11/Z1+ DMV11 MCTRL DIAG #Z
DMV-11 CNDMBA0

AH-T829A-MC
FICHE 01 OF 01

JUL 1984
digital
Made In USA

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                        .TITLE CNDMBAO DMV11 MCTRL DIAG #2
                        .SBTTL PROGRAM DOCUMENT
                        .REM *



                                        I D E N T I F I C A T I O N


                        PRODUCT CODE:   AC T828A MC

                        PRODUCT NAME:   CNDMBAO DMV11 MICRO CONTROLLER STATIC DIAGNOSTIC PART 2

                        PRODUCT DATE:   APRIL 1984

                        MAINTAINER:     ISS DIAGNOSTICS

                        AUTHORS:        CHRIS BRIENEN
                                        RAY MARSHALL

                        MODIFIED BY:    JAKI BERG       9 APR 1984

                        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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PROGRAM DOCUMENT

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                                    ***** MODIFICATION HISTORY *****

REV A: ORIGINAL RELEASE                         CHRIS BRIENEN, RAY MARSHALL     14 JAN 81

REV B: INSTALLED OUTSTANDING PATCHES                                            11 JUL 83

CVDMBB => CNDMBA                                        JAKI BERG               9 APR 84
CHANGES WERE MADE TO  CVDMBB  TO PRODUCE  CNDMBA  FOR THE  FALCON PLUS PROJECT
(SBC 11/21+).   CHANGES, MARKED BY ";JB REV A-O", ARE:
   SET THE  ODT BREAK  VECTOR (LOCATION 140) TO THE STARTING ADDRESS OF
   FALCON'S ODT ROM (170000-OCTAL).
   FALCON + CANNOT BE STRAPPED TO MODE 0 ON POWER UP.  THE "STRAPPED TO MODE 0
   QUESTION WAS REMOVED.  THE DEFAULTS AND P TABLE WERE SET APPROPRIATELY.
```

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117                          1.0 INTRODUCTION
118
119                          THE  M8053 AND M8064 ARE  SINGLE-LINE SYNCHRONOUS, MICRO
120                          PROCESSOR BASED COMMUNICATIONS INTERFACES WHICH CAN SUPPORT
121                          BOTH CHARACTER-ORIENTED (DDCMP, BSC,  ETC.) AND BIT ORIENTED
122                          (SDLC, HDLC, ETC.) PROTOCOLS. THE PURPOSE OF THIS PROGRAM IS
123                          TO PERFORM  DIAGNOSTIC  TESTING  OF THE CSRS, RAM, AND BASIC
124                          MICRO PROCESSOR  LOGIC  ON  THESE   BOARDS.   THE  FOLLOWING
125                          FUNCTIONS  WILL BE PERFORMED: DMV RESIDENT U DIAG  EXECUTION
126                          CSR ADDRESSING, VIA  REGISTER STATIC  BIT  INTERACTION  AND
127                          READ/WRITE TESTING, AND ON BOARD RAM TESTING.
128
129                          THE    STATIC    LOGIC    TESTS    WILL    PROVIDE    EXTENSIVE
130                          TROUBLESHOOTING CAPABILITIES, SUCH  AS  TIGHT  SCOPE  LOOPS,
131                          SWITCH  OPTIONS,  AND  ABILITY  TO  "LOCK" ONTO INTERMITTENT
132                          ERRORS.  IN  ADDITION  TESTS  ARE  DESIGNED  AND  STRUCTURED
133                          TO   ACHIEVE   MAXIMUM   FAULT   RESOLUTION  AND  FACILITATE
134                          REPLACEMENT OF THE SMALLEST FIELD REPLACEABLE UNIT.
135
136                          THIS PROGRAM IS IMPLEMENTED USING THE  DIAGNOSTIC SUPERVISOR
137                          AND  A STRUCTURED PROGRAMMING APPROACH.  BECAUSE THE  DESIGN
138                          CONFORMS TO THE SUPERVISOR  (STANDALONE VERSION) THE PROGRAM
139                          IS COMPATIBLE WITH ACT, APT, XXDP+, AND SLIDE.
140
141                          THROUGH  DIALOGUE  WITH  THE  OPERATOR, THE  PROGRAM  ALLOWS
142                          MODIFICATION  OF DEVICE PARAMETERS, SUCH AS LSI-BUS ADDRESS,
143                          VECTOR ADDRESSES AND  DEVICE  PRIORITY.   IN  ADDITION,  THE
144                          OPERATOR  CAN  SPECIFY  PARTICULAR  TESTS  TO  BE  RUN AND A
145                          VARIETY OF LOOPING, RUNNING, AND REPORTING MODES.
146
147                          DEVICE ERRORS WILL BE REPORTED AS THEY  OCCUR.   THE  REPORT
148                          WILL   INCLUDE   A   TEST   NUMBER AND DESCRIPTION OF THE ERROR,
149                          GOOD AND BAD  TEST  DATA,  AND  APPLICABLE  DEVICE  REGISTER
150                          CONTENTS.
151
152
153                          2.0 HARDWARE REQUIREMENTS
154
155                          THE FOLLOWING HARDWARE IS REQUIRED TO RUN THE M8053/8064 STATIC
156                          LOGIC TESTS:
157
158                          SBC 11/21+
159                          16K WORDS OF MEMORY
160                          CONSOLE TERMINAL
161                          M8053 OR M8064 COMMUNICATIONS INTERFACE
162
163
164                          3.0 PRELIMINARY PROGRAM REQUIREMENTS
165
166                          THIS  PROGRAM  (CNDMB)  SHOULD  BE THE SECOND OF THE FIVE DMV 11
167                          STATIC DIAGNOSTICS TO BE RUN (CNDMA SHOULD BE RUN FIRST). ERRORS
168                          FOUND IN THIS  PROGRAM SHOULD BE CORRECTED BEFORE RUNNING ANY OF
169                          THE LINE UNIT DIAGNOSTICS (CNDMC, CNDMD, OR CNDME).
```

PROGRAM DOCUMENT

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
                        CNDMB A 0
                        DMV 11 U CONTRL LOGIC DIAG   PART 2 OF 2
                        UNIT IS M8053 OR M8064
                        DR>

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


                        6.3 PROGRAM OPTIONS
```

PROGRAM DOCUMENT

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

PROGRAM DOCUMENT

LOT LOOP ON TEST

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

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

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

6.3.1.5 EFFECT OF START COMMAND

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

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

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

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

EXAMPLE:

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

THIS COMMAND WILL CAUSE THREE PASSES TO BE MADE, EACH PASS CONSISTING OF TESTS 1,2,3,4,6,8,9, AND 10 EXECUTED AGAINST ALL UNITS. THERE IS NO DIFFERENCE BETWEEN SAYING <FLAG> AND SAYING <FLAG=1>. THE NOTATION <FLAG=0> IS MEANINGFUL ONLY ON A COMMAND OTHER THAN START TO CLEAR A FLAG THAT WAS

PREVIOUSLY SET. NOTE THAT ON ALL COMMANDS ONLY THE FIRST THREE LETTERS ARE SCANNED.

6.3.2 RESTART COMMAND

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

6.3.2.1 TESTS, PASS, AND FLAGS SWITCHES

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

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

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

6.3.2.3 EFFECT OF RESTART COMMAND

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

6.3.3 CONTINUE COMMAND

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

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

<PASS CNT> IS SAME AS IN START COMMAND, BUT THE DEFAULT IS

```
456                             THE UNSATISFIED PASS CNT FROM THE PREVIOUS START OR RESTART.
457                             IF NONE REMAINS, THE DEFAULT IS NON ENDING EXECUTION.
458
459
460                             6.3.3.2 FLAG SWITCH (/FLAGS:<FLAG LIST>)
461
462                             <FLAG LIST> IS SAME AS IN  START  COMMAND,  BUT  UNSPECIFIED
463                             FLAGS RETAIN THEIR CURRENT VALUE.
464
465
466                             6.3.3.3 EFFECT OF CONTINUE COMMAND
467
468                             CONTINUE  MUST  FOLLOW  A START OR RESTART, AND COMMAND MODE
469                             MUST HAVE  BEEN  ENTERED  DUE  TO  A  HALT  ON  ERROR  OR  A
470                             CONTROL/C.  THE  EFFECT  OF  THE  COMMAND  IS  TO  GO TO THE
471                             BEGINNING OF THE TEST THAT WAS BEING EXECUTED WHEN THE  HALT
472                             OR  CONTROL/C  TOOK PLACE.  SOFTWARE DIALOGUE MAY OPTIONALLY
473                             BE REEXECUTED.  HARDWARE PARAMETERS MAY NOT BE CHANGED.
474
475
476                             6.3.4 PROCEED COMMAND
477
478                             ****************************************************************
479                             PRO(CEED)/FLAGS:<FLAG LIST>
480                             ****************************************************************
481
482
483                             6.3.4.1 FLAGS SWITCH (/FLAGS:<FLAG LIST>)
484
485                             <FLAG-LIST> IS AS IN  THE  START  COMMAND,  BUT  UNSPECIFIED
486                             FLAGS RETAIN THEIR CURRENT VALUE.
487
488
489                             6.3.4.2 EFFECT OF PROCEED COMMAND
490
491                             PROCEED  MUST FOLLOW A START, RESTART, OR CONTINUE.  COMMAND
492                             MODE MUST HAVE BEEN ENTERED VIA A HALT ON ERROR.  THE EFFECT
493                             OF  THE  COMMAND  IS  TO  BEGIN  EXECUTION  AT  THE LOCATION
494                             FOLLOWING THE ERROR CALL.   NEITHER  HARDWARE  NOR  SOFTWARE
495                             PARAMETERS MAY BE ALTERED.
496
497
498                             6.3.5 ADD COMMAND
499
500                             ****************************************************************
501                             ADD/UNITS:<UNIT LIST>
502                             ****************************************************************
503
504
505                             6.3.5.1 UNITS SWITCH (/UNITS:<UNIT-LIST>
506
507                             <UNIT LIST> IS AS IN THE RESTART COMMAND.
508
509
510                             6.3.5.2 EFFECT OF ADD COMMAND
511
512                             THE UNITS SPECIFIED ARE ADDED TO THE  TEST  SEQUENCE.   EACH
```

PROGRAM DOCUMENT

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

6.3.6 DROP COMMAND

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

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

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

6.3.6.2 EFFECT OF DROP COMMAND

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

6.3.7 PRINT COMMAND

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

6.3.7.1 EFFECT OF PRINT COMMAND

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

6.3.8 DISPLAY COMMAND

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

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

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

6.3.8.2 EFFECT OF DISPLAY COMMAND

THE HARDWARE P TABLES FOR ALL UNITS UNDER TEST ARE PRINTED OUT IN THE FORMAT IN WHICH THEY WERE ENTERED. ANY UNITS

THAT WERE DROPPED BY THE OPERATOR "DROP" COMMAND ARE SO DESIGNATED.

6.3.9 FLAGS COMMAND

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

6.3.9.1 EFFECT OF FLAGS COMMAND

THE CURRENT SETTINGS OF ALL FLAGS ARE PRINTED.

6.3.10 ZFLAGS COMMAND

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

6.3.10.1 EFFECT OF ZFLAGS COMMAND

ALL FLAGS ARE CLEARED.

6.3 11 CONTROL CHARACTERS

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

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

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

6.3.12 HARDWARE PARAMETERS

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

1. DEVICE CSR ADDRESS : (O) 160020?

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

```
627                          2.   DEVICE VECTOR ADDRESS : (O) 300 ?
628
629                         THIS IS THE ADDRESS OF THE INPUT INTERRUPT VECTOR FOR THIS
630                         DEVICE.  THE ALLOWABLE RANGE IS 000-674 (OCTAL), AND THE
631                         DEFAULT VALUE IS 300.
632
633                          3.   DEVICE PRIORITY LEVEL : (O) 4 ?
634
635                         THIS IS THE CPU PRIORITY AT WHICH THE INTERRUPT HANDLERS OF
636                         THIS DEVICE WILL BE EXECUTED.  THE ALLOWABLE RANGE IS 0 7,
637                         AND THE DEFAULT VALUE IS 4.
638
639                          4.   BOARD TYPE (0=M8064, 1=M8053 V35, 2=M8053 EIA) : (O) 0 ?
640
641                         THIS IS THE TYPE OF DMV 11 CURRENTLY INSTALLED. NOTE THAT THE
642                         M8053 IS SWITCH SELECTABLE BETWEEN V.35 AND EIA.
643
644                          5.   IS THIS A MANUFACTURING TEST STAND : (L) N ?
645
646                         THIS QUESTION REFERS TO A SPECIFIC MEMORY CONFIGURATION THAT IS
647                         REQUIRED TO RUN TEST #8 (SEE SEC. 7.0).
648
649                         6.3.13 SOFTWARE PARAMETERS
650
651                         NO SOFTWARE PARAMETER QUESTIONS ARE ASKED BY THIS PROGRAM.
652
653
654                         6.3.14 EXTENDED DISCUSSION OF P-TABLE DIALOGUE
655
656                         THE FULL CAPABILITY OF THE HARDWARE DIALOGUE IS REVEALED BY
657                         THE FOLLOWING DISCUSSION OF WHAT HAPPENS INTERNALLY.
658
659                         AS SOON AS THE QUESTION "# UNITS?" IS ANSWERED (WITH THE
660                         NUMBER N, SAY) SPACE IN CORE IS ALLOCATED FOR N P-TABLES.
661                         ALL OF THE P-TABLES ARE OF THE SAME FORMAT, AND THERE IS A
662                         ONE TO ONE CORRESPONDENCE BETWEEN THE HARDWARE PARAMETER
663                         QUESTIONS AND THE SLOTS IN THE P-TABLE FORMAT.
664
665                         ON THE FIRST TRIP THRU THE QUESTIONS, ALL OF THE SLOTS IN
666                         ALL OF THE P TABLES ARE FILLED.  IF THE OPERATOR TYPES IN
667                         LESS THAN N EXPLICIT VALUES IN RESPONSE TO A PARTICULAR
668                         QUESTION, THESE VALUES ARE PLACED IN THE P TABLES (ONE VALUE
669                         GOING INTO THE PROPER SLOT OF EACH P-TABLE BEGINNING WITH
670                         THE FIRST P-TABLE) UNTIL THE STRING OF VALUES IS EXHAUSTED.
671                         THE LAST VALUE IN THE STRING BECOMES THE NEW DEFAULT AND IS
672                         USED TO FILL THAT SLOT IN THE REMAINING P-TABLES.
673
674                         ON SUBSEQUENT TRIPS THRU THE QUESTIONS, THE SAME PROCESS IS
675                         CARRIED OUT, EXCEPT THAT THE EARLIEST P-TABLE NOT TO HAVE
676                         RECEIVED AN EXPLICIT VALUE IN ANY OF ITS SLOTS NOW ASSUMES
677                         THE ROLE THAT TABLE NUMBER ONE PLAYED IN THE FIRST TRIP.
678
679                         THE SERIES OF QUESTIONS IS REISSUED UNTIL AT LEAST ONE
680                         QUESTION HAS RECEIVED N EXPLICIT VALUES FROM THE OPERATOR.
681
682                         IN GIVING A STRING OF VALUES, COMMAS WITHOUT INTERVENING
683                         VALUES MAY BE USED TO INDICATE A REPETITION OF THE LAST
```

```
684                             NAMED VALUE.
685
686                             A  STRING  OF  VALUES  MAY  BE  GIVEN  AS  A RANGE (6 10 FOR
687                             EXAMPLE). IF THE VALUES REPRESENT PURE NUMERICAL DATA,  THIS
688                             SAMPLE   RANGE   TRANSLATES   TO   THE  STRING  6,7,8,9,10  (AN
689                             INCREMENT OF 1). IF THE VALUES  ARE  ADDRESSES,  THE  SAMPLE
690                             RANGE TRANSLATES TO THE STRING 6,8,10 (AN INCREMENT OF 2).
691
692                             NOW  LET  US  SEE  HOW  WE  COULD  USE THESE CAPABILITIES TO
693                             CONSTRUCT A SET OF P-TABLES.  ASSUME THAT WE HAVE 16  UNITS,
694                             AND THAT THERE ARE THREE HARDWARE PARAMETERS FOR EACH (THREE
695                             SLOTS IN  THE  P TABLE,  THREE  HARDWARE  QUESTIONS  IN  THE
696                             DIALOGUE).  LET THE DESIRED VALUE FOR THE FIRST PARAMETER BE
697                             THE NUMBER 75 FOR ALL 16 TABLES.  LET THE DESIRED VALUE  FOR
698                             THE    SECOND    PARAMETER    BE    EQUAL    TO    THE    UNIT    NUMBER
699                             (0,1,2,....,15) EXCEPT FOR UNIT 12, WHICH SHOULD RECEIVE  THE
700                             VALUE  11.  LET THE DESIRED VALUE FOR THE THIRD PARAMETER BE
701                             THE NUMBER 76 FOR THE FIRST 7 UNITS AND THE NUMBER  77  FOR
702                             THE LAST 9 UNITS.
703
704                             THE FOLLOWING DIALOGUE WOULD ACCOMPLISH THIS GOAL:
705
706                             # UNITS (D) ? 16
707                             UNIT 0
708                             <QUESTION 1> ? 75
709                             <QUESTION 2> ? 0 6
710                             <QUESTION 3> ? 76
711
712                             UNIT 7
713                             <QUESTION 1> ?
714                             <QUESTION 2> ? 7 11,,13 15
715                             <QUESTION 3> ? 77
716
717                             THE  FIRST  TIME THE SERIES IS ASKED, SLOT ONE RECEIVES A 75
718                             IN ALL 16 TABLES.  SLOT TWO RECEIVES THE VALUES 0,1,2,....,6
719                             IN  TABLES 0 THRU 6 AND A CONSTANT 6 IN TABLES 7 THRU 15.
720                             SLOT THREE RECEIVES A CONSTANT 76 IN ALL 16 TABLES.
721
722                             THE SECOND TIME THRU THE SERIES, TABLES 7 THRU THE END  ARE
723                             GOING TO BE AFFECTED (NOTE THAT THIS PIECE OF INFORMATION IS
724                             PRINTED OUT FOR THE THE OPERATOR IN THE FORM  "UNIT  XX"  AT
725                             THE  BEGINNING  OF EACH SERIES).  QUESTION 1 IS RESPONDED TO
726                             BY A <CR>, SO SLOT ONE STAYS AT CONSTANT  75  IN  TABLES  7
727                             THRU 15, SINCE NO NEW EXPLICIT VALUES ARE TYPED IN.  SLOT TWO
728                             GETS THE VALUES 7,8,9,10,11 IN TABLES 7  THRU  11.  AND
729                             GETS AN 11 IN SLOT 12, AND GETS THE VALUES 13,14,15 IN
730                             TABLES 13 THRU 15. SLOT THREE GETS THE VALUE 77 IN TABLES 7
731                             THRU 15.
732
733                             THE DIALOGUE IS TERMINATED WHEN THE SOFTWARE RECOGNIZES THAT
734                             16 EXPLICIT VALUES HAVE BEEN GIVEN FOR AT LEAST ONE QUESTION
735                             (NAMELY QUESTION 2).
736
737
```

```
                        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 TC
                        ;*    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.
                        ;*****************************************************************************
```

PROGRAM DOCUMENT

```
                        ;*****************************************************************************
                        ;*      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.
                        ;*****************************************************************************


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


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

```
853                     ;*****************************************************************************
854                     ;*      TEST 6  <NPR XFER ABORT>
855                     ;*
856                     ;* FIRST SUBTEST :
857                     ;* THE PROGRAM PERFORMS AN OUTPUT NPR REQUEST TO A NON-EXISTENT MEMORY
858                     ;* LOCATION, AND CHECKS FOR THE ASSERTION OF ABORT XFER BIT IN THE NPR CONTROL
859                     ;* REGISTER. THEN, AN OUTPUT NPR IS DONE AND CHECKED, TO A LOCATION IN THE
860                     ;* PROGRAM, USING 125252 FOR DATA, AND THE PROGRAM CHECKS FOR ABORT XFER TO
861                     ;* BE CLEARED BY SETTING THE DONE BIT.
862                     ;* SECOND SUBTEST :
863                     ;* THE ABOVE SUBTEST IS REPEATED USING INPUT NPR'S.
864                     ;*****************************************************************************
865
866
867                     ;*****************************************************************************
868                     ;*      TEST 7  <NPR EXTENDED ADDRESS BIT TEST>
869                     ;*
870                     ;* THIS TEST WILL ONLY BE RUN IF THERE IS AT LEAST 32K WORDS OF MEMORY ON THE
871                     ;* SYSTEM. IF THERE IS, THE PROGRAM CHOOSES A LOCATION TO USE IN THE ADDRESS
872                     ;* RANGE 200000-377776 (OCTAL). THEN, THE FOLLOWING 2 SUBTESTS ARE PERFORMED :
873                     ;*
874                     ;* FIRST SUBTEST :
875                     ;* AN INPUT NPR IS PERFORMED AND CHECKED USING THE MEMORY LOCATION, WITH
876                     ;* 125252 FOR DATA. THE PROGRAM CHECKS THAT THE ABORT XFER BIT REMAINS
877                     ;* CLEARED.
878                     ;* SECOND SUBTEST :
879                     ;* AN OUTPUT NPR IS PERFORMED AND CHECKED USING THE MEMORY LOCATION, WITH
880                     ;* 125252 FOR DATA. THE PROGRAM CHECKS THAT THE ABORT XFER BIT REMAINS
881                     ;* CLEARED.
882                     ;*****************************************************************************
883
884
885                     ;*****************************************************************************
886                     ;*      TEST 8  <SPECIAL MFG EXTENDED BIT TEST>
887                     ;*
888                     ;* THIS TEST WAS DESIGNED SPECIFICALLY TO ALLOW MANUFACTURING TO CHECK THE
889                     ;* NPRAIX/NPRAOX BITS WITHOUT A FULL 4 M. OF MEMORY.
890                     ;*
891                     ;* IT WILL CHECK THE 12 DMV EXTENDED ADDRESS BITS (6:NPRAIX/6:NPRAOX) ON
892                     ;* A Q22 SYSTEM IF MEMORY IS PRESENT AT THE FOLLOWING PHYSICAL ADDRESSES:
893                     ;*
894                     ;*      17600000        17400000        17200000
895                     ;*      16600000        15600000        13600000
896                     ;*       7600000
897                     ;*
898                     ;* FIRST SUBTEST :      TEST "NPRAIX" EXTENDED ADDRESS BITS
899                     ;* SECOND SUBTEST :     TEST "NPRAOX" EXTENDED ADDRESS BITS
900                     ;*****************************************************************************
901
902
903                     ;*****************************************************************************
904                     ;*      TEST 9  <Q-BUS INTERRUPT "A" & "B" SELECTION>
905                     ;*
906                     ;* THIS  TEST  CONTAINS SUBTESTS IN WHICH A SEQUENCE OF STEPS IS
907                     ;* PERFORMED. IN GENERAL, EACH SUBTEST PERFORMS THE FOLLOWING:
908                     ;*
909                     ;*      1. INTERRUPTS ARE DISABLED FOR BOTH "A" & "B"
```

```
910                             ;*
911                             ;*      2. THE INTERRUPT REQUEST REGISTER IS WRITTEN INTO
912                             ;*
913                             ;*      3. A TEST IS MADE TO BE SURE THAT NEITHER INTERRUPT OCCURS
914                             ;*
915                             ;*      4. BOTH INTERRUPTS ARE ENABLES
916                             ;*
917                             ;*      5. A TEST IS MADE TO BE SURE THAT IF AN INTERRUPT IS EXPECTED, IT IS
918                             ;*         RECEIVED AND IF IT ISN'T EXPECTED IT DOESN'T HAPPEN.
919                             ;*
920                             ;* ALL TESTING IS DONE HERE WITH THE PROCESSOR'S PRIORITY SET AT 0.
921                             ;*****************************************************************************
922
923
924                             ;*****************************************************************************
925                             ;*      TEST 10 <BUS RESET WITH DISABLE INIT SET> .PAGE
926                             ;*
927                             ;* A  BYTE SELECT REGISTER (BSEL3) IS LOADED WITH 377, DISABLE INIT BIT IS SET
928                             ;* IN  THE  NPR CONTROL REGISTER, AND A BUS RESET INSTRUCTION IS EXECUTED. THE
929                             ;* PROGRAM  THEN  CHECKS  THAT THE DMV-11 WAS NOT CLEARED, BY CHECKING FOR 377
930                             ;* STILL IN BSEL3
931                             ;*****************************************************************************
932
933
934                             ;*****************************************************************************
935                             ;*      TEST 11 <MASTER CLEAR WITH DISABLE INIT SET>
936                             ;*
937                             ;* THE "DISABL INIT" BIT IN THE NPR CONTROL REGISTER IS SET AND A MASTER CLEAR
938                             ;* IS  ISSUED.  IF  THE  MASTER  CLEAR SUBROUTINE DETECTS AN ERROR, THE MASTER
939                             ;* CLEAR  WILL  NOT  HAVE  FUNCTIONED PROPERLY. WHERE THE NORMAL ERROR MESSAGE
940                             ;* (QUEUED  UP  BY "MASCLR") IS NORMALLY PRINTED, THIS TEST WILL PRINT ITS OWN
941                             ;* INSTEAD.
942                             ;*****************************************************************************
943
944
945                             ;*****************************************************************************
946                             ;*      TEST 12 <DCOK H LO BIT>
947                             ;*
948                             ;* DCOK H LO IS SET IN THE NPR CONTROL REGISTER WHICH SHOULD CAUSE A VECTOR TO
949                             ;* THE  FIRST  INTERRUPT  HANDLER  WHERE THE VECTOR IS CHANGED TO POINT TO THE
950                             ;* SECOND HANDLER. THIS SECOND HANDLER WILL THEN STALL FOR A WHILE WAITING FOR
951                             ;* THE  POWER-UP  INTERRUPT  WHICH  SHOULD KICK US INTO THE SECOND HANDLER. IN
952                             ;* BOTH  HANDLERS  FLAGS  ARE  SET  TO  SAY THAT WE GOT THERE. WHEN WE FINALLY
953                             ;* RETURN  TO  OUR MAINLINE CODE, WE WILL RESUME THE DELAY FUNCTION WE WERE IN
954                             ;* AND THEN CHECK THE FLAGS.
955                             ;*
956                             ;* IN SUBTEST # 1, WE EXPECT THE DMV TO BE RESET
957                             ;*
958                             ;*****************************************************************************
959
960
961                             ;*****************************************************************************
962                             ;*      TEST 13 <HALT MODE VERIFICATION>
963                             ;*
964                             ;* THIS TEST CONTAINS TWO (2) SUBTESTS DESIGNED TO VERIFY THE FUNCTIONALITY
965                             ;* OF  THE  "HALT"  CONTROL CONTAINED WITHIN THE NPR CONTROL REGISTER. IN EACH
966                             ;* 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
;*
;*
;*  WE SHOULD GO
;*  THROUGH A POWER-UP SEQUENCE.   R6 IS
;*  RESTORED FROM OLDSP, INTERRUPT
;*  PRIORITY LEVEL IS RESTORED TO 0, &
;*  INTERRUPT VECTOR 24 IS RETURNED TO
;*  THE DIAGNOSTIC SUPERVISOR.  SEL4 IS
;*  COMPARED AGAINST TMPO    THEY SHOULD
;*  BE EQUAL.
```

```
;*
;* NOW CLEAR BSEL7.                              WAIT FOR BSEL7 TO CLEAR. THEN DROP
;*                                               "DISABLE INIT" AND EXIT TO M LOOP.
;*
;*- - ------- - -- -----------------
;*
;* SUBTEST # 2:
;*
;* HERE  THE  HALT MODE IS USED IN A WAY WHICH VERY CLOSELY MATCHES THE DMV 11
;* MICROCODE'S  UTILIZATION  DURING  A  "MOP  BOOT"  OPERATION. THE INTERRUPT
;* VECTOR  AREA  IS COMPLETELY OVERWRITTEN BY THE DMV NPR S AND IS THEREFORE
;* BACKED  UP  ELSEWHERE  IN  THE  11 CPU'S MEMORY. THERE IS ALSO THE POSSIBLE
;* CONTENTION  WITH  THE  DIAGNOSTIC  SUPERVISOR   -  TO HELP HERE, AS MUCH AS
;* POSSIBLE WILL BE DONE AT INTERRUPT LEVEL 7.
;*
;*      11 CPU'S OPERATIONS:                        DMV 11 S OPERATIONS:
;*
;* THE MICROCODE IS MOVED INTO THE DMV.
;*
;* THE INTERRUPT VECTOR AREA IS BACKED-
;* UP IN AN I/O BUFFER FOLLOWING THE
;* PROGRAM
;*
;* THE MICROCODE IS INITIATED & BSEL7 IS
;* SET TO  : AS A FLAG.
;*
;* WAIT FOR BSEL7 TO BE CLEARED           CLEAR BSEL7 AND WAIT FOR IT TO GO
;*                                        NON-ZERO AGAIN PUTTING BOTH
;*                                        PROCESSORS IN SYNC. WITH EACH
;*                                        OTHER
;* CLEAR TMPO AND SAVE R6 FOR RECOVERY
;* LATER.  SET BSEL7 AGAIN AND WAIT FOR
;* TMPO TO BE SET.
;*                                        SET HALT, 'DCOK H LO', & "DISABL
;*                                        INIT" AND PERFORM 2 NOP'S AS A
;*                                        1 MICROSECOND DELAY
;*
;* ENTRY INTO THE CONSOLE "ODT  WILL      CLEAR "DCOK H LO", SET "HALT  &
;* BE INITIATED.                          "DISABL INIT"
;*
;*                                        NPR OUT THE FOLLOWING:
;*                                         LOC:  CONTENTS
;*                                          24   000000  VECTOR TO LOC 0
;*                                          26   000340  @ PRIORITY 7
;*                                           0   012700  MOV  # 1,R0
;*                                           2   177777
;*                                           4   000777  BR   .
;*                                           -     - --    ---- ----
;*
;* THE ENTRY INTO THE CONSOLE "ODT        SET "DCOK H LO" & 'DISABL INIT
;* WILL BE ABORTED!                       AND CLEAR "HALT
;*
;*                                        DELAY FOR A SHORT TIME (ABOUT 1
;*                                        MICROSECOND
;*
;* THE ROUTINE NPR D INTO LOC. 0 WILL     CLEAR 'DCOK H LO  AND SET  DISABL
;* BE EXECUTED    EVENTUALLY HANGING      INIT
```

PROGRAM DOCUMENT

```
1081                    ;* AT THE 'BR  .' INSTRUCTION @ LOC. 4.
1082                    ;*
1083                    ;*                                      NPR-OUT THE FOLLOWING:
1084                    ;*                                       LOC:  CONTENTS
1085                    ;*                                         6   005001  CLR  R1
1086                    ;*                                        10   062701  ADD  #(.+2),R1
1087                    ;*                                        12   062701  ADD  #(.+2),R1
1088                    ;*                                         .     .      .
1089                    ;*                                         .     .      .
1090                    ;*                                         .     .      .
1091                    ;*                                       360   062701  ADD  #(.+2),R1
1092                    ;*                                       362   062701  ADD  #(.+2),R1
1093                    ;*                                       364   010037  MOV  R0,@#TMP0
1094                    ;*                                       366   [TMP0]
1095                    ;*                                       370   013706  MOV  @#OLDSP,R6
1096                    ;*                                       372   [OLDSP]
1097                    ;*                                       374   000137  JMP  HLTST2
1098                    ;*                                       376   [HLTST2]
1099                    ;*                                      ------------ --- ---- --- - -
1100                    ;*                                      THIS IS SYNONYMOUS TO THE DMV 11
1101                    ;*                                      LOADING A "MESSAGE' STARTING AT MEM.
1102                    ;*                                      LOC. 000006.
1103                    ;*
1104                    ;*                                      NPR-OUT THE FOLLOWING:
1105                    ;*                                       LOC:  CONTENTS
1106                    ;*                                         4   000240  NOP
1107                    ;*                                        --          -  -- -
1108                    ;*                                      THIS IS HOW THE DMV 11 WILL TAKE THE
1109                    ;*                                      11 CPU OUT OF THE "BR  ." CONDITION.
1110                    ;* THE ROUTINE JUST LOADED BY THE DMV
1111                    ;* MICROCODE WILL NOW BE EXECUTED (WE      DROP "DISABL INIT
1112                    ;* HOPE).  WHEN THE SUBROUTINE IS RE
1113                    ;* ENTERED (@ HLTST2),                     AN EXIT IS TAKEN TO THE M LOOP
1114                    ;*
1115                    ;*    1  THE INTERRUPT VECTORS WILL BE
1116                    ;*       RESTORED;
1117                    ;*    2  THE PRIORITY LEVEL WILL BE
1118                    ;*       LOWERED BACK TO 0;
1119                    ;*    3  R0, R1, & R6 WILL ALL BE CHECKED
1120                    ;*       FOR THE PROPER CONTENTS; AND
1121                    ;*    4  TMP0 WILL BE CHECKED FOR THE
1122                    ;*       PROPER CONTENTS;
1123                    ;*****************************************************************************
1124
1125
1126
```

```
1128
1129                                    8.0 ERROR INFORMATION
1130
1131
1132                                    8.1 ERROR REPORTING
1133
1134                                    ERRORS  ARE  REPORTED  BY  THE PROGRAM AS THEY OCCUR (IF NOT
1135                                    INHIBITED). THE REPORT CONFORMS TO THE DIAGNOSTIC SUPERVISOR
1136                                    ERROR  REPORT  FORMAT,  AND CONSISTS OF A DESCRIPTION OF THE
1137                                    ERROR, THE TEST NUMBER, SUBTEST  NUMBER,  PC  OF  THE  ERROR
1138                                    CALL,   DEVICE   ADDRESS,   AND  BASIC  AND  EXTENDED  ERROR
1139                                    INFORMATION.
1140
1141                                    THE FOLLOWING EXAMPLE PROVIDES A TYPICAL ERROR REPORT, WHICH
1142                                    DESCRIBES A "MASTER CLEAR FAILURE" ERROR, AND PROVIDES THE PC
1143                                    OF THE ERROR CALL AND THE DEVICE REGISTER CONTENTS :
1144
1145                                      CNDMB DVC FTL ERR 00001 ON UNIT 00 TST 002 SUB 000 PC: 021122
1146                                      MASTER CLEAR FAILURE
1147
1148                                        THE CONTENTS OF ALL BYTE SELECT REG S ARE:
1149                                      BSEL0   BSEL1   BSEL2   BSEL3
1150                                       000     000     000     000
1151                                          BSEL4   BSEL5   BSEL6   BSEL7
1152                                           000     000     121     000
1153                                      BSEL10  BSEL11  BSEL12  BSEL13
1154                                       000     000     000     000
1155                                          BSEL14  BSEL15  BSEL16  BSEL17
1156                                           000     000     000     000
1157
1158                                    FOR OTHER ERRORS, THE REPORT  MAY  BE  MORE  EXTENSIVE,  AND
1159                                    REQUIRE ADDITIONAL DATA TO BE REPORTED.
1160
1161                                    IF  EXTENDED  ERROR INFORMATION HAD BEEN INHIBITED USING THE
1162                                    IXE FLAG PRIOR TO RUNNING THE TEST, THE  ABOVE  ERROR  WOULD
1163                                    HAVE BEEN REPORTED IN THE FOLLOWING SHORTENED FORM :
1164
1165                                      CNDMB DVC FTL ERR 00001 ON UNIT 00 TST 002 SUB 000 PC: 021122
1166                                      MASTER CLEAR FAILURE
1167
1168                                    .
```

LISTING & ASSEMBLY CONTROL

```
                        .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
```

PROGRAM HEADER

```
                                .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 CNDMB,A,0,60.,0
002000                                                          L$NAME::
002000  103                                                             .ASCII /C/
002001  116                                                             .ASCII /N/
002002  104                                                             .ASCII /D/
002003  115                                                             .ASCII /M/
002004  102                                                             .ASCII /B/
002005  000                                                             .BYTE   0
002006  000                                                             .BYTE   0
002007  000                                                             .BYTE   0
002010                                                          L$REV::
002010  101                                                             .ASCII  /A/
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  036344                                                          .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  037054                                                          .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
```

PROGRAM HEADER

```
002C52
002052  000000                  L$EF::
002054  000000                          .WORD   0
002056                          L$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  023120                          .WORD   L$AU
002072                          L$DUT::
002072  023114                          .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$CCP::
002106  023076                          .WORD   L$CLEAN
002110                          L$ACP::
002110  022752                          .WORD   L$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
1223
1229                    .EVEN
```

DISPATCH TABLE

```
1231                                    .SBTTL DISPATCH TABLE
1232
1233                                    ;////////////////////////////////////////////////////////////////////////
1234                                    ;/ THE DISPATCH TABLE CONTAINS THE STARTING ADDRESS OF EACH TEST.
1235                                    ;/ IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
1236                                    ;////////////////////////////////////////////////////////////////////////
1237
1238 002122                                    DISPATCH        13.
     002122  000015                                                          .WORD   13
     002124                                                        L$DISPATCH::
     002124  023122                                                 .WORD   T1
     002126  024132                                                 .WORD   T2
     002130  025020                                                 .WORD   T3
     002132  025406                                                 .WORD   T4
     002134  026116                                                 .WORD   T5
     002136  026366                                                 .WORD   T6
     002140  026774                                                 .WORD   T7
     002142  031234                                                 .WORD   T8
     002144  032534                                                 .WORD   T9
     002146  034042                                                 .WORD   T10
     002150  034136                                                 .WORD   T11
     002152  034202                                                 .WORD   T12
     002154  034754                                                 .WORD   T13
1239
```

```
                                .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 ! $HW/2
002160                                                                      L$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  000011                          .WORD   000011          ;MISC. CONTROLS:

                                ; POWER-UP MODE 0 MASK = 100
                                ;   0 = NOT JUMPERED FOR MODE 0 POWER-UP  <--- DEFAULT SETTING  ;JB REV A-0
                                ;   1 = JUMPERED FOR MODE 0 POWER UP
                                ;       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:
```

```
                        .SBTTL SOFTWARE P TABLE

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

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

GLOBAL EQUATES SECTION

```
1290                            .SBTTL GLOBAL EQUATES SECTION
1291
1292
1293                            ;//////////////////////////////////////////////////////////////////////////////
1294                            ;/      THE GLOBAL EQUATES SECTION CONTAINS PROGRAM EQUATES THAT
1295                            ;/      ARE USED IN MORE THAN ONE TEST.
1296                            ;//////////////////////////////////////////////////////////////////////////////
1297
1298 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
                                ;
                                ;                                   ; BIT POSITION IN SECOND STATUS WORD
            000040              EF.START==      32.                 ; (100000) START COMMAND WAS ISSUED
            000037              EF.RESTART==    31.                 ; (040000) RESTART COMMAND WAS ISSUED
            000036              EF.CONTINUE==   30.                 ; (020000) CONTINUE COMMAND WAS ISSUED
            000035              EF.NEW==        29.                 ; (010000) A NEW PASS HAS BEEN STARTED
            000034              EF.PWR==        28.                 ; (004000) A POWER FAIL/POWER UP OCCURRED
                                ;
                                ;
                                ; PRIORITY LEVEL DEFINITIONS
                                ;
            000340              PRI07== 340
            000300              PRI06== 300
            000240              PRI05== 240
            000200              PRI04== 200
```

```
        000140          PRIO3== 140
        000100          PRIO2== 100
        000040          PRIO1== 40
        000000          PRIO0== 0
                        ;
                        ;OPERATOR FLAG BITS
                        ;
        000004          EVL==       4
        000010          LOT==      10
        000020          ADR==      20
        000040          IDU==      40
        000100          ISR==     100
        000200          UAM==     200
        000400          BOE==     400
        001000          PNT==    1000
        002000          PRI==    2000
        004000          IXE==    4000
        010000          IBE==   10000
        020000          IER==   20000
        040000          LOE==   40000
        100000          HOE==  100000

                        .SBTTL  DEFINE THE NUMBER OF CSR'S
        000010          CSREGS  =  8.

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

                        .SBTTL  NPR ADDRESS REGISTER EQUATES
        000070          NPRAOL  = 70                    ;OUT NPR ADRS LO REG
        000071          NPRAOH  = NPRAOL+1              ;OUT NPR ADRS HI REG
        000072          NPRAOX  = NPRAOL+2              ;OUT NPR EXTENDED ADRS REG
        000074          NPRAIL  = NPRAOL+4              ;IN NPR ADRS LO REG
        000075          NPRAIH  = NPRAOL+5              ;IN NPR ADRS HI REG
        000076          NPRAIX  = NPRAOL+6              ;IN NPR EXTENDED ADRS REG
        000200          NPRBS7  = BIT7                  ; BANK SELECT 7" BIT    W/IN EXTENDED ADRS. REG.



                        .SBTTL  NPR DATA REG EQUATES
        123000          NPRDRL  = 123000                ;NPR DATA REGISTER -  LOW BYTE
        123001          NPRDRH  = NPRDRL+1              ;NPR DATA REGISTER    HIGH BYTE



                        .SBTTL  NPR CONTROL REG EQUATES
        123004          NPRCTL  = NPRDRL+4              ;NPR CONTROL REGISTER
        000200          NPRABT  = BIT7                  ;=1 IF BUS TIME-OUT ON NPR
        000100          NPRGO   = BIT6                  ;SET FOR NOP, CLEAR TO "GO" / 0=DONE, 1=BUSY
        000040          NPRIO   = BIT5                  ;0 = (LSI ==> DMV);  1 = (DMV ==> LSI)
        000020          LSIHLT  = BIT4                  ;SETTING THIS WILL "HALT" THE LSI-11 !!
        000010          NPRBYT  = BIT3                  ;SET TO 1 TO WRITE BYTE ONLY TO LSI-11
        000004          DMVPU   = BIT2                  ;SET BY MICRO-DIAG.  MUST REMAIN SET!!!
        000002          LSIDCL  = BIT1                  ;IF SET, WILL CAUSE POWER DOWN CONDITION IN LSI!
        000001          DMVDAI  = BIT0                  ;"DISABLE INIT" FROM EFFECTING DMV 11


                        .SBTTL  NPR REQUEST FUNCTIONS
```

NPR REQUEST FUNCTIONS

```
1335        000004              NPRLD   = DMVPU                 ;WORD XFER:  LSI ==> DMV
1336        000044              NPRDL   = DMVPU!NPRIO           ;WORD XFER:  DMV ==> LSI
1337        000054              NPRDLB  = DMVPU!NPRIO!NPRBYT    ;BYTE XFER:  DMV ==> LSI
1338
1339                            ;       - -- - - - ------ -- - -------- - -----    ----- -   .       -  -
1340
1341                            .SBTTL  INTERRUPT REG EQUATES
1342        123005              IRQREG  = 123005                ;INTERRUPT REQUEST REG
1343        000004              IRQA    = BIT2                  ;REQUEST BIT FOR XX0 INTERRUPT    "A"
1344        000002              IRQB    = BIT1                  ;REQUEST BIT FOR XX4 INTERRUPT    "B"
1345
1346                            ; - - -                 - - -                 -   -     -   -       -
1347
1348                            .SBTTL  CONTROL FLAGS FROM P TABLE ENTRIES
1349        000001              PU24    = BIT0                  ;POWER FAIL VECTORING MODE.  1 = MODE 0
1350                                                            ;  (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]

```

```
                        .SBTTL  CSR REG. DEFINITION FOR MAINT. LOOP

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

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


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

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


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

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

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

DMV INTERNAL ADDRESSES

```
                        .SBTTL  DMV INTERNAL ADDRESSES

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


                        ;00000000  <<  MICROPROCESSOR REGISTER ADDRESS EQUATES  >> 00000000

                        .SBTTL          BYTE & WORD SELECT REGISTERS

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

                        .SBTTL          VIA'S REGISTERS

120000                  ORB     =120000
120001                  ORA     =ORB+1
120002                  DDRB    =ORB+2
120003                  DDRA    =ORB+3
120004                  T1CL    =ORB+4
120005                  T1CH    =ORB+5
120005                  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                  ACR     =ORB+13
120014                  PCR     =ORB+14
120015                  IFR     =ORB+15
120016                  IENR    =ORB+16
120017                  ORAM    =ORB+17

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

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

```
1?01                    ;------------------------------------------------------------
```

K3


```
                                   .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
002270  000000                     PSTACK:  .WORD   0               ;CONTAINS BASE LEVEL PROGRAM STACK POINTER
```

MISCELLANEOUS STORAGE

```
1755 002272  000000                INTFLG: .WORD   0               ;INTERRUPT RECEIVED FLAG BYTES.  ALLOCATION:
1756                                                               ;  LOW BYTE FOR "A" & HIGH BYTE FOR "B"
1757 002274  000000                INTWCH: .WORD   0               ;BYTE IS SET NON-ZERO WHEN HANDLER SHOULD BE
1758                                                               ;  WATCHING FOR INT'S.  ALLOCATION: SEE INTFLG
1759 002276  000000                ERRFLG: .WORD   0               ;ERROR FLAG
1760 002300  000000                REGNUM: .WORD   0               ;REGISTER NUMBER -- FOR PASSING ARG. TO "ERR#"
1761 002302  000000                FRSTIM: .WORD   0               ;FLAG=0 IF PROGRAM JUST LOADED
1762 002304  000000                FRSPAS: .WORD   0               ;FLAG=0 IF FIRST PASS AFTER LOAD
1763 002306  000000                STARES: .WORD   0               ;FLAG TO SHOW NO. OF PASSES SINCE STA OR RES
1764 002310  000000                DEVMAP: .WORD   0               ;BIT MAP OF ACTIVE DEVICES
1765 002312  000000                DEVPTR: .WORD   0               ;DEVICE MAP BIT POINTER
1766 002314  000000                CONSOL: .WORD   0               ;CONSOLE DEVICE FLAG    NON-ZERO = NONE PRESENT
1767 002316  000000                PFLAG:  .WORD   0               ;MISC. PROGRAM FLAGS
1768                                  ;
1769                                  ; THE ABOVE WORD CONTAINS MISC. FLAGS WHICH CAN ONLY BE ACCESSED BY PATCHING.
1770                                  ; IT IS NOT INTENDED THAT THEY BE SET OR CLEARED EXCEPT UNDER VERY UNUSUAL
1771                                  ; CIRCUMSTANCES.  THEREFORE, THEY WILL NOT BE DOCUMENTED ANY OTHER PLACE
1772                                  ; EXCEPT RIGHT HERE.
1773                                  ;
1774                                  ; BIT 0 -- WHEN SET, THOSE TESTS WHICH DO A BUS RESET WILL NOT BE EXECUTED.
1775                                  ;          THIS WAS INPLEMENTED TO SAVE WEAR & TEAR ON THE RX01 IN THE
1776                                  ;          DEVELOPMENT SYSTEM WHILE DOING LONG TERM TESTING OF ALL OTHER
1777                                  ;          TESTS.
1778                                  ;
1779                                  ; BIT 1 -- CPU TYPE (NOT USED).
1780                                  ;
1781                                  ; BIT 2 -- CONTROLS PRINTING OF EXTENDED ERROR INFORMATION DURING "MOVING
1782                                  ;          INVERSIONS TEST" OF RAM.  NORMALLY ONLY ADDRESS, GOOD & BAD
1783                                  ;          DATA, AND XOR WILL BE PRINTED.  IF THIS BIT IS SET HOWEVER,
1784                                  ;          INFORMATION IDENTIFYING WHERE WITHIN THE ALGORITHM THE ERROR
1785                                  ;          WAS DETECTED IS REPORTED.  THE FOLLOWING ABBREVIATIONS ARE USED
1786                                  ;          IN THE HEADING:
1787                                  ;                  BIT --  IDENTIFIES THE INNERMOST LOOP.  WHICH BIT IS
1788                                  ;                          BEING INVERTED AT EACH LOCATION.  BITS ARE
1789                                  ;                          IDENTIFIED AS 0 THROUGH 7.
1790                                  ;                  DATA    IDENTIFIES THE VALUE TO WHICH THE ABOVE BIT IS
1791                                  ;                          BEING SET (I.E. 0 OR 1).  IT IS FIRST READ AND
1792                                  ;                          CHECKED FOR EXPECTED CONTENTS; THEN THE BIT IS
1793                                  ;                          INVERTED TO THIS STATE (DATA) AND RE-WRITTEN;
1794                                  ;                          THEN IT IS AGAIN READ & CHECKED FOR THE NEW
1795                                  ;                          VALUE.
1796                                  ;                  SEQ - - INDICATES THE DIRECTION (FWD OR BKWD) THE TEST
1797                                  ;                          WAS SCANING THROUGH RAM WHEN THE ERROR OCCURED.
1798                                  ;                  LSB     THIS IS THE LOGICAL LEAST SIGNIFICANT BIT OF THE
1799                                  ;                          RAM ADDRESS AS WE SCAN THROUGH MEMORY.  BY
1800                                  ;                          VARYING THIS, THE ALGORITHM GENERATES NON-SEQUEN
1801                                  ;                          TIAL ADDRESSING OF RAM AND EFFECTS A MUCH MORE
1802                                  ;                          THOROUGH TEST OF MEMORY.
1803                                  ;
1804                                  ; BIT 3  - ENABLES PRINTOUT OF THE MESSAGE WITHIN THE INIT CODE THAT TELLS
1805                                  ;          US HOW LONG IT TOOK (IN LOOPS WITHIN THIS CPU) TO PERFORM ONE
1806                                  ;          NO-OP FUNCTION OF THE MAINTAINENCE LOOP.
1807
1808
1809
```

M5

CURRENT DEVICE PARAMETERS

```
                                        .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
```

SCRATCH STORAGE FOR MESSAGE REPORTING

```
                                .SBTTL  SCRATCH STORAGE FOR MESSAGE REPORTING

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


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

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

```
1908                                    .SBTTL  ***** DATA PATTERN F *****
1909
1910                                    .EVEN
1911 002506  000045                     PATF:   <1$ . 2>/2
1912 002510  125252                             125252
1913 002512  052525                             052525
1914 002514  000000                             0
1915 002516  177777                              1
1916 002520  000001                             1
1917 002522  000002                             2
1918 002524  000004                             4
1919 002526  000010                             10
1920 002530  000020                             20
1921 002532  000040                             40
1922 002534  000100                             100
1923 002536  000200                             200
1924 002540  000400                             400
1925 002542  001000                             1000
1926 002544  002000                             2000
1927 002546  004000                             4000
1928 002550  010000                             10000
1929 002552  020000                             20000
1930 002554  040000                             40000
1931 002556  100000                             100000
1932 002560  177776                             177776
1933 002562  177775                             177775
1934 002564  177773                             177773
1935 002566  177767                             177767
1936 002570  177757                             177757
1937 002572  177737                             177737
1938 002574  177677                             177677
1939 002576  177577                             177577
1940 002600  177377                             177377
1941 002602  176777                             176777
1942 002604  175777                             175777
1943 002606  173777                             173777
1944 002610  167777                             167777
1945 002612  157777                             157777
1946 002614  137777                             137777
1947 002616  077777                             077777
1948 002620  000000                             0
1949 002622                             1$:
```

```
                                .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
```

```
1982                                    .SBTTL  DATA BUFFER AREAS
1983
1984 002654                             BUFAREA:        .BLKB   256.
1985
1986
1987                                    ;  THIS BUFFER HAS SOME ALTERNATE USES TOO.  THE FOLLOWING LABELS ARE PROVIDED
1988                                    ;  FOR THOSE USAGES.
1989
1990            003054                  W0 = BUFAREA+128.       ;THIS WORD TABLE STARTS IN THE MIDDLE OF "BUFAREA"
1991            003056                  W1 = W0+2               ;AND IS USED BY "ERR6' FOR PRINTING BYTES
1992            003060                  W2 = W1+2
1993            003062                  W3 = W2+2
1994            003064                  W4 = W3+2
1995            003066                  W5 = W4+2
1996            003070                  W6 = W5+2
1997            003072                  W7 = W6+2
1998            003074                  W8 = W7+2
1999            003076                  W9 = W8+2
2000            003100                  WA = W9+2
2001            003102                  WB = WA+2
2002            003104                  WC = WB+2
2003            003106                  WD = WC+2
2004            003110                  WE = WD+2
2005            003112                  WF = WE+2
2006
2007            002654                  BT1 = BUFAREA           ;BYTE TABLE # 1
2008            002740                  BT2 = BUFAREA+64        ;BYTE TABLE # 2
```

