

DMV 11

MICRO-CTRLA STC 2
CVDMBCO

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DMV 11

MICRO-CTRLR STC 2
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.TITLE CVDNBCO 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-F264C-MC
PRODUCT NAME: CVDNBCO DMV11 MICRO-CONTROLLER STATIC DIAGNOSTIC PART 2
PRODUCT DATE: JULY 1983
MAINTAINER: DIAGNOSTICS MERRIMACK CC:38P
AUTHORS: CHRIS BRIENEN
RAY MARSHALL
PURPOSE: THIS DIAGNOSTIC IS DESIGNED TO PERFORM STATIC LOGIC TESTS FOR
THE M8053 OR M8064 (HEREAFTER REFERRED TO AS THE DMV OR DMV-11)

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DEC DECUS DECTAPE

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HISTORY

REV

DATE

REASON

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B
C

14-JAN-81
11-JUL-83
13-AUG-84

INITIAL RELEASE
INSTALL OUTSTANDING PATCHES
THERE WERE TIMING PROBLEMS
ASSOCIATED WITH RUNNING THIS PROGRAM
ON AN ORION PROCESSOR (J-11).
TIMING DELAYS HAD TO BE INCREASED.

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1.0 INTRODUCTION

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

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

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

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

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

2.0 HARDWARE REQUIREMENTS

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

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

3.0 PRELIMINARY PROGRAM REQUIREMENTS

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

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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.

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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
CVDHBC-C-0
DMV-11 U-CONTRL LOGIC DIAG - PART 2 OF 2
UNIT IS M8053 OR M8064
DR>
```

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

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6.3 PROGRAM OPTIONS

6.3.1 START COMMAND

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

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

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

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

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

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

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

MOE	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

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

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

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

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

6.3.1.5 EFFECT OF START COMMAND

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

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

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

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

EXAMPLE:

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

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

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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 DIALOGUE. 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>

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

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

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

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

6.3.3.3 EFFECT OF CONTINUE COMMAND

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

6.3.4 PROCEED COMMAND

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

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

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

6.3.4.2 EFFECT OF PROCEED COMMAND

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

6.3.5 ADD COMMAND

ADD/UNITS:<UNIT-LIST>

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

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

6.3.5.2 EFFECT OF ADD COMMAND

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

6.3.6 DROP COMMAND

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

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

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

6.3.6.2 EFFECT OF DROP COMMAND

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

6.3.7 PRINT COMMAND

PRI(NT)

6.3.7.1 EFFECT OF PRINT COMMAND

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

6.3.8 DISPLAY COMMAND

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

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

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

6.3.8.2 EFFECT OF DISPLAY COMMAND

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

6.3.9 FLAGS COMMAND

FLA(GS)

6.3.9.1 EFFECT OF FLAGS COMMAND

THE CURRENT SETTINGS OF ALL FLAGS ARE PRINTED.

6.3.10 ZFLAGS COMMAND

ZFL(AGS)

6.3.10.1 EFFECT OF ZFLAGS COMMAND

ALL FLAGS ARE CLEARED.

6.3.11 CONTROL CHARACTERS

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

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

A CONTROL O (O) ENTERED DURING THE EXECUTION OF A DIAGNOSTIC CAUSES ALL TELETYPE OUTPUT TO BE SUPPRESSED 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

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RESPONSE.

1. DEVICE CSR ADDRESS : (0) 160020?

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

2. DEVICE VECTOR ADDRESS : (0) 300 ?

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

3. DEVICE PRIORITY LEVEL : (0) 4 ?

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

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

THIS IS THE CPU'S POWER UP STRAPPING. "MODE 0" INDICATES THAT THE PROCESSOR WILL POWER UP USING LOCATIONS 24 AND 26. IF THE ANSWER TO THIS QUESTION IS NO, TESTS WHICH USE "DCOK" WILL BE SKIPPED.

(NOTE: MODE 0 IS SELECTED WHEN JUMPERS W5 AND W6 ARE "REMOVED"- SEE MICROCOMPUTER PROCESSOR HANDBOOK FOR MORE INFORMATION).

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

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

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

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

6.3.13 SOFTWARE PARAMETERS

NO SOFTWARE PARAMETER QUESTIONS ARE ASKED BY THIS PROGRAM.

6.3.14 EXTENDED DISCUSSION OF P-TABLE DIALOGUE

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

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

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

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

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

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

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

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

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

THE FOLLOWING DIALOGUE WOULD ACCOMPLISH THIS GOAL:

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

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

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

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

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

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7.0 TEST DESCRIPTIONS

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

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

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; * 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.
*****

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

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

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

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

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;* PERFORMED. IN GENERAL, EACH SUBTEST PERFORMS THE FOLLOWING:
;*
;* 1. INTERRUPTS ARE DISABLED FOR BOTH "A" & "B"
;*
;* 2. THE INTERRUPT REQUEST REGISTER IS WRITTEN INTO
;*
;* 3. A TEST IS MADE TO BE SURE THAT NEITHER INTERRUPT OCCURS
;*
;* 4. BOTH INTERRUPTS ARE ENABLES
;*
;* 5. A TEST IS MADE TO BE SURE THAT IF AN INTERRUPT IS EXPECTED, IT IS
;* RECEIVED AND IF IT ISN'T EXPECTED IT DOESN'T HAPPEN.
;*
;* ALL TESTING IS DONE HERE WITH THE PROCESSOR'S PRIORITY SET AT 0.
;*****

;*****
;* TEST 10 <BUS RESET WITH DISABLE INIT SET> .PAGE
;*
;* A BYTE SELECT REGISTER (BSEL3) IS LOADED WITH 377, DISABLE INIT BIT IS SET
;* IN THE NPR CONTROL REGISTER, AND A BUS RESET INSTRUCTION IS EXECUTED. THE
;* PROGRAM THEN CHECKS THAT THE DMV-11 WAS NOT CLEARED, BY CHECKING FOR 377
;* STILL IN BSEL3
;*****

;*****
;* TEST 11 <MASTER CLEAR WITH DISABLE INIT SET>
;*
;* THE "DISABL INIT" BIT IN THE NPR CONTROL REGISTER IS SET AND A MASTER CLEAR
;* IS ISSUED. IF THE MASTER CLEAR SUBROUTINE DETECTS AN ERROR, THE MASTER
;* CLEAR WILL NOT HAVE FUNCTIONED PROPERLY. WHERE THE NORMAL ERROR MESSAGE
;* (QUEUED UP BY "MASCLR") IS NORMALLY PRINTED, THIS TEST WILL PRINT ITS OWN
;* INSTEAD.
;*****

;*****
;* TEST 12 <DCOK H LO BIT>
;*
;* DCOK H LO IS SET IN THE NPR CONTROL REGISTER WHICH SHOULD CAUSE A VECTOR TO
;* THE FIRST INTERRUPT HANDLER WHERE THE VECTOR IS CHANGED TO POINT TO THE
;* SECOND HANDLER. THIS SECOND HANDLER WILL THEN STALL FOR A WHILE WAITING FOR
;* THE POWER-UP INTERRUPT WHICH SHOULD KICK US INTO THE SECOND HANDLER. IN
;* BOTH HANDLERS FLAGS ARE SET TO SAY THAT WE GOT THERE. WHEN WE FINALLY
;* RETURN TO OUR MAINLINE CODE, WE WILL RESUME THE DELAY FUNCTION WE WERE IN
;* AND THEN CHECK THE FLAGS.
;*
;* IN SUBTEST # 1, WE EXPECT THE DMV TO BE RESET.
;*
;*****

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

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962      ;*
963      ;* THIS TEST CONTAINS TWO (2) SUBTESTS DESIGNED TO VERIFY THE FUNCTIONALITY
964      ;* OF THE "HALT" CONTROL CONTAINED WITHIN THE NPR CONTROL REGISTER, IN EACH
965      ;* CASE, MICROCODE IS LOADED INTO THE DMV IN ORDER TO CONTROL THE TESTING
966      ;* FROM THERE.
967      ;*
968      ;*-----
969      ;*
970      ;* SUBTEST # 1:
971      ;*
972      ;* HERE WE VERIFY THAT WE CAN CONTROL NPR'S AND DCOK PROPERLY WHILE THE 11 CPU
973      ;* IS HALTED.
974      ;*
975      ;*          11 CPU'S OPERATIONS:                                DMV-11'S OPERATIONS:
976      ;*
977      ;* THE MICROCODE IS MOVED INTO THE DMV.
978      ;*
979      ;* CLEAR TMO. THIS WILL BE OUR TEST
980      ;* LOCATION FOR THE NPR OPERATION.
981      ;*
982      ;* SETUP FOR POWER-FAIL VECTORING THROUGH
983      ;* LOCATION 24.
984      ;*
985      ;* THE MICROCODE IS INITIATED & BSEL7 IS
986      ;* SET TO -1 AS A FLAG.
987      ;*
988      ;* WAIT FOR BSEL7 TO BE CLEARED                                CLEAR BSEL7 AND WAIT FOR IT TO GO
989      ;*                                                                NON-ZERO AGAIN. THIS PUTS THE
990      ;*                                                                DMV IN SYNC. WITH THE 11 CPU
991      ;*
992      ;* SAVE R6 IN OLDSP FOR RECOVERY LATER.
993      ;* CLEAR TMO, LOAD INTO SEL4 THE
994      ;* ADDRESS OF TMO, AND SET BSEL7 TO -1.
995      ;*
996      ;* START LOOPING -- INCREMENTING TMO                            GET THE ADDRESS OF TMO FROM SEL6
997      ;*                                                                AND SAVE IT FOR LATER
998      ;*
999      ;*                                                                HALT THE 11 CPU.
1000     ;*
1001     ;* CONSOLE "ODT" SHOULD BE ENTERED.                            NPR-IN THE CURRENT CONTENTS OF TMO
1002     ;*                                                                & PUT IT INTO SEL4 (THE FULL WORD).
1003     ;*
1004     ;*                                                                DELAY FOR ABOUT 100 MICROSECONDS
1005     ;*                                                                (THE TIME ISN'T CRITICAL).
1006     ;*
1007     ;* THE 11 CPU SHOULD NOT BE EXECUTING
1008     ;* ANYTHING NOW -- NOT EVEN "ODT"
1009     ;*
1010     ;*                                                                DROP THE "HALT" SIGNAL TO RELEASE
1011     ;*                                                                THE 11 CPU AND SET "DCOK H LO" &
1012     ;*                                                                "DISABL INIT". DROP "DCOK H LO"
1013     ;*
1014     ;*
1015     ;* WE SHOULD GO
1016     ;* THROUGH A POWER-UP SEQUENCE. R6 IS
1017     ;* RESTORED FROM OLDSP, INTERRUPT

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8.0 ERROR INFORMATION

8.1 ERROR REPORTING

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

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

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

THE CONTENTS OF ALL BYTE SELECT REG'S ARE:

BSEL0	BSEL1	BSEL2	BSEL3
000	000	000	000
BSEL4	BSEL5	BSEL6	BSEL7
000	000	121	000
BSEL10	BSEL11	BSEL12	BSEL13
000	000	000	000
BSEL14	BSEL15	BSEL16	BSEL17
000	000	000	000

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

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

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

†

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LISTING & ASSEMBLY CONTROL

.SBTTL LISTING & ASSEMBLY CONTROL

```

1167
1168
1169      000000      HELP=0      ; CONTROL LISTING OF HELP INFORMATION
1170                                ; HELP=0   NO LIST
1171                                ; HELP=1   LIST
1172
1173      002000      .-2000
1174
1175                                .MCALL SVC
1176 002000      SVC                                ; INITIALIZE SUPERVISOR MACROS
1177
1178 002000      BGNMOD LU1MOD
1179
1180
1181      000001      $LSTIN= 1
1182      000001      $LSTTAG= 1
1183      000001      SVCINS= 1      ; LIST INSTRUCTIONS, SHIFTED RIGHT
1184      000001      SVCTST= 1      ; LIST TEST TAGS, SHIFTED RIGHT
1185      000001      SVCSUB= 1      ; LIST SUBTEST TAGS, SHIFTED RIGHT
1186      000001      SVCGBL= 1      ; LIST GLOBAL TAGS, SHIFTED RIGHT
1187      000001      SVCTAG= 1      ; LIST OTHER TAGS, SHIFTED RIGHT
1188
1189      ; CHANGE THE VALUES OF THE SVC... SYMBOLS TO BE ZERO IF YOU WISH
1190      ; TO ALIGN THE MACRO CALLS AND THEIR EXPANSIONS. CHANGE THE
1191      ; SYMBOLS TO BE MINUS-ONE TO NOT LIST THE EXPANSIONS. YOU MAY
1192      ; CHANGE THE SYMBOLS AT ANY POINT IN YOUR PROGRAM.
1193
1194 002000      POINTER BGNAU,BGNDU,ERRTBL
1195

```


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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 CVDMB,C,0,60..0

1196		
1197		
1198		
1199		
1200		
1201		
1202		
1203		
1204		
1205		
1206	002000	
1207	002000	
1208	002000	103
1209	002001	126
1210	002002	104
1211	002003	115
1212	002004	102
1213	002005	000
1214	002006	000
1215	002007	000
1216	002010	
1217	002010	103
1218	002011	
1219	002011	060
1220	002012	
1221	002012	000000
1222	002014	
1223	002014	000074
1224	002016	
1225	002016	036406
1226	002020	
1227	002020	000000
1228	002022	
1229	002022	002160
1230	002024	
1231	002024	000000
1232	002026	
1233	002026	037124
1234	002030	
1235	002030	000000
1236	002032	
1237	002032	000000
1238	002034	
1239	002034	000000
1240	002036	
1241	002036	000000
1242	002040	
1243	002040	002124
1244	002042	
1245	002042	000000
1246	002044	
1247	002044	000000
1248	002046	
1249	002046	000000
1250	002050	
1251	002050	003

L\$NAME::	.ASCII	/C/
	.ASCII	/V/
	.ASCII	/D/
	.ASCII	/M/
	.ASCII	/B/
	.BYTE	0
	.BYTE	0
	.BYTE	0
L\$REV::	.ASCII	/C/
L\$DEPO::	.ASCII	/O/
L\$UNIT::	.WORD	0
L\$TIML::	.WORD	60.
L\$HPCP::	.WORD	L\$HARD
L\$SPCP::	.WORD	0
L\$HPTP::	.WORD	L\$HW
L\$SPTP::	.WORD	0
L\$LADP::	.WORD	L\$LAST
L\$STA::	.WORD	0
L\$CO::	.WORD	0
L\$DTYP::	.WORD	0
L\$APT::	.WORD	0
L\$DTP::	.WORD	L\$DISPATCH
L\$PRIO::	.WORD	0
L\$ENVI::	.WORD	0
L\$EXP1::	.WORD	0
L\$MREV::	.BYTE	C\$REVISION

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 PROGRAM HEADER

1252	002051	003
1253	002052	
1254	002052	000000
1255	002054	000000
1256	002056	
1257	002056	000000
1258	002060	
1259	002060	003254
1260	002062	
1261	002062	000000
1262	002064	
1263	002064	000000
1264	002066	
1265	002066	000000
1266	002070	
1267	002070	023162
1268	002072	
1269	002072	023156
1270	002074	
1271	002074	000000
1272	002076	
1273	002076	003274
1274	002100	
1275	002100	104035
1276	002102	
1277	002102	002202
1278	002104	
1279	002104	022020
1280	002106	
1281	002106	023140
1282	002110	
1283	002110	023014
1284	002112	
1285	002112	022012
1286	002114	
1287	002114	000000
1288	002116	
1289	002116	000000
1290	002120	
1291	002120	000000
1292		
1293		

.EVEN

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

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DISPATCH TABLE

.SBTTL DISPATCH TABLE

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

1294		
1295		
1296		
1297		
1298		
1299		
1300		
1301	002122	
1302	002122	000015
1303	002124	
1304	002124	023164
1305	002126	024174
1306	002130	025062
1307	002132	025450
1308	002134	026160
1309	002136	026430
1310	002140	027036
1311	002142	031276
1312	002144	032576
1313	002146	034104
1314	002150	034200
1315	002152	034244
1316	002154	035016
1317		

DISPATCH 13.

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

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DEFAULT HARDWARE P-TABLE

.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.
////////////////////////////////////

1318
1319
1320
1321
1322
1323
1324
1325
1326 002156
1327 002156 000010
1328 002160
1329 002160
1330
1331 002160 160020
1332 002162 000300
1333 002164 004000
1334 002166 000000
1335 002170 000000
1336 002172 000000
1337 002174 000000
1338 002176 000111
1339
1340
1341
1342
1343
1344
1345
1346
1347
1348
1349
1350
1351
1352 002200
1353 002200

BGNHW DFPTBL

.WORD L10000-L\$HW/2
L\$HW::
DFPTBL::

.WORD 160020 ;DMV11 CSR UNIBUS ADDRESS
.WORD 300 ;DMV11 INTERRUPT VECTOR
.WORD 4000 ;DMV11 INTERRUPT PRIORITY LEVEL = 4
.WORD 000 ;SWITCH REG. #1 (BOOT ADDRESS)
.WORD 000 ;SWITCH REG. #2 (DDCMP ADDRESS)
.WORD 0 ;MODULE IS M8064
.WORD 0 ;M3254/M3255 USED
.WORD 000111 ;MISC. CONTROLS:

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

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

ENDHW

L10000:

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SOFTWARE P-TABLE

1354
1355
1356
1357
1358
1359
1360
1361 002200
1362 002200 000000
1363 002202
1364 002202
1365 002202
1366 002202

.SBTTL SOFTWARE P-TABLE

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

BGNSW SFPTBL

ENDSW

.WORD L10001-L15M/2
L15M::
SFPTBL::
L10001:

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GLOBAL EQUATES SECTION

.SBTTL GLOBAL EQUATES SECTION

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

EQUALS

; BIT DIFINITIONS

1375 002202
1376
1377
1378
1379 100000
1380 040000
1381 020000
1382 010000
1383 004000
1384 002000
1385 001000
1386 000400
1387 000200
1388 000100
1389 000040
1390 000020
1391 000010
1392 000004
1393 000002
1394 000001
1395
1396 001000
1397 000400
1398 000200
1399 000100
1400 000040
1401 000020
1402 000010
1403 000004
1404 000002
1405 000001
1406

BIT15-- 100000
BIT14-- 40000
BIT13-- 20000
BIT12-- 10000
BIT11-- 4000
BIT10-- 2000
BIT09-- 1000
BIT08-- 400
BIT07-- 200
BIT06-- 100
BIT05-- 40
BIT04-- 20
BIT03-- 10
BIT02-- 4
BIT01-- 2
BIT00-- 1

; BIT9-- BIT09
BIT8-- BIT08
BIT7-- BIT07
BIT6-- BIT06
BIT5-- BIT05
BIT4-- BIT04
BIT3-- BIT03
BIT2-- BIT02
BIT1-- BIT01
BIT0-- BIT00

; EVENT FLAG DEFINITIONS

; EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION

1409
1410 000040
1411 000037
1412 000036
1413 000035
1414 000034
1415

EF.START-- 32.
EF.RESTART-- 31.
EF.CONTINUE-- 30.
EF.NEW-- 29.
EF.PWR-- 28.

; START COMMAND WAS ISSUED
; RESTART COMMAND WAS ISSUED
; CONTINUE COMMAND WAS ISSUED
; A NEW PASS HAS BEEN STARTED
; A POWER-FAIL/POWER-UP OCCURRED

; PRIORITY LEVEL DEFINITIONS

1416
1417
1418
1419 000340
1420 000300
1421 000240
1422 000200

PRI07-- 340
PRI06-- 300
PRI05-- 240
PRI04-- 200

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GLOBAL EQUATES SECTION

