR 08)
4285  023720  120010                    T2CL                    ;(THIS VALUE ISN'T CHECKED BECAUSE IT CAN BE
4286  023722  002432                    TMP8                    ; ALMOST ANYTHING)
4287  023724  103003                    BCC     .+10            ;IF NO ERROR, PROCEED
4288  023726                            ERROR                   ;ELSE, REPORT IT
4289  023726  104460                                                            TRAP    C$ERROR
4290  023730                            ESCAPE  TST             ;       AND EXIT THIS TEST
4291  023730  104410                                                            TRAP    C$ESCAPE
4292  023732  000146                                                            .WORD   L10027-.
4293  023734  004737  024134            JSR     PC,GETT2        ;IS "T2" CLEARED NOW
4294  023740  102002                    BVC     .+6             ;IF NO ERROR, PROCEED
```

```
4295  023742                                ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4296  023742  104410                                                                TRAP    C$ESCAPE
4297  023744  000132                                                                .WORD   L10030-.
4298  023746  103004                        BCC     29$             ;YES, ALL'S OK
4299  023750                                GEDF    EM51C,ERR51     ;NO!  BAD VIA CHIP!
4300                                                                ;       "DEVICE FATAL" ERROR # 18
4301  023750  104455                                                                TRAP    C$ERDF
4302  023752  000022                                                                .WORD   18
4303  023754  021002                                                                .WORD   EM51C
4304  023756  011176                                                                .WORD   ERR51
4305
4306                                  ;-------------------------------------------------------------------------
4307
4308  023760  004537  004042        29$:    JSR     R5,WRITE        ;RE-WRITE INTO T2C-H (ADDR 09) TO SET T2 AGAIN
4309  023764  120011                        T2CH
4310  023766  002435                        TMP9+1
4311  023770  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
4312  023772                                ERROR                   ;ELSE, REPORT IT
4313  023772  104460                                                                TRAP    C$ERROR
4314  023774                                ESCAPE  TST             ;       AND EXIT THIS TEST
4315  023774  104410                                                                TRAP    C$ESCAPE
4316  023776  000102                                                                .WORD   L10027-.
4317  024000  004737  024134                JSR     PC,GETT2        ;IS "T2" SET AGAIN
4318  024004  102002                        BVC     .+6             ;IF NO ERROR, PROCEED
4319  024006                                ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4320  024006  104410                                                                TRAP    C$ESCAPE
4321  024010  000066                                                                .WORD   L10030-.
4322  024012  103406                        BCS     32$             ;YES, ALL'S WELL (AGAIN?)
4323  024014                                GEDF    EM51L,ERR51     ;NO!  SOMETHING WENT WRONG!  REPORT IT
4324                                                                ;       "DEVICE FATAL" ERROR # 19
4325  024014  104455                                                                TRAP    C$ERDF
4326  024016  000023                                                                .WORD   19
4327  024020  021213                                                                .WORD   EM51L
4328  024022  011176                                                                .WORD   ERR51
4329  024024                                ESCAPE  SUB             ;       AND EXIT FROM THIS SUBTEST
4330  024024  104410                                                                TRAP    C$ESCAPE
4331  024026  000050                                                                .WORD   L10030-.
4332
4333                                  ;-------------------------------------------------------------------------
4334
4335  024030  004537  024102        32$:    JSR     R5,LODT2C       ;AGAIN RE-LOAD TIMER # 2.  THIS TIME WITH
4336  024034     125     125                .BYTE   125,125         ;  LARGER BUT DIFFERENT VALUES
4337
4338                                  ;-------------------------------------------------------------------------
4339
4340  024036  004737  024134                JSR     PC,GETT2        ;"T2" SHOULD NOW BE CLEARED
4341  024042  102002                        BVC     .+6             ;IF NO ERROR, PROCEED
4342  024044                                ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4343  024044  104410                                                                TRAP    C$ESCAPE
4344  024046  000030                                                                .WORD   L10030-.
4345  024050  103004                        BCC     34$             ;IT WAS, ALL'S WELL THAT END'S WELL (I THINK!?)
4346  024052                                GEDF    EM51N,ERR51     ;IT WASN'T!  SOMETHING WENT WRONG!  REPORT IT
4347                                                                ;       "DEVICE FATAL" ERROR # 20
4348  024052  104455                                                                TRAP    C$ERDF
4349  024054  000024                                                                .WORD   20
4350  024056  021337                                                                .WORD   EM51N
```

```
4351  024060  011176                                                          .WORD   ERR51
4352
4353  024062  004537  004630        34$:    JSR     R5,INITT2       ;RE-INITIALIZE TIMER # 1 W/ NORMAL RESET VALUES
4354  024066  000000                        0
4355  024070  000000                        0
4356  024072  103001                        BCC     .+4             ;IF NO ERROR, EXIT
4357  024074                                ERROR                   ;ELSE, REPORT IT
4358  024074  104460                                                        TRAP    C$ERROR
4359
4360  024076                                ENDSUB
4361  024076                                                        L10030:
4362  024076  104403                                                       TRAP    C$ESUB
4363
4364  024100                                ENDTST
4365  024100                                                        L10027:
4366  024100  104401                                                       TRAP    C$ETST
4367
4368                                ;-------------------------------------------------------------------
4369                                ; LODT2C -- LOAD TIMER TWO AT ADDRESSES 08 & 09
4370                                ;
4371                                ; CALLING SEQUENCE:
4372                                ;
4373                                ;       JSR     R5,LODT2C
4374                                ;       .BYTE   <VALUE FOR T2L-L (ADDRESS 08)>
4375                                ;       .BYTE   <VALUE FOR T2C-H (ADDRESS 09)>
4376                                ;       <NEXT SEQUENCIAL INSTRUCTION
4377                                ;
4378                                ;-------------------------------------------------------------------
4379
4380  024102  112537  002433       LODT2C: MOVB    (R5)+,TMP8+1    ;SETUP TO LOAD T2LL
4381  024106  112537  002435               MOVB    (R5)+,TMP9+1    ;  AND T2CH
4382  024112  004537  004042               JSR     R5,WRITE        ;LOAD T2L-L (ADDR 08) WITH PASSED PARAMETER
4383  024116  120010                       T2LL
4384  024120  002433                       TMP8+1
4385  024122  004537  004042               JSR     R5,WRITE        ;LOAD T2C-H (ADDR 09) WITH PASSED PARAMETER
4386  024126  120011                       T2CH                    ;  (THIS WILL ALSO RESET "T2" & THE COUNTER)
4387  024130  002435                       TMP9+1
4388  024132  000205                       RTS     R5
4389
4390                                ;-------------------------------------------------------------------
4391                                ; GETT2 -- GET THE "T2" FLAG FROM THE VIA'S IFR REGISTER AND PUT IT
4392                                ;          INTO THE "CARRY" BIT
4393                                ;
4394                                ;-------------------------------------------------------------------
4395
4396  024134  004537  003616       GETT2:  JSR     R5,READ         ;GET VIA'S IFR REG.
4397  024140  120015                       IFR
4398  024142  002444                       TMPD
4399  024144  103003                       BCC     1$              ;IF NO ERROR, PROCEED
4400  024146                                ERROR                   ;ELSE, REPORT IT
4401  024146  104460                                                        TRAP    C$ERROR
4402  024150  000262                       SEV                     ;FLAG AN ERROR TO MAINLINE ROUTINE
4403  024152  000207                       RTS     PC              ;  AND TAKE AN ABNORMAL RETURN
4404
4405  024154  010046               1$:     MOV     R0,-(SP)        ;PRESERVE R0
4406  024156  113700  002444               MOVB    TMPD,R0         ;PUT VALUE HERE TO PRESERVE TMPD
```

```
 4407  024162  106100                    ROLB    R0              ;"IRQ" GOES INTO CARRY BIT
 4408  024164  106100                    ROLB    R0              ;"T1" GOES INTO CARRY BIT
 4409  024166  106100                    ROLB    R0              ;"T2" GOES INTO CARRY BIT
 4410  024170  012600                    MOV     (SP)+,R0        ;RESTORE R0
 4411  024172  000207                    RTS     PC
 4412
```

```
                                .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
                                                                                        T2::
024174
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  105037  002437        1$:     CLRB    TMPA+1          ;CLEAR THE "WRITE" DATA FOR ERROR MESSAGES
024214  005037  002252                CLR     TDATA           ;THIS IS A FLAG TO INDICATE THAT "SR" HASN'T
                                                              ;BEEN LOADED YET.
024220  004537  003616                JSR     R5,READ         ;GET CURRENT "ACR" CONTENTS (SHOULD BE 000)
024224  120013                        ACR
024226  002440                        TMPB
024230  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
024232                                ERROR                   ;ELSE, REPORT IT
024232  104460                                                                TRAP    C$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-.
```

```
4469  024314  004737  025022              JSR     PC,GETSR        ;SAMPLE SR INTERRUPT FLAG -- IT SHOULD BE 0
4470  024320  102002                      BVC     .+6             ;IF NO ERROR, PROCEED
4471  024322                      ESCAPE  TST                     ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4472  024322  104410                                                      TRAP    C$ESCAPE
4473  024324  000474                                                      .WORD   L10031-.
4474  024326  103014                      BCC     4$              ;IT IS, GOOD.
4475  024330  004537  003616              JSR     R5,READ         ;READ SR FOR ERROR MESSAGE
4476  024334  120012                      SR
4477  024336  002436                      TMPA
4478  024340  103003                      BCC     .+10            ;IF NO ERROR, PROCEED
4479  024342                              ERROR                   ;ELSE, REPORT IT
4480  024342  104460                                                      TRAP    C$ERROR
4481  024344                      ESCAPE  TST                     ;       AND EXIT THIS TEST
4482  024344  104410                                                      TRAP    C$ESCAPE
4483  024346  000452                                                      .WORD   L10031-.
4484  024350                              GEDF    EM52A,ERR52     ;IT ISN'T!  REPORT SR NOT INITIALLY CLEARED
4485                                                              ;       "DEVICE FATAL" ERROR # 21
4486  024350  104455                                                      TRAP    C$EROF
4487  024352  000025                                                      .WORD   21
4488  024354  021457                                                      .WORD   EM52A
4489  024356  011270                                                      .WORD   ERR52
4490  024360  152737  000010  002441  4$:     BISB    #BIT3,TMPB+1    ;SET SHIFT REG. TO MODE 2
4491  024366  004537  004042              JSR     R5,WRITE
4492  024372  120013                      ACR
4493  024374  002441                      TMPB+1
4494  024376  103003                      BCC     .+10            ;IF NO ERROR, PROCEED
4495  024400                              ERROR                   ;ELSE, REPORT IT
4496  024400  104460                                                      TRAP    C$ERROR
4497  024402                      ESCAPE  TST                     ;       AND EXIT THIS TEST
4498  024402  104410                                                      TRAP    C$ESCAPE
4499  024404  000414                                                      .WORD   L10031-.
4500  024406  112737  000204  002447      MOVB    #BIT7+BIT2,TMPE+1  ;ENABLE SR INTERRUPTS WITHIN DMV-11
4501  024414  004537  004042              JSR     R5,WRITE        ;  (WE WILL NOT BE ALLOWING THEM TO GIVE US
4502  024420  120016                      IENR                    ;   A Q-BUS INTERRUPT)
4503  024422  002447                      TMPE+1
4504  024424  103003                      BCC     .+10            ;IF NO ERROR, PROCEED
4505  024426                              ERROR                   ;ELSE, REPORT IT
4506  024426  104460                                                      TRAP    C$ERROR
4507  024430                      ESCAPE  TST                     ;       AND EXIT THIS TEST
4508  024430  104410                                                      TRAP    C$ESCAPE
4509  024432  000366                                                      .WORD   L10031-.
4510  024434  004537  003616              JSR     R5,READ         ;READ IER INCASE IT'S NEEDED FOR ERROR MESSAGES
4511  024440  120016                      IENR
4512  024442  002446                      TMPE
4513  024444  103003                      BCC     .+10            ;IF NO ERROR, PROCEED
4514  024446                              ERROR                   ;ELSE, REPORT IT
4515  024446  104460                                                      TRAP    C$ERROR
4516  024450                      ESCAPE  TST                     ;       AND EXIT THIS TEST
4517  024450  104410                                                      TRAP    C$ESCAPE
4518  024452  000346                                                      .WORD   L10031-.
4519  024454  105037  002437              CLRB    TMPA+1          ;LOAD SR WITH PROPER VALUE....
4520  024460  005737  002366              TST     BRDTYP          ;  NOTE: THE INPUT LEAD (CB2) WILL EITHER BE
4521  024464  001403                      BEQ     5$              ;       TIED HI(M8064) OR LO(M8053).
4522  024466  112737  000377  002437      MOVB    #377,TMPA+1     ; IF M8064, THEN LOAD SR WITH 000.
4523  024474  004537  004042          5$: JSR     R5,WRITE        ; IF M8053, THEN LOAD SR WITH 377.
4524  024500  120012                      SR                      ;  THIS ALSO STARTS THE SHIFTING OPERATION.
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```
4525  024502  002437                          TMPA+1                  ;
4526
4527  024504  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
4528  024506                                  ERROR                   ;ELSE, REPORT IT
4529  024506  104460                                                          TRAP    C$ERROR
4530  024510                                  ESCAPE  TST             ;       AND EXIT THIS TEST
4531  024510  104410                                                          TRAP    C$ESCAPE
4532  024512  000306                                                          .WORD   L10031-.
4533
4534  024514  005337  002252                  DEC     TDATA           ;INDICATE THAT "SR" HAS BEEN LOADED NOW
4535  024520  012703  001000                  MOV     #512.,R3        ;GIVE THE INTERRUPT A CHANCE TO HAPPEN
4536  024524  077301                          SOB     R3,.
4537  024526  132777  000004  155572          BITB    #BIT2,@#SEL3    ;DID AN SR INTERRUPT OCCUR WITHIN THE 6502?
4538  024534  001026                          BNE     6$              ;YES, GOOD.
4539  024536  004537  003616                  JSR     R5,READ         ;NO,  SETUP TO REPORT THE ERROR:
4540  024542  120015                          IFR                     ;  GET INTERRUPT FLAG REGISTER
4541  024544  002444                          TMPD
4542  024546  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
4543  024550                                  ERROR                   ;ELSE, REPORT IT
4544  024550  104460                                                          TRAP    C$ERROR
4545  024552                                  ESCAPE  TST             ;       AND EXIT THIS TEST
4546  024552  104410                                                          TRAP    C$ESCAPE
4547  024554  000244                                                          .WORD   L10031-.
4548  024556  004537  003616                  JSR     R5,READ         ;  GET FINAL SR CONTENTS -- SHOULD BE 0
4549  024562  120012                          SR
4550  024564  002436                          TMPA
4551  024566  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
4552  024570                                  ERROR                   ;ELSE, REPORT IT
4553  024570  104460                                                          TRAP    C$ERROR
4554  024572                                  ESCAPE  TST             ;       AND EXIT THIS TEST
4555  024572  104410                                                          TRAP    C$ESCAPE
4556  024574  000224                                                          .WORD   L10031-.
4557  024576                                  GEDF    EM528,ERR52     ;REPORT MISSING SR INTERRUPT WITHIN DMV-11
4558                                                                  ;       "DEVICE FATAL" ERROR # 22
4559  024576  104455                                                          TRAP    C$ERDF
4560  024600  000026                                                          .WORD   22
4561  024602  021535                                                          .WORD   EM528
4562  024604  011270                                                          .WORD   ERR52
4563  024606                                  ESCAPE  TST             ;FURTHER TESTING INVALID
4564  024606  104410                                                          TRAP    C$ESCAPE
4565  024610  000210                                                          .WORD   L10031-.
4566  024612  004537  003616          6$:     JSR     R5,READ         ;GET FINAL SR CONTENTS:
4567  024616  120012                          SR                      ; IF M8064, THEN SR SHOULD=377
4568  024620  002436                          TMPA                    ; IF M8053, THEN SR SHOULD=000
4569  024622  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
4570  024624                                  ERROR                   ;ELSE, REPORT IT
4571  024624  104460                                                          TRAP    C$ERROR
4572  024626                                  ESCAPE  TST             ;       AND EXIT THIS TEST
4573  024626  104410                                                          TRAP    C$ESCAPE
4574  024630  000170                                                          .WORD   L10031-.
4575
4576  024632  005737  002366                  TST     BRDTYP          ;CHECK DMV-11 BOARD TYPE
4577  024636  001005                          BNE     9$              ;
4578  024640  122737  000377  002436          CMPB    #377,TMPA       ;M8064::SEE IF CORRECT RESULT
4579  024646  001422                          BEQ     8$              ;       YES:GOOD
4580  024650  000403                          BR      7$              ;       NO: GO REPORT ERROR
```

```
4581  024652  105737  002436          9$:     TSTB    TMPA            ;M8053::SEE IF CORRECT RESULT
4582  024656  001416                          BEQ     8$              ;       YES:GOOD.
4583  024660  004537  003616          7$:     JSR     R5,READ         ; NO: SETUP TO REPORT THE ERROR:
4584  024664  120015                          IFR                     ;  GET INTERRUPT FLAG REGISTER
4585  024666  002444                          TMPD
4586  024670  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
4587  024672                                  ERROR                   ;ELSE, REPORT IT
4588  024672  104460                                                                  TRAP    C$ERROR
4589  024674                                  ESCAPE  TST             ;       AND EXIT THIS TEST
4590  024674  104410                                                                  TRAP    C$ESCAPE
4591  024676  000122                                                                  .WORD   L10031-.
4592  024700                                  GEDF    EM52C,ERR52     ;REPORT INCOMPLETE OR BAD SHIFTING OPERATION
4593                                                                  ;       "DEVICE FATAL" ERROR # 23
4594  024700  104455                                                                  TRAP    C$ERDF
4595  024702  000027                                                                  .WORD   23
4596  024704  021567                                                                  .WORD   EM52C
4597  024706  011270                                                                  .WORD   ERR52
4598  024710                                  ESCAPE  TST             ;FURTHER TESTING INVALID
4599  024710  104410                                                                  TRAP    C$ESCAPE
4600  024712  000106                                                                  .WORD   L10031-.
4601  024714  105077  155406          8$:     CLRB    @BSEL3          ;CLEAR THE INTERRUPT FLAGS
4602  024720  004537  003616                  JSR     R5,READ         ;HIT THE SHIFT REG. THIS TIME WITH A READ
4603  024724  120012                          SR                      ; (WE DON'T REALLY CARE THIS TIME WHAT THE DATA
4604  024726  002436                          TMPA                    ;  RETURNED IS. BUT, WE HAVE TO PUT IT SOMEWHERE
4605  024730  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
4606  024732                                  ERROR                   ;ELSE, REPORT IT
4607  024732  104460                                                                  TRAP    C$ERROR
4608  024734                                  ESCAPE  TST             ;       AND EXIT THIS TEST
4609  024734  104410                                                                  TRAP    C$ESCAPE
4610  024736  000062                                                                  .WORD   L10031-.
4611  024740  004737  005132                  JSR     PC,STALL        ;DELAY FOR A LITTLE WHILE TO LET THE INTERRUPT
4612  024744  004737  005132                  JSR     PC,STALL        ;  GET THROUGH
4613  024750  004737  005132                  JSR     PC,STALL
4614  024754  132777  000004  155344        BITB    #BIT2,@BSEL3    ;DID WE GET AN INTERRUPT ON THE READ OPERATION?
4615  024762  001016                          BNE     10$             ;YES, GOOD.
4616  024764  004537  003616                  JSR     R5,READ         ;NO,  SETUP TO REPORT THE ERROR:
4617  024770  120015                          IFR                     ;  GET INTERRUPT FLAG REGISTER
4618  024772  002444                          TMPD
4619  024774  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
4620  024776                                  ERROR                   ;ELSE, REPORT IT
4621  024776  104460                                                                  TRAP    C$ERROR
4622  025000                                  ESCAPE  TST             ;       AND EXIT THIS TEST
4623  025000  104410                                                                  TRAP    C$ESCAPE
4624  025002  000016                                                                  .WORD   L10031-.
4625  025004                                  GEDF    EM52D,ERR52     ;REPORT THE FAILURE.
4626                                                                  ;       "DEVICE FATAL" ERROR # 24
4627  025004  104455                                                                  TRAP    C$ERDF
4628  025006  000030                                                                  .WORD   24
4629  025010  021653                                                                  .WORD   EM52D
4630  025012  011270                                                                  .WORD   ERR52
4631  025014                                  ESCAPE  TST
4632  025014  104410                                                                  TRAP    C$ESCAPE
4633  025016  000002                                                                  .WORD   L10031-.
4634  025020                          10$:
4635  025020                                  ENDTST
4636  025020                                                          L10031:
```

```
 4637  025020  104401                                                          TRAP    C$ETST
 4638  025022  004537  003616        GETSR:  JSR     R5,READ
 4639  025026  120015                        IFR                     ;GET CURRENT INTERRUPT FLAG REGISTER SETTINGS
 4640  025030  002444                        TMPD
 4641  025032  103003                        BCC     1$              ;IF NO ERROR, PROCEED
 4642  025034                                ERROR                   ;ELSE, REPORT IT
 4643  025034  104460                                                          TRAP    C$ERROR
 4644  025036  000262                        SEV                     ;FLAG AN ERROR TO MAINLINE ROUTINE
 4645  025040  000207                        RTS     PC              ;  AND TAKE AN ABNORMAL RETURN
 4646
 4647  025042  010046                1$:     MOV     R0,-(SP)        ;SAVE REGISTER FOR CALLER
 4648  025044  113700  002444               MOVB    TMPD,R0         ;PUT THEM WHERE WE CAN EASILY MASAGE THEM
 4649  025050  106000                        RORB    R0              ;CA2 ---> CARRY BIT
 4650  025052  106000                        RORB    R0              ;CA1 ---> CARRY BIT
 4651  025054  106000                        RORB    R0              ;SR ---> CARRY BIT
 4652  025056  012600                        MOV     (SP)+,R0        ;RESTORE REGISTER
 4653  025060  000207                        RTS     PC              ;RETURN WITH SR INTERRUPT FLAG IN CARRY BIT
 4654
```

```
                                .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
```

```
 4711  025174                          GEDF    EM26,ERR8       ;NPR ERROR -- BAD INITIALIZATION
 4712                                                          ;       "DEVICE FATAL" ERROR # 25
 4713  025174  104455                                                  TRAP    C$ERDF
 4714  025176  000031                                                  .WORD   25
 4715  025200  016152                                                  .WORD   EM26
 4716  025202  006532                                                  .WORD   ERR8
 4717  025204                          ESCAPE  TST             ;IF IT CAN'T BE INIT'ED, WE CAN'T TEST IT!
 4718  025204  104410                                                  TRAP    C$ESCAPE
 4719  025206  000240                                                  .WORD   L10032-.
 4720  025210  004537  004054    4$:   JSR     R5,WRITEI       ;WRITE THE TEST PATTERN INTO THE CONTROL REG.
 4721  025214  123004                  NPRCTL
 4722  025216  000355              5$:   355                     ;THIS SET SEVERAL BITS -- BUT NOT ALL!
 4723  025220  103002                  BCC     31$             ;IF AN ERROR OCCURED,
 4724  025222                          ERROR                   ;REPORT IT &
 4725  025222  104460                                                  TRAP    C$ERROR
 4726  025224  000510                  BR      24$             ;  EXIT
 4727  025226  004537  003616    31$:  JSR     R5,READ         ;READ IT BACK
 4728  025232  123004                  NPRCTL
 4729  025234  002740              13$:  BT2
 4730  025236  103002                  BCC     32$             ;IF AN ERROR OCCURED,
 4731  025240                          ERROR                   ;REPORT IT &
 4732  025240  104460                                                  TRAP    C$ERROR
 4733  025242  000501                  BR      24$             ;  EXIT
 4734
 4735  025244  013777  025216  155002  32$:  MOV     5$,@GDATA       ;BUILD THE EXPECTED RETURN VALUE
 4736  025252  042777  000300  154774        BIC     #NPRABT!NPRGO,@GDATA    ;WE CAN'T WRITE THESE BITS
 4737
 4738  025260  004737  005134                JSR     PC,NPREAD       ;GET CONTENTS OF ALL NPR REGISTERS INTO BT2
 4739  025264  103002                  BCC     33$             ;IF AN ERROR OCCURED,
 4740  025266                          ERROR                   ;REPORT IT &
 4741  025266  104460                                                  TRAP    C$ERROR
 4742  025270  000466                  BR      24$             ;  EXIT
 4743  025272  013701  002254    33$:  MOV     GDATA,R1        ;POINT TO TABLE OF EXPECTED REGISTER CONTENTS
 4744  025276  013702  002256          MOV     BDATA,R2        ;POINT TO NPR REGISTER CONTENTS
 4745  025302  012703  000001          MOV     #1,R3           ;COUNT OF # OF NPR REGISTERS BEING PROCESSED
 4746                                                          ;FOR NOW,  ONLY THE CONTROL REGISTER IS CHECKED!!
 4747
 4748  025306  121112              7$:   CMPB    (R1),(R2)       ;CHECK ONE BYTE
 4749  025310  001003                  BNE     8$              ;GO REPORT FAILURE IF ANY ERROR IS FOUND
 4750  025312  022122                  CMP     (R1)+,(R2)+     ;BUMP POINTERS -- TABLES ARE ACTUALLY WORD TABLES
 4751  025314  077304                  SOB     R3,7$           ;LOOP IF NOT DONE YET
 4752  025316  000412                  BR      9$              ;ELSE, PROCEED WITH TESTING
 4753
 4754  025320  163701  025132    8$:   SUB     12$,R1          ;CALCULATE THE REGISTER # CAUSING THE FAILURE
 4755  025324  010137  002300          MOV     R1,REGNUM       ;IDENTIFY FAULTY REGISTER
 4756  025330                          GEDF    EM26A,ERR8      ;NPR ERROR -- DURING WRITE TO CONTROL REG.
 4757                                                          ;       "DEVICE FATAL" ERROR # 26
 4758  025330  104455                                                  TRAP    C$ERDF
 4759  025332  000032                                                  .WORD   26
 4760  025334  016204                                                  .WORD   EM26A
 4761  025336  006532                                                  .WORD   ERR8
 4762  025340                          ESCAPE  TST             ;IF IT CAN'T BE INIT'ED, WE CAN'T TEST IT!
 4763  025340  104410                                                  TRAP    C$ESCAPE
 4764  025342  000104                                                  .WORD   L10032-.
 4765  025344  004737  003514    9$:   JSR     PC,MSTCLR       ;RE-I ITIALIZE DMV & ENTER M-LOOP
 4766  025350  103003                  BCC     20$             ;IF NO ERROR, PROCEED WITH TESTING
```

```
4767  025352                                  ERROR                   ;ELSE REPORT IT
4768  025352  104460                                                                  TRAP    C$ERROR
4769  025354                                  ESCAPE  TST             ;   & EXIT TEST
4770  025354  104410                                                                  TRAP    C$ESCAPE
4771  025356  000070                                                                  .WORD   L10032-.
4772
4773                                  ;       THE "MASTER CLEAR" JUST PERFORMED SHOULD RESET THE NPR CONTROL
4774                                  ;       REGISTER.  IT SHOULD NOW EQUAL 004 AGAIN.
4775
4776  025360  013777  002632  154666  20$:    MOV     NPRMCR,@GDATA   ;RESET THE EXPECTED DATA
4777
4778                                  ;       ALSO, THE OTHER REGISTERS SHOULD STILL BE AT THEIR INITIAL VALUES
4779
4780  025366  004737  005134          JSR     PC,NPREAD       ;GET CONTENTS OF ALL NPR REGISTERS INTO BT2
4781  025372  103002                  BCC     34$             ;IF AN ERROR OCCURED,
4782  025374                          ERROR                   ;REPORT IT &
4783  025374  104460                                                                  TRAP    C$ERROR
4784  025376  000423                  BR      24$             ;  EXIT
4785  025400  013701  002254          34$:    MOV     GDATA,R1        ;POINT TO TABLE OF EXPECTED REGISTER CONTENTS
4786  025404  013702  002256          MOV     BDATA,R2        ;POINT TO NPR REGISTER CONTENTS
4787  025410  012703  000001          MOV     #1,R3           ;COUNT OF # OF NPR REGISTERS BEING PROCESSED
4788                                                          ;FOR NOW,  ONLY THE CONTROL REGISTER IS CHECKED!!
4789
4790  025414  121112                  21$:    CMPB    (R1),(R2)       ;CHECK ONE BYTE
4791  025416  001003                  BNE     22$             ;GO REPORT FAILURE IF ANY ERROR IS FOUND
4792  025420  022122                  CMP     (R1)+,(R2)+     ;BUMP POINTERS -- TABLES ARE ACTUALLY WORD TABLES
4793  025422  077304                  SOB     R3,21$          ;LOOP IF NOT DONE YET
4794  025424  000410                  BR      24$             ;ELSE, PROCEED WITH TESTING
4795
4796  025426  163701  025132          22$:    SUB     12$,R1          ;CALCULATE THE REGISTER # CAUSING THE FAILURE
4797  025432  010137  002300          MOV     R1,REGNUM       ;IDENTIFY FAULTY REGISTER
4798  025436                          GEDF    EM26,ERR8       ;NPR ERROR -- BAD INITIALIZATION
4799                                                          ;       "DEVICE FATAL" ERROR # 27
4800  025436  104455                                                                  TRAP    C$ERDF
4801  025440  000033                                                                  .WORD   27
4802  025442  016152                                                                  .WORD   EM26
4803  025444  006532                                                                  .WORD   ERR8
4804  025446                          24$:    ENDTST
4805  025446                                                                  L10032:
4806  025446  104401                                                                  TRAP    C$ETST
```

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

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

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

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

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

```
4863  025512                          13$:    ERROR
4864  025512  104460                                                          TRAP    C$ERROR
4865  025514  005737  002412                  TST     TMP0            ;WE JUST REPORTED ONE ERROR BUT WAS IT A TIMEOUT
4866  025520  001421                          BEQ     7$              ;ERROR? IF SO, PROCEED WITH TESTING.  ELSE,
4867  025522  022737  000006  002204          CMP     @NPRTOE,ERRNBR  ;WE WILL HAVE TO REPORT IT HERE AND NOW.
4868  025530  001415                          BEQ     7$              ;THE TIMEOUT ERROR WAS ALREADY REPORTED.
4869  025532  012737  000002  002202          MOV     #T.EHRD,ERRTYP  ;IT WASN'T REPORTED YET, SETUP FOR IT NOW:
4870  025540  012737  000006  002204          MOV     @NPRTOE,ERRNBR
4871  025546  012737  016316  002206          MOV     @EM26E,ERRMSG
4872  025554  012737  007314  002210          MOV     @ERR11,ERRBLK
4873  025562  000753                          BR      13$             ;LOOP BACK TO CAUSE REPORT @ PROPER PC LOCATION
4874
4875  025564  013701  025500          7$:     MOV     2$,R1           ;POINT TO GOOD DATA
4876  025570  013702  025502                  MOV     3$,R2           ;       & ACTUAL DATA
4877  025574  013703  025504                  MOV     4$,R3           ;GET WORD COUNT
4878  025600  005037  002276                  CLR     ERRFLG          ;RESET ERROR FLAG
4879
4880  025604  022122                  5$:     CMP     (R1)+,(R2)+     ;CHECK RECEIVED DATA
4881  025606  001007                          BNE     6$              ;ERROR, GO REPORT IT
4882  025610  077303                  11$:    SOB     R3,5$           ;GOOD,  IF MORE DO IT AGAIN
4883  025612  005737  002276                  TST     ERRFLG          ;ELSE, SEE IF WE MUST FINISH AN ERROR MESSAGE
4884  025616  001440                          BEQ     10$             ;NO,  TEST IT AGAIN BUT WITH BYTE TRANSFERS
4885  025620  004737  013076                  JSR     PC,NULERR       ;YES, USE COMMON ROUTINE TO END ERROR MESSAGE
4886  025624  000435                          BR      10$             ;WE CAN TEST IT AGAIN BUT WITH BYTE TRANSFERS
4887
4888  025626  010146                  6$:     MOV     R1,-(SP)        ;SAVE THIS FOR FURTHER TESTING
4889  025630  014137  002254                  MOV     -(R1),GDATA     ;SETUP FOR ERROR REPORT
4890  025634  014237  002256                  MOV     -(R2),BDATA
4891  025640  010237  002252                  MOV     R2,TDATA        ;LSI-11'S MEMORY ADDRESS
4892  025644  163701  025500                  SUB     2$,R1           ;CALCULATE THE OFFSET AT WHICH THE
4893  025650  006201                          ASR     R1              ;  DATA COMPARISON ERROR OCCURED
4894  025652  010137  002300                  MOV     R1,REGNUM       ;THE ERROR MESSAGE WILL REPORT THIS TOO
4895  025656  005737  002276                  TST     ERRFLG          ;HAVE WE ALREADY REPORTED AN ERROR HERE?
4896  025662  001007                          BNE     8$              ;YES, THEN WE ONLY PRINT DATA THIS TIME
4897  025664  005237  002276                  INC     ERRFLG          ;NO,  SET FLAG & REPORT THE WHOLE MESSAGE
4898  025670                                  GEDF    EM26B,ERR9      ;WORD NPR TRANSFER DMV ---> LSI
4899                                                                  ;       "DEVICE FATAL" ERROR # 28
4900  025670  104455                                                          TRAP    C$ERDF
4901  025672  000034                                                          .WORD   28
4902  025674  016226                                                          .WORD   EM26B
4903  025676  007300                                                           WORD   ERR9
4904  025700  000402                          BR      9$              ;  RESUME TESTING
4905
4906  025702  004737  012574          8$:     JSR     PC,ERR9$        ;IDENTIFY THE FAILING DATA
4907  025706  012601                  9$:     MOV     (SP)+,R1        ;RESTORE POINTERS
4908  025710  013702  002252                  MOV     TDATA,R2
4909  025714  005722                          TST     (R2)+
4910  025716  000734                          BR      11$             ;AND RESUME TESTING
4911
4912  025720                          10$:    ENDSUB
4913  025720                                                                  L10034:
4914  025720  104403                                                          TRAP    C$ESUB
4915
4916                                  ;-------------------------------------------------------------------------
4917
4918  025722                          BGNSUB                  ;----- MAIN MEMORY BYTE DATA-OUT TESTING -----
```