GLOBAL TEXT SECTION

```
                                .SBTTL GLOBAL TEXT SECTION

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

                                ;+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                                ;+ NAMES OF DEVICES SUPPORTED BY PROGRAM
                                ; -+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
003254                                  DEVTYP  <M8053 OR M8064>
003254                                                                  L$DVTYP::
003254  115     070     060                                                     .ASCIZ  #M8053 OR M8064#
003257  065     063     040
003262  117     122     040
003265  115     070     060
003270  066     064     000

                                                                                .EVEN

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

000012                          .RADIX  10.
003274                                  DESCRIPT   <DMV-11 U-CONTRL LOGIC DIAG - PART 2 OF 2>
003274                                                                  L$DESC::
003274  104     115     126                                                     .ASCIZ  /DMV-11 U CONTRL LOG
IC DIAG - PART 2 OF 2/
003277  055     061     061
003302  040     125     055
003305  103     117     116
003310  124     122     114
003313  040     114     117
003316  107     111     103
003321  040     104     111
003324  101     107     040
003327  055     040     120
003332  101     122     124
003335  040     062     040
003340  117     106     040
003343  062     000

                                                                                .EVEN
000010                          .RADIX  8.
```

```
                        .SBTTL GLOBAL SUBROUTINES

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

                        ;+*****************************************************************************
                        .SBTTL  MASCLR -  MASTER CLEAR SUBROUTINE
                        ;
                        ; FUNCTION:
                        ;
                        ;  THIS  SUBROUTINE  FORCES THE 6502 MICROPROCESSOR TO EXECUTE A MINI 17 PART
                        ;  DIAGNOSTIC OF THE MICRO-PROCESSOR INSTRUCTION SET, RAM DATA AND ADDRESSING
                        ;  VALIDITY,   AND   A  ROM  CRC  TEST.  THE  CLEAR  SUBROUTINE  EXECUTES  IN
                        ;  APPROXIMATELY  500  HUNDRED(S)  MILLISECOND. THIS SUBROUTINE WILL SEND THE
                        ;  MASTER  CLEAR  COMMAND  AND  DELAY FOR APPROX. 500 MSEC. AT WHICH PRINT IN
                        ;  TIME,  THE  STATE  OF  THE  CSR  REGISTERS  IS  TESTED.  IF ANY ONE OF THE
                        ;  REGISTERS CONTAINS ANYTHING THAT IS NOT EXPECTED, AN ERROR IS QUEUE UP AND
                        ;  THE CARRY BIT IS SET. ELSE, THE CARRY BIT IS CLEARED.
                        ;
                        ; CALLING SEQUENCE:
                        ;
                        ;       JSR     PC,MASCLR
                        ;       BCC     N$              ;IF NO ERROR OCCURED, PROCEED WITH ROUTINE
                        ;       ERROR                   ;AN ERROR MESSAGE HAS BEEN STACKED:  PRINT IT
                        ;       <ANY OTHER SPECIAL ERROR PROCESSING MAY BE DONE HERE  (I.E. CKLOOP)>
                        ;
                        ; N$:   <RESUMPTION OF NORMAL PROCESSING>
                        ;
                        ;- *****************************************************************************
                        ;
003346  010146          MASCLR: MOV     R1,-(SP)        ; SAVE REGISTER ONE
003350  112777  000300  176744          MOVB    @RUN!MCLR,@BSEL1 ;SET BOTH THE RUN AND MASTER CLEAR BITS
                                                        ;TO INITIATE THE MICRODIAGNOSTIC

                                        ;NOW DELAY LONG ENOUGH FOR THE MICRODIAGNOSTIC TO COMPLETE

003356  013701  002262                  MOV     DELAY1,R1       ;INITIALIZE THE LOOP COUNTER FOR DELAY LOOP
003362  001402                  2$:     BEQ     1$              ; EXIT DELAY LOOP IF THE TIME HAS EXPIRED
003364  005301                          DEC     R1              ;  ELSE, DECREMENT THE LOOP COUNTER AND
003366  000775                          BR      2$              ;  CONTINUE TO LOOP.
003370                          1$:                             ; TIME-UP!
003370  132777  000200  176724          BITB    @RUN,@BSEL1     ;CHECK THE RUN BIT  -
003376  001410                          BEQ     3$              ;IF NOT SET, GO REPORT THE ERROR

                                        ;IF THE RUN BIT IS SET, MICRODIAGNOSTICS ARE COMPLETE.
                                        ;CHECK IF ALL MICRODIAGNOSTICS PASSED.

003400  127737  176730  002630  4$:     CMPB    @BSEL6,BSELRS+6 ;THIS CHECKS THE BYTE IN B SELECT 6 FOR THE
                                                        ;VALID MICRODIAGNOSTIC COMPLETION CODE.
003406  001004                          BNE     3$              ;IF BAD, GO REPORT ERROR

003410  127737  176714  002626          CMPB    @BSEL4,BSELRS+4 ;ELSE, CHECK FOR THE VALID CODE FOR A DMV-11
003416  001420                          BEQ     6$              ;IF THIS TOO IS CORRECT THEN NO ERROR EXISTS
                                                        ;ELSE, FALL INTO THE ERROR REPORTING CODE
```

MASCLR MASTER CLEAR SUBROUTINE

```
 2095 003420  004737  004232          3$:     JSR     PC,GETBSR       ;GET THE BSEL REGISTERS FOR DUMPING
 2096 003424                                  GTDF    20$,ERR3        ;MASTER CLEAR ERROR
                                              ;       QUEUE "DEVICE FATAL" ERROR # 1
      003424  012737  000001  002202                                                  MOV     #T.EDF,ERRTYP
      003432  012737  000001  002204                                                  MOV     #1,ERRNBR
      003440  012737  003466  002206                                                  MOV     #20$,ERRMSG
      003446  012737  006220  002210                                                  MOV     #ERR3,ERRBLK
 2097 003454  000261                          SEC                     ;INDICATE TO THE CALLING ROUTINE THAT
 2098 003456  000401                          BR      7$              ;   AN ERROR WAS DETECTED
 2099
 2100 003460  000241                  6$:     CLC                     ;CLEAR THE CARRY BIT TO INDICATE NO ERROR
 2101 003462  012601                  7$:     MOV     (SP)+,R1        ;RESTORE REGISTER ONE
 2102 003464  000207                          RTS     PC              ; RETURN TO THE CALLER
 2103                                 .NLIST  BEX
 2104 003466     115     101     123  20$:    .ASCIZ  /MASTER CLEAR FAILURE/
 2105                                 .LIST   BEX
 2106                                 .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  000014                  MOV     #12.,R3         ;WAIT FOR THE M-LOOP TO FINISH THE OPERATION
003530  077301                  1$:     SOB     R3,1$
003532  012603                          MOV     (SP)+,R3

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

```
2140                                    .SBTTL  M-LOOP -- READ
2141                                    ;+*********************************************************************
2142                                    ; READ   READ THE SPECIFIED ADDRESS WITHIN THE DMV 11
2143                                    ;
2144                                    ;  CALLING SEQUENCE:
2145                                    ;
2146                                    ;       JSR     R5,READ
2147                                    ;       .WORD   <ADDRESS OF REGISTER WITHIN DMV 11>
2148                                    ;       .WORD   <DESTINATION ADDRESS WITHIN LSI 11>
2149                                    ;       BCC     N$                  ;IF NO ERROR OCCURED, PROCEED WITH ROUTINE
2150                                    ;       ERROR                       ;AN ERROR MESSAGE HAS BEEN STACKED:  PRINT IT
2151                                    ;       <ANY OTHER SPECIAL ERROR PROCESSING MAY BE DONE HERE  (I.E. CKLOOP)>
2152                                    ;
2153                                    ; N$:   <RESUMPTION OF NORMAL PROCESSING>
2154                                    ;
2155                                    ;-*********************************************************************
2156
2157 003616  012577  176506            READ:   MOV     (R5)+,@SEL4         ;SETUP SOURCE POINTER
2158 003622  112777  000001  176474            MOVB    #REDLOC,@BSEL2      ;TELL M LOOP TO GIVE US THE REQUESTED DATA
2159
2160 003630  010346                            MOV     R3, (SP)
2161 003632  012703  000032                    MOV     #26.,R3             ;WAIT FOR THE M LOOP TO FINISH THE OPERATION
2162 003636  077301                    1$:     SOB     R3,1$
2163 003640  012603                            MOV     (SP)+,R3
2164
2165 003642  132777  000200  176454            BITB    #MRDY,@BSEL2        ;DID THE M LOOP FINISH
2166 003650  001023                            BNE     5$                  ;YES.  GOOD.  RETURN
2167
2168 003652  004737  004374                    JSR     PC,GETWSR           ;GET BYTE SELECT REGISTERS
2169 003656  012737  000001  002254            MOV     #REDLOC,GDATA       ;IDENTIFY REQUESTED FUNCTION
2170 003664                                    GTDF    EM4,ERR4            ; "MRDY" TIMEOUT
     003664  012737  000001  002202                                        ;       QUEUE  DEVICE FATAL  ERROR # 3
     003672  012737  000003  002204                                                MOV     #T.EDF,ERRT+P
     003700  012737  016135  002206                                                MOV     #3,ERRNBR
     003706  012737  006232  002210                                                MOV     #EM4,ERRMSG
                                                                                   MOV     #ERR4,ERRBLK
2171 003714  000261                    SEC                                 ;INDICATE AN ERROR HAS BEEN STACKED
2172 003716  000401                    BR      6$                          ;RETURN WITH THAT INDICATION
2173
2174 003720  000241                    5$:     CLC                         ;INDICATE  NO ERROR
2175 003722  117735  176406            6$:     MOVB    @BSEL6,@(R5)+       ;PUT DATA WHERE CALLER WANTS IT
2176 003726  000205                    RTS     R5                          ;RETURN
```

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

003730                          READI:
003730  012577  176374                  MOV     (R5)+,@SEL4     ;SETUP SOURCE POINTER
003734  112777  000001  176362          MOVB    #REDLOC,@BSEL2  ;TELL M LOOP TO GIVE US THE REQUESTED DATA

003742  010346                          MOV     R3, (SP)
003744  012703  000015                  MOV     #13.,R3         ;WAIT FOR THE M LOOP TO FINISH THE OPERATION
003750  077301                  1$:     SOB     R3,1$
003752  012603                          MOV     (SP)+,R3

003754  132777  000200  176342          BITB    #MRDY,@BSEL2    ;DID THE M LOOP FINISH
003762  001023                          BNE     5$              ;YES.  GOOD.  RETURN

003764  004737  004374                  JSR     PC,GETWSR       ;GET BYTE SELECT REGISTERS
003770  012737  000001  002254          MOV     #REDLOC,GDATA   ;IDENTIFY REQUESTED FUNCTION
003776                                  GTDF    EM4,ERR4        ;"MRDY" TIMEOUT
                                        ;               QUEUE "DEVICE FATAL" ERROR # 4
003776  012737  000001  002202                                                  MOV     #T.EDF,ERRTYP
004004  012737  000004  002204                                                  MOV     #4,ERRNBR
004012  012737  016135  002206                                                  MOV     #EM4,ERRMSG
004020  012737  006232  002210                                                  MOV     #ERR4,ERRBLK
004026  000261                          SEC                     ;INDICATE AN ERROR HAS BEEN STACKED
004030  000401                          BR      6$              ;RETURN WITH THAT INDICATION

004032  000241                  5$:     CLC                     ;INDICATE "NO ERROR"
004034  017725  176274          6$:     MOV     @SEL6,(R5)+     ;PUT DATA WHERE CALLER WANTS IT
004040  000205                          RTS     R5              ;RETURN
```

```
                                .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
```

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

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

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

004104  132777  000200  176212          BITB    #MRDY,@BSEL2    ;DID THE M-LOOP FINISH
004112  001023                  BNE     5$              ;YES.  GOOD.  RETURN
004114  004737  004374          JSR     PC,GETWSR       ;GET BYTE SELECT REGISTERS
004120  012737  000002  002254  MOV     #WRILOC,GDATA   ;IDENTIFY REQUESTED FUNCTION
004126                          GTDF    EM4,ERR4        ;"MRDY" TIMEOUT
                                ;       QUEUE "DEVICE FATAL ERROR # 5
004126  012737  000001  002202                                  MOV     #T.EDF,ERRTYP
004134  012737  000005  002204                                  MOV     #5,ERRNBR
004142  012737  016135  002206                                  MOV     #EM4,ERRMSG
004150  012737  006232  002210                                  MOV     #ERR4,ERRBLK
004156  000261                  SEC                     ;INDICATE AN ERROR HAS BEEN STACKED
004160  000401                  BR      6$              ;RETURN WITH THAT INDICATION

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

```
2276
2277                                    .SBTTL  M-LOOP   - BLOCK MOVE (11 CPU ==> DMV-11)
2278                                    ;*****************************************************************************
2279                                    ;
2280                                    ; MOVE A BLOCK OF BYTES FROM THE 11 CPU'S MEMORY TO THE DMV-11 S RAM
2281                                    ;
2282                                    ;       THE DESTINATION ADDRESS IS ALWAYS THE SAME -- 77 (OCT) OR 003F (HEX)
2283                                    ;
2284                                    ;       CALLING SEQUENCE:
2285                                    ;
2286                                    ;       JSR     R5,MOVLTD
2287                                    ;       .WORD   <SOURCE ADDRESS OF DATA>
2288                                    ;       .WORD   <# OF BYTE TO BE MOVED>
2289                                    ;
2290                                    ;*****************************************************************************
2291 004166  010146                    MOVLTD: MOV     R1,-(SP)        ;SAVE THE REGISTER WE'LL BE A NEED'N
2292
2293 004170  012737  000077  004210            MOV     #77,10$         ;DESTINATION ADDRESS IS ALWAYS THE SAME
2294 004176  012537  004212                    MOV     (R5)+,11$       ;SETUP THE SOURCE ADDRESS
2295 004202  012501                            MOV     (R5)+,R1        ;INITIALIZE THE BYTE COUNT
2296
2297 004204                            5$:
2298 004204  004537  004042                    JSR     R5,WRITE        ;WRITE ONE BYTE INTO THE DMV-11'S RAM
2299 004210  000077                    10$:    77                      ;THE RAM'S LOCATION
2300 004212  000000                    11$:    0                       ;THE DATA BYTE'S LOCATION
2301 004214  005237  004210                    INC     10$             ;POINT TO NEXT RAM BYTE
2302 004220  005237  004212                    INC     11$             ;POINT TO NEXT DATA BYTE
2303 004224  077111                            SOB     R1,5$           ;IF NOT DONE, LOOP
2304                                                                    ;ELSE, CLEAN-UP AND RETURN
2305 004226  012601                            MOV     (SP)+,R1        ;RESTORE R1
2306 004230  000205                            RTS     R5              ; & RETURN
2307
```

```
                                .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    @#SEL0,BSR0     ;PUT THE CURRENT CSR VALUES INTO THE PRINT OUT
004240  117737  176056  002214          MOVB    @#SEL1,BSR1     ;TABLE
004246  117737  176052  002216          MOVB    @#SEL2,BSR2
004254  117737  176046  002220          MOVB    @#SEL3,BSR3
004262  117737  176042  002222          MOVB    @#SEL4,BSR4
004270  117737  176036  002224          MOVB    @#SEL5,BSR5
004276  117737  176032  002226          MOVB    @#SEL6,BSR6
004304  117737  176026  002230          MOVB    @#SEL7,BSR7
004312  117737  176022  002232          MOVB    @#SEL10,BSR10
004320  117737  176016  002234          MOVB    @#SEL11,BSR11
004326  117737  176012  002236          MOVB    @#SEL12,BSR12
004334  117737  176006  002240          MOVB    @#SEL13,BSR13
004342  117737  176002  002242          MOVB    @#SEL14,BSR14
004350  117737  175776  002244          MOVB    @#SEL15,BSR15
004356  117737  175772  002246          MOVB    @#SEL16,BSR16
004364  117737  175766  002250          MOVB    @#SEL17,BSR17
004372  000207                          RTS     PC              ;RETURN TO CALLER

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

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

```
                        .SBTTL  .INITT1 -- INITIALIZE TIMER # 1

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

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

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

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

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

004542  004537  003616          JSR     R5,READ         ;READ THE CURRENT SETTING OF
004546  120013                  ACR                     ;THE VIA'S ACR
004550  002440                  TMPB
004552  103424                  BCS     63$             ;EXIT ON ERROR
```

.INITT1 INITIALIZE TIMER # 1

```
2414
2415 004554  013701  002440                MOV     TMPB,R1          ;GET THAT VALUE
2416 004560  042701  177477                BIC     #^C<BIT6!BIT7>,R1  ;CLEAR BITS 6 & 7
2417 004564  150137  002441                BISB    R1,TMPB+1        ;ADD CURRENT BITS 0 -> 5 TO NEW BITS 6 & 7
2418
2419 004570  004537  004042                JSR     R5,WRITE         ;WRITE THE NEW REGISTER SETTING TO VIA 5 ACR
2420 004574  120013                        ACR
2421 004576  002441                        TMPB+1
2422 004600  103411                        BCS     63$              ;EXIT ON ERROR
2423
2424 004602  004537  004042                JSR     R5,WRITE         ;WRITE TO
2425 004606  120006                        T1LL                     ;LOW ORDER LATCH REGISTER (T1L L)
2426 004610  002427                        TMP6+1                   ;THE VALUE PASSED
2427 004612  103404                        BCS     63$              ;EXIT ON ERROR
2428
2429 004614  004537  004042                JSR     R5,WRITE         ;WRITE TO
2430 004620  120007                        T1LH                     ;HIGH ORDER LATCH REGESTER (T1L H)
2431 004622  002431                        TMP7+1                   ;THE VALUE PASSED
2432
2433                             ; DON T WAIT AROUND FOR ANYTHING TO HAPPEN    JUST (JEST) RETURN!
2434
2435 004624  012601                63$:    MOV     (SP)+,R1         ;BUT FIRST RESTORE R1
2436 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,@#SEL3       ;CLEAR THE INT. FLAG IN THE SELECT REGISTER
004670  106301                  ASLB    R1              ;NOW PUT THE BIT INTO THE CONTROL POSITION
004672  106301                  ASLB    R1
004674  052701  000040          BIS     #BIT5,R1        ;THEN SET BIT 5
004700  110137  002447          MOVB    R1,TMPE+1       ;THE CALL WILL NOW WRITE THE APPROPRIATE VALUE

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

004716  004537  003616          JSR     R5,READ         ;READ THE CURRENT SETTING OF
004722  120013                  ACR                     ;THE VIA'S ACR
```

.INITT2 INITIALIZE TIMER # 2

```
2495 004724  002440                    TMPB
2496 004726  103424                    BCS     63$             ;EXIT ON ERROR
2497
2498 004730  113701  002440            MOVB    TMPB,R1         ;GET THAT VALUE
2499 004734  042701  000040            BIC     #BIT5,R1        ;CLEAR THE CURRENT SETTING OF BIT 5
2500 004740  150137  002441            BISB    R1,TMPB+1       ;SET REMAINING BITS IN THE VALUE TO BE WRITTEN
2501
2502 004744  004537  004042            JSR     R5,WRITE        ;WRITE TO
2503 004750  120013                    ACR                     ;THE VIA'S ACR
2504 004752  002441                    TMPB+1
2505 004754  103411                    BCS     63$             ;EXIT ON ERROR
2506
2507 004756  004537  004042            JSR     R5,WRITE        ;WRITE TO
2508 004762  120010                    T2LL                    ;LOW ORDER LATCH & COUNTER (T2L L)
2509 004764  002433                    TMP8+1                  ;THE PASSED VALUE
2510 004766  103404                    BCS     63$             ;EXIT ON ERROR
2511
2512 004770  004537  004042            JSR     R5,WRITE        ;WRITE TO
2513 004774  120011                    T2CH                    ;HIGH ORDER COUNTER (T2C H) <ALSO STARTS CTR>
2514 004776  002435                    TMP9+1                  ;THE PASSED VALUE
2515
2516                          ; DON'T WAIT AROUND FOR ANYTHING TO HAPPEN -  JUST (JEST) RETURN!
2517
2518 005000  012601            63$:    MOV     (SP)+,R1        ;BUT FIRST RESTORE R1
2519 005002  000205                    RTS     R5              ;THEN RETURN
2520
```

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

005130  000205                  RTS     R5              ;RETURN TO CALLING ROUTINE


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

005132  000207          STALL:  RTS     PC


```

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

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

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

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

```
                                .SBTTL  NPRMOV -- WORD/BYTE BLOCK MOVE USING THE NPR HARDWARE
                                ;**************************************************************************
                                ; NPRMOV -- MOVE A BLOCK OF DATA THROUGH THE DMV'S NPR LOGIC
                                ;--**********************************************************************
                                ; - - - - - - - - - I N I T I A L I Z A T I O N - - - - - - - - - - - - - - -
005266  010146                  NPRMOV: MOV     R1,-(SP)        ;SAVE THE REGISTERS WE USE
005270  010246                          MOV     R2,-(SP)
005272  010346                          MOV     R3,-(SP)
005274  012501                  1$:     MOV     (R5)+,R1        ;POINT TO TEST PATTERN
005276  012502                          MOV     (R5)+,R2        ;POINT TO THE LSI-11 BUFFER AREA
005300  012503                          MOV     (R5)+,R3        ;GET COUNT OF # OF WORDS IN TEST PATTERN
005302  012537  005612                  MOV     (R5)+,42$       ;LOAD UP THE COMMAND TO BE USED
005306  005037  002276                  CLR     ERRFLG          ;INITIALIZE ERROR FLAG
005312  032737  000040  005612          BIT     #NPRIO,42$      ;DETERMINE DIRECTION:
005320  001403                          BEQ     3$              ;LSI ***> DMV  --  USE "NPRAIL"
005322  012746  000070                  MOV     #NPRAOL,-(SP)   ;DMV ***> LSI  --  USE "NPRAOL"
005326  000402                          BR      4$
005330  012746  000074          3$:     MOV     #NPRAIL,-(SP)
005334  011637  005400          4$:     MOV     (SP),10$        ;SETUP LOW BYTE ADDRESS POINTER
005340  005216                          INC     (SP)            ;INCREMENT TO NEXT DMV ADDRESS
005342  011637  005422                  MOV     (SP),14$        ;SETUP HIGH BYTE ADDRESS POINTER
005346  005216                          INC     (SP)            ;INCREMENT TO NEXT DMV ADDRESS
005350  012637  005434                  MOV     (SP)+,17$       ;SETUP EXT. BYTE ADDRESS POINTER & RESTORE SP
                                ; - - - - - - - - - RE-INITIALIZE LOOP'S VARIABLES - - - - - - - - - - - - - -
005354                          6$:
                                ; - - - - - - - - - SETUP APPROPRIATE ADDRESS - - - - - - - - - - - - - - - -
005354  032737  000040  005612          BIT     #NPRIO,42$      ;DIRECTION OF TRANSFER?
005362  001002                          BNE     8$              ;DMV ***> LSI -- ADDR. SHOULD POINT TO BUFFER
005364  010246                          MOV     R2,-(SP)        ;LSI ***> DMV -- SAVE BUFFER POINTER
005366  010102                          MOV     R1,R2           ;       & POINT TO TEST DATA TO BE READ
005370  010237  005402          8$:     MOV     R2,11$          ;SETUP LOW BYTE OF ADDRESS
005374  004537  004054                  JSR     R5,WRITEI       ;LOAD UP DESTINATION ADDRESS
005400  000070                  10$:    NPRAOL                  ;  NPR ADDRESS LOW BYTE
005402  000000                  11$:    0                       ;*** MODIFIED FROM ABOVE ***
005404  103510                          BCS     45$             ;ON ERROR, EXIT
005406  000302                          SWAB    R2              ;SETUP HIGH BYTE OF DESTINATION ADDRESS
005410  010237  005424                  MOV     R2,15$
005414  000302                          SWAB    R2              ;  (RESTORE ADDRESS)
005416  004537  004054                  JSR     R5,WRITEI       ;  SEND IT TO THE DMV
005422  000071                  14$:    NPRAOH                  ;  NPR ADDRESS HIGH BYTE
005424  000000                  15$:    0                       ;*** MODIFIED FROM ABOVE ***
005426  103477                          BCS     45$             ;ON ERROR, EXIT
005430  004537  004054                  JSR     R5,WRITEI       ;MAKE SURE "EXTENDED" BITS ARE CLEARED
005434  000072                  17$:    NPRAOX                  ;  NPR ADDRESS EXTENDED BYTE
005436  000000                          0                       ;  ACTUAL VALUE LOADED INTO THIS BYTE (WE HOPE!)
005440  103472                          BCS     45$             ;ON ERROR, EXIT
```

```
                                         ;                    - S E T U P   D A T A - - -     -       - -          -
005442  112137  005556                              MOVB    (R1)+,30$           ;SETUP ONE BYTE OF DATA TO BE PASSED TO THE DMV
005446  032737  000040  005612                      BIT     #NPRIO,42$          ;DIRECTION OF TRANSFER?
005454  001010                                      BNE     19$                 ;DMV ===> LSI -- "DATA OUT"
                                                                                ;LSI ===> DMV -  "DATA IN"

                                         ; ON AN "LSI ===> DMV", R2 WAS STACKED & IT SHOULD NOW BE RESTORED:

005456  012602                                      MOV     (SP)+,R2            ;RESTORE R2

                                         ; WHEN WE FALL THROUGH TO HERE, THE DIRECTION IS LSI ===> DMV    ("DATA IN").
                                         ; THIS MUST ALWAYS BE A WORD TRANSFER SO THAT BOTH HIGH & LOW BYTES MUST BE
                                         ; LOADED WITH THE BACKGROUND PATTERN (THE ONE S COMPLEMENT OF THE TEST PATTERN)

005460  005137  005556                              COM     30$                 ;ONE'S COMPLEMENT THE LOW BYTE
005464  112137  005600                              MOVB    (R1)+,35$           ;SETUP THE HIGH BYTE AND
005470  005137  005600                              COM     35$                 ;  COMPLEMENT IT ALSO
005474  000425                                      BR      28$                 ;NO GO AROUND THE 'DATA-OUT' SETUP AND PASS
                                                                                ;THE BACKGROUND PATTERN TO THE DMV S NPR DATA REG'S

                                         ; IF WE GET TO HERE, THE DIRECTION IS DMV ===> LSI    ("DATA OUT").
                                         ; IF THIS IS A WORD XFER, BOTH HIGH & LOW BYTES MUST BE SETUP; IF BYTE, THEN
                                         ; WE MUST DETERMINE WHICH ONE (HIGH OR LOW) IS TO BE DONE AND ONLY LOAD THAT
                                         ; BYTE.  CONTRARY TO NORMAL PDP 11 OPERATION FOR A BYTE OPERATION FROM A
                                         ; REGISTER, THE ODD ADDRESSED BYTE WILL ALWAYS BE WRITTEN FROM THE HIGH DATA
                                         ; BYTE REGISTER AND THE EVEN ADDRESSED BYTE WILL ALWAYS BE WRITTEN FROM THE
                                         ; LOW DATA BYTE REGISTER.


005476  113712  005556                   19$:       MOVB    30$,(R2)            ;SETUP THE BACKGROUND PATTERN IN LSI'S MEM.
005502  105112                                      COMB    (R2)                ;  (THIS MAKES IT A 'BACKGROUND" PATTERN)

005504  032737  000010  005612                      BIT     #NPRBYT,42$         ;IS THIS A BYTE OR WORD TRANSFER?
005512  001007                                      BNE     21$                 ;BYTE, GO DETERMINE WHICH ONE
005514  111137  005600                              MOVB    (R1),35$            ;WORD, SETUP THE HIGH BYTE OF NPR DATA
005520  112162  000001                              MOVB    (R1)+,1(R2)         ;ALSO, SETUP THE HIGH BYTE'S BACKGROUND PATTERN
005524  105162  000001                              COMB    1(R2)               ;  (THIS MAKES IT A "BACKGROUND' PATTERN)
005530  000407                                      BR      28$                 ;GO LOAD UP THE NPR DATA REG'S NOW

005532  032702  000001                   21$:       BIT     #1,R2               ;IS LSI ADDRESS ODD OR EVEN (HIGH OR LOW BYTE)?
005536  001404                                      BEQ     28$                 ;EVEN (LOW BYTE),  EVERYTHING S OK -- GO LOAD IT
005540  013737  005556  005600                      MOV     30$,35$             ;ODD (HIGH BYTE).  WE SETUP THE WRONG ONE
                                                                                ;         PUT THE DATA BYTE IN THE RIGHT PLACE
005546  000411                                      BR      33$                 ;  AND GO LOAD IT INTO THE DMV'S NPR HIGH DATA BYTE REG.


005550  004537  004054                   28$:       JSR     R5,WRITEI           ;LOAD UP THE
005554  123000                                      NPRDRL                      ;  NPR DATA REG. LOW BYTE
005556  000000                           30$:       0                           ;  DATA BYTE  - LOW
005560  103422                                      BCS     45$                 ;ON ERROR, EXIT

005562  032737  000010  005612                      BIT     #NPRBYT,42$         ;IS THIS A BYTE OR WORD TRANSFER?
005570  001005                                      BNE     40$                 ;BYTE, THEN LEAVE THE NEXT BYTE OF DATA FOR LATER

005572  004537  004054                   33$:       JSR     R5,WRITEI           ;WORD, LOAD UP THE
```

```
2793 005576  123001                        NPRDRH                  ;  NPR DATA REG. HIGH BYTE WITH
2794 005600  000000              35$:      0                       ;  WHAT WE HOPE IS THE APPROPRIATE DATA!
2795 005602  103411                        BCS     45$             ;ON ERROR, EXIT
2796
2797                             ;          -       INITIATE ONE TRANSFER   - - -   -   - -             - -
2798
2799
2800 005604  004537  004054      40$:      JSR     R5,WRITEI       ;MAKE THE "NPR" LOGIC DO IT'S THING
2801 005610  123004                        NPRCTL                  ;  BY LOADING THE CONTROL REGISTER WITH
2802 005612  000044              42$:      NPRDL                   ;  THE PASSED COMMAND
2803 005614  103404                        BCS     45$             ;ON ERROR, EXIT
2804
2805                             ; - - -   -   -     MAKE SURE THE XFER RAN OK                    - - -   -     - -
2806
2807 005616  004537  003730                JSR     R5,READI        ;GET THE CONTROL REG. FOR IT'S STATUS
2808 005622  123004                        NPRCTL
2809 005624  000000              44$:      0
2810 005626  103513              45$:      BCS     63$             ;ON ERROR, EXIT
2811
2812                             ;  BY NOW, THE TRANSFER SHOULD BE COMPLETE SO BIT 6 SHOULD BE = 0.  THEREFOR
2813                             ;  THE ONLY SIGNIFICIANT BIT IS BIT 7 WHICH SHOULD = 0 IF EVERYTHING WENT OK.
2814
2815 005630  132737  000200  005624        BITB    @NPRABT,44$     ;DID THE TRANSFER ABORT?
2816 005636  001436                        BEQ     50$             ;NO,  PROCEED WITH TESTING
2817 005640  005237  002412                INC     TMP0            ;YES, COUNT THE TIME OUT
2818 005644  023727  002412  000001        CMP     TMP0,#1         ;IS THIS THE FIRST OCCURANCE OF A TIMEOUT?
2819 005652  001030                        BNE     50$             ;NO,  THEN DON'T STACK THE ERROR MESSAGE
2820                                                               ;YES, QUEUE UP A FATAL ERROR MESSAGE
2821                                                               ;PASS TO ERROR HANDLER:
2822 005654  013737  005612  002414        MOV     42$,TMP1        ;       CONTROL REGISTER AS WE SET IT
2823 005662  013737  005624  002416        MOV     44$,TMP2        ;       CONTROL REGISTER AS READ
2824 005670  113737  005424  002421        MOVB    15$,TMP3+1      ;       LSI'S MEMORY ADDRESS
2825 005676  113737  005402  002420        MOVB    11$,TMP3
2826 005704                                GTDF    EM26E,ERR11     ;IN ORDER TO REPORT THE TIME-OUT ERROR,
                                                                   ;       QUEUE "DEVICE FATAL" ERROR # 6
     005704  012737  000001  002202                                                    MOV     #T.EDF,ERRTYP
     005712  012737  000006  002204                                                    MOV     #6,ERRNBR
     005720  012737  016316  002206                                                    MOV     #EM26E,ERRMSG
     005726  012737  007314  002210                                                    MOV     #ERR11,ERRBLK
2827         000006              NPRTOE = $E                       ;THIS GETS THE ERROR # FOR TESTING LATER
2828
2829                             ; - - -     -       IF "LSI ===> DMV , RETRIEVE DATA -   -           -   -     -
2830
2831 005734  032737  000040  005612  50$:      BIT     #NPRIO,42$      ;DIRECTION?
2832 005742  001025                        BNE     54$             ;DMV ===> LSI  - DATA ALREADY IN LSI 11
2833                                                               ;LSI ===> DMV -  DATA IN REG'S,  RETRIEVE IT
2834
2835 005744  010237  005756                MOV     R2,51$          ;POINT TO LSI'S INPUT BUFFER
2836 005750  004537  003616                JSR     R5,READ         ;GET ONE BYTE
2837 005754  123000                        NPRDRL                  ;    FROM THE LOW ORDER HALF OF THE DATA REG.
2838 005756  000000              51$:      0                       ;*** MODIFIED FROM ABOVE *** DESTINATION ADDR.
2839 005760  103436                        BCS     63$             ;ON ERROR, EXIT
2840 005762  005202                        INC     R2              ;POINT TO NEXT BYTE OF THE BUFFER
2841
2842 005764  032737  000010  005612        BIT     #NPRBYT,42$     ;WAS A BYTE OF WORD "NPR" PERFORMED?
2843 005772  001022                        BNE     56$             ;BYTE    EVERYTHING S  KOOL'!
2844                                                               ;WORD    MOVE HIGH BYTE INTO BUFFER
```

NPRMOV - WORD/BYTE BLOCK MOVE USING THE NPR HARDWARE

```
2845 005774  010237  006006                MOV     R2,52$          ;POINT TO LSI'S I/P BUFFER
2846 006000  004537  003616                JSR     R5,READ         ;GET ONE BYTE
2847 006004  123001                        NPRDRH                  ;    FROM THE HIGH ORDER HALF OF THE DATA REG.
2848 006006  000000              52$:      0                       ;*** MODIFIED FROM ABOVE *** DESTINATION ADDR.
2849 006010  103422                        BCS     63$             ;ON ERROR, EXIT
2850 006012  005202                        INC     R2              ;POINT TO NEXT BYTE OF THE BUFFER
2851 006014  000411                        BR      56$             ;DONE RETRIEVING DATA -  CHECK FOR MORE
2852
2853                             ;  - -     - - - DMV ===> LSI    JUST ADVANCE LSI-11 ADDRESS          -
2854
2855 006016  005202              54$:      INC     R2              ;BUMP THE LSI 11 ADDRESS
2856 006020  032737  000010  005612        BIT     #NPRBYT,42$     ;IS THIS A BYTE OR WORD TRANSFER?
2857 006026  001004                        BNE     56$             ;BYTE, THEN ADDRESS IS OK AS IS
2858 006030  005202                        INC     R2              ;WORD, BUMP ADDR.  - WE ALREADY DID THE HIGH BYTE
2859 006032  000402                        BR      56$
2860
2861                             ; - -   - - - -   T E S T   F O R   M O R E - - - - - -     - - - - -   - - -
2862
2863 006034  000137  005354      55$:      JMP     6$              ;THIS LITTLE BIT IF CUTE LOGIC IS NECESSARY
2864                                                              ;BECAUSE "6$" IS TOO FAR AWAY FOR A BRANCH!
2865 006040  077303              56$:      SOB     R3,55$          ;DO IT AGAIN IF THERE IS MORE DATA
2866 006042  005737  002276                TST     ERRFLG          ;WAS AN ERROR DETECTED?
2867 006046  001402                        BEQ     61$             ;NO.  TAKE NORMAL EXIT
2868
2869                             ; - - - - - - -  - C L E A N   U P   &   E X I T - - -          - - - - - -
2870
2871 006050  000261              60$:      SEC                     ;INDICATE ERROR CONDITION
2872 006052  000401                        BR      63$
2873
2874 006054  000241              61$:      CLC                     ;INDICATE NO ERROR
2875
2876 006056  012603              63$:      MOV     (SP)+,R3        ;RESTORE THE REGISTERS AGAIN
2877 006060  012602                        MOV     (SP)+,R2
2878 006062  012601                        MOV     (SP)+,R1
2879
2880 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"
                        ;--*****************************************************************************

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

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

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

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

006140                          BGNSRV  MPOHAN
006140                                                                  MPOHAN::
006140  010046                  MOV     R0,-(SP)        ;SAVE R0
006142  105737  002275          TSTB    INTWCH+1        ;HAVE WE BEEN TOLD TO WATCH FOR TYPE "B" INT'S?
006146  001007                  BNE     5$              ;YES, DO NORMAL INTERRUPT PROCESSING
006150  004737  004232          JSR     PC,GETBSR       ;NO,  DUMP REGISTERS AND
006154                          GEDF    EM34B,ERR3      ;       REPORT "UNEXPECTED INTERRUPT"
                                                        ;       "DEVICE FATAL  ERROR # 8
006154  104455                                                          TRAP    C$ERDF
006156  000010                                                          .WORD   8
006160  016540                                                          .WORD   EM34B
006162  006220                                                          .WORD   ERR3
006164  000407                  BR      10$             ;GO TO EXIT

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

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

```
                                .SBTTL  GLOBAL ERROR REPORT REPORT SECTION

                                ;//////////////////////////////////////////////////////////////////////////////
                                ;/      THE GLOBAL ERROR REPORT SECTION CONTAINS ERROR MESSAGES
                                ;/      THAT ARE USED IN MORE THAN ONE TEST.
                                ;//////////////////////////////////////////////////////////////////////////////
                                        .EVEN
                                ;-------------------------------------------------------------------------------
                                .SBTTL  ERROR HANDLER    ERR1    "NO NOTHING" HANDLER
                                ;-------------------------------------------------------------------------------
006212                                  BGNMSG  ERR1
006212                                                                          ERR1::
006212  004737  013076                  JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
006216                                  ENDMSG
006216                                                                          L10004:
006216  104423                                                                  TRAP    C$MSG
                                ;-------------------------------------------------------------------------------
                                .SBTTL  ERROR HANDLER    ERR3    DUMP THE BYTE SELECT REGISTERS
                                ;-------------------------------------------------------------------------------
006220                                  BGNMSG  ERR3
006220                                                                          ERR3::
006220  004737  012206                  JSR     PC,ERR4$
006224  004737  013076                  JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
006230                                  ENDMSG
006230                                                                          L10005:
006230  104423                                                                  TRAP    C$MSG
                                ;-------------------------------------------------------------------------------
                                .SBTTL  ERROR HANDLER    ERR4    M LOOP TIMEOUT ERROR HANDLING
                                ;-------------------------------------------------------------------------------
006232                                  BGNMSG  ERR4
006232                                                                          ERR4::
006232  010146                  MOV     R1,-(SP)        ;SAVE THE WORKING REGISTER
006234  113701  002254          MOVB    GDATA,R1        ;SAVE THIS FOR LATER
006240  122701  000017          CMPB    #17,R1          ;WAS THIS AN M-LOOP REQUEST?
006244  103013                  BHIS    5$              ;YES, THEN REPORT THE FUNCTION CODE
006246                          PRINTX  #FMT5,<B,R1>    ;NO,  THEN IT MUST BE A BSEL1 SETTING
006246  005046                                                  CLR     -(SP)
006250  150116                                                  BISB    R1,(SP)
006252  012746  013346                                         MOV     #FMT5,-(SP)
006256  012746  000002                                         MOV     #2,-(SP)
006262  010600                                                  MOV     SP,R0
006264  104415                                                  TRAP    C$PNTX
006266  062706  000006                                         ADD     #6,SP
006272  000425                  BR      20$
                                
006274  001001          5$:     BNE     6$              ;IF IT WAS A 17, THIS IS A 'NOP' AND
006276  005001                  CLR     R1              ;  THE TEXT POINTER MUST SO REFLECT.
006300  022701  000007  6$:     CMP     #7,R1           ;IS FUNCTION CODE > 7?
006304  002002                  BGE     7$              ;NO,  THAN WE CAN HANDLE IT
006306  012701  000006          MOV     #6,R1           ;YES, THAN IT'S UNDEFINED    SAY SO
006312  006301          7$:     ASL     R1              ;CONVERT TO A WORD OFFSET
006314                          PRINTX  #FMT5A,<B,GDATA>,TXTMLT(R1)     ;REPORT THE FAILING FUNCTION
006314  016146  021746                                         MOV     TXTMLT(R1),-(SP)
006320  005046                                                  CLR     -(SP)
006322  153716  002254                                         BISB    GDATA,(SP)
006326  012746  013411                                         MOV     #FMT5A,-(SP)
006332  012746  000003                                         MOV     #3,(SP)
```

```
        006336  010600                                          MOV     SP,R0
        006340  104415                                          TRAP    C$PNTX
        006342  062706  000010                                  ADD     #10,SP
2974
2975    006346  012601          20$:    MOV     (SP)+,R1                ;RESTORE THE WORKING REGISTER
2976    006350                          PRINTX  #FMT4,#TXT6,#TXT4
        006350  012746  015212                                  MOV     #TXT4,-(SP)
        006354  012746  015313                                  MOV     #TXT6,-(SP)
        006360  012746  013213                                  MOV     #FMT4,-(SP)
        006364  012746  000003                                  MOV     #3,-(SP)
        006370  010600                                          MOV     SP,R0
        006372  104415                                          TRAP    C$PNTX
        006374  062706  000010                                  ADD     #10,SP
2977    006400                          PRINTX  #FMT11,WSR0,WSR2,WSR4,WSR6 ;DUMP THE SELECT REGISTERS
        006400  013746  002220                                  MOV     WSR6,-(SP)
        006404  013746  002216                                  MOV     WSR4,-(SP)
        006410  013746  002214                                  MOV     WSR2,-(SP)
        006414  013746  002212                                  MOV     WSR0,-(SP)
        006420  012746  013770                                  MOV     #FMT11,-(SP)
        006424  012746  000005                                  MOV     #5,-(SP)
        006430  010600                                          MOV     SP,R0
        006432  104415                                          TRAP    C$PNTX
        006434  062706  000014                                  ADD     #14,SP
2978    006440                          PRINTX  #FMT4B,#TXT4A
        006440  012746  015252                                  MOV     #TXT4A,-(SP)
        006444  012746  013306                                  MOV     #FMT4B,-(SP)
        006450  012746  000002                                  MOV     #2,-(SP)
        006454  010600                                          MOV     SP,R0
        006456  104415                                          TRAP    C$PNTX
        006460  062706  000006                                  ADD     #6,SP
2979    006464                          PRINTX  #FMT11,WSR10,WSR12,WSR14,WSR16
        006464  013746  002230                                  MOV     WSR16,-(SP)
        006470  013746  002226                                  MOV     WSR14,-(SP)
        006474  013746  002224                                  MOV     WSR12,-(SP)
        006500  013746  002222                                  MOV     WSR10,-(SP)
        006504  012746  013770                                  MOV     #FMT11,-(SP)
        006510  012746  000005                                  MOV     #5,-(SP)
        006514  010600                                          MOV     SP,R0
        006516  104415                                          TRAP    C$PNTX
        006520  062706  000014                                  ADD     #14,SP
2980    006524  004737  013076          JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
2981    006530                          ENDMSG
        006530                                          L10006:
        006530  104423                                          TRAP    C$MSG
2982                            ;------------------------------------------------------------------
2983                            .SBTTL  ERROR HANDLER    ERR8  - NPR REGISTER ERRORS
2984                            ;------------------------------------------------------------------
2985    006532                          BGNMSG  ERR8
        006532                                          ERR8::
2986    006532  113701  002300          MOVB    REGNUM,R1       ;THIS WAS CALCULATED TO BE A WORD OFFSET
2987    006536                          PRINTB  #FMT07,#TXTNP,TXTNPT(R1)
        006536  016146  021770                                  MOV     TXTNPT(R1),-(SP)
        006542  012746  015745                                  MOV     #TXTNP,-(SP)
        006546  012746  013476                                  MOV     #FMT07,-(SP)
        006552  012746  000003                                  MOV     #3,-(SP)
        006556  010600                                          MOV     SP,R0
        006560  104414                                          TRAP    C$PNTB
```

E6


```
      006562  062706  000010                                                         ADD     #10,SP
      006566                           PRINTX  #FMT06A
      006566  012746  013542                                                         MOV     #FMT06A,-(SP)
      006572  012746  000001                                                         MOV     #1,-(SP)
      006576  010600                                                                 MOV     SP,R0
      006600  104415                                                                 TRAP    C$PNTX
      006602  062706  000004                                                         ADD     #4,SP

                                       ;       PRINT FIRST SET OF REGISTERS: CONTROL & DATA

      006606                           PRINTX  #FMT06,#TXT11A
      006606  012746  015437                                                         MOV     #TXT11A,-(SP)
      006612  012746  013530                                                         MOV     #FMT06,-(SP)
      006616  012746  000002                                                         MOV     #2,-(SP)
      006622  010600                                                                 MOV     SP,R0
      006624  104415                                                                 TRAP    C$PNTX
      006626  062706  000006                                                         ADD     #6,SP
      006632  010146                   MOV     R1,-(SP)        ;PRESERVE R1
      006634  013701  002254           MOV     GDATA,R1        ;POINTER TO EXPECTED DATA
      006640                           PRINTX  #FMT16,#TXT8A,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>
      006640  005046                                                                 CLR     -(SP)
      006642  152116                                                                 BISB    (R1)+,(SP)
      006644  005046                                                                 CLR     -(SP)
      006646  152116                                                                 BISB    (R1)+,(SP)
      006650  005046                                                                 CLR     -(SP)
      006652  152116                                                                 BISB    (R1)+,(SP)
      006654  012746  015336                                                         MOV     #TXT8A,-(SP)
      006660  012746  014007                                                         MOV     #FMT16,-(SP)
      006664  012746  000005                                                         MOV     #5,-(SP)
      006670  010600                                                                 MOV     SP,R0
      006672  104415                                                                 TRAP    C$PNTX
      006674  062706  000014                                                         ADD     #14,SP
      006700  013701  002256           MOV     BDATA,R1        ;POINTER TO ACTUAL DATA
      006704                           PRINTX  #FMT16,#TXT8B,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>
      006704  005046                                                                 CLR     -(SP)
      006706  152116                                                                 BISB    (R1)+,(SP)
      006710  005046                                                                 CLR     -(SP)
      006712  152116                                                                 BISB    (R1)+,(SP)
      006714  005046                                                                 CLR     -(SP)
      006716  152116                                                                 BISB    (R1)+,(SP)
      006720  012746  015353                                                         MOV     #TXT8B,-(SP)
      006724  012746  014007                                                         MOV     #FMT16,-(SP)
      006730  012746  000005                                                         MOV     #5,-(SP)
      006734  010600                                                                 MOV     SP,R0
      006736  104415                                                                 TRAP    C$PNTX
      006740  062706  000014                                                         ADD     #14,SP
      006744  004537  005064           JSR     R5,XORSW        ;GENERATE XOR'S
      006750  002254                   .WORD   GDATA           ;BETWEEN GOOD DATA
      006752  002256                   .WORD   BDATA           ;AND BAD DATA
      006754  003054                   .WORD   W0              ;AND PUT THEM HERE
      006756  000011                   .WORD   9.              ;ONLY DO THIS MANY
      006760                           PRINTX  #FMT16,#TXT8C,<B,W0>,<B,W1>,<B,W2>
      006760  005046                                                                 CLR     -(SP)
      006762  153716  003060                                                         BISB    W2,(SP)
      006766  005046                                                                 CLR     -(SP)
      006770  153716  003056                                                         BISB    W1,(SP)
      006774  005046                                                                 CLR     -(SP)
```

ERROR HANDLER -- ERR8 - NPR REGISTER ERRORS

```
        006776  153716  003054                                                  BISB    W0,(SP)
        007002  012746  015370                                                  MOV     #TXT8C,-(SP)
        007006  012746  014007                                                  MOV     #FMT16,-(SP)
        007012  012746  000005                                                  MOV     #5,-(SP)
        007016  010600                                                          MOV     SP,R0
        007020  104415                                                          TRAP    C$PNTX
        007022  062706  000014                                                  ADD     #14,SP
   3004
   3005                                         ;       PRINT SECOND SET OF REGISTERS: ADDRESS' OUT & IN
   3006
   3007 007026                                  PRINTX  #FMT06,#TXT11B
        007026  012746  015460                                                  MOV     #TXT11B,(SP)
        007032  012746  013530                                                  MOV     #FMT06,-(SP)
        007036  012746  000002                                                  MOV     #2,-(SP)
        007042  010600                                                          MOV     SP,R0
        007044  104415                                                          TRAP    C$PNTX
        007046  062706  000006                                                  ADD     #6,SP
   3008 007052  012701  002257                  MOV     #GDATA+3,R1     ;POINTER TO EXPECTED DATA
   3009 007056                                  PRINTX  #FMT16A,#TXT8A,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>
        007056  005046                                                          CLR      (SP)
        007060  152116                                                          BISB    (R1)+,(SP)
        007062  005046                                                          CLR     -(SP)
        007064  152116                                                          BISB    (R1)+,(SP)
        007066  005046                                                          CLR     -(SP)
        007070  152116                                                          BISB    (R1)+,(SP)
        007072  005046                                                          CLR     -(SP)
        007074  152116                                                          BISB    (R1)+,(SP)
        007076  005046                                                          CLR     -(SP)
        007100  152116                                                          BISB    (R1)+,(SP)
        007102  005046                                                          CLR     -(SP)
        007104  152116                                                          BISB    (R1)+,(SP)
        007106  012746  015336                                                  MOV     #TXT8A,-(SP)
        007112  012746  014032                                                  MOV     #FMT16A,-(SP)
        007116  012746  000010                                                  MOV     #10,-(SP)
        007122  010600                                                          MOV     SP,R0
        007124  104415                                                          TRAP    C$PNTX
        007126  062706  000022                                                  ADD     #22,SP
3010 007132  012701  002261                  MOV     #BDATA+3,R1     ;POINTER TO ACTUAL DATA
3011 007136                                  PRINTX  #FMT16A,#TXT8B,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>
        007136  005046                                                          CLR     -(SP)
        007140  152116                                                          BISB    (R1)+,(SP)
        007142  005046                                                          CLR     -(SP)
        007144  152116                                                          BISB    (R1)+,(SP)
        007146  005046                                                          CLR     -(SP)
        007150  152116                                                          BISB    (R1)+,(SP)
        007152  005046                                                          CLR     -(SP)
        007154  152116                                                          BISB    (R1)+,(SP)
        007156  005046                                                          CLR     -(SP)
        007160  152116                                                          BISB    (R1)+,(SP)
        007162  005046                                                          CLR      (SP)
        007164  152116                                                          BISB    (R1)+,(SP)
        007166  012746  015353                                                  MOV     #TXT8B,-(SP)
        007172  012746  014032                                                  MOV     #FMT16A,(SP)
        007176  012746  000010                                                  MOV     #10,(SP)
        007202  010600                                                          MOV     SP,R0
        007204  104415                                                          TRAP    C$PNTX
        007206  062706  000022                                                  ADD     #22,SP
```

```
007212  012701  003062                  MOV     #W3,R1          ;POINT TO REST OF XOR'S
007216                                  PRINTX  #FMT16A,#TXT8C,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>,<B,(R1)+>
007216  005046                                                                          CLR      (SP)
007220  152116                                                                          BISB    (R1)+,(SP)
007222  005046                                                                          CLR     -(SP)
007224  152116                                                                          BISB    (R1)+,(SP)
007226  005046                                                                          CLR      (SP)
007230  152116                                                                          BISB    (R1)+,(SP)
007232  005046                                                                          CLR      (SP)
007234  152116                                                                          BISB    (R1)+,(SP)
007236  005046                                                                          CLR     -(SP)
007240  152116                                                                          BISB    (R1)+,(SP)
007242  005046                                                                          CLR     -(SP)
007244  152116                                                                          BISB    (R1)+,(SP)
007246  012746  015370                                                                  MOV     #TXT8C, (SP)
007252  012746  014032                                                                  MOV     #FMT16A,-(SP)
007256  012746  000010                                                                  MOV     #10,-(SP)
007262  010600                                                                          MOV     SP,R0
007264  104415                                                                          TRAP    C$PNTX
007266  062706  000022                                                                  ADD     #22,SP
007272  004737  013076                  JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
007276                                  ENDMSG
007276                                                                          L10007:
007276  104423                                                                          TRAP    C$MSG
                              ;------------------------------------------------------------------------
                              .SBTTL  ERROR HANDLER -- ERR9 -- WORD NPR I/O ERRORS
                              ;------------------------------------------------------------------------
007300                                  BGNMSG  ERR9
007300                                                                          ERR9::
007300  004737  012614                  JSR     PC,ERR9.        ;USE COMMON "ERROR 9" ROUTINE
007304                                  ENDMSG
007304                                                                          L10010:
007304  104423                                                                          TRAP    C$MSG
                              ;------------------------------------------------------------------------
                              .SBTTL  ERROR HANDLER -- ERR10  - BYTE NPR I/O ERRORS
                              ;------------------------------------------------------------------------
007306                                  BGNMSG  ERR10
007306                                                                          ERR10::
007306  004737  012752                  JSR     PC,ERR10.       ;USE COMMON "ERROR 10" ROUTINE
007312                                  ENDMSG
007312                                                                          L10011:
007312  104423                                                                          TRAP    C$MSG
                              ;------------------------------------------------------------------------
                              .SBTTL  ERROR HANDLER    ERR11    NPR TIMEOUT ERRORS
                              ;------------------------------------------------------------------------
007314                                  BGNMSG  ERR11
007314                                                                          ERR11::
007314  023727  002412  000001          CMP     TMP0,#1         ;IF ONLY ONE TIMEOUT,
007322  001412                          BEQ     1$              ;NO NEED TO TELL HOW MANY OCCURED
007324                                  PRINTX  #FMT17C,TMP0    ;ELSE,  SAY HOW MANY WERE FOUND IN ALL
007324  013746  002412                                                                  MOV     TMP0,-(SP)
007330  012746  014307                                                                  MOV     #FMT17C, (SP)
007334  012746  000002                                                                  MOV     #2,-(SP)
007340  010600                                                                          MOV     SP,R0
007342  104415                                                                          TRAP    C$PNTX
007344  062706  000006                                                                  ADD     #6,SP
007350                        1$:       PRINTX  #FMT17,<B,TMP1> ;NPRCTL SENT
```

```
007350  005046                                                    CLR     -(SP)
007352  153716  002414                                            BISB    TMP1,(SP)
007356  012746  014074                                            MOV     #FMT17,-(SP)
007362  012746  000002                                            MOV     #2,-(SP)
007366  010600                                                    MOV     SP,R0
007370  104415                                                    TRAP    C$PNTX
007372  062706  000006                                            ADD     #6,SP
007376                  PRINTX  #FMT17A,<B,TMP2>  ;NPRCTL      READ
007376  005046                                                    CLR     -(SP)
007400  153716  002416                                            BISB    TMP2,(SP)
007404  012746  014153                                            MOV     #FMT17A,-(SP)
007410  012746  000002                                            MOV     #2,-(SP)
007414  010600                                                    MOV     SP,R0
007416  104415                                                    TRAP    C$PNTX
007420  062706  000006                                            ADD     #6,SP
007424                  PRINTX  #FMT17B,TMP3    ;LSI-11'S MEMORY ADDRESS
007424  013746  002420                                            MOV     TMP3,-(SP)
007430  012746  014234                                            MOV     #FMT17B,-(SP)
007434  012746  000002                                            MOV     #2,-(SP)
007440  010600                                                    MOV     SP,R0
007442  104415                                                    TRAP    C$PNTX
007444  062706  000006                                            ADD     #6,SP
007450  004737  013076  JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
007454                  ENDMSG
007454                                                    L10012:
007454  104423                                                    TRAP    C$MSG
                ;---------------------------------------------------------------------------
                .SBTTL  ERROR HANDLER -  ERR12  - NPR EXTENDED ADDRESSING ERROR HANDLER
                ;---------------------------------------------------------------------------
007456                  BGNMSG  ERR12
007456                                                    ERR12::
007456                  PRINTX  #FMT12          ;PRINT FIRST HEADING LINE
007456  012746  007672                                            MOV     #FMT12,-(SP)
007462  012746  000001                                            MOV     #1,-(SP)
007466  010600                                                    MOV     SP,R0
007470  104415                                                    TRAP    C$PNTX
007472  062706  000004                                            ADD     #4,SP
007476                  PRINTX  #FMT12A         ;PRINT SECOND HEADING LINE
007476  012746  007732                                            MOV     #FMT12A,-(SP)
007502  012746  000001                                            MOV     #1,-(SP)
007506  010600                                                    MOV     SP,R0
007510  104415                                                    TRAP    C$PNTX
007512  062706  000004                                            ADD     #4,SP
                                                ;PRINT ADDRESS, CONTROL, & EXPECTED DATA
007516  004737  012162  JSR     PC,XORGB        ;GENERATE EXCLUSIVE OR OF EXPECTED & READ DATA
007522                  PRINTX  #FMT12D,<B,TMPF+1>,#0,#0,<B,TMP2>,GDATA,BDATA,XDATA
007522  013746  002260                                            MOV     XDATA,-(SP)
007526  013746  002256                                            MOV     BDATA,-(SP)
007532  013746  002254                                            MOV     GDATA,-(SP)
007536  005046                                                    CLR     -(SP)
007540  153716  002416                                            BISB    TMP2,(SP)
007544  012746  000000                                            MOV     #0,-(SP)
007550  012746  000000                                            MOV     #0,-(SP)
007554  005046                                                    CLR     -(SP)
007556  153716  002451                                            BISB    TMPF+1,(SP)
007562  012746  010020                                            MOV     #FMT12D,-(SP)
007566  012746  000010                                            MOV     #10,-(SP)
```