```

1423      000140      PRI03== 140
1424      000100      PRI02== 100
1425      000040      PRI01== 40
1426      000000      PRI00== 0
1427
1428      ;OPERATOR FLAG BITS
1429      ;
1430      000004      EVL==      4
1431      000010      LOT==      10
1432      000020      ADR==      20
1433      000040      IDU==      40
1434      000100      ISR==     100
1435      000200      UAM==     200
1436      000400      BOE==     400
1437      001000      PNT==    1000
1438      002000      PRI==    2000
1439      004000      IXE==    4000
1440      010000      IBE==   10000
1441      020000      IER==   20000
1442      040000      LOE==   40000
1443      100000      HOE==  100000
1444
1445      .SBTTL DEFINE THE NUMBER OF CSR'S
1446      000010      CSREGS = 8.
1447
1448      ;-----
1449
1450      .SBTTL NPR ADDRESS REGISTER EQUATES
1451      000070      NPRAOL = 70      ;OUT NPR ADRS LO REG
1452      000071      NPRAOH = NPRAOL+1 ;OUT NPR ADRS HI REG
1453      000072      NPRAOX = NPRAOL+2 ;OUT NPR EXTENDED ADRS REG
1454      000074      NPRAIL = NPRAOL+4 ;IN NPR ADRS LO REG
1455      000075      NPRAIH = NPRAOL+5 ;IN NPR ADRS HI REG
1456      000076      NPRAIX = NPRAOL+6 ;IN NPR EXTENDED ADRS REG
1457      000200      NPRBS7 = BIT7    ;"BANK SELECT 7" BIT -- W/IN EXTENDED ADRS. REG.
1458
1459
1460      .SBTTL NPR DATA REG EQUATES
1461      123000      NPRDRL = 123000 ;NPR DATA REGISTER -- LOW BYTE
1462      123001      NPRDRH = NPRDRL+1 ;NPR DATA REGISTER -- HIGH BYTE
1463
1464
1465      .SBTTL NPR CONTROL REG EQUATES
1466      123004      NPRCTL = NPRDRL+4 ;NPR CONTROL REGISTER
1467      000200      NPRABT = BIT7    ;=1 IF BUS TIME-OUT ON NPR
1468      000100      NPRGO  = BIT6    ;SET FOR NOP, CLEAR TO "GO" / 0-DONE, 1-BUSY
1469      000040      NPRIO  = BIT5    ;0 = (LSI ==> DMV); 1 = (DMV ==> LSI)
1470      000020      LSIHLT = BIT4    ;SETTING THIS WILL "HALT" THE LSI-11 !!
1471      000010      NPRBYT = BIT3    ;SET TO 1 TO WRITE BYTE ONLY TO LSI-11
1472      000004      DMVPU  = BIT2    ;SET BY MICRO-DIAG. MUST REMAIN SET!!!
1473      000002      LSIIDCL = BIT1   ;IF SET, WILL CAUSE POWER DOWN CONDITION IN LSI!
1474      000001      DMVDAI = BIT0   ;"DISABLE INIT" FROM EFFECTING DMV-11
1475
1476
1477
1478

```

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 NPR REQUEST FUNCTIONS

```

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

```


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SWITCH PACKS

1496
1497
1498
1499
1500
1501
1502
1503
1504

.SBTTL SWITCH PACKS

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

121000
121400

SWPBOT = 121000
SWPDDCMP = 121400

;"BOOT ADDRESS" SWITCH PACK [A200]
;"DDCMP ADDRESS" SWITCH PACK [A300]

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CSR REG. DEFINITION FOR MAINT. LOOP

```

1505      .SBTTL  CSR REG. DEFINITION FOR MAINT. LOOP
1506
1507      ;*****
1508      .SBTTL      MAINTENANCE REGISTER - BSELO
1509      ;-----*****
1510      ;          INTERRUPT ENABLE BITS
1511
1512      0C0001      IENBA   = BIT0          ;INTERRUPT ENABLE "A"
1513      000020      IENBB   = BIT4          ;INTERRUPT ENABLE "B"
1514
1515
1516      ;*****
1517      .SBTTL      MAINTENANCE REGISTER - BSEL1
1518      ;-----*****
1519      ; MAINT. LOOP CONTROL BITS:
1520
1521      000200      RUN      = BIT7
1522      000100      MCLR     = BIT6
1523      000001      MREQ     = BIT0
1524
1525
1526      ;*****
1527      .SBTTL      MAINTENANCE REGISTER - BSEL2
1528      ;-----*****
1529      ; MAINTENANCE FUNCTION CODES
1530
1531      000001      REDLOC   = 1          ;FUNCTION CODE FOR READ A 6502 LOCATION
1532      000002      WRILOC   = 2          ;FUNCTION CODE FOR WRITE A 6502 LOCATION
1533      000003      REDPAG   = 3          ;FUNCTION CODE FOR READ A 6502 MEMORY PAGE
1534      000004      WRIPAG   = 4          ;FUNCTION CODE FOR WRITE A 6502 RAM PAGE
1535      000005      EXECUT   = 5          ;FUNCTION CODE FOR EXECUTE AT GIVEN PC
1536
1537      000200      MRDY     = BIT7          ;M-LOOP REDY FOR A COMMAND WHEN SET

```


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DMV INTERNAL ADDRESSES

1538
1539
1540
1541
1542
1543
1544
1545
1546
1547
1548
1549
1550
1551
1552
1553
1554
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1562
1563
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1570
1571
1572
1573
1574
1575
1576
1577
1578
1579
1580
1581
1582
1583
1584

.SBTTL DMV INTERNAL ADDRESSES

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

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

.SBTTL BYTE & WORD SELECT REGISTERS

SLT0 =020
BSLT0 =SLT0
BSLT1 =SLT0+1
SLT2 =SLT0+2
BSLT2 =SLT0+2
BSLT3 =SLT0+3
SLT4 =SLT0+4
BSLT4 =SLT0+4
BSLT5 =SLT0+5
SLT6 =SLT0+6
BSLT6 =SLT0+6
BSLT7 =SLT0+7

.SBTTL VIA'S REGISTERS

ORB =120000
ORA =ORB+1
DORB =ORB+2
DDRA =ORB+3
T1CL =ORB+4
T1CH =ORB+5
T1LHGO =ORB+5
T1LL =ORB+6
T1LH =ORB+7
T2LL =ORB+10
T2CL =T2LL
T2CH =ORB+11
SR =ORB+12
ACP =ORB+13
PCR =ORB+14
IFR =ORB+15
IENR =ORB+16
ORAM =ORB+17

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

000020
000020
000021
000022
000022
000023
000024
000024
000025
000026
000026
000027

120000
120001
120002
120003
120004
120005
120005
120006
120007
120010
120010
120011
120012
120013
120014
120015
120016
120017

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VIA'S "IFR" REGISTER'S BIT ASSIGNMENTS

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

;-----

.SBTTL GLOBAL DATA SECTION

;/;;;/

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

ERRTBL
L#ERRTBL::
ERRTYP:: .WORD 0
ERRNBR:: .WORD 0
ERRMSG:: .WORD 0
ERRBLK:: .WORD 0

;*****
.SBTTL STORAGE FOR DEVICE REGISTERS
;-----

WSR0:
BSR0: .WORD 0
WSR2:
BSR1: .WORD 0
WSR4:
BSR2: .WORD 0
WSR6:
BSR3: .WORD 0
WSR10:
BSR4: .WORD 0
WSR12:
BSR5: .WORD 0
WSR14:
BSR6: .WORD 0
WSR16:
BSR7: .WORD 0
BSR10: .WORD 0
BSR11: .WORD 0
BSR12: .WORD 0
BSR13: .WORD 0
BSR14: .WORD 0
BSR15: .WORD 0
BSR16: .WORD 0
BSR17: .WORD 0

;*****
.SBTTL MISCELLANEOUS STORAGE
;-----

TDATA: .WORD 0 ;TEST DATA
GDATA: .WORD 0 ;EXPECTED DATA
BDATA: .WORD 0 ;ACTUAL DATA
XDATA: .WORD 0 ;EXCLUSIVE OR BETWEEN "GDATA" & "BDATA"
DELAY1: .WORD 110400 ;DELAY TIME, 3 INST., 500 MILLISEC.
DELAY2: .WORD 7 ;DELAY TIME FOR M-LOOP FUNCTION, 100 USEC.APPROX.
LOGDEV: .WORD 0 ;LOGICAL DEVICE NUMBER

- 1596
- 1597
- 1598
- 1599
- 1600
- 1601
- 1602
- 1603
- 1604
- 1605
- 1606
- 1607 002202
- 1608 002202
- 1609 002202 000000
- 1610 002204 000000
- 1611 002206 000000
- 1612 002210 000000
- 1613
- 1614
- 1615
- 1616
- 1617 002212
- 1618 002212 000000
- 1619 002214
- 1620 002214 000000
- 1621 002216
- 1622 002216 000000
- 1623 002220
- 1624 002220 000000
- 1625 002222
- 1626 002222 000000
- 1627 002224
- 1628 002224 000000
- 1629 002226
- 1630 002226 000000
- 1631 002230
- 1632 002230 000000
- 1633 002232 000000
- 1634 002234 000000
- 1635 002236 000000
- 1636 002240 000000
- 1637 002242 000000
- 1638 002244 000000
- 1639 002246 000000
- 1640 002250 000000
- 1641
- 1642
- 1643
- 1644
- 1645 002252 000000
- 1646 002254 000000
- 1647 002256 000000
- 1648 002260 000000
- 1649 002262 110400
- 1650 002264 000007
- 1651 002266 000000

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MISCELLANEOUS STORAGE

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

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CURRENT DEVICE PARAMETERS