```
4919  025722                                                                  T4.2:
4920  025722  104402                                                            TRAP    C$BSUB
4921  025724  013737  002456  025742          MOV     PATB,4$         ;SETUP COUNT OF # OF WORDS IN TEST PATTERN
4922
4923  025732  004537  005266                  JSR     R5,NPRMOV       ;MOVE DATA THROUGH THE NPR LOGIC
4924  025736  002460                  2$:     PATB+2                  ;  ADDRESS OF DATA
4925  025740  002654                  3$:     BUFAREA                 ;  BUFFER AREA
4926  025742  000000                  4$:     0                       ;*** MODIFIED FROM ABOVE *** -- BYTE COUNT
4927  025744  000054                          NPRDLB                  ;  OPERATION TO BE UTILIZED
4928
4929  025746  103025                          BCC     7$              ;IF ERROR, REPORT IT
4930  025750                          13$:    ERROR
4931  025750  104460                                                            TRAP    C$ERROR
4932  025752  005737  002412                  TST     TMPO            ;WE JUST REPORTED ONE ERROR BUT WAS IT A TIMEOUT
4933  025756  001421                          BEQ     7$              ;ERROR? IF SO, PROCEED WITH TESTING.  ELSE.
4934  025760  022737  000006  002204          CMP     @NPRTOE,ERRNBR  ;WE WILL HAVE TO REPORT IT HERE AND NOW.
4935  025766  001415                          BEQ     7$              ;THE TIMEOUT ERROR WAS ALREADY REPORTED.
4936  025770  012737  000002  0C2202          MOV     @T.EHRD,ERRTYP  ;IT WASN'T REPORTED YET, SETUP FOR IT NOW:
4937  025776  012737  000006  002204          MOV     @NPRTOE,ERRNBR
4938  026004  012737  016316  002206          MOV     @EM26E,ERRMSG
4939  026012  012737  007314  002210          MOV     @ERR11,ERRBLK
4940  026020  000753                          BR      13$             ;LOOP BACK TO CAUSE REPORT @ PROPER PC LOCATION
4941
4942  026022  013701  025736          7$.     MOV     2$,R1           ;POINT TO GOOD DATA
4943  026026  013702  025740                  MOV     3$,R2           ;       & ACTUAL DATA
4944  026032  013703  025742                  MOV     4$,R3           ;GET BYTE COUNT
4945  026036  005037  002276                  CLR     ERRFLG          ;RESET ERROR FLAG
4946
4947  026042  122122                  5$:     CMPB    (R1)+,(R2)+     ;CHECK RECEIVED DATA
4948  026044  001007                          BNE     6$              ;ERROR, GO REPORT IT
4949  026046  077303                  11$:    SOB     R3,5$           ;GOOD.  IF MORE DO IT AGAIN
4950  026050  005737  002276                  TST     ERRFLG          ;ELSE, SEE IF WE MUST FINISH AN ERROR MESSAGE
4951  026054  001437                          BEQ     10$             ;NO.  THEN WE CAN EXIT THE TEST
4952  026056  004737  013076                  JSR     PC,NULERR       ;YES, OUTPUT THE REQUIRED BLANK LINES.  NOW
4953  026062  000434                          BR      10$             ;THEN WE CAN EXIT THE TEST
4954
4955  026064  010146                  6$:     MOV     R1,-(SP)        ;SAVE THIS FOR FURTHER TESTING
4956  026066  114137  002254                  MOVB    -(R1),GDATA     ;SETUP FOR ERROR REPORT
4957  026072  114237  002256                  MOVB    -(R2),BDATA
4958  026076  010237  002252                  MOV     R2,TDATA        ;LSI-11'S MEMORY ADDRESS
4959  026102  163701  025736                  SUB     2$,R1           ;CALCULATE THE OFFSET AT WHICH THE
4960                                                                  ;  DATA COMPARISON ERROR OCCURED
4961  026106  010137  002300                  MOV     R1,REGNUM       ;THE ERROR MESSAGE WILL REPORT THIS TOO
4962  026112  005737  002276                  TST     ERRFLG          ;HAVE WE ALREADY REPORTED AN ERROR HERE?
4963  026116  001007                          BNE     8$              ;YES, THEN WE ONLY PRINT DATA THIS TIME
4964  026120  005237  002276                  INC     ERRFLG          ;NO.  SET FLAG & REPORT THE WHOLE MESSAGE
4965  026124                                  GEDF    EM26C,ERR10     ;BYTE NPR TRANSFER DMV ===> LSI
4966                                                                  ;       "DEVICE FATAL" ERROR # 29
4967  026124  104455                                                            TRAP    C$ERDF
4968  026126  000035                                                            .WORD   29
4969  026130  016251                                                            .WORD   EM26C
4970  026132  007306                                                            .WORD   ERR10
4971  026134  000402                          BR      9$              ;  RESUME TESTING
4972
4973  026136  004737  012732          8$:     JSR     PC,ERR10$       ;IDENTIFY THE FAILING DATA
4974  026142  012601                  9$:     MOV     (SP)+,R1        ;RESTORE POINTERS
```

```
 4975  026144  013702  002252                  MOV     TDATA,R2
 4976  026150  005202                          INC     R2
 4977  026152  000735                          BR      11$             ;AND RESUME TESTING
 4978
 4979  026154                          10$:    ENDSUB
 4980  026154                                                                  L10035:
 4981  026154  104403                                                                  TRAP    C$ESUB
 4982  026156                          ENDTST
 4983  026156                                                                  L10033:
 4984  026156  104401                                                                  TRAP    C$ETST
```

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

                                        ;*******************************************************************
                                        ;*
                                        ;*      TEST 5 -- NPR DATA-IN
                                        ;*
                                        ;* THE NPR INPUT ADDRESS REGISTER IS LOADED WITH THE ADDRESS OF A 2 BYTE
                                        ;* BUFFER IN THE PROGRAM. THEN, EACH WORD OF DATA PATTERN F IS LOADED INTO THE
                                        ;* PROGRAM BUFFER, A FULLWORD NPR INPUT REQUEST IS ISSUED AND PERFORMED,
                                        ;* AND THE PROGRAM CHECKS FOR THE CORRECT DATA IN THE NPR INPUT DATA REG.
                                        ;* ALSO, THE PROGRAM CHECKS THAT THE ABORT XFER BIT IN THE NPR CONTROL
                                        ;* REGISTER NEVER GETS SET.
                                        ;*   DATA PATTERN F = 125252, 052525, 000000, 177777, 000001, 000002, 000004,
                                        ;*                    000010, 000020, 000040, 000100, 000200, 000400, 001000,
                                        ;*                    002000, 004000, 010000, 020000, 040000, 100000, 177776,
                                        ;*                    177775, 177773, 177767, 177757, 177737, 177677, 177577,
                                        ;*                    177377, 176777, 175777, 173777, 167777, 157777, 137777,
                                        ;*                    077777, 000000
                                        ;*
                                        ;--*****************************************************************
                                        ;
                                        ;       BGNTST
        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
        0[illegible]212  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     TMPO            ;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
```

```
5041  026306  005037  002276              CLR     ERRFLG          ;RESET ERROR FLAG
5042
5043  026312  022122              5$:     CMP     (R1)+,(R2)+     ;CHECK RECEIVED DATA
5044  026314  001007                      BNE     6$              ;ERROR, GO REPORT IT
5045  026316  077303              11$:    SOB     R3,5$           ;GOOD.  IF MORE DO IT AGAIN
5046  026320  005737  002276              TST     ERRFLG          ;ELSE, SEE IF WE MUST FINISH AN ERROR MESSAGE
5047  026324  001440                      BEQ     10$             ;NO,  THEN WE CAN EXIT THE TEST
5048  026326  004737  013076              JSR     PC,NULERR       ;YES, USE COMMON ROUTINE TO END ERROR MESSAGE
5049  026332  000435                      BR      10$             ;THEN WE CAN EXIT THE TEST
5050
5051  026334  010246              6$:     MOV     R2,-(SP)        ;SAVE THIS FOR FURTHER TESTING
5052  026336  014137  002254              MOV     -(R1),GDATA     ;SETUP FOR ERROR REPORT
5053  026342  014237  002256              MOV     -(R2),BDATA
5054  026346  010137  002252              MOV     R1,TDATA        ;LSI-11'S MEMORY ADDRESS
5055  026352  163701  026206              SUB     2$,R1           ;CALCULATE THE OFFSET AT WHICH THE
5056  026356  006201                      ASR     R1              ;  DATA COMPARISON ERROR OCCURED
5057  026360  010137  002300              MOV     R1,REGNUM       ;THE ERROR MESSAGE WILL REPORT THIS TOO
5058  026364  005737  002276              TST     ERRFLG          ;HAVE WE ALREADY REPORTED AN ERROR HERE?
5059  026370  001007                      BNE     8$              ;YES, THEN WE ONLY PRINT DATA THIS TIME
5060
5061  026372  005237  002276              INC     ERRFLG          ;NO,  SET FLAG & REPORT THE WHOLE MESSAGE
5062  026376                              GEDF    EM26D,ERR9      ;WORD NPR TRANSFER LSI ---> DMV
5063                                                              ;       "DEVICE FATAL" ERROR # 30
5064  026376  104455                                                              TRAP    C$ERDF
5065  026400  000036                                                              .WORD   30
5066  026402  016274                                                              .WORD   EM26D
5067  026404  007300                                                              .WORD   ERR9
5068  026406  000402                      BR      9$              ;  RESUME TESTING
5069
5070  026410  004737  012574      8$:     JSR     PC,ERR9$        ;IDENTIFY THE FAILING DATA
5071  026414  012602              9$:     MOV     (SP)+,R2        ;RESTORE POINTERS
5072  026416  013701  002252              MOV     TDATA,R1
5073  026422  005721                      TST     (R1)+
5074  026424  000734                      BR      11$             ;AND RESUME TESTING
5075
5076  026426                      10$:
5077  026426                              ENDTST
5078  026426                                                                  L10036:
5079  026426  104401                                                                  TRAP    C$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 INPUT NPR'S.
                                ;*
                                ;-**********************************************************************
                                ;
                                ;       BGNTST
026430                                                                  T6::
                                ;***  SUBTEST # 1 -- NPR OUTPUT TO NON-EXISTENT LOCATION FORCING NPR-ABORT  ****
                                
                                        BGNSUB
026430                                                                  T6.1:
026430  104402                                                                  TRAP    C$BSUB
026432  004737  003514                JSR     PC,MSTCLR       ;INIT DMV & ENTER M-LOOP
026436  103003                        BCC     .+10            ;IF NO ERROR, PROCEED WITH TESTING
026440                                ERROR                   ;ELSE, REPORT ERROR
026440  104460                                                                  TRAP    C$ERROR
026442                                ESCAPE  SUB             ;   & EXIT TEST
026442  104410                                                                  TRAP    C$ESCAPE
026444  000164                                                                  .WORD   L10040-.
026446  012737  000001  002412        MOV     #1,TMP0         ;DISABLE PRINTOUT OF TIMEOUT-COUNT BY ERR11

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

```
5136  026540  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
5137  026542                                ERROR                   ;ELSE, REPORT IT
5138  026542  104460                                                                TRAP    C$ERROR
5139  026544                                ESCAPE  SUB             ;       AND EXIT THIS TEST
5140  026544  104410                                                                TRAP    C$ESCAPE
5141  026546  000062                                                                .WORD   L10040-.
5142  026550  004537  004042                JSR     R5,WRITE        ;INITIATE THE NPR-OUT OPERATION
5143  026554  123004                        NPRCTL
5144  026556  002414                        TMP1
5145  026560  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
5146  026562                                ERROR                   ;ELSE, REPORT IT
5147  026562  104460                                                                TRAP    C$ERROR
5148  026564                                ESCAPE  SUB             ;       AND EXIT THIS TEST
5149  026564  104410                                                                TRAP    C$ESCAPE
5150  026566  000042                                                                .WORD   L10040-.
5151  026570  004537  003616                JSR     R5,READ         ;READ BACK THE CONTROL-STATUS REGISTER
5152  026574  123004                        NPRCTL
5153  026576  002416                        TMP2
5154  026600  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
5155  026602                                ERROR                   ;ELSE, REPORT IT
5156  026602  104460                                                                TRAP    C$ERROR
5157  026604                                ESCAPE  SUB             ;       AND EXIT THIS TEST
5158  026604  104410                                                                TRAP    C$ESCAPE
5159  026606  000022                                                                .WORD   L10040-.
5160  026610  132737  000200  002416        BITB    #NPRABT,TMP2    ;THE ABORT BIT SHOULD BE SET
5161  026616  001004                        BNE     20$             ;IT IS.  EXIT SUBTEST
5162  026620                                GEDF    EM26G,ERR11     ;IT DIDN'T.  REPORT MISSING NPR ABORT
5163                                                                ;       "DEVICE FATAL" ERROR # 31
5164  026620  104455                                                                TRAP    C$ERDF
5165  026622  000037                                                                .WORD   31
5166  026624  016402                                                                .WORD   EM26G
5167  026626  007314                                                                .WORD   ERR11
5168  026630                        20$:    ENDSUB
5169  026630                                                                L10040:
5170  026630  104403                                                                TRAP    C$ESUB
5171                                ;***  SUBTEST #2 -- NPR OUTPUT TO EXISTENT LOCATION YIELDING NO NPR-ABORT  ****
5172
5173  026632                                BGNSUB
5174  026632                                                                T6.2:
5175  026632  104402                                                                TRAP    C$BSUB
5176  026634  004737  003514                JSR     PC,MSTCLR       ;INIT DMV & ENTER M-LOOP
5177  026640  103003                        BCC     .+10            ;IF NO ERROR, PROCEED WITH TESTING
5178  026642                                ERROR                   ;ELSE, REPORT ERROR
5179  026642  104460                                                                TRAP    C$ERROR
5180  026644                                ESCAPE  SUB             ;   & EXIT TEST
5181  026644  104410                                                                TRAP    C$ESCAPE
5182  026646  000164                                                                .WORD   L10041-.
5183  026650  012737  000001  002412        MOV     #1,TMP0         ;DISABLE PRINTOUT OF TIMEOUT-COUNT BY ERR11
5184
5185  026656  012737  002654  002420        MOV     #BUFAREA,TMP3   ;SETUP 11'S ADDRESS
5186  026664  012737  000044  002414        MOV     #NPRDL,TMP1     ;CONTROL REG. VALUE FOR NPR-OUT COMMAND
5187  026672  004537  004042                JSR     R5,WRITE        ;SETUP ADDRESS OUT REGISTERS
5188  026676  000070                        NPRAOL
5189  026700  002420                        TMP3
5190  026702  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
5191  026704                                ERROR                   ;ELSE, REPORT IT
```

```
5192  026704  104460                                                          TRAP    C$ERROR
5193  026706                        ESCAPE  SUB             ;       AND EXIT THIS TEST
5194  026706  104410                                                          TRAP    C$ESCAPE
5195  026710  000122                                                          .WORD   L10041-.
5196  026712  004537  004042        JSR     R5,WRITE
5197  026716  000071                NPRAOH
5198  026720  002421                TMP3+1
5199  026722  103003                BCC     .+10            ;IF NO ERROR, PROCEED
5200  026724                        ERROR                   ;ELSE, REPORT IT
5201  026724  104460                                                          TRAP    C$ERROR
5202  026726                        ESCAPE  SUB             ;       AND EXIT THIS TEST
5203  026726  104410                                                          TRAP    C$ESCAPE
5204  026730  000102                                                          .WORD   L10041-.
5205  026732  004537  004054        JSR     R5,WRITEI
5206  026736  000072                NPRAOX
5207  026740  000000                0                       ;  (THIS CLEARS BS7 & EXTENDED ADDR. BITS)
5208  026742  103003                BCC     .+10            ;IF NO ERROR, PROCEED
5209  026744                        ERROR                   ;ELSE, REPORT IT
5210  026744  104460                                                          TRAP    C$ERROR
5211  026746                        ESCAPE  SUB             ;       AND EXIT THIS TEST
5212  026746  104410                                                          TRAP    C$ESCAPE
5213  026750  000062                                                          .WORD   L10041-.
5214  026752  004537  004042        JSR     R5,WRITE        ;INITIATE THE NPR-OUT OPERATION
5215  026756  123004                NPRCTL
5216  026760  002414                TMP1
5217  026762  103003                BCC     .+10            ;IF NO ERROR, PROCEED
5218  026764                        ERROR                   ;ELSE, REPORT IT
5219  026764  104460                                                          TRAP    C$ERROR
5220  026766                        ESCAPE  SUB             ;       AND EXIT THIS TEST
5221  026766  104410                                                          TRAP    C$ESCAPE
5222  026770  000042                                                          .WORD   L10041-.
5223  026772  004537  003616        JSR     R5,READ         ;READ BACK THE CONTROL-STATUS REGISTER
5224  026776  123004                NPRCTL
5225  027000  002416                TMP2
5226  027002  103003                BCC     .+10            ;IF NO ERROR, PROCEED
5227  027004                        ERROR                   ;ELSE, REPORT IT
5228  027004  104460                                                          TRAP    C$ERROR
5229  027006                        ESCAPE  SUB             ;       AND EXIT THIS TEST
5230  027006  104410                                                          TRAP    C$ESCAPE
5231  027010  000022                                                          .WORD   L10041-.
5232  027012  132737  000200  002416        BITB    @#PRABT,TMP2    ;THE ABORT BIT SHOULD BE SET
5233  027020  001404                BEQ     20$             ;IT IS.  EXIT SUBTEST
5234  027022                        GEDF    EM26E,ERR11     ;IT DIDN'T.  REPORT MISSING NPR ABORT
5235                                                        ;       "DEVICE FATAL" ERROR # 32
5236  027022  104455                                                          TRAP    C$ERDF
5237  027024  000040                                                          .WORDD  32
5238  027026  016316                                                          .WORD   EM26E
5239  027030  007314                                                          .WORD   ERR11
5240  027032                  20$:  ENDSUB
5241  027032                                                                L10041:
5242  027032  104403                                                          TRAP    C$ESUB
5243  027034                        ENDTST
5244  027034                                                                L10037:
5245  027034  104401                                                          TRAP    C$ETST
```

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

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

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

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

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

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

```
5302  027134  004537  004054          JSR     R5,WRITEI
5303  027140  000075                  NPRAIH
5304  027142  000000                  0
5305  027144  004537  003616          JSR     R5,READ         ;READ BACK THE ADDRESS & VERIFY IT
5306  027150  000074                  NPRAIL
5307  027152  002434                  TMP9
5308  027154  004537  003616          JSR     R5,READ
5309  027160  000075                  NPRAIH
5310  027162  002435                  TMP9+1
5311  027164  023727  002434  000000  CMP     TMP9,#000000    ;IS IT CORRECT?
5312  027172  001424                  BEQ     2$              ;YES, PROCEED.
5313  027174  013737  002434  002256  MOV     TMP9,BDATA      ;NO, SETUP FOR & REPORT LOADING FAILURE
5314  027202  012737  000000  002254  MOV     #000000,GDATA
5315  027210  012737  000007  002300  MOV     #7,REGNUM       ;IDENTIFY NPRAIH AS THE CULPRIT
5316  027216  105737  002434          TSTB    TMP9            ;IS THAT REALLY TRUE?
5317  027222  001002                  BNE     1$              ;MAYBE.  BUT, NPRAIL IS DEFINITELY AT FAULT
5318  027224  005237  002300          INC     REGNUM          ;       SO IDENTIFY IT AS SUCH
5319  027230                  1$:     GEDF    EM26A,ERR14     ;REPORT THE FAILURE
5320                                                          ;       "DEVICE FATAL" ERROR # 33
5321  027230  104455                                                          TRAP    C$ERDF
5322  027232  000041                                                          .WORD   33
5323  027234  016204                                                          .WORD   EM26A
5324  027236  011002                                                          .WORD   ERR14
5325  027240                  ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5326  027240  104410                                                          TRAP    C$ESCAPE
5327  027242  000506                                                          .WORD   L10043-.
5328                          ;*************************************************************
5329                          ;***************** MAIN SUBTEST #1 LOOP STARTS HERE ******************
5330                          ;*************************************************************
5331
5332                          ;*************** COMPLEMENT OF NPRORH:NPRORL => TMP3 ***************
5333  027244  004537  003616  2$:     JSR     R5,READ         ;GET THE CURRENT CONTENTS OF THE NPR DATA REG'S
5334  027250  123000                  NPRORL
5335  027252  002414                  TMP1
5336  027254  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5337  027256                          ERROR                   ;ELSE, REPORT IT
5338  027256  104460                                                          TRAP    C$ERROR
5339  027260                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5340  027260  104410                                                          TRAP    C$ESCAPE
5341  027262  000466                                                          .WORD   L10043-.
5342  027264  004537  003616          JSR     R5,READ
5343  027270  123001                  NPRORH
5344  027272  002415                  TMP1+1
5345  027274  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5346  027276                          ERROR                   ;ELSE, REPORT IT
5347  027276  104460                                                          TRAP    C$ERROR
5348  027300                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5349  027300  104410                                                          TRAP    C$ESCAPE
5350  027302  000446                                                          .WORD   L10043-.
5351  027304  013737  002414  002420  MOV     TMP1,TMP3       ;USE CURRENT DATA & BUILD BACKGROUND PATTERN
5352  027312  005137  002420          COM     TMP3            ;COMPLEMENT IT TO GENERATE A BACKGROUND PATTERN
5353
5354                          ;********** TMP3 => 1ST LOCATION OF EACH EXTENDED MEMORY BLOCK **********
5355  027316  012737  002000  002446          MOV     #BIT10,TMPE     ;REFILL ALL TEST LOCATIONS STARTING HERE
5356  027324  004537  030700  4$:     JSR     R5,XMWRIT       ;WRITE BACKGROUND PATTERN GENERATED ABOVE
5357  027330  002446                  TMPE                    ; POINTER TO "PAR" FORMAT ADDERSS
```

```
5358  027332  002420                          TMP3                    ; POINTER TO DATA (TO BE WRITTEN)
5359  027334  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
5360  027336                                  ERROR                   ;ELSE, REPORT IT
5361  027336  104460                                                                  TRAP    C$ERROR
5362  027340                                  ESCAPE  SUB             ;       AND EXIT THIS TEST
5363  027340  104410                                                                  TRAP    C$ESCAPE
5364  027342  000406                                                                  .WORD   L10043-.
5365  027344  062737  002000  002446          ADD     #BIT10,TMPE     ;INCREMENT THE PAGE ADDR. REG. VALUE
5366  027352  001404                          BEQ     6$              ;DONE IF IT GOES TO ZERO
5367  027354  023737  002446  002436          CMP     TMPE,TMPA       ;IS THE NEW VALUE WITHIN CURRENT MEMORY?
5368  027362  101760                          BLOS    4$              ;YES, THE WRITE IT TOO.
5369                                                                  ;NO,  DONE.
5370                                  ;*************** WRITE/READ/VERIFY NPRAIX ***************
5371  027364  004537  004042          6$:     JSR     R5,WRITE        ;SETUP NPR EXTENDED ADDR. REG BITS
5372  027370  000076                          NPRAIX
5373  027372  002451                          TMPF+1
5374  027374  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
5375  027376                                  ERROR                   ;ELSE, REPORT IT
5376  027376  104460                                                                  TRAP    C$ERROR
5377  027400                                  ESCAPE  SUB             ;       AND EXIT THIS TEST
5378  027400  104410                                                                  TRAP    C$ESCAPE
5379  027402  000346                                                                  .WORD   L10043-.
5380  027404  004537  003616                  JSR     R5,READ         ;READ IT BACK & VERIFY THAT IT'S CORRECT
5381  027410  000076                          NPRAIX
5382  027412  002450                          TMPF
5383  027414  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
5384  027416                                  ERROR                   ;ELSE, REPORT IT
5385  027416  104460                                                                  TRAP    C$ERROR
5386  027420                                  ESCAPE  SUB             ;       AND EXIT THIS TEST
5387  027420  104410                                                                  TRAP    C$ESCAPE
5388  027422  000326                                                                  .WORD   L10043-.
5389  027424  123737  002450  002451          CMPB    TMPF,TMPF+1     ;DID IT LOAD CORRECTLY?
5390  027432  001417                          BEQ     8$              ;YES, PROCEED
5391  027434  113737  002451  002254          MOVB    TMPF+1,GDATA    ;NO, SETUP FOR ERROR HANDLER
5392  027442  113737  002450  002256          MOVB    TMPF,BDATA
5393  027450  012737  000006  002300          MOV     #6,REGNUM       ;       IDENTIFY NPRAIX AS FAILING REG.
5394  027456                                  GEDF    EM26A,ERR14     ;REPORT THE FAILURE
5395                                                                  ;       "DEVICE FATAL" ERROR # 34
5396  027456  104455                                                                  TRAP    C$ERDF
5397  027460  000042                                                                  .WORD   34
5398  027462  016204                                                                  .WORD   EM26A
5399  027464  011002                                                                  .WORD   ERR14
5400  027466                                  ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5401  027466  104410                                                                  TRAP    C$ESCAPE
5402  027470  000260                                                                  .WORD   L10043-.
5403
5404                                  ;*************** GENERATE/WRITE TEST WORD INTO "TMPC" (LSI-11) ***************
5405  027472  013737  002420  002254  8$:     MOV     TMP3,GDATA      ;GENERATE A TEST DATA PATTERN FROM BACKGROUND
5406  027500  062737  125252  002254          ADD     #125252,GDATA   ;PATTERN BY ADDING THIS TO IT.
5407
5408  027506  004537  030700                  JSR     R5,XMWRIT       ;LOAD UP THE TEST PATTERN
5409  027512  002442                          TMPC                    ; POINTER TO "PAR" FORMAT ADDRESS
5410  027514  002254                          GDATA                   ; POINTER TO DATA (TO BE WRITTEN)
5411  027516  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
5412  027520                                  ERROR                   ;ELSE, REPORT IT
5413  027520  104460                                                                  TRAP    C$ERROR
```

```
5414  027522                                  ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5415  027522  104410                                                                  TRAP    C$ESCAPE
5416  027524  000224                                                                  .WORD   L10043-.
5417  027526  112737  000004  002417          MOVB    #NPRLD,TMP2+1   ;SETUP CONTROL VALUE TO DO NPR-IN
5418  027534  004537  004042                  JSR     R5,WRITE        ;PERFORM THE "EXTENDED" DATA-IN NPR
5419  027540  123004                          NPRCTL
5420  027542  002417                          TMP2+1
5421  027544  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
5422  027546                                  ERROR                   ;ELSE, REPORT IT
5423  027546  104460                                                                  TRAP    C$ERROR
5424  027550                                  ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5425  027550  104410                                                                  TRAP    C$ESCAPE
5426  027552  000176                                                                  .WORD   L10043-.
5427
5428                                  ;*************** CHECK THE NPR OPERATION (DATA/NPRCTL) ***************
5429  027554  004537  003616                  JSR     R5,READ         ;CHECK THE NPR OPERATION
5430  027560  123004                          NPRCTL
5431  027562  002416                          TMP2
5432  027564  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
5433  027566                                  ERROR                   ;ELSE, REPORT IT
5434  027566  104460                                                                  TRAP    C$ERROR
5435  027570                                  ESCAPE  SUB             ;       AND EXIT THIS TEST
5436  027570  104410                                                                  TRAP    C$ESCAPE
5437  027572  000156                                                                  .WORD   L10043-.
5438  027574  004537  003616                  JSR     R5,READ         ;GET THE DATA WE SHOULD HAVE JUST LOADED INTO
5439  027600  123001                          NPRDRH                  ;       THE NPR DATA REGISTERS FROM THE
5440  027602  002257                          BDATA+1                 ;       EXTENDED MEMORY AREA
5441  027604  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
5442  027606                                  ERROR                   ;ELSE, REPORT IT
5443  027606  104460                                                                  TRAP    C$ERROR
5444  027610                                  ESCAPE  SUB             ;       AND EXIT THIS TEST
5445  027610  104410                                                                  TRAP    C$ESCAPE
5446  027612  000136                                                                  .WORD   L10043-.
5447  027614  004537  003616                  JSR     R5,READ
5448  027620  123000                          NPRDRL
5449  027622  002256                          BDATA
5450  027624  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
5451  027626                                  ERROR                   ;ELSE, REPORT IT
5452  027626  104460                                                                  TRAP    C$ERROR
5453  027630                                  ESCAPE  SUB             ;       AND EXIT THIS TEST
5454  027630  104410                                                                  TRAP    C$ESCAPE
5455  027632  000116                                                                  .WORD   L10043-.
5456  027634  132737  000300  002416          BITB    #300,TMP2       ;DID IT ABORT OR HANG?
5457  027642  001414                          BEQ     14$             ;NO, GOOD.  PROCEED WITH SUBTEST
5458  027644  100005                          BPL     10$             ;YES, WHICH ONE?
5459  027646                                  GEDF    EM27A,ERR12     ;ABORT, REPORT IT AS SUCH.
5460                                                                  ;       "DEVICE FATAL" ERROR # 35
5461  027646  104455                                                                  TRAP    C$ERDF
5462  027650  000043                                                                  .WORD   35
5463  027652  016437                                                                  .WORD   EM27A
5464  027654  007456                                                                  .WORD   ERR12
5465  027656  000404                          BR      12$             ;AND EXIT
5466  027660                          10$:    GEDF    EM27B,ERR12     ;HANG, REPORT IT AS SUCH.
5467                                                                  ;       "DEVICE FATAL" ERROR # 36
5468  027660  104455                                                                  TRAP    C$ERDF
5469  027662  000044                                                                  .WORD   36
```

```
5470  027664  016461                                                          .WORD   EM27B
5471  027666  007456                                                          .WORD   ERR12
5472  027670                        12$:    ESCAPE  SUB             ;  AND EXIT SUBTEST
5473  027670  104410                                                          TRAP    C$ESCAPE
5474  027672  000056                                                          .WORD   L10043-.
5475  027674  023737  002256  002254  14$:    CMP     BDATA,GDATA     ;DID WE READ THE TEST DATA USING THE NPR?
5476  027702  001406                        BEQ     20$             ;YES.  WELL THIS ONE WORKED.
5477  027704                                GEDF    EM27C,ERR12     ;NO!   REPORT THE ERROR.
5478                                                                ;       "DEVICE FATAL" ERROR # 37
5479  027704  104455                                                          TRAP    C$ERDF
5480  027706  000045                                                          .WORD   37
5481  027710  016502                                                          .WORD   EM27C
5482  027712  007456                                                          .WORD   ERR12
5483  027714                                ESCAPE  SUB             ;  EXIT FROM SUBTEST AFTER PRINTING ERROR MSG.
5484  027714  104410                                                          TRAP    C$ESCAPE
5485  027716  000032                                                          .WORD   L10043-.
5486  027720  062737  002000  002442  20$:    ADD     #BIT10,TMPC     ;POINT TO NEXT PAGE ADDRESS REG. VALUE
5487  027726  001410                        BEQ     63$             ;IF 0, WE'RE DONE
5488  027730  023737  002442  002436        CMP     TMPC,TMPA       ;IF GREATER THEN MAXIMUM VALUE,
5489  027736  101004                        BHI     63$             ;       WE'RE DONE TOO.
5490  027740  105237  002451                INCB    TMPF+1          ;ELSE, INCREMENT NPR'S EXTENDED ADDR. REG.
5491  027744  000137  027244                JMP     2$              ;AND GO BACK TO DO THIS ADDRESS
5492
5493  027750                        63$:    ENDSUB
5494  027750                                                                L10043:
5495  027750  104403                                                          TRAP    C$ESUB
5496                                ;*****************************************************************************
5497
5498  027752                                BGNSUB                  ;TEST THE NPR-OUT USING EXTENDED ADDR. BITS
5499  027752                                                                T7.2:
5500  027752  104402                                                          TRAP    C$BSUB
5501  027754  012737  002000  002442        MOV     #BIT10,TMPC     ;INITIALIZE PAGE ADDRESS REG. VARIABLE
5502  027762  112737  000001  002451        MOVB    #BIT0,TMPF+1    ;INITIALIZE NPR EXTENDED ADDRESS REG. VARIABLE
5503  027770  004737  030560                JSR     PC,XMINIT       ;INITIALIZE THE MMU
5504
5505                              ;**************** WRITE/READ/VERIFY NPRAOH,NPRAOL ****************
5506  027774  004537  004054                JSR     R5,WRITEI       ;POINT NPR REGISTERS TO 0
5507  030000  000070                        NPRAOL
5508  030002  000000                        0
5509  030004  004537  004054                JSR     R5,WRITEI
5510  030010  000071                        NPRAOH
5511  030012  000000                        0
5512  030014  004537  003616                JSR     R5,READ         ;READ BACK THE ADDRESS & VERIFY IT
5513  030020  000070                        NPRAOL
5514  030022  002434                        TMP9
5515  030024  004537  003616                JSR     R5,READ
5516  030030  000071                        NPRAOH
5517  030032  002435                        TMP9+1
5518  030034  023727  002434  000000        CMP     TMP9,#000000    ;IS IT CORRECT?
5519  030042  001427                        BEQ     2$              ;YES. PROCEED.
5520  030044  013737  002434  002256        MOV     TMP9,BDATA      ;NO. SETUP FOR & REPORT LOADING FAILURE
5521  030052  012737  000000  002254        MOV     #000000,GDATA
5522  030060  012737  000004  002300        MOV     #4,REGNUM       ;IDENTIFY NPRAIH AS THE CULPRIT
5523  030066  105737  002434                TSTB    TMP9            ;IS THAT REALLY TRUE?
5524  030072  001002                        BNE     1$              ;MAYBE.  BUT, NPRAIL IS DEFINATELY AT FAULT
5525  030074  005237  002300                INC     REGNUM          ;       SO IDENTIFY IT AS SUCH
```