```
ERROR HANDLER    ERR12  - NPR EXTENDED ADDRESSING ERROR HANDLE

        007572  010600                                                          MOV     SP,R0
        007574  104415                                                          TRAP    C$PNTX
        007576  062706  000022                                                  ADD     #22,SP
3049    007602  023737  002256  002420          CMP     BDATA,TMP3      ;DID WE READ THE BACKGROUND PATTERN?
3050    007610  001011                          BNE     4$              ;NO.
3051    007612                                  PRINTX  #FMT12E         ;YES, INDICATE WRONG PAGE READ
        007612  012746  010063                                                  MOV     #FMT12E,(SP)
        007616  012746  000001                                                  MOV     #1,(SP)
        007622  010600                                                          MOV     SP,R0
        007624  104415                                                          TRAP    C$PNTX
        007626  062706  000004                                                  ADD     #4,SP
3052    007632  000414                          BR      60$             ;       AND EXIT ERROR HANDLER
3053
3054    007634  023737  002256  002414  4$:     CMP     BDATA,TMP1      ;DID WE EVEN PERFORM A READ?
3055    007642  001010                          BNE     60$             ;YES, THEN WE CAN GIVE ANY FURTHER ERROR INFO.
3056    007644                                  PRINTX  #FMT12F         ;NO,  THEN WE CAN AT LEAST SAY THAT MUCH
        007644  012746  010145                                                  MOV     #FMT12F,(SP)
        007650  012746  000001                                                  MOV     #1,(SP)
        007654  010600                                                          MOV     SP,R0
        007656  104415                                                          TRAP    C$PNTX
        007660  062706  000004                                                  ADD     #4,SP
3057    007664  004737  013076          60$:    JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3058    007670                                  ENDMSG
        007670                                                          L10013:
        007670  104423                                                         TRAP    C$MSG
3059                                    .NLIST  BEX
3060    007672     045     116     045  FMT12:  .ASCIZ  /<NS13<ANPR REGISTERS<S14<ADATA/
3061    007732     045     116     045  FMT12A: .ASCIZ  /<NS11<AADDRESS   CONTROL   EXPECTED   READ     XOR<N/
3062    010020     045     116     045  FMT12D: .ASCIZ  /<NS8<03<S<03<S<03<S<03<S3<03<010<09<09/
3063    010063     045     116     045  FMT12E: .ASCIZ  /<NS7<A(NPR OPERATION ACCESSED WRONG MEMORY PAGE)/
3064    010145     045     116     045  FMT12F: .ASCIZ  /<NS2<A(NPR DATA REGISTER UN CHANGED FROM BEFORE REQUEST)/
3065                                    .LIST   BEX
3066                                    .EVEN
3067                                    ;
3068                                    .SBTTL  ERROR HANDLER    .ERR13     MM   ERROR HANDLER
3069                                    ;
3070    010240                          BGNMSG  ERR13
        010240                                                          ERR13::
3071    010240                          PRINTX  #FMT13A
        010240  012746  010546                                                  MOV     #FMT13A,(SP)
        010244  012746  000001                                                  MOV     #1,-(SP)
        010250  010600                                                          MOV     SP,R0
        010252  104415                                                          TRAP    C$PNTX
        010254  062706  000004                                                  ADD     #4,SP
3072    010260                          PRINTX  #FMT13B
        010260  012746  010611                                                  MOV     #FMT13B,(SP)
        010264  012746  000001                                                  MOV     #1,(SP)
        010270  010600                                                          MOV     SP,R0
        010272  104415                                                          TRAP    C$PNTX
        010274  062706  000004                                                  ADD     #4,SP
3073    010300                          PRINTX  #FMT13C
        010300  012746  010656                                                  MOV     #FMT13C,(SP)
        010304  012746  000001                                                  MOV     #1,(SP)
        010310  010600                                                          MOV     SP,R0
        010312  104415                                                          TRAP    C$PNTX
        010314  062706  000004                                                  ADD     #4,SP
3074    010320                          PRINTX  #FMT13D
```

```
        010320  012746  010721                                                  MOV     #FMT13D,-(SP)
        010324  012746  000001                                                  MOV     #1,-(SP)
        010330  010600                                                          MOV     SP,R0
        010332  104415                                                          TRAP    C$PNTX
        010334  062706  000004                                                  ADD     #4,SP
3075    010340                          PRINTX  #FMT11,TMP0,TMP1,TMP2,TMP3
        010340  013746  002420                                                  MOV     TMP3,-(SP)
        010344  013746  002416                                                  MOV     TMP2,(SP)
        010350  013746  002414                                                  MOV     TMP1,(SP)
        010354  013746  002412                                                  MOV     TMP0,(SP)
        010360  012746  013770                                                  MOV     #FMT11,(SP)
        010364  012746  000005                                                  MOV     #5,(SP)
        010370  010600                                                          MOV     SP,R0
        010372  104415                                                          TRAP    C$PNTX
        010374  062706  000014                                                  ADD     #14,SP
3076    010400                          PRINTX  #FMT13E,TMP4,TMP5,TMP6,TMP7
        010400  013746  002430                                                  MOV     TMP7,(SP)
        010404  013746  002426                                                  MOV     TMP6,(SP)
        010410  013746  002424                                                  MOV     TMP5,(SP)
        010414  013746  002422                                                  MOV     TMP4,(SP)
        010420  012746  010764                                                  MOV     #FMT13E,(SP)
        010424  012746  000005                                                  MOV     #5,(SP)
        010430  010600                                                          MOV     SP,R0
        010432  104415                                                          TRAP    C$PNTX
        010434  062706  000014                                                  ADD     #14,SP
3077    010440                          PRINTX  #FMT11,REG0,REG1,REG2,REG3
        010440  013746  002400                                                  MOV     REG3,(SP)
        010444  013746  002376                                                  MOV     REG2,(SP)
        010450  013746  002374                                                  MOV     REG1,(SP)
        010454  013746  002372                                                  MOV     REG0,-(SP)
        010460  012746  013770                                                  MOV     #FMT11,(SP)
        010464  012746  000005                                                  MOV     #5,(SP)
        010470  010600                                                          MOV     SP,R0
        010472  104415                                                          TRAP    C$PNTX
        010474  062706  000014                                                  ADD     #14,SP
3078    010500                          PRINTX  #FMT13E,REG4,REG5,REG6,REG7
        010500  013746  002410                                                  MOV     REG7,(SP)
        010504  013746  002406                                                  MOV     REG6,(SP)
        010510  013746  002404                                                  MOV     REG5,(SP)
        010514  013746  002402                                                  MOV     REG4,(SP)
        010520  012746  010764                                                  MOV     #FMT13E,(SP)
        010524  012746  000005                                                  MOV     #5,(SP)
        010530  010600                                                          MOV     SP,R0
        010532  104415                                                          TRAP    C$PNTX
        010534  062706  000014                                                  ADD     #14,SP
3079    010540  004737  013076          JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3080    010544                          ENDMSG
        010544                                                          L10014:
        010544  104423                                                          TRAP    C$MSG
3081                            .NLIST  BEX
3082    010546     045     116  045  FMT13A: .ASCIZ  /%N%A   SR0     SR1     SR2     SR3/
3083    010611     045     101  040  FMT13B: .ASCIZ  /%A     KPAR6   KPDP6   V ADDR  DATA?
3084    010656     045     116  045  FMT13C: .ASCIZ  /%N%A    R0      R1      R2      R3
3085    010721     045     101  040  FMT13D: .ASCIZ  /%A     R4      R5      SP      PC/
3086    010764     045     117  070  FMT13E: .ASCIZ  /%O8%O8%O8%O8/
3087                            .LIST   BEX
3088                            .EVEN
```

```
                        ;
                        .SBTTL  ERROR HANDLER    ERR14 -- NPR REGISTER LOAD ERROR HANDLER
                        ;
                        BGNMSG  ERR14
                                                                        ERR14::
011002  010146                  MOV     R1,-(SP)        ;SAVE GENERAL REGISTER
011004  013701  002300          MOV     REGNUM,R1
011010  006301                  ASL     R1              ;CONVERT REG # TO WORD INDEX
011012                          PRINTB  #FMT07,#TXTNP,TXTNPT(R1)
011012  016146  021770                                                  MOV     TXTNPT(R1),-(SP)
011016  012746  015745                                                  MOV     #TXTNP,(SP)
011022  012746  013476                                                  MOV     #FMT07,(SP)
011026  012746  000003                                                  MOV     #3,(SP)
011032  010600                                                          MOV     SP,R0
011034  104414                                                          TRAP    C$PNTB
011036  062706  000010                                                  ADD     #10,SP
011042  004737  012162          JSR     PC,XORGB
                                                ;DATA: GOOD, BAD, & XOR
011046  023727  002300  000006  CMP     REGNUM,#6       ;IF EXTENDED ADDRESS BYTE, USE BYTE PRINT
011054  001423                  BEQ     5$
011056  023727  002300  000003  CMP     REGNUM,#3
011064  001417                  BEQ     5$
                                                ;ELSE, USE WORD PRINTS
011066                          PRINTX  #FMT10,GDATA,BDATA,XDATA
011066  013746  002260                                                  MOV     XDATA,(SP)
011072  013746  002256                                                  MOV     BDATA,(SP)
011076  013746  002254                                                  MOV     GDATA,(SP)
011102  012746  013714                                                  MOV     #FMT10,(SP)
011106  012746  000004                                                  MOV     #4,(SP)
011112  010600                                                          MOV     SP,R0
011114  104415                                                          TRAP    C$PNTX
011116  062706  000012                                                  ADD     #12,SP
011122  000421          BR      10$             ;BYPASS BYTE PRINTS IF WORD PRINTS USED
                        ;
011124                  5$:     PRINTX  #FMT02A,<B,GDATA>,<B,BDATA>,<B,XDATA>
011124  005046                                                          CLR     -(SP)
011126  153716  002260                                                  BISB    XDATA,(SP)
011132  005046                                                          CLR     -(SP)
011134  153716  002256                                                  BISB    BDATA,(SP)
011140  005046                                                          CLR     -(SP)
011142  153716  002254                                                  BISB    GDATA,(SP)
011146  012746  013127                                                  MOV     #FMT02A,(SP)
011152  012746  000004                                                  MOV     #4,-(SP)
011156  010600                                                          MOV     SP,R0
011160  104415                                                          TRAP    C$PNTX
011162  062706  000012                                                  ADD     #12,SP
011166  004737  013076          10$:    JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
011172  012601                  MOV     (SP)+,R1        ;RESTORE GENERAL REGISTER
011174                          ENDMSG
011174                                                                  L10015:
011174  104423                                                          TRAP    C$MSG
                        ;
                        ;
                        .SBTTL  ERROR HANDLER -  ERR51    FOR REPORTING TIMER # 2 ERRORS
                        ;
                        BGNMSG  ERR51
011176                                                                  ERR51::
```

```
ERROR HANDLER -- ERR51 -- FOR REPORTING TIMER # 2 ERROR

 3116 011176  010146                    MOV     R1,-(SP)        ;SAVE R1 FOR CALLER
 3117 011200  113701  002441             MOVB    TMPB+1,R1       ;GET THE MODE LAST SETUP
 3118 011204  000241                     CLC                     ;SEEING AS THE CARRY BIT WILL BE ROTATED INTO
 3119                                                             ;THE DATA, WE HAD BETTER CLEAR IT JUST IN CASE.
 3120 011206  042701  177737             BIC     #^C<BIT5>,R1    ;LOOK @ JUST THE TIMER 2 MODE DEFINITION
 3121 011212  106101                     ROLB    R1              ;POSITION IT FOR PRINTOUT
 3122 011214  106101                     ROLB    R1
 3123 011216  106101                     ROLB    R1
 3124 011220  106101                     ROLB    R1
 3125
 3126                                    ;IDENTIFY THE MODE BEING USED AT THE TIME, AND THE VALUES THAT WERE
 3127                                    ;LOADED INTO THE LATCHES:
 3128
 3129 011222                            PRINTX  #FMT51A,R1,<B,TMP9+1>,<B,TMP8+1>
      011222  005046                                                                    CLR     (SP)
      011224  153716  002433                                                           BISB    TMP8+1,(SP)
      011230  005046                                                                    CLR     -(SP)
      011232  153716  002435                                                           BISB    TMP9+1,(SP)
      011236  010146                                                                    MOV     R1, (SP)
      011240  012746  014673                                                           MOV     #FMT51A,-(SP)
      011244  012746  000004                                                           MOV     #4,-(SP)
      011250  010600                                                                    MOV     SP,R0
      011252  104415                                                                    TRAP    C$PNTX
      011254  062706  000012                                                           ADD     #12,SP
 3130 011260  004737  013076             JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
 3131 011264  012601                     MOV     (SP)+,R1        ;RESTORE R1 FOR CALLER
 3132 011266                            ENDMSG
      011266                                                                  L10016:
      011266  104423                                                                   TRAP    C$MSG
 3133
 3134                                   .SBTTL  ERROR HANDLER -- ERR52 -- PROCESS SHIFT REGISTER ERROR MESSAGES
 3135
 3136 011270                            BGNMSG  ERR52
      011270                                                                  ERR52::
 3137 011270  004537  003616             JSR     R5,READ         ;GET CURRENT VALUES WITHIN ACR & PCR
 3138 011274  120013                     ACR
 3139 011276  002440                     TMPB
 3140 011300  004537  003616             JSR     R5,READ
 3141 011304  120014                     PCR
 3142 011306  002442                     TMPC
 3143 011310                            PRINTX  #FMT52H
      011310  012746  011514                                                           MOV     #FMT52H, (SP)
      011314  012746  000001                                                           MOV     #1,-(SP)
      011320  010600                                                                    MOV     SP,R0
      011322  104415                                                                    TRAP    C$PNTX
      011324  062706  000004                                                           ADD     #4,SP
 3144 011330                            PRINTX  #FMT52A,#TXT8D,<B,TMPA+1>,<B,TMPB+1>,<B,TMPE+1>
      011330  005046                                                                    CLR     -(SP)
      011332  153716  002447                                                           BISB    TMPE+1,(SP)
      011336  005046                                                                    CLR     (SP)
      011340  153716  002441                                                           BISB    TMPB+1,(SP)
      011344  005046                                                                    CLR     -(SP)
      011346  153716  002437                                                           BISB    TMPA+1,(SP)
      011352  012746  015405                                                           MOV     #TXT8D,-(SP)
      011356  012746  011557                                                           MOV     #FMT52A,-(SP)
      011362  012746  000005                                                           MOV     #5, (SP)
      011366  010600                                                                    MOV     SP,R0
```

```
011370  104415                                                                    TRAP    C$PNTX
011372  062706  000014                                                            ADD     #14,SP
011376                                  PRINTX  #FMT52B,#TXT8E,<B,TMPA>,<B,TMPB>,<B,TMPC>,<B,TMPD>,<B,TMPE>
011376  005046                                                                    CLR     -(SP)
011400  153716  002446                                                            BISB    TMPE,(SP)
011404  005046                                                                    CLR     -(SP)
011406  153716  002444                                                            BISB    TMPD,(SP)
011412  005046                                                                    CLR     -(SP)
011414  153716  002442                                                            BISB    TMPC,(SP)
011420  005046                                                                    CLR     -(SP)
011422  153716  002440                                                            BISB    TMPB,(SP)
011426  005046                                                                    CLR     -(SP)
011430  153716  002436                                                            BISB    TMPA,(SP)
011434  012746  015422                                                            MOV     #TXT8E,-(SP)
011440  012746  011607                                                            MOV     #FMT52B,-(SP)
011444  012746  000007                                                            MOV     #7,-(SP)
011450  010600                                                                    MOV     SP,R0
011452  104415                                                                    TRAP    C$PNTX
011454  062706  000020                                                            ADD     #20,SP
011460  005737  002252                  TST     TDATA           ;HAS "SR" BEEN WRITTEN YET?
011464  001010                          BNE     10$             ;NO,  THEN JUST FINISH ERROR MESSAGE
011466                                  PRINTX  #FMT52C         ;YES, ADD THAT INFORMATION TO MESSAGE
011466  012746  011652                                                            MOV     #FMT52C,-(SP)
011472  012746  000001                                                            MOV     #1,-(SP)
011476  010600                                                                    MOV     SP,R0
011500  104415                                                                    TRAP    C$PNTX
011502  062706  000004                                                            ADD     #4,SP
011506  004737  013076          10$:    JSR     PC,NULERR       ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
011512                                  ENDMSG
011512                                                                  L10017:
011512  104423                                                                    TRAP    C$MSG

                                .NLIST  BEX
011514     045     116     045  FMT52H: .ASCIZ  /#N#S14#ASR   ACR   PCR   IFR   IER/
011557     045     116     045  FMT52A: .ASCIZ  /#N#S1#T#03#S3#03#S15#03/
011607     045     116     045  FMT52B: .ASCIZ  /#N#S1#T#03#S3#03#S3#03#S3#03#S3#03/
011652     045     116     045  FMT52C: .ASCIZ  /#N#S10#A(SR HASN'T BEEN LOADED YET!)/
                                .LIST   BEX
                                .EVEN
                                ;       SR ERROR FORMATS:
                                ;
                                ;         SR   ACR   PCR   IFR   IER
                                ; LOADED XXX   XXX          -    XXX
                                ; READ   XXX   XXX   XXX   XXX   XXX
                                ; .
                                ; - --- -- ---  -   -  - --      -     - - --  -  -          -


                                ;- -- ---  ------ -         - ---  - -- - ---  ----- - --------- -----
                                .SBTTL  ERROR HANDLER    ERR60 -- NPR WRITE EXTENDED BIT ERRORS
                                ; - -       -  ---- - -- -  -   -     - -     ---- -    -
011720                                  BGNMSG  ERR60
011720                                                                  ERR60::
011720                                  PRINTX  #FMT60
011720  012746  012034                                                            MOV     #FMT60,-(SP)
011724  012746  000001                                                            MOV     #1,-(SP)
011730  010600                                                                    MOV     SP,R0
011732  104415                                                                    TRAP    C$PNTX
```

ERROR HANDLER - ERR60 - NPR WRITE EXTENDED BIT ERRORS

```
                011734  062706  000004                                                          ADD     #4,SP
3172            011740                          PRINTX  #FMT61
                011740  012746  012073                                                          MOV     #FMT61,-(SP)
                011744  012746  000001                                                          MOV     #1, (SP)
                011750  010600                                                                  MOV     SP,R0
                011752  104415                                                                  TRAP    C$PNTX
                011754  062706  000004                                                          ADD     #4,SP
3173            011760  005003                          CLR     R3              ;CLEAR INDEX
3174            011762                  10$:    PRINTX  #FMT62,XLOC0(R3),XVAL0(R3),RXVAL0(R3)
                011762  016346  032516                                                          MOV     RXVAL0(R3),-(SP)
                011766  016346  032500                                                          MOV     XVAL0(R3),-(SP)
                011772  016346  032462                                                          MOV     XLOC0(R3),-(SP)
                011776  012746  012134                                                          MOV     #FMT62,-(SP)
                012002  012746  000004                                                          MOV     #4,-(SP)
                012006  010600                                                                  MOV     SP,R0
                012010  104415                                                                  TRAP    C$PNTX
                012012  062706  000012                                                          ADD     #12,SP
3175            012016  005723                          TST     (R3)+           ;BUMP INDEX
3176            012020  020327  000016                  CMP     R3,#14.
3177            012024  001356                          BNE     10$
3178            012026  004737  013076                  JSR     PC,NULERR
3179            012032                          ENDMSG
                012032                                                                  L10020:
                012032  104423                                                                  TRAP    C$MSG
3180                                    .NLIST  BEX
3181            012034      045     116     045 FMT60:  .ASCIZ /%N%S3%AXLOC%S6%AXVAL%S6%ARXVAL/
3182            012073      045     116     045 FMT61:  .ASCIZ /%N%S3%A----%S6%A----%S6%A--- -%N/
3183            012134      045     116     045 FMT62:  .ASCIZ /%N%S2%06%S4%06%S4%06/
3184                                    .LIST   BEX
3185                                    .EVEN
```

```
                                .SBTTL  ERROR HANDLER SUBROUTINES

                                ;       --------------------------------------------
                                ;               SUBROUTINES USED ONLY BY ERROR HANDLERS
                                ;       --------------------------------------------

                                .SBTTL          ERROR HANDLER SUBROUTINE    XORGB

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

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

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

012206                          ERR4$:  PRINTX  #FMT4,#TXT3,#TXT1
012206  012746  014761                                                          MOV     #TXT1,-(SP)
012212  012746  015162                                                          MOV     #TXT3,-(SP)
012216  012746  013213                                                          MOV     #FMT4,-(SP)
012222  012746  000003                                                          MOV     #3,-(SP)
012226  010600                                                                  MOV     SP,R0
012230  104415                                                                  TRAP    C$PNTX
012232  062706  000010                                                          ADD     #10,SP
012236                                  PRINTX  #FMT4A,<B,BSR0>,<B,BSR1>,<B,BSR2>,<B,BSR3>
012236  005046                                                                  CLR     -(SP)
012240  153716  002220                                                          BISB    BSR3,(SP)
012244  005046                                                                  CLR     -(SP)
012246  153716  002216                                                          BISB    BSR2,(SP)
012252  005046                                                                  CLR     -(SP)
012254  153716  002214                                                          BISB    BSR1,(SP)
012260  005046                                                                  CLR     -(SP)
012262  153716  002212                                                          BISB    BSR0,(SP)
012266  012746  013253                                                          MOV     #FMT4A,-(SP)
012272  012746  000005                                                          MOV     #5,-(SP)
012276  010600                                                                  MOV     SP,R0
012300  104415                                                                  TRAP    C$PNTX
012302  062706  000014                                                          ADD     #14,SP
012306                                  PRINTX  #FMT4B,#TXT2
012306  012746  015017                                                          MOV     #TXT2,-(SP)
012312  012746  013306                                                          MOV     #FMT4B,-(SP)
012316  012746  000002                                                          MOV     #2,-(SP)
012322  010600                                                                  MOV     SP,R0
012324  104415                                                                  TRAP    C$PNTX
012326  062706  000006                                                          ADD     #6,SP
012332                                  PRINTX  #FMT4C,<B,BSR4>,<B,BSR5>,<B,BSR6>,<B,BSR7>
012332  005046                                                                  CLR     -(SP)
012334  153716  002230                                                          BISB    BSR7,(SP)
012340  005046                                                                  CLR     -(SP)
012342  153716  002226                                                          BISB    BSR6,(SP)
```

```
        012346  005046                                                          CLR     -(SP)
        012350  153716  002224                                                  BISB    BSR5,(SP)
        012354  005046                                                          CLR     -(SP)
        012356  153716  002222                                                  BISB    BSR4,(SP)
        012362  012746  013313                                                  MOV     #FMT4C,-(SP)
        012366  012746  000005                                                  MOV     #5,-(SP)
        012372  010600                                                          MOV     SP,R0
        012374  104415                                                          TRAP    C$PNTX
        012376  062706  000014                                                  ADD     #14,SP
3214    012402                          PRINTX  #FMT4B,#TXT2A
        012402  012746  015061                                                  MOV     #TXT2A,-(SP)
        012406  012746  013306                                                  MOV     #FMT4B,-(SP)
        012412  012746  000002                                                  MOV     #2,-(SP)
        012416  010600                                                          MOV     SP,R0
        012420  104415                                                          TRAP    C$PNTX
        012422  062706  000006                                                  ADD     #6,SP
3215    012426                          PRINTX  #FMT4A,<B,BSR10>,<B,BSR11>,<B,BSR12>,<B,BSR13>
        012426  005046                                                          CLR     -(SP)
        012430  153716  002240                                                  BISB    BSR13,(SP)
        012434  005046                                                          CLR     (SP)
        012436  153716  002236                                                  BISB    BSR12,(SP)
        012442  005046                                                          CLR     (SP)
        012444  153716  002234                                                  BISB    BSR11,(SP)
        012450  005046                                                          CLR     -(SP)
        012452  153716  002232                                                  BISB    BSR10,(SP)
        012456  012746  013253                                                  MOV     #FMT4A,-(SP)
        012462  012746  000005                                                  MOV     #5,(SP)
        012466  010600                                                          MOV     SP,R0
        012470  104415                                                          TRAP    C$PNTX
        012472  062706  000014                                                  ADD     #14,SP
3216    012476                          PRINTX  #FMT4B,#TXT2B
        012476  012746  015120                                                  MOV     #TXT2B,(SP)
        012502  012746  013306                                                  MOV     #FMT4B,(SP)
        012506  012746  000002                                                  MOV     #2,-(SP)
        012512  010600                                                          MOV     SP,R0
        012514  104415                                                          TRAP    C$PNTX
        012516  062706  000006                                                  ADD     #6,SP
3217    012522                          PRINTX  #FMT4C,<B,BSR14>,<B,BSR15>,<B,BSR16>,<B,BSR17>
        012522  005046                                                          CLR     -(SP)
        012524  153716  002250                                                  BISB    BSR17,(SP)
        012530  005046                                                          CLR     -(SP)
        012532  153716  002246                                                  BISB    BSR16,(SP)
        012536  005046                                                          CLR     -(SP)
        012540  153716  002244                                                  BISB    BSR15,(SP)
        012544  005046                                                          CLR     -(SP)
        012546  153716  002242                                                  BISB    BSR14,(SP)
        012552  012746  013313                                                  MOV     #FMT4C,(SP)
        012556  012746  000005                                                  MOV     #5,-(SP)
        012562  010600                                                          MOV     SP,R0
        012564  104415                                                          TRAP    C$PNTX
        012566  062706  000014                                                  ADD     #14,SP
3218    012572  000207                  RTS     PC
3219
3220                            ;
3221                            .SBTTL          ERROR HANDLER SUBROUTINE    ERR9$ & ERR9.
3222                            ;
3223                            ;       COMMON ERROR 9 ROUTINE TO IDENTIFY THE FAILING ADDRESS & DATA
```

```
     012574                         ERR9$:  PRINTX  #NEWLIN         ;WHEN CALLED FROM TEST, START A NEW LINE
     012574  012746  013124                                                         MOV     #NEWLIN,-(SP)
     012600  012746  000001                                                         MOV     #1,-(SP)
     012604  010600                                                                 MOV     SP,R0
     012606  104415                                                                 TRAP    C$PNTX
     012610  062706  000004                                                         ADD     #4,SP
     012614  005237  002300         ERR9.:  INC     REGNUM          ;CONVERT INDEX TO ELEMENT #
     012620                                 PRINTX  #FMT09,REGNUM   ;IDENTIFY DATA PATTERN OFFSET
     012620  013746  002300                                                         MOV     REGNUM,-(SP)
     012624  012746  013621                                                         MOV     #FMT09,-(SP)
     012630  012746  000002                                                         MOV     #2,-(SP)
     012634  010600                                                                 MOV     SP,R0
     012636  104415                                                                 TRAP    C$PNTX
     012640  062706  000006                                                         ADD     #6,SP
     012644  004737  012162                 JSR     PC,XORGB
     012650                                 PRINTX  #FMT10,GDATA,BDATA,XDATA  ;DATA: GOOD, BAD, & XOR
     012650  013746  002260                                                         MOV     XDATA,-(SP)
     012654  013746  002256                                                         MOV     BDATA,-(SP)
     012660  013746  002254                                                         MOV     GDATA,-(SP)
     012664  012746  013714                                                         MOV     #FMT10,-(SP)
     012670  012746  000004                                                         MOV     #4,-(SP)
     012674  010600                                                                 MOV     SP,R0
     012676  104415                                                                 TRAP    C$PNTX
     012700  062706  000012                                                         ADD     #12,SP
     012704                                 PRINTX  #FMT09A,TDATA   ;LSI ADDRESS
     012704  013746  002252                                                         MOV     TDATA,-(SP)
     012710  012746  013673                                                         MOV     #FMT09A,-(SP)
     012714  012746  000002                                                         MOV     #2,-(SP)
     012720  010600                                                                 MOV     SP,R0
     012722  104415                                                                 TRAP    C$PNTX
     012724  062706  000006                                                         ADD     #6,SP
     012730  000207                         RTS     PC

                                    ;-------------------------------------------------------------------------------
                                    .SBTTL          ERROR HANDLER SUBROUTINE  - ERR10$ & ERR10.
                                    ;-------------------------------------------------------------------------------
                                    ;       COMMON ERROR 10 ROUTINE TO IDENTIFY THE FAILING ADDRESS & DATA

     012732                         ERR10$: PRINTX  #NEWLIN         ;WHEN CALLED FROM TEST, START A NEW LINE
     012732  012746  013124                                                         MOV     #NEWLIN,-(SP)
     012736  012746  000001                                                         MOV     #1,-(SP)
     012742  010600                                                                 MOV     SP,R0
     012744  104415                                                                 TRAP    C$PNTX
     012746  062706  000004                                                         ADD     #4,SP
     012752  005237  002300         ERR10.: INC     REGNUM          ;CONVERT INDEX TO ELEMENT #
     012756                                 PRINTX  #FMT09,REGNUM   ;IDENTIFY DATA PATTERN OFFSET
     012756  013746  002300                                                         MOV     REGNUM,-(SP)
     012762  012746  013621                                                         MOV     #FMT09,-(SP)
     012766  012746  000002                                                         MOV     #2,-(SP)
     012772  010600                                                                 MOV     SP,R0
     012774  104415                                                                 TRAP    C$PNTX
     012776  062706  000006                                                         ADD     #6,SP
     013002  004737  012162                 JSR     PC,XORGB
     013006                                 PRINTX  #FMT02A,<B,GDATA>,<B,BDATA>,<B,XDATA>  ;DATA: GOOD, BAD, & XOR
     013006  005046                                                                 CLR     -(SP)
     013010  153716  002260                                                         BISB    XDATA,(SP)
```

ERROR HANDLER SUBROUTINE - ERR10$ & ERR10.

```
        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$PNTX
        013044  062706  000012                                                  ADD     #12,SP
3243    013050                          PRINTX  #FMT09A,TDATA   ;LSI ADDRESS
        013050  013746  002252                                                  MOV     TDATA,(SP)
        013054  012746  013673                                                  MOV     #FMT09A,(SP)
        013060  012746  000002                                                  MOV     #2,(SP)
        013064  010600                                                          MOV     SP,R0
        013066  104415                                                          TRAP    C$PNTX
        013070  062706  000006                                                  ADD     #6,SP
3244    013074  000207                  RTS     PC
3245
3246                            ;-------------------------------
3247                            .SBTTL          SUBROUTINE TO PERFORM "PRINTB   #ENDEMB
3248                            ;-------------------------------
3249
3250    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
3251    013116  000207                  RTS     PC
3252
```

```
                                        .SBTTL  FORMAT SPEC'S FOR ERROR HANDLERS -  "FMT  _"
                                        ;- -- ------ ----------------------------- -----    ---- -         ---- --
                                        ;-  -  - ----- FORMAT SPEC'S USED BY ERROR HANDLERS - -- -- -   --     - -
                                        ;- ------- - --------- -- -------------- - -    --  --  -   - -- -
                                        .NLIST  BEX
013120     045     116     062  ENDEMB: .ASCIZ  /%N2/
013124     045     116     000  NEWLIN: .ASCIZ  /%N/

013127     045     116     045  FMT02A: .ASCIZ  /%N%A  EXPECTED:  %03%A   ACTUAL:  %03%A   XOR:  %03/
013213     045     116     045  FMT4:   .ASCIZ  /%N%A  THE CONTENTS OF ALL%T%N%T/
013253     045     116     045  FMT4A:  .ASCIZ  /%N%S1%03%S5%03%S5%03%S5%03/
013306     045     116     045  FMT4B:  .ASCIZ  /%N%T/
013313     045     116     045  FMT4C:  .ASCIZ  /%N%S5%03%S5%03%S5%03%S5%03/
013346     045     116     045  FMT5:   .ASCIZ  /%N%A  WHEN %03%A LOADED INTO BSEL1/
013411     045     116     045  FMT5A:  .ASCIZ  /%N%A  ATTEMPTING "M-LOOP" FUNCTION CODE %02%A (%T%A)/
013476     045     101     040  FMT07:  .ASCIZ  /%A  DETECTED IN %T%T%A --/
013530     045     116     062  FMT06:  .ASCIZ  /%N2%S13%T/
013542     045     116     062  FMT06A: .ASCIZ  /%N2%A  N  P  R      R  E  G  I  S  T  E  R  S:/
013621     045     101     040  FMT09:  .ASCIZ  /%A  DETECTED @ TEST PATTERN ELEMENT # %D2/
013673     045     101     040  FMT09A: .ASCIZ  /%A  LSI ADDR:%08/

013714     045     116     045  FMT10:  .ASCIZ  /%N%A  EXPECTED:%08%A  ACTUAL:%08%A  XOR:%08/
013770     045     116     045  FMT11:  .ASCIZ  /%N%08%08%08%08/
014007     045     116     045  FMT16:  .ASCIZ  /%N%T%03%S4%03%S%03/
014032     045     116     045  FMT16A: .ASCIZ  /%N%T%03%S%03%S%03%S4%03%S%03%S%03/
014074     045     101     040  FMT17:  .ASCIZ  /%A     VALUE SENT TO NPR CONTROL REGISTER:  %03/
014153     045     116     045  FMT17A: .ASCIZ  /%N%A     VALUE READ FROM CONTROL REGISTER:     %03/
014234     045     116     045  FMT17B: .ASCIZ  /%N%A     LSI-11 MEMORY ADDRESS ACCESSED:%08/
014307     045     116     045  FMT17C: .ASCIZ  /%N%A  INFORMATION ON THE FIRST OF %D5%A ERRORS:/
014367     045     116     045  FMT50A: .ASCIZ  /%N%A  TIMER # 1 MODE:  %01%A   REGISTERS:/
014441     045     116     045  FMT50B: .ASCIZ  /%N%S15%AT1CH  T1CL  T1LH  T1LL   ACR   IFR   IER/
014522     045     116     045  FMT50C: .ASCIZ  /%N%S3%T%S1%03%S3%03%S3%03%S3%03/
014562     045     123     063  FMT50D: .ASCIZ  /%S3%03%S9%03/
014577     045     123     063  FMT50E: .ASCIZ  /%S3%03%S3%03/
014614     045     116     062  FMT50M: .ASCIZ  /%N2%S10%A(T1CH & T1CL HAVEN'T YET BEEN LOADED)/
014673     045     116     045  FMT51A: .ASCIZ  /%N%A  TIMER # 2 MODE:  %01%A   T2CH & T2LL:  %03%[illegible]%03/

                                        .SBTTL  TEXT STRINGS FOR ERROR HANDLERS -  "TXT __"
                                        ;--------------- ---- -   - --- --   - --------------- -- ---    -  -
                                        ;-------- ---- TEXT USED BY ERROR HANDLERS -------- -- --   ---- - -
                                        ;--- -------------- --- - ---------- ---------- --------  ---- ---- -----

014761     102     123     105  TXT1:   .ASCIZ  /BSEL0   BSEL1   BSEL2   BSEL3/
015017     040     040     040  TXT2:   .ASCIZ  /     BSEL4   BSEL5   BSEL6   BSEL7/
015061     102     123     105  TXT2A:  .ASCIZ  /BSEL10  BSEL11  BSEL12  BSEL13/
015120     040     040     040  TXT2B:  .ASCIZ  /   BSEL14  BSEL15  BSEL16  BSEL17/
015162     040     102     131  TXT3:   .ASCIZ  / BYTE SELECT REG'S ARE:/
015212     040     040     040  TXT4:   .ASCIZ  /    SEL0     SEL2     SEL4     SEL6/
015252     040     040     040  TXT4A:  .ASCIZ  /    SEL10    SEL12    SEL14    SEL16/
015313     040     123     105  TXT6:   .ASCIZ  / SELECT REG'S ARE:/
015336     040     105     130  TXT8A:  .ASCIZ  / EXPECTED:  /
015353     040     101     103  TXT8B:  .ASCIZ  / ACTUAL:    /
015370     040     130     117  TXT8C:  .ASCIZ  / XOR:       /
015405     040     114     117  TXT8D:  .ASCIZ  / LOADED:    /
015422     040     122     105  TXT8E:  .ASCIZ  / READ:      /

015437     103     117     116  TXT11A: .ASCIZ  /CONTROL  D A T A/
```

TEXT STRINGS FOR ERROR HANDLERS "TXT _"

```
3311 015460  040  040  040  TXT11B: .ASCIZ  /   OUT ADDR.      IN ADDR./
3312 015513  021  000       TXTNUL: .BYTE   21,0                    ;CTL Q -  THIS (WE HOPE) IS HARMLESS
3313
3314 015515  116  117  120  TXTML0: .ASCIZ  /NOP/
3315 015521  122  105  101  TXTML1: .ASCIZ  /READ 1 BYTE/
3316 015535  127  122  111  TXTML2: .ASCIZ  /WRITE 1 BYTE/
3317 015552  116  120  122  TXTML3: .ASCIZ  /NPR-OUT 256 BYTES/
3318 015574  116  120  122  TXTML4: .ASCIZ  /NPR-IN 256 BYTES/
3319 015615  123  105  124  TXTML5: .ASCIZ  /SET MICROPROCESSOR'S PC/
3320 015645  125  116  104  TXTML6: .ASCIZ  /UNDEFINED/
3321 015657  015  012  123  TXTML7: .ASCIZ  <15><12>/SET MAINT INTERRUPT & CLR INT DISABLE IN CPU STATUS/
3322
3323 015745  116  120  122  TXTNP:  .ASCIZ  /NPR /
3324 015752  103  117  116  TXTNP0: .ASCIZ  /CONTROL/
3325 015762  104  101  124  TXTNP1: .ASCIZ  /DATA HI/
3326 015772  104  101  124  TXTNP2: .ASCIZ  /DATA LO/
3327 016002  101  104  104  TXTNP3: .ASCIZ  /ADDR. OUT EX/
3328 016017  101  104  104  TXTNP4: .ASCIZ  /ADDR. OUT HI/
3329 016034  101  104  104  TXTNP5: .ASCIZ  /ADDR. OUT LO/
3330 016051  101  104  104  TXTNP6: .ASCIZ  /ADDR. IN EX/
3331 016065  101  104  104  TXTNP7: .ASCIZ  /ADDR. IN HI/
3332 016101  101  104  104  TXTNP8: .ASCIZ  /ADDR. IN LO/
```

```
                                 .SBTTL  ERROR MESSAGES -- "EM    "
                                 ; ----------------------------------------------------------------
                                 ;          -- ERROR MESSAGES USED BY ERROR CALLS
                                 ;   ----------------------------------------------------------
       
016115   125   055   104  EM3:    .ASCIZ  /U-DIAG. FAILURE/
016135   115   122   104  EM4:    .ASCIZ  /MRDY TIMEOUT/
016152   116   120   122  EM26:   .ASCIZ  /NPR LOGIC M-CLEAR FAILURE/
016204   102   101   104  EM26A:  .ASCIZ  /BAD NPR REG. LOAD/
016226   127   117   122  EM26B:  .ASCIZ  /WORD NPR-OUT ERROR/
016251   102   131   124  EM26C:  .ASCIZ  /BYTE NPR-OUT ERROR/
016274   127   117   122  EM26D:  .ASCIZ  /WORD NPR-IN ERROR/
016316   116   120   122  EM26E:  .ASCIZ  /NPR TIMEOUT -  "ABORT" SET/
016351   116   120   122  EM26F:  .ASCIZ  \NPR BS7 FAILURE ON WRITE\
016402   116   120   122  EM26G:  .ASCIZ  /NPR-ABORT FAILURE/
016424   115   115   125  EM27:   .ASCIZ  /MMU ABORT!/
016437   130   055   101  EM27A:  .ASCIZ  /X-ADDR. NPR ABORT/
016461   130   055   101  EM27B:  .ASCIZ  /X-ADDR. NPR HUNG/
016502   130   055   101  EM27C:  .ASCIZ  /X-ADDR. NPR FAILURE/
016526   042   101   042  EM34:   .ASCIZ  /"A" INT.?/
016540   042   102   042  EM34B:  .ASCIZ  /"B" INT.?/
016552   115   111   123  EM35:   .ASCIZ  /MISSING "A" INT./
016573   115   111   123  EM35B:  .ASCIZ  /MISSING "B" INT./
016614   104   115   126  EM40:   .ASCIZ  /DMV INIT'D BY "BINIT" WITH "DISABL INIT" SET/
016671   042   115   101  EM41:   .ASCIZ  /"MASTER RESET" FAILED WHEN "DISABL INIT" SET/
016746   116   117   040  EM42A:  .ASCIZ  /NO "POWER UP" VECTOR ON "DCOK" GOING HIGH/
017020   116   117   040  EM42B:  .ASCIZ  /NO INIT ON "DCOK" LOW & "DISABL INIT" CLEAR/
017074   111   116   126  EM42C:  .ASCIZ  /INVALID INIT ON "DCOK" LOW & "DISABL INIT" SET/
017153   104   115   126  EM43A:  .ASCIZ  \DMV MICRO-CODE HUNG\
017177   042   110   101  EM43B:  .ASCIZ  /"HALT" FAILED/
017215   116   117   040  EM43C:  .ASCIZ  /NO POWER-UP SEQUENCE/
017242   042   115   117  EM43D:  .ASCIZ  /"MOP-BOOT" LOAD FAILED/
017271   042   124   061  EM50A:  .ASCIZ  \"T1" FLAG NOT CLEARED BY LOADING T1LH\
017337   042   124   061  EM50B:  .ASCIZ  \"T1" FLAG NOT CLEARED BY LOADING T1CH\
017405   042   124   061  EM50C:  .ASCIZ  \"T1" FLAG NOT CLEARED BY READING T1CL\
017453   126   111   101  EM50D:  .ASCIZ  \VIA'S T1CL NOT DECREMENTING\
017507   126   111   101  EM50E:  .ASCIZ  \VIA'S T1CH NOT DECREMENTING\
017543   042   124   061  EM50F:  .ASCIZ  \"T1" FLAG NOT SET ON TIMER 1 TIMEOUT\
017610   042   124   061  EM50G:  .ASCIZ  \"T1" FLAG CLEARED BY READING T1CH\
017652   126   111   101  EM50H:  .ASCIZ  \VIA'S T1LL IMPROPERLY LOADED BY WRITING T1CL @ ADDR 4\
017740   042   124   061  EM50I:  .ASCIZ  \"T1" FLAG CLEARED BY READING T1LL\
020002   126   111   101  EM50J:  .ASCIZ  \VIA'S T1LH IMPROPERLY LOADED BY WRITING T1CH @ ADDR 5\
020070   042   124   061  EM50K:  .ASCIZ  \"T1" FLAG CLEARED BY READING T1LH\
020132   042   124   061  EM50L:  .ASCIZ  \"T1" FLAG NOT SET AFTER RE LOADING T1CH & TIMEOUT\
020214   042   124   061  EM50M:  .ASCIZ  \"T1" FLAG CLEARED BY LOADING T1LL\
020256   042   124   061  EM50N:  .ASCIZ  \"T1" FLAG NOT CLEARED BY LOADING T1CH\
020324   042   120   102  EM50S:  .ASCIZ  \"PB7" W/IN VIA NOT SET ON TIMER 1 TIMEOUT\
020376   042   120   102  EM50U:  .ASCIZ  \"PB7" NOT SET AFTER TIMER 1 TIMEOUT\
020442   042   120   102  EM50V:  .ASCIZ  \"PB7" NOT DRIVEN LOW BY LOADING T1CH\
020507   042   120   102  EM50W:  .ASCIZ  \"PB7" UNEXPECTEDLY MODIFIED BY TIMER 1\
020556   042   124   061  EM50X:  .ASCIZ  \"T1" NOT RESET AFTER BEING CLEARED\
020621   042   120   102  EM50Y:  .ASCIZ  \"PB7" PREMATURELY SET DURING T1 COUNTDOWN\
020673   042   120   102  EM50Z:  .ASCIZ  \"PB7" NOT SET AFTER SECOND CYCLE\
020734   042   124   062  EM51B:  .ASCIZ  \"T2" FLAG NOT CLEARED BY LOADING T2CH\
021002   042   124   062  EM51C:  .ASCIZ  \"T2" FLAG NOT CLEARED BY READING T2CL\
021050   126   111   101  EM51E:  .ASCIZ  \VIA'S T2CH NOT DECREMENTING\
021104   042   124   062  EM51F:  .ASCIZ  \"T2" FLAG NOT SET ON TIMER 2 TIMEOUT\
```

ERROR MESSAGES - "EM___"

```
3391 021151  042  124  062  EM51G:  .ASCIZ  \"T2" FLAG CLEARED BY READING T2CH\
3392 021213  042  124  062  EM51L:  .ASCIZ  \"T2" FLAG NOT SET AFTER RE-LOADING T2CH & TIMEOUT\
3393 021275  042  124  062  EM51M:  .ASCIZ  \"T2" FLAG CLEARED BY LOADING T2LL\
3394 021337  042  124  062  EM51N:  .ASCIZ  \"T2" FLAG NOT CLEARED BY LOADING T2CH\
3395 021405  042  124  062  EM51P:  .ASCIZ  \"T2" FLAG NOT SET AFTER APPROPRIATE DELAY\
3396 021457  042  123  122  EM52A:  .ASCIZ  \"SR" FLAG SET BEFORE ACCESSING SHIFT REGISTER\
3397 021535  116  117  040  EM52B:  .ASCIZ  \NO "SR" INT. USING MODE 2\
3398 021567  111  116  103  EM52C:  .ASCIZ  \INCOMPLETE SHIFTING OPERATION IN MODE 2    GOT INT.
3399 021653  116  117  040  EM52D:  .ASCIZ  \NO "SR" INT. AFTER READING SR\
3400 021711  104  115  126  EM60N:  .ASCIZ  /DMV EXTENDED NPR WRITE ERROR/
3401
3402                                 .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
```

LOAD DEVICE PROTECTION TABLE

```
3416                                    .SBTTL LOAD DEVICE PROTECTION TABLE
3417
3418                                    ;////////////////////////////////////////////////////////////////////////////
3419                                    ;/ THIS TABLE IDENTIFIES THE LOAD DEVICE TO THE SUPERVISOR, SO THAT IT CAN BE
3420                                    ;/ PROTECTED FROM TESTING. IF DESIRED.
3421                                    ;////////////////////////////////////////////////////////////////////////////
3422
3423 022012                                    BGNPROT
     022012                                                                          L$PROT::
3424 022012  177777                            .WORD     1       ;DON'T CHK CSR ADRS
3425 022014  177777                            .WORD     1       ;DON'T CHK MASSBUS UNIT NO.
3426 022016  177777                            .WORD     1       ;DON'T CHK DRIVE NO.
3427 022020                                    ENDPROT
```

```
                        .SBTTL INITIALIZE SECTION

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

022020                          BGNINIT
022020                                                          L$INIT::

022020                          SFTVEC  #140,#170000,#340       ;ODT ROM ADDRESS                ;JB REV A-0
022020  012746  000340                                                  MOV     #340, (SP)
022024  012746  170000                                                  MOV     #170000, (SP)
022030  012746  000140                                                  MOV     #140,-(SP)
022034  012746  000003                                                  MOV     #3,-(SP)
022040  104437                                                          TRAP    C$SVEC
022042  062706  000010                                                  ADD     #10,SP

022046  010637  002270                  MOV     SP,PSTACK       ;SAVE BASE LEVEL STACK POINTER
                        ;SEE IF PROGRAM JUST STARTED, BR IF YES
022052                          READEF  #EF.START
022052  012700  000040                                                  MOV     #EF.START,R0
022056  104447                                                          TRAP    C$REFG
022060                          BCOMPLETE       STARST
022060  103417                                                          BCS     STARST
                        ;SEE IF PROGRAM JUST RESTARTED, BR IF YES
022062                          READEF  #EF.RESTART
022062  012700  000037                                                  MOV     #EF.RESTART,R0
022066  104447                                                          TRAP    C$REFG
022070                          BCOMPLETE       RESTRT
022070  103454                                                          BCS     RESTRT
                        ;SEE IF THIS IS A NEW PASS, BR IF YES
022072                          READEF  #EF.NEW
022072  012700  000035                                                  MOV     #EF.NEW,R0
022076  104447                                                          TRAP    C$REFG
022100                          BCOMPLETE       NEWST
022100  103454                                                          BCS     NEWST
                        ;SEE IF PROGRAM WAS JUST CONTINUED
022102                          READEF  #EF.CONTINUE
022102  012700  000036                                                  MOV     #EF.CONTINUE,R0
022106  104447                                                          TRAP    C$REFG
022110                          BCOMPLETE       10$
022110  103401                                                          BCS     10$
022112  000461                  BR      GETPRM

022114  000137  022414  10$:     JMP     CONTIN          ;(THIS IS TO FAR AWAY FOR A 'BR' INSTRUCTION)

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

022120  005037  002306  STARST: CLR     STARES          ;CLEAR FLAG TO SHOW JUST HAD STA OR RES

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

022124  005037  002314          CLR     CONSOL          ;RESET THE CONSOLE TERMINAL FLAG
022130                          SETVEC  #4,#CONTST,#0   ;SETUP BUS TIMEOUT VECTER TO TEST FOR A CONSOLE
022130  012746  000000                                                  MOV     #0, (SP)
```

```
INITIALIZE SECTION

        022134  012746  022514                                                  MOV     #CONTST,(SP)
        022140  012746  000004                                                  MOV     #4,-(SP)
        022144  012746  000003                                                  MOV     #3,-(SP)
        022150  104437                                                          TRAP    C$SVEC
        022152  062706  000010                                                  ADD     #10,SP
  3466  022156  005737  177564          TST     @#177564        ;TRY TO ACCESS THE CONSOLE TERMINAL'S 'XCSR"
  3467  022162                        CLRVEC  #4              ;WE SHOULD BE THROUGH WITH THIS BY NOW
        022162  012700  000004                                                  MOV     #4,R0
        022166  104436                                                          TRAP    C$CVEC
  3468
  3469                          ;  AT THIS POINT, IF A CONSOLE TERMINAL IS PRESENT, "CONSOL" WILL BE ZERO.
  3470                          ;  IF NO CONSOLE TERMINAL EXISTS (OR AT LEAST NOT AT THE STANDARD ADDRESS),
  3471                          ;       "CONSOL" WILL BE NON-ZERO (-1).
  3472
  3473  022170  005737  002314          TST     CONSOL          ;IF CONSOLE TERMINAL ISN'T THERE,
  3474  022174  001412                  BEQ     5$
  3475  022176                        PRINTF  #CFMTO,#NPROTS  ;TELL THE OPERATOR WHAT TESTING WON'T BE DONE
        022176  012746  000004                                                  MOV     #NPROTS,(SP)
        022202  012746  022524                                                  MOV     #CFMTO,(SP)
        022206  012746  000002                                                  MOV     #2,-(SP)
        022212  010600                                                          MOV     SP,R0
        022214  104417                                                          TRAP    C$PNTF
        022216  062706  000006                                                  ADD     #6,SP
  3476  022222                  5$:
  3477                                  ;*** ENTER HERE IF "RESTART" COMMAND ISSUED
  3478
  3479  022222  005037  002306  RESTRT: CLR     STARES          ;CLEAR FLAG TO SHOW JUST HAD STA OR RES
  3480  022226  005037  002310          CLR     DEVMAP          ;CLEAR DEVICE MAP
  3481
  3482  022232                  NEWST:          ;ENTER HERE BEFORE EACH TEST
  3483
  3484  022232  012737  177777  002266          MOV     #-1,LOGDEV      ;RESET LOGICAL DEVICE TO -1
  3485  022240  005237  002306                  INC     STARES          ;INC # OF PASSES SINCE STA OR RES
  3486  022244  005237  002304                  INC     FRSPAS          ;INCREMENT NO. OF PASSES AFTER LOAD
  3487  022250  012737  000001  002312          MOV     #BIT0,DEVPTR    ;INIT DEVICE MAP BIT POINTER
  3488                          ; GET UNIBUS ADDRESS, VECTOR, PRIORITY LEVEL, SWITCH PACKS, TEST
  3489                          ;   CONNECTOR INFORMATION FOR THIS LOGICAL DEVICE
  3490  022256                  GETPRM:
  3491  022256  005237  002266          INC     LOGDEV          ;INCREMENT LOGICAL DEVICE NUMBER
  3492  022262                        GPHARD  LOGDEV,R1       ;GET P-TABLE POINTER INTO R1
        022262  013700  002266                                                  MOV     LOGDEV,R0
        022266  104442                                                          TRAP    C$GPHRD
        022270  010001                                                          MOV     R0,R1
  3493  022272                        BCOMPLETE  10$          ;BR IF DEVICE AVAILABLE
        022272  103403                                                          BCS     10$
  3494  022274  006337  002312          ASL     DEVPTR          ;IF UN-AVAILABLE, SHIFT DEVICE MAP BIT POINTER
  3495  022300  000766                  BR      GETPRM          ;       AND SKIP THIS DEVICE
  3496
  3497  022302  053737  002312  002310  10$:    BIS     DEVPTR,DEVMAP   ;ELSE, SET BIT FOR THIS DEVICE IN DEVICE MAP
  3498  022310  006337  002312          ASL     DEVPTR          ;SHIFT DEVICE MAP BIT POINTER
  3499
  3500                          ;  "R1" WAS RETURNED WITH A POINTER TO THE CURRENT "P-TABLE"
  3501
  3502  022314  012100                  MOV     (R1)+,R0        ;GET THE DEVICE CSR ADDRESS
  3503  022316  012703  000020          MOV     #16.,R3         ;WE HAVE TO SETUP THIS MANY ADDRESS POINTERS
  3504  022322  012702  002320          MOV     #MPCSR,R2       ;THIS IS THE ADDRESS OF THE FIRST POINTER
  3505  022326  010022                  12$:    MOV     R0,(R2)+        ;SETUP ONE CSR POINTER
```

INITIALIZE SECTION