```

1708      .SBTTL  CURRENT DEVICE PARAMETERS
1709
1710      160000      $MPCSR  ==      160000      ;INITIAL ASSEMBLED IN CSR ADDRESS
1711
1712      002320      MPCSR:      ;POINTER TO THE DMV11 CSR'S
1713      002320      BSEL0:      ;POINTER TO BSEL0
1714      002320      BSEL:      ;ALTERNATE NAME FOR BSEL0
1715      002320      160000      SEL0:      .WORD  $MPCSR      ;POINTER TO SEL0
1716      002322      160001      BSEL1:      .WORD  $MPCSR+1    ;POINTER TO BSEL1
1717      002324      BSEL2:      ;POINTER TO BSEL2
1718      002324      160002      SEL2:      .WORD  $MPCSR+2    ;POINTER TO SEL2
1719      002326      160003      BSEL3:      .WORD  $MPCSR+3    ;POINTER TO BSEL3
1720      002330      BSEL4:      ;POINTER TO BSEL4
1721      002330      160004      SEL4:      .WORD  $MPCSR+4    ;POINTER TO SEL4
1722      002332      160005      BSEL5:      .WORD  $MPCSR+5    ;POINTER TO BSEL5
1723      002334      BSEL6:      ;POINTER TO BSEL6
1724      002334      160006      SEL6:      .WORD  $MPCSR+6    ;POINTER TO SEL6
1725      002336      160007      BSEL7:      .WORD  $MPCSR+7    ;POINTER TO BSEL7
1726      002340      BSEL10:     ;POINTER TO BSEL10
1727      002340      160010      SEL10:     .WORD  $MPCSR+10   ;POINTER TO SEL10
1728      002342      160011      BSEL11:    .WORD  $MPCSR+11   ;POINTER TO BSEL11
1729      002344      BSEL12:     ;POINTER TO BSEL12
1730      002344      160012      SEL12:     .WORD  $MPCSR+12   ;POINTER TO SEL12
1731      002346      160013      BSEL13:    .WORD  $MPCSR+13   ;POINTER TO BSEL13
1732      002350      BSEL14:     ;POINTER TO BSEL14
1733      002350      160014      SEL14:     .WORD  $MPCSR+14   ;POINTER TO SEL14
1734      002352      160015      BSEL15:    .WORD  $MPCSR+15   ;POINTER TO BSEL15
1735      002354      BSEL16:     ;POINTER TO BSEL16
1736      002354      160016      SEL16:     .WORD  $MPCSR+16   ;POINTER TO SEL16
1737      002356      160017      BSEL17:    .WORD  $MPCSR+17   ;POINTER TO BSEL17
1738
1739      002360      000300      MPIVEC:    .WORD  300      ;DMV11 INPUT INTERRUPT VECTOR
1740      002362      000304      MPOVEC:    .WORD  304      ;DMV11 OUTPUT INTERRUPT VECTOR
1741      002364      000340      MPRIOR:    .WORD  340      ;DMV11 DEVICE PRIORITY
1742      002366      000000      BRDTYP:    .WORD  0      ;0-M8064,1-M8053/V.35,2-M8053/EIA
1743      002370      000000      PT.CTL:    .WORD  0      ;MISC. CONTROL FLAGS FROM P-TABLE
1744
1745      .SBTTL  GEN'L PURPOSE SCRATCH STORAGE
1746
1747      002372      000000      REG0:      .WORD  0
1748      002374      000000      REG1:      .WORD  0
1749      002376      000000      REG2:      .WORD  0
1750      002400      000000      REG3:      .WORD  0
1751      002402      000000      REG4:      .WORD  0
1752      002404      000000      REG5:      .WORD  0
1753      002406      000000      REG6:      .WORD  0
1754      002410      000000      REG7:      .WORD  0

```

1755
1756
1757
1758
1759 002412 000000
1760 002414 000000
1761 002416 000000
1762 002420 000000
1763 002422 000000
1764 002424 000000
1765 002426 000000
1766 002430 000000
1767 002432 000000
1768 002434 000000
1769 002436 000000
1770 002440 000000
1771 002442 000000
1772 002444 000000
1773 002446 000000
1774 002450 000000
1775 002452 000000
1776 002454 000000
1777
1778
1779
1780
1781
1782 002456 000025
1783 002460 125
1784 002461 252
1785 002462 000
1786 002463 377
1787 002464 001
1788 002465 002
1789 002466 004
1790 002467 010
1791 002470 020
1792 002471 040
1793 002472 100
1794 002473 200
1795 002474 376
1796 002475 375
1797 002476 373
1798 002477 367
1799 002500 357
1800 002501 337
1801 002502 277
1802 002503 177
1803 002504 000
1804 002505

.SBTTL SCRATCH STORAGE FOR MESSAGE REPORTING
.EVEN

TMP0: .WORD 0
TMP1: .WORD 0
TMP2: .WORD 0
TMP3: .WORD 0
TMP4: .WORD 0
TMP5: .WORD 0
TMP6: .WORD 0
TMP7: .WORD 0
TMP8: .WORD 0
TMP9: .WORD 0
TMPA: .WORD 0
TMPB: .WORD 0
TMPC: .WORD 0
TMPD: .WORD 0
TMPE: .WORD 0
TMPF: .WORD 0
NEWPC: .WORD 0
OLDSP: .WORD 0

;SAVE LOCATION FOR A "PC" VALUE RESET
;SAVE LOCATION FOR A STACK POINTER RESET VALUE

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

.EVEN
PATB: .WORD 16--2 ;USAGE:
 .BYTE 125 ;# OF BYTES IN PATTERN
 .BYTE 252
 .BYTE 000
 .BYTE 377
 .BYTE 001
 .BYTE 002
 .BYTE 004
 .BYTE 010
 .BYTE 020
 .BYTE 040
 .BYTE 100
 .BYTE 200
 .BYTE 376
 .BYTE 375
 .BYTE 373
 .BYTE 367
 .BYTE 357
 .BYTE 337
 .BYTE 277
 .BYTE 177
 .BYTE 000

14:

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

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

1805		
1806		
1807	002506	000045
1808	002506	000045
1809	002510	125252
1810	002512	052525
1811	002514	000000
1812	002516	177777
1813	002520	000001
1814	002522	000002
1815	002524	000004
1816	002526	000010
1817	002530	000020
1818	002532	000040
1819	002534	000100
1820	002536	000200
1821	002540	000400
1822	002542	001000
1823	002544	002000
1824	002546	004000
1825	002550	010000
1826	002552	020000
1827	002554	040000
1828	002556	100000
1829	002560	177776
1830	002562	177775
1831	002564	177773
1832	002566	177767
1833	002570	177757
1834	002572	177737
1835	002574	177677
1836	002576	177577
1837	002600	177377
1838	002602	176777
1839	002604	175777
1840	002606	173777
1841	002610	167777
1842	002612	157777
1843	002614	137777
1844	002616	077777
1845	002620	000000
1846	002622	

.EVEN
PATF: <10--2>/2
125252
052525
0
-1
1
2
4
10
20
40
100
200
400
1000
2000
4000
10000
20000
40000
100000
177776
177775
177773
177767
177757
177737
177677
177577
177377
176777
175777
173777
167777
157777
137777
077777
0

16:

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

1847
 1848
 1849
 1850 002622 000
 1851 002623 200
 1852 002624 000
 1853 002625 000
 1854 002626 033
 1855 002627 000
 1856 002630 305
 1857 002631 000

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

```
.EVEN
BSELRS: .BYTE 000 ;BSEL0
         .BYTE 200 ;BSEL1 -- "RUN" BIT SET
         .BYTE 000 ;BSEL2
         .BYTE 000 ;BSEL3
         .BYTE 033 ;BSEL4 -- CODE FOR THE DMV-11
         .BYTE 000 ;BSEL5
         .BYTE 305 ;BSEL6 -- INDICATING VALID COMPLETION OF U-DIAG.
         .BYTE 000 ;BSEL7
```

1858
 1859
 1860
 1861
 1862
 1863
 1864
 1865

.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!
```

1866
 1867
 1868 002632 000004
 1869 002634 000000
 1870 002636 000000
 1871 002640 000000
 1872 002642 000000
 1873 002644 000000
 1874 002646 000000
 1875 002650 000000
 1876 002652 000000

```
.EVEN
NPRMCR: .WORD DMVPU ;ONLY THE "POWER UP" IS SET (BY MICRO-DIAG.)
         .WORD 0 ;"DATA HI"
         .WORD 0 ;"DATA LO"
         .WORD 0 ;"OUT ADDR. EXTENDED"
         .WORD 0 ;"OUT ADDR. HI"
         .WORD 0 ;"OUT ADDR. LO"
         .WORD 0 ;"IN ADDR. EXTENDED"
         .WORD 0 ;"IN ADDR. HI"
         .WORD 0 ;"IN ADDR. LO"
```


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DATA BUFFER AREAS

.SBTTL DATA BUFFER AREAS

BUFAREA: .BLKB 256.

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

1877
1878
1879 002654 000400
1880
1881
1882
1883
1884
1885 003054
1886 003056
1887 003060
1888 003062
1889 003064
1890 003066
1891 003070
1892 003072
1893 003074
1894 003076
1895 003100
1896 003102
1897 003104
1898 003106
1899 003110
1900 003112
1901
1902 002654
1903 002740

W0 = BUFAREA+128.
W1 = W0+2
W2 = W1+2
W3 = W2+2
W4 = W3+2
W5 = W4+2
W6 = W5+2
W7 = W6+2
W8 = W7+2
W9 = W8+2
WA = W9+2
WB = WA+2
WC = WB+2
WD = WC+2
WE = WD+2
WF = WE+2

;THIS WORD TABLE STARTS IN THE MIDDLE OF "BUFAREA"
;AND IS USED BY "ERR6" FOR PRINTING BYTES

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

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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
;#-----
DEV TYP <M8053 OR M8064>

L#DVTYP::
.ASCIZ /M8053 OR M8064/

.EVEN

;# TITLE OF PROGRAM
;#-----

.RADIX 10.
DESCRIPT <DMV-11 U-CONTRL LOGIC DIAG - PART 2 OF 2>

L#DESC::
.ASCIZ /DMV-11 U-CONTRL

.EVEN

.RADIX 8.

1904				
1905				
1906				
1907				
1908				
1909				
1910				
1911				
1912				
1913				
1914				
1915	003254			
1916	003254			
1917	003254	034115	032460	020063
1918	003262	051117	046440	030070
1919	003270	032066	000	
1920		003274		
1921				
1922				
1923				
1924				
1925				
1926		000012		
1927	003274			
1928	003274			
1929	003274	046504	026526	030461
1930	003302	052440	041455	047117
1931	003310	051124	020114	047514
1932	003316	044507	020103	044504
1933	003324	043501	026440	050040
1934	003332	051101	020124	020062
1935	003340	043117	031040	000
1936		003346		
1937		000010		
1938				

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GLOBAL SUBROUTINES

```

1939 .SBTTL GLOBAL SUBROUTINES
1940
1941 ;////////////////////////////////////////////////////////////////////
1942 ;/ THE GLOBAL SUBROUTINES ARE CALLED BY MORE THAN ONE TEST
1943 ;////////////////////////////////////////////////////////////////////
1944
1945 ;*****
1946 .SBTTL MASCLR - MASTER CLEAR SUBROUTINE
1947
1948 ;
1949 ; FUNCTION:
1950 ;
1951 ; THIS SUBROUTINE FORCES THE 6502 MICROPROCESSOR TO EXECUTE A MINI 17 PART
1952 ; DIAGNOSTIC OF THE MICRO-PROCESSOR INSTRUCTION SET, RAM DATA AND ADDRESSING
1953 ; VALIDITY, AND A ROM CRC TEST. THE CLEAR SUBROUTINE EXECUTES IN
1954 ; APPROXIMATELY 500 HUNDRED(S) MILLISECOND. THIS SUBROUTINE WILL SEND THE
1955 ; MASTER CLEAR COMMAND AND DELAY FOR APPROX. 500 MSEC. AT WHICH PRINT IN
1956 ; TIME, THE STATE OF THE CSR REGISTERS IS TESTED. IF ANY ONE OF THE
1957 ; REGISTERS CONTAINS ANYTHING THAT IS NOT EXPECTED, AN ERROR IS QUEUE UP AND
1958 ; THE CARRY BIT IS SET. ELSE, THE CARRY BIT IS CLEARED.
1959
1960 ; CALLING SEQUENCE:
1961 ;
1962 ; JSR PC,MASCLR
1963 ; BCC N# ;IF NO ERROR OCCURED, PROCEED WITH ROUTINE
1964 ; ERROR ;AN ERROR MESSAGE HAS BEEN STACKED: PRINT IT
1965 ; <ANY OTHER SPECIAL ERROR PROCESSING MAY BE DONE HERE (I.E. CKLOOP)>
1966 ;
1967 ; N#: <RESUMPTION OF NORMAL PROCESSING>
1968 ;
1969 ;-----*****
1970 MASCLR: MOV R1,-(SP) ; SAVE REGISTER ONE
1971
1972 003346 010146 MOVB #RUN:MCLR,BSEL1 ;SET BOTH THE RUN AND MASTER CLEAR BITS
1973 003350 112777 000300 176744 ;TO INITIATE THE MICRODIAGNOSTIC
1974
1975 ;NOW DELAY LONG ENOUGH FOR THE MICRODIAGNOSTIC TO COMPLETE
1976
1977 003356 013701 002262 MOV DELAY1,R1 ;INITIALIZE THE LOOP COUNTER FOR DELAY LOOP
1978 003362 001402 24: BEQ 14 ; EXIT DELAY LOOP IF THE TIME HAS EXPIRED
1979 003364 005301 DEC R1 ; ELSE, DECREMENT THE LOOP COUNTER AND
1980 003366 000775 BR 24 ; CONTINUE TO LOOP.
1981 003370 14: ; TIME-UP!
1982 003370 132777 000200 176724 BITB #RUN,BSEL1 ;CHECK THE RUN BIT --
1983 003376 001410 BEQ 34 ;IF NOT SET, GO REPORT THE ERROR
1984
1985 ;IF THE RUN BIT IS SET, MICRODIAGNOSTICS ARE COMPLETE.
1986 ;CHECK IF ALL MICRODIAGNOSTICS PASSED.
1987
1988 003400 127737 176730 002630 44: CMPB BSEL5,BSELRS+6 ;THIS CHECKS THE BYTE IN B-SELECT 6 FOR THE
1989 ;VALID MICRODIAGNOSTIC COMPLETION CODE.
1990 003406 001004 BNE 34 ;IF BAD, GO REPORT ERROR
1991
1992 003410 127737 176714 002626 CMPB BSEL4,BSELRS+4 ;ELSE, CHECK FOR THE VALID CODE FOR A DMV-11
1993 003416 001420 BEQ 64 ;IF THIS TOO IS CORRECT THEN NO ERROR EXISTS
1994 ;ELSE, FALL INTO THE ERROR REPORTING CODE

```

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 MASCLR - MASTER CLEAR SUBROUTINE

```

1995
1996 003420 004737 004232      34:   JSR   PC,GETBSR      ;GET THE BSEL REGISTERS FOR DUMPING
1997 003424                                     ;MASTER CLEAR ERROR
1998                                     ;   QUEUE "DEVICE FATAL" ERROR # 1
1999 003424 012737 000001 002202                                     MOV   #T.EDF,ERRTYP
2000 003432 012737 000001 002204                                     MOV   #1,ERRNBR
2001 003440 012737 003466 002206                                     MOV   #204,ERRMSG
2002 003446 012737 006220 002210                                     MOV   #ERR3,ERRBLK
2003 003454 000261                                     SEC
2004 003456 000401                                     BR    74      ;INDICATE TO THE CALLING ROUTINE THAT
                                     ; AN ERROR WAS DETECTED
2005
2006 003460 000241      64:   CLC
2007 003462 012601      74:   MOV   (SP)+,R1      ;CLEAR THE CARRY BIT TO INDICATE NO ERROR
2008 003464 000207                                     RTS   PC      ;RESTORE REGISTER ONE
2009                                     ; RETURN TO THE CALLER
003466 040515 052123 051105 .NLIST BEX
                                     .ASCIZ /MASTER CLEAR FAILURE/
                                     .LIST BEX
2010 003514                                     .EVEN
    
```


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M-LOOP -- MSTCLR -- MASTER CLEAR & ENTER M-LOOP

2011
2012
2013
2014
2015
2016
2017
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2021
2022
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2045
2046

.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.,BSEL0 ;INITIATE M-LOOP
MOV R3,-(SP)
003522 010346 MOV #4096.,R3 ;WAIT FOR THE M-LOOP TO FINISH THE OPERATION
003524 012703 010000 1#: SOB R3,1#
003530 077301 MOV (SP)+,R3
003532 012603
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
MOV #T.EDF,ERRTYP
003556 012737 000001 002202 MOV #2,ERRNBR
003564 012737 000002 002204 MOV #EM3,ERRMSG
003572 012737 016115 002206 MOV #ERR4,ERRBLK
003600 012737 006232 002210
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