```
5526  030100                          1$:     GEDF    EM26A,ERR14     ;REPORT THE FAILURE
5527                                                                  ;       "DEVICE FATAL" ERROR # 38
5528  030100  104455                                                                  TRAP    C$ERDF
5529  030102  000046                                                                  .WORD   38
5530  030104  016204                                                                  .WORD   EM26A
5531  030106  011002                                                                  .WORD   ERR14
5532  030110                          ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5533  030110  104410                                                                  TRAP    C$ESCAPE
5534  030112  000442                                                                  .WORD   L10044-.
5535  030114  012737  123456  002420          MOV     #123456,TMP3    ;USE THIS AS INITIAL BACKGROUND PATTERN
5536
5537                                  ;*******************************************************************
5538                                  ;****************** MAIN SUBTEST #2 LOOP STARTS HERE ******************
5539                                  ;*******************************************************************
5540
5541                                  ;********** TMP3 => 1ST LOCATION OF EACH EXTENDED MEMORY BLOCK **********
5542  030122  062737  021475  002420  2$:     ADD     #21475,TMP3     ;GENERATE THE PATTERN WE'LL USE THIS TIME
5543  030130  013737  002420  002414          MOV     TMP3,TMP1       ;PUT HERE FOR ERROR HANDLER
5544  030136  005137  002414                  COM     TMP1
5545
5546  030142  012737  002000  002446          MOV     #BIT10,TMPE     ;REFILL ALL TEST LOCATIONS STARTING HERE
5547  030150  004537  030700          4$:     JSR     R5,XMWRIT       ;WRITE BACKGROUND PATTERN GENERATED ABOVE
5548  030154  002446                          TMPE                    ; POINTER TO ADDRESS (IN "PAR" FORMAT)
5549  030156  002420                          TMP3                    ; POINTER TO DATA (TO BE WRITTEN)
5550  030160  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
5551  030162                                  ERROR                   ;ELSE, REPORT IT
5552  030162  104460                                                                  TRAP    C$ERROR
5553  030164                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5554  030164  104410                                                                  TRAP    C$ESCAPE
5555  030166  000366                                                                  .WORD   L10044-.
5556  030170  062737  002000  002446          ADD     #BIT10,TMPE     ;INCREMENT THE PAGE ADDR. REG. VALUE
5557  030176  001404                          BEQ     6$              ;DONE IF IT GOES TO ZERO
5558  030200  023737  002446  002436          CMP     TMPE,TMPA       ;IS THE NEW VALUE WITHIN CURRENT MEMORY?
5559  030206  101760                          BLOS    4$              ;YES, THE WRITE IT TOO.
5560                                                                  ;NO,  DONE.
5561
5562                                  ;*************** WRITE/READ/VERIFY NPRAIX ***************
5563  030210  004537  004042          6$:     JSR     R5,WRITE        ;SETUP NPR EXTENDED ADDR. REG BITS
5564  030214  000072                          NPRAOX
5565  030216  002451                          TMPF+1
5566  030220  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
5567  030222                                  ERROR                   ;ELSE, REPORT IT
5568  030222  104460                                                                  TRAP    C$ERROR
5569  030224                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5570  030224  104410                                                                  TRAP    C$ESCAPE
5571  030226  000326                                                                  .WORD   L10044-.
5572  030230  004537  003616                  JSR     R5,READ         ;READ IT BACK & VERIFY THAT IT'S CORRECT
5573  030234  000072                          NPRAOX
5574  030236  002450                          TMPF
5575  030240  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
5576  030242                                  ERROR                   ;ELSE, REPORT IT
5577  030242  104460                                                                  TRAP    C$ERROR
5578  030244                          ESCAPE  SUB             ;       AND EXIT THIS TEST
5579  030244  104410                                                                  TRAP    C$ESCAPE
5580  030246  000306                                                                  .WORD   L10044-.
5581  030250  123737  002450  002451          CMPB    TMPF,TMPF+1     ;DID IT LOAD CORRECTLY?
```

```
5582  030256  001417                          BEQ     8$                ;YES, PROCEED
5583  030260  113737  002451  002254          MOVB    TMPF+1,GDATA      ;NO, SETUP FOR ERROR HANDLER
5584  030266  113737  002450  002256          MOVB    TMPF,BDATA
5585  030274  012737  000003  002300          MOV     #3,REGNUM         ;       IDENTIFY NPRAIX AS FAILING REG.
5586  030302                                  GEDF    EM26A,ERR14       ;REPORT THE FAILURE
5587                                                                    ;       "DEVICE FATAL" ERROR # 39
5588  030302  104455                                                                  TRAP    C$ERDF
5589  030304  000047                                                                  .WORD   39
5590  030306  016204                                                                  .WORD   EM26A
5591  030310  011002                                                                  .WORD   ERR14
5592  030312                          ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5593  030312  104410                                                                  TRAP    C$ESCAPE
5594  030314  000240                                                                  .WORD   L10044-.
5595
5596                          ;*************** WRITE(LSI-11) TEST LOCATION BACKGROUND PATTERN ***************
5597  030316  004537  030700  8$:     JSR     R5,XMWRIT       ;SETUP TEST LOCATION'S BACKGROUND PATTERN
5598  030322  002442                  TMPC
5599  030324  002414                  TMP1
5600  030326  013737  002420  002254          MOV     TMP3,GDATA      ;GENERATE A TEST DATA PATTERN FROM BACKGROUND
5601  030334  062737  052525  002254          ADD     #52525,GDATA    ;PATTERN BY ADDING THIS TO IT.
5602
5603                          ;*************** LOAD(DMV) TEST PATTERN ***************
5604  030342  004537  004042          JSR     R5,WRITE                ;LOAD UP THE TEST PATTERN
5605  030346  123001                  NPRDRH
5606  030350  002255                  GDATA+1
5607  030352  004537  004042          JSR     R5,WRITE
5608  030356  123000                  NPRDRL
5609  030360  002254                  GDATA
5610  030362  112737  000044  002417          MOVB    #NPRDL,TMP2+1   ;SETUP CONTROL VALUE TO DO NPR-OUT
5611
5612                          ;*************** PERFORM/CHECK EXTENDED NPR OPERATION ***************
5613  030370  004537  004042          JSR     R5,WRITE        ;PERFORM THE "EXTENDED" DATA-OUT NPR
5614  030374  123004                  NPRCTL
5615  030376  002417                  TMP2+1
5616  030400  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5617  030402                          ERROR                   ;ELSE, REPORT IT
5618  030402  104460                                                          TRAP    C$ERROR
5619  030404                          ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5620  030404  104410                                                          TRAP    C$ESCAPE
5621  030406  000146                                                          .WORD   L10044-.
5622  030410  004537  003616          JSR     R5,READ         ;CHECK THE NPR OPERATION
5623  030414  123004                  NPRCTL
5624  030416  002416                  TMP2
5625  030420  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
5626  030422                          ERRGR                   ;ELSE, REPORT IT
5627  030422  104460                                                          TRAP    C$ERROR
5628  030424                          ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
5629  030424  104410                                                          TRAP    C$ESCAPE
5630  030426  000126                                                          .WORD   L10044-.
5631  030430  132737  000300  002416          BITB    #300,TMP2       ;DID IT ABORT OR HANG?
5632  030436  001414                  BEQ     14$             ;NO, GOOD.  PROCEED WITH SUBTEST
5633  030440  100005                  BPL     10$             ;YES, WHICH ONE?
5634  030442                          GEDF    EM27A,ERR12     ;ABORT, REPORT IT AS SUCH.
5635                                                          ;       "DEVICE FATAL" ERROR # 40
5636  030442  104455                                                          TRAP    C$ERDF
5637  030444  000050                                                          .WORD   40
```

```
5638  030446  016437                                                          .WORD   EM27A
5639  030450  007456                                                          .WORD   ERR12
5640  030452  000404                      BR      12$             ;AND EXIT
5641  030454                      10$:    GEDF    EM27B,ERR12     ;HANG, REPORT IT AS SUCH.
5642                                                              ;       "DEVICE FATAL" ERROR # 41
5643  030454  104455                                                          TRAP    C$ERDF
5644  030456  000051                                                          .WORD   41
5645  030460  016461                                                          .WORD   EM27B
5646  030462  007456                                                          .WORD   ERR12
5647  030464                      12$:    ESCAPE  SUB             ;  AND EXIT SUBTEST
5648  030464  104410                                                          TRAP    C$ESCAPE
5649  030466  000066                                                          .WORD   L10044-.
5650  030470  004537  030776      14$:    JSR     R5,XMREAD       ;GET THE DATA WE SHOULD HAVE JUST LOADED INTO
5651  030474  002442                      TMPC
5652  030476  002256                      BDATA
5653  030500  023737  002256  002254      CMP     BDATA,GDATA     ;DID WE READ THE TEST DATA USING THE NPR?
5654  030506  001406                      BEQ     20$             ;YES.  WELL THIS ONE WORKED.
5655  030510                              GEDF    EM27C,ERR12     ;NO!   REPORT THE ERROR.
5656                                                              ;       "DEVICE FATAL" ERROR # 42
5657  030510  104455                                                          TRAP    C$ERDF
5658  030512  000052                                                          .WORD   42
5659  030514  016502                                                          .WORD   EM27C
5660  030516  007456                                                          .WORD   ERR12
5661  030520                              ESCAPE  SUB             ;  EXIT FROM SUBTEST AFTER PRINTING ERROR MSG.
5662  030520  104410                                                          TRAP    C$ESCAPE
5663  030522  000032                                                          .WORD   L10044-.
5664  030524  062737  002000  002442  20$:    ADD     #BIT10,TMPC     ;POINT TO NEXT PAGE ADDRESS REG. VALUE
5665  030532  001410                      BEQ     63$             ;IF 0, WE'RE DONE
5666  030534  023737  002442  002436      CMP     TMPC,TMPA       ;IF GREATER THEN MAXIMUM VALUE,
5667  030542  101004                      BHI     63$             ;       WE'RE DONE TOO.
5668  030544  105237  002451              INCB    TMPF+1          ;ELSE, INCREMENT NPR'S EXTENDED ADDR. REG.
5669  030550  000137  030122              JMP     2$              ;AND GO BACK TO DO THIS ADDRESS
5670
5671
5672  030554                      63$:    ENDSUB
5673  030554                                                                  L10044:
5674  030554  104403                                                                  TRAP    C$ESUB
5675  030556                              ENDTST
5676  030556                                                                  L10042:
5677  030556  104401                                                                  TRAP    C$ETST
5678
5679                                  ;*******************************************************************************
5680                                  ; XMINIT -- SUBROUTINE TO INITIALIZE EXTENDED MEMORY (ALIAS: MEMORY MANAGEMENT
5681                                  ;       UNIT) HARDWARE REGISTERS.
5682                                  ;
5683                                  ;*******************************************************************************
5684
5685  030560  010046              XMINIT: MOV     R0,-(SP)        ;SAVE WORKING REGISTERS
5686  030562  010146                      MOV     R1,-(SP)
5687  030564  010346                      MOV     R3,-(SP)
5688  030566  013737  000004  031122      MOV     #4,XM4HOL       ;SETUP #4 TRAP VALUE (JUST IN CASE)
5689
5690  030574  012700  077406              MOV     #77406,R0       ;"PDR" INITIALIZATION VALUE
5691                                                              ;  774 = FULL PAGE ACCESS
5692                                                              ;  0 = UPWARD EXPANSION
5693                                                              ;  6 = RESIDENT READ/WRITE
```

```
5694  030600  012701  172300          MOV     #172300,R1      ;ADDRESS OF KPDR0
5695  030604  012703  000010          MOV     #8.,R3          ;LOOP VALUE -- # OF PDR'S
5696  030610  010021              1$: MOV     R0,(R1)+        ;SETUP 1 PDR
5697  030612  077302                  SOB     R3,1$           ;IF ANOTHER PDR, DO IT TOO
5698                                                          ;ELSE, FALL THROUGH & INITIALIZE PAR'S
5699
5700  030614  005000                  CLR     R0              ;INITIALIZATION  ALUE FOR KPAR0
5701  030616  012701  172340          MOV     #172340,R1      ;ADDRESS OF KPAR0
5702  030622  012703  000007          MOV     #7,R3           ;LOOP VALUE -- ONLY FIRST 7 PAR'S DONE BY LOOP
5703  030626  010021              2$: MOV     R0,(R1)+        ;SETUP 1 PAR
5704  030630  062700  000200          ADD     #200,R0         ;CALCULATE NEXT PAR'S INITIALIZATION VALUE
5705  030634  077304                  SOB     R3,2$           ;IF ANOTHEER PAR, DO IT TOO
5706  030636  012721  177600          MOV     #177600,(R1)+   ;ELSE, SETUP KPAR7 FOR I/O PAGE ACCESSING
5707
5708  030642                          SETVEC  #250,#XMINTH,#7 ;SETUP OUR OWN TRAP CATCHER FOR ABORT HANDLING
5709  030642  012746  000007                                                  MOV     #7,-(SP)
5710  030646  012746  031124                                                  MOV     #XMINTH,-(SP)
5711  030652  012746  000250                                                  MOV     #250,-(SP)
5712  030656  012746  000003                                                  MOV     #3,-(SP)
5713  030662  104437                                                          TRAP    C$SVEC
5714  030664  062706  000010                                                  ADD     #10,SP
5715  030670  012603                  MOV     (SP)+,R3        ;RESTORE CALLER'S REGISTERS
5716  030672  012601                  MOV     (SP)+,R1
5717  030674  012600                  MOV     (SP)+,R0
5718  030676  000207                  RTS     PC              ;RETURN
5719
5720                          ;*****************************************************************************
5721                          ; XMWRIT -- SUBROUTINE TO WRITE ONE WORD INTO AN EXTENDED MEMORY LOCATION.
5722                          ;
5723                          ;       CALLING SEQUENCE:
5724                          ;
5725                          ;       JSR     R5,XMWRIT
5726                          ;       <PRINTER TO HIGH ORDER BITS OF ADDRESS IN "PAR" FORMAT>
5727                          ;       <POINTER TO DATA TO BE WRITTEN>
5728                          ;
5729                          ;*****************************************************************************
5730
5731  030700  010146          XMWRIT: MOV     R1,-(SP)        ;SAVE REGISTER(S)
5732
5733  030702  012701  172354          MOV     #172354,R1      ;ADDRESS OF KPAR6
5734  030706  011146                  MOV     (R1),-(SP)      ;SAVE CURRENT KPAR6 VALUE
5735  030710  013521                  MOV     @(R5)+,(R1)     ;SETUP "PAR" FOR THIS WRITE
5736  030712  011137  002426          MOV     (R1),TMP6       ;SAVE ADDRESS FOR ERROR MESSAGE
5737  030716  012737  000060  172516  MOV     #BIT4+BIT5,@#172516  ;ENABLE 22 BIT & I/O PAGE ADDRESSING IN SR3
5738  030724  000241                  CLC                     ;CLEAR OUR ERROR FLAG
5739  030726  013737  000004  031122  MOV     @#4,XM4HOL      ;* SETUP TRAP CATCHER #4 (BECAUSE OF MAPPING)
5740  030734  012737  031074  000004  MOV     #XM4INT,@#4     ;*
5741  030742  052737  000001  177572  BIS     #1,@#177572     ;ENABLE MEMORY MANAGEMENT
5742  030750  013537  140000          MOV     @(R5)+,@#140000 ;WRITE ONE WORD IN THE SPECIFIED PAGE
5743  030754  042737  000001  177572  BIC     #1,@#177572     ;TURN OFF MEMORY MANAGEMENT
5744  030762  013737  031122  000004  MOV     XM4HOL,@#4      ;* RESTORE SUPERVISOR TRAP VECTOR #4
5745  030770  012611                  MOV     (SP)+,(R1)      ;RESTORE KPAR6
5746
5747  030772  012601                  MOV     (SP)+,R1        ;RESTORE CALLER'S REGISTER(S)
5748  030774  000205                  RTS     R5              ;RETURN
5749
```

```
5750
5751                                    ;*****************************************************************************
5752                                    ; XMREAD -- SUBROUTINE TO READ FROM AN EXTENDED MEMORY LOCATION.
5753                                    ;
5754                                    ;       CALLING SEQUENCE:
5755                                    ;
5756                                    ;       JSR     R5,XMREAD
5757                                    ;       <PRINTER TO HIGH ORDER BITS OF ADDRESS IN "PAR" FORMAT>
5758                                    ;       <POINTER TO DATA RECEIVING LOCATION>
5759                                    ;
5760                                    ;*****************************************************************************
5761
5762  030776  010146                    XMREAD: MOV     R1,-(SP)        ;SAVE REGISTER(S)
5763
5764  031000  012701  172354                    MOV     #172354,R1      ;ADDRESS OF KPAR6
5765  031004  011146                            MOV     (R1),-(SP)      ;SAVE CURRENT KPAR6 VALUE
5766  031006  013511                            MOV     @(R5)+,(R1)     ;SETUP "PAR" FOR THIS READ
5767  031010  011137  002426                    MOV     (R1),TMP6       ;SAVE ADDRESS FOR ERROR MESSAGE
5768  031014  012737  000060  172516            MOV     #BIT4+BIT5,@#172516  ;ENABLE 22 BIT & I/O PAGE ADDRESSING IN SR3
5769  031022  000241                            CLC                     ;CLEAR OUR ERROR FLAG
5770  031024  013737  000004  031122            MOV     @#4,XM4HOL      ;* SETUP TRAP CATCHER #4 (BECAUSE OF MAPPING)
5771  031032  012737  031074  000004            MOV     #XM4INT,@#4     ;*
5772  031040  052737  000001  177572            BIS     #1,@#177572     ;ENABLE MEMORY MANAGEMENT
5773  031046  013735  140000                    MOV     @#140000,@(R5)+ ;READ ONE WORD IN THE SPECIFIED PAGE
5774  031052  042737  000001  177572            BIC     #1,@#177572     ;TURN OFF MEMORY MANAGEMENT
5775  031060  013737  031122  000004            MOV     XM4HOL,@#4      ;* RESTORE SUPERVISOR TRAP VECTOR #4
5776  031066  012611                            MOV     (SP)+,(R1)      ;RESTORE KPAR6
5777
5778  031070  012601                            MOV     (SP)+,R1        ;RESTORE CALLER'S REGISTER(S)
5779  031072  000205                            RTS     R5              ;RETURN
5780
5781
5782                                    ;*****************************************************************************
5783                                    ; HANDLER FOR BLOC 4 TRAP PROCESSING (FOR TESTS 7 & 8)
5784                                    ;*****************************************************************************
5785  031074  042737  000001  177572  XM4INT: BIC     #1,@#177572     ;TURN OFF MEMORY MANAGEMENT
5786  031102  013737  031122  000004            MOV     XM4HOL,@#4      ;* RESTORE SUPERVISOR TRAP VECTOR #4
5787  031110  000240                            NOP                     ;*
5788  031112  000240                            NOP                     ;*
5789  031114  000240                            NOP                     ;*
5790  031116  000177  146662                    JMP     @#4             ;NOW JUMP THRU IT !
5791  031122  000000                    XM4HOL: 0
5792
5793                                    ;*****************************************************************************
5794                                    ; INTERRUPT HANDLER FOR MEMORY MANAGEMENT ABORT PROCESSING
5795                                    ;*****************************************************************************
5796
5797  031124                                    BGNSRV  XMINTH
5798  031124                                                                                    XMINTH::
5799  031124  010037  002372                    MOV     R0,REG0         ;SAVE GENERAL REGISTERS
5800  031130  010137  002374                    MOV     R1,REG1
5801  031134  010237  002376                    MOV     R2,REG2
5802  031140  010337  002400                    MOV     R3,REG3
5803  031144  010437  002402                    MOV     R4,REG4
5804  031150  010537  002404                    MOV     R5,REG5
5805  031154  016637  000002  002406            MOV     2(SP),REG6      ;SAVE PSW FROM ERROR TRAP
```