```
3506 022330  005200                          INC     R0              ;POINT TO THE NEXT CSR ADDRESS
3507 022332  077303                          SOB     R3,12$          ;LOOP AS LONG AS THERE ARE MORE TABLE ENTRIES
3508                                                                 ;ELSE,  FALL THROUGH TO CONTINUE GETTING MORE
3509                                                                 ;       P-TABLE DATA
3510
3511 022334  012100                          MOV     (R1)+,R0        ;GET INTERRUPT VECTOR
3512 022336  010037  002360                  MOV     R0,MPIVEC       ;SETUP "A" VECTOR POINTER
3513 022342  022020                          CMP     (R0)+,(R0)+     ;ADD 4 TO VECTOR TO GET ADDRESS OF "B' VECTOR
3514 022344  010037  002362                  MOV     R0,MPOVEC       ;SETUP "B" VECTOR POINTER
3515
3516 022350  012100                          MOV     (R1)+,R0        ;GET DMV11 DEVICE PRIORITY
3517 022352  006200                          ASR     R0              ;       RE-POSITION IT
3518 022354  006200                          ASR     R0
3519 022356  006200                          ASR     R0
3520 022360  006200                          ASR     R0
3521 022362  010037  002364                  MOV     R0,MPRIOR       ;SETUP OUR VARIABLE FOR INT. VECTOR INIT S
3522
3523 022366  022121                          CMP     (R1)+,(R1)+     ;SKIP OVER SWITCH #'S 1 & 2
3524 022370  012137  002366                  MOV     (R1)+,BRDTYP    ;GET DMV-11 BOARD TYPE
3525 022374  022111                          CMP     (R1)+,(R1)      ;SKIP OVER CONNECTOR FLAG
3526
3527 022376  012100                          MOV     (R1)+,R0         GET CONTROL FLAGS
3528 022400  012703  000006                  MOV     #6,R3           ;POSITION THEM PROPERLY IN THE WORD
3529 022404  006200                  15$:    ASR     R0
3530 022406  077302                          SOB     R3,15$
3531 022410  010037  002370                  MOV     R0,PT.CTL       ;PUT IT WHERE TESTS EXPECT TO FIND IT
3532
3533                                         ;;  TEST THE VARIOUS CONTROL FLAGS & REPORT NON-STANDARD ACTION RESULTING FROM  ;JB REV A 0
3534                                         ;;  THEIR SETTINGS                                                              ;JB REV A-0
3535                                         ;                                                                               ;JB REV A 0
3536                                         ;       CMP     STARES,#1       ;FIRST PASS SINCE STA OR RES ??              ;JB REV A-0
3537                                         ;       BNE     40$             ; IF NO: SKIP POSSIBLE PRINTOUT              ;JB REV A-0
3538                                         ;                                                                            ;JB REV A 0
3539                                         ;       BIT     #PU24,PT.CTL    ;IF THE PROCESSOR ISN'T STRAPPED TO COME UP  ;JB REV A-0
3540                                         ;       BNE     40$             ;THROUGH INTERRUPT VECTOR 24 & 26.           ;JB REV A-0
3541                                         ;       PRINTF  #CFMT2,#DCOKTS,#HLTEST ;TELL THE OPERATOR THAT NO DCOK TESTING ;JB REV A-0
3542                                         ;       PRINTF  #CFMT3          ;WILL BE DONE                                ;JB REV A 0
3543 022414                                  40$:
3544
3545 022414                                  CONTIN:         ;ENTER HERE WHEN A  CONTINUE ' COMMAND IS ISSUED
3546
3547 022414                                          SETVEC  @#MPIVEC,#MPIHAN,@#MPRIOR  ;SETUP  A' INT. VECTOR
     022414  013746  002364                                                                  MOV     @#MPRIOR,-(SP)
     022420  012746  006066                                                                  MOV     #MPIHAN,-(SP)
     022424  013746  002360                                                                  MOV     @#MPIVEC,-(SP)
     022430  012746  000003                                                                  MOV     #3,-(SP)
     022434  104437                                                                         TRAP    C$SVEC
     022436  062706  000010                                                                  ADD     #10,SP
3548 022442  005037  006136                  CLR     IHILNK          ;WE DON T WANT THE HANDLER TO LINK ELSEWHERE
3549 022446                                  SETVEC  @#MPOVEC,#MPOHAN,@#MPRIOR  ;SETUP 'B  INT. VECTOR
     022446  013746  002364                                                                  MOV     @#MPRIOR,-(SP)
     022452  012746  006140                                                                  MOV     #MPOHAN,-(SP)
     022456  013746  002362                                                                  MOV     @#MPOVEC,-(SP)
     022462  012746  000003                                                                  MOV     #3,-(SP)
     022466  104437                                                                         TRAP    C$SVEC
     022470  062706  000010                                                                  ADD     #10,SP
3550 022474  005037  006210                  CLR     IHOLNK          ;WE DON T WANT THE HANDLER TO LINK ELSEWHERE
```

INITIALIZE SECTION

```
3551 022500  005037  002274                CLR     INTWCH          ;RESET "INTERRUPT WATCH" FLAGS (BOTH 'A" & "B")
3552
3553 022504  012737  000001  002302        MOV     #1,FRSTIM       ;MARK FLAG FOR NEXT TIME THROUGH
3554 022512                                ENDINIT         ;END OF "INIT" CODE
     022512                                                                  L10022:
     022512  104411                                                                TRAP    C$INIT
3555
3556                             ; ***** SUBROUTINES USED BY "INIT" CODE *****
3557
3558                             ;       INTERRUPT HANDLER FOR CONSOLE TERMINAL PRESENCE TESTING
3559
3560 022514  012737  177777  002314  CONTST: MOV     #1,CONSOL       ;INDICATE THAT NO CONSOLE TERMINAL EXISTS!
3561 022522  000002                        RTI                     ;RETURN
3562
3563                             ;       FORMATS FOR FORCED MESSAGES
3564                                     .NLIST  BEX
3565 022524     045     116     045  CFMT0:  .ASCIZ  /%N%A TEST %D2%A SUBTEST 3 CAN'T RUN    NO CSR @ 177764/
3566 022613     045     116     045  CFMT2:  .ASCIZ  /%N%A TESTS %D2%A AND %D2%A CAN T RUN    CPU NOT/
3567 022673     045     116     045  CFMT3:  .ASCIZ  /%N%S4%ATRAPPED TO POWER UP THROUGH VECTOR 24/
3568                                     .LIST   BEX
3569                                     .EVEN
```

AUTO DROP UNIT SECTION

```
                                .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 CNDMA 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
022752                                                                          L$AUTO::
022752
                                        SETVEC  #4,#AD.HIT,#0   ;SETUP INVALID-ADDRESS TRAP VECTOR
022752  012746  000000                                                          MOV     #0,-(SP)
022756  012746  023070                                                          MOV     #AD.HIT,(SP)
022762  012746  000004                                                          MOV     #4,-(SP)
022766  012746  000003                                                          MOV     #3,-(SP)
022772  104437                                                                  TRAP    C$SVEC
022774  062706  000010                                                          ADD     #10,SP
023000  005037  002412                CLR     TMP0            ;INITIALIZE TRAP FLAG REGISTER
023004  012702  000001                MOV     #1,R2           ;FLAG BIT
023010  013703  002320                MOV     BSELO,R3        ;INIT ADDRESS POINTER

023014  105723                1$:     TSTB    (R3)+           ;ACCESS THE CSR'S BY BYTES.
023016  006302                        ASL     R2
023020  103375                        BCC     1$

023022  013703  002320                MOV     BSELO,R3        ;RE INIT ADDRESS POINTER
023026  012702  000001                MOV     #1,R2           ;RE-INIT FLAG BIT
023032  005723                2$:     TST     (R3)+           ;ACCESS THE CSR'S BY WORDS.
023034  006302                        ASL     R2
023036  006302                        ASL     R2
023040  103374                        BCC     2$

023042                                  CLRVEC  #4              ;RESTORE THE VECTOR TO DS
023042  012700  000004                                                          MOV     #4,R0
023046  104436                                                                  TRAP    C$CVEC
023050  005737  002412                TST     TMP0            ;DID WE GET HIT WITH AN INVALID ADDRESS TRAP?
023054  001403                        BEQ     AD.OK           ;NO.  EXIT TEST
023056                                  DODU    LOGDEV          ;YES. DROP THIS LOGICAL DEV.
023056  013700  002266                                                          MOV     LOGDEV,R0
023062  104451                                                                  TRAP    C$DODU

023064  000240                AD.OK:  NOP                     ;(FOR PATCHING IN A HALT IF NECESSARY)

023066                                  ENDAUTO
023066                                                                      L10023:
023066  104461                                                                  TRAP    C$AUTO

023070  050237  002412        AD.HIT: BIS     R2,TMP0         ;FLAG THE HIT IF WE GET IT!
```

AUTO DROP UNIT SECTION

```
3615 023074  000002                    RTI                    ;RETURN
3616
```

CLEANUP CODING SECTION

```
3618                                    .SBTTL CLEANUP CODING SECTION
3619
3620                                    ;//////////////////////////////////////////////////////////////////////
3621                                    ;/ THE CLEANUP CODING SECTION CONTAINS THE CODING THAT IS PERFORMED
3622                                    ;/ AT THE END OF THE TEST SEQUENCE ON A PARTICULAR UNIT.
3623                                    ;//////////////////////////////////////////////////////////////////////
3624
3625 023076                                    BGNCLN
     023076                                                                          L$CLEAN::
3626 023076                                    CLRVEC  @#MPIVEC        ;RETURN VECTORS TO SUPERVISOR
     023076  013700  002360                                                         MOV     @#MPIVEC,R0
     023102  104436                                                                 TRAP    C$CVEC
3627 023104                                    CLRVEC  @#MPOVEC
     023104  013700  002362                                                         MOV     @#MPOVEC,R0
     023110  104436                                                                 TRAP    C$CVEC
3628 023112                                    ENDCLN
     023112                                                                     L10024:
     023112  104412                                                                 TRAP    C$CLEAN
```

DROP UNIT SECTION

```
                                .SBTTL DROP UNIT SECTION

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

023114                                  BGNDU
023114                                                                          L$DU::
                                ;ISSUE UNIBUS RESET TO CLEAN UP
023114                                  BRESET
023114  104433                                                                          TRAP    C$RESET
023116                                  ENDDU
023116                                                                          L10025:
023116  104453                                                                          TRAP    C$DU
```

ADD UNIT SECTION

```
                                .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.
                                ;////////////////////////////////////////////////////////////////

023120                                  BGNAU
023120                                                                  L$AU::
023120                                  ENDAU
023120                                                                  L10026:
023120  104452                                                                  TRAP    C$AU
```

```
3691                                   .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
      023122                                                                      T1::
3692  023122                                  BGNSUB
      023122                                                                      T1.1:
      023122  104402                                                                      TRAP    C$BSUB
3693                                   ;-----------------------------------------------------------------
3694
3695  023124  004737  003514                  JSR     PC,MSTCLR        ;INIT DMV & ENTER M LOOP
3696  023130  103003                          BCC     1$               ;IF NO ERROR, PROCEED WITH TESTING
3697  023132                                  ERROR                    ;ELSE, REPORT ERROR
      023132  104460                                                                      TRAP    C$ERROR
3698  023134                                  ESCAPE  TST              ;   & EXIT TEST
      023134  104410                                                                      TRAP    C$ESCAPE
      023136  000700                                                                      .WORD   L10027-.
```

```
CNDMBA0 DMv11 MCTRL DIAG #2     MACRO M1200  05 MAR 84 14:54  PAGE 53 1
                                                                                SEQ 0099
TEST 1    VIA TIMER 2 ONE SHOT MODE

 3699 023140  004537  004630          1$:     JSR     R5,INITT2       ;INITIALIZE TIMER # 2
 3700 023144  002000                          2000                    ;  2000 ==> LATCHES  (PREVENTS IMMED. TIMEOUT)
 3701 023146  000000                          0                       ;  MODE 0 & "T2" INT. ENABLE FLAG CLEARED
 3702 023150  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
 3703 023152                                  ERROR                   ;ELSE, REPORT IT
      023152  104460                                                                  TRAP    C$ERROR
 3704 023154                                  ESCAPE  TST             ;       AND EXIT THIS TEST
      023154  104410                                                                  TRAP    C$ESCAPE
      023156  000660                                                                  .WORD   L10027 .
 3705 023160  004737  024072                  JSR     PC,GETT2        ;IS "T2' SET?
 3706 023164  102002                          BVC     .+6             ;IF NO ERROR, PROCEED
 3707 023166                                  ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED    EXIT
      023166  104410                                                                  TRAP    C$ESCAPE
      023170  000644                                                                  .WORD   L10030 .
 3708 023172  103033                          BCC     6$              ;NO, GOOD.
 3709 023174                                  GEDF    EM51B,ERR51     ;YES, REPORT IT'S NOT BEING CLEARED @ INIT.
                                                                      ;       "DEVICE FATAL  ERROR # 9
      023174  104455                                                                  TRAP    C$ERDF
      023176  000011                                                                  .WORD   9
      023200  020734                                                                  .WORD   EM51B
      023202  011176                                                                  .WORD   ERR51
 3710
 3711                                 ;
 3712
 3713 023204  112737  000002  002435          MOVB    #2,TMP9+1
 3714 023212  004537  004042                  JSR     R5,WRITE        ;INIT TIMER # 2 BY WRITING INTO
 3715 023216  120011                          T2CH                    ;T2C H (ADDR 09)
 3716 023220  002435                          TMP9+1
 3717 023222  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
 3718 023224                                  ERROR                   ;ELSE, REPORT IT
      023224  104460                                                                  TRAP    C$ERROR
 3719 023226                                  ESCAPE  TST             ;       AND EXIT THIS TEST
      023226  104410                                                                  TRAP    C$ESCAPE
      023230  000606                                                                  .WORD   L10027 .
 3720 023232  004737  024072                  JSR     PC,GETT2        ;IS  T2  SET?
 3721 023236  102002                          BVC     .+6             ;IF NO ERROR, PROCEED
 3722 023240                                  ESCAPE  SUB             ;ELSE, IT S ALREADY BEEN REPORTED    EXIT
      023240  104410                                                                  TRAP    C$ESCAPE
      023242  000572                                                                  .WORD   L10030 .
 3723 023244  103006                          BCC     6$              ;NO, GOOD.
 3724 023246                                  GEDF    EM51B,ERR51     ;YES, REPORT IT'S NOT BEING CLEARED @ INIT.
                                                                      ;       "DEVICE FATAL  ERROR # 10
      023246  104455                                                                  TRAP    C$ERDF
      023250  000012                                                                  .WORD   10
      023252  020734                                                                  .WORD   EM51B
      023254  011176                                                                  .WORD   ERR51
 3725 023256                                  ESCAPE  SUB             ;AND EXIT SUBTEST
      023256  104410                                                                  TRAP    C$ESCAPE
      023260  000554                                                                  .WORD   L10030 .
 3726
 3727                                 ;
 3728
 3729 023262  004537  024040          6$:     JSR     R5,LODT2C       ;LOAD TIMER # 2
 3730 023266     252                  7$:     .BYTE   252
 3731 023267     252                  8$:     .BYTE   252
 3732
 3733                                 ;
```

```
TEST 1    VIA TIMER 2 ONE SHOT MODE

3734
3735 023270  004537  003616          JSR     R5,READ         ;READ THE LOW COUNTER
3736 023274  120010                  T2CL
3737 023276  002432                  TMP8
3738 023300  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
3739 023302                          ERROR                   ;ELSE, REPORT IT
     023302  104460                                                  TRAP    C$ERROR
3740 023304                          ESCAPE  TST             ;       AND EXIT THIS TEST
     023304  104410                                                  TRAP    C$ESCAPE
     023306  000530                                                  .WORD   L10027 .
3741 023310  123737  002432  023266      CMPB    TMP8,7$         ;MAKE SURE THE COUNTER IS DECREMENTING
3742 023316  001004                      BNE     12$             ;IT IS, NOW SEE IF THE HIGH COUNTER IS TOO
3743 023320                              GEDF    EM50D,ERR51     ;IT WASN'T - REPORT THE ERROR
                                                                 ;       "DEVICE FATAL  ERROR # 11
     023320  104455                                                  TRAP    C$ERDF
     023322  000013                                                  .WORD   11
     023324  017453                                                  .WORD   EM50D
     023326  011176                                                  .WORD   ERR51
3744 023330  012703  000100      12$:    MOV     #100,R3         ;INIT. TIMEOUT VALUE
3745 023334  004537  003616      13$:    JSR     R5,READ         ;READ THE HIGH COUNTER
3746 023340  120011                      T2CH
3747 023342  002434                      TMP9
3748 023344  103003                      BCC     .+10            ;IF NO ERROR, PROCEED
3749 023346                              ERROR                   ;ELSE, REPORT IT
     023346  104460                                                  TRAP    C$ERROR
3750 023350                              ESCAPE  TST             ;       AND EXIT THIS TEST
     023350  104410                                                  TRAP    C$ESCAPE
     023352  000464                                                  .WORD   L10027 .
3751 023354  123737  002434  023267      CMPB    TMP9,8$         ;DID IT CHANGE FROM THE LOADED VALUE?
3752 023362  001007                      BNE     14$             ;YES, PROCEED WITH TESTING
3753 023364  077315                      SOB     R3,13$          ;NO,  IF NO TIMEOUT, TRY AGAIN
3754 023366                              GEDF    EM51E,ERR51     ;ELSE, REPORT THAT HIGH COUNTER ISN'T RUNNING
                                                                 ;       "DEVICE FATAL" ERROR # 12
     023366  104455                                                  TRAP    C$ERDF
     023370  000014                                                  .WORD   12
     023372  021050                                                  .WORD   EM51E
     023374  011176                                                  .WORD   ERR51
3755 023376                              ESCAPE  SUB             ;       WE CAN'T PROCEED WITH TESTING EITHER
     023376  104410                                                  TRAP    C$ESCAPE
     023400  000434                                                  .WORD   L10030-.
3756
3757
3758 023402  005003      14$:    CLR     R3                      ;INITIALIZE TIMEOUT COUNTER
3759 023404  004737  024072      15$:    JSR     PC,GETT2        ;WAIT FOR TIMER TO COUNT DOWN
3760 023410  102002                      BVC     .+6             ;IF NO ERROR, PROCEED
3761 023412                              ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED    EXIT
     023412  104410                                                  TRAP    C$ESCAPE
     023414  000420                                                  .WORD   L10030 .
3762 023416  103406                      BCS     16$             ;DONE.
3763 023420  077307                      SOB     R3,15$          ;NOT YET, TIMEOUT?
3764 023422                              GEDF    EM51P,ERR51     ;YES, REPORT NO 'T2' INT. FLAG
                                                                 ;       "DEVICE FATAL' ERROR # 13
     023422  104455                                                  TRAP    C$ERDF
     023424  000015                                                  .WORD   13
     023426  021405                                                  .WORD   EM51P
     023430  011176                                                  .WORD   ERR51
3765 023432  000445                      BR      17$             ;     & BYPASS 'T2' RESET ON T2CH READ CHECK
```

```

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

     023434  004537  003616     16$:    JSR     R5,READ         ;READ T2C-H (ADDR 09)
     023440  120011                     T2CH
     023442  002434                     TMP9
     023444  103003                     BCC     .+10            ;IF NO ERROR, PROCEED
     023446                             ERROR                   ;ELSE, REPORT IT
     023446  104460                                                                     TRAP    C$ERROR
     023450                             ESCAPE  TST             ;       AND EXIT THIS TEST
     023450  104410                                                                     TRAP    C$ESCAPE
     023452  000364                                                                     .WORD   L10027 .
     023454  004737  024072             JSR     PC,GETT2        ;IS "T2" STILL SET?
     023460  102002                     BVC     .+6             ;IF NO ERROR, PROCEED
     023462                             ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
     023462  104410                                                                     TRAP    C$ESCAPE
     023464  000350                                                                     .WORD   L10030 .
     023466  103405                     BCS     40$             ;YES, ALL'S OK
     023470                             GEDF    EM51G,ERR51     ;NO!  BAD VIA CHIP!
                                                                ;       "DEVICE FATAL' ERROR # 14
     023470  104455                                                                     TRAP    C$ERDF
     023472  000016                                                                     .WORD   14
     023474  021151                                                                     .WORD   EM51G
     023476  011176                                                                     .WORD   ERR51
     023500  000422                     BR      17$             ;    & BYPASS 'T2'-RESET ON-T2LL WRITE CHECK

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

     023502  004537  004042     40$:    JSR     R5,WRITE        ;RE LOAD T2L-L (ADDR 08)
     023506  120010                     T2LL
     023510  002433                     TMP8+1
     023512  103003                     BCC     .+10            ;IF NO ERROR, PROCEED
     023514                             ERROR                   ;ELSE, REPORT IT
     023514  104460                                                                     TRAP    C$ERROR
     023516                             ESCAPE  TST             ;       AND EXIT THIS TEST
     023516  104410                                                                     TRAP    C$ESCAPE
     023520  000316                                                                     .WORD   L10027-.
     023522  004737  024072             JSR     PC,GETT2        ;IS 'T2" STILL SET?
     023526  102002                     BVC     .+6             ;IF NO ERROR, PROCEED
     023530                             ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -  EXIT
     023530  104410                                                                     TRAP    C$ESCAPE
     023532  000302                                                                     .WORD   L10030 .
     023534  103404                     BCS     17$             ;YES, ALL'S STILL OK
     023536                             GEDF    EM51M,ERR51     ;NO!  SOMETHING WENT WRONG!  REPORT IT
                                                                ;       "DEVICE FATAL" ERROR # 15
     023536  104455                                                                     TRAP    C$ERDF
     023540  000017                                                                     .WORD   15
     023542  021275                                                                     .WORD   EM51M
     023544  011176                                                                     .WORD   ERR51

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

     023546  004537  024040     17$:    JSR     R5,LODT2C       ;RE LOAD TIMER # 2 WITH A VALUE WHICH CAUSE AN
     023552     001             18$:    .BYTE   1               ;ALMOST IMMEDIATE TIMEOUT
     023553     000             19$:    .BYTE   0               ; (ADDRESS OF HIGH BYTE FOR T2C H (ADDR 09))
                                ;          - -----      --      -       -- -    --- -- - -          -

```

TEST 1 VIA TIMER 2 ONE SHOT MODE

```
3803 023554  004737  024072              JSR     PC,GETT2        ;WAS "T2" SET BY THE ABOVE OPERATION?
3804 023560  102002                      BVC     .+6             ;IF NO ERROR, PROCEED
3805 023562                              ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
     023562  104410                                                      TRAP    C$ESCAPE
     023564  000250                                                      .WORD   L10030 .
3806 023566  103406                      BCS     20$             ;YES, OK -  CONTINUE ERROR CHECKING
3807 023570                              GEDF    EM51F,ERR51     ;NO,  BAD NEWS!  REPORT THE FAILURE
                                                                 ;       "DEVICE FATAL" ERROR # 16
     023570  104455                                                      TRAP    C$ERDF
     023572  000020                                                      .WORD   16
     023574  021104                                                      .WORD   EM51F
     023576  011176                                                      .WORD   ERR51
3808 023600                              ESCAPE  SUB             ;  AND GET OUT OF SUBTEST
     023600  104410                                                      TRAP    C$ESCAPE
     023602  000232                                                      .WORD   L10030-.
3809 023604  004537  003616      20$:    JSR     R5,READ         ;READ T2C-H (ADDR 09) TO SEE IF THIS CLEARS "T2"
3810 023610  120011                      T2CH                    ;(THIS VALUE ISN'T CHECKED BECAUSE IT CAN BE
3811 023612  002434                      TMP9                    ; ALMOST ANYTHING)
3812 023614  103003                      BCC     .+10            ;IF NO ERROR, PROCEED
3813 023616                              ERROR                   ;ELSE, REPORT IT
     023616  104460                                                      TRAP    C$ERROR
3814 023620                              ESCAPE  TST             ;       AND EXIT THIS TEST
     023620  104410                                                      TRAP    C$ESCAPE
     023622  000214                                                      .WORD   L10027-.
3815 023624  004737  024072              JSR     PC,GETT2        ;PUT THE CURRENT "T2" VALUE INTO THE CARRY BIT
3816 023630  102002                      BVC     .+6             ;IF NO ERROR, PROCEED
3817 023632                              ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
     023632  104410                                                      TRAP    C$ESCAPE
     023634  000200                                                      .WORD   L10030 .
3818 023636  103405                      BCS     21$             ;IF SET, READING T2CH DIDN'T CLEAR IT -  OK!
3819 023640                              GEDF    EM50G,ERR51     ;IF CLEARED!  BAD VIA CHIP!
                                                                 ;       "DEVICE FATAL' ERROR # 17
     023640  104455                                                      TRAP    C$ERDF
     023642  000021                                                      .WORD   17
     023644  017610                                                      .WORD   EM50G
     023646  011176                                                      .WORD   ERR51
3820 023650  000400                      BR      28$             ;BYPASS THE REST OF THIS SECTION OF TESTING
3821
3822 023652                      21$:
3823                             ;--------- --- -------- -- -------   ----- ------------ ------------ ---
3824
3825 023652  004537  003616      28$:    JSR     R5,READ         ;READ T2C-L (ADDR 08)
3826 023656  120010                      T2CL                    ;(THIS VALUE ISN'T CHECKED BECAUSE IT CAN BE
3827 023660  002432                      TMP8                    ; ALMOST ANYTHING)
3828 023662  103003                      BCC     .+10            ;IF NO ERROR, PROCEED
3829 023664                              ERROR                   ;ELSE, REPORT IT
     023664  104460                                                      TRAP    C$ERROR
3830 023666                              ESCAPE  TST             ;       AND EXIT THIS TEST
     023666  104410                                                      TRAP    C$ESCAPE
     023670  000146                                                      .WORD   L10027-.
3831 023672  004737  024072              JSR     PC,GETT2        ;IS "T2" CLEARED NOW
3832 023676  102002                      BVC     .+6             ;IF NO ERROR, PROCEED
3833 023700                              ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
     023700  104410                                                      TRAP    C$ESCAPE
     023702  000132                                                      .WORD   L10030 .
3834 023704  103004                      BCC     29$             ;YES, ALL'S OK
3835 023706                              GEDF    EM51C,ERR51     ;NO!  BAD VIA CHIP!
```

```
                                                        ;       "DEVICE FATAL" ERROR # 18
     023706  104455                                                                  TRAP    C$ERDF
     023710  000022                                                                  .WORD   18
     023712  021002                                                                  .WORD   EM51C
     023714  011176                                                                  .WORD   ERR51
3836
3837                            ;---------------- ------------------- ----------- - ------------ -----
3838
3839 023716  004537  004042     29$:    JSR     R5,WRITE        ;RE-WRITE INTO T2C H (ADDR 09) TO SET T2 AGAIN
3840 023722  12001:             T2CH
3841 023724  002435             TMP9+1
3842 023726  103003             BCC     .+10            ;IF NO ERROR, PROCEED
3843 023730                     ERROR                   ;ELSE, REPORT IT
     023730  104460                                                                  TRAP    C$ERROR
3844 023732                     ESCAPE  TST             ;       AND EXIT THIS TEST
     023732  104410                                                                  TRAP    C$ESCAPE
     023734  000102                                                                  .WORD   L10027-.
3845 023736  004737  024072     JSR     PC,GETT2        ;IS "T2" SET AGAIN
3846 023742  102002             BVC     .+6             ;IF NO ERROR, PROCEED
3847 023744                     ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
     023744  104410                                                                  TRAP    C$ESCAPE
     023746  000066                                                                  .WORD   L10030-.
3848 023750  103406             BCS     32$             ;YES, ALL'S WELL (AGAIN?)
3849 023752                     GEDF    EM51L,ERR51     ;NO!  SOMETHING WENT WRONG!  REPORT IT
                                                        ;       "DEVICE FATAL" ERROR # 19
     023752  104455                                                                  TRAP    C$ERDF
     023754  000023                                                                  .WORD   19
     023756  021213                                                                  .WORD   EM51L
     023760  011176                                                                  .WORD   ERR51
3850 023762                     ESCAPE  SUB             ;       AND EXIT FROM THIS SUBTEST
     023762  104410                                                                  TRAP    C$ESCAPE
     023764  000050                                                                  .WORD   L10030-.
3851
3852                            ;- ---------------------------- --  - - -  -------------------------------
3853
3854 023766  004537  024040     32$:    JSR     R5,LODT2C       ;AGAIN RE-LOAD TIMER # 2.  THIS TIME WITH
3855 023772     125     125             .BYTE   125,125         ;  LARGER BUT DIFFERENT VALUES
3856
3857                            ;---  ---- ------------ --------------- ----------------   -  - -- -- --
3858
3859 023774  004737  024072             JSR     PC,GETT2        ;"T2" SHOULD NOW BE CLEARED
3860 024000  102002             BVC     .+6             ;IF NO ERROR, PROCEED
3861 024002                     ESCAPE  SUB             ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
     024002  104410                                                                  TRAP    C$ESCAPE
     024004  000030                                                                  .WORD   L10030-.
3862 024006  103004             BCC     34$             ;IT WAS, ALL'S WELL THAT END'S WELL (I THINK!?)
3863 024010                     GEDF    EM51N,ERR51     ;IT WASN'T!  SOMETHING WENT WRONG!  REPORT IT
                                                        ;       "DEVICE FATAL" ERROR # 20
     024010  104455                                                                  TRAP    C$ERDF
     024012  000024                                                                  .WORD   20
     024014  021337                                                                  .WORD   EM51N
     024016  011176                                                                  .WORD   ERR51
3864
3865 024020  004537  004630     34$:    JSR     R5,INITT2       ;RE-INITIALIZE TIMER # 1 W/ NORMAL RESET VALUES
3866 024024  000000             0
3867 024026  000000             0
3868 024030  103001             BCC     .+4             ;IF NO ERROR, EXIT
```

```
024032                           ERROR                       ;ELSE, REPORT IT
024032  104460                                                                     TRAP    C$ERROR

024034                           ENDSUB
024034                                                                   L10030:
024034  104403                                                                     TRAP    C$ESUB

024036                           ENDTST
024036                                                                   L10027:
024036  104401                                                                     TRAP    C$ETST

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

024040  112537  002433   LODT2C: MOVB    (R5)+,TMP8+1    ;SETUP TO LOAD T2LL
024044  112537  002435           MOVB    (R5)+,TMP9+1    ;  AND T2CH
024050  004537  004042           JSR     R5,WRITE        ;LOAD T2L-L (ADDR 08) WITH PASSED PARAMETER
024054  120010                   T2LL
024056  002433                   TMP8+1
024060  004537  004042           JSR     R5,WRITE        ;LOAD T2C-H (ADDR 09) WITH PASSED PARAMETER
024064  120011                   T2CH                    ;  (THIS WILL ALSO RESET "T2" & THE COUNTER)
024066  002435                   TMP9+1
024070  000205                   RTS     R5

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

024072  004537  003616   GETT2:  JSR     R5,READ         ;GET VIA'S IFR REG.
024076  120015                   IFR
024100  002444                   TMPD
024102  103003                   BCC     1$              ;IF NO ERROR, PROCEED
024104                           ERROR                   ;ELSE, REPORT IT
024104  104460                                                                     TRAP    C$ERROR
024106  000262                   SEV                     ;FLAG AN ERROR TO MAINLINE ROUTINE
024110  000207                   RTS     PC              ;  AND TAKE AN ABNORMAL RETURN

024112  010046           1$:     MOV     R0,(SP)         ;PRESERVE R0
024114  113700  002444           MOVB    TMPD,R0         ;PUT VALUE HERE TO PRESERVE TMPO
024120  106100                   ROLB    R0              ; IRQ' GOES INTO CARRY BIT
024122  106100                   ROLB    R0              ;'T1' GOES INTO CARRY BIT
024124  106100                   ROLB    R0              ; T2' GOES INTO CARRY BIT
024126  012600                   MOV     (SP)+,R0        ;RESTORE R0
024130  000207                   RTS     PC
```

```
3930                                    .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
    024132                                                                              T2::
3931 024132  004737  003514             JSR     PC,MSTCLR       ;INIT DMV & ENTER M-LOOP
3932 024136  103003                     BCC     1$              ;IF NO ERROR, PROCEED WITH TESTING
3933 024140                             ERROR                   ;ELSE, REPORT ERROR
     024140  104460                                                                 TRAP    C$ERROR
3934 024142                             ESCAPE  TST             ;   & EXIT TEST
     024142  104410                                                                 TRAP    C$ESCAPE
     024144  000612                                                                .WORD   L10031-.
3935 024146  005037  002437     1$:     CLR     TMPA+1          ;CLEAR THE "WRITE" DATA FOR ERROR MESSAGES
3936 024152  005037  002252             CLR     TDATA           ;THIS IS A FLAG TO INDICATE THAT "SR" HASN'T
3937                                                            ;BEEN LOADED YET.
3938 024156  004537  003616             JSR     R5,READ         ;GET CURRENT "ACR" CONTENTS (SHOULD BE 000)
3939 024162  120013                     ACR
3940 024164  002440                     TMPB
3941 024166  103003                     BCC     .+10            ;IF NO ERROR, PROCEED
3942 024170                             ERROR                   ;ELSE, REPORT IT
     024170  104460                                                                 TRAP    C$ERROR
3943 024172                             ESCAPE  TST             ;       AND EXIT THIS TEST
     024172  104410                                                                 TRAP    C$ESCAPE
     024174  000562                                                                .WORD   L10031-.
3944 024176  113737  002440  002441     MOVB    TMPB,TMPB+1     ;MOVE IT FROM I/P BUFFER TO O/P BUFFER
3945 024204  142737  000034  002441     BICB    #<BIT2+BIT3+BIT4>,TMPB+1  ;MAKE SURE CURRENT MODE IS 0
3946 024212  004537  004042             JSR     R5,WRITE        ;FORCE IT TO THAT MODE (MODE 0)
3947 024216  120013                     ACR
3948 024220  002441                     TMPB+1
3949 024222  103003                     BCC     .+10            ;IF NO ERROR, PROCEED
3950 024224                             ERROR                   ;ELSE, REPORT IT
     024224  104460                                                                 TRAP    C$ERROR
3951 024226                             ESCAPE  TST             ;       AND EXIT THIS TEST
     024226  104410                                                                 TRAP    C$ESCAPE
     024230  000526                                                                .WORD   L10031-.
3952 024232  004537  003616             JSR     R5,READ         ;READ IER INCASE IT'S NEEDED FOR ERROR MESSAGES
3953 024236  120016                     IENR
3954 024240  002446                     TMPB
3955 024242  103003                     BCC     .+10            ;IF NO ERROR, PROCEED
3956 024244                             ERROR                   ;ELSE, REPORT IT
     024244  104460                                                                 TRAP    C$ERROR
3957 024246                             ESCAPE  TST             ;       AND EXIT THIS TEST
     024246  104410                                                                 TRAP    C$ESCAPE
     024250  000506                                                                .WORD   L10031-.
3958 024252  004737  024760             JSR     PC,GETSR        ;SAMPLE SR INTERRUPT FLAG    IT SHOULD BE 0
```

TEST 2 VIA'S SR INPUT (MODE 2) SYSTEM CLOCK MODE

```
3959 024256  102002                          BVC     .+6             ;IF NO ERROR, PROCEED
3960 024260                                  ESCAPE  TST             ;ELSE, IT'S ALREADY BEEN REPORTED    EXIT
     024260  104410                                                                      TRAP    C$ESCAPE
     024262  000474                                                                      .WORD   L10031 .
3961 024264  103014                          BCC     4$              ;IT IS, GOOD.
3962 024266  004537  003616                  JSR     R5,READ         ;READ SR FOR ERROR MESSAGE
3963 024272  120012                          SR
3964 024274  002436                          TMPA
3965 024276  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
3966 024300                                  ERROR                   ;ELSE, REPORT IT
     024300  104460                                                                      TRAP    C$ERROR
3967 024302                                  ESCAPE  TST             ;       AND EXIT THIS TEST
     024302  104410                                                                      TRAP    C$ESCAPE
     024304  000452                                                                      .WORD   L10031 .
3968 024306                                  GEDF    EM52A,ERR52     ;IT ISN'T!  REPORT SR NOT INITIALLY CLEARED
                                                                     ;       "DEVICE FATAL" ERROR # 21
     024306  104455                                                                      TRAP    C$ERDF
     024310  000025                                                                      .WORD   21
     024312  021457                                                                      .WORD   EM52A
     024314  011270                                                                      .WORD   ERR52
3969 024316  152737  000010  002441  4$:     BISB    #BIT3,TMPB+1    ;SET SHIFT REG. TO MODE 2
3970 024324  004537  004042                  JSR     R5,WRITE
3971 024330  120013                          ACR
3972 024332  002441                          TMPB+1
3973 024334  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
3974 024336                                  ERROR                   ;ELSE, REPORT IT
     024336  104460                                                                      TRAP    C$ERROR
3975 024340                                  ESCAPE  TST             ;       AND EXIT THIS TEST
     024340  104410                                                                      TRAP    C$ESCAPE
     024342  000414                                                                      .WORD   L10031 .
3976 024344  112737  000204  002447          MOVB    #BIT7+BIT2,TMPE+1  ;ENABLE SR INTERRUPTS WITHIN DMV-11
3977 024352  004537  004042                  JSR     R5,WRITE        ;  (WE WILL NOT BE ALLOWING THEM TO GIVE US
3978 024356  120016                          IENR                    ;   A Q BUS INTERRUPT)
3979 024360  002447                          TMPE+1
3980 024362  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
3981 024364                                  ERROR                   ;ELSE, REPORT IT
     024364  104460                                                                      TRAP    C$ERROR
3982 024366                                  ESCAPE  TST             ;       AND EXIT THIS TEST
     024366  104410                                                                      TRAP    C$ESCAPE
     024370  000366                                                                      .WORD   L10031 .
3983 024372  004537  003616                  JSR     R5,READ         ;READ IER INCASE IT'S NEEDED FOR ERROR MESSAGES
3984 024376  120016                          IENR
3985 024400  002446                          TMPE
3986 024402  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
3987 024404                                  ERROR                   ;ELSE, REPORT IT
     024404  104460                                                                      TRAP    C$ERROR
3988 024406                                  ESCAPE  TST             ;       AND EXIT THIS TEST
     024406  104410                                                                      TRAP    C$ESCAPE
     024410  000346                                                                      .WORD   L10031 .
3989 024412  105037  002437                  CLRB    TMPA+1          ;LOAD SR WITH PROPER VALUE....
3990 024416  005737  002366                  TST     BRDTYP          ;  NOTE: THE INPUT LEAD (CB2) WILL EITHER BE
3991 024422  001403                          BEQ     5$              ;        TIED HI(M8064) OR LO(M8053).
3992 024424  112737  000377  002437          MOVB    #377,TMPA+1     ; IF M8064, THEN LOAD SR WITH 000.
3993 024432  004537  004042          5$:     JSR     R5,WRITE        ; IF M8053, THEN LOAD SR WITH 377.
3994 024436  120012                          SR                      ;  THIS ALSO STARTS THE SHIFTING OPERATION.
3995 024440  002437                          TMPA+1                  ;
3996
```

```
3997 024442  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
3998 024444                                 ERROR                   ;ELSE, REPORT IT
     024444  104460                                                                 TRAP    C$ERROR
3999 024446                                 ESCAPE  TST             ;       AND EXIT THIS TEST
     024446  104410                                                                 TRAP    C$ESCAPE
     024450  000306                                                                 .WORD   L10031 .
4000
4001 024452  005337  002252                 DEC     TDATA           ;INDICATE THAT "SR" HAS BEEN LOADED NOW
4002 024456  012703  000100                 MOV     #100,R3         ;GIVE THE INTERRUPT A CHANCE TO HAPPEN
4003 024462  077301                         SOB     R3,.
4004 024464  132777  000004  155634         BITB    #BIT2,@#SEL3    ;DID AN SR INTERRUPT OCCUR WITHIN THE 6502?
4005 024472  001026                         BNE     6$              ;YES, GOOD.
4006 024474  004537  003616                 JSR     R5,READ         ;NO,  SETUP TO REPORT THE ERROR:
4007 024500  120015                         IFR                     ;  GET INTERRUPT FLAG REGISTER
4008 024502  002444                         TMPD
4009 024504  103003                         BCC     .+10            ;IF NO ERROR, PROCEED
4010 024506                                 ERROR                   ;ELSE, REPORT IT
     024506  104460                                                                 TRAP    C$ERROR
4011 024510                                 ESCAPE  TST             ;       AND EXIT THIS TEST
     024510  104410                                                                 TRAP    C$ESCAPE
     024512  000244                                                                 .WORD   L10031-.
4012 024514  004537  003616                 JSR     R5,READ         ;  GET FINAL SR CONTENTS -- SHOULD BE 0
4013 024520  120012                         SR
4014 024522  002436                         TMPA
4015 024524  103003                         BCC     .+10            ;IF NO ERROR, PROCEED
4016 024526                                 ERROR                   ;ELSE, REPORT IT
     024526  104460                                                                 TRAP    C$ERROR
4017 024530                                 ESCAPE  TST             ;       AND EXIT THIS TEST
     024530  104410                                                                 TRAP    C$ESCAPE
     024532  000224                                                                 .WORD   L10031 .
4018 024534                                 GEDF    EM52B,ERR52     ;REPORT MISSING SR INTERRUPT WITHIN DMV 11
     024534  104455                                                                 TRAP    C$ERDF
     024536  000026                                                                 .WORD   22
     024540  021535                                                                 .WORD   EM52B
     024542  011270                                                                 .WORD   ERR52
4019 024544                                 ESCAPE  TST             ;FURTHER TESTING INVALID
     024544  104410                                                                 TRAP    C$ESCAPE
     024546  000210                                                                 .WORD   L10031 .
4020 024550  004537  003616          6$:    JSR     R5,READ         ;GET FINAL SR CONTENTS:
4021 024554  120012                         SR                      ; IF M8064, THEN SR SHOULD=377
4022 024556  002436                         TMPA                    ; IF M8053, THEN SR SHOULD=000
4023 024560  103003                         BCC     .+10            ;IF NO ERROR, PROCEED
4024 024562                                 ERROR                   ;ELSE, REPORT IT
     024562  104460                                                                 TRAP    C$ERROR
4025 024564                                 ESCAPE  TST             ;       AND EXIT THIS TEST
     024564  104410                                                                 TRAP    C$ESCAPE
     024566  000170                                                                 .WORD   L10031 .
4026
4027 024570  005737  002366                 TST     BRDTYP          ;CHECK DMV-11 BOARD TYPE
4028 024574  001005                         BNE     9$              ;
4029 024576  122737  000377  002436         CMPB    #377,TMPA       ;M8064::SEE IF CORRECT RESULT
4030 024604  001422                         BEQ     8$              ;       YES:GOOD
4031 024606  000403                         BR      7$              ;       NO: GO REPORT ERROR
4032 024610  105737  002436          9$:    TSTB    TMPA            ;M8053::SEE IF CORRECT RESULT
4033 024614  001416                         BEQ     8$              ;       YES:GOOD.
4034 024616  004537  003616          7$:    JSR     R5,READ         ; NO: SETUP TO REPORT THE ERROR:
```

TEST 2 VIA'S SR INPUT (MODE 2) SYSTEM CLOCK MODE

```
4035 024622  120015                        IFR                     ;  GET INTERRUPT FLAG REGISTER
4036 024624  002444                        TMPD
4037 024626  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
4038 024630                                ERROR                   ;ELSE, REPORT IT
     024630  104460                                                                TRAP    C$ERROR
4039 024632                                ESCAPE  TST             ;       AND EXIT THIS TEST
     024632  104410                                                                TRAP    C$ESCAPE
     024634  000122                                                                .WORD   L10031 .
4040 024636                                GEDF    EM52C,ERR52     ;REPORT INCOMPLETE OR BAD SHIFTING OPERATION
                                                                   ;       "DEVICE FATAL" ERROR # 23
     024636  104455                                                                TRAP    C$ERDF
     024640  000027                                                                .WORD   23
     024642  021567                                                                .WORD   EM52C
     024644  011270                                                                .WORD   ERR52
4041 024646                                ESCAPE  TST             ;FURTHER TESTING INVALID
     024646  104410                                                                TRAP    C$ESCAPE
     024650  000106                                                                .WORD   L10031-.
4042 024652  105077  155450          8$:     CLRB    @#SEL3          ;CLEAR THE INTERRUPT FLAGS
4043 024656  004537  003616                  JSR     R5,READ         ;HIT THE SHIFT REG. THIS TIME WITH A READ
4044 024662  120012                        SR                      ; (WE DON'T REALLY CARE THIS TIME WHAT THE DATA
4045 024664  002436                        TMPA                    ;  RETURNED IS. BUT, WE HAVE TO PUT IT SOMEWHERE
4046 024666  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
4047 024670                                ERROR                   ;ELSE, REPORT IT
     024670  104460                                                                TRAP    C$ERROR
4048 024672                                ESCAPE  TST             ;       AND EXIT THIS TEST
     024672  104410                                                                TRAP    C$ESCAPE
     024674  000062                                                                .WORD   L10031-.
4049 024676  004737  005132                  JSR     PC,STALL        ;DELAY FOR A LITTLE WHILE TO LET THE INTERRUPT
4050 024702  004737  005132                  JSR     PC,STALL        ;  GET THROUGH
4051 024706  004737  005132                  JSR     PC,STALL
4052 024712  132777  000004  155406          BITB    #BIT2,@#SEL3    ;DID WE GET AN INTERRUPT ON THE READ OPERATION?
4053 024720  001016                        BNE     10$             ;YES, GOOD.
4054 024722  004537  003616                  JSR     R5,READ         ;NO,  SETUP TO REPORT THE ERROR:
4055 024726  120015                        IFR                     ;  GET INTERRUPT FLAG REGISTER
4056 024730  002444                        TMPD
4057 024732  103003                        BCC     .+10            ;IF NO ERROR, PROCEED
4058 024734                                ERROR                   ;ELSE, REPORT IT
     024734  104460                                                                TRAP    C$ERROR
4059 024736                                ESCAPE  TST             ;       AND EXIT THIS TEST
     024736  104410                                                                TRAP    C$ESCAPE
     024740  000016                                                                .WORD   L10031 .
4060 024742                                GEDF    EM52D,ERR52     ;REPORT THE FAILURE.
                                                                   ;       "DEVICE FATAL' ERROR # 24
     024742  104455                                                                TRAP    C$ERDF
     024744  000030                                                                .WORD   24
     024746  021653                                                                .WORD   EM52D
     024750  011270                                                                .WORD   ERR52
4061 024752                                ESCAPE  TST
     024752  104410                                                                TRAP    C$ESCAPE
     024754  000002                                                                .WORD   L10031-.
4062 024756                        10$:
4063 024756                                ENDTST
     024756                                                                  L10031:
     024756  104401                                                                TRAP    C$ETST
4064 024760  004537  003616          GETSR:  JSR     R5,READ
4065 024764  120015                        IFR                     ;GET CURRENT INTERRUPT FLAG REGISTER SETTINGS
4066 024766  002444                        TMPD
```

TEST 2 VIA'S SR INPUT (MODE 2) SYSTEM CLOCK MODE

```
4067 024770  103003                    BCC     1$              ;IF NO ERROR, PROCEED
4068 024772                            ERROR                   ;ELSE, REPORT IT
     024772  104460                                                    TRAP    C$ERROR
4069 024774  000262                    SEV                     ;FLAG AN ERROR TO MAINLINE ROUTINE
4070 024776  000207                    RTS     PC              ;  AND TAKE AN ABNORMAL RETURN
4071
4072 025000  010046              1$:   MOV     R0,(SP)         ;SAVE REGISTER FOR CALLER
4073 025002  113700  002444            MOVB    TMPD,R0         ;PUT THEM WHERE WE CAN EASILY MASAGE THEM
4074 025006  106000                    RORB    R0              ;CA2 ===> CARRY BIT
4075 025010  106000                    RORB    R0              ;CA1 ===> CARRY BIT
4076 025012  106000                    RORB    R0              ;SR ===> CARRY BIT
4077 025014  012600                    MOV     (SP)+,R0        ;RESTORE REGISTER
4078 025016  000207                    RTS     PC              ;RETURN WITH SR INTERRUPT FLAG IN CARRY BIT
4079
```

```
4089                                    .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
     025020                                                                             T3::
4090 025020  004737  003514                    JSR     PC,MSTCLR       ;INIT DMV & START UP MAINT. LOOP
4091 025024  103003                            BCC     1$              ;IF NO ERROR, PROCEED WITH TESTING
4092 025026                                    ERROR                   ;ELSE REPORT ERROR
     025026  104460                                                                     TRAP    C$ERROR
4093 025030                                    ESCAPE  TST             ;   & EXIT TEST
     025030  104410                                                                     TRAP    C$ESCAPE
     025032  000352                                                                     .WORD   L10032 .
4094
4095 025034  004737  005134            1$:     JSR     PC,NPREAD       ;GET CONTENTS OF ALL NPR REGISTERS INTO B.2
4096 025040  103002                            BCC     30$             ;IF AN ERROR OCCURED,
4097 025042                                    ERROR                   ;REPORT IT &
     025042  104460                                                                     TRAP    C$ERROR
4098 025044  000557                            BR      24$             ;  EXIT
4099
4100 025046  012702  002740            30$:    MOV     #BT2,R2         ;POINT TO NPR REGISTER CONTENTS
4101 025052  010237  002256                    MOV     R2,BDATA        ;USE IT ALSO FOR ERROR HANDLING
4102 025056  010237  025172                    MOV     R2,13$          ;SETUP ALSO FOR READ BACK
4103
4104 025062  004537  005004                    JSR     R5,MOVSW        ;GET THE "EXPECTED' RESULTS TOO
4105 025066  002632                            NPRMCR
4106 025070  002654            12$:    BT1
4107 025072  000011            11$:    9.
4108 025074  013701  025070                    MOV     12$,R1          ;POINT TO TABLE OF EXPECTED REGISTER CONTENTS
4109 025100  010137  002254                    MOV     R1,GDATA        ;USE IT ALSO FOR ERROR HANDLING
4110 025104  012703  000001                    MOV     #1,R3           ;COUNT OF # OF NPR REGISTERS BEING PROCESSED
4111                                                                   ;FOR NOW,  ONLY THE CONTROL REGISTER IS CHECKED!!
4112
4113                                    ;**********************************************************************
4114                                    ; PLEASE NOTE THAT "GDATA' & "BDATA" NOW CONTAIN POINTERS  - NOT DATA!
4115                                    ; THIS IS A DEVIANT AND THEREFORE SHOULD BE BORNE IN MIND WHEN TRYING TO
4116                                    ; FOLLOW THIS DEVIOUS LOGIC.
4117                                    ;**********************************************************************
4118
4119 025110  121112            2$:     CMPB    (R1),(R2)       ;CHECK ONE BYTE
4120 025112  001003                    BNE     3$              ;GO REPORT FAILURE IF ANY ERROR IS FOUND
4121 025114  022122                    CMP     (R1)+,(R2)+     ;BUMP POINTERS -- TABLES ARE ACTUALLY WORD TABLES
4122 025116  077304                    SOB     R3,2$           ;LOOP IF NOT DONE YET
4123 025120  000412                    BR      4$              ;ELSE, PROCEED WITH TESTING
4124
4125 025122  163701  025070            3$:     SUB     12$,R1          ;CALCULATE THE REGISTER # CAUSING THE FAILURE
4126 025126  010137  002300                    MOV     R1,REGNUM       ;IDENTIFY FAULTY REGISTER
4127 025132                                    GEDF    EM26,ERR8       ;NPR ERROR     BAD INITIALIZATION
```

```
                                                        ;       "DEVICE FATAL" ERROR # 25
     025132  104455                                                              TRAP    C$ERDF
     025134  000031                                                              .WORD   25
     025136  016152                                                              .WORD   EM26
     025140  006532                                                              .WORD   ERR8
4128 025142                             ESCAPE  TST     ;IF IT CAN'T BE INIT'ED, WE CAN'T TEST IT!
     025142  104410                                                              TRAP    C$ESCAPE
     025144  000240                                                              .WORD   L10032-.
4129 025146  004537  004054      4$:    JSR     R5,WRITEI       ;WRITE THE TEST PATTERN INTO THE CONTROL REG.
4130 025152  123004                    NPRCTL
4131 025154  000355              5$:    355                     ;THIS SET SEVERAL BITS -  BUT NOT ALL!
4132 025156  103002                    BCC     31$             ;IF AN ERROR OCCURED,
4133 025160                             ERROR                   ;REPORT IT &
     025160  104460                                                              TRAP    C$ERROR
4134 025162  000510                    BR      24$             ;  EXIT
4135 025164  004537  003616      31$:   JSR     R5,READ         ;READ IT BACK
4136 025170  123004                    NPRCTL
4137 025172  002740              13$:   BT2
4138 025174  103002                    BCC     32$             ;IF AN ERROR OCCURED,
4139 025176                             ERROR                   ;REPORT IT &
     025176  104460                                                              TRAP    C$ERROR
4140 025200  000501                    BR      24$             ;  EXIT
4141
4142 025202  013777  025154  155044  32$:   MOV     5$,@GDATA       ;BUILD THE EXPECTED RETURN VALUE
4143 025210  042777  000300  155036          BIC     @NPRABT!NPRGO,@GDATA    ;WE CAN'T WRITE THESE BITS
4144
4145 025216  004737  005134                  JSR     PC,NPREAD       ;GET CONTENTS OF ALL NPR REGISTERS INTO BT2
4146 025222  103002                    BCC     33$             ;IF AN ERROR OCCURED,
4147 025224                             ERROR                   ;REPORT IT &
     025224  104460                                                              TRAP    C$ERROR
4148 025226  000466                    BR      24$             ;  EXIT
4149 025230  013701  002254      33$:   MOV     GDATA,R1        ;POINT TO TABLE OF EXPECTED REGISTER CONTENTS
4150 025234  013702  002256          MOV     BDATA,R2        ;POINT TO NPR REGISTER CONTENTS
4151 025240  012703  000001          MOV     #1,R3           ;COUNT OF # OF NPR REGISTERS BEING PROCESSED
4152                                                         ;FOR NOW,  ONLY THE CONTROL REGISTER IS CHECKED!!
4153
4154 025244  121112              7$:    CMPB    (R1),(R2)       ;CHECK ONE BYTE
4155 025246  001003                    BNE     8$              ;GO REPORT FAILURE IF ANY ERROR IS FOUND
4156 025250  022122                    CMP     (R1)+,(R2)+     ;BUMP POINTERS -  TABLES ARE ACTUALLY WORD TABLES
4157 025252  077304                    SOB     R3,7$           ;LOOP IF NOT DONE YET
4158 025254  000412                    BR      9$              ;ELSE, PROCEED WITH TESTING
4159
4160 025256  163701  025070      8$:    SUB     12$,R1          ;CALCULATE THE REGISTER # CAUSING THE FAILURE
4161 025262  010137  002300          MOV     R1,REGNUM       ;IDENTIFY FAULTY REGISTER
4162 025266                             GEDF    EM26A,ERR8      ;NPR ERROR -- DURING WRITE TO CONTROL REG.
                                                        ;       "DEVICE FATAL" ERROR # 26
     025266  104455                                                              TRAP    C$ERDF
     025270  000032                                                              .WORD   26
     025272  016204                                                              .WORD   EM26A
     025274  006532                                                              .WORD   ERR8
4163 025276                             ESCAPE  TST     ;IF IT CAN'T BE INIT'ED, WE CAN'T TEST IT!
     025276  104410                                                              TRAP    C$ESCAPE
     025300  000104                                                              .WORD   L10032-.
4164 025302  004737  003514      9$:    JSR     PC,MSTCLR       ;RE INITIALIZE DMV & ENTER M LOOP
4165 025306  103003                    BCC     20$             ;IF NO ERROR, PROCEED WITH TESTING
4166 025310                             ERROR                   ;ELSE REPORT IT
     025310  104460                                                              TRAP    C$ERROR
```

TEST 5 NPR CONTROL REGISTER MASTER CLEAR

```
4167 025312                          ;       ESCAPE  TST             ;   & EXIT TEST
     025312  104410                                                                  TRAP    C$ESCAPE
     025314  000070                                                                  .WORD   L10032 .
4168
4169                                 ;       THE "MASTER CLEAR" JUST PERFORMED SHOULD RESET THE NPR CONTROL
4170                                 ;       REGISTER.  IT SHOULD NOW EQUAL 004 AGAIN.
4171
4172 025316  013777  002632  154730 20$:    MOV     NPRMCR,@GDATA   ;RESET THE EXPECTED DATA
4173
4174                                 ;       ALSO, THE OTHER REGISTERS SHOULD STILL BE AT THEIR INITIAL VALUES
4175
4176 025324  004737  005134          JSR     PC,NPREAD       ;GET CONTENTS OF ALL NPR REGISTERS INTO BT2
4177 025330  103002                  BCC     34$             ;IF AN ERROR OCCURED,
4178 025332                          ERROR                   ;REPORT IT &
     025332  104460                                                                  TRAP    C$ERROR
4179 025334  000423                  BR      24$             ;  EXIT
4180 025336  013701  002254          34$:    MOV     GDATA,R1        ;POINT TO TABLE OF EXPECTED REGISTER CONTENTS
4181 025342  013702  002256          MOV     BDATA,R2        ;POINT TO NPR REGISTER CONTENTS
4182 025346  012703  000001          MOV     #1,R3           ;COUNT OF # OF NPR REGISTERS BEING PROCESSED
4183                                                         ;FOR NOW,  ONLY THE CONTROL REGISTER IS CHECKED!!
4184
4185 025352  121112          21$:    CMPB    (R1),(R2)       ;CHECK ONE BYTE
4186 025354  001003                  BNE     22$             ;GO REPORT FAILURE IF ANY ERROR IS FOUND
4187 025356  022122                  CMP     (R1)+,(R2)+     ;BUMP POINTERS -  TABLES ARE ACTUALLY WORD TABLES
4188 025360  077304                  SOB     R3,21$          ;LOOP IF NOT DONE YET
4189 025362  000410                  BR      24$             ;ELSE, PROCEED WITH TESTING
4190
4191 025364  163701  025070          22$:    SUB     12$,R1          ;CALCULATE THE REGISTER # CAUSING THE FAILURE
4192 025370  010137  002300          MOV     R1,REGNUM       ;IDENTIFY FAULTY REGISTER
4193 025374                          GEDF    EM26,ERR8       ;NPR ERROR    BAD INITIALIZATION
                                                             ;       DEVICE FATAL  ERROR # 27
     025374  104455                                                                  TRAP    C$ERDF
     025376  000033                                                                  .WORD   27
     025400  016152                                                                  .WORD   EM26
     025402  006532                                                                  .WORD   ERR8
4194 025404                  24$:    ENDTST
     025404                                                                  L10032:
     025404  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
 025406                                                                                T4::
        000004                          NPROTS = $T
 025406 004737  003514                          JSR     PC,MSTCLR       ;INIT DMV & START UP MAINT. LOOP
 025412 103003                                  BCC     1$              ;IF NO ERROR, PROCEED WITH TEST
 025414                                         ERROR                   ;ELSE, REPORT IT
 025414 104460                                                                             TRAP    C$ERROR
 025416                                         ESCAPE  TST             ;   & EXIT TEST
 025416 104410                                                                             TRAP    C$ESCAPE
 025420 000474                                                                             .WORD   L10033-.