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M-LOOP -- READ

```

2047 .SBTTL M-LOOP -- READ
2048 ;*****
2049 ; READ - READ THE SPECIFIED ADDRESS WITHIN THE DMV-11
2050 ;
2051 ; CALLING SEQUENCE:
2052 ;
2053 ; JSR R5,READ
2054 ; .WORD <ADDRESS OF REGISTER WITHIN DMV-11>
2055 ; .WORD <DESTINATION ADDRESS WITHIN LSI-11>
2056 ; BCC N# ;IF NO ERROR OCCURED, PROCEED WITH ROUTINE
2057 ; ERROR ;AN ERROR MESSAGE HAS BEEN STACKED: PRINT IT
2058 ; <ANY OTHER SPECIAL ERROR PROCESSING MAY BE DONE HERE (I.E. CKLOOP)>
2059 ;
2060 ; N#: <RESUMPTION OF NORMAL PROCESSING>
2061 ;
2062 ;-----*****
2063
2064 003616 012577 176506 READ: MOV (R5)+,BSEL4 ;SETUP SOURCE POINTER
2065 003622 112777 000001 176474 MOVB #REDLOC,BSEL2 ;TELL M-LOOP TO GIVE US THE REQUESTED DATA
2066
2067 003630 010346 MOV R3,-(SP)
2068 003632 012703 000100 MOV #64,R3 ;WAIT FOR THE M-LOOP TO FINISH THE OPERATION
2069 003636 077301 1#: SOB R3,1#
2070 003640 012603 MOV (SP)+,R3
2071
2072 003642 132777 000200 176454 BITB #MRDY,BSEL2 ;DID THE M-LOOP FINISH
2073 003650 001023 BNE 5# ;YES, GOOD. RETURN
2074
2075 003652 004737 004374 JSR PC,GETWSR ;GET BYTE SELECT REGISTERS
2076 003656 012737 000001 002254 MOV #REDLOC,GDATA ;IDENTIFY REQUESTED FUNCTION
2077 003664 GTDF EM4,ERR4 ;"MRDY" TIMEOUT
2078 ; QUEUE "DEVICE FATAL" ERROR # 3
2079 003664 012737 000001 002202 MOV #T.EDF,ERRTYP
2080 003672 012737 000003 002204 MOV #3,ERRNBR
2081 003700 012737 016135 002206 MOV #EM4,ERRMSG
2082 003706 012737 006232 002210 MOV #ERR4,ERRBLK
2083 003714 000261 SEC ;INDICATE AN ERROR HAS BEEN STACKED
2084 003716 000401 BR 6# ;RETURN WITH THAT INDICATION
2085
2086 003720 000241 5#: CLC ;INDICATE "NO ERROR"
2087 003722 117735 176406 6#: MOVB BSEL6,B(R5)+ ;PUT DATA WHERE CALLER WANTS IT
2088 003726 000205 RTS R5 ;RETURN
    
```


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M-LOOP -- READ IMMEDIATE

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.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>

-----*****

READI:

MOV (R5)+,RSEL4 ;SETUP SOURCE POINTER
MOVB #REDLOC,RSEL2 ;TELL M-LOOP TO GIVE US THE REQUESTED DATA

MOV R3,-(SP)
MOV #64,R3 ;WAIT FOR THE M-LOOP TO FINISH THE OPERATION
1#: SOB R3,1#
MOV (SP)+,R3

BITB #MRDY,RSEL2 ;DID THE M-LOOP FINISH
BNE 5# ;YES. GOOD. RETURN

JSR PC,GETWSR ;GET BYTE SELECT REGISTERS
MOV #REDLOC,GDATA ;IDENTIFY REQUESTED FUNCTION
GTFD EM4,ERR4 ;"MRDY" TIMEOUT
; QUEUE "DEVICE FATAL" ERROR # 4

MOV #T.EDF,ERRTYP
MOV #4,ERRNBR
MOV #EM4,ERRMSG
MOV #ERR4,ERRBLK

SEC ;INDICATE AN ERROR HAS BEEN STACKED
BR 6# ;RETURN WITH THAT INDICATION

5#: CLC ;INDICATE "NO ERROR"
6#: MOV RSEL6,(R5)+ ;PUT DATA WHERE CALLER WANTS IT
RTS R5 ;RETURN

003730 176374
003730 012577 176374
003734 112777 000001 176362

003742 010346
003744 012703 000100
003750 077301
003752 012603

003754 132777 000200 176342
003762 001023

003764 004737 004374
003770 012737 000001 002254
003776

003776 012737 000001 002202
004004 012737 000004 002204
004012 012737 016135 002206
004020 012737 006232 002210
004026 000261
004030 000401

004032 000241
004034 017725 176274
004040 000205

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M-LOOP -- WRITE

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004042 012577 176262
004046 113577 176262
004052 000404

```

.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  N#           ;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>
;
;-----*****
WRITE:  MOV     (R5)+,BSEL4   ;SETUP SOURCE POINTER
        MOVB  B(R5)+,BSEL6  ;MAKE DATA AVAILABLE TO M-LOOP
        BR    MLWRI        ;THE REST OF THIS ROUTINE IS THE SAME AS "WRITEI"

```


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M-LOOP -- WRITE IMMEDIATE

```

2152 .SBTTL M-LOOP -- WRITE IMMEDIATE
2153 ;*****
2154 ; WRITEI - WRITE IMMEDIATE THE SPECIFIED DATA INTO THE SPECIFIED DMV-11 ADDRESS
2155 ;
2156 ; CALLING SEQUENCE:
2157 ;
2158 ;     JSR     R5,WRITEI
2159 ;     .WORD  <ADDRESS OF REGISTER WITHIN DMV-11>
2160 ;     .WORD  <DATA FIELD -- DATA TO BE WRITTEN IN DMV-11>
2161 ;     BCC    N#           ;IF NO ERROR OCCURED, PROCEED WITH ROUTINE
2162 ;     ERROR  N#           ;AN ERROR MESSAGE HAS BEEN STACKED: PRINT IT
2163 ;     <ANY OTHER SPECIAL ERROR PROCESSING MAY BE DONE HERE (I.E. CKLOOP)>
2164 ;
2165 ; N#:  <RESUMPTION OF NORMAL PROCESSING>
2166 ;
2167 ;-----*****
2168
2169 004054 WRITEI:
2170 004054 012577 176250      MOV     (R5)+,BSEL4      ;SETUP SOURCE POINTER
2171 004060 012577 176250      MOV     (R5)+,BSEL6      ;MAKE DATA AVAILABLE TO M-LOOP
2172 004064 112777 000002 176232 MLWRI:  MOVB    @MRILOC,BSEL2    ;TELL M-LOOP TO WRITE THE DATA
2173
2174 004072 010346
2175 004074 012703 000200      MOV     R3,-(SP)
2176 004100 077301 1#         SOB     R3,1#           ;WAIT FOR THE M-LOOP TO FINISH THE OPERATION
2177 004102 012603
2178
2179 004104 132777 000200 176212 BITB    @MRDY,BSEL2    ;DID THE M-LOOP FINISH
2180 004112 001023 5#         BNE     5#           ;YES, GOOD. RETURN
2181 004114 004737 004374      JSR     PC,GETWSR      ;GET BYTE SELECT REGISTERS
2182 004120 012737 000002 002254 MOV     @MRILOC,GDATA  ;IDENTIFY REQUESTED FUNCTION
2183 004126 GTDF    EM4,ERR4    ;"MRDY" TIMEOUT
2184 ;
2185 004126 012737 000001 002202 MOV     #T,EDF,ERRTYP ;
2186 004134 012737 000005 002204 MOV     #5,ERRNBR    ;
2187 004142 012737 016135 002206 MOV     @EM4,ERRMSG  ;
2188 004150 012737 006232 002210 MOV     @ERR4,ERRBLK ;
2189 004156 000261
2190 004160 000401      SEC
2191 BR      6#           ;INDICATE AN ERROR HAS BEEN STACKED
2192 004162 000241 5#         CLC
2193 004164 000205 6#         RTS     R5      ;RETURN WITH THAT INDICATION
;INDICATE "NO ERROR"
;RETURN

```

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 M-LOOP -- WRITE IMMEDIATE

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2209 004166 010146
2210
2211 004170 012737 000077 004210
2212 004176 012537 004212
2213 004202 012501
2214
2215 004204
2216 004204 004537 004042
2217 004210 000077
2218 004212 000000
2219 004214 005237 004210
2220 004220 005237 004212
2221 004224 077111
2222
2223 004226 012601
2224 004230 000205
2225

.SBTTL M-LOOP --- BLOCK MOVE (11 CPU ==> DMV-11)
;*****
;
; MOVE A BLOCK OF BYTES FROM THE 11 CPU'S MEMORY TO THE DMV-11'S RAM
;
; THE DESTINATION ADDRESS IS ALWAYS THE SAME -- 77 (OCT) OR 003F (HEX)
;
; CALLING SEQUENCE:
;
; JSR R5,MOVLTD
; .WORD <SOURCE ADDRESS OF DATA>
; .WORD <# OF BYTE TO BE MOVED>
;*****
MOVLTD: MOV R1,-(SP) ;SAVE THE REGISTER WE'LL BE A NEED'N
;*****
MOV #77,10# ;DESTINATION ADDRESS IS ALWAYS THE SAME
MOV (R5)+,11# ;SETUP THE SOURCE ADDRESS
MOV (R5)+,R1 ;INITIALIZE THE BYTE COUNT

5#:
JSR R5,WRITE ;WRITE ONE BYTE INTO THE DMV-11'S RAM
;THE RAM'S LOCATION
10#: 77 ;THE DATA BYTE'S LOCATION
11#: 0 ;POINT TO NEXT RAM BYTE
;POINT TO NEXT DATA BYTE
INC 10# ;IF NOT DONE, LOOP
INC 11# ;ELSE, CLEAN-UP AND RETURN
SOB R1,5# ;RESTORE R1
MOV (SP)+,R1 ; & RETURN
RTS R5
    
```


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GETBSR -- GET BYTE SELECT REGISTERS

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004232 117737 176062 002212
004240 117737 176056 002214
004246 117737 176052 002216
004254 117737 176046 002220
004262 117737 176042 002222
004270 117737 176036 002224
004276 117737 176032 002226
004304 117737 176326 002230
004312 117737 176022 002232
004320 117737 176016 002234
004326 117737 176012 002236
004334 117737 176006 002240
004342 117737 176002 002242
004350 117737 175776 002244
004356 117737 175772 002246
004364 117737 175766 002250
004372 000207

017737 175720 002212
017737 175716 002214
017737 175714 002216
017737 175712 002220
017737 175710 002222
017737 175706 002224
017737 175704 002226
017737 175702 002230
004454 000207

.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 00 0 0000 0 00 0
: EXIT CONDITIONS - NONE 0 0 0 00 0 0 0
: REGISTERS DESTROYED - NONE 00 0000 0000 0 0 0
:

GETBSR: MOVB @SEL0,BSR0 ;PUT THE CURRENT CSR VALUES INTO THE PRINT-OUT
 MOVB @SEL1,BSR1 ;TABLE
 MOVB @SEL2,BSR2
 MOVB @SEL3,BSR3
 MOVB @SEL4,BSR4
 MOVB @SEL5,BSR5
 MOVB @SEL6,BSR6
 MOVB @SEL7,BSR7
 MOVB @SEL10,BSR10
 MOVB @SEL11,BSR11
 MOVB @SEL12,BSR12
 MOVB @SEL13,BSR13
 MOVB @SEL14,BSR14
 MOVB @SEL15,BSR15
 MOVB @SEL16,BSR16
 MOVB @SEL17,BSR17
 RTS PC ;RETURN TO CALLER

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

GETWSR: MOV @SEL0,WSR0 ;MOVE THE 4 WORD REGISTERS TO THE OTHERWISE
 MOV @SEL2,WSR2 ;BYTE TABLE
 MOV @SEL4,WSR4
 MOV @SEL6,WSR6
 MOV @SEL10,WSR10
 MOV @SEL12,WSR12
 MOV @SEL14,WSR14
 MOV @SEL16,WSR16
 RTS PC ;RETURN TO CALLER

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.INITT1 -- INITIALIZE TIMER # 1

.SBTTL .INITT1 -- INITIALIZE TIMER # 1

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;.....
; * 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
 004460 112537 002427
 004464 112537 002431
 004470 111537 002441
 004474 142737 177477 002441
 004502 012501

 004504 106301
 004506 042701 177677
 004512 140177 175610
 004516 106301
 004520 052701 000100
 004524 110137 002447

 004530 004537 004042
 004534 120016
 004536 002447
 004540 103431

 004542 004537 003616
 004546 120013
 004550 002440

```

INITT1: MOV R1,-(SP) ;SAVE THE REGISTER WE WILL BE USING
        MOVB (R5),TMP6.1 ;SETUP VALUES TO BE LOADED INTO THE LATCHES
        MOVB (R5),TMP7.1
        MOVB (R5),TMP8.1 ;GET & PROCESS BITS FOR ACR 6 & 7
        BICB @+C<BIT6-BIT7>,TMP8.1 ;EXTRACT BITS 6 & 7 & SAVE THEM FOR LATER
        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).

        ASLB R1 ;THIS PUTS THE PASSED BIT INTO BIT 6.
        BIC @+C<BIT6>,R1 ;WHILE HERE, CLEAR ALL OTHER BITS AND
        BICB R1,@SEL3 ;CLEAR THE INTERRUPT FLAG IN THE SELECT REG.
        ASLB R1 ;NOW THE BIT IS IN THE CONTROLLING POSITION
        BIS @BIT6,R1 ;SET BIT 6
        MOVB R1,TMP6.1 ;THE CALL WILL NOW WRITE THE APPROPRIATE VALUE

        JSR R5,WRITE ;WRITE TO
        IENR ;THE VIA'S IER
        TMPE.1 ;INTERRUPT ENABLE/DISABLE INFORMATION
        BCS 630 ;EXIT ON ERROR

        JSR R5,READ ;READ THE CURRENT SETTING OF
        ACR ;THE VIA'S ACR
        TMPB
    
```


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.INIT1 -- INITIALIZE TIMER # 1

```

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

```

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.INITT2 -- INITIALIZE TIMER # 2

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.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
 004632 112537 002433
 004636 112537 002435
 004642 111537 002441
 004646 142737 177737 002441
 004654 012501

 004656 106301
 004660 042701 177737
 004664 140177 175436
 004670 106301
 004672 106301
 004674 052701 000040
 004700 110137 002447

 004704 004537 004042
 004710 120016
 004712 002447
 004714 103431

 004716 004537 003616

INITT2: MOV R1,-(SP) ;SAVE THE REGISTER WE WILL BE USING
 MOVB (R5)+,TMP8+1 ;SETUP VALUES TO BE WRITTEN INTO COUNTER
 MOVB (R5)+,TMP9+1
 MOVB (R5),TMP8+1 ;GET & PROCESS BIT FOR ACR 5
 BICB #+CBITS,TMP8+1
 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).

 ASLB R1 ;THE PASSED BIT IS NOW IN POSITION TO
 BIC #+CBITS,R1 ;CLEAR ALL UNWANTED BITS AND
 BICB R1,#BSEL3 ;CLEAR THE INT. FLAG IN THE SELECT REGISTER
 ASLB R1 ;NOW PUT THE BIT INTO THE CONTROL POSITION
 ASLB R1
 BIS #BITS,R1 ;THEN SET BIT 5
 MOVB R1,TMPE+1 ;THE CALL WILL NOW WRITE THE APPROPRIATE VALUE

 JSR R5,WRITE ;WRITE TO
 IENR ;THE VIA'S IER
 TMPE+1 ;INTERRUPT ENABLE/DISABLE INFORMATION
 BCS 63 ;EXIT ON ERROR

 JSR R5,READ ;READ THE CURRENT SETTING OF

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.INITT2 -- INITIALIZE TIMER # 2