```
5806  031162  011637  002410                  MOV     (SP),REG7       ;LIKEWISE FOR PC
5807
5808  031166  013737  177572  002412          MOV     @#177572,TMP0   ;SAVE THE MMU'S STATUS/CONTROL REGISTERS
5809  031174  013737  177574  002414          MOV     @#177574,TMP1
5810  031202  013737  177576  002416          MOV     @#177576,TMP2
5811  031210  013737  172516  002420          MOV     @#172516,TMP3
5812
5813  031216  013737  172354  002422          MOV     @#172354,TMP4   ;SAVE KERNEL PAR WE'RE SUPPOSE TO BE USING
5814
5815  031224  013737  172314  002424          MOV     @#172314,TMP5   ;SAVE KERNEL PDR WE'RE SUPPOSE TO BE USING
5816
5817  031232  011537  002430                  MOV     (R5),TMP7       ;SAVE DATA READ OR WRITTEN
5818
5819  031236                                  GTDF    EM27,ERR13      ;QUEUE UP THE MMU ERROR
5820                                                                  ;       QUEUE "DEVICE FATAL" ERROR # 43
5821  031236  012737  000001  002202                                                  MOV     #T.EDF,ERRTYP
5822  031244  012737  000053  002204                                                  MOV     #43,ERRNBR
5823  031252  012737  016424  002206                                                  MOV     #EM27,ERRMSG
5824  031260  012737  010240  002210                                                  MOV     #ERR13,ERRBLK
5825
5826  031266  052766  000001  000002          BIS     #BIT0,2(SP)     ;SET CARRY BIT (AS ERROR FLAG) IN PSW ON STACK
5827
5828  031274                                  ENDSRV
5829  031274                                                                  L10045:
5830  031274  000002                                                                  RTI
5831
```

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

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

031276  032737  000002  002370          BIT     #2,PT.CTL       ;IS THIS A MFG SPECIAL Q22 SYSTEM?
031304  001002                          BNE     .+6             ;YES: GO START TEST
031306                                  EXIT    TST             ; NO: SKIP THIS TEST
031306  104432                                                                  TRAP    C$EXIT
031310  001212                                                                  .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  001176                                                                  .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  032524  032542  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
```

```
 5888                                   ;*     EXTENDED ADDRESSES SPECIFIED BY XLOC0 THRU XLOC6 USING 11/23 MMU
 5889                                   ;*     (XLOC'S SPECIFY THE UPPER TWO BYTES OF THE 3 BYTE EXTENDED ADDR)
 5890
 5891  031356  005002                        CLR     R2              ;CLEAR LOCAL INDEX
 5892  031360  016237  032542  002440  11$:  MOV     XVAL0(R2),TMPB  ;SETUP DATA POINTER
 5893  031366  016237  032524  002436        MOV     XLOC0(R2),TMPA  ;SETUP/ADJUST PAR VALUE
 5894  031374  006337  002436                ASL     TMPA
 5895  031400  006337  002436                ASL     TMPA
 5896  031404  004537  030700                JSR     R5,XMWRIT       ;WRITE BACKGROUND PATTERN
 5897  031410  002436                        TMPA                    ; POINTER TO PAR VALUE
 5898  031412  002440                        TMPB                    ; POINTER TO DATA
 5899
 5900  031414  005722                        TST     (R2)+           ;BUMP INDEX
 5901  031416  020227  000016                CMP     R2,#14.         ;ALL 'XLOC' EXTENDED ADDRESSES WRITTEN?
 5902  031422  001356                        BNE     11$             ; NO:  WRITE ANOTHER
 5903
 5904                                   ;*************** SETUP DMV'S NPR ADDRESSING REGISTERS ***************
 5905                                   ;************** (WRITE/READ/VERIFY NPRAIH,NPRAIL,NPRAIX) *************
 5906  031424  116437  032525  031460  3$:     MOVB    XLOC0+1(R4),4$  ;SETUP NPRAIX VALUE.
 5907  031432  004537  004054                JSR     R5,WRITEI       ;POINT NPR REGISTERS TO EXTENDED ADDRESS
 5908  031436  000074                        NPRAIL
 5909  031440  000000                        0
 5910  031442  004537  004054                JSR     R5,WRITEI
 5911  031446  000075                        NPRAIH
 5912  031450  000000                        0
 5913  031452  004537  004054                JSR     R5,WRITEI
 5914  031456  000076                        NPRAIX
 5915  031460  000000                4$:     00
 5916  031462  004537  003616                JSR     R5,READ         ;READ BACK THE ADDRESS
 5917  031466  000074                        NPRAIL
 5918  031470  002256                        BDATA
 5919  031472  004537  003616                JSR     R5,READ
 5920  031476  000075                        NPRAIH
 5921  031500  002257                        BDATA+1
 5922  031502  004537  003616                JSR     R5,READ
 5923  031506  000076                        NPRAIX
 5924  031510  002434                        TMP9
 5925                                                                  ;********** NOW CHECK THEM **********
 5926  031512  005737  002256                TST     BDATA           ;NPRAIL,NPRAIH=0 ?
 5927  031516  001413                        BEQ     6$              ; YES: TRY CHECKING NPRAIX
 5928  031520  005037  002254                CLR     GDATA           ; NO:  REPORT ERROR...
 5929  031524  012737  000007  002300        MOV     #7,REGNUM       ;
 5930  031532  105737  002256                TSTB    BDATA
 5931  031536  001020                        BNE     7$
 5932  031540  005237  002300                INC     REGNUM
 5933  031544  000415                        BR      7$
 5934  031546  013737  031460  002254  6$:     MOV     4$,GDATA        ;SET UP NPRAIX EXPECTED
 5935  031554  013737  002434  002256        MOV     TMP9,BDATA      ;SET UP NPRAIX READ...
 5936  031562  023737  002254  002256        CMP     GDATA,BDATA     ;DOES NPRAIX=EXPECTED ?
 5937  031570  001411                        BEQ     9$              ; YES: CONTINUE
 5938  031572  012737  000006  002300        MOV     #6,REGNUM       ; NO:  REPORT ERROR
 5939  031600                          7$:     GEDF    EM26A,ERR14
 5940                                                                  ;       "DEVICE FATAL" ERROR # 44
 5941  031600  104455                                                                  TRAP    C$ERDF
 5942  031602  000054                                                                  .WORD   44
 5943  031604  016204                                                                  .WORD   EM26A
```

```
031606  011002                                                                          .WORD    ERR14
031610                                    ESCAPE  SUB
031610  104410                                                                          TRAP     C$ESCAPE
031612  000152                                                                          .WORD    L10047-.

                                  ;******* SETUP/START/CHECK THE NPR OPERATION (DATA/NPRCTL) *********
031614  112737  000004  002417  9$:       MOVB    #NPRLD,TMP2+1     ;SETUP CONTROL VALUE TO DO NPR-IN

031622  004537  004042                    JSR     R5,WRITE          ;PERFORM THE "EXTENDED" DATA-IN NPR
031626  123004                            NPRCTL
031630  002417                            TMP2+1
031632  004537  003616                    JSR     R5,READ           ;CHECK THE NPR OPERATION
031636  123004                            NPRCTL
031640  002416                            TMP2
031642  004537  003616                    JSR     R5,READ           ;GET THE DATA WE SHOULD HAVE JUST LOADED INTO
031646  123001                            NPRDRH                    ;        THE NPR DATA REGISTERS FROM THE
031650  002257                            BDATA+1                   ;        EXTENDED MEMORY AREA
031652  004537  003616                    JSR     R5,READ
031656  123000                            NPRDRL
031660  002256                            BDATA
031662  132737  000300  002416            BITB    #300,TMP2         ;DID IT ABORT OR HANG?
031670  001414                            BEQ     14$               ; NO:  GOOD.  PROCEED WITH SUBTEST
031672  100005                            BPL     10$               ; YES: WHICH ONE?
031674                                    GEDF    EM27A,ERR12       ;ABORT, REPORT IT AS SUCH.
                                                                    ;        "DEVICE FATAL" ERROR # 45
031674  104455                                                                          TRAP     C$ERDF
031676  000055                                                                          .WORD    45
031700  016437                                                                          .WORD    EM27A
031702  007456                                                                          .WORD    ERR12
031704  000404                            BR      12$               ;AND EXIT
031706                          10$:      GEDF    EM27B,ERR12       ;HANG, REPORT IT AS SUCH.
                                                                    ;        "DEVICE FATAL" ERROR # 46
031706  104455                                                                          TRAP     C$ERDF
031710  000056                                                                          .WORD    46
031712  016461                                                                          .WORD    EM27B
031714  007456                                                                          .WORD    ERR12
031716                          12$:      ESCAPE  SUB               ;  AND EXIT SUBTEST
031716  104410                                                                          TRAP     C$ESCAPE
031720  000044                                                                          .WORD    L10047-.

                                  ;************* NOW CHECK DATA READ AGAINST EXPECTED VALUE *************
031722  016437  032524  002254  14$:      MOV     XLOCO(R4),GDATA ;SET UP EXPECTED READ VALUE

031730  023737  002256  002254            CMP     BDATA,GDATA       ;DID WE READ THE TEST DATA USING THE NPR?
031736  001406                            BEQ     15$               ;
031740                                    GEDF    EM27C,ERR12       ; NO:  REPORT THE ERROR.
                                                                    ;        "DEVICE FATAL" ERROR # 47
031740  104455                                                                          TRAP     C$ERDF
031742  000057                                                                          .WORD    47
031744  016502                                                                          .WORD    EM27C
031746  007456                                                                          .WORD    ERR12
031750                                    ESCAPE  SUB               ;       AND EXIT FROM SUBTEST
031750  104410                                                                          TRAP     C$ESCAPE
031752  000012                                                                          .WORD    L10047-.

031754  005724                  15$:      TST     (R4)+             ; YES: BUMP INDEX
```

```
6000  031756  020427  000016                  CMP     R4,#14.         ;ARE WE DONE W/ALL EXTENDED LOCATIONS
6001  031762  001220                          BNE     3$              ; NO: DO NEXT EXTENDED LOCATION
6002
6003  031764                          63$:    ENDSUB                  ;YES: END SUBROUTINE
6004  031764                                                                  L10047:
6005  031764  104403                                                          TRAP    C$ESUB
6006
6007
6008
6009                                  ;*************************************************************************
6010                                  ;**  SUBTEST #2 : TEST THE NPR-OUT EXTENDED ADDRESS BITS
6011                                  ;*************************************************************************
6012  031766                          BGNSUB                  ;TEST THE NPR-OUT USING EXTENDED ADDR. BITS
6013  031766                                                                  T8.2:
6014  031766  104402                                                          TRAP    C$BSUB
6015  031770  004737  030560                  JSR     PC,XMINIT       ;INITIALIZE THE MMU
6016  031774  005004                          CLR     R4              ;CLEAR INDEX
6017
6018                                  ;************** MAIN LOOP STARTS HERE ***************
6019  031776  005002                  T8LP:   CLR     R2              ;SETUP EXTENDED MEM BACKGROUND PATTERN
6020  032000  012762  125252  032542  3$:     MOV     #125252,XVAL0(R2)       ;(125252 IN XVAL0 => XVAL6)
6021  032006  005722                          TST     (R2)+           ; THIS IS DONE FOR ERROR REPORTING
6022  032010  020227  000016                  CMP     R2,#14.         ; PURPOSES.
6023  032014  001371                          BNE     3$
6024
6025                                  ;*      WRITE (USING MMU) XVAL0, XVAL1, XVAL2, ... XVAL6 (IE: 125252) INTO
6026                                  ;*      THE SEVEN SPECIFIC EXTENDED ADDRESSES SPECIFIED BY XLOC0 THRU XLOC6
6027                                  ;*      (XLOC'S SPECIFY THE UPPER TWO BYTES OF THE 3 BYTE EXTENDED ADDR)
6028
6029  032016  005002                          CLR     R2              ;CLEAR LOCAL INDEX
6030  032020  016237  032542  002440  11$:     MOV     XVAL0(R2),TMPB  ;SETUP DATA POINTER
6031  032026  016237  032524  002436          MOV     XLOC0(R2),TMPA  ;SETUP/ADJUST PAR VALUE
6032  032034  006337  002436                  ASL     TMPA
6033  032040  006337  002436                  ASL     TMPA
6034  032044  004537  030700                  JSR     R5,XMWRIT       ;WRITE BACKGROUND PATTERN INTO EXTENDED MEMORY
6035  032050  002436                          TMPA                    ; POINTER TO PAR VALUE
6036  032052  002440                          TMPB                    ; POINTER TO DATA (@DATA = 125252)
6037
6038  032054  005722                          TST     (R2)+           ;BUMP INDEX
6039  032056  020227  000016                  CMP     R2,#14.         ;ALL 'XLOC' EXTENDED ADDRESSES WRITTEN?
6040  032062  001356                          BNE     11$             ; NO:  WRITE ANOTHER
6041
6042                                  ;* WE NOW CHANGE ONE LOCATION IN THE "XVAL" BACKGROUND TABLE.
6043                                  ;* AFTER OUR DMV NPR OUT, THIS TABLE WILL REPRESENT THE
6044                                  ;* EXPECTED VALUES OF OUR EXTENDED MEMORY.
6045  032064  012764  052525  032542          MOV     #052525,XVAL0(R4)       ;SETUP EXPECTED PATTERN AFTER NPR-OUT
6046                                                                          ;XVAL0 => XVAL6 NOW = EXPECTED PATTERN
6047
6048                                  ;*************** SETUP DMV NPR ADDRESSING REGISTERS ***************
6049                                  ;************ (WRITE/READ/VERIFY NPRAOH,NPRAOL,NPRAOX) *************
6050  032072  116437  032525  032126          MOVB    XLOC0+1(R4),5$  ;INIT NPRAOX VALUE
6051  032100  004537  004054                  JSR     R5,WRITEI       ;POINT NPR REGISTERS TO EXTENDED ADDRESS
6052  032104  000070                          NPRAOL
6053  032106  000000                          0
6054  032110  004537  004054                  JSR     R5,WRITEI
6055  032114  000071                          NPRAOH
```

```
                                                0
032116  000000                                  JSR     R5,WRITEI
032120  004537  004054                          NPRAOX
032124  000072                                  00
032126  000000                          5$:     JSR     R5,READ         ;READ BACK THE ADDRESS
032130  004537  003616                          NPRAOL
032134  000070                                  BDATA
032136  002256                                  JSR     R5,READ
032140  004537  003616                          NPRAOH
032144  000071                                  BDATA+1
032146  002257                                  JSR     R5,READ
032150  004537  003616                          NPRAOX
032154  000072                                  TMP9
032156  002434
                                                ;********** NOW CHECK THEM **********
032160  005737  002256                          TST     BDATA           ;NPRAOL,NPRAOH=0 ?
032164  001413                                  BEQ     6$              ; YES: TRY CHECKING NPRAOX
032166  005037  002254                          CLR     GDATA           ; NO:  REPORT ERROR...
032172  012737  000004  002300                  MOV     #4,REGNUM       ;
032200  105737  002256                          TSTB    BDATA
032204  001020                                  BNE     7$
032206  005237  002300                          INC     REGNUM
032212  000415                                  BR      7$
032214  013737  032126  002254          6$:     MOV     5$,GDATA        ;SET UP NPRAOX EXPECTED
032222  013737  002434  002256                  MOV     TMP9,BDATA      ;SET UP NPRAOX READ...
032230  023737  002254  002256                  CMP     GDATA,BDATA     ;DOES NPRAOX=EXPECTED ?
032236  001411                                  BEQ     9$              ; YES: CONTINUE
032240  012737  000003  002300                  MOV     #3,REGNUM       ; NO:  REPORT ERROR
032246                                  7$:     GEDF    EM26A,ERR14
                                                ;       "DEVICE FATAL" ERROR # 48
032246  104455                                                          TRAP    C$ERDF
032250  000060                                                          .WORD   48
032252  016204                                                          .WORD   EM26A
032254  011002                                                          .WORD   ERR14
032256                                          ESCAPE  SUB
032256  104410                                                          TRAP    C$ESCAPE
032260  000240                                                          .WORD   L10050-.

                                ;******** SETUP/START/CHECK THE NPR OPERATION (DATA/NPRCTL) *********
032262  012737  052525  002254  9$:     MOV     #052525,GDATA   ;DATA DMV WILL NPR TO TOP LOC

                                ;************** LOAD (DMV) TEST PATTERN **************
032270  004537  004042                  JSR     R5,WRITE                ;LOAD UP THE TEST PATTERN TO BE
032274  123001                          NPRDRH                          ;WRITTEN INTO EXTENDED MEMORY BY
032276  002255                          GDATA+1                         ;THE DMV
032300  004537  004042                  JSR     R5,WRITE
032304  123000                          NPRDRL
032306  002254                          GDATA

                                ;***************** PERFORM/CHECK NPR OPERATION (BUT NOT DATA) ***************
032310  112737  000044  002417          MOVB    #NPRDL,TMP2+1   ;SETUP CONTROL VALUE TO DO NPR-OUT

032316  004537  004042                  JSR     R5,WRITE        ;PERFORM THE "EXTENDED" DATA-OUT NPR
032322  123004                          NPRCTL
032324  002417                          TMP2+1
032326  004537  003616                  JSR     R5,READ         ;CHECK THE NPR OPERATION
032332  123004                          NPRCTL
```

```
                                        TMP2
                                BITB    #300,TMP2       ;DID IT ABORT OR HANG?
                                BEQ     14$             ;NO, GOOD.  PROCEED WITH SUBTEST
                                BPL     10$             ;YES, WHICH ONE?
                                GEDF    EM27A,ERR12     ;ABORT, REPORT IT AS SUCH.
                                                        ;       "DEVICE FATAL" ERROR # 49
                                                                                TRAP    C$ERDF
                                                                                .WORD   49
                                                                                .WORD   EM27A
                                                                                .WORD   ERR12
                                BR      12$             ;AND EXIT
                        10$:    GEDF    EM27B,ERR12     ;HANG, REPORT IT AS SUCH.
                                                        ;       "DEVICE FATAL" ERROR # 50
                                                                                TRAP    C$ERDF
                                                                                .WORD   50
                                                                                .WORD   EM27B
                                                                                .WORD   ERR12
                        12$:    ESCAPE  SUB             ;  AND EXIT SUBTEST
                                                                                TRAP    C$ESCAPE
                                                                                .WORD   L10050-.

                        ;********** READ EXTENDED MEM INTO LOCAL RAM (RXVAL0-6) ***************
                        14$:    CLR     R2              ;CLEAR LOCAL INDEX
                        15$:    MOV     XLOC0(R2),TMPA  ;SETUP/ADJUST PAR VALUE
                                ASL     TMPA
                                ASL     TMPA
                                JSR     R5,XMREAD       ;READ EXTENDED MEM BACKGROUND PATTERN
                                TMPA                    ; POINTER TO PAR VALUE
                                TMPB                    ; POINTER TO DATA STORAGE
                                MOV     TMPB,RXVAL0(R2) ;# SAVE ACTUAL EXTENDED DATA
                                ADD     #2,R2           ;BUMP INDEX
                                CMP     R2,#14.         ;ALL 'XLOC' EXTENDED ADDRESSES READ?
                                BNE     15$             ; NO:  READ ANOTHER

                        ;********** NOW CHECK EXPECTED VS. ACTUAL EXT. MEM VALUES **********
                                CLR     R2
                        16$:    CMP     RXVAL0(R2),XVAL0(R2)
                                BEQ     17$
                                GEDF    EM60N,ERR60
                                                        ;       "DEVICE FATAL" ERROR # 51
                                                                                TRAP    C$ERDF
                                                                                .WORD   51
                                                                                .WORD   EM60N
                                                                                .WORD   ERR60
                                ESCAPE  SUB
                                                                                TRAP    C$ESCAPE
                                                                                .WORD   L10050-.
                        17$:    TST     (R2)+           ;BUMP LOCAL INDEX
                                CMP     R2,#14.         ;ALL VALUES CHECKED ?
                                BNE     16$

                        20$:    TST     (R4)+           ; YES: BUMP INDEX
                                CMP     R4,#14.         ;ARE WE DONE W/ALL EXTENDED LOCATIONS
                                BEQ     63$             ; YES: END
                                JMP     T8LP            ; NO:  GO DO SOME MORE
                        63$:    ENDSUB
```

```
032520                                                                L10050:
032520  104403                                                                TRAP    C$ESUB
032522                  MFEND:  ENDTST
032522                                                                L10046:
032522  104401                                                                TRAP    C$ETST


032524  037400          XLOC0:  37400           ;ADDRESS 17600000 POINTER
032526  037000          XLOC1:  37000           ;ADDRESS 17400000 POINTER
032530  036400          XLOC2:  36400           ;ADDRESS 17200000 POINTER
032532  035400          XLOC3:  35400           ;ADDRESS 16600000 POINTER
032534  033400          XLOC4:  33400           ;ADDRESS 15600000 POINTER
032536  027400          XLOC5:  27400           ;ADDRESS 13600000 POINTER
032540  017400          XLOC6:  17400           ;ADDRESS 07600000 POINTER

032542  000000          XVAL0:  0
032544  000000          XVAL1:  0
032546  000000          XVAL2:  0
032550  000000          XVAL3:  0
032552  000000          XVAL4:  0
032554  000000          XVAL5:  0
032556  000000          XVAL6:  0

032560  000000          RXVAL0: 0
032562  000000          RXVAL1: 0
032564  000000          RXVAL2: 0
032566  000000          RXVAL3: 0
032570  000000          RXVAL4: 0
032572  000000          RXVAL5: 0
032574  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
                                                                                T9::
032576                  JSR     PC,MSTCLR       ;ISSUE MASTER CLEAR & ENTER MAINT. LOOP
032576  004737  003514  BCC     1$              ;IF NO ERROR, CONTINUE
032602  103003          ERROR                   ;ELSE, REPORT IT AND
032604                                                          TRAP    C$ERROR
032604  104460          EXIT    TST             ;EXIT THIS TEST
032606                                                          TRAP    C$EXIT
032606  104432                                                  .WORD   L10051-.
032610  001272
                        ;-------------------------------------------------------------------------
                        ;               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
                        ;
032612                  1$:     BGNSUB
032612                                                          T9.1:
032612  104402                                                  TRAP    C$BSUB
032614  012737  177777  002274  MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
032622  005037  002272          CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
```

```
6254  032626  112777  000000  147464          MOVB    #0,@#BBSEL0     ;DISABLE BOTH INTERRUPTS
6255  032634  004537  004054                  JSR     R5,WRITEI       ;LOAD THE INTERRUPT CONTROL REGISTER WITH
6256  032640  123005                          IRQREG                  ;  BOTH BITS SET.  THIS SHOULD NOT CAUSE
6257  032642  000006                          IRQA!IRQB               ;  AN INTERRUPT AT EITHER LEVEL
6258  032644  103003                          BCC     30$             ;IF AN ERROR OCCURED,
6259  032646                                  ERROR                   ;REPORT IT &
6260  032646  104460                                                          TRAP    C$ERROR
6261  032650                                  ESCAPE  TST             ;  QUIT
6262  032650  104410                                                          TRAP    C$ESCAPE
6263  032652  001230                                                          .WORD   L10051-.
6264
6265  032654  105737  002272          30$:    TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
6266  032660  001407                          BEQ     5$              ;NO.  GOOD.  GO TEST THE "B" INTERRUPT
6267  032662  012737  000001  002254          MOV     #1,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6268  032670                                  GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
6269                                                                  ;       "DEVICE FATAL" ERROR # 52
6270  032670  104455                                                          TRAP    C$ERDF
6271  032672  000064                                                          .WORD   52
6272  032674  016526                                                          .WORD   EM34
6273  032676  006212                                                          .WORD   ERR1
6274
6275  032700  105737  002273          5$:     TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
6276  032704  001407                          BEQ     6$              ;NO.  GOOD.  NOW TRY LETTING ONE THROUGH
6277  032706  012737  000002  002254          MOV     #2,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6278  032714                                  GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
6279                                                                  ;       "DEVICE FATAL" ERROR # 53
6280  032714  104455                                                          TRAP    C$ERDF
6281  032716  000065                                                          .WORD   53
6282  032720  016540                                                          .WORD   EM34B
6283  032722  006212                                                          .WORD   ERR1
6284
6285  032724  005037  002272          6$:     CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
6286  032730  112777  000021  147362          MOVB    #IENBA!IENB8,@#BSEL0    ;ENABLE BOTH INTERRUPTS
6287  032736  012703  010000                  MOV     #4096.,R3       ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
6288  032742  077301                          SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
6289  032744  105737  002272                  TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
6290  032750  001407                          BEQ     7$              ;NO.  GOOD.  GO TEST THE "B" INTERRUPT
6291  032752  012737  000003  002254          MOV     #3,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6292  032760                                  GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
6293                                                                  ;       "DEVICE FATAL" ERROR # 54
6294  032760  104455                                                          TRAP    C$ERDF
6295  032762  000066                                                          .WORD   54
6296  032764  016526                                                          .WORD   EM34
6297  032766  006212                                                          .WORD   ERR1
6298
6299  032770  105737  002273          7$:     TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
6300  032774  001407                          BEQ     8$              ;NO.  GOOD.  NOW TRY LETTING ONE THROUGH
6301  032776  012737  000004  002254          MOV     #4,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6302  033004                                  GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
6303                                                                  ;       "DEVICE FATAL" ERROR # 55
6304  033004  104455                                                          TRAP    C$ERDF
6305  033006  000067                                                          .WORD   55
6306  033010  016540                                                          .WORD   EM34B
6307  033012  006212                                                          .WORD   ERR1
6308
6309  033014                          8$:     ENDSUB
```

```
6310  033014                                                                  L10052:
6311  033014  104403                                                                 TRAP    C$ESUB
6312
6313                          ;-------------------------------------------------------------------------
6314                          ;               TEST FOR "A" INTERRUPT WHEN ENABLED
6315                          ;
6316                          ;       1. DISABLE BOTH INTERRUPTS
6317                          ;
6318                          ;       2. ASSERT "B" REQUEST BIT TO 1:
6319                          ;               DISABLING "B" & FORCING "A"
6320                          ;
6321                          ;       3. CHECK FOR NO "A" INTERRUPT
6322                          ;
6323                          ;       4. CHECK FOR NO "B" INTERRUPT
6324                          ;
6325                          ;       5. ENABLE BOTH INTERRUPTS
6326                          ;
6327                          ;       6. CHECK FOR "A" INTERRUPT
6328                          ;
6329                          ;       7. CHECK FOR NO "B" INTERRUPT
6330
6331  033016                  BGNSUB
6332  033016                                                                  T9.2:
6333  033016  104402                                                                 TRAP    C$BSUB
6334  033020  012737  177777  002274          MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
6335  033026  005037  002272                  CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
6336  033032  112777  000000  147260          MOVB    #0,@#BSELO      ;DISABLE INTERRUPTS AGAIN
6337  033040  004537  004054                  JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON "A"
6338  033044  123005                          IRQREG                  ;   BUT NOT ON "B"
6339  033046  000002                          IRQB
6340  033050  103003                          BCC     31$             ;IF AN ERROR OCCURED,
6341  033052                                  ERROR                   ;REPORT IT &
6342  033052  104460                                                                  TRAP    C$ERROR
6343  033054                                  ESCAPE  TST             ;  QUIT
6344  033054  104410                                                                  TRAP    C$ESCAPE
6345  033056  001024                                                                  .WORD   L10051-.
6346
6347  033060  105737  002272          31$:    TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
6348  033064  001407                          BEQ     10$             ;NO.  GOOD.  GO TEST THE "B" INTERRUPT
6349  033066  012737  000005  002254          MOV     #5,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6350  033074                                  GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
6351                                                                  ;       "DEVICE FATAL" ERROR # 56
6352  033074  104455                                                                  TRAP    C$ERDF
6353  033076  000070                                                                  .WORD   56
6354  033100  016526                                                                  .WORD   EM34
6355  033102  006212                                                                  .WORD   ERR1
6356
6357  033104  105737  002273          10$:    TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
6358  033110  001407                          BEQ     11$             ;NO.  GOOD.  NOW TRY LETTING ONE THROUGH
6359  033112  012737  000006  002254          MOV     #6,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6360  033120                                  GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
6361                                                                  ;       "DEVICE FATAL" ERROR # 57
6362  033120  104455                                                                  TRAP    C$ERDF
6363  033122  000071                                                                  .WORD   57
6364  033124  016540                                                                  .WORD   EM34B
6365  033126  006212                                                                  .WORD   ERR1
```

```
6366
6367  033130  005037  002272          11$:    CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
6368  033134  112777  000021  147156          MOVB    #IENBA!IENBB,@#BSELO    ;ENABLE BOTH INTERRUPTS
6369  033142  012703  010000                  MOV     #4096.,R3       ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
6370  033146  077301                          SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
6371  033150  105737  002272                  TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
6372  033154  001007                          BNE     12$             ;YES, GOOD.  GO TEST THE "B" INTERRUPT
6373  033156  012737  000007  002254          MOV     #7,GDATA        ;NO,  TELL ERROR HANDLER WHAT WE HAD DONE
6374  033164                                  GEDF    EM35,ERR1       ;REPORT MISSING INTERRUPT ON "ENABLE"
6375                                                                  ;       "DEVICE FATAL" ERROR # 58
6376  033164  104455                                                                  TRAP    C$ERDF
6377  033166  000072                                                                  .WORD   58
6378  033170  016552                                                                  .WORD   EM35
6379  033172  006212                                                                  .WORD   ERR1
6380
6381  033174  105737  002273          12$:    TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
6382  033200  001407                          BEQ     13$             ;NO,  GOOD.  NOW TRY HITTING THE "B" INTERRUPT
6383  033202  012737  000010  002254          MOV     #8.,GDATA       ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6384  033210                                  GEDF    EM348,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
6385                                                                  ;       "DEVICE FATAL" ERROR # 59
6386  033210  104455                                                                  TRAP    C$ERDF
6387  033212  000073                                                                  .WORD   59
6388  033214  016540                                                                  .WORD   EM348
6389  033216  006212                                                                  .WORD   ERR1
6390
6391  033220                          13$:    ENDSUB
6392  033220                                                                  L10053:
6393  033220  104403                                                                  TRAP    C$ESUB
6394
6395                                  ;-------------------------------------------------------------------------
6396                                  ;               TEST FOR "B" INTERRUPT WHEN ENABLED
6397                                  ;
6398                                  ;       1. DISABLE BOTH INTERRUPTS
6399                                  ;
6400                                  ;       2. ASSERT "A" REQUEST BIT TO 1:
6401                                  ;            DISABLING "A" & FORCING "B"
6402                                  ;
6403                                  ;       3. CHECK FOR NO "A" INTERRUPT
6404                                  ;
6405                                  ;       4. CHECK FOR NO "B" INTERRUPT
6406                                  ;
6407                                  ;       5. ENABLE BOTH INTERRUPTS
6408                                  ;
6409                                  ;       6. CHECK FOR NO "A" INTERRUPT
6410                                  ;
6411                                  ;       7. CHECK FOR "B" INTERRUPT
6412
6413  033222                          BGNSUB
6414  033222                                                                  T9.3:
6415  033222  104402                                                                  TRAP    C$BSUB
6416  033224  012737  177777  002274          MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
6417  033232  005037  002272                  CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
6418  033236  112777  000000  147054          MOVB    #0,@#BSELO      ;DISABLE INTERRUPTS AGAIN
6419  033244  004537  004054                  JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON "B"
6420  033250  123005                          IRQREG                  ;   BUT NOT ON "A"
6421  033252  000004                          IRQA
```

```
6422  033254  103003                    BCC     32$             ;IF AN ERROR OCCURED,
6423  033256                            ERROR                   ;REPORT IT &
6424  033256  104460                                                    TRAP    C$ERROR
6425  033260                            ESCAPE  TST             ;  EXIT
6426  033260  104410                                                    TRAP    C$ESCAPE
6427  033262  000620                                                    .WORD   L10051-.
6428
6429  033264  105737  002272    32$:    TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
6430  033270  001407                    BEQ     14$             ;NO,  GOOD.  GO TEST THE "B" INTERRUPT
6431  033272  012737  000011  002254    MOV     #9.,GDATA       ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6432  033300                            GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
6433                                                            ;       "DEVICE FATAL" ERROR # 60
6434  033300  104455                                                    TRAP    C$ERDF
6435  033302  000074                                                    .WORD   60
6436  033304  016526                                                    .WORD   EM34
6437  033306  006212                                                    .WORD   ERR1
6438
6439  033310  105737  002273    14$:    TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
6440  033314  001407                    BEQ     15$             ;NO,  GOOD.  NOW TRY LETTING ONE THROUGH
6441  033316  012737  000012  002254    MOV     #10.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6442  033324                            GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
6443                                                            ;       "DEVICE FATAL" ERROR # 61
6444  033324  104455                                                    TRAP    C$ERDF
6445  033326  000075                                                    .WORD   61
6446  033330  016540                                                    .WORD   EM34B
6447  033332  006212                                                    .WORD   ERR1
6448
6449  033334  005037  002272    15$:    CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
6450  033340  112777  000021  146752    MOVB    #IENBA!IENBB,@#BSELO    ;ENABLE BOTH INTERRUPTS
6451  033346  012703  010000            MOV     #4096.,R3       ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
6452  033352  077301                    SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
6453  033354  105737  002272            TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
6454  033360  001407                    BEQ     16$             ;NO,  GOOD.  GO TEST THE "B" INTERRUPT
6455  033362  012737  000013  002254    MOV     #11.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6456  033370                            GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
6457                                                            ;       "DEVICE FATAL" ERROR # 62
6458  033370  104455                                                    TRAP    C$ERDF
6459  033372  000076                                                    .WORD   62
6460  033374  016526                                                    .WORD   EM34
6461  033376  006212                                                    .WORD   ERR1
6462
6463  033400  105737  002273    16$:    TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
6464  033404  001007                    BNE     17$             ;YES, GOOD.  NOW TRY HITTING THE "B" INTERRUPT
6465  033406  012737  000014  002254    MOV     #12.,GDATA      ;NO,  TELL ERROR HANDLER WHAT WE HAD DONE
6466  033414                            GEDF    EM35B,ERR1      ;REPORT MISSING INTERRUPT ON "ENABLE"
6467                                                            ;       "DEVICE FATAL" ERROR # 63
6468  033414  104455                                                    TRAP    C$ERDF
6469  033416  000077                                                    .WORD   63
6470  033420  016573                                                    .WORD   EM35B
6471  033422  006212                                                    .WORD   ERR1
6472
6473  033424                    17$:    ENDSUB
6474  033424                                                  L10054:
6475  033424  104403                                                    TRAP    C$ESUB
6476
6477                            ;-------------------------------------------------------------------------
```

```
                                ;    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

033426                          BGNSUB
033426                                                                  T9.4:
033426  104402                                                                  TRAP    C$BSUB
033430  012737  177777  002274        MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
033436  005037  002272              CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
033442  112777  000000  146650      MOVB    #0,@BSELO       ;DISABLE INTERRUPTS AGAIN
033450  004537  004054              JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON BOTH "A" & "B"
033454  123005                      IRQREG
033456  000000                      0
033460  103003                      BCC     31$             ;IF AN ERROR OCCURED,
033462                              ERROR                   ;REPORT IT &
033462  104460                                                                  TRAP    C$ERROR
033464                              ESCAPE  TST             ;  QUIT
033464  104410                                                                  TRAP    C$ESCAPE
033466  000414                                                                  .WORD   L10051-.
033470  105737  002272        31$:  TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
033474  001407                      BEQ     10$             ;NO,  GOOD.  GO TEST THE "B" INTERRUPT
033476  012737  000015  002254        MOV     #13.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
033504                              GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
                                    ;               "DEVICE FATAL" ERROR # 64
033504  104455                                                                  TRAP    C$ERDF
033506  000100                                                                  .WORD   64
033510  016526                                                                  .WORD   EM34
033512  006212                                                                  .WORD   ERR1
033514  105737  002273        10$:  TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
033520  001407                      BEQ     11$             ;NO,  GOOD.  NOW TRY LETTING ONE THROUGH
033522  012737  000016  002254        MOV     #14.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
033530                              GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
                                    ;               "DEVICE FATAL" ERROR # 65
033530  104455                                                                  TRAP    C$ERDF
033532  000101                                                                  .WORD   65
033534  016540                                                                  .WORD   EM34B
033536  006212                                                                  .WORD   ERR1
033540  005037  002272        11$:  CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
033544  112777  000021  146546      MOVB    #IENBA!IENBB,@BSELO     ;ENABLE BOTH INTERRUPTS
033552  012703  010000              MOV     #4096.,R3       ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
```

```
6534  033556  077301                          SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
6535  033560  105737  002272                  TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
6536  033564  001007                          BNE     12$             ;YES, GOOD.  GO TEST THE "B" INTERRUPT
6537  033566  012737  000017  002254          MOV     #15.,GDATA      ;NO,  TELL ERROR HANDLER WHAT WE HAD DONE
6538  033574                                  GEDF    EM35,E.R1       ;REPORT MISSING INTERRUPT ON "ENABLE"
6539                                                                  ;       "DEVICE FATAL" ERROR # 66
6540  033574  104455                                                                  TRAP    C$ERDF
6541  033576  000102                                                                  .WORD   66
6542  033600  016552                                                                  .WORD   EM35
6543  033602  006212                                                                  .WORD   ERR1
6544
6545  033604  105737  002273          12$:    TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
6546  033610  001407                          BEQ     13$             ;NO,  GOOD.  NOW TRY HITTING THE "B" INTERRUPT
6547  033612  012737  000020  002254          MOV     #16.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6548  033620                                  GEDF    EM348,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
6549                                                                  ;       "DEVICE FATAL" ERROR # 67
6550  033620  104455                                                                  TRAP    C$ERDF
6551  033622  000103                                                                  .WORD   67
6552  033624  016540                                                                  .WORD   EM348
6553  033626  006212                                                                  .WORD   ERR1
6554
6555  033630                          13$:    ENDSUR
6556  033630                                                                  L10055:
6557  033630  104403                                                                  TRAP    C$ESUB
6558
6559                                  ;-------------------------------------------------------------------------
6560                                  ;               TEST FOR "A" INTERRUPT WHILE ENABLED
6561                                  ;
6562                                  ;       1. ENABLE BOTH INTERRUPTS
6563                                  ;
6564                                  ;       2. ASSERT "B" REQUEST BIT TO 1:
6565                                  ;               DISABLING "B" & FORCING "A"
6566                                  ;
6567                                  ;       3. CHECK FOR "A" INTERRUPT
6568                                  ;
6569                                  ;       4. CHECK FOR NO "B" INTERRUPT
6570
6571  033632                                  BGNSUB
6572  033632                                                                  T9.5:
6573  033632  104402                                                                  TRAP    C$BSUB
6574  033634  012737  177777  002274          MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
6575  033642  005037  002272                  CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
6576  033646  112777  000021  146444          MOVB    #IENBA!IENBB,@BSELO     ;ENABLE BOTH INTERRUPTS
6577  033654  004537  004054                  JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON "A"
6578  033660  123005                          IRQREG                  ;   BUT NOT ON "B"
6579  033662  000002                          IRQB
6580  033664  103003                          BCC     31$             ;IF AN ERROR OCCURED,
6581  033666                                  ERROR                   ;REPORT IT &
6582  033666  104460                                                                  TRAP    C$ERROR
6583  033670                                  ESCAPE  TST             ;  QUIT
6584  033670  104410                                                                  TRAP    C$ESCAPE
6585  033672  000210                                                                  .WORD   L10051-.
6586
6587  033674  012703  010000          31$:    MOV     #4096.,R3       ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
6588  033700  077301                          SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
6589  033702  105737  002272                  TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
```

```
6590  033706  001007                          BNE     12$             ;YES, GOOD.  GO TEST THE "B" INTERRUPT
6591  033710  012737  000023  002254          MOV     #19.,GDATA      ;NO,  TELL ERROR HANDLER WHAT WE HAD DONE
6592  033716                                  GEDF    EM35,ERR1       ;REPORT MISSING INTERRUPT ON "ENABLE"
6593                                                                  ;       "DEVICE FATAL" ERROR # 68
6594  033716  104455                                                                  TRAP    C$ERDF
6595  033720  000104                                                                  .WORD   68
6596  033722  016552                                                                  .WORD   EM35
6597  033724  006212                                                                  .WORD   ERR1
6598
6599  033726  105737  002273          12$:    TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
6600  033732  001407                          BEQ     13$             ;NO,  GOOD.  NOW TRY HITTING THE "B" INTERRUPT
6601  033734  012737  000024  002254          MOV     #20.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6602  033742                                  GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
6603                                                                  ;       "DEVICE FATAL" ERROR # 69
6604  033742  104455                                                                  TRAP    C$ERDF
6605  033744  000105                                                                  .WORD   69
6606  033746  016540                                                                  .WORD   EM34B
6607  033750  006212                                                                  .WORD   ERR1
6608
6609  033752                          13$:    ENDSUB
6610  033752                                                                  L10056:
6611  033752  104403                                                                  TRAP    C$ESUB
6612
6613                                  ;-----------------------------------------------------------------------
6614                                  ;               TEST FOR "B" INTERRUPT WHILE ENABLED
6615                                  ;
6616                                  ;       1. ENABLE BOTH INTERRUPTS
6617                                  ;
6618                                  ;       2. ASSERT "A" REQUEST BIT TO 1:
6619                                  ;               DISABLING "A" & FORCING "B"
6620                                  ;
6621                                  ;       3. CHECK FOR NO "A" INTERRUPT
6622                                  ;
6623                                  ;       4. CHECK FOR "B" INTERRUPT
6624
6625  033754                                  BGNSUB
6626  033754                                                                  T9.6:
6627  033754  104402                                                                  TRAP    C$BSUB
6628  033756  012737  177777  002274          MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
6629  033764  005037  002272                  CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
6630  033770  112777  000021  146322          MOVB    #IENBA!IENBB,@BSELO     ;ENABLE BOTH INTERRUPTS
6631  033776  004537  004054                  JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON "B"
6632  034002  123005                          IRQREG                  ;   BUT NOT ON "A"
6633  034004  000004                          IRQA
6634  034006  103003                          BCC     32$             ;IF AN ERROR OCCURED,
6635  034010                                  ERROR                   ;REPORT IT &
6636  034010  104460                                                                  TRAP    C$ERROR
6637  034012                                  ESCAPE  TST             ;  QUIT
6638  034012  104410                                                                  TRAP    C$ESCAPE
6639  034014  000066                                                                  .WORD   L10051-.
6640
6641  034016  012703  010000          32$:    MOV     #4096.,R3       ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
6642  034022  077301                          SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
6643  034024  105737  002272                  TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
6644  034030  001407                          BEQ     16$             ;NO,  GOOD.  GO TEST THE "B" INTERRUPT
6645  034032  012737  000025  002254          MOV     #21.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
```

```
6646  034040                                  GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
6647                                                                  ;       "DEVICE FATAL" ERROR # 70
6648  034040  104455                                                                  TRAP    C$ERDF
6649  034042  000106                                                                  .WORD   70
6650  034044  016526                                                                  .WORD   EM34
6651  034046  006212                                                                  .WORD   ERR1
6652
6653  034050  105737  002273          16$:    TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
6654  034054  001007                  BNE     17$             ;YES. GOOD.  NOW TRY HITTING THE "B" INTERRUPT
6655  034056  012737  000026  002254          MOV     #22.,GDATA      ;NO.  TELL ERROR HANDLER WHAT WE HAD DONE
6656  034064                          GEDF    EM358,ERR1      ;REPORT MISSING INTERRUPT ON "ENABLE"
6657                                                                  ;       "DEVICE FATAL" ERROR # 71
6658  034064  104455                                                                  TRAP    C$ERDF
6659  034066  000107                                                                  .WORD   71
6660  034070  016573                                                                  .WORD   EM358
6661  034072  006212                                                                  .WORD   ERR1
6662
6663  034074                          17$:    ENDSUB
6664  034074                                                                  L10057:
6665  034074  104403                                                                  TRAP    C$ESUB
6666
6667  034076  005037  002274                  CLR     INTWCH          ;TELL HANDLERS TO STOP WATCHING FOR INTERRUPTS
6668  034102                          ENDTST
6669  034102                                                                  L10051:
6670  034102  104401                                                                  TRAP    C$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
                                                                                        T10::
034104                                  BIT     #BIT0,PFLAG     ;IF BUS RESETS ARE NOT ALLOWED,
034104  032737  000001  002316          BNE     10$             ;  BYPASS THIS TEST
034112  001031                                                  ;ELSE,
034114  004737  003514                  JSR     PC,MSTCLR       ;INIT DMV & START UP THE MAINT. LOOP
034120  103003                          BCC     1$              ;IF AN ERROR OCCURED,
034122                                  ERROR                   ;REPORT IT &
034122  104460                                                                  TRAP    C$ERROR
034124                                  ESCAPE  TST             ;  EXIT
034124  104410                                                                  TRAP    C$ESCAPE
034126  000050                                                                  .WORD   L10060-.

034130  004537  004054          1$:     JSR     R5,WRITEI       ;NOW SET "DISABLE INIT"
034134  123004                          NPRCTL
034136  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.

034140  112777  000377  146160          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!

034146                                  BRESET                  ;THE "SUPERVISOR" WILL DO A BUS RESET FOR US
034146  104433                                                                  TRAP    C$RESET
034150  012703  010000                  MOV     #4096.,R3       ;DELAY FOR A BIT SO THE MICRO-DIAG. CAN DO
034154  077301                          SOB     R3,.            ;ITS THING IF IT'S GOING TO
034156  122777  000377  146142          CMPB    #377,@BSEL3     ;IF A FAILURE OCCURED, THIS SHOULD HAVE BEEN
034164  001404                          BEQ     10$             ;ALTERED BY NOW.  IF NOT, ALL'S WELL -- EXIT
034166                                  GEDF    EM40,ERR1       ;ELSE, "DISABL INIT" DIDN'T STOP "BUS RESET"
                                        ;       "DEVICE FATAL" ERROR # 72
```

```
 6722  034166  104455                                          TRAP    C$ERDF
 6723  034170  000110                                          .WORD   72
 6724  034172  016614                                          .WORD   EM40
 6725  034174  006212                                          .WORD   ERR1
 6726
 6727  034176                        10$:    ENDTST
 6728  034176                                          L10060:
 6729  034176  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::
034200                                  JSR     PC,MSTCLR       ;INIT DMV & START UP THE MAINT. LOOP