                                        ;     --   -        -              --  --- --  - - --- - -- - ---- ---
 025422                                 1$:     BGNSUB                  ;-      MAIN MEMORY WORD DATA OUT TESTING -
 025422                                                                                T4.1:
 025422 104402                                                                             TRAP    C$BSUB
 025424 013737  002506  025442                  MOV     PATF,4$         ;SETUP COUNT OF # OF WORDS IN TEST PATTERN

 025432 004537  005266                          JSR     R5,NPRMOV       ;MOVE DATA THROUGH THE NPR LOGIC
 025436 002510                          2$:     PATF+2                  ;  ADDRESS OF DATA
 025440 002654                          3$:     BUFAREA                 ;  BUFFER AREA
 025442 000000                          4$:     0                       ;*** MODIFIED FROM ABOVE ***   WORD COUNT
 025444 000044                                  NPRDL                   ;  OPERATION TO BE UTILIZED

 025446 103025                                  BCC     7$              ;IF ERROR, REPORT IT
 025450                                 13$:    ERROR
```

```
     025450  104460                                                                         TRAP    C$ERROR
     025452  005737  002412                 TST     TMPO             ;WE JUST REPORTED ONE ERROR BUT WAS IT A TIMEOUT
     025456  001421                         BEQ     7$               ;ERROR? IF SO, PROCEED WITH TESTING.  ELSE,
     025460  022737  000006  002204         CMP     #NPRTOE,ERRNBR   ;WE WILL HAVE TO REPORT IT HERE AND NOW.
     025466  001415                         BEQ     7$               ;THE TIMEOUT ERROR WAS ALREADY REPORTED.
     025470  012737  000002  002202         MOV     #T.EHRD,ERRTYP   ;IT WASN'T REPORTED YET, SETUP FOR IT NOW:
     025476  012737  000006  002204         MOV     #NPRTOE,ERRNBR
     025504  012737  016316  002206         MOV     #EM26E,ERRMSG
     025512  012737  007314  002210         MOV     #ERR11,ERRBLK
     025520  000753                         BR      13$              ;LOOP BACK TO CAUSE REPORT @ PROPER PC LOCATION

     025522  013701  025436         7$:     MOV     2$,R1            ;POINT TO GOOD DATA
     025526  013702  025440                 MOV     3$,R2            ;        & ACTUAL DATA
     025532  013703  025442                 MOV     4$,R3            ;GET WORD COUNT
     025536  005037  002276                 CLR     ERRFLG           ;RESET ERROR FLAG

     025542  022122                 5$:     CMP     (R1)+,(R2)+      ;CHECK RECEIVED DATA
     025544  001007                         BNE     6$               ;ERROR, GO REPORT IT
     025546  077303                 11$:    SOB     R3,5$            ;GOOD,  IF MORE DO IT AGAIN
     025550  005737  002276                 TST     ERRFLG           ;ELSE, SEE IF WE MUST FINISH AN ERROR MESSAGE
     025554  001440                         BEQ     10$              ;NO,  TEST IT AGAIN BUT WITH BYTE TRANSFERS
     025556  004737  013076                 JSR     PC,NULERR        ;YES, USE COMMON ROUTINE TO END ERROR MESSAGE
     025562  000435                         BR      10$              ;WE CAN TEST IT AGAIN BUT WITH BYTE TRANSFERS

     025564  010146                 6$:     MOV     R1,-(SP)         ;SAVE THIS FOR FURTHER TESTING
     025566  014137  002254                 MOV     -(R1),GDATA      ;SETUP FOR ERROR REPORT
     025572  014237  002256                 MOV     -(R2),BDATA
     025576  010237  002252                 MOV     R2,TDATA         ;LSI-11'S MEMORY ADDRESS
     025602  163701  025436                 SUB     2$,R1            ;CALCULATE THE OFFSET AT WHICH THE
     025606  006201                         ASR     R1               ;  DATA COMPARISON ERROR OCCURED
     025610  010137  002300                 MOV     R1,REGNUM        ;THE ERROR MESSAGE WILL REPORT THIS TOO
     025614  005737  002276                 TST     ERRFLG           ;HAVE WE ALREADY REPORTED AN ERROR HERE?
     025620  001007                         BNE     8$               ;YES, THEN WE ONLY PRINT DATA THIS TIME
     025622  005237  002276                 INC     ERRFLG           ;NO,  SET FLAG & REPORT THE WHOLE MESSAGE
     025626                                 GEDF    EM26B,ERR9       ;WORD NPR TRANSFER DMV ===> LSI
                                                                     ;       "DEVICE FATAL" ERROR # 28
     025626  104455                                                                         TRAP    C$ERDF
     025630  000034                                                                         .WORD   28
     025632  016226                                                                         .WORD   EM26B
     025634  007300                                                                         .WORD   ERR9
     025636  000402                         BR      9$               ;  RESUME TESTING

     025640  004737  012574         8$:     JSR     PC,ERR9$         ;IDENTIFY THE FAILING DATA
     025644  012601                 9$:     MOV     (SP)+,R1         ;RESTORE POINTERS
     025646  013702  002252                 MOV     TDATA,R2
     025652  005722                         TST     (R2)+
     025654  000734                         BR      11$              ;AND RESUME TESTING

     025656                         10$:    ENDSUB
     025656                                                                         L10034:
     025656  104403                                                                         TRAP    C$ESUB


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

     025660                                 BGNSUB                   ;  - - -  MAIN MEMORY BYTE DATA OUT TESTING
     025660                                                                         T4.2:
     025660  104402                                                                         TRAP    C$BSUB
```

TEST 4 - NPR DATA-OUT

```
4289 025662  013737  002456  025700          MOV     PATB,4$          ;SETUP COUNT OF # OF WORDS IN TEST PATTERN
4290
4291 025670  004537  005266                  JSR     R5,NPRMOV        ;MOVE DATA THROUGH THE NPR LOGIC
4292 025674  002460                  2$:     PATB+2                   ;  ADDRESS OF DATA
4293 025676  002654                  3$:     BUFAREA                  ;  BUFFER AREA
4294 025700  000000                  4$:     0                        ;*** MODIFIED FROM ABOVE *** -- BYTE COUNT
4295 025702  000054                          NPRDLB                   ;  OPERATION TO BE UTILIZED
4296
4297 025704  103025                          BCC     7$               ;IF ERROR, REPORT IT
4298 025706                          13$:    ERROR
     025706  104460                                                   TRAP    C$ERROR
4299 025710  005737  002412                  TST     TMP0             ;WE JUST REPORTED ONE ERROR BUT WAS IT A TIMEOUT
4300 025714  001421                          BEQ     7$               ;ERROR? IF SO, PROCEED WITH TESTING.  ELSE,
4301 025716  022737  000006  002204          CMP     @NPRTOE,ERRNBR   ;WE WILL HAVE TO REPORT IT HERE AND NOW.
4302 025724  001415                          BEQ     7$               ;THE TIMEOUT ERROR WAS ALREADY REPORTED.
4303 025726  012737  000002  002202          MOV     @T.EHRD,ERRTYP   ;IT WASN'T REPORTED YET, SETUP FOR IT NOW:
4304 025734  012737  000006  002204          MOV     @NPRTOE,ERRNBR
4305 025742  012737  016316  002206          MOV     @EM26E,ERRMSG
4306 025750  012737  007314  002210          MOV     @ERR11,ERRBLK
4307 025756  000753                          BR      13$              ;LOOP BACK TO CAUSE REPORT @ PROPER PC LOCATION
4308
4309 025760  013701  025674          7$:     MOV     2$,R1            ;POINT TO GOOD DATA
4310 025764  013702  025676                  MOV     3$,R2            ;       & ACTUAL DATA
4311 025770  013703  025700                  MOV     4$,R3            ;GET BYTE COUNT
4312 025774  005037  002276                  CLR     ERRFLG           ;RESET ERROR FLAG
4313
4314 026000  122122                  5$:     CMPB    (R1)+,(R2)+      ;CHECK RECEIVED DATA
4315 026002  001007                          BNE     6$               ;ERROR, GO REPORT IT
4316 026004  077303                  11$:    SOB     R3,5$            ;GOOD.  IF MORE DO IT AGAIN
4317 026006  005737  002276                  TST     ERRFLG           ;ELSE, SEE IF WE MUST FINISH AN ERROR MESSAGE
4318 026012  001437                          BEQ     10$              ;NO.  THEN WE CAN EXIT THE TEST
4319 026014  004737  013076                  JSR     PC,NULERR        ;YES, OUTPUT THE REQUIRED BLANK LINES.  NOW
4320 026020  000434                          BR      10$              ;THEN WE CAN EXIT THE TEST
4321
4322 026022  010146                  6$:     MOV     R1,-(SP)         ;SAVE THIS FOR FURTHER TESTING
4323 026024  114137  002254                  MOVB    (R1),GDATA       ;SETUP FOR ERROR REPORT
4324 026030  114237  002256                  MOVB    (R2),BDATA
4325 026034  010237  002252                  MOV     R2,TDATA         ;LSI-11'S MEMORY ADDRESS
4326 026040  163701  025674                  SUB     2$,R1            ;CALCULATE THE OFFSET AT WHICH THE
4327                                                                  ;  DATA COMPARISON ERROR OCCURED
4328 026044  010137  002300                  MOV     R1,REGNUM        ;THE ERROR MESSAGE WILL REPORT THIS TOO
4329 026050  005737  002276                  TST     ERRFLG           ;HAVE WE ALREADY REPORTED AN ERROR HERE?
4330 026054  001007                          BNE     8$               ;YES, THEN WE ONLY PRINT DATA THIS TIME
4331 026056  005237  002276                  INC     ERRFLG           ;NO.  SET FLAG & REPORT THE WHOLE MESSAGE
4332 026062                                  GEDF    EM26C,ERR10      ;BYTE NPR TRANSFER DMV ===> LSI
                                                                      ;       "DEVICE FATAL' ERROR # 29
     026062  104455                                                                  TRAP    C$ERDF
     026064  000035                                                                  .WORD   29
     026066  016251                                                                  .WORD   EM26C
     026070  007306                                                                  .WORD   ERR10
4333 026072  000402                          BR      9$               ;  RESUME TESTING
4334
4335 026074  004737  012732          8$:     JSR     PC,ERR10$        ;IDENTIFY THE FAILING DATA
4336 026100  012601                  9$:     MOV     (SP)+,R1         ;RESTORE POINTERS
4337 026102  013702  002252                  MOV     TDATA,R2
4338 026106  005202                          INC     R2
4339 026110  000735                          BR      11$              ;AND RESUME TESTING
```

TEST 4 - NPR DATA-OUT

```
4340
4341 026112                          10$:    ENDSUB
     026112                                                  L10035:
     026112  104403                                                 TRAP    C$ESUB
4342 026114                                  ENDTST
     026114                                                  L10033:
     026114  104401                                                 TRAP    C$ETST
```

```
4360                                    .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
     026116                                                                     T5.:
4361 026116  004737  003514             1$:     JSR     PC,MSTCLR       ;INIT DMV & START UP MAINT. LOOP
4362 026122  103003                             BCC     1$              ;IF NO ERROR, PROCEED WITH TEST
4363 026124                                     ERROR                   ;ELSE, REPORT IT
     026124  104460                                                             TRAP    C$ERROR
4364 026126                                     ESCAPE  T5              ;   & EXIT TEST
     026126  104410                                                             TRAP    C$ESCAPE
     026130  000234                                                             .WORD   L10036-.
4365
4366 026132                             1$:
4367 026132  013737  002506  026150             MOV     PATF,4$         ;SETUP COUNT OF # OF WORDS IN TEST PATTERN
4368
4369 026140  004537  005266                     JSR     R5,NPRMOV       ;MOVE DATA THROUGH THE NPR LOGIC
4370 026144  002510                     2$:     PATF+2                  ;  ADDRESS OF DATA
4371 026146  002654                     3$:     BUFAREA                 ;  BUFFER AREA
4372 026150  000000                     4$:     0                       ;*** MODIFIED FROM ABOVE ***    WORD COUNT
4373 026152  000004                             NPRLD                   ;  OPERATION TO BE UTILIZED
4374
4375 026154  103025                             BCC     7$              ;IF ERROR, REPORT IT
4376 026156                             13$:    ERROR
     026156  104460                                                             TRAP    C$ERROR
4377 026160  005737  002412                     TST     TMPO            ;WE JUST REPORTED ONE ERROR BUT WAS IT A TIMEOUT
4378 026164  001421                             BEQ     7$              ;ERROR? IF SO, PROCEED WITH TESTING.  ELSE,
4379 026166  022737  000006  002204             CMP     #NPRTOE,ERRNBR  ;WE WILL HAVE TO REPORT IT HERE AND NOW.
4380 026174  001415                             BEQ     7$              ;THE TIMEOUT ERROR WAS ALREADY REPORTED.
4381 026176  012737  000002  002202             MOV     #T.EHRD,ERRTYP  ;IT WASN'T REPORTED YET, SETUP FOR IT NOW:
4382 026204  012737  000006  002204             MOV     #NPRTOE,ERRNBR
4383 026212  012737  016316  002206             MOV     #EM26E,ERRMSG
4384 026220  012737  007314  002210             MOV     #ERR11,ERRBLK
4385 026226  000753                             BR      13$             ;LOOP BACK TO CAUSE REPORT @ PROPER PC LOCATION
4386
4387 026230  013701  026144             7$:     MOV     2$,R1           ;POINT TO GOOD DATA
4388 026234  013702  026146                     MOV     3$,R2           ;       & ACTUAL DATA
4389 026240  013703  026150                     MOV     4$,R3           ;GET WORD COUNT
4390 026244  005037  002276                     CLR     ERRFLG          ;RESET ERROR FLAG
```

TEST 5 NPR DATA IN

```
4391
4392 026250  022122                5$:     CMP     (R1)+,(R2)+     ;CHECK RECEIVED DATA
4393 026252  001007                        BNE     6$              ;ERROR, GO REPORT IT
4394 026254  077303                11$:    SOB     R3,5$           ;GOOD,  IF MORE DO IT AGAIN
4395 026256  005737  002276                TST     ERRFLG          ;ELSE, SEE IF WE MUST FINISH AN ERROR MESSAGE
4396 026262  001440                        BEQ     10$             ;NO,  THEN WE CAN EXIT THE TEST
4397 026264  004737  013076                JSR     PC,NULERR       ;YES, USE COMMON ROUTINE TO END ERROR MESSAGE
4398 026270  000435                        BR      10$             ;THEN WE CAN EXIT THE TEST
4399
4400 026272  010246                6$:     MOV     R2, (SP)        ;SAVE THIS FOR FURTHER TESTING
4401 026274  014137  002254                MOV      (R1),GDATA     ;SETUP FOR ERROR REPORT
4402 026300  014237  002256                MOV      (R2),BDATA
4403 026304  010137  002252                MOV     R1,TDATA        ;LSI 11'S MEMORY ADDRESS
4404 026310  163701  026144                SUB     2$,R1           ;CALCULATE THE OFFSET AT WHICH THE
4405 026314  006201                        ASR     R1              ;  DATA COMPARISON ERROR OCCURED
4406 026316  010137  002300                MOV     R1,REGNUM       ;THE ERROR MESSAGE WILL REPORT THIS TOO
4407 026322  005737  002276                TST     ERRFLG          ;HAVE WE ALREADY REPORTED AN ERROR HERE?
4408 026326  001007                        BNE     8$              ;YES, THEN WE ONLY PRINT DATA THIS TIME
4409
4410 026330  005237  002276                INC     ERRFLG          ;NO,  SET FLAG & REPORT THE WHOLE MESSAGE
4411 026334                                GEDF    EM26D,ERR9      ;WORD NPR TRANSFER LSI ---> DMV
                                                                   ;       'DEVICE FATAL" ERROR # 30
     026334  104455                                                                TRAP    C$ERDF
     026336  000036                                                                .WORD   30
     026340  016274                                                                .WORD   EM26D
     026342  007300                                                                .WORD   ERR9
4412 026344  000402                        BR      9$              ;  RESUME TESTING
4413
4414 026346  004737  012574          8$:   JSR     PC,ERR9$        ;IDENTIFY THE FAILING DATA
4415 026352  012602                9$:   MOV     (SP)+,R2        ;RESTORE POINTERS
4416 026354  013701  002252                MOV     TDATA,R1
4417 026360  005721                        TST     (R1)+
4418 026362  000734                        BR      11$             ;AND RESUME TESTING
4419
4420 026364                        10$:
4421 026364                                ENDTST
     026364                                                                L10036:
     026364  104401                                                                TRAP    C$ETST
```

```
4435                                    .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
     026366                                                                          T6::
4436                                    ;***  SUBTEST # 1    NPR OUTPUT TO NON EXISTENT LOCATION FORCING NPR-ABORT  ****
4437
4438 026366                             BGNSUB
     026366                                                                          T6.1:
     026366  104402                                                                 TRAP    C$BSUB
4439 026370  004737  003514            JSR     PC,MSTCLR       ;INIT DMV & ENTER M-LOOP
4440 026374  103003                    BCC     .+10            ;IF NO ERROR, PROCEED WITH TESTING
4441 026376                            ERROR                   ;ELSE, REPORT ERROR
     026376  104460                                                                 TRAP    C$ERROR
4442 026400                            ESCAPE  SUB             ;    & EXIT TEST
     026400  104410                                                                 TRAP    C$ESCAPE
     026402  000164                                                                 .WORD   L10040-.
4443 026404  012737  000001  002412    MOV     #1,TMP0         ;DISABLE PRINTOUT OF TIMEOUT COUNT BY ERR11
4444
4445 026412  012737  160000  002420    MOV     #160000,TMP3    ;SETUP 11'S ADDRESS
4446 026420  012737  000044  002414    MOV     #NPRDL,TMP1     ;CONTROL REG. VALUE FOR NPR OUT COMMAND
4447 026426  004537  004042            JSR     R5,WRITE        ;SETUP ADDRESS OUT REGISTERS
4448 026432  000070                    NPRAOL
4449 026434  002420                    TMP3
4450 026436  103003                    BCC     .+10            ;IF NO ERROR, PROCEED
4451 026440                            ERROR                   ;ELSE, REPORT IT
     026440  104460                                                                 TRAP    C$ERROR
4452 026442                            ESCAPE  SUB             ;       AND EXIT THIS TEST
     026442  104410                                                                 TRAP    C$ESCAPE
     026444  000122                                                                 .WORD   L10040-.
4453 026446  004537  004042            JSR     R5,WRITE
4454 026452  000071                    NPRAOH
4455 026454  002421                    TMP3+1
4456 026456  103003                    BCC     .+10            ;IF NO ERROR, PROCEED
4457 026460                            ERROR                   ;ELSE, REPORT IT
     026460  104460                                                                 TRAP    C$ERROR
4458 026462                            ESCAPE  SUB             ;       AND EXIT THIS TEST
     026462  104410                                                                 TRAP    C$ESCAPE
     026464  000102                                                                 .WORD   L10040-.
4459 026466  004537  004054            JSR     R5,WRITEI
4460 026472  000072                    NPRACX
4461 026474  000200                    NPRBS7                  ;  (THIS SETS BS7 & CLEARS EXTENDED ADDR. BITS)
4462 026476  103003                    BCC     .+10            ;IF NO ERROR, PROCEED
```

```
 4463 026500                              ERROR                       ;ELSE, REPORT IT
      026500  104460                                                                                TRAP    C$ERROR
 4464 026502                              ESCAPE  SUB                 ;       AND EXIT THIS TEST
      026502  104410                                                                                TRAP    C$ESCAPE
      026504  000062                                                                                .WORD   L10040 .
 4465 026506  004537  004042              JSR     R5,WRITE            ;INITIATE THE NPR OUT OPERATION
 4466 026512  123004                      NPRCTL
 4467 026514  002414                      TMP1
 4468 026516  103003                      BCC     .+10                ;IF NO ERROR  PROCEED
 4469 026520                              ERROR                       ;ELSE, REPOR  I
      026520  104460                                                                                TRAP    C$ERROR
 4470 026522                              ESCAPE  SUB                 ;       AN  EXI   HIS TEST
      026522  104410                                                                                TRAP    C$ESCAPE
      026524  000042                                                                                .WORD   L10040 .
 4471 026526  004537  003616              JSR     R5,READ             ;READ BACK THE CONTROL-STATUS REGISTER
 4472 026532  123004                      NPRCTL
 4473 026534  002416                      TMP2
 4474 026536  103003                      BCC     .+10                ;IF NO ERRO . PROCEED
 4475 026540                              ERROR                       ;ELSE, REPORT IT
      026540  104460                                                                                TRAP    C$ERROR
 4476 026542                              ESCAPE  SUB                 ;       AND EXIT THIS TEST
      026542  104410                                                                                TRAP    C$ESCAPE
      026544  000022                                                                                .WORD   L10040 .
 4477 026546  132737  000200  002416      BITB    #NPRABT,TMP2        ;THE ABORT BIT SHOULD BE SET
 4478 026554  001004                      BNE     20$                 ;IT IS.  EXIT SUBTEST
 4479 026556                              GEDF    EM26G,ERR11         ;IT DIDN'T.  REPORT "MISSING NPR ABORT
                                                                      ;       "DEVICE FATAL" ERROR # 31
      026556  104455                                                                                TRAP    C$ERDF
      026560  000037                                                                                .WORD   31
      026562  016402                                                                                .WORD   EM26G
      026564  007314                                                                                .WORD   ERR11
 4480 026566                      20$:    ENDSUB
      026566                                                                               L10040:
      026566  104403                                                                                TRAP    C$ESUB
 4481                             ;***  SUBTEST #2 -- NPR OUTPUT TO EXISTENT LOCATION YIELDING NO NPR ABORT  ****
 4482
 4483 026570                              BGNSUB
      026570                                                                                T6.2:
      026570  104402                                                                                TRAP    C$BSUB
 4484 026572  004737  003514              JSR     PC,MSTCLR           ;INIT DMV & ENTER M LOOP
 4485 026576  103003                      BCC     .+10                ;IF NO ERROR, PROCEED WITH TESTING
 4486 026600                              ERROR                       ;ELSE, REPORT ERROR
      026600  104460                                                                                TRAP    C$ERROR
 4487 026602                              ESCAPE  SUB                 ;   & EXIT TEST
      026602  104410                                                                                TRAP    C$ESCAPE
      026604  000164                                                                                .WORD   L10041 .
 4488 026606  012737  000001  002412      MOV     #1,TMP0             ;DISABLE PRINTOUT OF TIMEOUT-COUNT BY ERR11
 4489
 4490 026614  012737  002654  002420      MOV     #BUFAREA,TMP3       ;SETUP 11 S ADDRESS
 4491 026622  012737  000044  002414      MOV     #NPRDL,TMP1         ;CONTROL REG. VALUE FOR NPR-OUT COMMAND
 4492 026630  004537  004042              JSR     R5,WRITE            ;SETUP ADDRESS OUT REGISTERS
 4493 026634  000070                      NPRAOL
 4494 026636  002420                      TMP3
 4495 026640  103003                      BCC     .+10                ;IF NO ERROR, PROCEED
 4496 026642                              ERROR                       ;ELSE, REPORT IT
      026642  104460                                                                                TRAP    C$ERROR
 4497 026644                              ESCAPE  SUB                 ;       AND EXIT THIS TEST
```

TEST 6 NPR XFER ABORT

```
        026644  104410                                                          TRAP    C$ESCAPE
        026646  000122                                                          .WORD   L10041 .
4498    026650  004537  004042          JSR     R5,WRITE
4499    026654  000071                  NPRAOH
4500    026656  002421                  TMP3+1
4501    026660  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
4502    026662                          ERROR                   ;ELSE, REPORT IT
        026662  104460                                                          TRAP    C$ERROR
4503    026664                          ESCAPE  SUB             ;       AND EXIT THIS TEST
        026664  104410                                                          TRAP    C$ESCAPE
        026666  000102                                                          .WORD   L10041 .
4504    026670  004537  004054          JSR     R5,WRITEI
4505    026674  000072                  NPRAOX
4506    026676  000000                  0                       ;  (THIS CLEARS BS7 & EXTENDED ADDR. BITS)
4507    026700  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
4508    026702                          ERROR                   ;ELSE, REPORT IT
        026702  104460                                                          TRAP    C$ERROR
4509    026704                          ESCAPE  SUB             ;       AND EXIT THIS TEST
        026704  104410                                                          TRAP    C$ESCAPE
        026706  000062                                                          .WORD   L10041-.
4510    026710  004537  004042          JSR     R5,WRITE        ;INITIATE THE NPR OUT OPERATION
4511    026714  123004                  NPRCTL
4512    026716  002414                  TMP1
4513    026720  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
4514    026722                          ERROR                   ;ELSE, REPORT IT
        026722  104460                                                          TRAP    C$ERROR
4515    026724                          ESCAPE  SUB             ;       AND EXIT THIS TEST
        026724  104410                                                          TRAP    C$ESCAPE
        026726  000042                                                          .WORD   L10041-.
4516    026730  004537  003616          JSR     R5,READ         ;READ BACK THE CONTROL STATUS REGISTER
4517    026734  123004                  NPRCTL
4518    026736  002416                  TMP2
4519    026740  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
4520    026742                          ERROR                   ;ELSE, REPORT IT
        026742  104460                                                          TRAP    C$ERROR
4521    026744                          ESCAPE  SUB             ;       AND EXIT THIS TEST
        026744  104410                                                          TRAP    C$ESCAPE
        026746  000022                                                          .WORD   L10041 .
4522    026750  132737  000200  002416  BITB    @NPRABT,TMP2    ;THE ABORT BIT SHOULD BE SET
4523    026756  001404                  BEQ     20$             ;IT IS.  EXIT SUBTEST
4524    026760                          GEDF    EM26E,ERR11     ;IT DIDN'T.  REPORT MISSING NPR ABORT
                                                                ;       "DEVICE FATAL' ERROR # 32
        026760  104455                                                          TRAP    C$ERDF
        026762  000040                                                          .WORD   32
        026764  016316                                                          .WORD   EM26E
        026766  007314                                                          .WORD   ERR11
4525    026770                  20$:    ENDSUB
        026770                                                          L10041:
        026770  104403                                                          TRAP    C$ESUB
4526    026772                          ENDTST
        026772                                                          L10037:
        026772  104401                                                          TRAP    C$ETST
```

TEST 7 NPR EXTENDED ADDRESS BIT TEST

```
4544                                    .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
     026774                                                                     T7::
4545 026774  004737  003514                     JSR     PC,MSTCLR       ;INIT DMV & ENTER M-LOOP
4546 027000  103003                             BCC     1$              ;IF NO ERROR, PROCEED WITH TESTING
4547 027002                                     ERROR                   ;ELSE, REPORT ERROR
     027002  104460                                                             TRAP    C$ERROR
4548 027004                                     EXIT    TST             ;   & EXIT TEST
     027004  104432                                                             TRAP    C$EXIT
     027006  001506                                                             .WORD   L10042-.
4549 027010  013700  002120        1$:          MOV     L$HIMEM,R0      ;GET LAST VALID "PAR" VALUE FROM SUPERVISOR
4550 027014  042700  001777                     BIC     #1777,R0        ;THESE BITS CORESPOND TO BITS 6 - > 15 OF THE
4551                                                                    ;ACTUAL ADDRESS AND AREN'T OUR CONCERN HERE.
4552 027020  001002                             BNE     2$              ;IF THE RESULT IS ZERO,
4553 027022                                     EXIT    TST             ;       THERE IS NOTHING TO TEST
     027022  104432                                                             TRAP    C$EXIT
     027024  001470                                                             .WORD   L10042 .
4554                                                                    ;ELSE, PROCEED TO SETUP MMU'S PAR AND DMV S NPR
4555                                                                    ;       REGISTER MAXIMUM VALUES
4556
4557 027026  010037  002436        2$:          MOV     R0,TMPA         ;THIS IS FOR THE MMU
4558
4559                                    ;*************************************************************************
4560
4561 027032                             12$:    BGNSUB                  ;TEST THE NPR-IN USING EXTENDED ADDR. BITS
     027032                                                                   T7.1:
     027032  104402                                                             TRAP    C$BSUB
4562 027034  012737  177777  002434             MOV     #177777,TMP9    ;INITIALIZE TEMP 9
4563 027042  012737  002000  002442             MOV     #BIT10,TMPC     ;INITIALIZE PAGE ADDRESS REG. VARIABLE
4564 027050  112737  000001  002451             MOVB    #BIT0,TMPF+1    ;INITIALIZE NPR EXTENDED ADDRESS REG. VARIABLE
4565 027056  004737  030516                     JSR     PC,XMINIT       ;INITIALIZE THE MMU
4566
4567                                    ;**************** WRITE/READ/VERIFY NPRAIH,NPRAIL ****************
4568 027062  004537  004054                     JSR     R5,WRITEI       ;POINT NPR REGISTERS TO 0
4569 027066  000074                             NPRAIL
4570 027070  000000                             0
4571 027072  004537  004054                     JSR     R5,WRITEI
```

TEST 7 - NPR EXTENDED ADDRESS BIT TEST

```
4572 027076  000075                        NPRAIH
4573 027100  000000                        0
4574 027102  004537  003616                JSR     R5,READ          ;READ BACK THE ADDRESS & VERIFY IT
4575 027106  000074                        NPRAIL
4576 027110  002434                        TMP9
4577 027112  004537  003616                JSR     R5,READ
4578 027116  000075                        NPRAIH
4579 027120  002435                        TMP9+1
4580 027122  023727  002434  000000        CMP     TMP9,#000000     ;IS IT CORRECT?
4581 027130  001424                        BEQ     2$               ;YES, PROCEED.
4582 027132  013737  002434  002256        MOV     TMP9,BDATA       ;NO, SETUP FOR & REPORT LOADING FAILURE
4583 027140  012737  000000  002254        MOV     #000000,GDATA
4584 027146  012737  000007  002300        MOV     #7,REGNUM        ;IDENTIFY NPRAIH AS THE CULPRIT
4585 027154  105737  002434                TSTB    TMP9             ;IS THAT REALLY TRUE?
4586 027160  001002                        BNE     1$               ;MAYBE.  BUT, NPRAIL IS DEFINITELY AT FAULT
4587 027162  005237  002300                INC     REGNUM           ;        SO IDENTIFY IT AS SUCH
4588 027166                        1$:     GEDF    EM26A,ERR14      ;REPORT THE FAILURE
                                                                    ;       "DEVICE FATAL  ERROR # 33
     027166  104455                                                                    TRAP    C$ERDF
     027170  000041                                                                    .WORD   33
     027172  016204                                                                    .WORD   EM26A
     027174  011002                                                                    .WORD   ERR14
4589 027176                                ESCAPE  SUB              ;       AND EXIT THIS SUBTEST
     027176  104410                                                                    TRAP    C$ESCAPE
     027200  000506                                                                    .WORD   L10043 .
4590                               ;*****************************************************************
4591                               ;***************** MAIN SUBTEST #1 LOOP STARTS HERE ******************
4592                               ;*****************************************************************
4593
4594                               ;**************** COMPLEMENT OF NPRDRH:NPRDRL => TMP3 ****************
4595 027202  004537  003616        2$:     JSR     R5,READ          ;GET THE CURRENT CONTENTS OF THE NPR DATA REG'S
4596 027206  123000                        NPRDRL
4597 027210  002414                        TMP1
4598 027212  103003                        BCC     .+10             ;IF NO ERROR, PROCEED
4599 027214                                ERROR                    ;ELSE, REPORT IT
     027214  104460                                                                    TRAP    C$ERROR
4600 027216                                ESCAPE  SUB              ;       AND EXIT THIS TEST
     027216  104410                                                                    TRAP    C$ESCAPE
     027220  000466                                                                    .WORD   L10043 .
4601 027222  004537  003616                JSR     R5,READ
4602 027226  123001                        NPRDRH
4603 027230  002415                        TMP1+1
4604 027232  103003                        BCC     .+10             ;IF NO ERROR, PROCEED
4605 027234                                ERROR                    ;ELSE, REPORT IT
     027234  104460                                                                    TRAP    C$ERROR
4606 027236                                ESCAPE  SUB              ;       AND EXIT THIS TEST
     027236  104410                                                                    TRAP    C$ESCAPE
     027240  000446                                                                    .WORD   L10043-.
4607 027242  013737  002414  002420        MOV     TMP1,TMP3        ;USE CURRENT DATA & BUILD BACKGROUND PATTERN
4608 027250  005137  002420                COM     TMP3             ;COMPLEMENT IT TO GENERATE A BACKGROUND PATTERN
4609
4610                               ;********** TMP3 => 1ST LOCATION OF EACH EXTENDED MEMORY BLOCK **********
4611 027254  012737  002000  002446        MOV     #BIT10,TMPE      ;REFILL ALL TEST LOCATIONS STARTING HERE
4612 027262  004537  030636        4$:     JSR     R5,XMWRIT        ;WRITE BACKGROUND PATTERN GENERATED ABOVE
4613 027266  002446                        TMPE                     ; POINTER TO  PAR  FORMAT ADDERSS
4614 027270  002420                        TMP3                     ; POINTER TO DATA (TO BE WRITTEN)
4615 027272  103003                        BCC     .+10             ;IF NO ERROR, PROCEED
```

```
4616 027274                                     ERROR                       ;ELSE, REPORT IT
     027274  104460                                                                                  TRAP    C$ERROR
4617 027276                                     ESCAPE  SUB                 ;       AND EXIT THIS TEST
     027276  104410                                                                                  TRAP    C$ESCAPE
     027300  000406                                                                                  .WORD   L10043 .
4618 027302  062737  002000  002446             ADD     #BIT10,TMPE         ;INCREMENT THE PAGE ADDR. REG. VALUE
4619 027310  001404                             BEQ     6$                  ;DONE IF IT GOES TO ZERO
4620 027312  023737  002446  002436             CMP     TMPE,TMPA           ;IS THE NEW VALUE WITHIN CURRENT MEMORY?
4621 027320  101760                             BLOS    4$                  ;YES, THE WRITE IT TOO.
4622                                                                        ;NO,  DONE.
4623                                   ;*************** WRITE/READ/VERIFY NPRAIX ***************
4624 027322  004537  004042            6$:      JSR     R5,WRITE            ;SETUP NPR EXTENDED ADDR. REG BITS
4625 027326  000076                             NPRAIX
4626 027330  002451                             TMPF+1
4627 027332  103003                             BCC     .+10                ;IF NO ERROR, PROCEED
4628 027334                                     ERROR                       ;ELSE, REPORT IT
     027334  104460                                                                                  TRAP    C$ERROR
4629 027336                                     ESCAPE  SUB                 ;       AND EXIT THIS TEST
     027336  104410                                                                                  TRAP    C$ESCAPE
     027340  000346                                                                                  .WORD   L10043 .
4630 027342  004537  003616                     JSR     R5,READ             ;READ IT BACK & VERIFY THAT IT S CORRECT
4631 027346  000076                             NPRAIX
4632 027350  002450                             TMPF
4633 027352  103003                             BCC     .+10                ;IF NO ERROR, PROCEED
4634 027354                                     ERROR                       ;ELSE, REPORT IT
     027354  104460                                                                                  TRAP    C$ERROR
4635 027356                                     ESCAPE  SUB                 ;       AND EXIT THIS TEST
     027356  104410                                                                                  TRAP    C$ESCAPE
     027360  000326                                                                                  .WORD   L10043-.
4636 027362  123737  002450  002451             CMPB    TMPF,TMPF+1         ;DID IT LOAD CORRECTLY?
4637 027370  001417                             BEQ     8$                  ;YES, PROCEED
4638 027372  113737  002451  002254             MOVB    TMPF+1,GDATA        ;NO, SETUP FOR ERROR HANDLER
4639 027400  113737  002450  002256             MOVB    TMPF,BDATA
4640 027406  012737  000006  002300             MOV     #6,REGNUM           ;       IDENTIFY NPRAIX AS FAILING REG.
4641 027414                                     GEDF    EM26A,ERR14         ;REPORT THE FAILURE
                                                                            ;       'DEVICE FATAL' ERROR # 34
     027414  104455                                                                                  TRAP    C$ERDF
     027416  000042                                                                                  .WORD   34
     027420  016204                                                                                  .WORD   EM26A
     027422  011002                                                                                  .WORD   ERR14
4642 027424                                     ESCAPE  SUB                 ;       AND EXIT THIS SUBTEST
     027424  104410                                                                                  TRAP    C$ESCAPE
     027426  000260                                                                                  .WORD   L10043 .
4643
4644                                   ;*************** GENERATE/WRITE TEST WORD INTO "TMPC" (LSI 11) ***************
4645 027430  013737  002420  002254    8$:      MOV     TMP3,GDATA          ;GENERATE A TEST DATA PATTERN FROM BACKGROUND
4646 027436  062737  125252  002254             ADD     #125252,GDATA       ;PATTERN BY ADDING THIS TO IT.
4647
4648 027444  004537  030636                     JSR     R5,XMWRIT           ;LOAD UP THE TEST PATTERN
4649 027450  002442                             TMPC                        ; POINTER TO "PAR" FORMAT ADDRESS
4650 027452  002254                             GDATA                       ; POINTER TO DATA (TO BE WRITTEN)
4651 027454  103003                             BCC     .+10                ;IF NO ERROR, PROCEED
4652 027456                                     ERROR                       ;ELSE, REPORT IT
     027456  104460                                                                                  TRAP    C$ERROR
4653 027460                                     ESCAPE  SUB                 ;       AND EXIT THIS SUBTEST
     027460  104410                                                                                  TRAP    C$ESCAPE
     027462  000224                                                                                  .WORD   L10043 .
```

SEQ 0125

TEST * NPR EXTENDED ADDRESS BIT TEST

```
4654 027464  112737  000004  002417          MOVB    #NPRLD,TMP2+1   ;SETUP CONTROL VALUE TO DO NPR IN
4655 027472  004537  004042                  JSR     R5,WRITE        ;PERFORM THE "EXTENDED' DATA IN NPR
4656 027476  123004                          NPRCTL
4657 027500  002417                          TMP2+1
4658 027502  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
4659 027504                                  ERROR                   ;ELSE, REPORT IT
     027504  104460                                                  TRAP    C$ERROR
4660 027506                                  ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
     027506  104410                                                  TRAP    C$ESCAPE
     027510  000176                                                  .WORD   L10043 .
4661
4662                                ;*************** CHECK THE NPR OPERATION (DATA/NPRCTL) ***************
4663 027512  004537  003616                  JSR     R5,READ         ;CHECK THE NPR OPERATION
4664 027516  123004                          NPRCTL
4665 027520  002416                          TMP2
4666 027522  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
4667 027524                                  ERROR                   ;ELSE, REPORT IT
     027524  104460                                                  TRAP    C$ERROR
4668 027526                                  ESCAPE  SUB             ;       AND EXIT THIS TEST
     027526  104410                                                  TRAP    C$ESCAPE
     027530  000156                                                  .WORD   L10043 .
4669 027532  004537  003616                  JSR     R5,READ         ;GET THE DATA WE SHOULD HAVE JUST LOADED INTO
4670 027536  123001                          NPRDRH                  ;       THE NPR DATA REGISTERS FROM THE
4671 027540  002257                          BDATA+1                 ;       EXTENDED MEMORY AREA
4672 027542  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
4673 027544                                  ERROR                   ;ELSE, REPORT IT
     027544  104460                                                  TRAP    C$ERROR
4674 027546                                  ESCAPE  SUB             ;       AND EXIT THIS TEST
     027546  104410                                                  TRAP    C$ESCAPE
     027550  000136                                                  .WORD   L10043-.
4675 027552  004537  003616                  JSR     R5,READ
4676 027556  123000                          NPRDRL
4677 027560  002256                          BDATA
4678 027562  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
4679 027564                                  ERROR                   ;ELSE, REPORT IT
     027564  104460                                                  TRAP    C$ERROR
4680 027566                                  ESCAPE  SUB             ;       AND EXIT THIS TEST
     027566  104410                                                  TRAP    C$ESCAPE
     027570  000116                                                  .WORD   L10043 .
4681 027572  132737  000300  002416          BITB    #300,TMP2       ;DID IT ABORT OR HANG?
4682 027600  001414                          BEQ     14$             ;NO, GOOD.  PROCEED WITH SUBTEST
4683 027602  100005                          BPL     10$             ;YES, WHICH ONE?
4684 027604                                  GEDF    EM27A,ERR12     ;ABORT, REPORT IT AS SUCH.
                                                                     ;       "DEVICE FATAL" ERROR # 35
     027604  104455                                                  TRAP    C$ERDF
     027606  000043                                                  .WORD   35
     027610  016437                                                  .WORD   EM27A
     027612  007456                                                  .WORD   ERR12
4685 027614  000404                          BR      12$             ;AND EXIT
4686 027616                          10$:    GEDF    EM27B,ERR12     ;HANG, REPORT IT AS SUCH.
                                                                     ;       "DEVICE FATAL' ERROR # 36
     027616  104455                                                  TRAP    C$ERDF
     027620  000044                                                  .WORD   36
     027622  016461                                                  .WORD   EM27B
     027624  007456                                                  .WORD   ERR12
4687 027626                          12$:    ESCAPE  SUB             ;  AND EXIT SUBTEST
     027626  104410                                                  TRAP    C$ESCAPE
```

```
TEST 7    NPR EXTENDED ADDRESS BIT TEST

                027630  000056                                                          .WORD   L10043 .
4688            027632  023737  002256  002254  14$:    CMP     BDATA,GDATA     ;DID WE READ THE TEST DATA USING THE NPR?
4689            027640  001406                          BEQ     20$             ;YES.  WELL THIS ONE WORKED.
4690            027642                                  GEDF    EM27C,ERR12     ;NO!   REPORT THE ERROR.
                                                                                ;       "DEVICE FATAL" ERROR # 37
                027642  104455                                                          TRAP    C$ERDF
                027644  000045                                                          .WORD   37
                027646  016502                                                          .WORD   EM27C
                027650  007456                                                          .WORD   ERR12
4691            027652                                  ESCAPE  SUB             ;  EXIT FROM SUBTEST AFTER PRINTING ERROR MSG.
                027652  104410                                                          TRAP    C$ESCAPE
                027654  000032                                                          .WORD   L10043 .
4692            027656  062737  002000  002442  20$:    ADD     #BIT10,TMPC     ;POINT TO NEXT PAGE ADDRESS REG. VALUE
4693            027664  001410                          BEQ     63$             ;IF 0, WE'RE DONE
4694            027666  023737  002442  002436          CMP     TMPC,TMPA       ;IF GREATER THEN MAXIMUM VALUE,
4695            027674  101004                          BHI     63$             ;       WE'RE DONE TOO.
4696            027676  105237  002451                  INCB    TMPF+1          ;ELSE, INCREMENT NPR'S EXTENDED ADDR. REG.
4697            027702  000137  027202                  JMP     2$              ;AND GO BACK TO DO THIS ADDRESS
4698
4699            027706                          63$:    ENDSUB
                027706                                                                  L10043:
                027706  104403                                                          TRAP    C$ESUB
4700                    ;*************************************************************************
4701
4702            027710                                  BGNSUB                  ;TEST THE NPR OUT USING EXTENDED ADDR. BITS
                027710                                                                  T7.2:
                027710  104402                                                          TRAP    C$BSUB
4703            027712  012737  002000  002442          MOV     #BIT10,TMPC     ;INITIALIZE PAGE ADDRESS REG. VARIABLE
4704            027720  112737  000001  002451          MOVB    #BIT0,TMPF+1    ;INITIALIZE NPR EXTENDED ADDRESS REG. VARIABLE
4705            027726  004737  030516                  JSR     PC,XMINIT       ;INITIALIZE THE MMU
4706
4707                    ;*************** WRITE/READ/VERIFY NPRAOH,NPRAOL ***************
4708            027732  004537  004054                  JSR     R5,WRITEI       ;POINT NPR REGISTERS TO 0
4709            027736  000070                          NPRAOL
4710            027740  000000                          0
4711            027742  004537  004054                  JSR     R5,WRITEI
4712            027746  000071                          NPRAOH
4713            027750  000000                          0
4714            027752  004537  003616                  JSR     R5,READ         ;READ BACK THE ADDRESS & VERIFY IT
4715            027756  000070                          NPRAOL
4716            027760  002434                          TMP9
4717            027762  004537  003616                  JSR     R5,READ
4718            027766  000071                          NPRAOH
4719            027770  002435                          TMP9+1
4720            027772  023727  002434  000000          CMP     TMP9,#000000    ;IS IT CORRECT?
4721            030000  001427                          BEQ     2$              ;YES. PROCEED.
4722            030002  013737  002434  002256          MOV     TMP9,BDATA      ;NO. SETUP FOR & REPORT LOADING FAILURE
4723            030010  012737  000000  002254          MOV     #000000,GDATA
4724            030016  012737  000004  002300          MOV     #4,REGNUM       ;IDENTIFY NPRAIH AS THE CULPRIT
4725            030024  105737  002434                  TSTB    TMP9            ;IS THAT REALLY TRUE?
4726            030030  001002                          BNE     1$              ;MAYBE.  BUT, NPRAIL IS DEFINATELY AT FAULT
4727            030032  005237  002300                  INC     REGNUM          ;       SO IDENTIFY IT AS SUCH
4728            030036                          1$:     GEDF    EM26A,ERR14     ;REPORT THE FAILURE
                                                                                ;       "DEVICE FATAL" ERROR # 38
                030036  104455                                                          TRAP    C$ERDF
                030040  000046                                                          .WORD   38
                030042  016204                                                          .WORD   EM26A
```

```
                030044  011002                                                                  .WORD   ERR14
4729            030046                          ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
                030046  104410                                                                  TRAP    C$ESCAPE
                030050  000442                                                                  .WORD   L10044 .
4730            030052  012737  123456  002420          MOV     #123456,TMP3    ;USE THIS AS INITIAL BACKGROUND PATTERN
4731
4732                                    ;*************************************************************************
4733                                    ;****************** MAIN SUBTEST #2 LOOP STARTS HERE *********************
4734                                    ;*************************************************************************
4735
4736                                    ;********** TMP3 => 1ST LOCATION OF EACH EXTENDED MEMORY BLOCK **********
4737            030060  062737  021475  002420  2$:     ADD     #21475,TMP3     ;GENERATE THE PATTERN WE'LL USE THIS TIME
4738            030066  013737  002420  002414          MOV     TMP3,TMP1       ;PUT HERE FOR ERROR HANDLER
4739            030074  005137  002414                  COM     TMP1
4740
4741            030100  012737  002000  002446          MOV     #BIT10,TMPE     ;REFILL ALL TEST LOCATIONS STARTING HERE
4742            030106  004537  030636          4$:     JSR     R5,XMWRIT       ;WRITE BACKGROUND PATTERN GENERATED ABOVE
4743            030112  002446                          TMPE                    ; POINTER TO ADDRESS (IN "PAR" FORMAT)
4744            030114  002420                          TMP3                    ; POINTER TO DATA (TO BE WRITTEN)
4745            030116  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
4746            030120                                  ERROR                   ;ELSE, REPORT IT
                030120  104460                                                                  TRAP    C$ERROR
4747            030122                          ESCAPE  SUB             ;       AND EXIT THIS TEST
                030122  104410                                                                  TRAP    C$ESCAPE
                030124  000366                                                                  .WORD   L10044-.
4748            030126  062737  002000  002446          ADD     #BIT10,TMPE     ;INCREMENT THE PAGE ADDR. REG. VALUE
4749            030134  001404                          BEQ     6$              ;DONE IF IT GOES TO ZERO
4750            030136  023737  002446  002436          CMP     TMPE,TMPA       ;IS THE NEW VALUE WITHIN CURRENT MEMORY?
4751            030144  101760                          BLOS    4$              ;YES, THE WRITE IT TOO.
4752                                                                            ;NO,  DONE.
4753
4754                                    ;*************** WRITE/READ/VERIFY NPRAIX ***************
4755            030146  004537  004042          6$:     JSR     R5,WRITE        ;SETUP NPR EXTENDED ADDR. REG BITS
4756            030152  000072                          NPRAOX
4757            030154  002451                          TMPF+1
4758            030156  103003                          BCC     .+10            ;IF NO ERROR, PROCEED
4759            030160                                  ERROR                   ;ELSE, REPORT IT
                030160  104460                                                                  TRAP    C$ERROR
4760            030162                          ESCAPE  SUB             ;       AND EXIT THIS TEST
                030162  104410                                                                  TRAP    C$ESCAPE
                030164  000326                                                                  .WORD   L10044 .
4761            030166  004537  003616          JSR     R5,READ         ;READ IT BACK & VERIFY THAT IT'S CORRECT
4762            030172  000072                  NPRAOX
4763            030174  002450                  TMPF
4764            030176  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
4765            030200                          ERROR                   ;ELSE, REPORT IT
                030200  104460                                                                  TRAP    C$ERROR
4766            030202                          ESCAPE  SUB             ;       AND EXIT THIS TEST
                030202  104410                                                                  TRAP    C$ESCAPE
                030204  000306                                                                  .WORD   L10044-.
4767            030206  123737  002450  002451          CMPB    TMPF,TMPF+1     ;DID IT LOAD CORRECTLY?
4768            030214  001417                          BEQ     8$              ;YES, PROCEED
4769            030216  113737  002451  002254          MOVB    TMPF+1,GDATA    ;NO, SETUP FOR ERROR HANDLER
4770            030224  113737  002450  002256          MOVB    TMPF,BDATA
4771            030232  012737  000003  002300          MOV     #3,REGNUM       ;       IDENTIFY NPRAIX AS FAILING REG.
4772            030240                                  GEDF    EM26A,ERR14     ;REPORT THE FAILURE
                                                                                ;       "DEVICE FATAL' ERROR # 39
```

TEST 7 - NPR EXTENDED ADDRESS BIT TEST