```

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

```

CVDNBCO DMV11 MCTRL DIAG #2
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MOVSW -- MOVE A STRING OF WORDS

```

2436 .SBTTL MOVSW -- MOVE A STRING OF WORDS
2437 ;*****
2438 ; MOVSW -- MOVE A STRING OF WORDS
2439 ;
2440 ; CALLING SEQUENCE:
2441 ;
2442 ; JSR R5,MOVSW
2443 ; .WORD <ADDRESS OF SOURCE STRING>
2444 ; .WORD <ADDRESS OF DESTINATION STRING>
2445 ; .WORD <# OF WORDS TO MOVE>
2446 ;
2447 ;-----
2448
2449 005004 010146 MOVSW: MOV R1,-(SP) ;SAVE THE REGISTERS WE'LL BE USING
2450 005006 010246 MOV R2,-(SP)
2451 005010 010346 MOV R3,-(SP)
2452
2453 005012 012501 MOV (R5)+,R1 ;INITIALIZE SOURCE POINTER
2454 005014 012502 MOV (R5)+,R2 ; DESTINATION POINTER
2455 005016 012503 MOV (R5)+,R3 ; COUNTER
2456
2457 005020 012122 1$: MOV (R1)+,(R2)+ ;MOVE IN 1 WORD OF DATA
2458 005022 077302 SOB R3,1$ ;IF MORE DATA, LOOP
2459 ;ELSE, RESTORE REGISTERS AND RETURN
2460
2461 005024 012603 MOV (SP)+,R3 ;RESTORE REGISTERS
2462 005026 012602 MOV (SP)+,R2
2463 005030 012601 MOV (SP)+,R1
2464
2465 005032 000205 RTS R5 ;RETURN TO CALLING ROUTINE
2466

```


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MOVSB -- MOVE A STRING OF BYTES

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005034 010146
005036 010246
005040 010346
005042 012501
005044 012502
005046 012503
112122
077302
012603
012602
012601
000205

```

.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>
;-----
MOVSB: MOV R1,-(SP) ;SAVE THE REGISTERS WE'LL BE USING
      MOV R2,-(SP)
      MOV R3,-(SP)
      MOV (R5),R1 ;INITIALIZE SOURCE POINTER
      MOV (R5),R2 ; DESTINATION POINTER
      MOV (R5),R3 ; COUNTER
10:   MOVB (R1),R2 ;MOVE IN 1 BYTE OF DATA
      SOB R3,10 ;IF MORE DATA, LOOP
      ;ELSE, RESTORE REGISTERS AND RETURN
      MOV (SP),R3 ;RESTORE REGISTERS
      MOV (SP),R2
      MOV (SP),R1
      RTS R5 ;RETURN TO CALLING ROUTINE

```

CVDNBCO DMV11 MCTRL DIAG #2
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XORSW -- XOR TWO WORD TABLES

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2545

```

.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>
;
;-----
XORSW: MOV R1,-(SP) ;SAVE THE REGISTERS WE'LL BE USING
      MOV R2,-(SP)
      MOV R3,-(SP)
      MOV R4,-(SP)
      MOV (R5),R1 ;INITIALIZE SOURCE POINTER # 1
      MOV (R5),R2 ; SOURCE POINTER # 2
      MOV (R5),R3 ; "XOR" STRING POINTER
      MOV (R5),R4 ; COUNTER
      MOV R5,-(SP) ;NOW WE CAN SAVE R5 FOR THE RETURN
1$: MOV (R1),R3 ;MOVE ONE WORD TO THE DESTINATION FIELD
    MOV (R2),R5 ;GET SECOND WORD & SETUP FOR XOR INSTRUCTION
    XOR R5,(R3) ;PERFORM ACTUAL XOR
    SOB R4,1$ ;IF MORE DATA, LOOP
    ;ELSE, RESTORE REGISTERS AND RETURN
      MOV (SP),R5 ;RESTORE REGISTERS
      MOV (SP),R4
      MOV (SP),R3
      MOV (SP),R2
      MOV (SP),R1
      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
;-----
STALL: RTS PC

```

7

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NPREAD -- "READ" CONTENTS OF ALL NPR REGISTERS

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

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

2546			
2547			
2548			
2549			
2550			
2551			
2552	005134	004537	003616
2553	005140	123004	
2554	005142	002740	
2555	005144	103447	
2556	005146	004537	003616
2557	005152	123001	
2558	005154	002742	
2559	005156	103442	
2560	005160	004537	003616
2561	005164	123000	
2562	005166	002744	
2563	005170	103435	
2564	005172	004537	003616
2565	005176	000072	
2566	005200	002746	
2567	005202	103430	
2568	005204	004537	003616
2569	005210	000071	
2570	005212	002750	
2571	005214	103423	
2572	005216	004537	003616
2573	005222	000070	
2574	005224	002752	
2575	005226	103416	
2576	005230	004537	003616
2577	005234	000076	
2578	005236	002754	
2579	005240	103411	
2580	005242	004537	003616
2581	005246	000075	
2582	005250	002756	
2583	005252	103404	
2584	005254	004537	003616
2585	005260	000074	
2586	005262	002760	
2587			
2588	005264	000207	

```

NPREAD: JSR      R5,READ
          NPRCTL
          BT2
          BCS      10$      ;ON ERROR, EXIT
          JSR      R5,READ
          NPRDRH
          BT2+2
          BCS      10$      ;ON ERROR, EXIT
          JSR      R5,READ
          NPRDRL
          BT2+4
          BCS      10$      ;ON ERROR, EXIT
          JSR      R5,READ
          NPRAOX
          BT2+6
          BCS      10$      ;ON ERROR, EXIT
          JSR      R5,READ
          NPRAOH
          BT2+8.
          BCS      10$      ;ON ERROR, EXIT
          JSR      R5,READ
          NPRAQL
          BT2+10.
          BCS      10$      ;ON ERROR, EXIT
          JSR      R5,READ
          NPRAIX
          BT2+12.
          BCS      10$      ;ON ERROR, EXIT
          JSR      R5,READ
          NPRAIH
          BT2+14.
          BCS      10$      ;ON ERROR, EXIT
          JSR      R5,READ
          NPRAIL
          BT2+16.
10$:    RTS      PC      ;RETURN

```


CVDMBCO DMV11 MCTRL DIAG #2
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 NPRMOV -- WORD/BYTE BLOCK MOVE USING THE NPR HARDWARE

```

2589 .SBTTL NPRMOV -- WORD/BYTE BLOCK MOVE USING THE NPR HARDWARE
2590 ;*****
2591 ; NPRMOV -- MOVE A BLOCK OF DATA THROUGH THE DMV'S NPR LOGIC
2592 ;-----
2593
2594 ; - - - - - I N I T I A L I Z A T I O N - - - - -
2595
2596 005266 010146 NPRMOV: MOV R1,-(SP) ;SAVE THE REGISTERS WE USE
2597 005270 010246 MOV R2,-(SP)
2598 005272 010346 MOV R3,-(SP)
2599
2600 005274 012501 1#: MOV (R5)+,R1 ;POINT TO TEST PATTERN
2601 005276 012502 MOV (R5)+,R2 ;POINT TO THE LSI-11 BUFFER AREA
2602 005300 012503 MOV (R5)+,R3 ;GET COUNT OF # OF WORDS IN TEST PATTERN
2603 005302 012537 005612 MOV (R5)+,42# ;LOAD UP THE COMMAND TO BE USED
2604
2605 005306 005037 002276 CLR ERRFLG ;INITIALIZE ERROR FLAG
2606
2607 005312 032737 000040 005612 BIT #NPRIO,42# ;DETERMINE DIRECTION:
2608 005320 001403 BEQ 3# ;LSI ==> DMV -- USE "NPRAIL"
2609 005322 012746 000070 MOV #NPR AOL,-(SP) ;DMV ==> LSI -- USE "NPR AOL"
2610 005326 000402 BR 4#
2611 005330 012746 000074 3#: MOV #NPRAIL,-(SP)
2612 005334 011637 005400 4#: MOV (SP),10# ;SETUP LOW BYTE ADDRESS POINTER
2613 005340 005216 INC (SP) ;INCREMENT TO NEXT DMV ADDRESS
2614 005342 011637 005422 MOV (SP),14# ;SETUP HIGH BYTE ADDRESS POINTER
2615 005346 005216 INC (SP) ;INCREMENT TO NEXT DMV ADDRESS
2616 005350 012637 005434 MOV (SP)+,17# ;SETUP EXT. BYTE ADDRESS POINTER & RESTORE SP
2617
2618 ; - - - - - R E - I N I T I A L I Z E L O O P ' S V A R I A B L E S - - - - -
2619
2620 005354 6#:
2621
2622 ; - - - - - S E T U P A P P R O P R I A T E A D D R E S S - - - - -
2623
2624 005354 032737 000040 005612 BIT #NPRIO,42# ;DIRECTION OF TRANSFER?
2625 005362 001002 BNE 8# ;DMV ==> LSI -- ADDR. SHOULD POINT TO BUFFER
2626 005364 010246 MOV R2,-(SP) ;LSI ==> DMV -- SAVE BUFFER POINTER
2627 005366 010102 MOV R1,R2 ; & POINT TO TEST DATA TO BE READ
2628 005370 010237 005402 8#: MOV R2,11# ;SETUP LOW BYTE OF ADDRESS
2629 005374 004537 004054 JSR R5,WRITEI ;LOAD UP DESTINATION ADDRESS
2630 005400 000070 10#: NPR AOL ; NPR ADDRESS LOW BYTE
2631 005402 000000 11#: 0 ;*** MODIFIED FROM ABOVE ***
2632 005404 103510 BCS 45# ;ON ERROR, EXIT
2633
2634 005406 000302 SWAB R2 ;SETUP HIGH BYTE OF DESTINATION ADDRESS
2635 005410 010237 005424 MOV R2,15#
2636 005414 000302 SWAB R2 ; (RESTORE ADDRESS)
2637 005416 004537 004054 JSR R5,WRITEI ; SEND IT TO THE DMV
2638 005422 000071 14#: NPR AO H ; NPR ADDRESS HIGH BYTE
2639 005424 000000 15#: 0 ;*** MODIFIED FROM ABOVE ***
2640 005426 103477 BCS 45# ;ON ERROR, EXIT
2641
2642 005430 004537 004054 17#: JSR R5,WRITEI ;MAKE SURE "EXTENDED" BITS ARE CLEARED
2643 005434 000072 NPR AO X ; NPR ADDRESS EXTENDED BYTE
2644 005436 000000 0 ; ACTUAL VALUE LOADED INTO THIS BYTE (WE HOPE!)
    
```

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NPRMOV -- WORD/BYTE BLOCK MOVE USING THE NPR HARDWARE

```

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

```


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NPRMOV -- WORD/BYTE BLOCK MOVE USING THE NPR HARDWARE

```

2701
2702 005572 004537 004054      33: JSR      R5,WRITEI      ;WORD, LOAD UP THE
2703 005576 123001              NPRDRM      ; NPR DATA REG. HIGH BYTE WITH
2704 005600 000000      35: 0              ; WHAT WE HOPE IS THE APPROPRIATE DATA!
2705 005602 103411          BCS      45:      ;ON ERROR, EXIT
2706
2707      ; - - - - - INITIATE ONE TRANSFER - - - - -
2708
2709
2710 005604 004537 004054      40: JSR      R5,WRITEI      ;MAKE THE "NPR" LOGIC DO IT'S THING
2711 005610 123004          NPRCTL      ; BY LOADING THE CONTROL REGISTER WITH
2712 005612 000044          NPRDL      ; THE PASSED COMMAND
2713 005614 103404          BCS      45:      ;ON ERROR, EXIT
2714
2715      ; - - - - - MAKE SURE THE XFER RAN OK - - - - -
2716
2717 005616 004537 003730          JSR      R5,READI      ;GET THE CONTROL REG. FOR IT'S STATUS
2718 005622 123004          NPRCTL
2719 005624 000000      44: 0
2720 005626 103513          BCS      63:      ;ON ERROR, EXIT
2721
2722      ; BY NOW, THE TRANSFER SHOULD BE COMPLETE SO BIT 6 SHOULD BE = 0. THEREFOR
2723      ; THE ONLY SIGNIFICANT BIT IS BIT 7 WHICH SHOULD = 0 IF EVERYTHING WENT OK.
2724
2725 005630 132737 000200 005624      BITB     #NPRABT,44:   ;DID THE TRANSFER ABORT?
2726 005636 001436          BEQ      50:      ;NO, PROCEED WITH TESTING
2727 005640 005237 002412          INC     TMO
2728 005644 023727 002412 000001      CMP     TMO,#01      ;YES, COUNT THE TIME-OUT
2729 005652 001030          BNE     50:      ;IS THIS THE FIRST OCCURANCE OF A TIMEOUT?
2730
2731      ;NO, THEN DON'T STACK THE ERROR MESSAGE
2732 005654 013737 005612 002414      MOV     42: ,TMP1     ;YES, QUEUE UP A FATAL ERROR MESSAGE
2733 005662 013737 005624 002416      MOV     44: ,TMP2     ;PASS TO ERROR HANDLER:
2734 005670 113737 005424 002421      MOVB   15: ,TMP3+1   ; CONTROL REGISTER AS WE SET IT
2735 005676 113737 005402 002420      MOVB   11: ,TMP3     ; CONTROL REGISTER AS READ
2736 005704          GTDF   EM26E,ERR11 ; LSI'S MEMORY ADDRESS
2737
2738 005704 012737 000001 002202      ;IN ORDER TO REPORT THE TIME-OUT ERROR,
2739 005712 012737 000006 002204      ; QUEUE "DEVICE FATAL" ERROR # 6
2740 005720 012737 016316 002206      MOV     @T.EDF,ERRTYP
2741 005726 012737 007314 002210      MOV     @6.ERRNBR
2742      MOV     @EM26E,ERRMSG
2743      MOV     @ERR11,ERRBLK
2744
2745      ;THIS GETS THE ERROR # FOR TESTING LATER
2746
2747      ; - - - - - IF "LSI ==> DMV", RETRIEVE DATA - - - - -
2748
2749
2750 005734 032737 000040 005612      50: BIT     #NPRIO,42:   ;DIRECTION?
2751 005742 001025          BNE     54:      ;DMV ==> LSI -- DATA ALREADY IN LSI-11
2752
2753      ;LSI ==> DMV -- DATA IN REG'S, RETRIEVE IT
2754
2755
2756      ;POINT TO LSI'S INPUT BUFFER
2757
2758      ;GET ONE BYTE
2759
2760      ; FROM THE LOW ORDER HALF OF THE DATA REG.
2761
2762      ;*** MODIFIED FROM ABOVE *** DESTINATION ADDR.
2763
2764      ;ON ERROR, EXIT
2765
2766      ;POINT TO NEXT BYTE OF THE BUFFER
2767
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CVDNBCO DMV11 MCTRL DIAG #2
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NPRMOV -- WORD/BYTE BLOCK MOVE USING THE NPR HARDWARE

```

2757 005764 032737 000010 005612      BIT      @NPRBYT,42#      ;WAS A BYTE OF WORD "NPR" PERFORMED?
2758 005772 001022                      BNE      56#            ;BYTE -- EVERYTHING'S "KOOL"!
2759                                     ;WORD -- MOVE HIGH BYTE INTO BUFFER
2760 005774 010237 006006                MOV      R2,52#        ;POINT TO LSI'S I/P BUFFER
2761 006000 004537 003616                JSR      R5,READ       ;GET ONE BYTE
2762 006004 123001                      NPRDRH
2763 006006 000000                      52#:    0              ; FROM THE HIGH ORDER HALF OF THE DATA REG.
2764 006010 103422                      BCS      63#            ;*** MODIFIED FROM ABOVE *** DESTINATION ADDR.
2765 006012 005202                      INC      R2            ;ON ERROR, EXIT
2766 006014 000411                      BR       56#            ;POINT TO NEXT BYTE OF THE BUFFER
2767                                     ;DONE RETRIEVING DATA -- CHECK FOR MORE
2768                                     ; - - - - - DMV ----> LSI -- JUST ADVANCE LSI-11 ADDRESS - - - - -
2769
2770 006016 005202 000010 005612      54#:    INC      R2            ;BUMP THE LSI-11 ADDRESS
2771 006020 032737 000010 005612      BIT      @NPRBYT,42#    ;IS THIS A BYTE OR WORD TRANSFER?
2772 006026 001004                      BNE      56#            ;BYTE, THEN ADDRESS IS OK AS IS
2773 006030 005202                      INC      R2            ;WORD, BUMP ADDR. -- WE ALREADY DID THE HIGH BYTE
2774 006032 000402                      BR       56#
2775
2776                                     ; - - - - - TEST FOR MORE - - - - -
2777
2778 006034 000137 005354      55#:    JMP      6#            ;THIS LITTLE BIT IF CUTE LOGIC IS NECESSARY
2779                                     ;BECAUSE "6#" IS TOO FAR AWAY FOR A BRANCH!
2780 006040 077303 002276      56#:    SOB      R3,55#        ;DO IT AGAIN IF THERE IS MORE DATA
2781 006042 005737 002276      TST      ERRFLG        ;WAS AN ERROR DETECTED?
2782 006046 001402                      BEQ      61#            ;NO, TAKE NORMAL EXIT
2783
2784                                     ; - - - - - CLEAN UP & EXIT - - - - -
2785
2786 006050 000261      60#:    SEC                      ;INDICATE ERROR CONDITION
2787 006052 000401                      BR       63#
2788
2789 006054 000241      61#:    CLC                      ;INDICATE NO ERROR
2790
2791 006056 012603      63#:    MOV      (SP)+,R3      ;RESTORE THE REGISTERS AGAIN
2792 006060 012602                      MOV      (SP)+,R2
2793 006062 012601                      MOV      (SP)+,R1
2794
2795 006064 000205                      RTS      R5            ;RETURN