034200  004737  003514                  BCC     1$              ;IF AN ERROR OCCURED,
034204  103003                          ERROR                   ;REPORT IT &
034206                                                                  TRAP    C$ERROR
034206  104460                          ESCAPE  TST             ;  EXIT
034210                                                                  TRAP    C$ESCAPE
034210  104410                                                          .WORD   L10061-.
034212  000030
034214  004537  004054          1$:     JSR     R5,WRITEI       ;NOW SET "DISABLE INIT"
034220  123004                          NPRCTL
034222  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.

034224  004737  003514                  JSR     PC,MSTCLR       ;INIT THE DMV & RESTART THE M-LOOP
034230  103004                          BCC     2$              ;IF AN ERROR OCCURED, IGNORE QUEUED ERROR AND
034232                                  GEDF    EM41,ERR1       ;REPORT THAT "DISABL INIT" STOPPED MASTER CLEAR
                                        ;       "DEVICE FATAL" ERROR # 73
034232  104455                                                          TRAP    C$ERDF
034234  000111                                                          .WORD   73
034236  016671                                                          .WORD   EM41
034240  006212                                                          .WORD   ERR1
034242                          2$:     ENDTST
034242                                                          L10061:
034242  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
034244                                                                  T12::
        000014          DCOKTS  = $T                    ;DEFINE TEST # FOR "INIT" SECTION
034244  032737  000001  002370          BIT     #PU24,PT.CTL    ;IS POWER-UP STRAPPED FOR OPTION 0?
034252  001002                        BNE     1$              ;YES, THEN WE CAN DO THIS TEST
034254                                  EXIT    TST             ;NO,  WE CAN'T DO THIS TEST UNLESS IT IS!
034254  104432                                                          TRAP    C$EXIT
034256  000476                                                          .WORD   L10062-.

034260  032737  000001  002316  1$:     BIT     #BIT0,PFLAG     ;IF BUS RESETS ARE ALLOWED,
034266  001402                        BEQ     2$              ;  PERFORM THIS TEST
034270                                  EXIT    TST             ;ELSE, BYPASS IT
034270  104432                                                          TRAP    C$EXIT
034272  000462                                                          .WORD   L10062-.

034274                          2$:     DELAY   40.             ;DELAY TO PREVENT TST # ROACHING
034274  012727  000050                                                  MOV     #40.,(PC)+
034300  000000                                                          .WORD   0
034302  013727  002116                                                  MOV     L$DLY,(PC)+
034306  000000                                                          .WORD   0
034310  005367  177772                                                  DEC     -6(PC)
034314  001375                                                          BNE     .-4
034316  005367  177756                                                  DEC     -22(PC)
034322  001367                                                          BNE     .-20
                                ;-----------------------------------------------------------------------
                                ; SUBTEST #1: DCOK H LO (RESET DMV)
                                ;-----------------------------------------------------------------------
                                        BGNSUB          ; <====>  TEST FOR POWER-DOWN/UP & DMV-11 RESET
034324                                                                  T12.1:
034324  104402                                                          TRAP    C$BSUB
034326  004737  003514                BSUB    JSR     PC,MSTCLR       ;INIT DMV & START UP THE MAINT. LOOP
034332  103003                        BCC     3$              ;IF AN ERROR OCCURED,
034334                                  ERROR                   ;REPORT IT &
034334  104460                                                          TRAP    C$ERROR
034336                                  ESCAPE  SUB             ;  EXIT
034336  104410                                                          TRAP    C$ESCAPE
034340  000220                                                          .WORD   L10063-.
```

```
6828  034342                          3$:     SETVEC  #24,#5$,#7      ;SETUP VECTOR FOR POWER FAIL INTERRUPT HANDLER
6829  034342  012746  000007                                                  MOV     #7,-(SP)
6830  034346  012746  034450                                                  MOV     #5$,-(SP)
6831  034352  012746  000024                                                  MOV     #24,-(SP)
6832  034356  012746  000003                                                  MOV     #3,-(SP)
6833  034362  104437                                                          TRAP    C$SVEC
6834  034364  062706  000010                                                  ADD     #10,SP
6835  034370  112737  177777  002274          MOVB    #-1,INTWCH      ;EXPECT AN "A" INTERRUPT (IF "DCOK" FAILS!)
6836  034376  105037  002272          CLRB    INTFLG          ;CLEAR THE FLAG IN CASE WE WANT TO DETECT IT
6837  034402  152777  000001  145710  BISB    #IENBA,@BSEL0   ;NOW ENABLE "A" INTERRUPTS
6838
6839  034410  010637  002454          MOV     SP,OLDSP        ;SAVE THE STACK POINTER
6840
6841                                  ;       SETUP "DISABL INIT" TO ALLOW BINIT TO RESET THE DMV AND THEN CAUSE
6842                                  ;       A POWER-FAIL CONDITION TO BE SIMULATED.
6843
6844  034414  012777  177506  145712          MOV     #177400!LSIDCL!DMVPU!NPRGO,@BSEL6  ;VALUE TO BE LOADED INTO
6845  034422  012777  123004  145700          MOV     #NPRCTL,@BSEL4          ;THE NPR CONTROL REGISTER
6846  034430  112777  000042  145666          MOVB    #URILOC!<IRQA*8.>,@BSEL2  ;TELL M-LOOP TO WRITE IT & INTERRUPT
6847                                                                          ;US JUST BEFORE REQUESTING ANOTHER
6848                                                                          ;M-LOOP COMMAND.
6849
6850                                  ;       SETTING  "NPRGO" PREVENTS AN "NPR" OPERATION FROM OCCURING. THE HIGH
6851                                  ;       ORDER  BYTE  IS  SET  TO  -1 AND IS USED AS A FLAG -- WHEN THE RESET
6852                                  ;       OCCURS.  THE  SELECT  REGISTERS  WILL  ALL  BE  CLEARED; WE WILL BE
6853                                  ;       LOOKING AT THE RUN BIT TO BE SET AND AT BSEL7 TO BE CLEARED AS POSITIVE
6854                                  ;       PROOF THAT THE DMV GOT RESET.
6855
6856
6857  034436  000001          4$:     WAIT                    ;HANG HERE UNTIL INTERRUPTED
6858
6859
6860                                  ;       IF  THE DCOK WORKS AS IT SHOULD, THE NEXT INSTRUCTION TO BE EXECUTED
6861                                  ;       IS AT THE LABEL "5$". IF I DOESN'T WORK, THE DMV SHOULD FINISH THE
6862                                  ;       "WRITE"  COMMAND  AND  GENERAT  A Q-BUS INTERRUPT. ON RETURNING FROM
6863                                  ;       THAT INTERRUPT, WE FALL INTO THE ERROR CALL BELOW:
6864
6865  034440                          GEDF    EM42A,ERR1      ;REPORT MISSING POWER-UP
6866                                                          ;       "DEVICE FATAL" ERROR # 74
6867  034440  104455                                                          TRAP    C$ERDF
6868  034442  000112                                                          .WORD   74
6869  034444  016746                                                          .WORD   EM42A
6870  034446  006212                                                          .WORD   ERR1
6871
6872  034450                          5$:
6873
6874                                  ;       IN  EITHER  CASE:  RESTORE THE POWER FAIL VECTOR, STACK POINTER, AND
6875                                  ;       THE FLAGS USED BY THE Q-BUS INTERRUPT SERVICE ROUTINE.
6876
6877                                  ;                               B U T   F I R S T !
6878
6879                                  ;       IN  SOME  CASES  THE  Q-BUS  GETS CONFUSED WHEN WE PERFORM THE ABOVE
6880                                  ;       (HIGHLY  NON-  STANDARD)  "DCOK"  MANIPULATION. EXPERIENCE HAS SHOWN
6881                                  ;       THAT THE INSTRUCTION BEING EXECUTED CAN BE CORRUPTED -- USUALLY (BUT
6882                                  ;       NOT  ALWAYS) BEING CLEARED TO ZERO (A HALT INSTRUCTION). THIS IS NOT
6883                                  ;       A FAILURE OF THE  DMV  AND THEREFORE SHOULD NOT BE OUR CONCERN HERE.
```

```
6884                                    ;       THE  FAILURE  SHOULD  NOT AFFECT THE TEST WITHIN THE PASS IN WHICH IT
6885                                    ;       OCCURS  BUT  IN  A  SUBSEQUENT  PASS. IN AN EFFORT TO ELIMINATE ANY
6886                                    ;       PROBLEMS FROM THIS GLITCH, WE RESTORE THE INSTRUCTION:
6887
6888  034450  012737  000001  034436            MOV     #1,4$           ;RESTORE THE "WAIT" INSTRUCTION -- JUST IN
6889                                                                    ; CASE IT GOT MODIFIED!
6890  034456  013706  002454                    MOV     OLDSP,SP        ;RESTORE THE STACK
6891  034462  142777  000001  145630            BICB    #IENBA,@BSEL0   ;DISABLE THE "A" INTERRUPT
6892  034470  105037  002274                    CLRB    INTWCH          ;STOP EXPECTING Q-BUS INTERRUPTS
6893  034474                                    CLRVEC  #24             ;RETURN THE VECTOR TO THE SUPERVISOR
6894  034474  012700  000024                                                    MOV     #24,R0
6895  034500  104436                                                            TRAP    C$CVEC
6896  034502                                    SETPRI  #0              ;MAKE SURE WE'RE BACK RUNNING AT 0 AGAIN!
6897  034502  012700  000000                                                    MOV     #0,R0
6898  034506  104441                                                            TRAP    C$SPRI
6899
6900  034510  013701  002262                    MOV     DELAY1,R1       ;INITIALIZE TTHE LOOP COUNTER FOR DELAY LOOP
6901  034514  001402                    10$:    BEQ     11$             ; EXIT DELAY LOOP IF TIME HAS EXPIRED
6902  034516  005301                            DEC     R1              ;  ELSE, DECREMENT THE LOOP COUNTER AND
6903  034520  000775                            BR      10$             ;  CONTINUE TO LOOP
6904  034522                            11$:                            ; TIME UP !
6905  034522  132777  000200  145572            BITB    #RUN,@BSEL1     ;CHECK RUN BIT
6906  034530  001403                            BEQ     12$             ; NOT SET... REPORT ERROR.
6907  034532  105777  145600                    TSTB    @BSEL7          ;THIS REGISTER SHOULD HAVE BEEN CLEARED
6908  034536  001404                            BEQ     13$             ;IT IS, EVERYTHING HERE IS OK -- EXIT SUBTEST
6909  034540                            12$:    GEDF    EM42B,ERR1      ;NO, THEN REPORT THE FAILURE
6910                                                                    ;       "DEVICE FATAL" ERROR # 75
6911  034540  104455                                                            TRAP    C$ERDF
6912  034542  000113                                                            .WORD   75
6913  034544  017020                                                            .WORD   EM42B
6914  034546  006212                                                            .WORD   ERR1
6915  034550  004737  003346            13$:    JSR     PC,MASCLR       ;RESTORE DMV-11 TO A NORMAL STATE!
6916  034554  103001                            BCC     14$             ;NO ERRORS, EXIT SUBTEST
6917  034556                                    ERROR                   ;REPORT MSTCLR ERROR
6918  034556  104460                                                            TRAP    C$ERROR
6919  034560                            14$:
6920  034560                                    ENDSUB
6921  034560                                                                L10063:
6922  034560  104403                                                            TRAP    C$ESUB
6923                                    ;-------------------------------------------------------------------------
6924                                    ; SUBTEST #2: DCOK H LO (DMV-11 SHOULDN'T BE RESET)
6925                                    ;-------------------------------------------------------------------------
6926                                    ;       SINCE HITTING "DCOK H LO" WITHOUT "HALT" OCCASIONALLY CORRUPTS
6927                                    ;       PROGRAM MEMORY: WE SET BOTH "HALT" AND "DCOK H LO" IN THIS
6928                                    ;       SUB-TEST (IF HALT FAILS, THIS TEST MAY BLOW UP).
6929
6930  034562                                    BGNSUB          ; <==>  TEST FOR POWER-DOWN/UP & NO DMV-11 RESET
6931  034562                                                                T12.2:
6932  034562  104402                                                            TRAP    C$BSUB
6933
6934  034564  004737  003514                    JSR     PC,MSTCLR       ;INIT DMV & START UP THE MAINT. LOOP
6935  034570  103003                            BCC     2$              ;IF AN ERROR OCCURED,
6936  034572                                    ERROR                   ;REPORT IT &
6937  034572  104460                                                            TRAP    C$ERROR
6938  034574                                    ESCAPE  SUB             ;  EXIT
6939  034574  104410                                                            TRAP    C$ESCAPE
```

```
                                                                                        .WORD   L10064-.
                        2$:     SETVEC  #24,#5$,#7      ;SETUP VECTOR FOR POWER FAIL INTERRUPT HANDLER
                                                                                        MOV     #7,-(SP)
                                                                                        MOV     #5$,-(SP)
                                                                                        MOV     #24,-(SP)
                                                                                        MOV     #3,-(SP)
                                                                                        TRAP    C$SVEC
                                                                                        ADD     #10,SP
                                MOV     SP,OLDSP        ;SAVE THE STACK POINTER
                                JSR     R5,MOVLTD       ;MOVE THE MICRO CODE INTO THE DMV
                                SMCODE                  ;       THIS IS WHERE IT STARTS
                                EMCODE-SMCODE           ;       THIS IS ITS SIZE IN BYTES
                                MOVB    #377,@#BSEL6    ;WRITE ALL 1'S TO BSEL6
                                MOV     #77,@#BSEL4     ;START ADDRESS OF MICROCODE
                                MOV     #EXECUT,@#BSEL2 ;INITIATE M-CODE
                        ;  *** IF THE RESET GETS THROUGH, THE MICRO-DIAGNOSTIC WILL CLEAR BSEL4 ***
                                MOV     #4096.,R3       ;STALL FOR A BIT (UCODE SHOULD HALT US HERE)
                                SOB     R3,.
                        ; IF WE GET HERE, WE NEVER GOT THE EXPECTED POWER-UP SEQUENCE!
                                GEDF    EM42A,ERR1      ;REPORT MISSING POWER-UP
                                                        ;       "DEVICE FATAL" ERROR # 76
                                                                                        TRAP    C$EROF
                                                                                        .WORD   76
                                                                                        .WORD   EM42A
                                                                                        .WORD   ERR1
                        ;IN EITHER CASE, RESTORE THE VECTOR & STACK AND SEE IF THE DMV GOT RESET
                        5$:     MOV     OLDSP,SP        ;RESTORE THE STACK
                                CLRVEC  #24             ;RETURN THE VECTOR TO THE SUPERVISOR
                                                                                        MOV     #24,R0
                                                                                        TRAP    C$CVEC
                                SETPRI  #0              ;MAKE SURE WE'RE BACK RUNNING AT 0 AGAIN!
                                                                                        MOV     #0,R0
                                                                                        TRAP    C$SPRI
                                CMPB    #377,@#BSEL6    ;THIS REGISTER SHOULD NOT HAVE BEEN CLEARED
                                BEQ     10$             ;IT ISN'T, ALL IS OK -- EXIT SUBTEST
                                GEDF    EM42C,ERR1      ;IT IS, THEN REPORT THE FAILURE
                                                        ;       "DEVICE FATAL" ERROR # 77
                                                                                        TRAP    C$EROF
                                                                                        .WORD   77
                                                                                        .WORD   EM42C
                                                                                        .WORD   ERR1
                                                        ;* AT THIS POINT "DINIT" IS STILL SET *
                        10$:    JSR     PC,MASCLR       ;MAKE SURE THE DMV IS PROPERLY RESET!
                                BCC     11$             ;EVERYTHING OK, EXIT SUBR AND TEST.
                                ERROR                   ;REPORT MASCLR ERROR
                                                                                        TRAP    C$ERROR
                        11$:
```

```
 6996  034752                          ENDSUB
 6997  034752                                                  L10064:
 6998  034752  104403                                                  TRAP    C$ESUB
 6999  034754                          ENDTST
 7000  034754                                                  L10062:
 7001  034754  104401                                                  TRAP    C$ETST
```

```
7002                                    .SBTTL  SUBTEST 2'S M-CODE -- COMPLETE
7003                                    ;-------------------------------------------------------------------------
7004                                    ; 6502 MICROCODE FOR TEST #11/ SUBTEST #2
7005                                    ;-------------------------------------------------------------------------
7006  034756                            SMCODE:
7007  034756  251  125                          .BYTE 251,125    ;A9 55     LDA #GOBSY1!HALT!PWRUP!DINIT
7008  034760  215  004  246                    .BYTE 215,4,246  ;8D 04 A6  STA NPRCTL          :SET DISABLE INIT/HALT
7009  034763  251  105                          .BYTE 251,105    ;A9 45     LDA #GOBSY1!PWRUP!DINIT
7010  034765  215  004  246                    .BYTE 215,4,246  ;8D 04 A6  STA NPRCTL          :CLEAR HALT
7011  034770  352                              .BYTE 352        ;EA        NOP                 :WAIT A WHILE
7012  034771  352                              .BYTE 352        ;EA        NOP
7013  034772  352                              .BYTE 352        ;EA        NOP
7014  034773  251  107                          .BYTE 251,107    ;A9 47     LDA #GOBSY1!PWRUP!SDCOK!DINIT
7015  034775  215  004  246                    .BYTE 215,4,246  ;8D 04 A6  STA NPRCTL          :SET DCOK
7016  035000  251  105                          .BYTE 251,105    ;A9 45     LDA #GOBSY1!PWRUP!DINIT
7017  035002  215  004  246                    .BYTE 215,4,246  ;8D 04 A6  STA NPRCTL          :CLEAR DCOK
7018  035005  251  003                          .BYTE 251,3      ;A9 03     LDA #^D3            :DELAY FOR 16.8 USEC
7019  035007  205  000                          .BYTE 205,0      ;8D 00     STA SP0             :BUS INIT IS 10 USEC
7020  035011  306  000                          .BYTE 306,0      ;C6 00  5$:DEC SP0             :
7021  035013  320  374                          .BYTE 320,374    ;D0 FC     BNE 5$              :
7022  035015  140                              .BYTE 140        ;60        RTS          :RETURN TO M-LOOP
7023                                          .EVEN
7024  035016                            EMCODE:
7025                                    ;-------------------------------------------------------------------------
```

```
        .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"
```

```
7082                            ;*
7083                            ;*
7084                            ;* WE SHOULD GO
7085                            ;* THROUGH A POWER-UP SEQUENCE.   R6 IS
7086                            ;* RESTORED FROM OLDSP, INTERRUPT
7087                            ;* PRIORITY LEVEL IS RESTORED TO 0, &
7088                            ;* INTERRUPT VECTOR 24 IS RETURNED TO
7089                            ;* THE DIAGNOSTIC SUPERVISOR.  SEL4 IS
7090                            ;* COMPARED AGAINST TMP0 -- THEY SHOULD
7091                            ;* BE EQUAL.
7092                            ;*
7093                            ;* NOW CLEAR BSEL7.                    WAIT FOR BSEL7 TO CLEAR. THEN DROP
7094                            ;*                                     "DISABLE INIT" AND EXIT TO M-LOOP.
7095                            ;*
7096                            ;*-----------------------------------------------------------------------
7097                            ;*
7098                            ;* SUBTEST # 2:
7099                            ;*
7100                            ;* HERE  THE  HALT MODE IS USED IN A WAY WHICH VERY CLOSELY MATCHES THE DMV-11
7101                            ;* MICROCODE'S  UTILIZATION  DURING  A  "MOP  BOOT"  OPERATION. THE INTERRUPT
7102                            ;* VECTOR  AREA  IS COMPLETELY OVERWRITTEN BY THE DMV NPR'S AND IS THEREFORE
7103                            ;* BACKED  UP  ELSEWHERE  IN  THE  11 CPU'S MEMORY. THERE IS ALSO THE POSSIBLE
7104                            ;* CONTENTION  WITH  THE  DIAGNOSTIC  SUPERVISOR  --  TO HELP HERE, AS MUCH AS
7105                            ;* POSSIBLE WILL BE DONE AT INTERRUPT LEVEL 7.
7106                            ;*
7107                            ;*      11 CPU'S OPERATIONS:                        DMV-11'S OPERATIONS:
7108                            ;*
7109                            ;* THE MICROCODE IS MOVED INTO THE DMV.
7110                            ;*
7111                            ;* THE INTERRUPT VECTOR AREA IS BACKED-
7112                            ;* UP IN AN I/O BUFFER FOLLOWING THE
7113                            ;* PROGRAM
7114                            ;*
7115                            ;* THE MICROCODE IS INITIATED & BSEL7 IS
7116                            ;* SET TO -1 AS A FLAG.
7117                            ;*
7118                            ;* WAIT FOR BSEL7 TO BE CLEARED        CLEAR BSEL7 AND WAIT FOR IT TO GO
7119                            ;*                                     NON-ZERO AGAIN PUTTING BOTH
7120                            ;*                                     PROCESSORS IN SYNC. WITH EACH
7121                            ;*                                     OTHER
7122                            ;* CLEAR TMP0 AND SAVE R6 FOR RECOVERY
7123                            ;* LATER.  SET BSEL7 AGAIN AND WAIT FOR
7124                            ;* TMP0 TO BE SET.
7125                            ;*                                     SET HALT, "DCOK H LO", & "DISABL
7126                            ;*                                     INIT" AND PERFORM 2 NOP'S AS A
7127                            ;*                                     1 MICROSECOND DELAY
7128                            ;*
7129                            ;* ENTRY INTO THE CONSOLE "ODT" WILL   CLEAR "DCOK H LO", SET "HALT" &
7130                            ;* BE INITIATED.                       "DISABL INIT"
7131                            ;*
7132                            ;*                                     NPR-OUT THE FOLLOWING:
7133                            ;*                                      LOC:  CONTENTS
7134                            ;*                                       24   000000  VECTOR TO LOC 0
7135                            ;*                                       26   000340  @ PRIORITY 7
7136                            ;*                                        0   012700  MOV  #-1,R0
7137                            ;*                                        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;
;*
;--*******************************************************************************
;
```

```
                                        ;       BGNTST
035016                                                                                  T13::
        000015                          HLTEST  = $T                    ;DEFINE TEST # FOR "INIT" SECTION
035016  032737  000001  002370                  BIT     #PU24,PT.CTL    ;IS POWER-UP STRAPPED FOR OPTION 0?
035024  001002                                  BNE     5$              ;YES, THEN WE CAN DO THIS TEST
035026                                          EXIT    TST             ;NO,  WE CAN'T DO THIS TEST UNLESS IT IS!
035026  104432                                                                                  TRAP    C$EXIT
035030  000772                                                                                  .WORD   L10065-.

035032  032737  000001  002316  5$:             BIT     #BIT0,PFLAG     ;IF BUS RESETS ARE ALLOWED,
035040  001402                                  BEQ     2$              ;  PERFORM THIS TEST
035042                                          EXIT    TST             ;ELSE, BYPASS IT
035042  104432                                                                                  TRAP    C$EXIT
035044  000756                                                                                  .WORD   L10065-.

035046                          2$:             DELAY   40.             ;DELAY TO PREVENT TST # ROACHING
035046  012727  000050                                                                          MOV     #40.,(PC)+
035052  000000                                                                                  .WORD   0
035054  013727  002116                                                                          MOV     L$DLY,(PC)+
035060  000000                                                                                  .WORD   0
035062  005367  177772                                                                          DEC     -6(PC)
035066  001375                                                                                  BNE     .-4
035070  005367  177756                                                                          DEC     -22(PC)
035074  001367                                                                                  BNE     .-20
                                ;-----------------------------------------------------------------------
035076                          1$:             BGNSUB
035076                                                                                  T13.1:
035076  104402                                                                                  TRAP    C$BSUB
035100  004737  003514                          JSR     PC,MSTCLR       ;RESET DMV & ENTER M-LOOP
035104  103003                                  BCC     2$              ;IF NO ERROR HERE, CONTINUE
035106                                          ERROR                   ;ELSE, REPORT THE ERROR
035106  104460                                                                                  TRAP    C$ERROR
035110                                          ESCAPE  TST             ;       & EXIT THE TEST
035110  104410                                                                                  TRAP    C$ESCAPE
035112  000710                                                                                  .WORD   L10065-.
035114                          2$:
035114  004537  004166                          JSR     R5,MOVLTD       ;MOVE THE MICRO CODE INTO THE DMV
035120  036024                                  MC1                     ;       THIS IS WHERE IT STARTS
035122  000114                                  MC2-MC1                 ;       THIS IS ITS SIZE IN BYTES

035124  005037  002412                          CLR     TMP0            ;INITIALIZE THE COUNTER
035130                                          SETVEC  #24,#24$,#7     ;SETUP POWER-UP VECTOR
035130  012746  000007                                                                          MOV     #7,-(SP)
035134  012746  035304                                                                          MOV     #24$,-(SP)
035140  012746  000024                                                                          MOV     #24,-(SP)
035144  012746  000003                                                                          MOV     #3,-(SP)
035150  104437                                                                                  TRAP    C$SVEC
035152  062706  000010                                                                          ADD     #10,SP
035156  012777  000077  145144          MOV     #77,@SEL4               ;START ADDRESS OF MICROCODE
035164  112777  177777  145144          MOVB    #-1,@BSEL7              ;SET FLAG (BSEL7)
035172  012777  000005  145124          MOV     #EXECUT,@SEL2           ;INITIATE M-CODE

035200  005002                                  CLR     R2
035202  105777  145130          3$:             TSTB    @BSEL7          ;WAIT FOR FLAG TO BE CLEARED
035206  001405                                  BEQ     5$
035210  077204                                  SOB     R2,3$
```

```
7250  035212                                  GEDF    EM43A,ERR1      ;TIMEOUT...M-CODE IS HUNG!
7251                                                                  ;       "DEVICE FATAL" ERROR # 78
7252  035212  104455                                                                  TRAP    C$ERDF
7253  035214  000116                                                                  .WORD   78
7254  035216  017153                                                                  .WORD   EM43A
7255  035220  006212                                                                  .WORD   ERR1
7256
7257  035222  010637  002454          5$.     MOV     SP,OLDSP        ;SAVE STACK POINTER FOR LATER
7258  035226  012777  002412  145074          MOV     #TMP0,@SEL4     ;PASS ADDRESS OF TMP0 TO M-CODE
7259  035234  112777  177777  145074          MOVB    #-1,@SEL7       ;TELL M-CODE TO PROCEED
7260
7261  035242  005237  002412          4$:     INC     TMP0            ;LOOP HERE UNTIL TMP0 GOES TO 0 AGAIN
7262  035246  001375                          BNE     4$
7263  035250  000240                          NOP
7264  035252  000240                          NOP
7265  035254  000240                          NOP
7266  035256                                  GEDF    EM43A,ERR1      ;DMV SEEMS TO HAVE HUNG!
7267                                                                  ;       "DEVICE FATAL" ERROR # 79
7268  035256  104455                                                                  TRAP    C$ERDF
7269  035260  000117                                                                  .WORD   79
7270  035262  017153                                                                  .WORD   EM43A
7271  035264  006212                                                                  .WORD   ERR1
7272  035266  000240                          NOP                     ; (FOR PATCHING)
7273  035270  004737  003346                  JSR     PC,MASCLR       ;RESET THE DMV
7274  035274  103001                          BCC     9$              ;RESET SUCCEEDED, ESCAPE TEST
7275  035276                                  ERROR                   ; REPORT RESET ERROR
7276  035276  104460                                                                  TRAP    C$ERROR
7277  035300                          9$:     ESCAPE  TST             ; & GET OUT
7278  035300  104410                                                                  TRAP    C$ESCAPE
7279  035302  000520                                                                  .WORD   L10065-.
7280
7281  035304  013706  002454          24$:    MOV     OLDSP,SP        ;RESTORE R6 FIRST!
7282  035310                                  CLRVEC  #24             ;RETURN THE VECTORE TO THE SUPERVISOR
7283  035310  012700  000024                                                          MOV     #24,R0
7284  035314  104436                                                                  TRAP    C$CVEC
7285  035316                                  SETPRI  #0              ;RESTORE PRIORITY LEVEL TO 0
7286  035316  012700  000000                                                          MOV     #0,R0
7287  035322  104441                                                                  TRAP    C$SPRI
7288  035324  027737  145000  002412          CMP     @SEL4,TMP0      ;THESE SHOULD BE EQUAL
7289  035332  001405                          BEQ     30$             ;THEY ARE -- TEST PASSED
7290  035334                                  GEDF    EM43B,ERR1      ;THEY AREN'T -- HALT DIDN'T WORK
7291                                                                  ;       "DEVICE FATAL" ERROR # 80
7292  035334  104455                                                                  TRAP    C$ERDF
7293  035336  000120                                                                  .WORD   80
7294  035340  017177                                                                  .WORD   EM43B
7295  035342  006212                                                                  .WORD   ERR1
7296  035344  000240                          NOP                     ; (FOR PATCHING)
7297  035346  105077  144764          30$:    CLRB    @BSEL7          ;TELL M-CODE TO CLEAR DINIT
7298  035352                                  ENDSUB
7299  035352                                                                  L10066:
7300  035352  104403                                                                  TRAP    C$ESUB
7301                                  ;-----------------------------------------------------------------
7302  035354                                  BGNSUB
7303  035354                                                                  T13.2:
7304  035354  104402                                                                  TRAP    C$BSUB
7305  035356  004737  003514                  JSR     PC,MSTCLR       ;RESET DMV & ENTER M-LOOP
```

```
7306  035362  103003                  1$:     BCC     1$              ;IF NO ERROR HERE, CONTINUE
7307  035364                                  ERROR                   ;ELSE, REPORT THE ERROR
7308  035364  104460                                                                  TRAP    C$ERROR
7309  035366                                  ESCAPE  TST             ;       & EXIT THE TEST
7310  035366  104410                                                                  TRAP    C$ESCAPE
7311  035370  000432                                                                  .WORD   L10065-.
7312  035372
7313  035372  004537  004166                  JSR     R5,MOVLTD       ;MOVE THE MICRO CODE INTO THE DMV
7314  035376  036140                          MC2                     ;       THIS IS WHERE IT STARTS
7315  035400  000243                          MC2END-MC2              ;       THIS IS ITS SIZE IN BYTES
7316
7317  035402  004537  005004                  JSR     R5,MOVSW        ;SAVE THE INTERRUPT VECTORS
7318  035406  000000                          0
7319  035410  002654                          BUFAREA                 ; IN THE BUFFER AREA
7320  035412  000200                          400/2                   ;  LOC'S 0 ==> 377 WILL BE SAVED
7321
7322  035414                                  SETVEC  #376,#0,#7      ;FAKE OUT THE SUPERVISOR,  WE'RE JUST
7323  035414  012746  000007                                                          MOV     #7,-(SP)
7324  035420  012746  000000                                                          MOV     #0,-(SP)
7325  035424  012746  000376                                                          MOV     #376,-(SP)
7326  035430  012746  000003                                                          MOV     #3,-(SP)
7327  035434  104437                                                                  TRAP    C$SVEC
7328  035436  062706  000010                                                          ADD     #10,SP
7329                                                  ; SETTING LOCATION 376 TO ZERO (0)
7330
7331  035442  012777  000077  144660          MOV     #77,@SEL4       ;START ADDRESS OF MICROCODE
7332  035450  112777  177777  144660          MOVB    #-1,@SEL7       ;SET FLAG (SEL7)
7333  035456  012777  000005  144640          MOV     #EXECUT,@SEL2   ;INITIATE M-CODE
7334
7335  035464  005002                          CLR     R2
7336  035466  105777  144644          3$:     TSTB    @SEL7           ;WAIT FOR FLAG TO BE CLEARED
7337  035472  001406                          BEQ     5$
7338  035474  077204                          SOB     R2,3$
7339  035476                                  GEDF    EM43A,ERR1      ;TIMEOUT...M-CODE IS HUNG!
7340                                                  ;       "DEVICE FATAL" ERROR # 81
7341  035476  104455                                                                  TRAP    C$ERDF
7342  035500  000121                                                                  .WORD   81
7343  035502  017153                                                                  .WORD   EM43A
7344  035504  006212                                                                  .WORD   ERR1
7345  035506  000447                          BR      22$             ;EXIT
7346
7347  035510  010637  002454          5$:     MOV     SP,OLDSP        ;SAVE STACK POINTER FOR LATER
7348  035514  005037  002412                  CLR     TMP0            ;RESET EXECUTION INDICATOR (TMP0)
7349  035520  112777  177777  144610          MOVB    #-1,@SEL7       ;TELL M-CODE TO PROCEED
7350
7351  035526  005003                          CLR     R3              ;WE'LL WAIT THIS LONG FOR THE M-CODE TO
7352                                                  ;       INTERRUPT OUR SEQUENCE OF OPERATION
7353  035530  005737  000376          10$:    TST     @#376           ;LOOK FOR THE M-CODE TO LOAD THIS LOCATION
7354  035534  001017                          BNE     20$             ;WE SHOULD NEVER SEE THIS HAPPEN!!!
7355  035536  077304                          SOB     R3,10$          ;LOOP UNTIL WE'RE INTERRUPTED
7356                                          ;IF WE AREN'T, WE HAVE A REAL PROBLEM
7357
7358  035540  004537  005004                  JSR     R5,MOVSW        ;RESTORE THE INTERRUPT VECTORS
7359  035544  002654                          BUFAREA                 ; FROM THE BUFFER AREA
7360  035546  000000                          0
7361  035550  000200                          400/2                   ; TO LOC'S 0 ==> 377
```

```
7362
7363  035552                          SETPRI  #0              ;RESTORE PRIORITY LEVEL TO 0
7364  035552  012700  000000                                                  MOV     #0,R0
7365  035556  104441                                                          TRAP    C$SPRI
7366
7367  035560                          GEDF    EM43A,ERR1      ;BUT WE AREN'T SURE WHAT IT IS!!!
7368                                                          ;       "DEVICE FATAL" ERROR # 82
7369  035560  104455                                                          TRAP    C$ERDF
7370  035562  000122                                                          .WORD   82
7371  035564  017153                                                          .WORD   EM43A
7372  035566  006212                                                          .WORD   ERR1
7373  035570  000240                  NOP                     ; (FOR PATCHING)
7374  035572  000415                  BR      22$             ; GO RESET DMV & EXIT
7375
7376  035574  004537  005004  20$:    JSR     R5,MOVSW        ;RESTORE THE INTERRUPT VECTORS
7377  035600  002654                  BUFAREA                 ; FROM THE BUFFER AREA
7378  035602  000000                  0
7379  035604  000200                  400/2                   ; TO LOC'S 0 ==> 377
7380
7381  035606                          SETPRI  #0              ;RESTORE PRIORITY LEVEL TO 0
7382  035606  012700  000000                                                  MOV     #0,R0
7383  035612  104441                                                          TRAP    C$SPRI
7384
7385  035614                          GEDF    EM43C,ERR1      ;POWER-UP INTERRUPT DIDN'T OCCUR
7386                                                          ;       "DEVICE FATAL" ERROR # 83
7387  035614  104455                                                          TRAP    C$ERDF
7388  035616  000123                                                          .WORD   83
7389  035620  017215                                                          .WORD   EM43C
7390  035622  006212                                                          .WORD   ERR1
7391  035624  000240                  NOP                     ; (FOR PATCHING)
7392  035626  004737  003346  22$:    JSR     PC,MASCLR       ;RESET THE DMV
7393  035632  103001                  BC      23$             ; RESET OK, PROCEED
7394  035634                          ERROR                   ; RESET FAILED, REPORT IT
7395  035634  104460                                                          TRAP    C$ERROR
7396  035636                  23$:
7397  035636                          ESCAPE  SUB             ; & GET THE HECK OUT OF HERE!!!
7398  035636  104410                                                          TRAP    C$ESCAPE
7399  035640  000160                                                          .WORD   L10067-.
7400  035642                  MLTST2:
7401
7402  035642  004537  005004          JSR     R5,MOVSW        ;RESTORE THE INTERRUPT VECTORS
7403  035646  002654                  BUFAREA                 ; FROM THE BUFFER AREA
7404  035650  000000                  0
7405  035652  000200                  400/2                   ; TO LOC'S 0 ==> 377
7406
7407  035654  010002                  MOV     R0,R2           ;R0 WILL BE CORRUPTED BY SUPERVISOR CALLS!
7408
7409  035656                          SETPRI  #0              ;RESTORE PRIORITY LEVEL TO 0
7410  035656  012700  000000                                                  MOV     #0,R0
7411  035662  104441                                                          TRAP    C$SPRI
7412  035664  022701  071573          CMP     #071573,R1      ;CHECK RESULTS OF THE ADDITIONS
7413  035670  001412                  BEQ     5$              ;OK -->
7414  035672  010137  002256          MOV     R1,BDATA        ;WHAT!!!  SETUP & REPORT AN
7415  035676  012737  177777  002254  MOV     #-1,GDATA       ;  ADDITION ERROR
7416  035704                          GEDF    EM43D,ERR1      ;ADDITION DIDN'T WORK PROPERLY
7417                                                          ;       "DEVICE FATAL" ERROR # 84
```

```
7418  035704  104455                                                          TRAP    C$ERDF
7419  035706  000124                                                          .WORD   84
7420  035710  017242                                                          .WORD   EM43D
7421  035712  006212                                                          .WORD   ERR1
7422  035714  000240                  NOP                 ; (FOR PATCHING)
7423  035716  020227  177777    5$:   CMP     R2,#-1      ;THE LOADED ROUTINE SHOULD HAVE DONE THIS
7424  035722  001003                  BNE     8$          ;IT DIDN'T -- IT FAILED
7425  035724  023702  002412          CMP     TMP0,R2     ;THESE SHOULD BE EQUAL TOO
7426  035730  001412                  BEQ     10$         ;OK -->
7427  035732  010237  002256    8$:   MOV     R2,BDATA    ;WHAT!!!  SETUP & REPORT AN ERROR
7428  035736  012737  177777  002254  MOV     #-1,GDATA
7429  035744                          GEDF    EM43D,ERR1  ;LOADED ROUTINE FAILED
7430                                                      ;       "DEVICE FATAL" ERROR # 85
7431  035744  104455                                                          TRAP    C$ERDF
7432  035746  000125                                                          .WORD   85
7433  035750  017242                                                          .WORD   EM43D
7434  035752  006212                                                          .WORD   ERR1
7435  035754  000240                  NOP                 ; (FOR PATCHING)
7436  035756  020637  002454    10$:  CMP     SP,OLDSP    ;THESE SHOULD ALSO BE EQUAL
7437  035762  001412                  BEQ     15$         ;OK -->
7438  035764  010637  002256          MOV     SP,BDATA    ;WHAT!!!  SETUP & REPORT AN ERROR
7439  035770  013737  002454  002254  MOV     OLDSP,GDATA
7440  035776                          GEDF    EM43D,ERR1  ;LOADED ROUTINE FAILED
7441                                                      ;       "DEVICE FATAL" ERROR # 86
7442  035776  104455                                                          TRAP    C$ERDF
7443  036000  000126                                                          .WORD   86
7444  036002  017242                                                          .WORD   EM43D
7445  036004  006212                                                          .WORD   ERR1
7446  036006  000240                  NOP                 ; (FOR PATCHING)
7447  036010  004737  003346    15$:  JSR     PC,MASCLR   ;MAKE SURE THE DMV IS RESET
7448  036014  103001                  BCC     16$         ; RESET OK, CONTINUE
7449  036016                          ERROR               ;RESET FAILED, REPORT ERROR
7450  036016  104460                                                          TRAP    C$ERROR
7451  036020                  16$:
7452  036020                          ENDSUB
7453  036020                                                          L10067:
7454  036020  104403                                                          TRAP    C$ESUB
7455  036022                          ENDTST
7456  036022                                                          L10065:
7457  036022  104401                                                          TRAP    C$ETST
```

```
7458                                    .SBTTL  SUBTEST 1'S M-CODE -- ASSIGNMENTS
7459
7460                                    ;*****************************************************************************
7461                                    ;       MICRO-CODE FOR SUBROUTINE # 1
7462                                    ;*****************************************************************************
7463
7464  036024                            MC1:
7465                                    ;       ASSEMBLED BY:  COMPAS MICROSYSTEMS MINMIC (V6A)
7466                                    ;                      (WITH CHANGES EDITED IN)
7467                                    ;
7468                                    ;LINE# LOC   CODE        LINE
7469                                    ;0002  0000              .=.+0000
7470                                    ;0003  0000
7471                                    ;0004  0000              ;EQUATES FOR BIT DEFINITIONS
7472                                    ;0005  0000              BIT0    =.01
7473                                    ;0006  0000              BIT1    =.02
7474                                    ;0007  0000              BIT2    =.04
7475                                    ;0008  0000              BIT4    =.020
7476                                    ;0009  0000              BIT5    =.040
7477                                    ;0010  0000              BIT6    =.0100
7478                                    ;0011  0000
7479                                    ;0012  0000
7480                                    ;0013  0000              ;ADDRESS EQUATES FOR CSR REGISTERS
7481                                    ;0014  0000              BSEL4   =.+14
7482                                    ;0015  0000              BSEL5   =.+BSEL4+1
7483                                    ;0016  0000              BSEL7   =.+BSEL4+3
7484                                    ;0017  0000
7485                                    ;0018  0000
7486                                    ;0019  0000              ;NPR ADDRESS REGISTER EQUATES
7487                                    ;0020  0000              NPRAIL  = .003C     ;IN NPR ADRS LO REG
7488                                    ;0021  0000              NPRAIH  = NPRAIL+1 ;IN NPR ADRS HI REG
7489                                    ;0022  0000              NPRAIX  = NPRAIL+2 ;IN NPR EXTENDED ADRS REG
7490                                    ;0023  0000
7491                                    ;0024  0000
7492                                    ;0025  0000              ;NPR DATA REG EQUATES
7493                                    ;0026  0000              NPRDIL  = .A600     ;IN NPR DATA LO REG
7494                                    ;0027  0000              NPRDIH  = NPRDIL+1 ;IN NPR DATA HI REG
7495                                    ;0028  0000
7496                                    ;0029  0000
7497                                    ;0030  0000              ;NPR CONTROL REG EQUATES
7498                                    ;0031  0000              NPRCTL  = .A604 ;NPR CONTROL REGISTER
7499                                    ;0032  0000              NONPR   = BIT6  ;USED TO PREVENT AN NPR
7500                                    ;0033  0000              INOUT   = BIT5  ;SET TO 1 FOR INPUT, SET TO 0 FOR OUTPUT NPR
7501                                    ;0034  0000              HALT    = BIT4  ;SET DURING MOP MODE ONLY
7502                                    ;0035  0000              PWRUP   = BIT2  ;CLEARED BY BUS INIT TO INDICATE PWR UP
7503                                    ;0036  0000              SDCLOW  = BIT1  ;SET TO 1 TO RESET LSI-11 FOR MOP BOOT
7504                                    ;0037  0000              DISINI  = BIT0  ;SET TO 1 TO DISABLE BUS INIT TO 6502
7505                                    ;0038  0000
7506                                    ;0039  0000
7507                                    ;0040  0000              ;NPR REQUEST FUNCTIONS
7508                                    ;0041  0000              NPRRED  = PWRUP ;IN/OUT BIT = 0 FOR READ TO DMV-11
7509                                    ;0042  0000
7510                                    ;0043  0000
7511                                    ;0044  0000              ;MISCELLANEOUS EQUATES
7512                                    ;0045  0000              STARAM  = .003F ;STARTING ADRS OF GEN'L PURPOSE RAM TO TEST
7513                                    ;0046  0000
```

```
7514                                    ;0047  0000
7515                                    .SBTTL  SUBTEST 1'S M-CODE -- ROUTINE
7516                                    ;0048  0000             *=STARAM        ;START OF MICROCODE IN RAM
7517
7518                                    ;LINE# LOC   CODE       LINE
7519
7520  036024    251     000             .BYTE  251,00
7521                                    ;0050  003F  A9 00              LDA     #0      ;CLEAR BSEL7
7522  036026    205     027             .BYTE  205,27
7523                                    ;0051  0041  85 17              STA     BSEL7
7524                                    ;0052  0043
7525  036030    245     027             .BYTE  245,27
7526                                    ;0053  0043  A5 17      WAIT1   LDA     BSEL7   ;WAIT FOR IT TO GO <> 0
7527  036032    360     374             .BYTE  360,374
7528                                    ;0054  0045  F0 FC              BEQ     WAIT1
7529                                    ;0055  0047
7530                                    ;0056  0047             ; WE SHOULD NOW BE IN SYNC WITH THE 11 PROCESSOR
7531                                    ;0057  0047
7532  036034    245     024             .BYTE  245,24
7533                                    ;0058  0047  A5 14              LDA     BSEL4   ;GET & SAVE THE ADDRESS
7534  036036    205     074             .BYTE  205,74
7535                                    ;0059  0049  85 3C              STA     NPRAIL  ;OF "TMP0" AND USE IT TO
7536  036040    245     025             .BYTE  245,25
7537                                    ;0060  0048  A5 15              LDA     BSEL5   ;SETUP FOR AN NPR-IN
7538  036042    205     075             .BYTE  205,75
7539                                    ;0061  004D  85 3D              STA     NPRAIH  ;OPERATION LATER
7540                                    ;0062  004F
7541  036044    251     124             .BYTE  251,124
7542                                    ;0063  004F  A9 54              LDA     #NONPR!HALT!PWRUP
7543  036046    215     004     246     .BYTE  215,4,246
7544                                    ;0064  0051  8D 04 A6          STA     NPRCTL  ;HALT THE 11 CPU
7545                                    ;0064  0054
7546                                    ;0064  0054             ; DELAY TO ALLOW "HALT" TO TAKE EFFECT (ABOUT
7547                                    ;0064  0054             ; 100 MICROSECONDS).
7548  036051    240     041             .BYTE  240,41
7549                                    ;0064  0054  A0 21              LDY     #$21    ;INITIAL VALUE OF COUNTER
7550  036053    210                     .BYTE  210
7551                                    ;0064  0056  88         DELAY   DEY             ;(33. FOR .6 US CYCLE)
7552  036054    320     375             .BYTE  320,375
7553                                    ;0064  0057  D0 FD              BNE     DELAY
7554                                    ;0065  0059
7555                                    ;0066  0059             ; WE NOW HAVE TO READ THE 11 CPU'S LOCATION WHO'S
7556                                    ;0067  0059             ; ADDRESS WE PREVIOUSLY READ FROM SEL6
7557                                    ;0068  0059
7558  036056    251     000             .BYTE  251,00
7559                                    ;0069  0059  A9 00              LDA     #0      ;CLEAR THE EXTENDED-ADDRESS-IN
7560  036060    205     076             .BYTE  205,76
7561                                    ;0070  0058  85 3E              STA     NPRAIX
7562  036062    251     024             .BYTE  251,24
7563                                    ;0071  005D  A9 14              LDA     #NPRRED!HALT
7564  036064    215     004     246     .BYTE  215,4,246
7565                                    ;0072  005F  8D 04 A6          STA     NPRCTL  ;READ ONE WORD FROM THE 11 CPU
7566                                    ;0073  0062
7567  036067    054     004     246     .BYTE  54,4,246
7568                                    ;0074  0062  2C 04 A6  NPRWAT  BIT     NPRCTL  ;WAIT FOR IT TO "ALMOST" COMPLETE
7569  036072    160     373             .BYTE  160,373
```

```
7570                                    ;0075  0065  70 FB          BVS     NPRWAT
7571  036074    352                     .BYTE  352
7572                                    ;0075  0067  EA             NOP             ;SHOULD COMPLETE HERE
7573                                    ;0076  0068
7574  036075    255     000     246     .BYTE  255,0,246
7575                                    ;0077  0068  AD 00 A6       LDA     NPRDIL  ;MOVE THE WORD JUST READ INTO
7576  036100    205     024             .BYTE  205,24
7577                                    ;0078  0068  85 14          STA     BSEL4   ; SEL4
7578  036102    255     001     246     .BYTE  255,1,246
7579                                    ;0079  0060  AD 01 A6       LDA     NPRDIH
7580  036105    205     025             .BYTE  205,25
7581                                    ;0080  0070  85 15          STA     BSEL5
7582                                    ;0088  0072
7583                                    ;0089  0072             ; DROP "HALT" AND SET "DCOK H LO" & "DISABL INIT"
7584                                    ;0090  0072
7585  036107    251     125             .BYTE  251,125
7586                                    ;0091  0072  A9 55          LDA     #NONPR!PWRUP!DISINI!HALT
7587  036111    215     004     246     .BYTE  215,4,246
7588                                    ;0092  0074  8D 04 A6       STA     NPCRTL
7589  036114    251     107             .BYTE  251,107
7590                                    ;0093  0077  A9 47          LDA     #NONPR!PWRUP!SDCLOW!DISINI
7591  036116    215     004     246     .BYTE  215,4,246
7592                                    ;0094  0079  8D 04 A6       STA     NPRCTL
7593                                    ;0095  007C
7594                                    ;0096  007C             ; NOW LET THE 11 CPU GO THROUGH THE POWER-UP SEQUENCE
7595                                    ;0097  007C
7596  036121    251     105             .BYTE  251,105
7597                                    ;0098  007C  A9 45          LDA     #NONPR!PWRUP!DISINI
7598  036123    215     004     246     .BYTE  215,4,246
7599                                    ;0099  007E  8D 04 A6       STA     NPRCTL
7600                                    ;0100  0081
7601                                    ;0101  0081             ; WHEN BSEL7 IS CLEARED, CLEAR "DISABL INIT"
7602                                    ;0102  0081
7603  036126    245     027             .BYTE  245,27
7604                                    ;0103  0081  A5 17      WAIT2   LDA     BSEL7
7605  036130    320     374             .BYTE  320,374
7606                                    ;0104  0083  D0 FC          BNE     WAIT2
7607                                    ;0105  0085
7608  036132    251     104             .BYTE  251,104
7609                                    ;0106  0085  A9 44          LDA     #NONPR!PWRUP
7610  036134    215     004     246     .BYTE  215,4,246
7611                                    ;0107  0087  8D 04 A6       STA     NPRCTL
7612                                    ;0108  008A
7613                                    ;0109  008A             ; USE A STANDARD SUBROUTINE RETURN TO GET BACK INTO
7614                                    ;0110  008A             ; THE MAINTENANCE LOOP
7615                                    ;0111  008A
7616  036137    140                     .BYTE  140
7617                                    ;0112  008A  60             RTS
7618                                    ;0113  008B
7619
7620
7621                                    ;ERRORS = 0000
7622
7623                                    .SBTTL  SUBTEST 1'S M-CODE -- SYMBOL   TABLE
7624
7625                                    ; BIT0     0001    BIT1     0002    BIT2     0004    BIT4     0010
```

```
7626                    ; BIT5     0020    BIT6     0040    BSEL4    0014    BSEL5    0015
7627                    ; BSEL7    0017    DELAY    006E    DISINI   0001    HALT     0010
7628                    ; INOUT    0020    NONPR    0040    NPRAIH   003D    NPRAIL   003C
7629                    ; NPRAIX   003E    NPRCTL   A604    NPRDIH   A601    NPRDIL   A600
7630                    ; NPRRED   0004    NPRWAT   005D    PWRUP    0004    SDCLOW   0002
7631                    ; STARAM   003F    WAIT1    0043    WAIT2    0078
7632                    ;END OF ASSEMBLY(V6A)
7633                    ;SYMBOLS LEFT = 1473 OUT OF 1500
7634
7635                    .SBTTL  SUBTEST 1'S M-CODE -- CROSS REFERENCE TABLE (CREF V01.05 )
7636
7637
7638                    ;BIT0              50      37
7639                    ;BIT1      60      36
7640                    ;BIT2      70      35
7641                    ;BIT4      80      34
7642                    ;BIT5      90      33
7643                    ;BIT6     100      32
7644                    ;BSEL4    140      58      78
7645                    ;BSEL5    150      60      80
7646                    ;BSEL7    160      15      16      51      53      100
7647                    ;DELAY    860      87
7648                    ;DISINI   370      91      96
7649                    ;HALT              340      63      71
7650                    ;INOUT    330
7651                    ;NONPR    320      63      91      96     103
7652                    ;NPRAIH   210      61
7653                    ;NPRAIL   200      21      22      59
7654                    ;NPRAIX   220      70
7655                    ;NPRCTL   310      64      72      74      92      104
7656                    ;NPRDIH   270      79
7657                    ;NPRDIL   260      27      77
7658                    ;NPRRED   410      71
7659                    ;NPRWAT   740      75
7660                    ;PWRUP    350      41      63      91      96      103
7661                    ;SDCLOW   360      91
7662                    ;STARAM   450      48
7663                    ;WAIT1    530      54
7664                    ;WAIT2   1000     101
```