```
        030240  104455                                                          TRAP    C$ERDF
        030242  000047                                                          .WORD   39
        030244  016204                                                          .WORD   EM26A
        030246  011002                                                          .WORD   ERR14
  4773  030250                          ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
        030250  104410                                                          TRAP    C$ESCAPE
        030252  000240                                                          .WORD   L10044-.
  4774
  4775                          ;***************** WRITE(LSI-11) TEST LOCATION BACKGROUND PATTERN ***************
  4776  030254  004537  030636  8$:     JSR     R5,XMWRIT       ;SETUP TEST LOCATION'S BACKGROUND PATTERN
  4777  030260  002442                  TMPC
  4778  030262  002414                  TMP1
  4779  030264  013737  002420  002254        MOV     TMP3,GDATA      ;GENERATE A TEST DATA PATTERN FROM BACKGROUND
  4780  030272  062737  052525  002254        ADD     #52525,GDATA    ;PATTERN BY ADDING THIS TO IT.
  4781
  4782                          ;***************** LOAD(DMV) TEST PATTERN ***************
  4783  030300  004537  004042        JSR     R5,WRITE                ;LOAD UP THE TEST PATTERN
  4784  030304  123001                  NPRDRH
  4785  030306  002255                  GDATA+1
  4786  030310  004537  004042        JSR     R5,WRITE
  4787  030314  123000                  NPRDRL
  4788  030316  002254                  GDATA
  4789  030320  112737  000044  002417        MOVB    #NPRDL,TMP2+1   ;SETUP CONTROL VALUE TO DO NPR-OUT
  4790
  4791                          ;***************** PERFORM/CHECK EXTENDED NPR OPERATION ***************
  4792  030326  004537  004042        JSR     R5,WRITE        ;PERFORM THE "EXTENDED" DATA-OUT NPR
  4793  030332  123004                  NPRCTL
  4794  030334  002417                  TMP2+1
  4795  030336  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
  4796  030340                          ERROR                   ;ELSE, REPORT IT
        030340  104460                                                          TRAP    C$ERROR
  4797  030342                          ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
        030342  104410                                                          TRAP    C$ESCAPE
        030344  000146                                                          .WORD   L10044 .
  4798  030346  004537  003616        JSR     R5,READ         ;CHECK THE NPR OPERATION
  4799  030352  123004                  NPRCTL
  4800  030354  002416                  TMP2
  4801  030356  103003                  BCC     .+10            ;IF NO ERROR, PROCEED
  4802  030360                          ERROR                   ;ELSE, REPORT IT
        030360  104460                                                          TRAP    C$ERROR
  4803  030362                          ESCAPE  SUB             ;       AND EXIT THIS SUBTEST
        030362  104410                                                          TRAP    C$ESCAPE
        030364  000126                                                          .WORD   L10044-.
  4804  030366  132737  000300  002416        BITB    #300,TMP2       ;DID IT ABORT OR HANG?
  4805  030374  001414                  BEQ     14$             ;NO, GOOD.  PROCEED WITH SUBTEST
  4806  030376  100005                  BPL     10$             ;YES, WHICH ONE?
  4807  030400                          GEDF    EM27A,ERR12     ;ABORT, REPORT IT AS SUCH.
                                                                  ;       "DEVICE FATAL" ERROR # 40
        030400  104455                                                          TRAP    C$ERDF
        030402  000050                                                          .WORD   40
        030404  016437                                                          .WORD   EM27A
        030406  007456                                                          .WORD   ERR12
  4808  030410  000404                  BR      12$             ;AND EXIT
  4809  030412                  10$:    GEDF    EM27B,ERR12     ;HANG, REPORT IT AS SUCH.
                                                                  ;       "DEVICE FATAL" ERROR # 41
        030412  104455                                                          TRAP    C$ERDF
        030414  000051                                                          .WORD   41
```

TEST 7 -- NPR EXTENDED ADDRESS BIT TEST

```
        030416  016461                                                          .WORD   EM27B
        030420  007456                                                          .WORD   ERR12
4810    030422                          12$:    ESCAPE  SUB             ;  AND EXIT SUBTEST
        030422  104410                                                          TRAP    C$ESCAPE
        030424  000066                                                          .WORD   L10044 .
4811    030426  004537  030734          14$:    JSR     R5,XMREAD       ;GET THE DATA WE SHOULD HAVE JUST LOADED INTO
4812    030432  002442                          TMPC
4813    030434  002256                          BDATA
4814    030436  023737  002256  002254          CMP     BDATA,GDATA     ;DID WE READ THE TEST DATA USING THE NPR?
4815    030444  001406                          BEQ     20$             ;YES,  WELL THIS ONE WORKED.
4816    030446                                  GEDF    EM27C,ERR12     ;NO!   REPORT THE ERROR.
                                                                        ;       "DEVICE FATAL" ERROR # 42
        030446  104455                                                          TRAP    C$ERDF
        030450  000052                                                          .WORD   42
        030452  016502                                                          .WORD   EM27C
        030454  007456                                                          .WORD   ERR12
4817    030456                                  ESCAPE  SUB             ;  EXIT FROM SUBTEST AFTER PRINTING ERROR MSG.
        030456  104410                                                          TRAP    C$ESCAPE
        030460  000032                                                          .WORD   L10044-.
4818    030462  062737  002000  002442  20$:    ADD     #8IT10,TMPC     ;POINT TO NEXT PAGE ADDRESS REG. VALUE
4819    030470  001410                          BEQ     63$             ;IF 0, WE'RE DONE
4820    030472  023737  002442  002436          CMP     TMPC,TMPA       ;IF GREATER THEN MAXIMUM VALUE,
4821    030500  101004                          BHI     63$             ;       WE'RE DONE TOO.
4822    030502  105237  002451                  INCB    TMPF+1          ;ELSE, INCREMENT NPR'S EXTENDED ADDR. REG.
4823    030506  000137  030060                  JMP     2$              ;AND GO BACK TO DO THIS ADDRESS
4824
4825
4826    030512                          63$:    ENDSUB
        030512                                                                  L10044:
        030512  104403                                                          TRAP    C$ESUB
4827    030514                                  ENDTST
        030514                                                                  L10042:
        030514  104401                                                          TRAP    C$ETST
4828
4829                                    ;*****************************************************************************
4830                                    ; XMINIT -- SUBROUTINE TO INITIALIZE EXTENDED MEMORY (ALIAS: MEMORY MANAGEMENT
4831                                    ;       UNIT) HARDWARE REGISTERS.
4832                                    ;
4833                                    ;*****************************************************************************
4834
4835    030516  010046          XMINIT: MOV     R0,-(SP)        ;SAVE WORKING REGISTERS
4836    030520  010146                  MOV     R1,-(SP)
4837    030522  010346                  MOV     R3,-(SP)
4838    030524  013737  000004  031060          MOV     @#4,XM4HOL      ;SETUP @4 TRAP VALUE (JUST IN CASE)
4839
4840    030532  012700  077406                  MOV     #77406,R0       ;"PDR" INITIALIZATION VALUE
4841                                                                    ;  774 = FULL PAGE ACCESS
4842                                                                    ;  0 = UPWARD EXPANSION
4843                                                                    ;  6 = RESIDENT READ/WRITE
4844    030536  012701  172300                  MOV     #172300,R1      ;ADDRESS OF KPDR0
4845    030542  012703  000010                  MOV     #8.,R3          ;LOOP VALUE -- # OF PDR'S
4846    030546  010021          1$:     MOV     R0,(R1)+        ;SETUP 1 PDR
4847    030550  077302                  SOB     R3,1$           ;IF ANOTHER PDR, DO IT TOO
4848                                                            ;ELSE, FALL THROUGH & INITIALIZE PAR'S
4849
4850    030552  005000                  CLR     R0              ;INITIALIZATION VALUE FOR KPAR0
4851    030554  012701  172340                  MOV     #172340,R1      ;ADDRESS OF KPAR0
```

TEST 7 -- NPR EXTENDED ADDRESS BIT TEST

```
4852 030560  012703  000007            2$:   MOV     #7,R3             ;LOOP VALUE  - ONLY FIRST 7 PAR'S DONE BY LOOP
4853 030564  010021                      2$:   MOV     R0,(R1)+          ;SETUP 1 PAR
4854 030566  062700  000200                    ADD     #200,R0           ;CALCULATE NEXT PAR'S INITIALIZATION VALUE
4855 030572  077304                            SOB     R3,2$             ;IF ANOTHEER PAR, DO IT TOO
4856 030574  012721  177600                    MOV     #177600,(R1)+     ;ELSE, SETUP KPAR7 FOR I/O PAGE ACCESSING
4857
4858 030600                                    SETVEC  #250,#XMINTH,#7 ;SETUP OUR OWN TRAP CATCHER FOR ABORT HANDLING
     030600  012746  000007                                                    MOV     #7, (SP)
     030604  012746  031062                                                    MOV     #XMINTH, (SP)
     030610  012746  000250                                                    MOV     #250,-(SP)
     030614  012746  000003                                                    MOV     #3, (SP)
     030620  104437                                                            TRAP    C$SVEC
     030622  062706  000010                                                    ADD     #10,SP
4859 030626  012603                            MOV     (SP)+,R3          ;RESTORE CALLER'S REGISTERS
4860 030630  012601                            MOV     (SP)+,R1
4861 030632  012600                            MOV     (SP)+,R0
4862 030634  000207                            RTS     PC                ;RETURN
4863
4864                                 ;*************************************************************************
4865                                 ; XMWRIT -- SUBROUTINE TO WRITE ONE WORD INTO AN EXTENDED MEMORY LOCATION.
4866                                 ;
4867                                 ;       CALLING SEQUENCE:
4868                                 ;
4869                                 ;       JSR     R5,XMWRIT
4870                                 ;       <PRINTER TO HIGH ORDER BITS OF ADDRESS IN 'PAR" FORMAT>
4871                                 ;       <POINTER TO DATA TO BE WRITTEN>
4872                                 ;
4873                                 ;*************************************************************************
4874
4875 030636  010146                 XMWRIT: MOV     R1, (SP)          ;SAVE RECISTER(S)
4876
4877 030640  012701  172354                    MOV     #172354,R1        ;ADDRESS OF KPAR6
4878 030644  011146                            MOV     (R1),-(SP)        ;SAVE CURRENT KPAR6 VALUE
4879 030646  013511                            MOV     @(R5)+,(R1)       ;SETUP "PAR" FOR THIS WRITE
4880 030650  011137  002426                    MOV     (R1),TMP6         ;SAVE ADDRESS FOR ERROR MESSAGE
4881 030654  012737  000060  172516            MOV     #BIT4+BIT5,@#172516  ;ENABLE 22 BIT & I/O PAGE ADDRESSING IN SR3
4882 030662  000241                            CLC                       ;CLEAR OUR ERROR FLAG
4883 030664  013737  000004  031060            MOV     @#4,XM4HOL        ;* SETUP TRAP CATCHER @4 (BECAUSE OF MAPPING)
4884 030672  012737  031032  000004            MOV     #XM4INT,@#4       ;*
4885 030700  052737  000001  177572            BIS     #1,@#177572       ;ENABLE MEMORY MANAGEMENT
4886 030706  013537  140000                    MOV     @(R5)+,@#140000 ;WRITE ONE WORD IN THE SPECIFIED PAGE
4887 030712  042737  000001  177572            BIC     #1,@#177572       ;TURN OFF MEMORY MANAGEMENT
4888 030720  013737  031060  000004            MOV     XM4HOL,@#4        ;* RESTORE SUPERVISOR TRAP VECTOR @4
4889 030726  012611                            MOV     (SP)+,(R1)        ;RESTORE KPAR6
4890
4891 030730  012601                            MOV     (SP)+,R1          ;RESTORE CALLER'S REGISTER(S)
4892 030732  000205                            RTS     R5                ;RETURN
4893
4894
4895                                 ;*************************************************************************
4896                                 ; XMREAD    SUBROUTINE TO READ FROM AN EXTENDED MEMORY LOCATION.
4897                                 ;
4898                                 ;       CALLING SEQUENCE:
4899                                 ;
4900                                 ;       JSR     R5,XMREAD
4901                                 ;       <PRINTER TO HIGH ORDER BITS OF ADDRESS IN 'PAR  FORMAT>
4902                                 ;       <POINTER TO DATA RECEIVING LOCATION>
```

```
                                        ;
                                        ;*****************************************************************************
                                        ;
030734  010146                         xMREAD: MOV     R1,-(SP)        ;SAVE REGISTER(S)
                                        ;
030736  012701  172354                          MOV     #172354,R1      ;ADDRESS OF KPAR6
030742  011146                                  MOV     (R1),-(SP)      ;SAVE CURRENT KPAR6 VALUE
030744  013511                                  MOV     @(R5)+,(R1)     ;SETUP "PAR" FOR THIS READ
030746  011137  002426                         MOV     (R1),TMP6       ;SAVE ADDRESS FOR ERROR MESSAGE
030752  012737  000060  172516                 MOV     #BIT4+BIT5,@#172516  ;ENABLE 22 BIT & I/O PAGE ADDRESSING IN SR3
030760  000241                                  CLC                     ;CLEAR OUR ERROR FLAG
030762  013737  000004  031060                 MOV     @#4,XM4HOL      ;* SETUP TRAP CATCHER @4 (BECAUSE OF MAPPING)
030770  012737  031032  000004                 MOV     #XM4INT,@#4     ;*
030776  052737  000001  177572                 BIS     #1,@#177572     ;ENABLE MEMORY MANAGEMENT
031004  013735  140000                         MOV     @#140000,@(R5)+ ;READ ONE WORD IN THE SPECIFIED PAGE
031010  042737  000001  177572                 BIC     #1,@#177572     ;TURN OFF MEMORY MANAGEMENT
031016  013737  031060  000004                 MOV     XM4HOL,@#4      ;* RESTORE SUPERVISOR TRAP VECTOR @4
031024  012611                                  MOV     (SP)+,(R1)      ;RESTORE KPAR6
                                        ;
031026  012601                                  MOV     (SP)+,R1        ;RESTORE CALLER'S REGISTER(S)
031030  000205                                  RTS     R5              ;RETURN
                                        ;
                                        ;
                                        ;*****************************************************************************
                                        ; HANDLER FOR @LOC 4 TRAP PROCESSING (FOR TESTS 7 & 8)
                                        ;*****************************************************************************
031032  042737  000001  177572         XM4INT: BIC     #1,@#177572     ;TURN OFF MEMORY MANAGEMENT
031040  013737  031060  000004                 MOV     XM4HOL,@#4      ;* RESTORE SUPERVISOR TRAP VECTOR @4
031046  000240                                  NOP                     ;*
031050  000240                                  NOP                     ;*
031052  000240                                  NOP                     ;*
031054  000177  146724                         JMP     @4              ;NOW JUMP THRU IT !
031060  000000                         XM4HOL: 0
                                        ;
                                        ;*****************************************************************************
                                        ; INTERRUPT HANDLER FOR MEMORY MANAGEMENT ABORT PROCESSING
                                        ;*****************************************************************************
                                        ;
031062                                          BGNSRV  XMINTH
031062                                                                  XMINTH::
031062  010037  002372                          MOV     R0,REG0         ;SAVE GENERAL REGISTERS
031066  010137  002374                          MOV     R1,REG1
031072  010237  002376                          MOV     R2,REG2
031076  010337  002400                          MOV     R3,REG3
031102  010437  002402                          MOV     R4,REG4
031106  010537  002404                          MOV     R5,REG5
031112  016637  000002  002406                 MOV     2(SP),REG6      ;SAVE PSW FROM ERROR TRAP
031120  011637  002410                         MOV     (SP),REG7       ;LIKEWISE FOR PC
                                        ;
031124  013737  177572  002412                 MOV     @#177572,TMP0   ;SAVE THE MMU'S STATUS/CONTROL REGISTERS
031132  013737  177574  002414                 MOV     @#177574,TMP1
031140  013737  177576  002416                 MOV     @#177576,TMP2
031146  013737  172516  002420                 MOV     @#172516,TMP3
                                        ;
031154  013737  172354  002422                 MOV     @#172354,TMP4   ;SAVE KERNEL PAR WE'RE SUPPOSE TO BE USING
                                        ;
031162  013737  172314  002424                 MOV     @#172314,TMP5   ;SAVE KERNEL PDR WE'RE SUPPOSE TO BE USING
```

```
TEST *    NPR EXTENDED ADDRESS BIT TEST

4959
4960 031170  011537  002430                MOV     (R5),TMP7       ;SAVE DATA READ OR WRITTEN
4961
4962 031174                                GTDF    EM27,ERR13      ;QUEUE UP THE MMU ERROR
                                                                   ;       QUEUE "DEVICE FATAL" ERROR # 43
     031174  012737  000001  002202                                                    MOV     #T.EDF,ERRTYP
     031202  012737  000053  002204                                                    MOV     #43,ERRNBR
     031210  012737  016424  002206                                                    MOV     #EM27,ERRMSG
     031216  012737  010240  002210                                                    MOV     #ERR13,ERRBLK
4963
4964 031224  052766  000001  000002          BIS     #BIT0,2(SP)     ;SET CARRY BIT (AS ERROR FLAG) IN PSW ON STACK
4965
4966 031232                                ENDSRV
     031232                                                                  L10045:
     031232  000002                                                                RTI
4967
```

TEST 8 SPECIAL MFG EXTENDED BIT TEST

```
4986                                    .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
    031234                                                                                      T8::
4987
4988 031234  032737  000002  002370            BIT     #2,PT.CTL       ;IS THIS A MFG SPECIAL Q22 SYSTEM?
4989 031242  001002                            BNE     .+6             ;YES: GO START TEST
4990 031244                                    EXIT    TST             ; NO: SKIP THIS TEST
     031244  104432                                                                     TRAP    C$EXIT
     031246  001212                                                                     .WORD   L10046-.
4991
4992 031250  004737  003514                    JSR     PC,MSTCLR       ;INIT DMV & ENTER M LOOP
4993 031254  103003                            BCC     1$              ;IF NO ERROR, PROCEED WITH TESTING
4994 031256                                    ERROR                   ;ELSE, REPORT ERROR
     031256  104460                                                                     TRAP    C$ERROR
4995 031260                                    EXIT    TST             ;   & EXIT TEST
     031260  104432                                                                     TRAP    C$EXIT
     031262  001176                                                                     .WORD   L10046 .
4996                                    ;*****************************************************************************
4997                                    ;** SUBTEST #1 : TEST THE NPR IN EXTENDED ADDRESS BITS
4998                                    ;*****************************************************************************
4999 031264                            1$:     BGNSUB
     031264                                                                                 T8.1:
     031264  104402                                                                     TRAP    C$BSUB
5000 031266  004737  030516                    JSR     PC,XMINIT       ;INITIALIZE THE MMU
5001 031272  005004                            CLR     R4              ;CLEAR INDEX
5002
5003 031274  005002                            CLR     R2              ;SETUP EXTENDED MEM BACKGROUND PATTERN
5004 031276  016262  032462  032500  2$:      MOV     XLOC0(R2),XVAL0(R2)     ;(IN XVAL0 => XVAL6)
5005 031304  005722                            TST     (R2)+
5006 031306  020227  000016                    CMP     R2,#14.
5007 031312  001371                            BNE     2$
5008
5009                                    ;************** MAIN LOOP STARTS HERE **************
5010
5011                                    ;*      WRITE XVAL0, XVAL1, XVAL2, ... XVAL6 INTO THE SEVEN SPECIFIC
5012                                    ;*      EXTENDED ADDRESSES SPECIFIED BY XLOC0 THRU XLOC6 USING 11/23 MMU
```

```
5013                                        ;*      (XLOC'S SPECIFY THE UPPER TWO BYTES OF THE 3 BYTE EXTENDED ADDR)
5014
5015 031314  005002                                 CLR     R2                  ;CLEAR LOCAL INDEX
5016 031316  016237  032500  002440  11$:          MOV     XVALO(R2),TMPB      ;SETUP DATA POINTER
5017 031324  016237  032462  002436                MOV     XLOCO(R2),TMPA      ;SETUP/ADJUST PAR VALUE
5018 031332  006337  002436                        ASL     TMPA
5019 031336  006337  002436                        ASL     TMPA
5020 031342  004537  030636                        JSR     R5,XMWRIT           ;WRITE BACKGROUND PATTERN
5021 031346  002436                                TMPA                        ; POINTER TO PAR VALUE
5022 031350  002440                                TMPB                        ; POINTER TO DATA
5023
5024 031352  005722                                TST     (R2)+               ;BUMP INDEX
5025 031354  020227  000016                        CMP     R2,#14.             ;ALL 'XLOC' EXTENDED ADDRESSES WRITTEN?
5026 031360  001356                                BNE     11$                 ; NO:  WRITE ANOTHER
5027
5028                                        ;**************** SETUP DMV'S NPR ADDRESSING REGISTERS ****************
5029                                        ;************** (WRITE/READ/VERIFY NPRAIH,NPRAIL,NPRAIX) **************
5030 031362  116437  032463  031416  3$:          MOVB    XLOCO+1(R4),4$      ;SETUP NPRAIX VALUE.
5031 031370  004537  004054                        JSR     R5,WRITEI           ;POINT NPR REGISTERS TO EXTENDED ADDRESS
5032 031374  000074                                NPRAIL
5033 031376  000000                                0
5034 031400  004537  004054                        JSR     R5,WRITEI
5035 031404  000075                                NPRAIH
5036 031406  000000                                0
5037 031410  004537  004054                        JSR     R5,WRITEI
5038 031414  000076                                NPRAIX
5039 031416  000000                        4$:     00
5040 031420  004537  003616                        JSR     R5,READ             ;READ BACK THE ADDRESS
5041 031424  000074                                NPRAIL
5042 031426  002256                                BDATA
5043 031430  004537  003616                        JSR     R5,READ
5044 031434  000075                                NPRAIH
5045 031436  002257                                BDATA+1
5046 031440  004537  003616                        JSR     R5,READ
5047 031444  000076                                NPRAIX
5048 031446  002434                                TMP9
5049                                                                            ;********** NOW CHECK THEM **********
5050 031450  005737  002256                        TST     BDATA               ;NPRAIL,NPRAIH=0 ?
5051 031454  001413                                BEQ     6$                  ; YES: TRY CHECKING NPRAIX
5052 031456  005037  002254                        CLR     GDATA               ; NO:  REPORT ERROR...
5053 031462  012737  000007  002300                MOV     #7,REGNUM           ;
5054 031470  105737  002256                        TSTB    BDATA
5055 031474  001020                                BNE     7$
5056 031476  005237  002300                        INC     REGNUM
5057 031502  000415                                BR      7$
5058 031504  013737  031416  002254  6$:          MOV     4$,GDATA            ;SET UP NPRAIX EXPECTED
5059 031512  013737  002434  002256                MOV     TMP9,BDATA          ;SET UP NPRAIX READ...
5060 031520  023737  002254  002256                CMP     GDATA,BDATA         ;DOES NPRAIX=EXPECTED ?
5061 031526  001411                                BEQ     9$                  ; YES: CONTINUE
5062 031530  012737  000006  002300                MOV     #6,REGNUM           ; NO:  REPORT ERROR
5063 031536                              7$:        GEDF    EM26A,ERR14
                                                                            ;       "DEVICE FATAL' ERROR # 44
     031536  104455                                                                        TRAP    C$ERDF
     031540  000054                                                                        .WORD   44
     031542  016204                                                                        .WORD   EM26A
     031544  011002                                                                        .WORD   ERR14
5064 031546                                 ESCAPE  SUB
```

TEST 8 - SPECIAL MFG EXTENDED BIT TEST

```
        031546  104410                                                          TRAP    C$ESCAPE
        031550  000152                                                          .WORD   L10047-.
5065
5066                                    ;******* SETUP/START/CHECK THE NPR OPERATION (DATA/NPRCTL) *********
5067 031552  112737  000004  002417  9$:     MOVB    #NPRLD,TMP2+1   ;SETUP CONTROL VALUE TO DO NPR IN
5068
5069 031560  004537  004042          JSR     R5,WRITE        ;PERFORM THE "EXTENDED" DATA IN NPR
5070 031564  123004                  NPRCTL
5071 031566  002417                  TMP2+1
5072 031570  004537  003616          JSR     R5,READ         ;CHECK THE NPR OPERATION
5073 031574  123004                  NPRCTL
5074 031576  002416                  TMP2
5075 031600  004537  003616          JSR     R5,READ         ;GET THE DATA WE SHOULD HAVE JUST LOADED INTO
5076 031604  123001                  NPRDRH                  ;       THE NPR DATA REGISTERS FROM THE
5077 031606  002257                  BDATA+1                 ;       EXTENDED MEMORY AREA
5078 031610  004537  003616          JSR     R5,READ
5079 031614  123000                  NPRDRL
5080 031616  002256                  BDATA
5081 031620  132737  000300  002416  BITB    #300,TMP2       ;DID IT ABORT OR HANG?
5082 031626  001414                  BEQ     14$             ; NO:  GOOD.  PROCEED WITH SUBTEST
5083 031630  100005                  BPL     10$             ; YES: WHICH ONE?
5084 031632                          GEDF    EM27A,ERR12     ;ABORT, REPORT IT AS SUCH.
                                                             ;       'DEVICE FATAL' ERROR # 45
        031632  104455                                                          TRAP    C$ERDF
        031634  000055                                                          .WORD   45
        031636  016437                                                          .WORD   EM27A
        031640  007456                                                          .WORD   ERR12
5085 031642  000404                  BR      12$             ;AND EXIT
5086 031644                  10$:    GEDF    EM27B,ERR12     ;HANG, REPORT IT AS SUCH.
                                                             ;       DEVICE FATAL' ERROR # 46
        031644  104455                                                          TRAP    C$ERDF
        031646  000056                                                          .WORD   46
        031650  016461                                                          .WORD   EM27B
        031652  007456                                                          .WORD   ERR12
5087 031654                  12$:    ESCAPE  SUB             ;  AND EXIT SUBTEST
        031654  104410                                                          TRAP    C$ESCAPE
        031656  000044                                                          .WORD   L10047 .
5088
5089                                    ;************** NOW CHECK DATA READ AGAINST EXPECTED VALUE **************
5090 031660  016437  032462  002254  14$:     MOV     XLOCO(R4),GDATA ;SET UP EXPECTED READ VALUE
5091
5092 031666  023737  002256  002254          CMP     BDATA,GDATA     ;DID WE READ THE TEST DATA USING THE NPR?
5093 031674  001406                  BEQ     15$             ;
5094 031676                          GEDF    EM27C,ERR12     ; NO:  REPORT THE ERROR.
                                                             ;       "DEVICE FATAL" ERROR # 47
        031676  104455                                                          TRAP    C$ERDF
        031700  000057                                                          .WORD   47
        031702  016502                                                          .WORD   EM27C
        031704  007456                                                          .WORD   ERR12
5095 031706                          ESCAPE  SUB             ;       AND EXIT FROM SUBTEST
        031706  104410                                                          TRAP    C$ESCAPE
        031710  000012                                                          .WORD   L10047 .
5096
5097 031712  005724                  15$:    TST     (R4)+           ; YES: BUMP INDEX
5098 031714  020427  000016                  CMP     R4,#14.         ;ARE WE DONE W/ALL EXTENDED LOCATIONS
5099 031720  001220                  BNE     3$              ; NO: DO NEXT EXTENDED LOCATION
5100
```

TEST 8 SPECIAL MFG EXTENDED BIT TEST

```
5101 031722                          63$:    ENDSUB                  ;YES: END SUBROUTINE
     031722                                                                      L10047:
     031722  104403                                                                TRAP    C$ESUB
5102
5103
5104
5105                                 ;*************************************************************************
5106                                 ;**  SUBTEST #2 : TEST THE NPR OUT EXTENDED ADDRESS BITS
5107                                 ;*************************************************************************
5108 031724                                  BGNSUB                  ;TEST THE NPR OUT USING EXTENDED ADDR. BITS
     031724                                                                      T8.2:
     031724  104402                                                                TRAP    C$BSUB
5109 031726  004737  030516                   JSR     PC,XMINIT       ;INITIALIZE THE MMU
5110 031732  005004                          CLR     R4              ;CLEAR INDEX
5111
5112                                 ;************** MAIN LOOP STARTS HERE **************
5113 031734  005002                 T8LP:    CLR     R2              ;SETUP EXTENDED MEM BACKGROUND PATTERN
5114 031736  012762  125252  032500 3$:      MOV     #125252,XVALO(R2)       ;(125252 IN XVALO => XVAL6)
5115 031744  005722                          TST     (R2)+                   ; THIS IS DONE FOR ERROR REPORTING
5116 031746  020227  000016                   CMP     R2,#14.                 ; PURPOSES.
5117 031752  001371                          BNE     3$
5118
5119                                 ;*      WRITE (USING MMU) XVALO, XVAL1, XVAL2, ... XVAL6 (IE: 125252) INTO
5120                                 ;*      THE SEVEN SPECIFIC EXTENDED ADDRESSES SPECIFIED BY XLOC0 THRU XLOC6
5121                                 ;*      (XLOC'S SPECIFY THE UPPER TWO BYTES OF THE 3 BYTE EXTENDED ADDR)
5122
5123 031754  005002                          CLR     R2              ;CLEAR LOCAL INDEX
5124 031756  016237  032500  002440 11$:     MOV     XVALO(R2),TMPB  ;SETUP DATA POINTER
5125 031764  016237  032462  002436          MOV     XLOC0(R2),TMPA  ;SETUP/ADJUST PAR VALUE
5126 031772  006337  002436                   ASL     TMPA
5127 031776  006337  002436                   ASL     TMPA
5128 032002  004537  030636                   JSR     R5,XMWRIT       ;WRITE BACKGROUND PATTERN INTO EXTENDED MEMORY
5129 032006  002436                          TMPA                    ; POINTER TO PAR VALUE
5130 032010  002440                          TMPB                    ; POINTER TO DATA (@DATA + 125252)
5131
5132 032012  005722                          TST     (R2)+           ;BUMP INDEX
5133 032014  020227  000016                   CMP     R2,#14.         ;ALL 'XLOC' EXTENDED ADDRESSES WRITTEN?
5134 032020  001356                          BNE     11$             ; NO:  WRITE ANOTHER
5135
5136                                 ;* WE NOW CHANGE ONE LOCATION IN THE "XVAL" BACKGROUND TABLE.
5137                                 ;* AFTER OUR DMV NPR OUT, THIS TABLE WILL REPRESENT THE
5138                                 ;* EXPECTED VALUES OF OUR EXTENDED MEMORY.
5139 032022  012764  052525  032500          MOV     #052525,XVALO(R4)       ;SETUP EXPECTED PATTERN AFTER NPR OUT
5140                                                                         ;XVALO => XVAL6 NOW = EXPECTED PATTERN
5141
5142                                 ;*************** SETUP DMV NPR ADDRESSING REGISTERS ***************
5143                                 ;************ (WRITE/READ/VERIFY NPRAOH,NPRAOL,NPRAOX) *************
5144 032030  116437  032463  032064          MOVB    XLOC0+1(R4),5$  ;INIT NPRAOX VALUE
5145 032036  004537  004054                   JSR     R5,WRITEI       ;POINT NPR REGISTERS TO EXTENDED ADDRESS
5146 032042  000070                          NPRAOL
5147 032044  000000                          0
5148 032046  004537  004054                   JSR     R5,WRITEI
5149 032052  000071                          NPRAOH
5150 032054  000000                          0
5151 032056  004537  004054                   JSR     R5,WRITEI
5152 032062  000072                          NPRAOX
5153 032064  000000                 5$:      00
```

```
5154 032066  004537  003616              JSR     R5,READ         ;READ BACK THE ADDRESS
5155 032072  000070                      NPRAOL
5156 032074  002256                      BDATA
5157 032076  004537  003616              JSR     R5,READ
5158 032102  000071                      NPRAOH
5159 032104  002257                      BDATA+1
5160 032106  004537  003616              JSR     R5,READ
5161 032112  000072                      NPRAOX
5162 032114  002434                      TMP9
5163                                                 ;********** NOW CHECK THEM **********
5164 032116  005737  002256              TST     BDATA           ;NPRAOL,NPRAOH=0 ?
5165 032122  001413                      BEQ     6$              ; YES: TRY CHECKING NPRAOX
5166 032124  005037  002254              CLR     GDATA           ; NO:  REPORT ERROR...
5167 032130  012737  000004  002300      MOV     #4,REGNUM       ;
5168 032136  105737  002256              TSTB    BDATA
5169 032142  001020                      BNE     7$
5170 032144  005237  002300              INC     REGNUM
5171 032150  000415                      BR      7$
5172 032152  013737  032064  002254  6$: MOV     5$,GDATA        ;SET UP NPRAOX EXPECTED
5173 032160  013737  002434  002256      MOV     TMP9,BDATA      ;SET UP NPRAOX READ...
5174 032166  023737  002254  002256      CMP     GDATA,BDATA     ;DOES NPRAOX=EXPECTED ?
5175 032174  001411                      BEQ     9$              ; YES: CONTINUE
5176 032176  012737  000003  002300      MOV     #3,REGNUM       ; NO:  REPORT ERROR
5177 032204                          7$: GEDF    EM26A,ERR14
                                                     ;       "DEVICE FATAL" ERROR # 48
     032204  104455                                                 TRAP    C$ERDF
     032206  000060                                                 .WORD   48
     032210  016204                                                 .WORD   EM26A
     032212  011002                                                 .WORD   ERR14
5178 032214                          ESCAPE  SUB
     032214  104410                                                 TRAP    C$ESCAPE
     032216  000240                                                 .WORD   L10050 .
5179
5180                                 ;******** SETUP/START/CHECK THE NPR OPERATION (DATA/NPRCTL) *********
5181 032220  012737  052525  002254  9$: MOV     #052525,GDATA   ;DATA DMV WILL NPR TO TOP LOC
5182
5183                                 ;************** LOAD (DMV) TEST PATTERN **************
5184 032226  004537  004042              JSR     R5,WRITE                ;LOAD UP THE TEST PATTERN TO BE
5185 032232  123001                      NPRDRH                          ;WRITTEN INTO EXTENDED MEMORY BY
5186 032234  002255                      GDATA+1                         ;THE DMV
5187 032236  004537  004042              JSR     R5,WRITE
5188 032242  123000                      NPRDRL
5189 032244  002254                      GDATA
5190
5191                                 ;***************** PERFORM/CHECK NPR OPERATION (BUT NOT DATA) ****************
5192 032246  112737  000044  002417      MOVB    #NPRDL,TMP2+1   ;SETUP CONTROL VALUE TO DO NPR OUT
5193
5194 032254  004537  004042              JSR     R5,WRITE        ;PERFORM THE "EXTENDED" DATA OUT NPR
5195 032260  123004                      NPRCTL
5196 032262  002417                      TMP2+1
5197 032264  004537  003616              JSR     R5,READ         ;CHECK THE NPR OPERATION
5198 032270  123004                      NPRCTL
5199 032272  002416                      TMP2
5200 032274  132737  000300  002416      BITB    #300,TMP2       ;DID IT ABORT OR HANG?
5201 032302  001414                      BEQ     14$             ;NO, GOOD.  PROCEED WITH SUBTEST
5202 032304  100005                      BPL     10$             ;YES, WHICH ONE?
5203 032306                              GEDF    EM27A,ERR12     ;ABORT, REPORT IT AS SUCH.
```

TEST 8 SPECIAL MFG EXTENDED BIT TEST

```
                                                        ;       "DEVICE FATAL" ERROR # 49
     032306  104455                                                                  TRAP    C$ERDF
     032310  000061                                                                  .WORD   49
     032312  016437                                                                  .WORD   EM27A
     032314  007456                                                                  .WORD   ERR12
5204 032316  000404                BR      12$             ;AND EXIT
5205 032320                   10$: GEDF    EM27B,ERR12     ;HANG, REPORT IT AS SUCH.
                                                        ;       "DEVICE FATAL" ERROR # 50
     032320  104455                                                                  TRAP    C$ERDF
     032322  000062                                                                  .WORD   50
     032324  016461                                                                  .WORD   EM27B
     032326  007456                                                                  .WORD   ERR12
5206 032330                   12$: ESCAPE  SUB             ;  AND EXIT SUBTEST
     032330  104410                                                                  TRAP    C$ESCAPE
     032332  000124                                                                  .WORD   L10050 .
5207
5208                          ;********** READ EXTENDED MEM INTO LOCAL RAM (RXVALO-6) ***************
5209 032334  005002           14$: CLR     R2              ;CLEAR LOCAL INDEX
5210 032336  016237  032462  002436 15$: MOV     XLOCO(R2),TMPA  ;SETUP/ADJUST PAR VALUE
5211 032344  006337  002436          ASL     TMPA
5212 032350  006337  002436          ASL     TMPA
5213 032354  004537  030734          JSR     R5,XMREAD       ;READ EXTENDED MEM BACKGROUND PATTERN
5214 032360  002436                  TMPA                    ; POINTER TO PAR VALUE
5215 032362  002440                  TMPB                    ; POINTER TO DATA STORAGE
5216 032364  013762  002440  032516        MOV     TMPB,RXVALO(R2) ;# SAVE ACTUAL EXTENDED DATA
5217 032372  062702  000002          ADD     #2,R2           ;BUMP INDEX
5218 032376  020227  000016          CMP     R2,#14.         ;ALL 'XLOC' EXTENDED ADDRESSES READ?
5219 032402  001355                  BNE     15$             ; NO:  READ ANOTHER
5220
5221                          ;********** NOW CHECK EXPECTED VS. ACTUAL EXT. MEM VALUES **********
5222 032404  005002                  CLR     R2
5223 032406  026262  032516  032500 16$: CMP     RXVALO(R2),XVALO(R2)
5224 032414  001406                  BEQ     17$
5225 032416                         GEDF    EM60N,ERR60
                                                        ;       'DEVICE FATAL' ERROR # 51
     032416  104455                                                                  TRAP    C$ERDF
     032420  000063                                                                  .WORD   51
     032422  021711                                                                  .WORD   EM60N
     032424  011720                                                                  .WORD   ERR60
5226 032426                         ESCAPE  SUB
     032426  104410                                                                  TRAP    C$ESCAPE
     032430  000026                                                                  .WORD   L10050 .
5227 032432  005722           17$: TST     (R2)+           ;BUMP LOCAL INDEX
5228 032434  020227  000016          CMP     R2,#14.         ;ALL VALUES CHECKED ?
5229 032440  001362                  BNE     16$
5230
5231 032442  005724           20$: TST     (R4)+           ; YES: BUMP INDEX
5232 032444  020427  000016          CMP     R4,#14.         ;ARE WE DONE W/ALL EXTENDED LOCATIONS
5233 032450  001402                  BEQ     63$             ; YES: END
5234 032452  000137  031734          JMP     T8LP            ; NO:  GO DO SOME MORE
5235 032456                   63$: ENDSUB
     032456                                                                  L10050:
     032456  104403                                                                  TRAP    C$ESUB
5236 032460                   MFEND: ENDTST
     032460                                                                  L10046:
     032460  104401                                                                  TRAP    C$ETST
5237
```

TEST 8 SPECIAL MFG EXTENDED BIT TEST

```
5238
5239 032462  037400                XLOC0:  37400          ;ADDRESS 17600000 POINTER
5240 032464  037000                XLOC1:  37000          ;ADDRESS 17400000 POINTER
5241 032466  036400                XLOC2:  36400          ;ADDRESS 17200000 POINTER
5242 032470  035400                XLOC3:  35400          ;ADDRESS 16600000 POINTER
5243 032472  033400                XLOC4:  33400          ;ADDRESS 15600000 POINTER
5244 032474  027400                XLOC5:  27400          ;ADDRESS 13600000 POINTER
5245 032476  017400                XLOC6:  17400          ;ADDRESS 07600000 POINTER
5246
5247 032500  000000                XVAL0:  0
5248 032502  000000                XVAL1:  0
5249 032504  000000                XVAL2:  0
5250 032506  000000                XVAL3:  0
5251 032510  000000                XVAL4:  0
5252 032512  000000                XVAL5:  0
5253 032514  000000                XVAL6:  0
5254
5255 032516  000000                RXVAL0: 0
5256 032520  000000                RXVAL1: 0
5257 032522  000000                RXVAL2: 0
5258 032524  000000                RXVAL3: 0
5259 032526  000000                RXVAL4: 0
5260 032530  000000                RXVAL5: 0
5261 032532  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
     032534                                                                          T9::
     032534  004737  003514                     JSR     PC,MSTCLR       ;ISSUE MASTER CLEAR & ENTER MAINT. LOOP
     032540  103003                             BCC     1$              ;IF NO ERROR, CONTINUE
     032542                                     ERROR                   ;ELSE, REPORT IT AND
     032542  104460                                                                          TRAP    C$ERROR
     032544                                     EXIT    TST             ;EXIT THIS TEST
     032544  104432                                                                          TRAP    C$EXIT
     032546  001272                                                                          .WORD   L10051 .

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

     032550                               1$:   BGNSUB
     032550                                                                           T9.1:
     032550  104402                                                                          TRAP    C$BSUB
     032552  012737  177777  002274             MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
     032560  005037  002272                     CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
     032564  112777  000000  147526             MOVB    #0,@BSELO       ;DISABLE BOTH INTERRUPTS
```

TEST 9 -- Q-BUS INTERRUPT "A" & "B" SELECTION

```
5309 032572  004537  004054                    JSR     R5,WRITEI       ;LOAD THE INTERRUPT CONTROL REGISTER WITH
5310 032576  123005                            IRQREG                  ;  BOTH BITS SET.  THIS SHOULD NOT CAUSE
5311 032600  000006                            IRQA!IRQB               ;  AN INTERRUPT AT EITHER LEVEL
5312 032602  103003                            BCC     30$             ;IF AN ERROR OCCURED,
5313 032604                                    ERROR                   ;REPORT IT &
     032604  104460                                                                  TRAP    C$ERROR
5314 032606                                    ESCAPE  TST             ;  QUIT
     032606  104410                                                                  TRAP    C$ESCAPE
     032610  001230                                                                  .WORD   L10051-.
5315
5316 032612  105737  002272          30$:      TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
5317 032616  001407                            BEQ     5$              ;NO,  GOOD.  GO TEST THE "B" INTERRUPT
5318 032620  012737  000001  002254            MOV     #1,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
5319 032626                                    GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
                                                                       ;       "DEVICE FATAL" ERROR # 52
     032626  104455                                                                  TRAP    C$ERDF
     032630  000064                                                                  .WORD   52
     032632  016526                                                                  .WORD   EM34
     032634  006212                                                                  .WORD   ERR1
5320
5321 032636  105737  002273          5$:       TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
5322 032642  001407                            BEQ     6$              ;NO,  GOOD.  NOW TRY LETTING ONE THROUGH
5323 032644  012737  000002  002254            MOV     #2,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
5324 032652                                    GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
                                                                       ;       "DEVICE FATAL" ERROR # 53
     032652  104455                                                                  TRAP    C$ERDF
     032654  000065                                                                  .WORD   53
     032656  016540                                                                  .WORD   EM34B
     032660  006212                                                                  .WORD   ERR1
5325
5326 032662  005037  002272          6$:       CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
5327 032666  112777  000021  147424            MOVB    #IENBA!IENBB,@#SELO     ;ENABLE BOTH INTERRUPTS
5328 032674  012703  001000                    MOV     #1000,R3        ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
5329 032700  077301                            SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
5330 032702  105737  002272                    TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
5331 032706  001407                            BEQ     7$              ;NO,  GOOD.  GO TEST THE "B" INTERRUPT
5332 032710  012737  000003  002254            MOV     #3,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
5333 032716                                    GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
                                                                       ;       "DEVICE FATAL" ERROR # 54
     032716  104455                                                                  TRAP    C$ERDF
     032720  000066                                                                  .WORD   54
     032722  016526                                                                  .WORD   EM34
     032724  006212                                                                  .WORD   ERR1
5334
5335 032726  105737  002273          7$:       TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
5336 032732  001407                            BEQ     8$              ;NO,  GOOD.  NOW TRY LETTING ONE THROUGH
5337 032734  012737  000004  002254            MOV     #4,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
5338 032742                                    GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
                                                                       ;       "DEVICE FATAL" ERROR # 55
     032742  104455                                                                  TRAP    C$ERDF
     032744  000067                                                                  .WORD   55
     032746  016540                                                                  .WORD   EM34B
     032750  006212                                                                  .WORD   ERR1
5339
5340 032752                          8$:       ENDSUB
     032752                                                                 L10052:
     032752  104403                                                                  TRAP    C$ESUB
```

```
5341
5342                            ;---- ---------- ---------- - ----- ----- - - - - -
5343                            ;               TEST FOR "A" INTERRUPT WHEN ENABLED
5344                            ;
5345                            ;       1. DISABLE BOTH INTERRUPTS
5346                            ;
5347                            ;       2. ASSERT "B" REQUEST BIT TO 1:
5348                            ;               DISABLING "B" & FORCING "A"
5349                            ;
5350                            ;       3. CHECK FOR NO "A" INTERRUPT
5351                            ;
5352                            ;       4. CHECK FOR NO "B" INTERRUPT
5353                            ;
5354                            ;       5. ENABLE BOTH INTERRUPTS
5355                            ;
5356                            ;       6. CHECK FOR "A" INTERRUPT
5357                            ;
5358                            ;       7. CHECK FOR NO "B" INTERRUPT
5359
5360 032754                             BGNSUB
      032754                                                            T9.2:
      032754  104402                                                            TRAP    C$BSUB
5361 032756  012737  177777  002274      MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
5362 032764  005037  002272              CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
5363 032770  112777  000000  147322      MOVB    #0,@BSELO       ;DISABLE INTERRUPTS AGAIN
5364 032776  004537  004054              JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON "A"
5365 033002  123005                      IRQREG                  ;   BUT NOT ON "B"
5366 033004  000002                      IRQB
5367 033006  103003                      BCC     31$             ;IF AN ERROR OCCURED,
5368 033010                              FRROR                   ;REPORT IT &
      033010  104460                                                            TRAP    C$ERROR
5369 033012                              ESCAPE  TST             ;  QUIT
      033012  104410                                                            TRAP    C$ESCAPE
      033014  001024                                                            .WORD   L10051 .
5370
5371 033016  105737  002272      31$:    TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
5372 033022  001407                      BEQ     10$             ;NO,  GOOD.  GO TEST THE "B" INTERRUPT
5373 033024  012737  000005  002254      MOV     #5,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
5374 033032                              GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
                                                                 ;       "DEVICE FATAL" ERROR # 56
      033032  104455                                                            TRAP    C$ERDF
      033034  000070                                                            .WORD   56
      033036  016526                                                            .WORD   EM34
      033040  006212                                                            .WORD   ERR1
5375
5376 033042  105737  002273      10$:    TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
5377 033046  001407                      BEQ     11$             ;NO,  GOOD.  NOW TRY LETTING ONE THROUGH
5378 033050  012737  000006  002254      MOV     #6,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
5379 033056                              GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
                                                                 ;       "DEVICE FATAL" ERROR # 57
      033056  104455                                                            TRAP    C$ERDF
      033060  000071                                                            .WORD   57
      033062  016540                                                            .WORD   EM34B
      033064  006212                                                            .WORD   ERR1
5380
5381 033066  005037  002272      11$:    CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
5382 033072  112777  000021  147220      MOVB    #IENBA!IENBB,@BSELO     ;ENABLE BOTH INTERRUPTS
```

```
033100  012703  001000                  MOV     #1000,R3        ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
033104  077301                          SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
033106  105737  002272                  TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
033112  001007                          BNE     12$             ;YES, GOOD.  GO TEST THE "B" INTERRUPT
033114  012737  000007  002254          MOV     #7,GDATA        ;NO,  TELL ERROR HANDLER WHAT WE HAD DONE
033122                                  GEDF    EM35,ERR1       ;REPORT MISSING INTERRUPT ON "ENABLE"
                                                                ;        "DEVICE FATAL" ERROR # 58
033122  104455                                                                          TRAP    C$ERDF
033124  000072                                                                          .WORD   58
033126  016552                                                                          .WORD   EM35
033130  006212                                                                          .WORD   ERR1

033132  105737  002273          12$:    TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
033136  001407                          BEQ     13$             ;NO,  GOOD.  NOW TRY HITTING THE "B" INTERRUPT
033140  012737  000010  002254          MOV     #8.,GDATA       ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
033146                                  GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
                                                                ;        "DEVICE FATAL" ERROR # 59
033146  104455                                                                          TRAP    C$ERDF
033150  000073                                                                          .WORD   59
033152  016540                                                                          .WORD   EM34B
033154  006212                                                                          .WORD   ERR1

033156                          13$:    ENDSUB
033156                                                                          L10053:
033156  104403                                                                          TRAP    C$ESUB


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

033160                                  BGNSUB
033160                                                                          T9.3:
033160  104402                                                                          TRAP    C$BSUB
033162  012737  177777  002274          MOV     # 1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
033170  005037  002272                  CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
033174  112777  000000  147116          MOVB    #0,@BSELO       ;DISABLE INTERRUPTS AGAIN
033202  004537  004054                  JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON "B"
033206  123005                          IRQREG                  ;   BUT NOT ON  A"
033210  000004                          IRQA
033212  103003                          BCC     32$             ;IF AN ERROR OCCURED,
033214                                  ERROR                   ;REPORT IT &
033214  104460                                                                          TRAP    C$ERROR
033216                                  ESCAPE  TST             ;  EXIT
```

```
     033216  104410                                                          TRAP    C$ESCAPE
     033220  000620                                                          .WORD   L10051 .
5425
5426 033222  105737  002272          32$:   TSTB   INTFLG          ;DID AN "A" INTERRUPT OCCUR?
5427 033226  001407                         BEQ    14$             ;NO.  GOOD.  GO TEST THE 'B  INTERRUPT
5428 033230  012737  000011  002254         MOV    #9.,GDATA       ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
5429 033236                                 GEDF   EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
                                                                   ;        "DEVICE FATAL" ERROR # 60
     033236  104455                                                          TRAP    C$ERDF
     033240  000074                                                          .WORD   60
     033242  016526                                                          .WORD   EM34
     033244  006212                                                          .WORD   ERR1
5430
5431 033246  105737  002273          14$:   TSTB   INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
5432 033252  001407                         BEQ    15$             ;NO.  GOOD.  NOW TRY LETTING ONE THROUGH
5433 033254  012737  000012  002254         MOV    #10.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
5434 033262                                 GEDF   EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
                                                                   ;        "DEVICE FATAL  ERROR # 61
     033262  104455                                                          TRAP    C$ERDF
     033264  000075                                                          .WORD   61
     033266  016540                                                          .WORD   EM34B
     033270  006212                                                          .WORD   ERR1
5435
5436 033272  005037  002272          15$:   CLR    INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
5437 033276  112777  000021  147014         MOVB   #IENBA!IENBB,@BSELO     ;ENABLE BOTH INTERRUPTS
5438 033304  012703  001000                 MOV    #1000,R3        ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
5439 033310  077301                         SOB    R3,.            ;  BY SITTING HERE FOR A WHILE
5440 033312  105737  002272                 TSTB   INTFLG          ;DID AN 'A" INTERRUPT OCCUR?
5441 033316  001407                         BEQ    16$             ;NO.  GOOD.  GO TEST THE 'B' INTERRUPT
5442 033320  012737  000013  002254         MOV    #11.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
5443 033326                                 GEDF   EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
                                                                   ;        'DEVICE FATAL  ERROR # 62
     033326  104455                                                          TRAP    C$ERDF
     033330  000076                                                          .WORD   62
     033332  016526                                                          .WORD   EM34
     033334  006212                                                          .WORD   ERR1
5444
5445 033336  105737  002273          16$:   TSTB   INTFLG+1        ;DID A 'B  INTERRUPT OCCUR?
5446 033342  001007                         BNE    17$             ;YES, GOOD.  NOW TRY HITTING THE 'B  INTERRUPT
5447 033344  012737  000014  002254         MOV    #12.,GDATA      ;NO,  TELL ERROR HANDLER WHAT WE HAD DONE
5448 033352                                 GEDF   EM35B,ERR1      ;REPORT MISSING INTERRUPT ON "ENABLE"
                                                                   ;        'DEVICE FATAL  ERROR # 63
     033352  104455                                                          TRAP    C$ERDF
     033354  000077                                                          .WORD   63
     033356  016573                                                          .WORD   EM35B
     033360  006212                                                          .WORD   ERR1
5449
5450 033362                          17$:   ENDSUB
     033362                                                          L10054:
     033362  104403                                                          TRAP    C$ESUB
5451
5452                                 ;
5453                                 ;   TEST FOR "A" INTERRUPT BUT NO "B' WHEN BOTH ENABLED & FORCED
5454                                 ;
5455                                 ;      1. DISABLE BOTH INTERRUPTS
5456                                 ;
5457                                 ;      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

033364                                  BGNSUB
033364                                                                          T9.4:
033364  104402                                                                  TRAP    C$BSUB
033366  012737  177777  002274        MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
033374  005037  002272                CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
033400  112777  000000  146712        MOVB    #0,@BSELO       ;DISABLE INTERRUPTS AGAIN
033406  004537  004054                JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON BOTH  A  &  B
033412  123005                        IRQREG
033414  000000                        0
033416  103003                        BCC     31$             ;IF AN ERROR OCCURED,
033420                                ERROR                   ;REPORT IT &
033420  104460                                                                  TRAP    C$ERROR
033422                                ESCAPE  TST             ;  QUIT
033422  104410                                                                  TRAP    C$ESCAPE
033424  000414                                                                  .WORD   L10051 .