```

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INTERRUPT HANDLER -- MPIHAN

.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"
;-----

2796
2797
2798
2799
2800
2801
2802
2803
2804
2805
2806 006066
2807 006066
2808 006066 010046
2809 006070 105737 002274
2810 006074 001007
2811 006076 004737 004232
2812 006102
2813
2814 006102 104455
2815 006104 000007
2816 006106 016526
2817 006110 006220
2818 006112 000407
2819
2820 006114 105237 002272
2821 006120 005737 006136
2822 006124 001402
2823 006126 004777 000004
2824 006132 012600
2825 006134
2826 006134
2827 006134 000002
2828
2829 006136 000000

BGNSRV MPIHAN
MPIHAN::
MOV RO, -(SP) ;SAVE RO
TSTB INTWCH ;HAVE WE BEEN TOLD TO WATCH FOR TYPE "A" INT'S?
BNE 54 ;YES, DO NORMAL INTERRUPT PROCESSING
JSR PC,GETBSR ;NO, DUMP REGISTERS AND
GEDF EM34,ERR3 ; REPORT "UNEXPECTED INTERRUPT"
; "DEVICE FATAL" ERROR # 7
TRAP C6ERDF
.WORD 7
.WORD EM34
.WORD ERR3
BR 104 ;GO TO EXIT
54: INCB INTFLG ;INCREMENT LOW BYTE OF INTERRUPT COUNTER
TST IHILNK ;ARE WE EXPECTED TO EXECUTE ANOTHER ROUTINE?
BEQ 104 ;NO, GET OUT
JSR PC,IHILNK ;YES, GO TO IT -- I HOPE IT'S VALID!
104: MOV (SP)+,RO ;RESTORE RO
ENDSRV ;RETURN TO INTERRUPTED PROCESS
L10002:
RTI
IHILNK: .WORD 0 ;POINTER TO AUXILIARY INT. HANDLING ROUTINE

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 INTERRUPT HANDLER -- MPOHAN

2830
 2831
 2832
 2833
 2834
 2835
 2836
 2837
 2838
 2839
 2840 006140
 2841 006140
 2842 006140 010046
 2843 006142 105737 002275
 2844 006146 001007
 2845 006150 004737 004232
 2846 006154
 2847
 2848 006154 104455
 2849 006156 000010
 2850 006160 016540
 2851 006162 006220
 2852 006164 000407
 2853
 2854 006166 105237 002273
 2855 006172 005737 006210
 2856 006176 001402
 2857 006200 004777 000004
 2858 006204 012600
 2859 006206
 2860 006206
 2861 006206 000002
 2862
 2863 006210 000000

```

.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"
;-----
BGNSRV MPOHAN
MPOHAN::
MOV RO, -(SP) ;SAVE RO
TSTB INTMCH+1 ;HAVE WE BEEN TOLD TO WATCH FOR TYPE "B" INT'S?
BNE 50 ;YES, DO NORMAL INTERRUPT PROCESSING
JSR PC,GETBSR ;NO, DUMP REGISTERS AND
GEDF EM34B,ERR3 ; REPORT "UNEXPECTED INTERRUPT"
; "DEVICE FATAL" ERROR # 8
TRAP C1ERDF
.MWORD 8
.MWORD EM34B
.MWORD ERR3
BR 100 ;GO TO EXIT
50: INCB INTFLG+1 ;INCREMENT HIGH BYTE OF INTERRUPT COUNTER
TST IHOLNK ;ARE WE EXPECTED TO EXECUTE ANOTHER ROUTINE?
BEQ 100 ;NO, GET OUT
JSR PC, IHOLNK ;YES, GO TO IT -- I HOPE IT'S VALID!
100: MOV (SP)+,RO ;RESTORE RO
ENDSRV ;RETURN TO INTERRUPTED PROCESS
L10003: RTI
IHOLNK: .WORD 0 ;POINTER TO AUXILIARY INT. HANDLING ROUTINE
    
```


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ERROR HANDLER -- ERR4 -- M-LOOP TIMEOUT ERROR HANDLING

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2920 006332 012746 000003          MOV      #3,-(SP)
2921 006336 010600          MOV      SP,R0
2922 006340 104415          TRAP    C#PNTX
2923 006342 062706 000010          ADD     #10,SP
2924
2925 006346 012601          204:    MOV      (SP)+,R1          ;RESTORE THE WORKING REGISTER
2926 006350          PRINTX  #FMT4,#TXT6,#TXT4
2927 006350 012746 015212          MOV      #TXT4,-(SP)
2928 006354 012746 015313          MOV      #TXT6,-(SP)
2929 006360 012746 013213          MOV      #FMT4,-(SP)
2930 006364 012746 000003          MOV      #3,-(SP)
2931 006370 010600          MOV      SP,R0
2932 006372 104415          TRAP    C#PNTX
2933 006374 062706 000010          ADD     #10,SP
2934 006400          PRINTX  #FMT11,WSR0,WSR2,WSR4,WSR6 ;DUMP THE SELECT REGISTERS
2935 006400 013746 002220          MOV      WSR6,-(SP)
2936 006404 013746 002216          MOV      WSR4,-(SP)
2937 006410 013746 002214          MOV      WSR2,-(SP)
2938 006414 013746 002212          MOV      WSR0,-(SP)
2939 006420 012746 013770          MOV      #FMT11,-(SP)
2940 006424 012746 000005          MOV      #5,-(SP)
2941 006430 010600          MOV      SP,R0
2942 006432 104415          TRAP    C#PNTX
2943 006434 062706 000014          ADD     #14,SP
2944 006440          PRINTX  #FMT4B,#TXT4A
2945 006440 012746 015252          MOV      #TXT4A,-(SP)
2946 006444 012746 013306          MOV      #FMT4B,-(SP)
2947 006450 012746 000002          MOV      #2,-(SP)
2948 006454 010600          MOV      SP,R0
2949 006456 104415          TRAP    C#PNTX
2950 006460 062706 000006          ADD     #6,SP
2951 006464          PRINTX  #FMT11,WSR10,WSR12,WSR14,WSR16
2952 006464 013746 002230          MOV      WSR16,-(SP)
2953 006470 013746 002226          MOV      WSR14,-(SP)
2954 006474 013746 002224          MOV      WSR12,-(SP)
2955 006500 013746 002222          MOV      WSR10,-(SP)
2956 006504 012746 013770          MOV      #FMT11,-(SP)
2957 006510 012746 000005          MOV      #5,-(SP)
2958 006514 010600          MOV      SP,R0
2959 006516 104415          TRAP    C#PNTX
2960 006520 062706 000014          ADD     #14,SP
2961 006524 004737 013076          JSR     PC,NULERR          ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
2962 006530          ENDMSG
2963 006530          L10006:
2964 006530 104423          TRAP    C#MSG
2965
2966          ;-----
2967          ;.SBTTL ERROR HANDLER -- ERR8 -- NPR REGISTER ERRORS
2968          ;-----
2968 006532          BGNMSG  ERR8
2969 006532          ERR8::
2970 006532 113701 002300          MOV     REGNUM,R1          ;THIS WAS CALCULATED TO BE A WORD OFFSET
2971 006536          PRINTB #FMT07,#TXTNP,#TXTNPT(R1)
2972 006536 016146 021770          MOV     TXTNPT(R1),-(SP)
2973 006542 012746 015745          MOV     #TXTNP,-(SP)
2974 006546 012746 013476          MOV     #FMT07,-(SP)
2975 006552 012746 000003          MOV     #3,-(SP)

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ERROR HANDLER -- ERR8 -- NPR REGISTER ERRORS

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

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ERROR HANDLER -- ERR8 -- NPR REGISTER ERRORS

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

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ERROR HANDLER -- ERR8 -- NPR REGISTER ERRORS

3088	007176	012746	000010				MOV	#10,-(SP)
3089	007202	010600					MOV	SP,R0
3090	007204	104415					TRAP	C#PNTX
3091	007206	062706	000022				ADD	#22,SP
3092	007212	012701	003062	MOV	#W3,R1			
3093	007216			PRINTX	#FMT16A,#TXT8C,<B,(R1)>,<B,(R1)>,<B,(R1)>,<B,(R1)>,<B,(R1)>,<B,(R1)>,<B,(R1)>			
3094	007216	005046					CLR	-(SP)
3095	007220	152116					BISB	(R1),-(SP)
3096	007222	005046					CLR	-(SP)
3097	007224	152116					BISB	(R1),-(SP)
3098	007226	005046					CLR	-(SP)
3099	007230	152116					BISB	(R1),-(SP)
3100	007232	005046					CLR	-(SP)
3101	007234	152116					BISB	(R1),-(SP)
3102	007236	005046					CLR	-(SP)
3103	007240	152116					BISB	(R1),-(SP)
3104	007242	005046					CLR	-(SP)
3105	007244	152116					BISB	(R1),-(SP)
3106	007246	012746	015370				MOV	#TXT8C,-(SP)
3107	007252	012746	014032				MOV	#FMT16A,-(SP)
3108	007256	012746	000010				MOV	#10,-(SP)
3109	007262	010600					MOV	SP,R0
3110	007264	104415					TRAP	C#PNTX
3111	007266	062706	000022				ADD	#22,SP
3112	007272	004737	013076	JSR	PC,NULERR			;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3113	007276			ENDMSG				
3114	007276						L10007:	
3115	007276	104423					TRAP	C#MSG
3116								
3117				.SBTTL	ERROR HANDLER -- ERR9 -- WORD NPR I/O ERRORS			
3118								
3119	007300			BGNMSG	ERR9			ERR9::
3120	007300							
3121	007300	004737	012614	JSR	PC,ERR9.			;USE COMMON "ERROR 9" ROUTINE
3122	007304			ENDMSG				
3123	007304						L10010:	
3124	007304	104423					TRAP	C#MSG
3125								
3126				.SBTTL	ERROR HANDLER -- ERR10 -- BYTE NPR I/O ERRORS			
3127								
3128	007306			BGNMSG	ERR10			ERR10::
3129	007306							
3130	007306	004737	012752	JSR	PC,ERR10.			;USE COMMON "ERROR 10" ROUTINE
3131	007312			ENDMSG				
3132	007312						L10011:	
3133	007312	104423					TRAP	C#MSG
3134								
3135				.SBTTL	ERROR HANDLER -- ERR11 -- NPR TIMEOUT ERRORS			
3136								
3137	007314			BGNMSG	ERR11			ERR11::
3138	007314							
3139	007314	023727	002412	000001	CMP	TMPO,#1		;IF ONLY ONE TIMEOUT,
3140	007322	001412			BEG	14		;NO NEED TO TELL HOW MANY OCCURED
3141	007324				PRINTX	#FMT17C,TMPO		;ELSE, SAY HOW MANY WERE FOUND IN ALL
3142	007324	013746	002412				MOV	TMPO,-(SP)
3143	007330	012746	014307				MOV	#FMT17C,-(SP)

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ERROR HANDLER -- ERR11 -- NPR TIMEOUT ERRORS

3144	007334	012746	000002			MOV	#2,-(SP)	
3145	007340	010600				MOV	SP,RO	
3146	007342	104415				TRAP	C#PNTX	
3147	007344	062706	000006			ADD	#6,SP	
3148	007350			16:	PRINTX	#FMT17,<B,TMP1>	;NPRCTL SENT	
3149	007350	005046				CLR	-(SP)	
3150	007352	153716	002414			BISB	TMP1,(SP)	
3151	007356	012746	014074			MOV	#FMT17,-(SP)	
3152	007362	012746	000002			MOV	#2,-(SP)	
3153	007366	010600				MOV	SP,RO	
3154	007370	104415				TRAP	C#PNTX	
3155	007372	062706	000006			ADD	#6,SP	
3156	007376				PRINTX	#FMT17A,<B,TMP2>	;NPRCTL READ	
3157	007376	005046				CLR	-(SP)	
3158	007400	153716	002416			BISB	TMP2,(SP)	
3159	007404	012746	014153			MOV	#FMT17A,-(SP)	
3160	007410	012746	000002			MOV	#2,-(SP)	
3161	007414	010600				MOV	SP,RO	
3162	007416	104415				TRAP	C#PNTX	
3163	007420	062706	000006			ADD	#6,SP	
3164	007424				PRINTX	#FMT17B,TMP3	;LSI-11'S MEMORY ADDRESS	
3165	007424	013746	002420			MOV	TMP3,-(SP)	
3166	007430	012746	014234			MOV	#FMT17B,-(SP)	
3167	007434	012746	000002			MOV	#2,-(SP)	
3168	007440	010600				MOV	SP,RO	
3169	007442	104415				TRAP	C#PNTX	
3170	007444	062706	000006			ADD	#6,SP	
3171	007450	004737	013076		JSR	PC,NULERR	;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE	
3172	007454				ENDMSG			
3173	007454						L10012:	
3174	007454	104423					TRAP	C#MSG
3175								
3176					.SBTTL	ERROR HANDLER -- ERR12 -- NPR EXTENDED ADDRESSING ERROR HANDLER		
3177								
3178	007456				BGNMSG	ERR12		
3179	007456						ERR12::	
3180	007456				PRINTX	#FMT12	;PRINT FIRST HEADING LINE	
3181	007456	012746	007672				MOV	#FMT12,-(SP)
3182	007462	012746	000001				MOV	#1,-(SP)
3183	007466	010600					MOV	SP,RO
3184	007470	104415					TRAP	C#PNTX
3185	007472	062706	000004				ADD	#4,SP
3186	007476				PRINTX	#FMT12A	;PRINT SECOND HEADING LINE	
3187	007476	012746	007732				MOV	#FMT12A,-(SP)
3188	007502	012746	000001				MOV	#1,-(SP)
3189	007506	010600					MOV	SP,RO
3190	007510	104415					TRAP	C#PNTX
3191	007512	062706	000004				ADD	#4,SP
3192								;PRINT ADDRESS, CONTROL, & EXPECTED DATA
3193	007516	004737	012162		JSR	PC,XORGB	;GENERATE EXCLUSIVE OR OF EXPECTED & READ DATA	
3194	007522				PRINTX	#FMT120,<B,TMPF+1>,<#0,<B,TMP2>,GDATA,BDATA,XDATA		
3195	007522	013746	002260				MOV	XDATA,-(SP)
3196	007526	013746	002256				MOV	BDATA,-(SP)
3197	007532	013746	002254				MOV	GDATA,-(SP)
3198	007536	005046					CLR	-(SP)
3199	007540	153716	002416				BISB	TMP2,(SP)