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

                                ;*****************************************************************************
                                ;       MICRO-CODE FOR SUBROUTINE # 2
                                ;*****************************************************************************
000010                          .RADIX  8.
036140                          MC2:
                                ;LINE# LOC   CODE        LINE
                                ;0002  0000              *=$0000
                                ;0003  0000
                                ;0004  0000              ;EQUATES FOR BIT DEFINITIONS
                                ;0005  0000              BIT0    =B1
                                ;0006  0000              BIT1    =B2
                                ;0007  0000              BIT2    =B4
                                ;0008  0000              BIT4    =B20
                                ;0009  0000              BIT6    =B100
                                ;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 I.O REG
                                ;0024  0000              NPRDOH  = NPRDOL+1 ;OUT NPR DATA HI REG
                                ;0025  0000
                                ;0026  0000
                                ;0027  0000              ;NPR CONTROL REG EQUATES
                                ;0028  0000              NPRCTL  = $A604 ;NPR CONTROL REGISTER
                                ;0029  0000              NONPR   = BIT6  ;USED TO PREVENT AN NPR
                                ;0030  0000              HALT    = BIT4  ;SET DURING MOP MODE ONLY
                                ;0031  0000              PWRUP   = BIT2  ;CLEARED BY BUS INIT
                                ;0032  0000              SDCLOW  = BIT1  ;SET TO 1 TO RESET LSI-11 FOR MOP BOOT
                                ;0033  0000              DISINI  = BIT0  ;SET TO 1 TO DISABLE BUS INIT TO 6502
                                ;0034  0000
                                ;0035  0000
                                ;0036  0000              ;MISCELLANEOUS EQUATES
                                ;0037  0000              STARAM  = $003F ;STARTING ADRS OF GEN'L PURPOSE RAM
                                ;0038  0000
```

```
                                        .SBTTL  SUBTEST 2'S M-CODE -- ROUTINE
                                        ;0039  0000
                                        ;004C  0000             .=STARAM        ;START OF MICROCODE IN RAM
7714  036140    251     000           .BYTE  251,000
                                        ;0042  003F  A9 00              LDA     #0      ;CLEAR BSEL7
7716  036142    205     027           .BYTE  205,027
                                        ;0043  0041  85 17              STA     BSEL7
                                        ;0044  0043
7719  036144    245     027           .BYTE  245,027
                                        ;0045  0043  A5 17      WAIT1   LDA     BSEL7   ;WAIT FOR IT TO GO <> 0
7721  036146    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
7731  036150    251     125           .BYTE  251,125
                                        ;0054  0047  A9 55              LDA     #NONPR!HALT!PWRUP!DISINI
7733  036152    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).
7738  036155    240     041           .BYTE  240,41
                                        ;0054  004C  A0 21              LDY     #^21    ;INITIAL VALUE OF COUNTER
7740  036157    210                   .BYTE  210
                                        ;0054  004E  88         DELAY   DEY             ;(33. FOR .6 US CYCLE)
7742  036160    320     375           .BYTE  320,375
                                        ;0054  004F  D0 FD              BNE     DELAY
7744  036162    251     127           .BYTE  251,127
                                        ;0055  0051  A9 57              LDA     #NONPR!HALT!PWRUP!SDCLOW!DISINI
7746  036164    215     004     246   .BYTE  215,004,246
                                        ;0056  0053  8D 04 A6           STA     NPRCTL  ;HANG THE 11 CPU ETC.
7748  036167    251     165           .BYTE  251,165
                                        ;0057  0056  A9 75              LDA     #NONPR!HALT!PWRUP!DISINI!NPROUT
7750  036171    215     004     246   .BYTE  215,004,246
                                        ;0058  0058  8D 04 A6           STA     NPRCTL  ;NOW LET IT "POWER-UP"
                                        ;0059  0058
7753  036174    251     000           .BYTE  251,000
                                        ;0060  0058  A9 00              LDA     #0      ;SETUP NPR ADDR OUT HIGH FOR
7755  036176    205     071           .BYTE  205,071
                                        ;0061  0050  85 39              STA     NPRAOH  ;  ALL NPR'S
7757  036200    205     072           .BYTE  205,072
                                        ;0062  005F  85 3A              STA     NPRAOX  ;THE EXTENDED BYTE TOO
7759  036202    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
7765  036203    251     024           .BYTE  251,024
                                        ;0068  0062  A9 14              LDA     #^B24   ;POINT TO 11'S POWER-UP VEC.
```

```
 7767  036205  205  070          .BYTE  205,070
 7768                           ;0069  0064  85 38          STA     NPRAOL
 7769  036207  040  305  000    .BYTE  040,305,000
 7770                           ;0070  0066  20 C5 00       JSR     NPR     ;MOVE TO 24
 7771  036212  040  305  000    .BYTE  040,305,000
 7772                           ;0071  0069  20 C5 00       JSR     NPR     ;MOVE TO 26
 7773                           ;0072  006C
 7774  036215  251  000          .BYTE  251,000
 7775                           ;0073  006C  A9 00          LDA     #0
 7776  036217  205  070          .BYTE  205,070
 7777                           ;0074  006E  85 38          STA     NPRAOL  ;POINT TO THE 11'S LOC. 0
 7778  036221  040  305  000    .BYTE  040,305,000
 7779                           ;0075  0070  20 C5 00       JSR     NPR     ;MOVE TO LOC 0
 7780  036224  040  305  000    .BYTE  040,305,000
 7781                           ;0076  0073  20 C5 00       JSR     NPR     ;MOVE TO LOC 2
 7782  036227  040  305  000    .BYTE  040,305,000
 7783                           ;0077  0076  20 C5 00       JSR     NPR     ;MOVE TO 4
 7784                           ;0078  0079
 7785                           ;0079  0079          ; NOW THAT WE'VE TAKEN CONTROL OF THE 11'S POWER-
 7786                           ;0080  0079          ; UP VECTOR, FORCE HIM THROUGH IT.  BUT DON'T LET
 7787                           ;0081  0079          ; HIS BINIT RESET US (BY KEEPING "DISABL INIT"
 7788                           ;0082  0079          ; SET)
 7789                           ;0083  0079
 7790  036232  251  107          .BYTE  251,107
 7791                           ;0084  0079  A9 47          LDA     #NONPR!PWRUP!SDCLOW!DISINI
 7792  036234  215  004  246    .BYTE  215,004,246
 7793                           ;0085  0078  8D 04 A6       STA     NPRCTL
 7794  036237  251  145          .BYTE  251,145
 7795                           ;0086  007E  A9 65          LDA     #NONPR!PWRUP!DISINI!NPROUT
 7796  036241  215  004  246    .BYTE  215,004,246
 7797                           ;0087  0080  8D 04 A6       STA     NPRCTL
 7798  036244  352                .BYTE  352
 7799                           ;0087  0083  EA             NOP
 7800  036245  352                .BYTE  352
 7801                           ;0087  0084  EA             NOP
 7802                           ;0088  0085
 7803                           ;0089  0085          ; NOW WE CAN NPR-OUT THE REST OF THE DATA WE HAVE
 7804                           ;0090  0085
 7805  036246  040  305  000    .BYTE  040,305,000
 7806                           ;0091  0085  20 C5 00       JSR     NPR     ;MOVE TO LOC 6
 7807  036251  240  166          .BYTE  240,166
 7808                           ;0092  0088  A0 76          LDY     #^O166  ;THIS IS HOW MANY WE'LL DO
 7809  036253  040  305  000    .BYTE  040,305,000
 7810                           ;0093  008A  20 C5 00  FILOOP  JSR     NPR     ;WRITE 1 WORD
 7811  036256  312                .BYTE  312
 7812                           ;0094  008D  CA             DEX             ;BACK UP THE DATA POINTER
 7813  036257  312                .BYTE  312
 7814                           ;0095  008E  CA             DEX             ; -- WE WANT THE SAME WORD
 7815  036260  210                .BYTE  210
 7816                           ;0096  008F  88             DEY             ;IF NOT DONE,
 7817  036261  320  370          .BYTE  320,370
 7818                           ;0097  0090  D0 F8          BNE     FILOOP  ;               DO IT AGAIN
 7819  036263  240  006          .BYTE  240,006
 7820                           ;0098  0092  A0 06          LDY     #6      ;ELSE, SETUP TO DO 6 MORE
 7821  036265  350                .BYTE  350
 7822                           ;0099  0094  E8             INX             ;       WORDS
```

```
 7823  036266  350                     .BYTE  350
 7824                                  ;0100  0095  E8                INX             ;POINT TO NEXT WORD
 7825  036267  040  305  000           .BYTE  040,305,000
 7826                                  ;0101  0096  20 C5 00  ENDLOP  JSR     NPR     ;MOVE THE LAST 6 WORDS
 7827  036272  210                     .BYTE  210
 7828                                  ;0102  0099  88                DEY             ;IF NOT DONE,
 7829  036273  320  372                .BYTE  320,372
 7830                                  ;0103  009A  D0 FA             BNE     ENDLOP  ;                DO IT AGAIN
 7831                                  ;0104  009C                                    ;ELSE, THE SIMULATED "DOWN-
 7832                                  ;0105  009C                                    ;  LINE LOAD" IS COMPLETE
 7833                                  ;0106  009C
 7834  036275  251  004                .BYTE  251,004
 7835                                  ;0107  009C  A9 04             LDA     #4      ; AND THE 11'S LOC. 4
 7836  036277  205  070                .BYTE  205,070
 7837                                  ;0108  009E  85 38             STA     NPRAOL
 7838  036301  040  305  000           .BYTE  040,305,000
 7839                                  ;0109  00A0  20 C5 00          JSR     NPR     ;OVER-WRITE THE "BR  ."
 7840                                  ;0110  00A3                                    ;INSTRUCTION TO LET THE JUST
 7841                                  ;0111  00A3                                    ;LOADED ROUTINE BE EXECUTED
 7842                                  ;0112  00A3
 7843  036304  251  104                .BYTE  251,104
 7844                                  ;0113  00A3  A9 44             LDA     #NONPR!PWRUP
 7845  036306  215  004  246           .BYTE  215,004,246
 7846                                  ;0114  00A5  8D 04 A6          STA     NPRCTL  ;LET BINIT RESET US AGAIN
 7847                                  ;0115  00A8
 7848  036311  140                     .BYTE  140
 7849                                  ;0116  00A8  60                RTS             ;RETURN TO MAINTENANCE LOOP
 7850                                  ;0117  00A9
 7851                                  ;0118  00A9
 7852                                  ;0119  00A9          ;*********************************************************
 7853                                  ;0120  00A9          ;
 7854                                  ;0121  00A9          ;       DATABL -- DATA TABLE CONTAINING THE DATA THAT
 7855                                  ;0122  00A9          ;                 IS TO BE NPR'D INTO THE 11'S MEMORY
 7856                                  ;0123  00A9          ;
 7857                                  ;0124  00A9          ;*********************************************************
 7858                                  ;0125  00A9
 7859                                  ;0126  00A9
 7860                                  ;0127  00A9          DATABL
 7861  036312  000000                  .WORD  000000
 7862                                  ;0128  00A9  00 00             .DBYTE  0,@340  ;LOC'S 24 & 26
 7863  036314  000340                  .WORD  000340
 7864                                  ;0128  00AB  00 E0
 7865  036316  012700  177777          MOV    #-1,R0
 7866                                  ;0129  00AD  15 C0             .DBYTE  @012700,-1,@777 ;LOC'S 0 --> 4
 7867                                  ;0129  00AF  FF FF
 7868  036322  000777                  BR      .
 7869                                  ;0129  0081  01 FF
 7870  036324  005001                  CLR     R1
 7871                                  ;0130  0083  0A 01             .DBYTE  @005001 ;LOC. 6
 7872  036326  062701                  .WORD  062701
 7873                                  ;0131  0085  65 C1             .DBYTE  @062701 ;LOC'S 10 --> 362
 7874  036330  010037  002412          MOV    R0,@#TMP0
 7875                                  ;0132  0087  10 1F             .DBYTE  @010037 ;LOC 364  "MOV"
 7876                                  ;0133  0089  00 00             .DBYTE  0       ;LOC 366
 7877  036334  013706  002454          MOV    @#OLDSP,SP
 7878                                  ;0134  008B  17 C6             .DBYTE  @013706 ;LOC 370  "MOV"
```