033426  105737  002272        31$:    TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
033432  001407                        BEQ     10$             ;NO,  GOOD.  GO TEST THE  B' INTERRUPT
033434  012737  000015  002254        MOV     #13.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
033442                                GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
                                        ;       DEVICE FATAL' ERROR # 64
033442  104455                                                                  TRAP    C$ERDF
033444  000100                                                                  .WORD   64
033446  016526                                                                  .WORD   EM34
033450  006212                                                                  .WORD   ERR1

033452  105737  002273        10$:    TSTB    INTFLG+1        ;DID A 'B' INTERRUPT OCCUR?
033456  001407                        BEQ     11$             ;NO,  GOOD.  NOW TRY LETTING ONE THROUGH
033460  012737  000016  002254        MOV     #14.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
033466                                GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
                                        ;       DEVICE FATAL' ERROR # 65
033466  104455                                                                  TRAP    C$ERDF
033470  000101                                                                  .WORD   65
033472  016540                                                                  .WORD   EM34B
033474  006212                                                                  .WORD   ERR1

033476  005037  002272        11$:    CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
033502  112777  000021  146610        MOVB    #IENBA!IENBB,@BSELO     ;ENABLE BOTH INTERRUPTS
033510  012703  001000                MOV     #1000,R3        ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
033514  077301                        SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
033516  105737  002272                TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
033522  001007                        BNE     12$             ;YES, GOOD.  GO TEST THE "B" INTERRUPT
033524  012737  000017  002254        MOV     #15.,GDATA      ;NO,  TELL ERROR HANDLER WHAT WE HAD DONE
033532                                GEDF    EM35,ERR1       ;REPORT MISSING INTERRUPT ON 'ENABLE
                                        ;       "DEVICE FATAL  ERROR # 66
```

```
     033532  104455                                                            TRAP     C$ERDF
     033534  000102                                                            .WORD    66
     033536  016552                                                            .WORD    EM35
     033540  006212                                                            .WORD    ERR1

     033542  105737  002273          12$:    TSTB    INTFLG+1        ;DID A "B" INTERRUPT OCCUR?
     033546  001407                          BEQ     13$             ;NO,  GOOD.  NOW TRY HITTING THE "B" INTERRUPT
     033550  012737  000020  002254          MOV     #16.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
     033556                                  GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
                                                                     ;        "DEVICE FATAL" ERROR # 67
     033556  104455                                                            TRAP     C$ERDF
     033560  000103                                                            .WORD    67
     033562  016540                                                            .WORD    EM34B
     033564  006212                                                            .WORD    ERR1

     033566                          13$:    ENDSUB
     033566                                                          L10055:
     033566  104403                                                            TRAP     C$ESUB


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

     033570                                  BGNSUB
     033570                                                          T9.5:
     033570  104402                                                            TRAP     C$BSUB
     033572  012737  177777  002274          MOV     # 1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
     033600  005037  002272                  CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
     033604  112777  000021  146506          MOVB    #IENBA!IENBB,@BSELO     ;ENABLE BOTH INTERRUPTS
     033612  004537  004054                  JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON "A"
     033616  123005                          IRQREG                  ;   BUT NOT ON "B"
     033620  000002                          IRQB
     033622  103003                          BCC     31$             ;IF AN ERROR OCCURED,
     033624                                  ERROR                   ;REPORT IT &
     033624  104460                                                            TRAP     C$ERROR
     033626                                  ESCAPE  TST             ;  QUIT
     033626  104410                                                            TRAP     C$ESCAPE
     033630  000210                                                            .WORD    L10051 .

     033632  012703  001000          31$:    MOV     #1000,R3        ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
     033636  077301                          SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
     033640  105737  002272                  TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
     033644  001007                          BNE     12$             ;YES, GOOD.  GO TEST THE "B" INTERRUPT
     033646  012737  000023  002254          MOV     #19.,GDATA      ;NO,  TELL ERROR HANDLER WHAT WE HAD DONE
     033654                                  GEDF    EM35,ERR1       ;REPORT MISSING INTERRUPT ON "ENABLE"
                                                                     ;        "DEVICE FATAL" ERROR # 68
     033654  104455                                                            TRAP     C$ERDF
     033656  000104                                                            .WORD    68
     033660  016552                                                            .WORD    EM35
```

TEST 9 - Q BUS INTERRUPT "A" & "B" SELECTION

```
      033662  006212                                                                .WORD   ERR1
5536
5537 033664  105737  002273          12$:    TSTB    INTFLG 1        ;DID A "B" INTERRUPT OCCUR?
5538 033670  001407                          BEQ     13$             ;NO,  GOOD.  NOW TRY HITTING THE 'B' INTERRUPT
5539 033672  012737  000024  002254          MOV     #20.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
5540 033700                                  GEDF    EM34B,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
                                                                     ;       "DEVICE FATAL" ERROR # 69
      033700  104455                                                                TRAP    C$ERDF
      033702  000105                                                                .WORD   69
      033704  016540                                                                .WORD   EM34B
      033706  006212                                                                .WORD   ERR1
5541
5542 033710                          13$:    ENDSUB
      033710                                                                L10056:
      033710  104403                                                                TRAP    C$ESUB
5543
5544                                 ;-------------------------------------------------------
5545                                 ;               TEST FOR "B" INTERRUPT WHILE ENABLED
5546                                 ;
5547                                 ;       1. ENABLE BOTH INTERRUPTS
5548                                 ;
5549                                 ;       2. ASSERT "A" REQUEST BIT TO 1:
5550                                 ;               DISABLING "A" & FORCING "B"
5551                                 ;
5552                                 ;       3. CHECK FOR NO "A" INTERRUPT
5553                                 ;
5554                                 ;       4. CHECK FOR "B" INTERRUPT
5555
5556 033712                                  BGNSUB
      033712                                                                T9.6:
      033712  104402                                                                TRAP    C$BSUB
5557 033714  012737  177777  002274          MOV     #-1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH' FOR INTERRUPTS
5558 033722  005037  002272                  CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
5559 033726  112777  000021  146364          MOVB    #IENBA!IENBB,@BSELO     ;ENABLE BOTH INTERRUPTS
5560 033734  004537  004054                  JSR     R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON "B'
5561 033740  123005                          IRQREG                  ;   BUT NOT ON  A'
5562 033742  000004                          IRQA
5563 033744  103003                          BCC     32$             ;IF AN ERROR OCCURED,
5564 033746                                  ERROR                   ;REPORT IT &
      033746  104460                                                                TRAP    C$ERROR
5565 033750                          ESCAPE  TST                     ;  QUIT
      033750  104410                                                                TRAP    C$ESCAPE
      033752  000066                                                                .WORD   L10051 .
5566
5567 033754  012703  001000          32$:    MOV     #1000,R3        ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
5568 033760  077301                          SOB     R3,.            ;  BY SITTING HERE FOR A WHILE
5569 033762  105737  002272                  TSTB    INTFLG          ;DID AN "A" INTERRUPT OCCUR?
5570 033766  001407                          BEQ     16$             ;NO,  GOOD.  GO TEST THE 'B" INTERRUPT
5571 033770  012737  000025  002254          MOV     #21.,GDATA      ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
5572 033776                                  GEDF    EM34,ERR1       ;REPORT THE UNEXPECTED INTERRUPT
                                                                     ;       "DEVICE FATAL ' ERROR # 70
      033776  104455                                                                TRAP    C$ERDF
      034000  000106                                                                .WORD   70
      034002  016526                                                                .WORD   EM34
      034004  006212                                                                .WORD   ERR1
5573
5574 034006  105737  002273          16$:    TSTB    INTFLG+1        ;DID A "B  INTERRUPT OCCUR?
```

TEST 9 - Q-BUS INTERRUPT "A" & "B" SELECTION

```
 5575 034012  001007                        BNE     17$             ;YES, GOOD.  NOW TRY HITTING THE "B' INTERRUPT
 5576 034014  012737  000026  002254        MOV     #22.,GDATA      ;NO,  TELL ERROR HANDLER WHAT WE HAD DONE
 5577 034022                                GEDF    EM35B,ERR1      ;REPORT MISSING INTERRUPT ON "ENABLE"
                                                                    ;       "DEVICE FATAL' ERROR # 71
      034022  104455                                                                    TRAP    C$ERDF
      034024  000107                                                                    .WORD   71
      034026  016573                                                                    .WORD   EM35B
      034030  006212                                                                    .WORD   ERR1
 5578
 5579 034032                        17$:    ENDSUB
      034032                                                                L10057:
      034032  104403                                                                  TRAP    C$ESUB
 5580
 5581 034034  005037  002274                CLR     INTWCH          ;TELL HANDLERS TO STOP WATCHING FOR INTERRUPTS
 5582 034040                                ENDTST
      034040                                                                L10051:
      034040  104401                                                                  TRAP    C$ETST
```

TEST 10 BUS RESET WITH DISABLE INIT SET

```
5591                                    .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
     034042                                                                                     T10::
5592 034042  032737  000001  002316            BIT     #BIT0,PFLAG     ;IF BUS RESETS ARE NOT ALLOWED,
5593 034050  001031                            BNE     10$             ;  BYPASS THIS TEST
5594                                                                   ;ELSE,
5595 034052  004737  003514                    JSR     PC,MSTCLR       ;INIT DMV & START UP THE MAINT. LOOP
5596 034056  103003                            BCC     1$              ;IF AN ERROR OCCURED,
5597 034060                                    ERROR                   ;REPORT IT &
     034060  104460                                                                     TRAP    C$ERROR
5598 034062                                    ESCAPE  TST             ;  EXIT
     034062  104410                                                                     TRAP    C$ESCAPE
     034064  000050                                                                     .WORD   L10060 .
5599
5600 034066  004537  004054            1$:     JSR     R5,WRITEI       ;NOW SET "DISABLE INIT"
5601 034072  123004                            NPRCTL
5602 034074  000105                            DMVDAI!DMVPU!NPRGO
5603                                                                   ;THE "NPRGO" BIT IS SET BECAUSE ASSERTING IT
5604                                                                   ;TO A ZERO WOULD KICK OFF AN NPR OPERATION!
5605                                                                   ;THE 'DMVPU" BIT MUST ALWAYS BE SET WHENEVER
5606                                                                   ;THE NPR CONTROL REGISTER IS LOADED.
5607
5608 034076  112777  000377  146222            MOVB    #377,@BSEL3     ;THIS REGISTER WILL ONLY GET ALTERED IF THE
5609                                                                   ;DMV 11 IS SUCCESSFULLY RESET:  THE "DMVPU
5610                                                                   ;BIT WILL BE CLEARED, THE MICRO-DIAGNOSTIC
5611                                                                   ;WILL BE STARTED, AND FINDING "DMVPU' CLEARED,
5612                                                                   ;IT WILL CLEAR ALL BSEL REGISTERS (INCLUDING
5613                                                                   ;BSEL3) AND PERFORM THE 17 TESTS IS CONTAINS.
5614                                                                   ;OF COURSE, IF THIS ALL HAPPENS, THAN THIS
5615                                                                   ;TEST WILL HAVE FAILED!
5616
5617 034104                                    BRESET                  ;THE "SUPERVISOR' WILL DO A BUS RESET FOR US
     034104  104433                                                                     TRAP    C$RESET
5618 034106  012703  001000                    MOV     #1000,R3        ;DELAY FOR A BIT SO THE MICRO DIAG. CAN DO
5619 034112  077301                            SOB     R3,.            ;ITS THING IF IT S GOING TO
5620 034114  122777  000377  146204            CMPB    '377,@BSEL3     ;IF A FAILURE OCCURED, THIS SHOULD HAVE BEEN
5621 034122  001404                            BEQ     10$             ;ALTERED BY NOW.  IF NOT, ALL'S WELL  - EXIT
5622 034124                                    GEDF    EM40,ERR1       ;ELSE, "DISABL INIT' DIDN T STOP "BUS RESET
                                                                       ;       "DEVICE FATAL" ERROR # 72
     034124  104455                                                                     TRAP    C$EROF
     034126  000110                                                                     .WORD   72
     034130  016614                                                                     .WORD   EM4C
     034132  006212                                                                     .WORD   ERR1
5623
5624 034134                            10$:    ENDTST
```

SEQ 0150

TEST 10 BUS RESET WITH DISABLE INIT SET

```
        034134
        034134  104401                          L10060:
                                                        TRAP    C$ETST
```

```
5635                                    .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
     034136                                                                          T11::
5636 034136  004737  003514                    JSR     PC,MSTCLR       ;INIT DMV & START UP THE MAINT. LOOP
5637 034142  103003                            BCC     1$              ;IF AN ERROR OCCURED,
5638 034144                                    ERROR                   ;REPORT IT &
     034144  104460                                                                 TRAP    C$ERROR
5639 034146                                    ESCAPE  TST             ;  EXIT
     034146  104410                                                                 TRAP    C$ESCAPE
     034150  000030                                                                 .WORD   L10061-.
5640 034152  004537  004054            1$:     JSR     R5,WRITEI       ;NOW SET "DISABLE INIT'
5641 034156  123004                            NPRCTL
5642 034160  000105                            DMVDAI!DMVPU!NPRGO
5643                                                                    ;THE "NPRGO" BIT IS SET BECAUSE ASSERTING IT
5644                                                                    ;TO A ZERO WOULD KICK OFF AN NPR OPERATION!
5645                                                                    ;THE "DMVPU" BIT MUST ALWAYS BE SET WHENEVER
5646                                                                    ;THE NPR-CONTROL REGISTER IS LOADED.
5647
5648 034162  004737  003514                    JSR     PC,MSTCLR       ;INIT THE DMV & RESTART THE M-LOOP
5649 034166  103004                            BCC     2$              ;IF AN ERROR OCCURED, IGNORE QUEUED ERROR AND
5650 034170                                    GEDF    EM41,ERR1       ;REPORT THAT 'DISABL INIT' STOPPED MASTER CLEAR
                                                                        ;       'DEVICE FATAL' ERROR # 73
     034170  104455                                                                 TRAP    C$ERDF
     034172  000111                                                                 .WORD   73
     034174  016671                                                                 .WORD   EM41
     034176  006212                                                                 .WORD   ERR1
5651 034200                            2$:     ENDTST
     034200                                                                 L10061:
     034200  104401                                                                 TRAP    C$ETST
```

```
5667                                        .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
     034202                                                                          T12::
5668        000014                      DCOKTS  = $T                    ;DEFINE TEST # FOR "INIT" SECTION
5669 034202 032737  000001  002370              BIT     #PU24,PT.CTL    ;IS POWER UP STRAPPED FOR OPTION 0?
5670 034210 001002                              BNE     1$              ;YES. THEN WE CAN DO THIS TEST
5671 034212                                     EXIT    TST             ;NO,  WE CAN'T DO THIS TEST UNLESS IT IS!
     034212 104432                                                                       TRAP    C$EXIT
     034214 000476                                                                       .WORD   L10062-.
5672
5673 034216 032737  000001  002316      1$:     BIT     #BIT0,PFLAG     ;IF BUS RESETS ARE ALLOWED,
5674 034224 001402                              BEQ     2$              ;  PERFORM THIS TEST
5675 034226                                     EXIT    TST             ;ELSE, BYPASS IT
     034226 104432                                                                       TRAP    C$EXIT
     034230 000462                                                                       .WORD   L10062 .
5676
5677 034232                             2$:     DELAY   40.             ;DELAY TO PREVENT TST # ROACHING
     034232 012727  000050                                                               MOV     #40.,(PC)+
     034236 000000                                                                       .WORD   0
     034240 013727  002116                                                               MOV     L$DLY,(PC)+
     034244 000000                                                                       .WORD   0
     034246 005367  177772                                                               DEC     -6(PC)
     034252 001375                                                                       BNE     . 4
     034254 005367  177756                                                               DEC     22(PC)
     034260 001367                                                                       BNE     .-20
5678                                    ;-------- -  ---      -          --   -- - ---  - --- -  --     -    ------
5679                                    ; SUBTEST #1: DCOK H LO (RESET DMV)
5680                                    ;   - -                           - ----          --  -  -  -   ---- ---- -   -
5681 034262                                     BGNSUB            ; <====>  TEST FOR POWER-DOWN/UP & DMV 11 RESET
     034262                                                                          T12.1:
     034262 104402                                                                       TRAP    C$BSUB
5682 034264 004737  003514                      JSR     PC,MSTCLR       ;INIT DMV & START UP THE MAINT. LOOP
5683 034270 103003                              BCC     3$              ;IF AN ERROR OCCURED,
5684 034272                                     ERROR                   ;REPORT IT &
     034272 104460                                                                       TRAP    C$ERROR
5685 034274                                     ESCAPE  SUB             ;  EXIT
     034274 104410                                                                       TRAP    C$ESCAPE
     034276 000220                                                                       .WORD   L10063 .
5686 034300                             3$:     SETVEC  #24,#5$,#7      ;SETUP VECTOR FOR POWER FAIL INTERRUPT HANDLER
```

```
TEST 12    DCOK H LO BIT

        034300  012746  000007                                                  MOV     #7,-(SP)
        034304  012746  034406                                                  MOV     #5$, (SP)
        034310  012746  000024                                                  MOV     #24, (SP)
        034314  012746  000003                                                  MOV     #3, (SP)
        034320  104437                                                          TRAP    C$SVEC
        034322  062706  000010                                                  ADD     #10,SP
  5687  034326  112737  177777  002274          MOVB    #-1,INTWCH      ;EXPECT AN "A" INTERRUPT (IF "DCOK" FAILS!)
  5688  034334  105037  002272                  CLRB    INTFLG          ;CLEAR THE FLAG IN CASE WE WANT TO DETECT IT
  5689  034340  152777  000001  145752          BISB    #IENBA,@BSEL0   ;NOW ENABLE "A" INTERRUPTS
  5690
  5691  034346  010637  002454                  MOV     SP,OLDSP        ;SAVE THE STACK POINTER
  5692
  5693                                  ;       SETUP "DISABL INIT" TO ALLOW BINIT TO RESET THE DMV AND THEN CAUSE
  5694                                  ;       A POWER-FAIL CONDITION TO BE SIMULATED.
  5695
  5696  034352  012777  177506  145754          MOV     #177400!LSIDCL!DMVPU!NPRGO,@SEL6  ;VALUE TO BE LOADED INTO
  5697  034360  012777  123004  145742          MOV     #NPRCTL,@SEL4           ;THE NPR CONTROL REGISTER
  5698  034366  112777  000042  145730          MOVB    #WRILOC!<IRQA*8.>,@BSEL2  ;TELL M-LOOP TO WRITE IT & INTERRUPT
  5699                                                                  ;US JUST BEFORE REQUESTING ANOTHER
  5700                                                                  ;M-LOOP COMMAND.
  5701
  5702                                  ;       SETTING  "NPRGO" PREVENTS AN "NPR" OPERATION FROM OCCURING. THE HIGH
  5703                                  ;       ORDER  BYTE  IS  SET  TO  -1 AND IS USED AS A FLAG -  WHEN THE RESET
  5704                                  ;       OCCURS,  THE  SELECT  REGISTERS  WILL  ALL  BE  CLEARED; WE WILL BE
  5705                                  ;       LOOKING AT THE RUN BIT TO BE SET AND AT BSEL7 TO BE CLEARED AS POSITIVE
  5706                                  ;       PROOF THAT THE DMV GOT RESET.
  5707
  5708
  5709  034374  000001                  4$:     WAIT                    ;HANG HERE UNTIL INTERRUPTED
  5710
  5711
  5712                                  ;       IF  THE DCOK WORKS AS IT SHOULD, THE NEXT INSTRUCTION TO BE EXECUTED
  5713                                  ;       IS AT THE LABEL "5$". IF I DOESN'T WORK, THE DMV SHOULD FINISH THE
  5714                                  ;       "WRITE"  COMMAND  AND  GENERAT  A Q-BUS INTERRUPT. ON RETURNING FROM
  5715                                  ;       THAT INTERRUPT, WE FALL INTO THE ERROR CALL BELOW:
  5716
  5717  034376                          GEDF    EM42A,ERR1      ;REPORT MISSING POWER-UP
                                                                ;       "DEVICE FATAL" ERROR # 74
        034376  104455                                                          TRAP    C$ERDF
        034400  000112                                                         .WORD   74
        034402  016746                                                         .WORD   EM42A
        034404  006212                                                         .WORD   ERR1
  5718
  5719  034406                  5$:
  5720
  5721                                  ;       IN  EITHER  CASE:  RESTORE THE POWER FAIL VECTOR, STACK POINTER, AND
  5722                                  ;       THE FLAGS USED BY THE Q-BUS INTERRUPT SERVICE ROUTINE.
  5723
  5724                                  ;                               B U T   F I R S T !
  5725
  5726                                  ;       IN  SOME  CASES  THE  Q-BUS  GETS CONFUSED WHEN WE PERFORM THE ABOVE
  5727                                  ;       (HIGHLY  NON-  STANDARD)  "DCOK"  MANIPULATION. EXPERIENCE HAS SHOWN
  5728                                  ;       THAT THE INSTRUCTION BEING EXECUTED CAN BE CORRUPTED    USUALLY (BUT
  5729                                  ;       NOT  ALWAYS) BEING CLEARED TO ZERO (A HALT INSTRUCTION). THIS IS NOT
  5730                                  ;       A FAILURE OF THE  DMV  AND THEREFORE SHOULD NOT BE OUR CONCERN HERE.
  5731                                  ;       THE  FAILURE  SHOULD  NOT AFFECT THE TEST WITHIN THE PASS IN WHICH IT
  5732                                  ;       OCCURS  BUT  IN  A  SUBSEQUENT  PASS. IN AN EFFORT TO ELIMINATE ANY
```

TEST 12 - DCOK H LO BIT

```
5733                                    ;       PROBLEMS FROM THIS GLITCH, WE RESTORE THE INSTRUCTION:
5734
5735 034406  012737  000001  034374            MOV     #1,4$           ;RESTORE THE "WAIT" INSTRUCTION -- JUST IN
5736                                                                    ; CASE IT GOT MODIFIED!
5737 034414  013706  002454                    MOV     OLDSP,SP        ;RESTORE THE STACK
5738 034420  142777  000001  145672            BICB    #IENBA,@BSELO   ;DISABLE THE "A" INTERRUPT
5739 034426  105037  002274                    CLRB    INTWCH          ;STOP EXPECTING Q-BUS INTERRUPTS
5740 034432                                    CLRVEC  #24             ;RETURN THE VECTOR TO THE SUPERVISOR
     034432  012700  000024                                                    MOV     #24,R0
     034436  104436                                                            TRAP    C$CVEC
5741 034440                                    SFTPRI  #0              ;MAKE SURE WE'RE BACK RUNNING AT 0 AGAIN!
     034440  012700  000000                                                    MOV     #0,R0
     034444  104441                                                            TRAP    C$SPRI
5742
5743 034446  013701  002262                    MOV     DELAY1,R1       ;INITIALIZE TTHE LOOP COUNTER FOR DELAY LOOP
5744 034452  001402                10$:        BEQ     11$             ; EXIT DELAY LOOP IF TIME HAS EXPIRED
5745 034454  005301                            DEC     R1              ;  ELSE, DECREMENT THE LOOP COUNTER AND
5746 034456  000775                            BR      10$             ;  CONTINUE TO LOOP
5747 034460                         11$:                                ; TIME UP !
5748 034460  132777  000200  145634            BITB    #RUN,@BSEL1     ;CHECK RUN BIT
5749 034466  001403                            BEQ     12$             ; NOT SET... REPORT ERROR.
5750 034470  105777  145642                    TSTB    @BSEL7          ;THIS REGISTER SHOULD HAVE BEEN CLEARED
5751 034474  001404                            BEQ     13$             ;IT IS, EVERYTHING HERE IS OK -- EXIT SUBTEST
5752 034476                         12$:        GEDF    EM42B,ERR1      ;NO, THEN REPORT THE FAILURE
                                                                        ;       "DEVICE FATAL" ERROR # 75
     034476  104455                                                            TRAP    C$ERDF
     034500  000113                                                            .WORD   75
     034502  017020                                                            .WORD   EM42B
     034504  006212                                                            .WORD   ERR1
5753 034506  004737  003346                13$:        JSR     PC,MASCLR       ;RESTORE DMV-11 TO A NORMAL STATE!
5754 034512  103001                            BCC     14$             ;NO ERRORS, EXIT SUBTEST
5755 034514                                    ERROR                   ;REPORT MSTCLR ERROR
     034514  104460                                                            TRAP    C$ERROR
5756 034516                         14$:
5757 034516                                    ENDSUB
     034516                                                                 L10063:
     034516  104403                                                            TRAP    C$ESUB
5758
5759                                    ; SUBTEST #2: DCOK H LO (DMV-11 SHOULDN'T BE RESET)
5760
5761                                    ;       SINCE HITTING "DCOK H LO" WITHOUT "HALT" OCCASIONALLY CORRUPTS
5762                                    ;       PROGRAM MEMORY: WE SET BOTH "HALT" AND "DCOK H LO" IN THIS
5763                                    ;       SUB-TEST (IF HALT FAILS, THIS TEST MAY BLOW UP).
5764
5765 034520                                    BGNSUB          ; <==>  TEST FOR POWER DOWN/UP & NO DMV 11 RESET
     034520                                                                 T12.2:
     034520  104402                                                            TRAP    C$BSUB
5766
5767 034522  004737  003514                    JSR     PC,MSTCLR       ;INIT DMV & START UP THE MAINT. LOOP
5768 034526  103003                            BCC     2$              ;IF AN ERROR OCCURED,
5769 034530                                    ERROR                   ;REPORT IT &
     034530  104460                                                            TRAP    C$ERROR
5770 034532                                    ESCAPE  SUB             ;  EXIT
     034532  104410                                                            TRAP    C$ESCAPE
     034534  000154                                                            .WORD   L10064 .
5771 034536                         2$:         SETVEC  #24,#5$,#7      ;SETUP VECTOR FOR POWER FAIL INTERRUPT HANDLER
     034536  012746  000007                                                    MOV     #7, (SP)
```

TEST 12 - DCOK H LO BIT

```
        034542  012746  034640                                                          MOV     #5$,-(SP)
        034546  012746  000024                                                          MOV     #24,-(SP)
        034552  012746  000003                                                          MOV     #3,-(SP)
        034556  104437                                                                  TRAP    C$SVEC
        034560  062706  000010                                                          ADD     #10,SP
  5772  034564  010637  002454                MOV     SP,OLDSP        ;SAVE THE STACK POINTER
  5773
  5774  034570  004537  004166                JSR     R5,MOVLTD       ;MOVE THE MICRO CODE INTO THE DMV
  5775  034574  034714                        SMCODE                  ;       THIS IS WHERE IT STARTS
  5776  034576  000040                        EMCODE-SMCODE           ;       THIS IS ITS SIZE IN BYTES
  5777
  5778  034600  112777  000377  145526        MOVB    #377,@BSEL6     ;WRITE ALL 1'S TO BSEL6
  5779
  5780  034606  012777  000077  145514        MOV     #77,@SEL4       ;START ADDRESS OF MICROCODE
  5781  034614  012777  000005  145502        MOV     #EXECUT,@SEL2   ;INITIATE M-CODE
  5782
  5783                          ;  *** IF THE RESET GETS THROUGH, THE MICRO-DIAGNOSTIC WILL CLEAR BSEL4 ***
  5784
  5785  034622  012703  001000                MOV     #1000,R3        ;STALL FOR A BIT (UCODE SHOULD HALT US HERE)
  5786  034626  077301                        SOB     R3,.
  5787
  5788                          ; IF WE GET HERE, WE NEVER GOT THE EXPECTED POWER-UP SEQUENCE!
  5789
  5790  034630                                GEDF    EM42A,ERR1      ;REPORT MISSING POWER UP
                                                                        ;       "DEVICE FATAL" ERROR # 76
        034630  104455                                                                  TRAP    C$ERDF
        034632  000114                                                                  .WORD   76
        034634  016746                                                                  .WORD   EM42A
        034636  006212                                                                  .WORD   ERR1
  5791
  5792                          ;IN EITHER CASE, RESTORE THE VECTOR & STACK AND SEE IF THE DMV GOT RESET
  5793
  5794  034640  013706  002454        5$:     MOV     OLDSP,SP        ;RESTORE THE STACK
  5795  034644                                CLRVEC  #24             ;RETURN THE VECTOR TO THE SUPERVISOR
        034644  012700  000024                                                          MOV     #24,R0
        034650  104436                                                                  TRAP    C$CVEC
  5796  034652                                SETPRI  #0              ;MAKE SURE WE'RE BACK RUNNING AT 0 AGAIN!
        034652  012700  000000                                                          MOV     #0,R0
        034656  104441                                                                  TRAP    C$SPRI
  5797  034660  122777  000377  145446        CMPB    #377,@BSEL6     ;THIS REGISTER SHOULD NOT HAVE BEEN CLEARED
  5798  034666  001404                        BEQ     10$             ;IT ISN'T, ALL IS OK -  EXIT SUBTEST
  5799  034670                                GEDF    EM42C,ERR1      ;IT IS, THEN REPORT THE FAILURE
                                                                        ;       'DEVICE FATAL' ERROR # 77
        034670  104455                                                                  TRAP    C$ERDF
        034672  000115                                                                  .WORD   77
        034674  017074                                                                  .WORD   EM42C
        034676  006212                                                                  .WORD   ERR1
  5800                                                                  ;* AT THIS POINT "DINIT" IS STILL SET *
  5801  034700  004737  003346        10$:    JSR     PC,MASCLR       ;MAKE SURE THE DMV IS PROPERLY RESET!
  5802  034704  103001                        BCC     11$             ;EVERYTHING OK, EXIT SUBR AND TEST.
  5803  034706                                ERROR                   ;REPORT MASCLR ERROR
        034706  104460                                                                  TRAP    C$ERROR
  5804  034710                        11$:
  5805  034710                                ENDSUB
        034710                                                                  L10064:
        034710  104403                                                                  TRAP    C$ESUB
  5806  034712                                ENDTST
```

SEQ 0156

TEST 12 DCOK H LO BIT

```
        034712
        034712  104401                  L10062:
                                                TRAP    C$ETST
```

```
                                .SBTTL  SUBTEST 2'S M CODE -- COMPLETE
                                ;-------------------------------------------------------------
                                ; 6502 MICROCODE FOR TEST #11/ SUBTEST #2
                                ;-------------------------------------------------------------
034714                          SMCODE:
034714  251  125                        .BYTE 251,125    ;A9 55     LDA #GOBSY1!HALT!PWRUP!DINIT
034716  215  004  246                   .BYTE 215,4,246  ;8D 04 A6  STA NPRCTL             :SET DISABLE INIT/HALT
034721  251  105                        .BYTE 251,105    ;A9 45     LDA #GOBSY1!PWRUP!DINIT
034723  215  004  246                   .BYTE 215,4,246  ;8D 04 A6  STA NPRCTL             :CLEAR HALT
034726  352                            .BYTE 352        ;EA        NOP                    :WAIT A WHILE
034727  352                            .BYTE 352        ;EA        NOP
034730  352                            .BYTE 352        ;EA        NOP
034731  251  107                        .BYTE 251,107    ;A9 47     LDA #GOBSY1!PWRUP!SDCOK!DINIT
034733  215  004  246                   .BYTE 215,4,246  ;8D 04 A6  STA NPRCTL             :SET DCOK
034736  251  105                        .BYTE 251,105    ;A9 45     LDA #GOBSY1!PWRUP!DINIT
034740  215  004  246                   .BYTE 215,4,246  ;8D 04 A6  STA NPRCTL             :CLEAR DCOK
034743  251  003                        .BYTE 251,3      ;A9 03     LDA #$03               :DELAY FOR 16.8 USEC
034745  205  000                        .BYTE 205,0      ;85 00     STA SP0                :BUS INIT IS 10 USEC
034747  306  000                        .BYTE 306,0      ;C6 00  5$:DEC SP0                :
034751  320  374                        .BYTE 320,374    ;D0 FC     BNE 5$                 :
034753  140                            .BYTE 140        ;60        RTS          :RETURN TO M LOOP
                                        .EVEN
034754                          EMCODE:
                                ;-------------------------------------------------------------
```

```
5996                                   .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 TMPC, 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
                                       ;*
```

```
;*
;* WE SHOULD GO
;* THROUGH A POWER-UP SEQUENCE.   R6 IS
;* RESTORED FROM OLDSP, INTERRUPT
;* PRIORITY LEVEL IS RESTORED TO 0, &
;* INTERRUPT VECTOR 24 IS RETURNED TO
;* THE DIAGNOSTIC SUPERVISOR.  SEL4 IS
;* COMPARED AGAINST TMPO -  THEY SHOULD
;* BE EQUAL.
;*
;* NOW CLEAR BSEL7.                          WAIT FOR BSEL7 TO CLEAR, THEN DROP
;*                                           'DISABLE INIT  AND EXIT TO M LOOP.
;*
;*--
;*
;* SUBTEST # 2:
;*
;* HERE  THE  HALT MODE IS USED IN A WAY WHICH VERY CLOSELY MATCHES THE DMV 11
;* MICROCODE'S  UTILIZATION  DURING  A   MOP  BOOT"  OPERATION. THE INTERRUPT
;* VECTOR  AREA  IS COMPLETELY OVERWRITTEN BY THE DMV NPR'S AND IS THEREFORE
;* BACKED  UP  ELSEWHERE  IN  THE  11 CPU'S MEMORY. THERE IS ALSO THE POSSIBLE
;* CONTENTION  WITH  THE  DIAGNOSTIC  SUPERVISOR  -   TO HELP HERE, AS MUCH AS
;* POSSIBLE WILL BE DONE AT INTERRUPT LEVEL 7.
;*
;*      11 CPU'S OPERATIONS:                      DMV-11 S OPERATIONS:
;*
;* THE MICROCODE IS MOVED INTO THE DMV.
;*
;* THE INTERRUPT VECTOR AREA IS BACKED
;* UP IN AN I/O BUFFER FOLLOWING THE
;* PROGRAM
;*
;* THE MICROCODE IS INITIATED & BSEL7 IS
;* SET TO  1 AS A FLAG.
;*
;* WAIT FOR BSEL7 TO BE CLEARED              CLEAR BSEL7 AND WAIT FOR IT TO GO
;*                                           NON-ZERO AGAIN PUTTING BOTH
;*                                           PROCESSORS IN SYNC. WITH EACH
;*                                           OTHER
;* CLEAR TMPO AND SAVE R6 FOR RECOVERY
;* LATER.  SET BSEL7 AGAIN AND WAIT FOR
;* TMPO TO BE SET.
;*                                           SET HALT, 'DCOK H LO , &  DISABL
;*                                           INIT" AND PERFORM 2 NOP'S AS A
;*                                           1 MICROSECOND DELAY
;*
;* ENTRY INTO THE CONSOLE 'ODT" WILL         CLEAR "DCOK H LO', SET 'HALT  &
;* BE INITIATED.                             "DISABL INIT'
;*
;*                                           NPR OUT THE FOLLOWING:
;*                                            LOC:  CONTENTS
;*                                             24   000000  VECTOR TO LOC 0
;*                                             26   000340  @ PRIORITY 7
;*                                              0   012700  MOV  # 1,R0
;*                                              2   177777
;*                                              4   000777  BR   .
;*
```

```
                          ;*
                          ;* THE ENTRY INTO THE CONSOLE  ODT"       SET "DCOK H LO" & "DISABL INIT"
                          ;* WILL BE ABORTED!                       AND CLEAR "HALT"
                          ;*
                          ;*                                        DELAY FOR A SHORT TIME (ABOUT 1
                          ;*                                        MICROSECOND
                          ;*
                          ;* THE ROUTINE NPR'D INTO LOC. 0 WILL     CLEAR "DCOK H LO" AND SET "DISABL
                          ;* BE EXECUTED    EVENTUALLY HANGING      INIT"
                          ;* AT THE "BR  ." INSTRUCTION @ LOC. 4.
                          ;*
                          ;*                                        NPR-OUT THE FOLLOWING:
                          ;*                                         LOC:  CONTENTS
                          ;*                                           6   005001  CLR  R1
                          ;*                                          10   062701  ADD  #(.+2),R1
                          ;*                                          12   062701  ADD  #(.+2),R1
                          ;*                                           .     .      .
                          ;*                                           .     .      .
                          ;*                                           .     .      .
                          ;*                                         360   062701  ADD  #(.+2),R1
                          ;*                                         362   062701  ADD  #(.+2),R1
                          ;*                                         364   010037  MOV  R0,@#TMP0
                          ;*                                         366   [TMP0]
                          ;*                                         370   013706  MOV  @#OLDSP,R6
                          ;*                                         372   [OLDSP]
                          ;*                                         374   000137  JMP  HLTST2
                          ;*                                         376   [HLTST2]
                          ;*
                          ;*                                        THIS IS SYNONYMOUS TO THE DMV-11
                          ;*                                        LOADING A "MESSAGE' STARTING AT MEM.
                          ;*                                        LOC. 000006.
                          ;*
                          ;*                                        NPR OUT THE FOLLOWING:
                          ;*                                         LOC:  CONTENTS
                          ;*                                           4   000240  NOP
                          ;*
                          ;*                                        THIS IS HOW THE DMV-11 WILL TAKE THE
                          ;*                                        11 CPU OUT OF THE 'BR  .' CONDITION.
                          ;* THE ROUTINE JUST LOADED BY THE DMV
                          ;* MICROCODE WILL NOW BE EXECUTED (WE     DROP "DISABL INIT'
                          ;* HOPE).  WHEN THE SUBROUTINE IS RE
                          ;* ENTERED (@ HLTST2),                    AN EXIT IS TAKEN TO THE M-LOOP
                          ;*
                          ;*   1  THE INTERRUPT VECTORS WILL BE
                          ;*      RESTORED;
                          ;*   2  THE PRIORITY LEVEL WILL BE
                          ;*      LOWERED BACK TO 0;
                          ;*   3  R0, R1, & R6 WILL ALL BE CHECKED
                          ;*      FOR THE PROPER CONTENTS; AND
                          ;*   4  TMP0 WILL BE CHECKED FOR THE
                          ;*      PROPER CONTENTS;
                          ;*
                          ;  ***************************************************************************
                          ;
                          ;       BGNTST
        034754                                                                T13::
 5997           000015    HLTEST  = $T                     ;DEFINE TEST # FOR  INIT" SECTION
```

TEST 13 HALT MODE VERIFICATION

```
5998 034754  032737  000001  002370          BIT     #PU24,PT.CTL    ;IS POWER-UP STRAPPED FOR OPTION 0?
5999 034762  001002                          BNE     5$              ;YES, THEN WE CAN DO THIS TEST
6000 034764                                  EXIT    TST             ;NO,  WE CAN'T DO THIS TEST UNLESS IT IS!
     034764  104432                                                                  TRAP    C$EXIT
     034766  000772                                                                  .WORD   L10065 .
6001
6002 034770  032737  000001  002316  5$:     BIT     #BIT0,PFLAG     ;IF BUS RESETS ARE ALLOWED,
6003 034776  001402                          BEQ     2$              ;  PERFORM THIS TEST
6004 035000                                  EXIT    TST             ;ELSE, BYPASS IT
     035000  104432                                                                  TRAP    C$EXIT
     035002  000756                                                                  .WORD   L10065 .
6005
6006 035004                          2$:     DELAY   40.             ;DELAY TO PREVENT TST # ROACHING
     035004  012727  000050                                                          MOV     #40.,(PC)+
     035010  000000                                                                  .WORD   0
     035012  013727  002116                                                          MOV     L$DLY,(PC)+
     035016  000000                                                                  .WORD   0
     035020  005367  177772                                                          DEC     -6(PC)
     035024  001375                                                                  BNE     .-4
     035026  005367  177756                                                          DEC     -22(PC)
     035032  001367                                                                  BNE     .-20
6007                                 ;
6008 035034                          1$:     BGNSUB
     035034                                                                  T13.1:
     035034  104402                                                                  TRAP    C$BSUB
6009 035036  004737  003514                  JSR     PC,MSTCLR       ;RESET DMV & ENTER M LOOP
6010 035042  103003                          BCC     2$              ;IF NO ERROR HERE, CONTINUE
6011 035044                                  ERROR                   ;ELSE, REPORT THE ERROR
     035044  104460                                                                  TRAP    C$ERROR
6012 035046                                  ESCAPE  TST             ;       & EXIT THE TEST
     035046  104410                                                                  TRAP    C$ESCAPE
     035050  000710                                                                  .WORD   L10065 .
6013 035052                          2$:
6014 035052  004537  004166                  JSR     R5,MOVLTD       ;MOVE THE MICRO CODE INTO THE DMV
6015 035056  035762                          MC1                     ;       THIS IS WHERE IT STARTS
6016 035060  000114                          MC2 MC1                 ;       THIS IS ITS SIZE IN BYTES
6017
6018 035062  005037  002412                  CLR     TMP0            ;INITIALIZE THE COUNTER
6019 035066                                  SETVEC  #24,#24$,#7     ;SETUP POWER UP VECTOR
     035066  012746  000007                                                          MOV     #7,-(SP)
     035072  012746  035242                                                          MOV     #24$,-(SP)
     035076  012746  000024                                                          MOV     #24,-(SP)
     035102  012746  000003                                                          MOV     #3,-(SP)
     035106  104437                                                                  TRAP    C$SVEC
     035110  062706  000010                                                          ADD     #10,SP
6020 035114  012777  000077  145206          MOV     #77,@SEL4       ;START ADDRESS OF MICROCODE
6021 035122  112777  177777  145206          MOVB    #-1,@BSEL7      ;SET FLAG (BSEL7)
6022 035130  012777  000005  145166          MOV     #EXECUT,@SEL2   ;INITIATE M CODE
6023
6024 035136  005002                          CLR     R2
6025 035140  105777  145172          3$:     TSTB    @BSEL7          ;WAIT FOR FLAG TO BE CLEARED
6026 035144  001405                          BEQ     5$
6027 035146  077204                          SOB     R2,3$
6028 035150                                  GEDF    EM43A,ERR1      ;TIMEOUT...M CODE IS HUNG!
                                                                     ;       "DEVICE FATAL" ERROR # 78
     035150  104455                                                                  TRAP    C$ERDF
     035152  000116                                                                  .WORD   78
```

```
                035154  017153                                                          .WORD   EM43A
                035156  006212                                                          .WORD   ERR1
     6029
     6030 035160  010637  002454          5$:     MOV     SP,OLDSP        ;SAVE STACK POINTER FOR LATER
     6031 035164  012777  002412  145136          MOV     #TMP0,@SEL4     ;PASS ADDRESS OF TMP0 TO M CODE
     6032 035172  112777  177777  145136          MOVB    # 1,@BSEL7      ;TELL M CODE TO PROCEED
     6033
     6034 035200  005237  002412          4$:     INC     TMP0            ;LOOP HERE UNTIL TMP0 GOES TO 0 AGAIN
     6035 035204  001375                          BNE     4$
     6036 035206  000240                          NOP
     6037 035210  000240                          NOP
     6038 035212  000240                          NOP
     6039 035214                                  GEDF    EM43A,ERR1      ;DMV SEEMS TO HAVE HUNG!
                                                                          ;       "DEVICE FATAL" ERROR # 79
                035214  104455                                                          TRAP    C$ERDF
                035216  000117                                                          .WORD   79
                035220  017153                                                          .WORD   EM43A
                035222  006212                                                          .WORD   ERR1
     6040 035224  000240                          NOP                     ; (FOR PATCHING)
     6041 035226  004737  003346                  JSR     PC,MASCLR       ;RESET THE DMV
     6042 035232  103001                          BCC     9$              ;RESET SUCCEEDED, ESCAPE TEST
     6043 035234                                  ERROR                   ; REPORT RESET ERROR
                035234  104460                                                          TRAP    C$ERROR
     6044 035236                          9$:     ESCAPE  TST             ; & GET OUT
                035236  104410                                                          TRAP    C$ESCAPE
                035240  000520                                                          .WORD   L10065 .
     6045
     6046 035242  013706  002454          24$:    MOV     OLDSP,SP        ;RESTORE R6 FIRST!
     6047 035246                                  CLRVEC  #24             ;RETURN THE VECTORE TO THE SUPERVISOR
                035246  012700  000024                                                  MOV     #24,R0
                035252  104436                                                          TRAP    C$CVEC
     6048 035254                                  SETPRI  #0              ;RESTORE PRIORITY LEVEL TO 0
                035254  012700  000000                                                  MOV     #0,R0
                035260  104441                                                          TRAP    C$SPRI
     6049 035262  027737  145042  002412          CMP     @SEL4,TMP0      ;THESE SHOULD BE EQUAL
     6050 035270  001405                          BEQ     30$             ;THEY ARE     TEST PASSED
     6051 035272                                  GEDF    EM43B,ERR1      ;THEY AREN'T -- HALT DIDN T WORK
                                                                          ;       "DEVICE FATAL" ERROR # 80
                035272  104455                                                          TRAP    C$ERDF
                035274  000120                                                          .WORD   80
                035276  017177                                                          .WORD   EM43B
                035300  006212                                                          .WORD   ERR1
     6052 035302  000240                          NOP                     ; (FOR PATCHING)
     6053 035304  105077  145026          30$:    CLRB    @BSEL7          ;TELL M CODE TO CLEAR DINIT
     6054 035310                                  ENDSUB
                035310                                                                  L10066:
                035310  104403                                                          TRAP    C$ESUB
     6055                                 ;       - - - - - - - - - - - - - - - - - - - - - - - - - - - -
     6056 035312                                  BGNSUB
                035312                                                                  T13.2:
                035312  104402                                                          TRAP    C$BSUB
     6057 035314  004737  003514                  JSR     PC,MSTCLR       ;RESET DMV & ENTER M LOOP
     6058 035320  103003                          BCC     1$              ;IF NO ERROR HERE, CONTINUE
     6059 035322                                  ERROR                   ;ELSE, REPORT THE ERROR
                035322  104460                                                          TRAP    C$ERROR
     6060 035324                                  ESCAPE  TST             ;       & EXIT THE TEST
                035324  104410                                                          TRAP    C$ESCAPE
```

```
     035326  000432                                                                        .WORD    L10065 .
     035330                              1$:
     035330  004537  004166                       JSR     R5,MOVWTD          ;MOVE THE MICRO CODE INTO THE DMV
     035334  036076                               MC2                        ;       THIS IS WHERE IT STARTS
     035336  000243                               MC2END-MC2                 ;       THIS IS ITS SIZE IN BYTES

     035340  004537  005004                       JSR     R5,MOVSW           ;SAVE THE INTERRUPT VECTORS
     035344  000000                               0
     035346  002654                               BUFAREA                    ; IN THE BUFFER AREA
     035350  000200                               400/2                      ;  LOC'S 0 ==> 377 WILL BE SAVED

     035352                                       SETVEC  #376,#0,#7         ;FAKE OUT THE SUPERVISOR.  WE'RE JUST
     035352  012746  000007                                                                    MOV      #7,-(SP)
     035356  012746  000000                                                                    MOV      #0,-(SP)
     035362  012746  000376                                                                    MOV      #376,-(SP)
     035366  012746  000003                                                                    MOV      #3,-(SP)
     035372  104437                                                                            TRAP     C$SVEC
     035374  062706  000010                                                                    ADD      #10,SP
                                                                         ; SETTING LOCATION 376 TO ZERO (0)

     035400  012777  000077  144722               MOV     #77,@SEL4          ;START ADDRESS OF MICROCODE
     035406  112777  177777  144722               MOVB    # 1,@BSEL7         ;SET FLAG (BSEL7)
     035414  012777  000005  144702               MOV     #EXECUT,@SEL2      ;INITIATE M-CODE

     035422  005002                               CLR     R2
     035424  105777  144706              3$:      TSTB    @BSEL7             ;WAIT FOR FLAG TO BE CLEARED
     035430  001406                               BEQ     5$
     035432  077204                               SOB     R2,3$
     035434                                       GEDF    EM43A,ERR1         ;TIMEOUT...M CODE IS HUNG!
                                                                         ;        DEVICE FATAL" ERROR # 81
     035434  104455                                                                            TRAP     C$ERDF
     035436  000121                                                                            .WORD    81
     035440  017153                                                                            .WORD    EM43A
     035442  006212                                                                            .WORD    ERR1
     035444  000447                               BR      22$                ;EXIT

     035446  010637  002454              5$:      MOV     SP,OLDSP           ;SAVE STACK POINTER FOR LATER
     035452  005037  002412                       CLR     TMP0               ;RESET EXECUTION INDICATOR (TMP0)
     035456  112777  177777  144652               MOVB    # 1,@BSEL7         ;TELL M CODE TO PROCEED

     035464  005003                               CLR     R3                 ;WE'LL WAIT THIS LONG FOR THE M-CODE TO
                                                                         ;       INTERRUPT OUR SEQUENCE OF OPERATION
     035466  005737  000376              10$:     TST     @#376              ;LOOK FOR THE M-CODE TO LOAD THIS LOCATION
     035472  001017                               BNE     20$                ;WE SHOULD NEVER SEE THIS HAPPEN!!!
     035474  077304                               SOB     R3,10$             ;LOOP UNTIL WE'RE INTERRUPTED
                                                                         ;IF WE AREN'T, WE HAVE A REAL PROBLEM

     035476  004537  005004                       JSR     R5,MOVSW           ;RESTORE THE INTERRUPT VECTORS
     035502  002654                               BUFAREA                    ; FROM THE BUFFER AREA
     035504  000000                               0
     035506  000200                               400/2                      ; TO LOC'S 0 ==> 377

     035510                                       SETPRI  #0                 ;RESTORE PRIORITY LEVEL TO 0
     035510  012700  000000                                                                    MOV      #0,R0
     035514  104441                                                                            TRAP     C$SPRI

     035516                                       GEDF    EM43A,ERR1         ;BUT WE AREN'T SURE WHAT IT IS!!!
```

TEST 13 HALT MODE VERIFICATION

```
                                                        ;       "DEVICE FATAL" ERROR # 82
     035516  104455                                                                  TRAP    C$ERDF
     035520  000122                                                                  .WORD   82
     035522  017153                                                                  .WORD   EM43A
     035524  006212                                                                  .WORD   ERR1
6104 035526  000240                NOP                  ; (FOR PATCHING)
6105 035530  000415                BR      22$          ; GO RESET DMV & EXIT
6106
6107 035532  004537  005004  20$:  JSR     R5,MOVSW     ;RESTORE THE INTERRUPT VECTORS
6108 035536  002654                BUFAREA              ; FROM THE BUFFER AREA
6109 035540  000000                0
6110 035542  000200                400/2                ; TO LOC'S 0 ==> 377
6111
6112 035544                        SETPRI  #0           ;RESTORE PRIORITY LEVEL TO 0
     035544  012700  000000                                                         MOV     #0,R0
     035550  104441                                                                TRAP    C$SPRI
6113
6114 035552                        GEDF    EM43C,ERR1   ;POWER UP INTERRUPT DIDN'T OCCUR
                                                        ;       "DEVICE FATAL" ERROR # 83
     035552  104455                                                                TRAP    C$ERDF
     035554  000123                                                                .WORD   83
     035556  017215                                                                .WORD   EM43C
     035560  006212                                                                .WORD   ERR1
6115 035562  000240                NOP                  ; (FOR PATCHING)
6116 035564  004737  003346  22$:  JSR     PC,MASCLR    ;RESET THE DMV
6117 035570  103001                BCC     23$          ; RESET OK, PROCEED
6118 035572                        ERROR                ; RESET FAILED, REPORT IT
     035572  104460                                                                TRAP    C$ERROR
6119 035574                  23$:
6120 035574                        ESCAPE  SUB          ; & GET THE HECK OUT OF HERE!!!
     035574  104410                                                                TRAP    C$ESCAPE
     035576  000160                                                                .WORD   L10067 .
6121 035600                  HLTST2:
6122
6123 035600  004537  005004        JSR     R5,MOVSW     ;RESTORE THE INTERRUPT VECTORS
6124 035604  002654                BUFAREA              ; FROM THE BUFFER AREA
6125 035606  000000                0
6126 035610  000200                400/2                ; TO LOC'S 0 ==> 377
6127
6128 035612  010002                MOV     R0,R2        ;R0 WILL BE CORRUPTED BY SUPERVISOR CALLS!
6129
6130 035614                        SETPRI  #0           ;RESTORE PRIORITY LEVEL TO 0
     035614  012700  000000                                                         MOV     #0,R0
     035620  104441                                                                TRAP    C$SPRI
6131 035622  022701  071573        CMP     #071573,R1   ;CHECK RESULTS OF THE ADDITIONS
6132 035626  001412                BEQ     5$           ;OK -->
6133 035630  010137  002256        MOV     R1,BDATA     ;WHAT!!!  SETUP & REPORT AN
6134 035634  012737  177777  002254  MOV   # 1,GDATA    ;  ADDITION ERROR
6135 035642                        GEDF    EM43D,ERR1   ;ADDITION DIDN'T WORK PROPERLY
                                                        ;       "DEVICE FATAL" ERROR # 84
     035642  104455                                                                TRAP    C$ERDF
     035644  000124                                                                .WORD   84
     035646  017242                                                                .WORD   EM43D
     035650  006212                                                                .WORD   ERR1
6136 035652  000240                NOP                  ; (FOR PATCHING)
6137 035654  020227  177777  5$:   CMP     R2,# 1       ;THE LOADED ROUTINE SHOULD HAVE DONE THIS
6138 035660  001003                BNE     8$           ;IT DIDN'T  - IT FAILED
```

TEST 13 HALT MODE VERIFICATION