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ERROR HANDLER -- ERR12 -- NPR EXTENDED ADDRESSING ERROR HANDLER

```

3200 007544 012746 000000          MOV      #0,-(SP)
3201 007550 012746 000000          MOV      #0,-(SP)
3202 007554 005046                   CLR      -(SP)
3203 007556 153716 002451          BISB    TMPF+1,(SP)
3204 007562 012746 010020          MOV      #FMT12D,-(SP)
3205 007566 012746 000010          MOV      #10,-(SP)
3206 007572 010600                   MOV      SP,R0
3207 007574 104415                   TRAP    C#PNTX
3208 007576 062706 000022          ADD      #22,SP
3209 007602 023737 002256 002420    CMP      BDATA,TMP3          ;DID WE READ THE BACKGROUND PATTERN?
3210 007610 001011                   BNE     4#                    ;NO,
3211 007612                   PRINTX #FMT12E                ;YES, INDICATE WRONG PAGE READ
3212 007612 012746 010063          MOV      #FMT12E,-(SP)
3213 007616 012746 000001          MOV      #1,-(SP)
3214 007622 010600                   MOV      SP,R0
3215 007624 104415                   TRAP    C#PNTX
3216 007626 062706 000004          ADD      #4,SP
3217 007632 000414                   BR      60#                    ; AND EXIT ERROR HANDLER
3218
3219 007634 023737 002256 002414 4# :  CMP      BDATA,TMP1          ;DID WE EVEN PERFORM A READ?
3220 007642 001010                   BNE     60#                    ;YES, THEN WE CAN GIVE ANY FURTHER ERROR INFO.
3221 007644                   PRINTX #FMT12F                ;NO, THEN WE CAN AT LEAST SAY THAT MUCH
3222 007644 012746 010145          MOV      #FMT12F,-(SP)
3223 007650 012746 000001          MOV      #1,-(SP)
3224 007654 010600                   MOV      SP,R0
3225 007656 104415                   TRAP    C#PNTX
3226 007660 062706 000004          ADD      #4,SP
3227 007664 004737 013076 60# :  JSR     PC,NULERR            ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3228 007670                   ENDMSG
3229 007670                   L10013:
3230 007670 104423                   TRAP    C#MSG
3231
3232 007672 047045 051445 031461    .NLIST BEX
3233 007732 047045 051445 030461    FMT12:  .ASCIZ /#S13#ANPR REGISTERS#S14#ADATA/
3234 010020 047045 051445 022470    FMT12A: .ASCIZ /#S11#ADDRESS CONTROL EXPECTED READ XOR#N/
3235 010063 045 022516 033523    FMT12D: .ASCIZ /#S8#03#S#03#S#03#S3#03#010#09#09/
3236 010145 045 022516 031123    FMT12E: .ASCIZ /#S7#A(NPR OPERATION ACCESSED WRONG MEMORY PAGE)/
3237                   FMT12F: .ASCIZ /#S2#A(NPR DATA REGISTER UN-CHANGED FROM BEFORE REQUEST)/
3238                   .LIST BEX
3239                   .EVEN
3240                   ;-----
3241                   .SBTTL ERROR HANDLER -- ERR13 -- "MMU" ERROR HANDLER
3242                   ;-----
3243                   BGNMSG ERR13
3244                   PRINTX #FMT13A
3245                   ERR13::
3246                   MOV      #FMT13A,-(SP)
3247                   MOV      #1,-(SP)
3248                   MOV      SP,R0
3249                   TRAP    C#PNTX
3250                   ADD      #4,SP
3251                   MOV      #FMT13B,-(SP)
3252                   MOV      #1,-(SP)
3253                   MOV      SP,R0
3254                   TRAP    C#PNTX
3255                   ADD      #4,SP

```

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ERROR HANDLER -- ERR13 -- "MMU" ERROR HANDLER

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

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ERROR HANDLER -- ERR13 -- "MMU" ERROR HANDLER

```

3306      010546 047045 040445 020040 .NLIST BEX
          010611 045 020101 020040 FMT13A: .ASCIZ /#NA SRO SR1 SR2 SR3/
          010656 047045 040445 020040 FMT13B: .ASCIZ /#A KPAR6 KPDR6 V ADDR DATA?/
          010721 045 020101 020040 FMT13C: .ASCIZ /#NA R0 R1 R2 R3/
          010764 047445 022470 034117 FMT13D: .ASCIZ /#A R4 R5 SP PC/
          010764 047445 022470 034117 FMT13E: .ASCIZ /#08#08#08#08/
3307      011002 .LIST BEX
3308      011002 .EVEN
3309      011002 ;-----
3310      011002 ;.SBTTL ERROR HANDLER -- ERR14 -- NPR REGISTER LOAD ERROR HANDLER
3311      011002 ;-----
3312      011002 BGNMSG ERR14
3313      011002 ERR14::
3314      011002 010146 MOV R1,-(SP) ;SAVE GENERAL REGISTER
3315      011004 013701 002300 MOV REGNUM,R1
3316      011010 006301 ASL R1 ;CONVERT REG # TO WORD INDEX
3317      011012 016146 021770 PRINTB #FMT07,#TXTNP,TXTNPT(R1)
3318      011016 012746 015745 MOV TXTNPT(R1),-(SP)
3319      011022 012746 013476 MOV #TXTNP,-(SP)
3320      011026 012746 000003 MOV #FMT07,-(SP)
3321      011032 010600 MOV #3,-(SP)
3322      011034 104414 MOV SP,RO
3323      011036 062706 000010 TRAP C#PNTB
3324      011042 004737 012162 ADD #10,SP
3325      011046 023727 002300 000006 JSR PC,XORGB ;DATA: GOOD, BAD, & XOR
3326      011054 001423 002300 000003 CMP REGNUM,#6 ;IF EXTENDED ADDRESS BYTE, USE BYTE PRINT
3327      011056 023727 002300 000003 BEQ 5#
3328      011064 001417 002300 000003 CMP REGNUM,#3
3329      011066 001417 002300 000003 BEQ 5#
3330      011066 ;ELSE, USE WORD PRINTS
3331      011066 PRINTX #FMT10,GDATA,BDATA,XDATA
3332      011066 013746 002260 MOV XDATA,-(SP)
3333      011072 013746 002256 MOV BDATA,-(SP)
3334      011076 013746 002254 MOV GDATA,-(SP)
3335      011102 012746 013714 MOV #FMT10,-(SP)
3336      011106 012746 000004 MOV #4,-(SP)
3337      011112 010600 MOV SP,RO
3338      011114 104415 TRAP C#PNTX
3339      011116 062706 000012 ADD #12,SP
3340      011122 000421 BR 10# ;BYPASS BYTE PRINTS IF WORD PRINTS USED
3341      011124 5# PRINTX #FMT02A,<B,GDATA>,<B,BDATA>,<B,XDATA>
3342      011124 005046 CLR -(SP)
3343      011126 153716 002260 BISB XDATA,(SP)
3344      011132 005046 CLR -(SP)
3345      011134 153716 002256 BISB BDATA,(SP)
3346      011140 005046 CLR -(SP)
3347      011142 153716 002254 BISB GDATA,(SP)
3348      011146 012746 013127 MOV #FMT02A,-(SP)
3349      011152 012746 000004 MOV #4,-(SP)
3350      011156 010600 MOV SP,RO
3351      011160 104415 TRAP C#PNTX
3352      011162 062706 000012 ADD #12,SP
3353      011166 004737 013076 10# JSR PC,NULERR ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3354      011172 012601 MOV (SP)+,R1 ;RESTORE GENERAL REGISTER
3355

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ERROR HANDLER -- ERR14 -- NPR REGISTER LOAD ERROR HANDLER

```

3356 011174          ENDMSG
3357 011174
3358 011174 104423          L10015: TRAP CMSG
3359
3360
3361 ;-----
3362 ;.SBTTL ERROR HANDLER -- ERR51 -- FOR REPORTING TIMER # 2 ERRORS
3363 ;-----
3363 011176          BGNMSG ERR51
3364 011176
3365 011176 010146          MOV R1,-(SP) ;SAVE R1 FOR CALLER
3366 011200 113701 002441  MOVB TMP8+1,R1 ;GET THE MODE LAST SETUP
3367 011204 000241          CLC ;SEEING AS THE CARRY BIT WILL BE ROTATED INTO
3368 ;THE DATA, WE HAD BETTER CLEAR IT JUST IN CASE.
3369 011206 042701 177737  BIC #+C<BIT5>,R1 ;LOOK @ JUST THE TIMER 2 MODE DEFINITION
3370 011212 106101          ROLB R1 ;POSITION IT FOR PRINTOUT
3371 011214 106101          ROLB R1
3372 011216 106101          ROLB R1
3373 011220 106101          ROLB R1
3374
3375 ;IDENTIFY THE MODE BEING USED AT THE TIME, AND THE VALUES THAT WERE
3376 ;LOADED INTO THE LATCHES:
3377
3378 011222          PRINTX #FMT51A,R1,<B,TMP9+1>,<B,TMP8+1>
3379 011222 005046
3380 011224 153716 002433          CLR -(SP)
3381 011230 005046          BISB TMP8+1,(SP)
3382 011232 153716 002435          CLR -(SP)
3383 011236 010146          BISB TMP9+1,(SP)
3384 011240 012746 014673          MOV R1,-(SP)
3385 011244 012746 000004          MOV #FMT51A,-(SP)
3386 011250 010600          MOV #4,-(SP)
3387 011252 104415          MOV SP,R0
3388 011254 062706 000012          TRAP C#PNTX
3389 011260 004737 013076          ADD #12,SP
3390 011264 012601          JSR PC,NULERR ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
3391 011266          MOV (SP)+,R1 ;RESTORE R1 FOR CALLER
3392 011266          ENDMSG
3393 011266 104423          L10016: TRAP CMSG
3394
3395 ;-----
3396 ;.SBTTL ERROR HANDLER -- ERR52 -- PROCESS SHIFT REGISTER ERROR MESSAGES
3397 ;-----
3397 011270          BGNMSG ERR52
3398 011270
3399 011270 004537 003616          JSR R5,READ ;GET CURRENT VALUES WITHIN ACR & PCR
3400 011274 120013          ACR
3401 011276 002440          TMPB
3402 011300 004537 003616          JSR R5,READ
3403 011304 120014          PCR
3404 011306 002442          TMPC
3405 011310          PRINTX #FMT52H
3406 011310 012746 011514          MOV #FMT52H,-(SP)
3407 011314 012746 000001          MOV #1,-(SP)
3408 011320 010600          MOV SP,R0
3409 011322 104415          TRAP C#PNTX
3410 011324 062706 000004          ADD #4,SP
3411 011330          PRINTX #FMT52A,#TXT8D,<B,TMPA+1>,<B,TMPB+1>,<B,TMPE+1>

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ERROR HANDLER -- ERR52 -- PROCESS SHIFT REGISTER ERROR MESSAGES

3412 011330 005046
 3413 011332 153716 002447
 3414 011336 005046
 3415 011340 153716 002441
 3416 011344 005046
 3417 011346 153716 002437
 3418 011352 012746 015405
 3419 011356 012746 011557
 3420 011362 012746 000005
 3421 011366 010600
 3422 011370 104415
 3423 011372 062706 000014
 3424 011376
 3425 011376 005046
 3426 011400 153716 002446
 3427 011404 005046
 3428 011406 153716 002444
 3429 011412 005046
 3430 011414 153716 002442
 3431 011420 005046
 3432 011422 153716 002440
 3433 011426 005046
 3434 011430 153716 002436
 3435 011434 012746 015422
 3436 011440 012746 011607
 3437 011444 012746 000007
 3438 011450 010600
 3439 011452 104415
 3440 011454 062706 000020
 3441 011460 005737 002252
 3442 011464 001010
 3443 011466
 3444 011466 012746 011652
 3445 011472 012746 000001
 3446 011476 010600
 3447 011500 104415
 3448 011502 062706 000004
 3449 011506 004737 013076
 3450 011512
 3451 011512
 3452 011512 104423
 3453
 3454
 011514 047045 051445 032061
 011557 045 022516 030523
 011607 045 022516 030523
 011652 047045 051445 030061
 3455 011720
 3456
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 3460
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 3462

```

CLR      -(SP)
BISB    TMPE+1,(SP)
CLR      -(SP)
BISB    TMPB+1,(SP)
CLR      -(SP)
BISB    TMPA+1,(SP)
MOV      @TXT8D,-(SP)
MOV      @FMT52A,-(SP)
MOV      @5,-(SP)
MOV      SP,RO
TRAP     C#PNTX
ADD      @14,SP
PRINTX  @FMT52B,@TXT8E,<B,TMPA>,<B,TMPB>,<B,TMPC>,<B,TMPD>,<B,TMPE>
CLR      -(SP)
BISB    TMPE,(SP)
CLR      -(SP)
BISB    TMPD,(SP)
CLR      -(SP)
BISB    TMPC,(SP)
CLR      -(SP)
BISB    TMPB,(SP)
CLR      -(SP)
BISB    TMPA,(SP)
MOV      @TXT8E,-(SP)
MOV      @FMT52B,-(SP)
MOV      @7,-(SP)
MOV      SP,RO
TRAP     C#PNTX
ADD      @20,SP

TST      TDATA      ;HAS "SR" BEEN WRITTEN YET?
BNE      10#        ;NO, THEN JUST FINISH ERROR MESSAGE
PRINTX  @FMT52C    ;YES, ADD THAT INFORMATION TO MESSAGE
MOV      @FMT52C,-(SP)
MOV      @1,-(SP)
MOV      SP,RO
TRAP     C#PNTX
ADD      @4,SP

10#:     JSR      PC,MULERR      ;USE COMMON ROUTINE TO TERMINATE ERROR MESSAGE
ENDMSG

L10017:  TRAP     C#MSG