```
 7879                                   ;0135  0080  00 00              .DBYTE  0        ;LOC 372
 7880  036340  000137  035642            JMP    @#HLTST2
                                        ;0136  0083  00 5F              .DBYTE  @000137 ;LOC 374  "JMP"
 7881
 7882                                   ;0137  0085  00 00              .DBYTE  0        ;LOC 376
 7883  036344  000240                    NOP
                                        ;0138  0087  00 A0              .DBYTE  @000240 ;"NOP" FOR LOC 4
 7884
 7885                                   ;0139  0089
 7886                                   ;0140  0089                ;  THE THREE WORDS FOR LOCATIONS 366, 372, & 376 ARE
 7887                                   ;0141  0089                ;  ASSEMBLED IN WHEN THIS CODE IS INCLUDED INTO THE
 7888                                   ;0142  0089                ;  DIAGNOSTIC
 7889                                   ;0143  0089
 7890                                   ;0144  0089                ;*****************************************************
 7891                                   ;0145  0089                ;
 7892                                   ;0146  0089                ;       "NPR" SUBROUTINE:
 7893                                   ;0147  0089                ;
 7894                                   ;0148  0089                ; 1 TAKE THE DATA FROM THE DATA TABLE AS INDEXED BY
 7895                                   ;0149  0089                ;       "X" AND PUT IT INTO THE NPR DATA OUT REGISTERS
 7896                                   ;0150  0089                ;
 7897                                   ;0151  0089                ; 2 GET THE CURRENT SETTING OF THE NPR CONTROL REG.
 7898                                   ;0152  0089                ;       AND WRITE IT BACK TO CAUSE A WORD NPR-OUT
 7899                                   ;0153  0089                ;
 7900                                   ;0154  0089                ; 3 INCREMENT THE NPR-OUT-ADDRESS-LOW REGISTER
 7901                                   ;0155  0089                ;
 7902                                   ;0156  0089                ; 4 WAIT FOR "GOBUSY" TO GO LOW
 7903                                   ;0157  0089                ;
 7904                                   ;0158  0089                ; 5 RETURN TO CALLER
 7905                                   ;0159  0089                ;
 7906                                   ;0160  0089                ;*****************************************************
 7907                                   ;0161  0089
 7908  036346      265     251           .BYTE  265,251
 7909                                   ;0162  0089  B5 A9      NPR     LDA     DATABL,X ;LOAD THE DATA-OUT REG'S
 7910  036350      215     00\     246   .BYTE  215,000,246
 7911                                   ;0163  008D  80 00 A6           STA     NPRDOL
 7912  036353      265     252           .BYTE  265,252
 7913                                   ;0164  0090  B5 AA              LDA     DATABL+1,X
 7914  036355      215     001     246   .BYTE  215,001,246
 7915                                   ;0165  0092  80 01 A6           STA     NPRDOH
 7916                                   ;0166  0095
 7917  036360      255     004     246   .BYTE  255,004,246
 7918                                   ;0167  0095  AD 04 A6           LDA     NPRCTL
 7919  036363      215     004     246   .BYTE  215,004,246
 7920                                   ;0168  0098  80 04 A6           STA     NPRCTL  ;KICK OFF A WORD NPR-OUT
 7921                                   ;0169  009B
 7922  036366      350                   .BYTE  350
 7923                                   ;0170  009B  E8                 INX             ;POINT TO THE NEXT DATA
 7924  036367      350                   .BYTE  350
 7925                                   ;0171  009C  E8                 INX             ;  WORD
 7926                                   ;0172  009F
 7927                                   ;0173  009F
 7928                                   ;0174  009F             NPRWAT
 7929  036370      054     004     246   .BYTE  054,004,246
 7930                                   ;0175  009F  2C 04 A6           BIT     NPRCTL  ;WAIT FOR THE NPR TO
 7931  036373      160     373           .BYTE  160,373
 7932                                   ;0176  00A2  70 FB              BVS     NPRWAT  ; COMPLETE
 7933  036375      352                   .BYTE  352
 7934                                   ;0177  00A4  EA                 NOP
```

```
7935  056376      346     070          .BYTE  346,070
7936                                   ;0178  0000  E6 38              INC     NPRAOL  ;POINT TO THE NEXT WORD
7937  036400      346     070          .BYTE  346,070
7938                                   ;0179  000F  E6 38              INC     NPRAOL  ;OF THE 11'S MEMORY
7939                                   ;0180  00E1
7940  036402      140                  .BYTE  140
7941                                   ;0181  00E1  60                 RTS             ;RETURN TO CALLER
7942                                   ;0182  00E2
7943                                   ;
7944                                   ;
7945                                   ;ERRORS = 0000
7946                                   ;
7947                                   .SBTTL  SUBTEST 2'S M-CODE -- SYMBOL   TABLE
7948                                   ;
7949                                   ; BIT0     0001    BIT1     0002    BIT2     0004    BIT4     0010
7950                                   ; BIT6     0040    BSEL7    0017    DATABL   0090    DISINI   0001
7951                                   ; ENDLOP   008A    FILOOP   007E    HALT     0010    NONPR    0040
7952                                   ; NPR      0089    NPRAOH   0039    NPRAOL   0038    NPRAOX   003A
7953                                   ; NPRCTL   A604    NPRDOH   A601    NPRDOL   A600    NPRWAT   00CB
7954                                   ; PWRUP    0004    SDCLOW   0002    STARAM   003F    WAIT1    0043
7955                                   ;
7956                                   ;END OF ASSEMBLY(V6A)
7957                                   ;SYMBOLS LEFT = 1476 OUT OF 1500
7958                                   ;
7959                                   ;COMPAS MICROSYSTEMS MINMIC CROSS ASSEMBLER PAGE C-1
7960                                   .SBTTL  SUBTEST 2'S M-CODE -- CROSS REFERENCE TABLE (CREF V01-05 )
7961                                   ;
7962                                   ;
7963                                   ;BIT0     5#     33
7964                                   ;BIT1     6#     32
7965                                   ;BIT2     7#     31
7966                                   ;BIT4     8#     30
7967                                   ;BIT6     9#     29
7968                                   ;BSEL7   13#     43      45
7969                                   ;DATABL  127#    162     164
7970                                   ;DISINI   33#     55      57      84      86
7971                                   ;ENDLOP  101#    103
7972                                   ;FILOOP   93#     97
7973                                   ;HALT     30#     55      57
7974                                   ;NONPR    29#     55      57      84      86      113
7975                                   ;NPR      70      71      75      76      77      91      93
7976                                   ;        101     109     162#
7977                                   ;NPRAOH   18#     61
7978                                   ;NPRAOL   17#     18      19      69      74      108     178
7979                                   ;        179
7980                                   ;NPRAOX   19#     62
7981                                   ;NPRCTL   28#     56      58      85      87      114     167
```

```
7982                                    ;       168     175
7983                                    ;NPRDOH  24#    165
7984                                    ;NPRDOL  23#     24     163
7985                                    ;NPRWAT 174#    176
7986                                    ;PWRUP   31#     55      57      84      86      113
7987                                    ;SDCLOW  32#     55      84
7988                                    ;STARAM  37#     40
7989                                    ;WAIT1   45#     46
7990  036403                            MC2END:
7991            036404                  .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.
                        ;////////////////////////////////////////////////////////////////////////

036404                          BGNHRD
036404  000030                                                    .WORD L10070-L$HARD/2
036406                                                        L$HARD::
036406                          GPRMA   ADDRES,0,0,160020,177776,YES
036406  000031                                                  .WORD   T$CODE
036410  036466                                                  .WORD   ADDRES
036412  160020                                                  .WORD   T$LOLIM
036414  177776                                                  .WORD   T$HILIM
036416                          GPRMA   VECTOR,2,0,0,674,YES
036416  001031                                                  .WORD   T$CODE
036420  036514                                                  .WORD   VECTOR
036422  000000                                                  .WORD   T$LOLIM
036424  000674                                                  .WORD   T$HILIM
036426                          GPRMD   PRIRTY,4,0,7000,0,7,YES
036426  002032                                                  .WORD   T$CODE
036430  036545                                                  .WORD   PRIRTY
036432  007000                                                  .WORD   7000
036434  000000                                                  .WORD   T$LOLIM
036436  000007                                                  .WORD   T$HILIM
036440                          GPRML   PU24.M,16,100,YES
036440  007130                                                  .WORD   T$CODE
036442  036661                                                  .WORD   PU24.M
036444  000100                                                  .WORD   100
036446                          GPRMD   BDTY.M,12,0,7,0,2,YES
036446  005032                                                  .WORD   T$CODE
036450  036576                                                  .WORD   BDTY.M
036452  000007                                                  .WORD   7
036454  000000                                                  .WORD   T$LOLIM
036456  000002                                                  .WORD   T$HILIM
036460                          GPRML   XMFG.M,16,200,YES
036460  007130                                                  .WORD   T$CODE
036462  036743                                                  .WORD   XMFG.M
036464  000200                                                  .WORD   200

036466                          ENDHRD
                                                                .EVEN
036466                                                        L10070:

                                .NLIST  BEX
036466  042504  044526  042503  ADDRES: .ASCIZ  /DEVICE CSR ADDRESS : /
036514  042504  044526  042503  VECTOR: .ASCIZ  /DEVICE VECTOR ADDRESS : /
036545     104  053105  041511  PRIRTY: .ASCIZ  /DEVICE PRIORITY LEVEL : /
```

```
        036576  047502  051101  020104  BDTY.M: .ASCIZ  /BOARD TYPE (0=M8064, 1=M8053-V.35, 2=M8053-EIA) : /
        036661     111  020123  044124  PU24.M: .ASCIZ  /IS THE PROCESSOR STRAPPED TO MODE 0 ON POWER-UP? /
        036743     111  020123  044124  XMFG.M: .ASCIZ  /IS THIS A MANUFACTURING TEST STAND?/
                                        .LIST   BEX
  8045          037010                  .EVEN
```

```
 8046                                   .SBTTL SOFTWARE PARAMETER CODING SECTION
 8047
 8048
 8049
 8050                                   ;////////////////////////////////////////////////////////////////////////
 8051                                   ;/  THE SOFTWARE PARAMETER CODING SECTION CONTAINS MACROS
 8052                                   ;/  THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
 8053                                   ;/  MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
 8054                                   ;/  INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
 8055                                   ;/  MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
 8056                                   ;/  WITH THE OPERATOR.
 8057                                   ;////////////////////////////////////////////////////////////////////////
 8058
 8059  037010                                   BGNSFT
 8060  037010  000000                                                          .WORD L10071-L$SOFT/2
 8061  037012                                                          L$SOFT::
 8062  037012                                   ENDSFT
 8063                                                                          .EVEN
 8064  037012                                                          L10071:
```

```
                                .SBTTL PATCH AREA FOR DEBUG
                                PATCH:
                                        .=.+100
037112  000240                          NOP
037114  000240                          NOP
037116  000240                          NOP

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

                                .SBTTL "ENDMOD" & "LASTAD"
                                        ENDMOD
                                        LASTAD
                                                                        .EVEN
037120  000000                                                          .WORD   0
037122  000000                                                          .WORD   0
037124                          L$LAST::
                                .END
```

```
ACR     = 120013            1577#  2327   2336   2409   2418   3400   4441   4452   4492
ADDRES  036466              8011   8044#
ADR     = 000020 G          1432#
AD.HIT  023132              3931   3966#
AD.OK   023126              3955   3960#
ASSEMB= 000010              1177
BDATA   002256              1647#  3010   3026   3072   3196   3209   3219   3333   3346   3513   3632   3672   4685#
                            4744   4786   4890#  4957#  5053#  5313#  5392#  5440   5449   5475   5520#  5584#  5652
                            5653   5918   5921   5926   5930   5935#  5936   5960   5963   5987   6062   6065   6070
                            6074   6079#  6080   7414#  7427#  7438#
BDTY.M  036576              8031   8044#
BIT0    = 000001 G          1405#  1476   1494   1512   1523   1592   3801   5295   5502   5826   6686   6800   7203
BIT00   = 000001 G          1394#  1405
BIT01   = 000002 G          1393#  1404
BIT02   = 000004 G          1392#  1403
BIT03   = 000010 G          1391#  1402
BIT04   = 000020 G          1390#  1401
BIT05   = 000040 G          1389#  1400
BIT06   = 000100 G          1388#  1399
BIT07   = 000200 G          1387#  1398
BIT08   = 000400 G          1386#  1397
BIT09   = 001000 G          1385#  1396
BIT1    = 000002 G          1404#  1475   1489   1591
BIT10   = 002000 G          1384#  5294   5355   5365   5486   5501   5546   5556   5664
BIT11   = 004000 G          1383#
BIT12   = 010000 G          1382#
BIT13   = 020000 G          1381#
BIT14   = 040000 G          1380#
BIT15   = 100000 G          1379#
BIT2    = 000004 G          1403#  1474   1488   1590   4450   4500   4537   4614
BIT3    = 000010 G          1402#  1473   1589   4450   4490
BIT4    = 000020 G          1401#  1472   1513   1588   4450   5737   5768
BIT5    = 000040 G          1400#  1471   1587   2386   2396   2400   2414   3369   5737   5768
BIT6    = 000100 G          1399#  1470   1522   1586   2305   2315   2318   2332
BIT7    = 000200 G          1398#  1457   1469   1521   1537   1585   2305   2332   4500
BIT8    = 000400 G          1397#
BIT9    = 001000 G          1396#
BOE     = 000400 G          1436#
BRDTYP  002366              1742#  3842#  4520   4576
BSEL    002320              1714#
BSELRS  002622              1850#  1988   1992
BSEL0   002320              1713#  2243   3938   3944   6254#  6286#  6336#  6368#  6418#  6450#  6500#  6532#  6576#
                            6630#  6837#  6891#
BSEL1   002322              1716#  1972#  1982   2244   6905
BSEL10  002340              1726#  2251
BSEL11  002342              1728#  2252
BSEL12  002344              1729#  2253
BSEL13  002346              1731#  2254
BSEL14  002350              1732#  2255
BSEL15  002352              1734#  2256
BSEL16  002354              1735#  2257
BSEL17  002356              1737#  2258
BSEL2   002324              1717#  2033   2065#  2072   2108#  2115   2172#  2179   2245   6846#
BSEL3   002326              1719#  2246   2316#  2397#  4537   4601#  4614   6705#  6718
BSEL4   002330              1720#  1992   2247
BSEL5   002332              1722#  2248
```

```
BSEL6   002334          17230  1988   2087   2249   6954#  6982
BSEL7   002336          17250  2250   6907   7243#  7247   7259#  7297#  7332#  7336   7349#
BSLT0 - 000020          15500
BSLT1 - 000021          15510
BSLT2 - 000022          15530
BSLT3 - 000023          15540
BSLT4 - 000024          15560
BSLT5 - 000025          15570
BSLT6 - 000026          15590
BSLT7 - 000027          15600
BSR0    002212          16180  2243#  3539
BSR1    002214          16200  2244#  3537
BSR10   002232          16330  2251#  3581
BSR11   002234          16340  2252#  3579
BSR12   002236          16350  2253#  3577
BSR13   002240          16360  2254#  3575
BSR14   002242          16370  2255#  3602
BSR15   002244          16380  2256#  3600
BSR16   002246          16390  2257#  3598
BSR17   002250          16400  2258#  3596
BSR2    002216          16220  2245#  3535
BSR3    002220          16240  2246#  3533
BSR4    002222          16260  2247#  3560
BSR5    002224          16280  2248#  3558
BSR6    002226          16300  2249#  3556
BSR7    002230          16320  2250#  3554
BT1   - 002654          19020  4690
BT2   - 002740          19030  2554   2558   2562   2566   2570   2574   2578   2582   2586   4684   4729
BUFARE  002654          18790  1885   1902   1903   4858   4925   5021   5185   7319   7359   7377   7403
CFMT0   022566          3785   39080
CFMT2   022655          3862   39080
CFMT3   022735          3868   39080
CONSOL  002314          16640  3764#  3781   3904#
CONTIN  022456          3756   38750
CONTST  022556          3767   39040
CSREGS= 000010          14460
C$AU  - 000052          11770  4014
C$AUTO= 000061          11770  3964
C$BRK - 000022          11770
C$BSEG= 000004          11770
C$BSUB= 000002          11770  4062   4853   4920   5103   5175   5292   5500   5875   6014   6251   6333   6415
                        6497   6573   6627   6820   6932   7221   7304
C$CEFG= 000045          11770
C$CLCX= 000062          11770
C$CLEA= 000012          11770  3986
C$CLOS= 000055          11770
C$CLP1= 000006          11770
C$CVEC= 000036          11770  3775   3953   3980   3983   6895   6978   7284
C$DCLN= 000044          11770
C$DODU= 000051          11770  3958
C$DRPT= 000024          11770
C$DU  - 000053          11770  4001
C$EDIT= 000003          11770  1252
C$ERDF= 000055          11770  2814   2848   4089   4114   4143   4162   4181   4206   4231   4251   4275   4301
                        4325   4348   4486   4559   4594   4627   4713   4758   4800   4900   4967   5064   5164
                        5236   5321   5396   5461   5468   5479   5528   5588   5636   5643   5657   5941   5969
```

```
                    5976  5991  6085  6118  6125  6152  6270  6280  6294  6304  6352  6362  6376
                    6386  6434  6444  6458  6468  6516  6526  6540  6550  6594  6604  6648  6658
                    6722  6765  6867  6911  6968  6986  7252  7268  7292  7341  7369  7387  7418
                    7431  7442
C$ERHR= 000056       1177#
C$ERRO= 000060       1177#  4068  4077  4102  4135  4153  4194  4219  4263  4289  4313  4358  4401
                    4433  4445  4456  4465  4480  4496  4506  4515  4529  4544  4553  4571  4588
                    4607  4621  4643  4673  4681  4725  4732  4741  4768  4783  4844  4864  4931
                    5011  5027  5107  5120  5129  5138  5147  5156  5179  5192  5201  5210  5219
                    5228  5272  5338  5347  5361  5376  5385  5413  5423  5434  5443  5452  5552
                    5568  5577  5618  5627  5866  6227  6260  6342  6424  6506  6582  6636  6692
                    6749  6824  6918  6937  6994  7225  7276  7308  7395  7450
C$ERSF= 000054       1177#
C$ERSO= 000057       1177#
C$ESCA= 000010       1177#  4070  4079  4084  4104  4109  4119  4137  4155  4167  4175  4196  4201
                    4221  4226  4246  4256  4265  4270  4291  4296  4315  4320  4330  4343  4435
                    4447  4458  4467  4472  4482  4498  4508  4517  4531  4546  4555  4564  4573
                    4590  4599  4609  4623  4632  4675  4718  4763  4770  4846  5013  5109  5122
                    5131  5140  5149  5158  5181  5194  5203  5212  5221  5230  5326  5340  5349
                    5363  5378  5387  5401  5415  5425  5436  5445  5454  5473  5484  5533  5554
                    5570  5579  5593  5620  5629  5648  5662  5946  5981  5996  6090  6130  6157
                    6262  6344  6426  6508  6584  6638  6694  6751  6926  6939  7227  7278  7310
                    7398
C$ESEG= 000005       1177#
C$ESUB= 000003       1177#  4362  4914  4981  5170  5242  5495  5674  6005  6169  6311  6393  6475
                    6557  6611  6665  6922  6998  7300  7454
C$ETST= 000001       1177#  4366  4637  4806  4984  5079  5245  5677  6172  6670  6729  6771  7001
                    7457
C$EXIT= 000032       1177#  5274  5281  5860  5868  6229  6797  6803  7200  7206
C$GETB= 000026       1177#
C$GETW= 000027       1177#
C$GMBM= 000043       1177#
C$GPHR= 000042       1177#  3808
C$GPLO= 000030       1177#
C$GPRI= 000040       1177#
C$INIT= 000011       1177#  3898
C$INLP= 000020       1177#
C$MMNI= 000050       1177#
C$MEM = 000031       1177#
C$MSG = 000023       1177#  2879  2889  2964  3115  3124  3133  3174  3230  3305  3358  3393  3452
                    3497
C$OPEN= 000034       1177#
C$PNTB= 000014       1177#  2977  3322  3697
C$PNTF= 000017       1177#  3788  3865  3871
C$PNTS= 000016       1177#
C$PNTX= 000015       1177#  2905  2922  2932  2942  2949  2959  2983  2993  3008  3022  3040  3050
                    3070  3090  3110  3146  3154  3162  3169  3184  3190  3207  3215  3225  3242
                    3248  3254  3260  3270  3280  3290  3300  3338  3352  3387  3409  3422  3439
                    3447  3473  3479  3489  3529  3543  3550  3564  3571  3585  3592  3606  3619
                    3627  3637  3644  3657  3665  3678  3685
C$QIO = 000377       1177#
C$RDBU= 000007       1177#
C$REFG= 000047       1177#  3733  3739  3745  3751
C$RESE= 000033       1177#  3998  6715
C$REVI= 000003       1177#  1251
C$RFLA= 000021       1177#
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C$RPT = 000025           1177#
C$SEFG= 000046           1177#
C$SPRI= 000041           1177#  6898   6981   7287   7365   7383   7411
C$SVEC= 000037           1177#  3770   3882   3890   3934   5713   6833   6946   7240   7327
C$TPRI= 000013           1177#
DCOKTS= 000014           3861   6793#
DDRA  = 120003           1567#
DDRB  = 120002           1566#
DELAY1  002262           1649#  1977   6900
DELAY2  002264           1650#
DEVMAP  002310           1662#  3794*  3815*
DEVPTR  002312           1663#  3801*  3812*  3815   3816*
DFPTBL  002160 G         1329#
DIAGMC= 000000           1177
DMVDAI= 000001           1476#  6699   6755
DMVPU = 000004           1474#  1480   1481   1482   1868   6699   6755   6844
EF.CON= 000036 G         1412#  3750
EF.NEW= 000035 G         1413#  3744
EF.PWR= 000034 G         1414#
EF.RES= 000037 G         1411#  3738
EF.STA= 000040 G         1410#  3732
EMCODE  035016           6952   7024#
EM26    016152           3705#  4715   4802
EM26A   016204           3705#  4760   5323   5398   5530   5590   5943   6087
EM26B   016226           3705#  4902
EM26C   016251           3705#  4969
EM26D   016274           3705#  5066
EM26E   016316           2740   3705#  4871   4938   5034   5238
EM26F   016351           3705#
EM26G   016402           3705#  5166
EM27    016424           3705#  5823
EM27A   016437           3705#  5463   5638   5971   6120
EM27B   016461           3705#  5470   5645   5978   6127
EM27C   016502           3705#  5481   5659   5993
EM3     016115           2041   3705#
EM34    016526           2816   3705#  6272   6296   6354   6436   6460   6518   6650
EM34B   016540           2850   3705#  6282   6306   6364   6388   6446   6528   6552   6606
EM35    016552           3705#  6378   6542   6596
EM35B   016573           3705#  6470   6660
EM4     016135           2081   2124   2187   3705#
EM40    016614           3705#  6724
EM41    016671           3705#  6767
EM42A   016746           3705#  6869   6970
EM42B   017020           3705#  6913
EM42C   017074           3705#  6988
EM43A   017153           3705#  7254   7270   7343   7371
EM43B   017177           3705#  7294
EM43C   017215           3705#  7389
EM43D   017242           3705#  7420   7433   7444
EM50A   017271           3705#
EM50B   017337           3705#
EM50C   017405           3705#
EM50D   017453           3705#  4145
EM50E   017507           3705#
EM50F   017543           3705#
EM50G   017610           3705#  4277
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EM50H   017652            3705#
EM50I   017740            3705#
EM50J   020002            3705#
EM50K   020070            3705#
EM50L   020132            3705#
EM50M   020214            3705#
EM50N   020256            3705#
EM50S   020324            3705#
EM50U   020376            3705#
EM50V   020442            3705#
EM50W   020507            3705#
EM50X   020556            3705#
EM50Y   020621            3705#
EM50Z   020673            3705#
EM51B   020734            3705#   4091    4116
EM51C   021002            3705#   4303
EM51E   021050            3705#   4164
EM51F   021104            3705#   4253
EM51G   021151            3705#   4208
EM51L   021213            3705#   4327
EM51M   021275            3705#   4233
EM51N   021337            3705#   4350
EM51P   021405            3705#   4183
EM52A   021457            3705#   4488
EM52B   021535            3705#   4561
EM52C   021567            3705#   4596
EM52D   021653            3705#   4629
EM60N   021711            3705#   6154
ENDEMB  013120            3694    3705#
ERRBLK  002210 G          1612#   2002#   2042#   2082#   2125#   2188#   2741#   4872#   4939#   5035#   5824#
ERRFLG  002276            1657#   2605#   2781    4878#   4883    4895    4897#   4945#   4950    4962    4964#   5041#   5046
                          5058    5061#
ERRMSG  002206 G          1611#   2001#   2041#   2081#   2124#   2187#   2740#   4871#   4938#   5034#   5823#
ERRNBR  002204 G          1610#   2000#   2040#   2080#   2123#   2186#   2739#   4867    4870#   4934    4937#   5030    5033#
                          5822#
ERRTYP  002202 G          1609#   1999#   2039#   2079#   2122#   2185#   2738#   4869#   4936#   5032#   5821#
ERR1    006212 G          2875#   6273    6283    6297    6307    6355    6365    6379    6389    6437    6447    6461    6471
                          6519    6529    6543    6553    6597    6607    6651    6661    6725    6768    6870    6914    6971
                          6989    7255    7271    7295    7344    7372    7390    7421    7434    7445
ERR10   007306 G          3129#   4970
ERR10$  012732            3653#   4973
ERR10.  012752            3130    3659#
ERR11   007314 G          2741    3138#   4872    4939    5035    5167    5239
ERR12   007456 G          3179#   5464    5471    5482    5639    5646    5660    5972    5979    5994    6121    6128
ERR13   010240 G          3237#   5824
ERR14   011002 G          3312#   5324    5399    5531    5591    5944    6088
ERR3    006220 G          2002    2817    2851    2884#
ERR4    006232 G          2042    2082    2125    2188    2894#
ERR4$   012206            2885    3523#
ERR51   011176 G          3364#   4092    4117    4146    4165    4184    4209    4234    4254    4278    4304    4328    4351
ERR52   011270 G          3398#   4489    4562    4597    4630
ERR60   011720 G          3468#   6155
ERR8    006532 G          2969#   4716    4761    4803
ERR9    007300 G          3120#   4903    5067
ERR9$   012574            3615#   4906    5070
ERR9.   012614            3121    3621#
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EVL    = 000004 G      14304
EXECUT= 000005         15354   6957    7244    7333
E$END  = 002100        11774
E$LOAD= 000035         11774   1275
FMT02A  013127         3349    3675    37054
FMT06   013530         2990    3047    37054
FMT06A  013542         2980    37054
FMT07   013476         2974    3319    37054
FMT09   013621         3624    3662    37054
FMT09A  013673         3641    3682    37054
FMT10   013714         3335    3634    37054
FMT11   013770         2939    2956    3267    3287    37054
FMT12   007672         3181    32314
FMT12A  007732         3187    32314
FMT12D  010020         3204    32314
FMT12E  010063         3212    32314
FMT12F  010145         3222    32314
FMT13A  010546         3239    33064
FMT13B  010611         3245    33064
FMT13C  010656         3251    33064
FMT13D  010721         3257    33064
FMT13E  010764         3277    3297    33064
FMT16   014007         3005    3019    3037    37054
FMT16A  014032         3067    3087    3107    37054
FMT17   014074         3151    37054
FMT17A  014153         3159    37054
FMT17B  014234         3166    37054
FMT17C  014307         3143    37054
FMT4    013213         2929    3526    37054
FMT4A   013253         3540    3582    37054
FMT4B   013306         2946    3547    3568    3589    37054
FMT4C   013313         3561    3603    37054
FMT5    013346         2902    37054
FMT5A   013411         2919    37054
FMT50A  014367         37054
FMT50B  014441         37054
FMT50C  014522         37054
FMT50D  014562         37054
FMT50E  014577         37054
FMT50H  014614         37054
FMT51A  014673         3384    37054
FMT52A  011557         3419    34544
FMT52B  011607         3436    34544
FMT52C  011652         3444    34544
FMT52H  011514         3406    34544
FMT60   012034         3470    34984
FMT61   012073         3476    34984
FMT62   012134         3486    34984
FRSPAS  002304         16604   38004
FRSTIM  002302         16594   38954
F$AU   = 000015        11774   4011    4013
F$AUTO= 000020         11774   3927    3963
F$BGN  = 000040        11774   1179    2807    2841    2875    2884    2894    2969    3120    3129    3138    3179    3237
                       3312    3364    3398    3468    3714    3727    3927    3977    3995    4011    4059    4061    4070
                       4079    4084    4104    4109    4119    4137    4155    4167    4175    4196    4201    4221    4226
                       4246    4256    4265    4270    4291    4296    4315    4320    4330    4343    4361    4365    4429
```