```
6139 035662  023702  002412                    CMP     TMP0,R2         ;THESE SHOULD BE EQUAL TOO
6140 035666  001412                            BEQ     10$             ;OK -->
6141 035670  010237  002256            8$:     MOV     R2,BDATA        ;WHAT!!!  SETUP & REPORT AN ERROR
6142 035674  012737  177777  002254            MOV     #-1,GDATA
6143 035702                                    GEDF    EM43D,ERR1      ;LOADED ROUTINE FAILED
                                                                       ;       "DEVICE FATAL" ERROR # 85
     035702  104455                                                                    TRAP    C$ERDF
     035704  000125                                                                    .WORD   85
     035706  017242                                                                    .WORD   EM43D
     035710  006212                                                                    .WORD   ERR1
6144 035712  000240                            NOP                     ; (FOR PATCHING)
6145 035714  020637  002454            10$:    CMP     SP,OLDSP        ;THESE SHOULD ALSO BE EQUAL
6146 035720  001412                            BEQ     15$             ;OK - >
6147 035722  010637  002256                    MOV     SP,BDATA        ;WHAT!!!  SETUP & REPORT AN ERROR
6148 035726  013737  002454  002254            MOV     OLDSP,GDATA
6149 035734                                    GEDF    EM43D,ERR1      ;LOADED ROUTINE FAILED
                                                                       ;       "DEVICE FATAL" ERROR # 86
     035734  104455                                                                    TRAP    C$ERDF
     035736  000126                                                                    .WORD   86
     035740  017242                                                                    .WORD   EM43D
     035742  006212                                                                    .WORD   ERR1
6150 035744  000240                            NOP                     ; (FOR PATCHING)
6151 035746  004737  003346            15$:    JSR     PC,MASCLR       ;MAKE SURE THE DMV IS RESET
6152 035752  103001                            BCC     16$             ; RESET OK, CONTINUE
6153 035754                                    ERROR                   ;RESET FAILED, REPORT ERROR
     035754  104460                                                                    TRAP    C$ERROR
6154 035756                            16$:
6155 035756                                    ENDSUB
     035756                                                                 L10067:
     035756  104403                                                                    TRAP    C$ESUB
6156 035760                                    ENDTST
     035760                                                                 L10065:
     035760  104401                                                                    TRAP    C$ETST
```

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

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

035762                  MC1:
                        ;       ASSEMBLED BY:  COMPAS MICROSYSTEMS MINMIC (V6A)
                        ;                       (WITH CHANGES EDITED IN)
                        ;
                        ;LINE# LOC   CODE        LINE
                        ;0002  0000              .=$0000
                        ;0003  0000
                        ;0004  0000              ;EQUATES FOR BIT DEFINITIONS
                        ;0005  0000              BIT0    =@1
                        ;0006  0000              BIT1    =@2
                        ;0007  0000              BIT2    =@4
                        ;0008  0000              BIT4    =@20
                        ;0009  0000              BIT5    =@40
                        ;0010  0000              BIT6    =@100
                        ;0011  0000
                        ;0012  0000
                        ;0013  0000              ;ADDRESS EQUATES FOR CSR REGISTERS
                        ;0014  0000              BSEL4   =$14
                        ;0015  0000              BSEL5   =BSEL4+1
                        ;0016  0000              BSEL7   =BSEL4+3
                        ;0017  0000
                        ;0018  0000
                        ;0019  0000              ;NPR ADDRESS REGISTER EQUATES
                        ;0020  0000              NPRAIL  = $003C    ;IN NPR ADRS LO REG
                        ;0021  0000              NPRAIH  = NPRAIL+1 ;IN NPR ADRS HI REG
                        ;0022  0000              NPRAIX  = NPRAIL+2 ;IN NPR EXTENDED ADRS REG
                        ;0023  0000
                        ;0024  0000
                        ;0025  0000              ;NPR DATA REG EQUATES
                        ;0026  0000              NPRDIL  = $A600    ;IN NPR DATA LO REG
                        ;0027  0000              NPRDIH  = NPRDIL+1 ;IN NPR DATA HI REG
                        ;0028  0000
                        ;0029  0000
                        ;0030  0000              ;NPR CONTROL REG EQUATES
                        ;0031  0000              NPRCTL  = $A604 ;NPR CONTROL REGISTER
                        ;0032  0000              NONPR   = BIT6  ;USED TO PREVENT AN NPR
                        ;0033  0000              INOUT   = BIT5  ;SET TO 1 FOR INPUT, SET TO 0 FOR OUTPUT NPR
                        ;0034  0000              HALT    = BIT4  ;SET DURING MOP MODE ONLY
                        ;0035  0000              PWRUP   = BIT2  ;CLEARED BY BUS INIT TO INDICATE PWR UP
                        ;0036  0000              SDCLOW  = BIT1  ;SET TO 1 TO RESET LSI-11 FOR MOP BOOT
                        ;0037  0000              DISINI  = BIT0  ;SET TO 1 TO DISABLE BUS INIT TO 6502
                        ;0038  0000
                        ;0039  0000
                        ;0040  0000              ;NPR REQUEST FUNCTIONS
                        ;0041  0000              NPRRED  = PWRUP ;IN/OUT BIT = 0 FOR READ TO DMV 11
                        ;0042  0000
                        ;0043  0000
                        ;0044  0000              ;MISCELLANEOUS EQUATES
                        ;0045  0000              STARAM  = $003F ;STARTING ADRS OF GEN'L PURPOSE RAM TO TEST
                        ;0046  0000
                        ;0047  0000
```

```
                                        .SBTTL  SUBTEST 1'S M-CODE -  ROUTINE
                                        ;0048  0000             *=STARAM        ;START OF MICROCODE IN RAM
                                        ;LINE# LOC   CODE       LINE
035762      251     000                  .BYTE  251,00
                                        ;0050  003F  A9 00              LDA     #0      ;CLEAR BSEL7
035764      205     027                  .BYTE  205,27
                                        ;0051  0041  85 17              STA     BSEL7
                                        ;0052  0043
035766      245     027                  .BYTE  245,27
                                        ;0053  0043  A5 17      WAIT1   LDA     BSEL7   ;WAIT FOR IT TO GO <> 0
035770      360     374                  .BYTE  360,374
                                        ;0054  0045  F0 FC              BEQ     WAIT1
                                        ;0055  0047
                                        ;0056  0047             ; WE SHOULD NOW BE IN SYNC WITH THE 11 PROCESSOR
                                        ;0057  0047
035772      245     024                  .BYTE  245,24
                                        ;0058  0047  A5 14              LDA     BSEL4   ;GET & SAVE THE ADDRESS
035774      205     074                  .BYTE  205,74
                                        ;0059  0049  85 3C              STA     NPRAIL  ;OF "TMP0" AND USE IT TO
035776      245     025                  .BYTE  245,25
                                        ;0060  004B  A5 15              LDA     BSEL5   ;SETUP FOR AN NPR IN
036000      205     075                  .BYTE  205,75
                                        ;0061  004D  85 3D              STA     NPRAIH  ;OPERATION LATER
                                        ;0062  004F
036002      251     124                  .BYTE  251,124
                                        ;0063  004F  A9 54              LDA     #NONPR!HALT!PWRUP
036004      215     004     246          .BYTE  215,4,246
                                        ;0064  0051  8D 04 A6           STA     NPRCTL  ;HALT THE 11 CPU
                                        ;0064  0054
                                        ;0064  0054             ; DELAY TO ALLOW "HALT" TO TAKE EFFECT (ABOUT
                                        ;0064  0054             ; 100 MICROSECONDS).
036007      240     041                  .BYTE  240,41
                                        ;0064  0054  A0 21              LDY     #$21    ;INITIAL VALUE OF COUNTER
036011      210                          .BYTE  210
                                        ;0064  0056  88         DELAY   DEY             ;(33. FOR .6 US CYCLE)
036012      320     375                  .BYTE  320,375
                                        ;0064  0057  D0 FD              BNE     DELAY
                                        ;0065  0059
                                        ;0066  0059             ; WE NOW HAVE TO READ THE 11 CPU'S LOCATION WHO'S
                                        ;0067  0059             ; ADDRESS WE PREVIOUSLY READ FROM SEL6
                                        ;0068  0059
036014      251     000                  .BYTE  251,00
                                        ;0069  0059  A9 00              LDA     #0      ;CLEAR THE EXTENDED ADDRESS-IN
036016      205     076                  .BYTE  205,76
                                        ;0070  005B  85 3E              STA     NPRAIX
036020      251     024                  .BYTE  251,24
                                        ;0071  005D  A9 14              LDA     #NPRRED!HALT
036022      215     004     246          .BYTE  215,4,246
                                        ;0072  005F  8D 04 A6           STA     NPRCTL  ;READ ONE WORD FROM THE 11 CPU
                                        ;0073  0062
036025      054     004     246          .BYTE  54,4,246
                                        ;0074  0062  2C 04 A6   NPRWAT  BIT     NPRCTL  ;WAIT FOR IT TO "ALMOST  COMPLETE
036030      160     373                  .BYTE  160,373
                                        ;0075  0065  70 FB              BVS     NPRWAT
036032      352                          .BYTE  352
```

```
6272                                    ;0075  0067  EA              NOP             ;SHOULD COMPLETE HERE
6273                                    ;0076  0068
6274 036033     255     000     246     .BYTE  255,0,246
6275                                    ;0077  0068  AD 00 A6        LDA     NPRDIL  ;MOVE THE WORD JUST READ INTO
6276 036036     205     024             .BYTE  205,24
6277                                    ;0078  006B  85 14           STA     BSEL4   ; SEL4
6278 036040     255     001     246     .BYTE  255,1,246
6279                                    ;0079  006D  AD 01 A6        LDA     NPRDIH
6280 036043     205     025             .BYTE  205,25
6281                                    ;0080  0070  85 15           STA     BSEL5
6282                                    ;0088  0072
6283                                    ;0089  0072          ; DROP "HALT" AND SET "DCOK H LO" & "DISABL INIT"
6284                                    ;0090  0072
6285 036045     251     125             .BYTE  251,125
6286                                    ;0091  0072  A9 55           LDA     #NONPR!PWRUP!DISINI!HALT
6287 036047     215     004     246     .BYTE  215,4,246
6288                                    ;0092  0074  8D 04 A6        STA     NPCRTL
6289 036052     251     107             .BYTE  251,107
6290                                    ;0093  0077  A9 47           LDA     #NONPR!PWRUP!SDCLOW!DISINI
6291 036054     215     004     246     .BYTE  215,4 246
6292                                    ;0094  0079  8D 04 A6        STA     NPRCTL
6293                                    ;0095  007C
6294                                    ;0096  007C          ; NOW LET THE 11 CPU GO THROUGH THE POWER-UP SEQUENCE
6295                                    ;0097  007C
6296 036057     251     105             .BYTE  251,105
6297                                    ;0098  007C  A9 45           LDA     #NONPR!PWRUP!DISINI
6298 036061     215     004     246     .BYTE  215,4,246
6299                                    ;0099  007E  8D 04 A6        STA     NPRCTL
6300                                    ;0100  0081
6301                                    ;0101  0081          ; WHEN BSEL7 IS CLEARED, CLEAR "DISABL INIT"
6302                                    ;0102  0081
6303 036064     245     027             .BYTE  245,27
6304                                    ;0103  0081  A5 17    WAIT2  LDA     BSEL7
6305 036066     320     374             .BYTE  320,374
6306                                    ;0104  0083  D0 FC           BNE     WAIT2
6307                                    ;0105  0085
6308 036070     251     104             .BYTE  251,104
6309                                    ;0106  0085  A9 44           LDA     #NONPR!PWRUP
6310 036072     215     004     246     .BYTE  215,4,246
6311                                    ;0107  0087  8D 04 A6        STA     NPRCTL
6312                                    ;0108  008A
6313                                    ;0109  008A          ; USE A STANDARD SUBROUTINE RETURN TO GET BACK INTO
6314                                    ;0110  008A          ; THE MAINTENANCE LOOP
6315                                    ;0111  008A
6316 036075     140                     .BYTE  140
6317                                    ;0112  008A  60              RTS
6318                                    ;0113  008B
6319
6320
6321                                    ;ERRORS = 0000
6322
6323                                    .SBTTL  SUBTEST 1'S M CODE -  SYMBOL   TABLE
6324
6325                                    ; BIT0     0001    BIT1     0002    BIT2     0004    BIT4     0010
6326                                    ; BIT5     0020    BIT6     0040    BSEL4    0014    BSEL5    0015
6327                                    ; BSEL7    0017    DELAY    0C6E    DISINI   0001    HALT     0010
6328                                    ; INOUT    0020    NONPR    0040    NPRAIH   003D    NPRAIL   003C
```

```
6329                            ; NPRAIX   003E    NPRCTL   A604    NPRDIH   A601    NPRDIL   A600
6330                            ; NPRRED   0004    NPRWAT   005D    PWRUP    0004    SDCLOW   0002
6331                            ; STARAM   003F    WAIT1    0043    WAIT2    0078
6332                            ;END OF ASSEMBLY(V6A)
6333                            ;SYMBOLS LEFT = 1473 OUT OF 1500
6334
6335                            .SBTTL  SUBTEST 1'S M-CODE -- CROSS REFERENCE TABLE (CREF V01 05 )
6336
6337
6338                            ;BIT0              5#     37
6339                            ;BIT1     6#      36
6340                            ;BIT2     7#      35
6341                            ;BIT4     8#      34
6342                            ;BIT5     9#      33
6343                            ;BIT6    10#      32
6344                            ;BSEL4   14#      58      78
6345                            ;BSEL5   15#      60      80
6346                            ;BSEL7   16#      15      16      51      53      100
6347                            ;DELAY   86#      87
6348                            ;DISINI  37#      91      96
6349                            ;HALT             34#     63      71
6350                            ;INOUT   33#
6351                            ;NONPR   32#      63      91      96      103
6352                            ;NPRAIH  21#      61
6353                            ;NPRAIL  20#      21      22      59
6354                            ;NPRAIX  22#      70
6355                            ;NPRCTL  31#      64      72      74      92      104
6356                            ;NPRDIH  27#      79
6357                            ;NPRDIL  26#      27      77
6358                            ;NPRRED  41#      71
6359                            ;NPRWAT  74#      75
6360                            ;PWRUP   35#      41      63      91      96      103
6361                            ;SDCLOW  36#      91
6362                            ;STARAM  45#      48
6363                            ;WAIT1   53#      54
6364                            ;WAIT2  100#     101
```

```
6366                                    .EVEN
6367                                    .SBTTL  SUBTEST 2'S M-CODE -- ASSIGNMENTS
6368
6369                                    ;*****************************************************************************
6370                                    ;       MICRO-CODE FOR SUBROUTINE # 2
6371                                    ;*****************************************************************************
6372        000010                      .RADIX  8.
6373 036076                            MC2:
6374                                    ;LINE# LOC   CODE        LINE
6375                                    ;0002  0000              **$0000
6376                                    ;0003  0000
6377                                    ;0004  0000              ;EQUATES FOR BIT DEFINITIONS
6378                                    ;0005  0000              BIT0    =01
6379                                    ;0006  0000              BIT1    =02
6380                                    ;0007  0000              BIT2    =04
6381                                    ;0008  0000              BIT4    =020
6382                                    ;0009  0000              BIT6    =0100
6383                                    ;0010  0000
6384                                    ;0011  0000
6385                                    ;0012  0000              ;ADDRESS EQUATES FOR CSR REGISTERS
6386                                    ;0013  0000              BSEL7   =$17
6387                                    ;0014  0000
6388                                    ;0015  0000
6389                                    ;0016  0000              ;NPR ADDRESS REGISTER EQUATES
6390                                    ;0017  0000              NPRAOL  = $0038 ;OUT NPR ADRS LO REG
6391                                    ;0018  0000              NPRAOH  = NPRAOL+1 ;OUT NPR ADRS HI REG
6392                                    ;0019  0000              NPRAOX  = NPRAOL+2 ;OUT NPR EXTENDED ADRS REG
6393                                    ;0020  0000
6394                                    ;0021  0000
6395                                    ;0022  0000              ;NPR DATA REG EQUATES
6396                                    ;0023  0000              NPRDOL  = $A600 ;OUT NPR DATA LO REG
6397                                    ;0024  0000              NPRDOH  = NPRDOL+1 ;OUT NPR DATA HI REG
6398                                    ;0025  0000
6399                                    ;0026  0000
6400                                    ;0027  0000              ;NPR CONTROL REG EQUATES
6401                                    ;0028  0000              NPRCTL  = $A604 ;NPR CONTROL REGISTER
6402                                    ;0029  0000              NONPR   = BIT6  ;USED TO PREVENT AN NPR
6403                                    ;0030  0000              HALT    = BIT4  ;SET DURING MOP MODE ONLY
6404                                    ;0031  0000              PWRUP   = BIT2  ;CLEARED BY BUS INIT
6405                                    ;0032  0000              SDCLOW  = BIT1  ;SET TO 1 TO RESET LSI-11 FOR MOP BOOT
6406                                    ;0033  0000              DISINI  = BIT0  ;SET TO 1 TO DISABLE BUS INIT TO 6502
6407                                    ;0034  0000
6408                                    ;0035  0000
6409                                    ;0036  0000              ;MISCELLANEOUS EQUATES
6410                                    ;0037  0000              ;TARAM  = $003F ;STARTING ADRS OF GEN'L PURPOSE RAM
6411                                    ;0038  0000
```

```
                                                .SBTTL  SUBTEST 2'S M CODE    ROUTINE
                                                ;0039   0000
                                                ;0040   0000            A-STARAM        ;START OF MICROCODE IN RAM
6416 036076     251     000                      .BYTE   251,000
                                                ;0042   003F  A9 00             LDA     #0      ;CLEAR BSEL7
6418 036100     205     027                      .BYTE   205,027
                                                ;0043   0041  85 17             STA     BSEL7
                                                ;0044   0043
6421 036102     245     027                      .BYTE   245,027
                                                ;0045   0043  A5 17     WAIT1   LDA     BSEL7   ;WAIT FOR IT TO GO <> 0
6423 036104     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
6433 036106     251     125                      .BYTE   251,125
                                                ;0054   0047  A9 55             LDA     #NONPR!HALT!PWRUP!DISINI
6435 036110     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).
6440 036113     240     041                      .BYTE   240,41
                                                ;0054   004C  A0 21             LDY     #^D33   ;INITIAL VALUE OF COUNTER
6442 036115     210                              .BYTE   210
                                                ;0054   004E  88        DELAY   DEY             ;(33. FOR .6 US CYCLE)
6444 036116     320     375                      .BYTE   320,375
                                                ;0054   004F  D0 FD             BNE     DELAY
6446 036120     251     127                      .BYTE   251,127
                                                ;0055   0051  A9 57             LDA     #NONPR!HALT!PWRUP!SDCLOW!DISINI
6448 036122     215     004     246              .BYTE   215,004,246
                                                ;0056   0053  8D 04 A6          STA     NPRCTL  ;HANG THE 11 CPU ETC.
6450 036125     251     165                      .BYTE   251,165
                                                ;0057   0056  A9 75             LDA     #NONPR!HALT!PWRUP!DISINI!NPROUT
6452 036127     215     004     246              .BYTE   215,004,246
                                                ;0058   0058  8D 04 A6          STA     NPRCTL  ;NOW LET IT  POWER-UP
                                                ;0059   0058
6455 036132     251     000                      .BYTE   251,000
                                                ;0060   0058  A9 00             LDA     #0      ;SETUP NPR ADDR OUT HIGH FOR
6457 036134     205     071                      .BYTE   205,071
                                                ;0061   005D  85 39             STA     NPRAOH  ;  ALL NPR'S
6459 036136     205     072                      .BYTE   205,072
                                                ;0062   005F  85 3A             STA     NPRAOX  ;THE EXTENDED BYTE TOO
6461 036140     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
6467 036141     251     024                      .BYTE   251,024
                                                ;0068   0062  A9 14             LDA     #^O24   ;POINT TO 11'S POWER UP VEC.
6469 036143     205     070                      .BYTE   205,070
```

```
6470                                    ;0069  0064  85 38              STA     NPRAOL
6471 036145     040     305     000     .BYTE  040,305,000
6472                                    ;0070  0066  20 C5 00           JSR     NPR     ;MOVE TO 24
6473 036150     040     305     000     .BYTE  040,305,000
6474                                    ;0071  0069  20 C5 00           JSR     NPR     ;MOVE TO 26
6475                                    ;0072  006C
6476 036153     251     000             .BYTE  251,000
6477                                    ;0073  006C  A9 00              LDA     #0
6478 036155     205     070             .BYTE  205,070
6479                                    ;0074  006E  85 38              STA     NPRAOL  ;POINT TO THE 11'S LOC. 0
6480 036157     040     305     000     .BYTE  040,305,000
6481                                    ;0075  0070  20 C5 00           JSR     NPR     ;MOVE TO LOC 0
6482 036162     040     305     000     .BYTE  040,305,000
6483                                    ;0076  0073  20 C5 00           JSR     NPR     ;MOVE TO LOC 2
6484 036165     040     305     000     .BYTE  040,305,000
6485                                    ;0077  0076  20 C5 00           JSR     NPR     ;MOVE TO 4
6486                                    ;0078  0079
6487                                    ;0079  0079             ; NOW THAT WE'VE TAKEN CONTROL OF THE 11'S POWER
6488                                    ;0080  0079             ; UP VECTOR, FORCE HIM THROUGH IT.  BUT DON'T LET
6489                                    ;0081  0079             ; HIS BINIT RESET US (BY KEEPING "DISABL INIT'
6490                                    ;0082  0079             ; SET)
6491                                    ;0083  0079
6492 036170     251     107             .BYTE  251,107
6493                                    ;0084  0079  A9 47              LDA     #NONPR!PWRUP!SDCLOW!DISINI
6494 036172     215     004     246     .BYTE  215,004,246
6495                                    ;0085  007B  8D 04 A6           STA     NPRCTL
6496 036175     251     145             .BYTE  251,145
6497                                    ;0086  007E  A9 65              LDA     #NONPR!PWRUP!DISINI!NPROUT
6498 036177     215     004     246     .BYTE  215,004,246
6499                                    ;0087  0080  8D 04 A6           STA     NPRCTL
6500 036202     352                     .BYTE  352
6501                                    ;0087  0083  EA                 NOP
6502 036203     352                     .BYTE  352
6503                                    ;0087  0084  EA                 NOP
6504                                    ;0088  0085
6505                                    ;0089  0085             ; NOW WE CAN NPR OUT THE REST OF THE DATA WE HAVE
6506                                    ;0090  0085
6507 036204     040     305     000     .BYTE  040,305,000
6508                                    ;0091  0085  20 C5 00           JSR     NPR     ;MOVE TO LOC 6
6509 036207     240     166             .BYTE  240,166
6510                                    ;0092  0088  A0 76              LDY     #@166   ;THIS IS HOW MANY WE'LL DO
6511 036211     040     305     000     .BYTE  040,305,000
6512                                    ;0093  008A  20 C5 00   FILOOP  JSR     NPR     ;WRITE 1 WORD
6513 036214     312                     .BYTE  312
6514                                    ;0094  008D  CA                 DEX             ;BACK UP THE DATA POINTER
6515 036215     312                     .BYTE  312
6516                                    ;0095  008E  CA                 DEX             ;    WE WANT THE SAME WORD
6517 036216     210                     .BYTE  210
6518                                    ;0096  008F  88                 DEY             ;IF NOT DONE,
6519 036217     320     370             .BYTE  320,370
6520                                    ;0097  0090  D0 F8              BNE     FILOOP  ;                DO IT AGAIN
6521 036221     240     006             .BYTE  240,006
6522                                    ;0098  0092  A0 06              LDY     #@6     ;ELSE, SETUP TO DO 6 MORE
6523 036223     350                     .BYTE  350
6524                                    ;0099  0094  E8                 INX             ;       WORDS
6525 036224     350                     .BYTE  350
6526                                    ;0100  0095  E8                 INX             ;POINT TO NEXT WORD
```

```
6527 036225  040  305  000   .BYTE  040,305,000
6528                        ;0101  0096  20 C5 00   ENDLOP  JSR     NPR      ;MOVE THE LAST 6 WORDS
6529 036230  210             .BYTE  210
6530                        ;0102  0099  88                 DEY              ;IF NOT DONE,
6531 036231  320  372         .BYTE  320,372
6532                        ;0103  009A  D0 FA              BNE     ENDLOP   ;                DO IT AGAIN
6533                        ;0104  009C                                      ;ELSE, THE SIMULATED "DOWN
6534                        ;0105  009C                                      ;  LINE LOAD" IS COMPLETE
6535                        ;0106  009C
6536 036233  251  004         .BYTE  251,004
6537                        ;0107  009C  A9 04              LDA     #4       ; AND THE 11'S LOC. 4
6538 036235  205  070         .BYTE  205,070
6539                        ;0108  009E  85 38              STA     NPRAOL
6540 036237  040  305  000   .BYTE  040,305,000
6541                        ;0109  00A0  20 C5 00           JSR     NPR      ;OVER WRITE THE 'BR  .
6542                        ;0110  00A3                                      ;INSTRUCTION TO LET THE JUST
6543                        ;0111  00A3                                      ;LOADED ROUTINE BE EXECUTED
6544                        ;0112  00A3
6545 036242  251  104         .BYTE  251,104
6546                        ;0113  00A3  A9 44              LDA     #NONPR!PWRUP
6547 036244  215  004  246   .BYTE  215,004,246
6548                        ;0114  00A5  8D 04 A6           STA     NPRCTL   ;LET BINIT RESET US AGAIN
6549                        ;0115  00A8
6550 036247  140             .BYTE  140
6551                        ;0116  00A8  60                 RTS              ;RETURN TO MAINTENANCE LOOP
6552                        ;0117  00A9
6553                        ;0118  00A9
6554                        ;0119  00A9          ;*****************************************************
6555                        ;0120  00A9          ;
6556                        ;0121  00A9          ;       DATABL  - DATA TABLE CONTAINING THE DATA THAT
6557                        ;0122  00A9          ;                 IS TO BE NPR'D INTO THE 11 S MEMORY
6558                        ;0123  00A9          ;
6559                        ;0124  00A9          ;*****************************************************
6560                        ;0125  00A9
6561                        ;0126  00A9
6562                        ;0127  00A9          DATABL
6563 036250  000000           .WORD  000000
6564                        ;0128  00A9  00 00              .BYTE  0,@340  ;LOC'S 24 & 26
6565 036252  000340           .WORD 000340
6566                        ;0128  00AB  00 E0
6567 036254  012700  177777   MOV    #-1,R0
6568                        ;0129  00AD  15 C0              .BYTE  @012700,-1,@777 ;LOC'S 0 --> 4
6569                        ;0129  00AF  FF FF
6570 036260  000777           BR     .
6571                        ;0129  00B1  01 FF
6572 036262  005001           CLR    R1
6573                        ;0130  00B3  0A 01              .BYTE  @005001 ;LOC. 6
6574 036264  062701           .WORD  062701
6575                        ;0131  00B5  65 C1              .BYTE  @062701 ;LOC'S 10 - > 362
6576 036266  010037  002412   MOV    R0,@#TMP0
6577                        ;0132  00B7  10 1F              .BYTE  @010037 ;LOC 364   'MOV'
6578                        ;0133  00B9  00 00              .BYTE  0       ;LOC 366
6579 036272  013706  002454   MOV    @#OLDSP,SP
6580                        ;0134  00BB  17 C6              .BYTE  @013706 ;LOC 370   'MOV'
6581                        ;0135  00BD  00 00              .BYTE  0       ;LOC 372
6582 036276  000137  035600   JMP    @#HLTST2
6583                        ;0136  00BF  00 5F              .BYTE  @000137 ;LOC 374   'JMP
```

```
6584
6585 036302  000240                    ;0137  00C1  00 00            .DBYTE  0       ;LOC 376
 NOP
6586                                    ;0138  00C3  00 A0            .DBYTE  @000240 ;"NOP" FOR LOC 4
6587                                    ;0139  00C5
6588                                    ;0140  00C5             ;  THE THREE WORDS FOR LOCATIONS 366, 372, & 376 ARE
6589                                    ;0141  00C5             ;  ASSEMBLED IN WHEN THIS CODE IS INCLUDED INTO THE
6590                                    ;0142  00C5             ;  DIAGNOSTIC
6591                                    ;0143  00C5
6592                                    ;0144  00C5             ;*************************************************
6593                                    ;0145  00C5             ;
6594                                    ;0146  00C5             ;       "NPR" SUBROUTINE:
6595                                    ;0147  00C5             ;
6596                                    ;0148  00C5             ; 1 TAKE THE DATA FROM THE DATA TABLE AS INDEXED BY
6597                                    ;0149  00C5             ;       "X" AND PUT IT INTO THE NPR DATA OUT REGISTERS
6598                                    ;0150  00C5             ;
6599                                    ;0151  00C5             ; 2 GET THE CURRENT SETTING OF THE NPR CONTROL REG.
6600                                    ;0152  00C5             ;       AND WRITE IT BACK TO CAUSE A WORD NPR OUT
6601                                    ;0153  00C5             ;
6602                                    ;0154  00C5             ; 3 INCREMENT THE NPR OUT-ADDRESS LOW REGISTER
6603                                    ;0155  00C5             ;
6604                                    ;0156  00C5             ; 4 WAIT FOR "GOBUSY' TO GO LOW
6605                                    ;0157  00C5             ;
6606                                    ;0158  00C5             ; 5 RETURN TO CALLER
6607                                    ;0159  00C5             ;
6608                                    ;0160  00C5             ;*************************************************
6609                                    ;0161  00C5
6610 036304      265     251             .BYTE  265,251
6611                                    ;0162  00C5  B5 A9      NPR     LDA     DATABL,X ;LOAD THE DATA-OUT REG'S
6612 036306      215     000     246     .BYTE  215,000,246
6613                                    ;0163  00C7  8D 00 A6           STA     NPRDOL
6614 036311      265     252             .BYTE  265,252
6615                                    ;0164  00CA  B5 AA              LDA     DATABL+1,X
6616 036313      215     001     246     .BYTE  215,001,246
6617                                    ;0165  00CC  8D 01 A6           STA     NPRDOH
6618                                    ;0166  00CF
6619 036316      255     004     246     .BYTE  255,004,246
6620                                    ;0167  00CF  AD 04 A6           LDA     NPRCTL
6621 036321      215     004     246     .BYTE  215,004,246
6622                                    ;0168  00D2  8D 04 A6           STA     NPRCTL  ;KICK OFF A WORD NPR-OUT
6623                                    ;0169  00D5
6624 036324      350                     .BYTE  350
6625                                    ;0170  00D5  E8                 INX             ;POINT TO THE NEXT DATA
6626 036325      350                     .BYTE  350
6627                                    ;0171  00D6  E8                 INX             ;  WORD
6628                                    ;0172  00D7
6629                                    ;0173  00D7
6630                                    ;0174  00D7             NPRWAT
6631 036326      054     004     246     .BYTE  054,004,246
6632                                    ;0175  00D7  2C 04 A6           BIT     NPRCTL  ;WAIT FOR THE NPR TO
6633 036331      160     373             .BYTE  160,373
6634                                    ;0176  00DA  70 FB              BVS     NPRWAT  ; COMPLETE
6635 036333      352                     .BYTE  352
6636                                    ;0177  00DC  EA                 NOP
6637 036334      346     070             .BYTE  346,070
6638                                    ;0178  00DD  E6 38              INC     NPRAOL  ;POINT TO THE NEXT WORD
6639 036336      346     070             .BYTE  346,070
6640                                    ;0179  00DF  E6 38              INC     NPRAOL  ;OF THE 11'S MEMORY
```

```
6641
6642 036340     140                 ;0180  00E1
                                     .BYTE  140
6643                                 ;0181  00E1  60                RTS             ;RETURN TO CALLER
6644                                 ;0182  00E2
6645                                 ;
6646                                 ;
6647                                 ;ERRORS = 0000
6648                                 ;
6649                                 .SBTTL  SUBTEST 2'S M CODE -- SYMBOL   TABLE
6650                                 ;
6651                                 ; BIT0     0001    BIT1     0002    BIT2     0004    BIT4     0010
6652                                 ; BIT6     0040    BSEL7    0017    DATABL   009D    DISINI   0001
6653                                 ; ENDLOP   008A    FILOOP   007E    HALT     0010    NONPR    0040
6654                                 ; NPR      00B9    NPRA0H   0039    NPRA0L   0038    NPRA0X   003A
6655                                 ; NPRCTL   A604    NPRD0H   A601    NPRD0L   A600    NPRWAT   00CB
6656                                 ; PWRUP    0004    SDCLOW   0002    STARAM   003F    WAIT1    0043
6657                                 ;
6658                                 ;END OF ASSEMBLY(V6A)
6659                                 ;SYMBOLS LEFT = 1476 OUT OF 1500
6660                                 ;
6661                                 ;COMPAS MICROSYSTEMS MINMIC CROSS ASSEMBLER PAGE C 1
6662                                 .SBTTL  SUBTEST 2'S M CODE  - CROSS REFERENCE TABLE (CREF V01 05 )
6663                                 ;
6664                                 ;
6665                                 ;BIT0     5#     33
6666                                 ;BIT1     6#     32
6667                                 ;BIT2     7#     31
6668                                 ;BIT4     8#     30
6669                                 ;BIT6     9#     29
6670                                 ;BSEL7   13#     43      45
6671                                 ;DATABL 127#    162     164
6672                                 ;DISINI  33#     55      57      84      86
6673                                 ;ENDLOP 101#    103
6674                                 ;FILOOP  93#     97
6675                                 ;HALT    30#     55      57
6676                                 ;NONPR   29#     55      57      84      86      113
6677                                 ;NPR      7      71      75      76      77      91      93
6678                                 ;       101     109     162#
6679                                 ;NPRA0H  18#     61
6680                                 ;NPRA0L  17#     18      19      69      74      108     178
6681                                 ;       179
6682                                 ;NPRA0X  19#     62
6683                                 ;NPRCTL  28#     56      58      85      87      114     167
6684                                 ;       168     175
6685                                 ;NPRD0H  24#     165
6686                                 ;NPRD0L  23#     24      163
6687                                 ;NPRWAT 174#    176
6688                                 ;PWRUP   31#     55      57      84      86      113
6689                                 ;SDCLOW  32#     55      84
6690                                 ;STARAM  37#     40
6691                                 ;WAIT1   45#     46
6692 036341                         MC2END:
6693                                 .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.
                                        ;///////////////////////////////////////////////////////////////////////////

036342                                          BGNHRD
036342  000025                                                                          .WORD L10070-L$HARD/2
036344                                                                          L$HARD::

036344                                          GPRMA   ADDRES,0,0,160020,177776,YES
036344  000031                                                                          .WORD   T$CODE
036346  036416                                                                          .WORD   ADDRES
036350  160020                                                                          .WORD   T$LOLIM
036352  177776                                                                          .WORD   T$HILIM
036354                                          GPRMA   VECTOR,2,0,0,674,YES
036354  001031                                                                          .WORD   T$CODE
036356  036444                                                                          .WORD   VECTOR
036360  000000                                                                          .WORD   T$LOLIM
036362  000674                                                                          .WORD   T$HILIM
036364                                          GPRMD   PRIRTY,4,0,7000,0,7,YES
036364  002032                                                                          .WORD   T$CODE
036366  036475                                                                          .WORD   PRIRTY
036370  007000                                                                          .WORD   7000
036372  000000                                                                          .WORD   T$LOLIM
036374  000007                                                                          .WORD   T$HILIM
                                        ;       GPRML   PU24.M,16,100,YES                       ;JB REV A 0
036376                                          GPRMD   BDTY.M,12,0,7,0,2,YES
036376  005032                                                                          .WORD   T$CODE
036400  036526                                                                          .WORD   BDTY.M
036402  000007                                                                          .WORD   7
036404  000000                                                                          .WORD   T$LOLIM
036406  000002                                                                          .WORD   T$HILIM
036410                                          GPRML   XMFG.M,16,200,YES
036410  007130                                                                          .WORD   T$CODE
036412  036673                                                                          .WORD   XMFG.M
036414  000200                                                                          .WORD   200

036416                                          ENDHRD
                                                                                        .EVEN
036416                                                                          L10070:

                                        .NLIST  BEX
036416     104      105      126        ADDRES: .ASCIZ  /DEVICE CSR ADDRESS : /
036444     104      105      126        VECTOR: .ASCIZ  /DEVICE VECTOR ADDRESS : /
036475     104      105      126        PRIRTY: .ASCIZ  /DEVICE PRIORITY LEVEL : /
036526     102      117      101        BDTY.M: .ASCIZ  /BOARD TYPE (0=M8064, 1=M8053 V.35, 2=M8053 EIA) :
036611     111      123      040        PU24.M: .ASCIZ  /IS THE PROCESSOR STRAPPED TO MODE 0 ON POWER UP?
036673     111      123      040        XMFG.M: .ASCIZ  /IS THIS A MANUFACTURING TEST STAND?/
                                        .LIST   BEX
```

HARDWARE PARAMETER CODING SECTION

```
6727                                .EVEN
```

```
                                .SBTTL SOFTWARE PARAMETER CODING SECTION



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

036740                                  BGNSFT
036740  000000                                                          .WORD L10071-L$SOFT/2
036742                                                          L$SOFT::
036742                                  ENDSFT
                                                                .EVEN
036742                                                          L10071:
```

PATCH AREA FOR DEBUG

```
6745                                    .SBTTL PATCH AREA FOR DEBUG
6746 036742                             PATCH:
6747          037042                            .=.+100
6748 037042   000240                            NOP
6749 037044   000240                            NOP
6750 037046   000240                            NOP
6751
6752                                    ;*****************************************
6753
6754                                    .SBTTL "ENDMOD" & "LASTAD"
6755 037050                                       ENDMOD
6756 037050                                       LASTAD
                                                                        .EVEN
     037050   000000                                                    .WORD   0
     037052   000000                                                    .WORD   0
     037054                             L$LAST::
6757          000001                    .END
```

SYMBOL TABLE

```
ACR    = 120013          BSLT3 = 000023          C$GETB= 000026          EM34    016526          ERR10$  012732
ADDRES  036416           BSLT4 = 000024          C$GETW= 000027          EM34B   016540          ERR10.  012752
ADR    = 000020 G        BSLT5 = 000025          C$GMAN= 000043          EM35    016552          ERR11   007314 G
AD.HIT  023070           BSLT6 = 000026          C$GPHR= 000042          EM35B   016573          ERR12   007456 G
AD.OK   023064           BSLT7 = 000027          C$GPLO= 000030          EM4     016135          ERR13   010240 G
ASSEMB= 000010           BSR0    002212          C$GPRI= 000040          EM40    016614          ERR14   011002 G
BDATA   002256           BSR1    002214          C$INIT= 000011          EM41    016671          ERR3    006220 G
BDTY.M  036526           BSR10   002232          C$INLP= 000020          EM42A   016746          EPR4    006232 G
BIT0   = 000001 G        BSR11   002234          C$MANI= 000050          EM42B   017020          ERR4$   012206
BIT00  = 000001 G        BSR12   002236          C$MEM = 000031          EM42C   017074          ERR51   011176 G
BIT01  = 000002 G        BSR13   002240          C$MSG = 000023          EM43A   017153          ERR52   011270 G
BIT02  = 000004 G        BSR14   002242          C$OPEN= 000034          EM43B   017177          ERR60   011720 G
BIT03  = 000010 G        BSR15   002244          C$PNTB= 000014          EM43C   017215          ERR8    006532 G
BIT04  = 000020 G        BSR16   002246          C$PNTF= 000017          EM43D   017242          ERR9    007300 G
BIT05  = 000040 G        BSR17   002250          C$PNTS= 000016          EM50A   017271          ERR9$   012574
BIT06  = 000100 G        BSR2    002216          C$PNTX= 000015          EM50B   017337          ERR9.   012614
BIT07  = 000200 G        BSR3    002220          C$QIO = 000377          EM50C   017405          EVL    = 000004 G
BIT08  = 000400 G        BSR4    002222          C$RDBU= 000007          EM50D   017453          EXECUT= 000005
BIT09  = 001000 G        BSR5    002224          C$REFG= 000047          EM50E   017507          E$END  = 002100
BIT1   = 000002 G        BSR6    002226          C$RESE= 000033          EM50F   017543          E$LOAD= 000035
BIT10  = 002000 G        BSR7    002230          C$REVI= 000003          EM50G   017610          FMT02A  013127
BIT11  = 004000 G        BT1    = 002654         C$RFLA= 000021          EM50H   017652          FMT06   013530
BIT12  = 010000 G        BT2    = 002740         C$RPT = 000025          EM50I   017740          FMT06A  013542
BIT13  = 020000 G        BUFARE  002654          C$SEFG= 000046          EM50J   020002          FMT07   013476
BIT14  = 040000 G        CFMT0   022524          C$SPRI= 000041          EM50K   020070          FMT09   013621
BIT15  = 100000 G        CFMT2   022613          C$SVEC= 000037          EM50L   020132          FMT09A  013673
BIT2   = 000004 G        CFMT3   022673          C$TPRI= 000013          EM50M   020214          FMT10   013714
BIT3   = 000010 G        CONSOL  002314          DCOKTS= 000014          EM50N   020256          FMT11   013770
BIT4   = 000020 G        CONTIN  022414          DDRA   = 120003          EM50S   020324          FMT12   007672
BIT5   = 000040 G        CONTST  022514          DDRB   = 120002          EM50U   020376          FMT12A  007732
BIT6   = 000100 G        CSREGS= 000010          DELAY1  002262          EM50V   020442          FMT12D  010020
BIT7   = 000200 G        C$AU   = 000052         DELAY2  002264          EM50W   020507          FMT12E  010063
BIT8   = 000400 G        C$AUTO= 000061          DEVMAP  002310          EM50X   020556          FMT12F  010145
BIT9   = 001000 G        C$BRK  = 000022         DEVPTR  002312          EM50Y   020621          FMT13A  010546
BOE    = 000400 G        C$BSEG= 000004          DFPTBL  002160 G        EM50Z   020673          FMT13B  010611
BRDTYP  002366           C$BSUB= 000002          DIAGMC= 000000          EM51B   020734          FMT13C  010656
BSEL    002320           C$CEFG= 000045          DMVDAI= 000001          EM51C   021002          FMT13D  010721
BSELRS  002622           C$CLCK= 000062          DMVPU = 000004          EM51E   021050          FMT13E  010764
BSEL0   002320           C$CLEA= 000012          EF.CON= 000036 G        EM51F   021104          FMT16   014007
BSEL1   002322           C$CLOS= 000035          EF.NEW= 000035 G        EM51G   021151          FMT16A  014032
BSEL10  002340           C$CLP1= 000006          EF.PWR= 000034 G        EM51L   021213          FMT17   014074
BSEL11  002342           C$CVEC= 000036          EF.RES= 000037 G        EM51M   021275          FMT17A  014153
BSEL12  002344           C$DCLN= 000044          EF.STA= 000040 G        EM51N   021337          FMT17B  014234
BSEL13  002346           C$DODU= 000051          EMCODE  034754          EM51P   021405          FMT17C  014307
BSEL14  002350           C$DRPT= 000024          EM26    016152          EM52A   021457          FMT4    013213
BSEL15  002352           C$DU   = 000053         EM26A   016204          EM52B   021535          FMT4A   013253
BSEL16  002354           C$EDIT= 000003          EM26B   016226          EM52C   021567          FMT4B   013306
BSEL17  002356           C$ERDF= 000055          EM26C   016251          EM52D   021653          FMT4C   013313
BSEL2   002324           C$ERHR= 000056          EM26D   016274          EM60N   021711          FMT5    013346
BSEL3   002326           C$ERRO= 000060          EM26E   016316          ENDEMB  013120          FMT5A   013411
BSEL4   002330           C$ERSF= 000054          EM26F   016351          ERRBLK  002210 G        FMT50A  014367
BSEL5   002332           C$ERSO= 000057          EM26G   016402          ERRFLG  002276          FMT50B  014441
BSEL6   002334           C$ESCA= 000010          EM27    016424          ERRMSG  002206 G        FMT50C  014522
BSEL7   002336           C$ESEG= 000005          EM27A   016437          ERRNBR  002204 G        FMT50D  014562
BSLT0  = 000020          C$ESUB= 000003          EM27B   016461          ERRTYP  002202 G        FMT50E  014577
BSLT1  = 000021          C$ETST= 000001          EM27C   016502          ERR1    006212 G        FMT50M  014614
BSLT2  = 000022          C$EXIT= 000032          EM3     016115          ERR10   007306 G        FMT51A  014673
```

SYMBOL TABLE

```
FMT52A  011557          HLTST2  035600          L$AUT   002070 G        L10007  007276          MOVLTD  004166
FMT52B  011607          HOE     = 100000 G      L$AUTO  022752 G        L10010  007304          MOVSB   005034
FMT52C  011652          IBE     = 010000 G      L$CCP   002106 G        L10011  007312          MOVSW   005004
FMT52H  011514          IDU     = 000040 G      L$CLEA  023076 G        L10012  007454          MPCSR   002320
FMT60   012034          IENBA   = 000001        L$CO    002032 G        L10013  007670          MPIHAN  006066 G
FMT61   012073          IENBB   = 000020        L$DEPO  002011 G        L10014  010544          MPIVEC  002360
FMT62   012134          IENR    = 120016        L$DESC  003274 G        L10015  011174          MPOHAN  006140 G
FRSPAS  002304          IER     = 020000 G      L$DESP  002076 G        L10016  011266          MPOVEC  002362
FRSTIM  002302          IFR     = 120015        L$DEVP  002060 G        L10017  011512          MPRIOR  002364
F$AU    = 000015        IFRCA1= 000002          L$DISP  002124 G        L10020  012032          MRDY    = 000200
F$AUTO= 000020          IFRCA2= 000001          L$DLY   002116 G        L10022  022512          MREQ    = 000001
F$BGN   = 000040        IFRCB1= 000020          L$DTP   002040 G        L10023  023066          MSTCLR  003514
F$CLEA= 000007          IFRCB2= 000010          L$DTYP  002034 G        L10024  023112          NEWLIN  013124
F$DU    = 000016        IFRIRQ= 000200          L$DU    023114 G        L10025  023116          NEWPC   002452
F$END   = 000041        IFRSR   = 000004        L$DUT   002072 G        L10026  023120          NEWST   022232
F$HARD= 000004          IFRT1   = 000100        L$DVTY  003254 G        L10027  024036          NPRABT= 000200
F$HW    = 000013        IFRT2   = 000040        L$EF    002052 G        L10030  024034          NPRAIH= 000075
F$INIT= 000006          IHILNK  006136          L$ENVI  002044 G        L10031  024756          NPRAIL= 000074
F$JMP   = 000050        IHOLNK  006210          L$ERRT  002202 G        L10032  025404          NPRAIX= 000076
F$MOD   = 000000        INITT1  004456          L$ETP   002102 G        L10033  026114          NPRAOH= 000071
F$MSG   = 000011        INITT2  004630          L$EXP1  002046 G        L10034  025656          NPRAOL= 000070
F$PROT= 000021          INTFLG  002272          L$EXP4  002064 G        L10035  026112          NPRAOX= 000072
F$PWR   = 000017        INTWCH  002274          L$EXP5  002066 G        L10036  026364          NPRBS7= 000200
F$RPT   = 000012        IRQA    = 000004        L$HARD  036344 G        L10037  026772          NPRBYT= 000010
F$SEG   = 000003        IRQB    = 000002        L$HIME  002120 G        L10040  026566          NPRCTL= 123004
F$SOFT= 000005          IRQREG= 123005          L$HPCP  002016 G        L10041  026770          NPRDL   = 000044
F$SRV   = 000010        ISR     = 000100 G      L$HPTP  002022 G        L10042  030514          NPRDLB= 000054
F$SUB   = 000002        IXE     = 004000 G      L$HW    002160 G        L10043  027706          NPRDRH= 123001
F$SW    = 000014        I$AU    = 000041        L$ICP   002104 G        L10044  030512          NPRDRL= 123000
F$TEST= 000001          I$AUTO= 000041          L$INIT  022020 G        L10045  031232          NPREAD  005134
GDATA   002254          I$CLN   = 000041        L$LADP  002026 G        L10046  032460          NPRGO   = 000100
GETBSR  004232          I$DU    = 000041        L$LAST  037054 G        L10047  031722          NPRIO   = 000040
GETPRM  022256          I$HRD   = 000041        L$LOAD  002100 G        L10050  032456          NPRLD   = 000004
GETSR   024760          I$INIT= 000041          L$LUN   002074 G        L10051  034040          NPRMCR  002632
GETT2   024072          I$MOD   = 000041        L$MREV  002050 G        L10052  032752          NPRMOV  005266
GETWSR  004374          I$MSG   = 000041        L$NAME  002000 G        L10053  033156          NPROTS= 000004
G$CNTO= 000200          I$PROT= 000040          L$PRIO  002042 G        L10054  033362          NPRTOE= 000006
G$DELM= 000372          I$PTAB= 000041          L$PROT  022012 G        L10055  033566          NULERR  013076
G$DISP= 000003          I$PWR   = 000041        L$PRT   002112 G        L10056  033710          OLDSP   002454
G$EXCP= 000400          I$RPT   = 000041        L$REPP  002062 G        L10057  034032          ORA     = 120001
G$HILI= 000002          I$SEG   = 000041        L$REV   002010 G        L10060  034134          ORAM    = 120017
G$LOLI= 000001          I$SETU= 000041          L$SOFT  036742 G        L10061  034200          ORB     = 120000
G$NO    = 000000        I$SFT   = 000041        L$SPC   002056 G        L10062  034712          O$APTS= 000000
G$OFFS= 000400          I$SRV   = 000041        L$SPCP  002020 G        L10063  034516          O$AU    = 000001
G$OFSI= 000376          I$SUB   = 000041        L$SPTP  002024 G        L10064  034710          O$BGNR= 000000
G$PRMA= 000001          I$TST   = 000041        L$STA   002030 G        L10065  035760          O$BGNS= 000000
G$PRMD= 000002          J$JMP   = 000167        L$SW    002202 G        L10066  035310          O$DU    = 000001
G$PRML= 000000          LODT2C  024040          L$TEST  002114 G        L10067  035756          O$ERRT= 000001
G$RADA= 000140          LOE     = 040000 G      L$TIML  002014 G        L10070  036416          O$GNSW= 000000
G$RADB= 000000          LOGDEV  002266          L$UNIT  002012 G        L10071  036742          O$POIN= 000001
G$RADD= 000040          LOT     = 000010 G      L10000  002200          MASCLR  003346          O$SETU= 000000
G$RADL= 000120          LSIDCL= 000002          L10001  002202          MCLR    = 000100        PATB    002456
G$RADO= 000020          LSIHLT= 000020          L10002  006134          MC1     035762          PATCH   036742
G$XFER= 000004          LU1MOD  002000 G        L10003  006206          MC2     036076          PATF    002506
G$YES   = 000010        L$ACP   002110 G        L10004  006216          MC2END  036341          PCR     = 120014
HELP    = 000000        L$APT   002036 G        L10005  006230          MFEND   032460          PFLAG   002316
HLTEST= 000015          L$AU    023120 G        L10006  006530          MLWRI   004064          PNT     = 001000 G
```

SYMBOL TABLE

```
PRI    = 002000 G      STARST  022120      TXT3    015162      T1      023122 G      WRITEI  004054
PRIRTY  036475         SVCGBL= 000000      TXT4    015212      T1CH  = 120005        WSR0    002212
PRI00  = 000000 G      SVCINS= 000001      TXT4A   015252      T1CL  = 120004        WSR10   002222
PRI01  = 000040 G      SVCSUB= 000001      TXT6    015313      T1LH  = 120007        WSR12   002224
PRI02  = 000100 G      SVCTAG= 000001      TXT8A   015336      T1LHGO= 120005        WSR14   002226
PRI03  = 000140 G      SVCTST= 000001      TXT8B   015353      T1LL  = 120006        WSR16   002230
PRI04  = 000200 G      SWPBOT= 121000      TXT8C   015370      T1.1    023122        WSR2    002214
PRI05  = 000240 G      SWPDDC= 121400      TXT8D   015405      T10     034042 G      WSR4    002216
PRI06  = 000300 G      S$LSYM= 010000      TXT8E   015422      T11     034136 G      WSR6    002220
PRI07  = 000340 G      TDATA   002252      T$ARGC= 000002      T12     034202 G      W0    = 003054
PSTACK  002270         TMPA    002436      T$CODE= 007130      T12.1   034262        W1    = 003056
PT.CTL  002370         TMPB    002440      T$ERRN= 000126      T12.2   034520        W2    = 003060
PU24   = 000001        TMPC    002442      T$EXCP= 000000      T13     034754 G      W3    = 003062
PU24.M  036611         TMPD    002444      T$FLAG= 000040      T13.1   035034        W4    = 003064
READ    003616         TMPE    002446      T$GMAN= 000000      T13.2   035312        W5    = 003066
READI   003730         TMPF    002450      T$HILI= 000002      T2      024132 G      W6    = 003070
REDLOC= 000001         TMP0    002412      T$LAST= 000001      T2CH  = 120011        W7    = 003072
REDPAG= 000003         TMP1    002414      T$LOLI= 000000      T2CL  = 120010        W8    = 003074
REGNUM  002300         TMP2    002416      T$LSYM= 010000      T2LL  = 120010        W9    = 003076
REG0    002372         TMP3    002420      T$LTNO= 000015      T3      025020 G      XDATA   002260
REG1    002374         TMP4    002422      T$NEST= 177777      T4      025406 G      XLOC0   032462
REG2    002376         TMP5    002424      T$NS0  = 000000     T4.1    025422        XLOC1   032464
REG3    002400         TMP6    002426      T$NS1  = 000005     T4.2    025660        XLOC2   032466
REG4    002402         TMP7    002430      T$NS2  = 000002     T5      026116 G      XLOC3   032470
REG5    002404         TMP8    002432      T$PTNU= 000000      T6      026366 G      XLOC4   032472
REG6    002406         TMP9    002434      T$SAVL= 177777      T6.1    026366        XLOC5   032474
REG7    002410         TXTMLT  021746      T$SEGL= 177777      T6.2    026570        XLOC6   032476
RESTRT  022222         TXTML0  015515      T$SUBN= 000002      T7      026774 G      XMFG.M  036673
RUN    = 000200        TXTML1  015521      T$TAGL= 177777      T7.1    027032        XMINIT  030516
RXVAL0  032516         TXTML2  015535      T$TAGN= 010072      T7.2    027710        XMINTH  031062 G
RXVAL1  032520         TXTML3  015552      T$TEMP= 000000      T8      031234 G      XMREAD  030734
RXVAL2  032522         TXTML4  015574      T$TEST= 000015      T8LP    031734        XMWRIT  030636
RXVAL3  032524         TXTML5  015615      T$TSTM= 177777      T8.1    031264        XM4HOL  031060
RXVAL4  032526         TXTML6  015645      T$TSTS= 000001      T8.2    031724        XM4INT  031032
RXVAL5  032530         TXTML7  015657      T$$AU  = 010026     T9      032534 G      XORGB   012162
RXVAL6  032532         TXTNP   015745      T$$AUT= 010023      T9.1    032550        XORSW   005064
SEL0    002320         TXTNPT  021770      T$$CLE= 010024      T9.2    032754        XVAL0   032500
SEL10   002340         TXTNP0  015752      T$$DU  = 010025     T9.3    033160        XVAL1   032502
SEL12   002344         TXTNP1  015762      T$$HAR= 010070      T9.4    033364        XVAL2   032504
SEL14   002350         TXTNP2  015772      T$$HW  = 010000     T9.5    033570        XVAL3   032506
SEL16   002354         TXTNP3  016002      T$$INI= 010022      T9.6    033712        XVAL4   032510
SEL2    002324         TXTNP4  016017      T$$MSG= 010020      UAM    = 000200 G     XVAL5   032512
SEL4    002330         TXTNP5  016034      T$$PRO= 010021      VECTOR  036444        XVAL6   032514
SEL6    002334         TXTNP6  016051      T$$SOF= 010071      WA     = 003100       X$ALWA= 000000
SFPTBL  002202 G       TXTNP7  016065      T$$SRV= 010045      WB     = 003102       X$FALS= 000040
SLT0   = 000020        TXTNP8  016101      T$$SUB= 010067      WC     = 003104       X$OFFS= 000400
SLT2   = 000022        TXTNUL  015513      T$$SW  = 010001     WD     = 003106       X$TRUE= 000020
SLT4   = 000024        TXT1    014761      T$$TES= 010065      WE     = 003110       $E     = 000126
SLT6   = 000026        TXT11A  015437      T.EDF  = 000001     WF     = 003112       $LSTIN= 000001
SMCODE  034714         TXT11B  015460      T.EHRD= 000002      WRILOC= 000002        $LSTTA= 000001
SR     = 120012        TXT2    015017      T.ESF  = 000000     WRIPAG= 000004        $MPCSR= 160000 G
STALL   005132         TXT2A   015061      T.ESFT= 000003      WRITE   004042        $T     = 000015
STARES  002306         TXT2B   015120

. ABS.  037054      000
        000000      001
ERRORS DETECTED:  0
```

SYMBOL TABLE

VIRTUAL MEMORY USED: 34304 WORDS (135 PAGES)
DYNAMIC MEMORY: 19748 WORDS (75 PAGES)
ELAPSED TIME: 00:24:01
CNDMBA.BIC,CNDMBA.SEQ/CR/-SP=SVC34.MLB/ML,CNDMBA.P11
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