```
                    4435  4447  4458  4467  4472  4482  4498  4508  4517  4531  4546  4555  4564
                    4573  4590  4599  4609  4623  4632  4636  4669  4675  4718  4763  4770  4805
                    4839  4846  4852  4913  4919  4980  4983  5007  5013  5078  5098  5102  5109
                    5122  5131  5140  5149  5158  5169  5174  5181  5194  5203  5212  5221  5230
                    5241  5244  5268  5274  5281  5291  5326  5340  5349  5363  5378  5387  5401
                    5415  5425  5436  5445  5454  5473  5484  5494  5499  5533  5554  5570  5579
                    5593  5620  5629  5648  5662  5673  5676  5798  5855  5860  5868  5874  5946
                    5981  5996  6004  6013  6090  6130  6157  6168  6171  6223  6229  6250  6262
                    6310  6332  6344  6392  6414  6426  6474  6496  6508  6556  6572  6584  6610
                    6626  6638  6664  6669  6685  6694  6728  6745  6751  6770  6792  6797  6803
                    6819  6826  6921  6931  6939  6997  7000  7195  7200  7206  7220  7227  7278
                    7299  7303  7310  7398  7453  7456  8006  8060  8076
F$CLEA= 000007       11770 3977  3985
F$DU  = 000016       11770 3995  4000
F$END = 000041       11770 1179  2828  2862  2880  2890  2965  3116  3125  3134  3175  3231  3306
                    3359  3394  3453  3498  3899  3965  3987  4002  4015  4059  4061  4070  4079
                    4084  4104  4109  4119  4137  4155  4167  4175  4196  4201  4221  4226  4246
                    4256  4265  4270  4291  4296  4315  4320  4330  4343  4361  4363  4365  4367
                    4429  4435  4447  4458  4467  4472  4482  4498  4508  4517  4531  4546  4555
                    4564  4573  4590  4599  4609  4623  4632  4636  4638  4669  4675  4718  4763
                    4770  4805  4807  4839  4846  4852  4913  4915  4919  4980  4982  4983  4985
                    5007  5013  5078  5080  5098  5102  5109  5122  5131  5140  5149  5158  5169
                    5171  5174  5181  5194  5203  5212  5221  5230  5241  5243  5244  5246  5268
                    5274  5281  5291  5326  5340  5349  5363  5378  5387  5401  5415  5425  5436
                    5445  5454  5473  5484  5494  5496  5499  5533  5554  5570  5579  5593  5620
                    5629  5648  5662  5673  5675  5676  5678  5831  5855  5860  5868  5874  5946
                    5981  5996  6004  6006  6013  6090  6130  6157  6168  6170  6171  6173  6223
                    6229  6250  6262  6310  6312  6332  6344  6392  6394  6414  6426  6474  6476
                    6496  6508  6556  6558  6572  6584  6610  6612  6626  6638  6664  6666  6669
                    6671  6685  6694  6728  6730  6745  6751  6770  6772  6792  6797  6803  6819
                    6826  6921  6923  6931  6939  6997  6999  7000  7002  7195  7200  7206  7220
                    7227  7278  7299  7301  7303  7310  7398  7453  7455  7456  7458  8043  8065
                    8076
F$HARD= 000004       11770 8006  8041
F$HW  = 000013       11770 1327  1353
F$INIT= 000006       11770 3727  3897
F$JMP = 000050       11770 5274  5281  5860  5868  6229  6797  6803  7200  7206
F$MOD = 000000       11770 1179  8076
F$MSG = 000011       11770 2875  2878  2884  2888  2894  2963  2969  3114  3120  3123  3129  3132
                    3138  3173  3179  3229  3237  3304  3312  3357  3364  3392  3398  3451  3468
                    3496
F$PROT= 000021       11770 3714  3719
F$PWR = 000017       11773
F$RPT = 000012       11770
F$SEG = 000003       11770
F$SOFT= 000005       11770 8060  8063
F$SRV = 000010       11770 2807  2826  2841  2860  5798  5829
F$SUB = 000002       11770 4062  4361  4853  4913  4920  4980  5103  5169  5175  5241  5292  5494
                    5500  5673  5875  6004  6014  6168  6251  6310  6333  6392  6415  6474  6497
                    6556  6573  6610  6627  6664  6820  6921  6932  6997  7221  7299  7304  7453
F$SW  = 000014       11770 1362  1366
F$TEST= 000001       11770 4060  4365  4430  4636  4670  4805  4840  4983  5008  5078  5099  5244
                    5269  5676  5856  6171  6224  6669  6686  6728  6746  6770  6793  7000  7196
                    7456
GDATA   002254       16460 2036* 2076* 2119* 2182* 2896  2918  2996  3025  3052  3197  3334  3348
                    3512  3633  3674  4693* 4735* 4736* 4743  4776* 4785  4889* 4956* 5052* 5314*
```

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                    5391* 5405* 5406* 5410  5475  5521* 5583* 5600* 5601* 5606  5609  5653  5928*
                    5934* 5936  5985* 5987  6072* 6078* 6080  6094* 6099  6102  6267* 6277* 6291*
                    6301* 6349* 6359* 6373* 6383* 6431* 6441* 6455* 6465* 6513* 6523* 6537* 6547*
                    6591* 6601* 6645* 6655* 7415* 7428* 7439*
GETBSR  004232       1996  2243#  2811  2845
GETPRM  022230       3754  3804#  3813
GETSR   025022       4469  4638#
GETT2   024134       4081  4106   4172  4198  4223  4243  4267  4293  4317  4340  4396#
GETWSR  004374       2035  2075   2118  2181  2264#
G$CNTO= 000200      1177#
G$DELM= 000372      1177#  6807   7210
G$DISP= 000003      1177#
G$EXCP= 000400      1177#
G$HILI= 000002      1177#
G$LOLI= 000001      1177#
G$NO  = 000000      1177#
G$OFFS= 000400      1177#  8010   8015  8020  8026  8030  8036
G$OFSI= 000376      1177#  8010   8015  8020  8026  8030  8036
G$PRMA= 000001      1177#  8010   8015
G$PRMD= 000002      1177#  8020   8030
G$PRML= 000000      1177#  8026   6036
G$RADA= 000140      1177#
G$RADB= 000000      1177#
G$RADD= 000040      1177#
G$RADL= 000120      1177#  8026   8036
G$RADO= 000020      1177#  8010   8015  8020  8030
G$XFER= 000004      1177#
G$YES = 000010      1177#  8010   8015  8020  8026  8030  8036
HELP  = 000000      1169#  1196   1293  1318  1939
HLTEST= 000015      3860   7196#
HLTST2  035642      7400#  7880
HOE   = 100000 G    1443#
IBE   = 010000 G    1440#
IDU   = 000040 G    1433#
IENBA = 000001      1512#  6286   6368  6450  6532  6576  6630  6837  6891
IENBB = 000020      1513#  6286   6368  6450  6532  6576  6630
IENR  = 120016      1580#  2322   2404  4461  4502  4511
IER   = 020000 G    1441#
IFR   = 120015      1579#  4397   4540  4584  4617  4639
IFRCA1= 000002      1591#
IFRCA2= 000001      1592#
IFRCB1= 000020      1588#
IFRCB2= 000010      1589#
IFRIRQ= 000200      1585#
IFRSR = 000004      1590#
IFRT1 = 000100      1586#
IFRT2 = 000040      1587#
IHILNK  006136       2821   2823   2829#  3884*
IHOLNK  006210       2855   2857   2863#  3892*
INITT1  004456      2301#
INITT2  004630      2382#  4072   4353
INTFLG  002272      1653#  2820*  2854*  6253*  6265  6275  6285*  6289  6299  6335*  6347  6357  6367*
                     6371   6381   6417*  6429  6439  6449*  6453  6463  6499*  6511  6521  6531*  6535
                     6545   6575*  6589  6599  6629*  6643  6653  6836*
INTWCH  002274       1655#  2809   2843  3893*  6252*  6334*  6416*  6498*  6574*  6628*  6667*  6835*  6892*
IRQA  = 000004      1488#  6257   6421  6633  6846
```

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IRQB   = 000002            1489#  6257   6339   6579
IRQREG= 123005             1487#  6256   6338   6420   6502   6578   6632
ISR    = 000100 G          1434#
IXE    = 004000 G          1439#
I$AU   = 000041            1177#  4011#  4015#
I$AUTO= 000041             1177#  3927#  3965#
I$CLN  = 000041            1177#  3977#  3987#
I$DU   = 000041            1177#  3995#  4002#
I$HRD  = 000041            8006#  8043#
I$INIT= 000041             1177#  3727#  3899#
I$MOD  = 000041            1177#  1179#  8076#
I$MSG  = 000041            1177#  2875#  2880#  2884#  2890#  2894#  2965#  2969#  3116#  3120#  3125#  3129#  3134#
                           3138#  3175#  3179#  3231#  3237#  3306#  3312#  3359#  3364#  3394#  3398#  3453#  3468#
                           3498#
I$PROT= 000040             1177#  3714#
I$PTAB= 000041             1177#
I$PWR  = 000041            1177#
I$RPT  = 000041            1177#
I$SEG  = 000041            1177#  4059   4061   4429   4669   4839   4852   4919   5007   5098   5102   5174   5268
                           5291   5499   5855   5874   6013   6223   6250   6332   6414   6496   6572   6626   6685
                           6745   6792   6819   6931   7195   7220   7303
I$SETU= 000041             1177#
I$SFT  = 000041            8060#  8065#
I$SRV  = 000041            1177#  2807#  2828#  2841#  2862#  5798#  5831#
I$SUB  = 000041            1177#  4059   4061#  4084   4109   4119   4167   4175   4201   4226   4246   4256   4270
                           4296   4320   4330   4343   4361#  4363#  4429   4669   4839   4852#  4913#  4915#  4919#
                           4980#  4982#  5007   5098   5102#  5109   5122   5131   5140   5149   5158   5169#  5171#
                           5174#  5181   5194   5203   5212   5221   5230   5241#  5243#  5268   5291#  5326   5340
                           5349   5363   5378   5387   5401   5415   5425   5436   5445   5454   5473   5484   5494#
                           5496#  5499#  5533   5554   5570   5579   5593   5620   5629   5648   5662   5673#  5675#
                           5855   5874#  5946   5981   5996   6004#  6006#  6013#  6090   6130   6157   6168#  6170#
                           6223   6250#  6310#  6312#  6332#  6392#  6394#  6414#  6474#  6476#  6496#  6556#  6558#
                           6572#  6610#  6612#  6626#  6664#  6666#  6685   6745   6792   6819#  6826   6921#  6923#
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                           4365#  4367#  4429#  4435   4447   4458   4467   4472   4482   4498   4508   4517   4531
                           4546   4555   4564   4573   4590   4599   4609   4623   4632   4636#  4638#  4669#  4675
                           4718   4763   4770   4805#  4807#  4839#  4846   4852   4919   4983#  4985#  5007#  5013
                           5078#  5080#  5098#  5102   5174   5244#  5246#  5268#  5274   5281   5291   5499   5676#
                           5678#  5855#  5860   5868   5874   6013   6171#  6173#  6223#  6229   6250   6262   6332
                           6344   6414   6426   6496   6508   6572   6584   6626   6638   6669#  6671#  6685#  6694
                           6728#  6730#  6745#  6751   6770#  6772#  6792#  6797   6803   6819   6931   7000#  7002#
                           7195#  7200   7206   7220   7227   7278   7303   7310   7456#  7458#
J$JMP  = 000167            1177#
LODT2C  024102             4124   4238   4335   4380#
LOE    = 040000 G          1442#
LOGDEV  002266             1651#  3798*  3805*  3807   3957
LOT    = 000010 G          1431#
LSIDCL= 000002             1475#  6844
LSIHLT= 000020             1472#
LU1MOD  002000 G           1179#
L$ACP   002110 G           1282#
L$APT   002036 G           1240#
L$AU    023162 G           1267   4011#
L$AUT   002070 G           1266#
L$AUTO  023014 G           1283   3927#
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L$CLEA  023140 G          1281    3977#
L$CO    002032 G          1236#
L$DEPO  002011 G          1218#
L$DESC  003274 G          1273    1928#
L$DESP  002076 G          1272#
L$DEVP  002060 G          1258#
L$DISP  002124 G          1243    1303#
L$DLY   002116 G          1288#   6809    7212
L$DTP   002040 G          1242#
L$DTYP  002034 G          1238#
L$DU    023156 G          1269    3995#
L$DUT   002072 G          1268#
L$DVTY  003254 G          1259    1916#
L$EF    002052 G          1253#
L$ENVI  002044 G          1246#
L$ERRT  002202 G          1277    1608#
L$ETP   002102 G          1276#
L$EXP1  002046 G          1248#
L$EXP4  002064 G          1262#
L$EXP5  002066 G          1264#
L$HARD  036406 G          1225    8006    8007#
L$HIME  002120 G          1290#   5276
L$HPCP  002016 G          1224#
L$HPTP  002022 G          1228#
L$HW    002160 G          1229    1327    1328#
L$ICP   002104 G          1278#
L$INIT  022020 G          1279    3727#
L$LADP  002026 G          1232#
L$LAST  037124 G          1233    8080#
L$LOAD  002100 G          1274#
L$LUN   002074 G          1270#
L$MREV  002050 G          1250#
L$NAME  002000 G          1207#
L$PRIO  002042 G          1244#
L$PROT  022012 G          1285    3714#
L$PRT   002112 G          1284#
L$REPP  002062 G          1260#
L$REV   002010 G          1216#
L$SOFT  037012 G          8060    8061#
L$SPC   002056 G          1256#
L$SPCP  002020 G          1226#
L$SPTP  002024 G          1230#
L$STA   002030 G          1234#
L$SW    002202 G          1362    1363#
L$TEST  002114 G          1286#
L$TIML  002014 G          1222#
L$UNIT  002012 G          1220#
L10000  002200            1327    1353#
L10001  002202            1362    1366#
L10002  006134            2826#
L10003  006206            2860#
L10004  006216            2878#
L10005  006230            2888#
L10006  006530            2963#
L10007  007276            3114#
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L10011  007312          3132#
L10012  007454          3173#
L10013  007670          3229#
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L10015  011174          3357#
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L10017  011512          3451#
L10020  012032          3496#
L10022  022554          3897#
L10023  023130          3963#
L10024  023154          3985#
L10025  023160          4000#
L10026  023162          4013#
L10027  024100          4071    4080    4105    4138    4156    4197    4222    4266    4292    4316    4365#
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                        4344    4361#
L10031  025020          4436    4448    4459    4468    4473    4483    4499    4509    4518    4532    4547    4556    4565
                        4574    4591    4600    4610    4624    4633    4636#
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L10033  026156          4847    4983#
L10034  025720          4913#
L10035  026154          4980#
L10036  026426          5014    5078#
L10037  027034          5244#
L10040  026630          5110    5123    5132    5141    5150    5159    5169#
L10041  027032          5182    5195    5204    5213    5222    5231    5241#
L10042  030556          5275    5282    5676#
L10043  027750          5327    5341    5350    5364    5379    5388    5402    5416    5426    5437    5446    5455    5474
                        5485    5494#
L10044  030554          5534    5555    5571    5580    5594    5621    5630    5649    5663    5673#
L10045  031274          5829#
L10046  032522          5861    5869    6171#
L10047  031764          5947    5982    5997    6004#
L10050  032520          6091    6131    6158    6168#
L10051  034102          6230    6263    6345    6427    6509    6585    6639    6669#
L10052  033014          6310#
L10053  033220          6392#
L10054  033424          6474#
L10055  033630          6556#
L10056  033752          6610#
L10057  034074          6664#
L10060  034176          6695    6728#
L10061  034242          6752    6770#
L10062  034754          6798    6804    7000#
L10063  034560          6827    6921#
L10064  034752          6940    6997#
L10065  036022          7201    7207    7228    7279    7311    7456#
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L10067  036020          7399    7453#
L10070  036466          8006    8042#
L10071  037012          8060    8064#
MASCLR  003346          1970#   6915    6991    7273    7392    7447
MCLR =  000100          1522#   1972    2026    2036
MC1     036024          7231    7232    7464#
MC2     036140          7232    7314    7315    7672#
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MC2END  036403          7315    7990#
MFEND   032522          6170#
MLWRI   004064          2151    2172#
MOVLTD  004166          2209#   6950    7230    7313
MOVSB   005034          2480#
MOVSW   005004          2449#   4688    7317    7358    7376    7402
MPCSR   002320          1712#   3822
MPIHAN  006066 G        2807#   3879
MPIVEC  002360          1739#   3830*   3880    3979
MPOHAN  006140 G        2841#   3887
MPOVEC  002362          1740#   3832*   3888    3982
MPRIOR  002364          1741#   3839*   3878    3886
MRDY  = 000200          1537#   2033    2072    2115    2179
MREQ  = 000001          1523#   2026    2036
MSTCLR  003514          2026#   4065    4430    4670    4765    4841    5008    5104    5176    5269    5863    6224    6589
                        6746    6761    6821    6934    7222    7305
NEWLIN  013124          3616    3654    3705#
NEWPC   002452          1775#
NEWST   022204          3747    3796#
NPRABT= 000200          1469#   2725    4736    5160    5232
NPRAIH= 000075          1455#   2581    5303    5309    5911    5920
NPRAIL= 000074          1454#   2585    2611    5300    5306    5908    5917
NPRAIX= 000076          1456#   2577    5372    5381    5914    5923
NPRAOH= 000071          1452#   2569    2638    5125    5197    5510    5516    6055    6064
NPRAOL= 000070          1451#   1452    1453    1454    1455    1456    2573    2609    2630    5116    5188    5507    5513
                        6052    6061
NPRAOX= 000072          1453#   2565    2643    5134    5206    5564    5573    6058    6067
NPRBS7= 000200          1457#   5135
NPRBYT= 000010          1473#   1482    2680    2699    2757    2771
NPRCTL= 123004          1468#   2553    2711    2718    4721    4728    5143    5152    5215    5224    5419    5430    5614
                        5623    5953    5956    6108    6111    6698    6754    6845
NPRDL = 000044          1481#   2712    4860    5114    5186    5610    6105
NPRDLB= 000054          1482#   4927
NPRDRH= 123001          1463#   2557    2703    2762    5343    5439    5605    5959    6098
NPRDRL= 123000          1462#   1463    1468    2561    2695    2752    5334    5448    5608    5962    6101
NPREAD  005134          2552#   4678    4738    4780
NPRGO = 000100          1470#   4736    6699    6755    6844
NPRIO = 000040          1471#   1481    1482    2607    2624    2650    2746
NPRLD = 000004          1480#   5023    5417    5950
NPRMCR  002632          1868#   4689    4776
NPRMOV  005266          2596#   4856    4923    5019
NPROTS= 000004          3784    4840#
NPRTOE= 000006          2742#   4867    4870    4934    4937    5030    5033
NULERR  013076          2876    2886    2961    3112    3171    3227    3302    3354    3389    3449    3494    3693#   4885
                        4952    5048
OLDSP   002454          1776#   6839*   6890    6948*   6975    7257*   7281    7347*   7436    7439    7877
ORA   = 120001          1565#
ORAM  = 120017          1581#
ORB   = 120000          1564#   1565    1566    1567    1568    1569    1570    1571    1572    1573    1575    1576    1577
                        1578    1579    1580    1581
O$APTS= 000000          1177#   1234
O$AU  = 000001          1177#   1195#   1266
O$BGNR= 000000          1177#   1260
O$BGNS= 000000          1177#   1226
O$DU  = 000001          1177#   1195#   1268
O$ERRT= 000001          1177#   1195#   1276
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O$POIN= 000001          1177#  1195#  1292
O$SETU= 000000          1177#  1220   8078
PATB    002456          1782#  4921   4924
PATCH   037012          8066#
PATF    002506          1808#  4854   4857   5017   5020
PCR   = 120014          1578#  3403
PFLAG   002316          1665#  6686   6800   7203
PNT   = 001000 G        1437#
PRI   = 002000 G        1438#
PRIRTY  036545          8021   8044#
PRI00 = 000000 G        1426#
PRI01 = 000040 G        1425#
PRI02 = 000100 G        1424#
PRI03 = 000140 G        1423#
PRI04 = 000200 G        1422#
PRI05 = 000240 G        1421#
PRI06 = 000300 G        1420#
PRI07 = 000340 G        1419#
PSTACK  002270          1652#  3729*
PT.CTL  002370          1743#  3849*  3857   5857   6794   7197
PU24  = 000001          1494#  3857   6794   7197
PU24.M  036661          8027   8044#
READ    003616          2064#  2326   2408   2552   2556   2560   2564   2568   2572   2576   2580   2584   2751
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                        5958   5961   6060   6063   6066   6110
READI   003730          2106#  2717
REDLOC= 000001          1531#  2065   2076   2108   2119
REDPAG= 000003          1533#
REGNUM  002300          1658#  2970   3314   3326   3328   3621*  3623   3659*  3661   4710*  4755*  4797*  4894*
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                        6082*
REG0    002372          1747#  3286   5799*
REG1    002374          1748#  3285   5800*
REG2    002376          1749#  3284   5801*
REG3    002400          1750#  3283   5802*
REG4    002402          1751#  3296   5803*
REG5    002404          1752#  3295   5804*
REG6    002406          1753#  3294   5805*
REG7    002410          1754#  3293   5806*
RESTRT  022174          3741   3793#
RUN   = 000200          1521#  1972   1982   2026   2036   6905
RXVAL0  032560          3483   6141*  6148   6191#
RXVAL1  032562          6192#
RXVAL2  032564          6193#
RXVAL3  032566          6194#
RXVAL4  032570          6195#
RXVAL5  032572          6196#
RXVAL6  032574          6197#
SEL0    002320          1715#  2026*  2264
SEL10   002340          1727#  2268
SEL12   002344          1730#  2269
SEL14   002350          1733#  2270
SEL16   002354          1736#  2271
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SEL2    002324          1718#  2265   6957*  7244*  7333*
SEL4    002330          1721#  2064*  2107*  2149*  2170*  2266   6845*  6956*  7242*  7258*  7288   7331*
SEL6    002334          1724#  2130   2150*  2171*  2267   6844*
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SLT2  = 000022          1552#
SLT4  = 000024          1555#
SLT6  = 000026          1558#
SMCODE  034756          6951   6952   7006#
SR    = 120012          1576#  4476   4524   4549   4567   4603
STALL   005132          2543#  4611   4612   4613
STARES  002306          1661#  3760*  3793*  3799*  3854
STARST  022072          3735   3760#
SVCGBL= 000000          1177#  1179   1186#  1207   1216   1218   1220   1222   1224   1226   1228   1230   1232
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SVCINS= 000001          1177#  1183#  1208   1209   1210   1211   1212   1213   1214   1215   1217   1219   1221
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                        2976   2977   2978   2980   2981   2982   2983   2984   2989   2990   2991   2992   2993
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3741	3744	3745	3747	3750	3751	3753	3766	3767	3768	3769	3770	3771
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3880	3881	3882	3883	3886	3887	3888	3889	3890	3891	3898	3930	3931
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3986	3998	4001	4014	4062	4068	4070	4071	4077	4079	4080	4084	4085
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TMPB   002440        1770#  2304*  2305*  2328  2331  2333*  2337  2385*  2386*  2410  2413  2415*  2419
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TMPC   002442        1771#  3404  3430  5294*  5409  5486*  5488  5501*  5598  5651  5664*  5666
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TMPF   002450        1774#  3203  5295*  5373  5382  5389  5391  5392  5490*  5502*  5565  5574  5581
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CROSS REFERENCE TABLE -- USER SYMBOLS

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                    7228   72780  7279   72990  73100  7311   73980  7399   74530  74560  80100  80150  80200
                    80260  80300  80360  80410  80630  80760
T$TEST= 000015       11770  40590  4061   44290  46690  48390  4852   4919   50070  50980  5102   5174   52680
                    5291   5499   58550  5874   6013   62230  6250   6332   6414   6496   6572   6626   66850
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T$TSTM= 177777      11770  2814   2848   2879   2889   2905   2922   2932   2942   2949   2959   2964   2977
                    2983   2993   3008   3022   3040   3050   3070   3090   3110   3115   3124   3133   3146
                    3154   3162   3169   3174   3184   3190   3207   3215   3225   3230   3242   3248   3254
                    3260   3270   3280   3290   3300   3305   3322   3338   3352   3358   3387   3393   3409
                    3422   3439   3447   3452   3473   3479   3489   3497   3529   3543   3550   3564   3571
                    3585   3592   3606   3619   3627   3637   3644   3657   3665   3678   3685   3697   3733
                    3739   3745   3751   3770   3775   3788   3808   3865   3871   3882   3890   3898   3934
                    3953   3958   3964   3980   3983   3986   3998   4001   4014   4062   4068   4070   4077
                    4079   4084   4089   4102   4104   4109   4114   4119   4135   4137   4143   4153   4155
                    4162   4167   4175   4181   4194   4196   4201   4206   4219   4221   4226   4231   4246
                    4251   4256   4263   4265   4270   4275   4289   4291   4296   4301   4313   4315   4320
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                    5221   5228   5230   5236   5242   5245   5272   5274   5281   5292   5321   5326   5338
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                    5423   5425   5434   5436   5443   5445   5452   5454   5461   5468   5473   5479   5484
                    5495   5500   5528   5533   5552   5554   5568   5570   5577   5579   5588   5593   5618
                    5620   5627   5629   5636   5643   5648   5657   5662   5674   5677   5713   5860   5866
                    5868   5875   5941   5946   5969   5976   5981   5991   5996   6005   6014   6085   6090
```

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                    6665  6670  6692  6694  6715  6722  6729  6749  6751  6765  6771  6797  6803
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                    6946  6968  6978  6981  6986  6994  6998  7001  7200  7206  7221  7225  7227
                    7240  7252  7268  7276  7278  7284  7287  7292  7300  7304  7308  7310  7327
                    7341  7365  7369  7383  7387  7395  7398  7411  7418  7431  7442  7450  7454
                    7457
T$TSTS= 000001       1177#  4060#  4430#  4670#  4840#  5008#  5099#  5269#  5856#  6224#  6686#  6746#  6793#
                    7196#
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T$$AUT= 010023      3927#  3963
T$$CLE= 010024      3977#  3985
T$$DU = 010025      3995#  4000
T$$HAR= 010070      8006#  8042
T$$HW = 010000      1327#  1353
T$$INI= 010022      3727#  3897
T$$MSG= 010020      2875#  2878  2884#  2886  2894#  2963  2969#  3114  3120#  3123  3129#  3132  3138#
                    3173  3179#  3229  3237#  3304  3312#  3357  3364#  3392  3398#  3451  3468#  3496
T$$PRO= 010021      3714#
T$$SOF= 010071      8060#  8064
T$$SRV= 010045      2807#  2826  2841#  2860  5798#  5829
T$$SUB= 010067      4062#  4084  4109  4119  4167  4175  4201  4226  4246  4256  4270  4296  4320
                    4330  4343  4361  4653#  4913  4920#  4980  5103#  5109  5122  5131  5140  5149
                    5158  5169  5175#  5181  5194  5203  5212  5221  5230  5241  5292#  5326  5340
                    5349  5363  5378  5387  5401  5415  5425  5436  5445  5454  5473  5484  5494
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                    5981  5996  6004  6014#  6090  6130  6157  6168  6251#  6310  6333#  6392  6415#
                    6474  6497#  6556  6573#  6610  6627#  6664  6820#  6826  6921  6932#  6939  6997
                    7221#  7299  7304#  7398  7453
T$$SW = 010001      1362#  1366
T$$TES= 010065      4060#  4070  4079  4104  4137  4155  4196  4221  4265  4291  4315  4365  4430#
                    4435  4447  4458  4467  4472  4482  4498  4508  4517  4531  4546  4555  4564
                    4573  4590  4599  4609  4623  4632  4636  4670#  4675  4718  4763  4770  4805
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                    6694  6728  6746#  6751  6770  6793#  6797  6803  7000  7196#  7200  7206  7227
                    7278  7310  7456
T.EDF = 000001      1595#  1999  2039  2079  2122  2185  2738  5821
T.EMRD= 000002      1595#  4869  4936  5032
T.ESF = 000000      1595#
T.ESFT= 000003      1595#
T1      023164 G    1304  4059#
T1CH  = 120005      1569#
T1CL  = 120004      1568#
T1LH  = 120007      1572#  2346
T1LMGO= 120005      1570#
T1LL  = 120006      1571#  2341
T1.1    023164      4061#
T10     034104 G    1313  6685#
T11     034200 G    1314  6745#
T12     034244 G    1315  6792#
T12.1   034324      6819#
T12.2   034562      6931#
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T13      035016 G        1316    7195#
T13.1    035076          7220#
T13.2    035354          7303#
T2       024174 G        1305    4429#
T2CH   = 120011          1575#   2428    4098    4149    4190    4259    4309    4386
T2CL   = 120010          1574#   4131    4285
T2LL   = 120010          1573#   1574    2423    4215    4383
T3       025062 G        1306    4669#
T4       025450 G        1307    4839#
T4.1     025464          4852#
T4.2     025722          4919#
T5       026160 G        1308    5007#
T6       026430 G        1309    5098#
T6.1     026430          5102#
T6.2     026632          5174#
T7       027036 G        1310    5268#
T7.1     027074          5291#
T7.2     027752          5499#
T8       031276 G        1311    5855#
T8LP     031776          6019#   6166
T8.1     031326          5874#
T8.2     031766          6013#
T9       032576 G        1312    6223#
T9.1     032612          6250#
T9.2     033016          6332#
T9.3     033222          6414#
T9.4     033426          6496#
T9.5     033632          6572#
T9.6     033754          6626#
UAM    = 000200 G        1435#
VECTOR   036514          8016    8044#
WA     = 003100          1895#   1896
WB     = 003102          1896#   1897
WC     = 003104          1897#   1898
WD     = 003106          1898#   1899
WE     = 003110          1899#   1900
WF     = 003112          1900#
WRILOC = 000002          1532#   2172    2182    6846
WRIPAG = 000004          1534#
WRITE    004042          2149#   2216    2321    2335    2340    2345    2403    2417    2422    2427    4097    4214    4308
                         4382    4385    4451    4491    4501    4523    5115    5124    5142    5187    5196    5214    5371
                         5418    5563    5604    5607    5613    5952    6097    6100    6107
WRITEI   004054          2169#   2629    2637    2642    2694    2702    2710    4720    5133    5205    5299    5302    5506
                         5509    5907    5910    5913    6051    6054    6057    6255    6337    6419    6501    6577    6631
                         6697    6753
WSR0     002212          1617#   2264*   2938
WSR10    002222          1625#   2268*   2955
WSR12    002224          1627#   2269*   2954
WSR14    002226          1629#   2270*   2953
WSR16    002230          1631#   2271*   2952
WSR2     002214          1619#   2265*   2937
WSR4     002216          1621#   2266*   2936
WSR6     002220          1623#   2267*   2935
W0     = 003054          1885#   1886    3027    3035
W1     = 003056          1886#   1887    3033
W2     = 003060          1887#   1888    3031
```

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W3     = 003062          1888#  1889   3092
W4     = 003064          1889#  1890
W5     = 003066          1890#  1891
W6     = 003070          1891#  1892
W7     = 003072          1892#  1893
W8     = 003074          1893#  1894
W9     = 003076          1894#  1895
XDATA    002260          1648#  3195   3332   3344   3513*  3514*  3631   3670
XLOC0    032524          3485   5880   5893   5906   5985   6031   6050   6135   6175#
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XLOC2    032530          6177#
XLOC3    032532          6178#
XLOC4    032534          6179#
XLOC5    032536          6180#
XLOC6    032540          6181#
XMFG.M   036743          8037   8044#
XMINIT   030560          5296   5503   5685#  5876   6015
XMINTH   031124 G        5710   5798#
XMREAD   030776          5650   5762#  6138
XMWRIT   030700          5356   5408   5547   5597   5731#  5896   6034
XM4HOL   031122          5688*  5739*  5744   5770*  5775   5786   5791#
XM4INT   031074          5740   5771   5785#
XORGB    012162          3193   3324   3511#  3629   3667
XORSW    005064          2511#  3024
XVAL0    032542          3484   5880*  5892   6020*  6030   6045*  6148   6183#
XVAL1    032544          6184#
XVAL2    032546          6185#
XVAL3    032550          6186#
XVAL4    032552          6187#
XVAL5    032554          6188#
XVAL6    032556          6189#
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X$FALS= 000040           1177#
X$OFFS= 000400           1177#
X$TRUE= 000020           1177#
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                         4712#  4757#  4799#  4899#  4966#  5063#  5163#  5235#  5320#  5395#  5460#  5467#  5478#
                         5527#  5587#  5635#  5642#  5656#  5820#  5940#  5968#  5975#  5990#  6084#  6117#  6124#
                         6151#  6269#  6279#  6293#  6303#  6351#  6361#  6375#  6385#  6433#  6443#  6457#  6467#
                         6515#  6525#  6539#  6549#  6593#  6603#  6647#  6657#  6721#  6764#  6866#  6910#  6967#
                         6985#  7251#  7267#  7291#  7340#  7368#  7386#  7417#  7430#  7441#
$LSTIN= 000001           1181#
$LSTTA= 000001           1182#
$MPCSR= 160000 G         1710#  1715   1716   1718   1719   1721   1722   1724   1725   1727   1728   1730   1731
                         1733   1734   1736   1737
$T     = 000015          1595#  4015#  4413#  4655#  4807#  4840   4985#  5080#  5246#  5832#  6198#  6671#  6730#
                         6772#  6793   7026#  7196
.      = 037124          1173#  1782   1807#  1808   1879#  1920#  1936#  2010#  3232#  3307#  3455#  3499#  3909#
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                         4156   4168   4173   4176   4192   4197   4199   4202   4217   4222   4224   4227   4244
                         4247   4257   4261   4266   4268   4271   4287   4292   4294   4297   4311   4316   4318
                         4321   4331   4341   4344   4356   4436   4443   4448   4454   4459   4463   4468   4470
                         4473   4478   4483   4494   4499   4504   4509   4513   4518   4527   4532   4536   4542
                         4547   4551   4556   4565   4569   4574   4536   4591   4600   4605   4610   4619   4624
                         4633   4676   4719   4764   4771   4847   5014   5105   5110   5118   5123   5127   5132
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5446	5450	5455	5474	5485	5534	5550	5555	5566	5571	5575	5580	5594
5616	5621	5625	5630	5649	5663	5858	5861	5869	5947	5982	5997	6091
6131	6158	6230	6263	6288	6345	6370	6427	6452	6509	6534	6585	6588
6639	6642	6695	6717	6752	6798	6804	6812	6814	6827	6940	6962	7201
7207	7215	7217	7228	7279	7311	7399	7868	7991#	8045#	8067#		

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BGNMOD      1#  1177#  1178
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BGNRPT      1#  1177#
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BGNSFT      1#  1177#  8059
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BGNSW       1#  1177#  1361
BGNTST      1#  1177#  4059  4429  4669  4839  5007  5098  5268  5855  6223  6685  6745  6792  7195
BNCOMP      1#  1177#
BNERRO      1#  1177#
BREAK       1#  1177#
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CLRVEC      1#  1177#  3773  3951  3978  3981  6893  6976  7282
COMMEN      1#  1177#
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DESCRI      1#  1177#  1927
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ERRSOF      1#  1177#
ERRTBL      1#  1177#  1607
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GTSF     15954
GTSFT    15954
HEADER      1#  1177#  1206
INLOOP      1#  1177#
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PRINTF        1#  1177#  3783  3859  3867
PRINTS        1#  1177#
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STARS         1#  1177#
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J1

SEQ 216

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          6549     6593     6603     6647     6657     6721     6764     6866     6910     6967     6985     7251     7267     7291     7340
          7368     7386     7417     7430     7441
$GEHRD    1595#
$GESF     1595#
$GESFT    1595#
$GTDF     1595#    1998     2038     2078     2121     2184     2737     5820
$GTHRD    1595#
$GTSF     1595#
$GTSFT    1595#


. ABS.  037124     000


 ERRORS DETECTED:  0

 CVDMBC,CVDMBC/SOL/CRF=SVC34R.MLB,CVDMBC.P11
 RUN-TIME: 39 49 5 SECONDS
 RUN-TIME RATIO: 137/94=1.4
 CORE USED:  21K  (41 PAGES)
```