```

```

.NLIST  BEX
FMT52H: .ASCIZ  /@#S14#ASR  ACR  PCR  IFR  IER/
FMT52A: .ASCIZ  /@#S1#T#03#S3#03#S15#03/
FMT52B: .ASCIZ  /@#S1#T#03#S3#03#S3#03#S3#03#S3#03/
FMT52C: .ASCIZ  /@#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
:
:-----

```


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ERROR HANDLER -- ERR52 -- PROCESS SHIFT REGISTER ERROR MESSAGES

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011720
011720
011720
011720 012746 012034
011724 012746 000001
011730 010600
011732 104415
011734 062706 000004
011740
011740 012746 012073
011744 012746 000001
011750 010600
011752 104415
011754 062706 000004
011760 005003
011762
011762 016346 032560
011766 016346 032542
011772 016346 032524
011776 012746 012134
012002 012746 000004
012006 010600
012010 104415
012012 062706 000012
012016 005723
012020 020327 000016
012024 001356
012026 004737 013076
012032
012032 104423
012034 047045 051445 022463
012073 045 022516 031523
012134 047045 051445 022462
012162

:SBTTL ERROR HANDLER -- ERR60 -- NPR WRITE-EXTENDED BIT ERRORS

```
BGNMSG ERR60
PRINTX @FMT60
ERR60::
MOV @FMT60,-(SP)
MOV @1,-(SP)
MOV SP,R0
TRAP C@PNTX
ADD @4,SP
PRINTX @FMT61
MOV @FMT61,-(SP)
MOV @1,-(SP)
MOV SP,R0
TRAP C@PNTX
ADD @4,SP
100: CLR R3 ;CLEAR INDEX
PRINTX @FMT62,XLOC0(R3),XVAL0(R3),RXVAL0(R3)
MOV RXVAL0(R3),-(SP)
MOV XVAL0(R3),-(SP)
MOV XLOC0(R3),-(SP)
MOV @FMT62,-(SP)
MOV @4,-(SP)
MOV SP,R0
TRAP C@PNTX
ADD @12,SP
TST (R3), ;BUMP INDEX
CMP R3,@14.
BNE 100
JSR PC,MULERR
ENDMSG
L10020: TRAP C@MSG
.NLIST BEX
FMT60: .ASCIZ /@S3@XLOC@S6@XVAL@S6@RXVAL/
FMT61: .ASCIZ /@S3@A-----@S6@A-----@S6@A-----@N/
FMT62: .ASCIZ /@S2@06@S4@06@S4@06/
.LIST BEX
.EVEN
```


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ERROR HANDLER SUBROUTINES

3500
3501
3502
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3511 012162 010146
3512 012164 013701 002254
3513 012170 013737 002256 002260
3514 012176 074137 002260
3515 012202 012601
3516 012204 000207
3517
3518
3519
3520
3521
3522
3523 012206
3524 012206 012746 014761
3525 012212 012746 015162
3526 012216 012746 013213
3527 012222 012746 000003
3528 012226 010600
3529 012230 104415
3530 012232 062706 000010
3531 012236
3532 012236 005046
3533 012240 153716 002220
3534 012244 005046
3535 012246 153716 002216
3536 012252 005046
3537 012254 153716 002214
3538 012260 005046
3539 012262 153716 002212
3540 012266 012746 013253
3541 012272 012746 000005
3542 012276 010600
3543 012300 104415
3544 012302 062706 000014
3545 012306
3546 012306 012746 015017
3547 012312 012746 013306
3548 012316 012746 000002
3549 012322 010600
3550 012324 104415
3551 012326 062706 000006
3552 012332
3553 012332 005046
3554 012334 153716 002230
3555 012340 005046

.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"

XORGB: MOV R1, -(SP) ;PRESERVE WORKING REGISTER
MOV GDATA, R1 ;GET "GOOD" DATA
MOV BDATA, XDATA ;AND "BAD" DATA
XOR R1, XDATA ;PERFORM EXCLUSIVE OR
MOV (SP), R1 ;RESTORE R1
RTS PC ;RETURN

.SBTTL ERROR HANDLER SUBROUTINE -- ERR44

IDENTIFY & DUMP THE BYTE SELECT REGISTERS

ERR44: PRINTX @FMT4, @TXT3, @TXT1

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

PRINTX @FMT4A, <B.BSR0>, <B.BSR1>, <B.BSR2>, <B.BSR3>

CLR -(SP)
BISB BSR3, (SP)
CLR -(SP)
BISB BSR2, (SP)
CLR -(SP)
BISB BSR1, (SP)
CLR -(SP)

BISB BSR0, (SP)
MOV @FMT4A, -(SP)
MOV @5, -(SP)
MOV SP, R0
TRAP C#PNTX
ADD @14, SP

PRINTX @FMT4B, @TXT2

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

PRINTX @FMT4C, <B.BSR4>, <B.BSR5>, <B.BSR6>, <B.BSR7>

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

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ERROR HANDLER SUBROUTINE -- ERR41

3556 012342 153716 002226
3557 012346 005046
3558 012350 153716 002224
3559 012354 005046
3560 012356 153716 002222
3561 012362 012746 013313
3562 012366 012746 000005
3563 012372 010600
3564 012374 104415
3565 012376 062706 000014
3566 012402
3567 012402 012746 015061
3568 012406 012746 013306
3569 012412 012746 000002
3570 012416 010600
3571 012420 104415
3572 012422 062706 000006
3573 012426
3574 012426 005046
3575 012430 153716 002240
3576 012434 005046
3577 012436 153716 002236
3578 012442 005046
3579 012444 153716 002234
3580 012450 005046
3581 012452 153716 002232
3582 012456 012746 013253
3583 012462 012746 000005
3584 012466 010600
3585 012470 104415
3586 012472 062706 000014
3587 012476
3588 012476 012746 015120
3589 012502 012746 013306
3590 012506 012746 000002
3591 012512 010600
3592 012514 104415
3593 012516 062706 000006
3594 012522
3595 012522 005046
3596 012524 153716 002250
3597 012530 005046
3598 012532 153716 002246
3599 012536 005046
3600 012540 153716 002244
3601 012544 005046
3602 012546 153716 002242
3603 012552 012746 013313
3604 012556 012746 000005
3605 012562 010600
3606 012564 104415
3607 012566 062706 000014
3608 012572 000207
3609
3610
3611

PRINTX @FMT4B,@TXT2A

PRINTX @FMT4A,<B.BSR10>,<B.BSR11>,<B.BSR12>,<B.BSR13>

PRINTX @FMT4B,@TXT2B

PRINTX @FMT4C,<B.BSR14>,<B.BSR15>,<B.BSR16>,<B.BSR17>

RTS PC

:SBTTL

ERROR HANDLER SUBROUTINE -- ERR91 & ERR9.

BISB BSR6,(SP)
CLR -(SP)
BISB BSR5,(SP)
CLR -(SP)
BISB BSR4,(SP)
MOV @FMT4C,-(SP)
MOV #5,-(SP)
MOV SP,RO
TRAP C1PNTX
ADD #14,SP

MOV @TXT2A,-(SP)
MOV @FMT4B,-(SP)
MOV #2,-(SP)
MOV SP,RO
TRAP C1PNTX
ADD #6,SP

CLR -(SP)
BISB BSR13,(SP)
CLR -(SP)
BISB BSR12,(SP)
CLR -(SP)
BISB BSR11,(SP)
CLR -(SP)
BISB BSR10,(SP)
MOV @FMT4A,-(SP)
MOV #5,-(SP)
MOV SP,RO
TRAP C1PNTX
ADD #14,SP

MOV @TXT2B,-(SP)
MOV @FMT4B,-(SP)
MOV #2,-(SP)
MOV SP,RO
TRAP C1PNTX
ADD #6,SP

CLR -(SP)
BISB BSR17,(SP)
CLR -(SP)
BISB BSR16,(SP)
CLR -(SP)
BISB BSR15,(SP)
CLR -(SP)
BISB BSR14,(SP)
MOV @FMT4C,-(SP)
MOV #5,-(SP)
MOV SP,RO
TRAP C1PNTX
ADD #14,SP

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 ERROR HANDLER SUBROUTINE -- ERR104 & ERR10.

```

3668 013006
3669 013006 005046
3670 013010 153716 002260
3671 013014 005046
3672 013016 153716 002256
3673 013022 005046
3674 013024 153716 002254
3675 013030 012746 013127
3676 013034 012746 000004
3677 013040 010600
3678 013042 104415
3679 013044 062706 000012
3680 013050
3681 013050 013746 002252
3682 013054 012746 013673
3683 013060 012746 000002
3684 013064 010600
3685 013066 104415
3686 013070 062706 000006
3687 013074 000207
3688
3689
3690
3691
3692
3693 013076
3694 013076 012746 013120
3695 013102 012746 000001
3696 013106 010600
3697 013110 104414
3698 013112 062706 000004
3699 013116 000207
3700
    
```

```

PRINTX #FMT02A,<B,GDATA>,<B,BDATA>,<B,XDATA> ;DATA: GOOD, BAD, & XOR
CLR -(SP)
BISB XDATA,(SP)
CLR -(SP)
BISB BDATA,(SP)
CLR -(SP)
BISB GDATA,(SP)
MOV #FMT02A,-(SP)
MOV #4,-(SP)
MOV SP,RO
TRAP C#PNTX
ADD #12,SP

PRINTX #FMT09A,TDATA ;LSI ADDRESS
MOV TDATA,-(SP)
MOV #FMT09A,-(SP)
MOV #2,-(SP)
MOV SP,RO
TRAP C#PNTX
ADD #6,SP

RTS PC
    
```

 .SBTTL SUBROUTINE TO PERFORM "PRINTB #ENDEMB"

```

NULERR: PRINTB #ENDEMB ;TERMINATE ERROR MESSAGE
MOV #ENDEMB,-(SP)
MOV #1,-(SP)
MOV SP,RO
TRAP C#PNTB
ADD #4,SP

RTS PC
    
```

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TEXT STRINGS FOR ERROR HANDLERS -- "TXT_..."

015437	103	047117	051124	TXT11A:	.ASCIZ	/CONTROL DATA/
015460	020040	047440	052125	TXT11B:	.ASCIZ	/ OUT ADDR. IN ADDR./
015513	021	000		TXTNLA:	.BYTE	21,0 ;CTL-Q -- THIS (WE HOPE) IS HARMLESS
015515	116	050117	000	TXTPL0:	.ASCIZ	/NOP/
015521	122	040505	020104	TXTPL1:	.ASCIZ	/READ 1 BYTE/
015535	127	044522	042524	TXTPL2:	.ASCIZ	/WRITE 1 BYTE/
015552	050116	026522	052517	TXTPL3:	.ASCIZ	/NPR-OUT 256 BYTES/
015574	050116	026522	047111	TXTPL4:	.ASCIZ	/NPR-IN 256 BYTES/
015615	123	052105	046440	TXTPL5:	.ASCIZ	/SET MICROPROCESSOR'S PC/
015645	125	042116	043105	TXTPL6:	.ASCIZ	/UNDEFINED/
015657	015	051412	052105	TXTPL7:	.ASCIZ	<15><12>/SET MAINT INTERRUPT & CLR INT DISABLE IN CPU STATUS/
015745	116	051120	000040	TXTNP:	.ASCIZ	/NPR /
015752	047503	052116	047522	TXTNP0:	.ASCIZ	/CONTROL/
015762	040504	040524	044040	TXTNP1:	.ASCIZ	/DATA HI/
015772	040504	040524	046040	TXTNP2:	.ASCIZ	/DATA LO/
016002	042101	051104	020056	TXTNP3:	.ASCIZ	/ADDR. OUT EX/
016017	101	042104	027122	TXTNP4:	.ASCIZ	/ADDR. OUT HI/
016034	042101	051104	020056	TXTNP5:	.ASCIZ	/ADDR. OUT LO/
016051	101	042104	027122	TXTNP6:	.ASCIZ	/ADDR. IN EX/
016065	101	042104	027122	TXTNP7:	.ASCIZ	/ADDR. IN HI/
016101	101	042104	027122	TXTNP8:	.ASCIZ	/ADDR. IN LO/

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ERROR MESSAGES -- "EM_..."

.SBTTL ERROR MESSAGES -- "EM_..."

----- ERROR MESSAGES USED BY ERROR CALL'S -----

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

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ERROR MESSAGES -- "EM_..."

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

.EVEN

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TEXT ADDRESS TABLES FOR ERROR HANDLERS -- "TXT__T"

.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	TXTMP
021770	015752	015762	015772	TXTMP: .WORD	TXTMP0, TXTMP1, TXTMP2, TXTMP3, TXTMP4, TXTMP5, TXTMP6, TXTMP7, TXTMP8
				.LIST	BEX

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LOAD DEVICE PROTECTION TABLE

.SBTTL LOAD DEVICE PROTECTION TABLE

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

3706
3707
3708
3709
3710
3711
3712
3713 022012
3714 022012
3715 022012 177777
3716 022014 177777
3717 022016 177777
3718 022020

BGNPROT

.WORD -1
.WORD -1
.WORD -1
ENDPROT

;/DON'T CHK CSR ADRS
;/DON'T CHK MASSBUS UNIT NO.
;/DON'T CHK DRIVE NO.

L#PROT::

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INITIALIZE SECTION

.SBTTL INITIALIZE SECTION

```

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

```

3719
3720
3721
3722
3723
3724
3725
3726 022020          BGNINIT
3727 022020                      L0INIT::
3728
3729 022020 010637 002270      MOV     SP,PSTACK      ;SAVE BASE-LEVEL STACK POINTER
;SEE IF PROGRAM JUST STARTED, BR IF YES
3730                      READEF  #EF.START
3731 022024                      BCOMPLETE      STARST
3732 022024 012700 000040      MOV     #EF.START,R0
3733 022030 104447                      TRAP   C0REFG
3734 022032                      BCOMPLETE      STARST
3735 022032 103417                      BCS    STARST
3736
3737 022034                      ;SEE IF PROGRAM JUST RESTARTED, BR IF YES
3738 022034 012700 000037      READEF  #EF.RESTART
3739 022040 104447                      MOV     #EF.RESTART,R0
3740 022042                      TRAP   C0REFG
3741 022042 103454                      BCOMPLETE      RESTRT
3742                      ;SEE IF THIS IS A NEW PASS, BR IF YES
3743 022044                      READEF  #EF.NEW
3744 022044 012700 000035      MOV     #EF.NEW,R0
3745 022050 104447                      TRAP   C0REFG
3746 022052                      BCOMPLETE      NEWST
3747 022052 103454                      BCS    NEWST
3748
3749 022054                      ;SEE IF PROGRAM WAS JUST CONTINUED
3750 022054 012700 000036      READEF  #EF.CONTINUE
3751 022060 104447                      MOV     #EF.CONTINUE,R0
3752 022062                      TRAP   C0REFG
3753 022062 103401                      BCOMPLETE      10#
3754 022064 000461                      BCS    10#
3755                      BR     GETPRM
3756 022066 000137 022456      10#:  JMP     CONTIN      ;(THIS IS TO FAR AWAY FOR A "BR" INSTRUCTION)
3757                      ;*** ENTER HERE IF "START" COMMAND ISSUED
3758
3759 022072 005037 002306      STARST: CLR    STARES      ;CLEAR FLAG TO SHOW JUST HAD STA OR RES
3760                      ; TEST FOR THE PRESENCE OR ABSENCE OF A CONSOLE TERMINAL.
3761
3762
3763
3764 022076 005037 002314      CLR     CONSOL      ;RESET THE CONSOLE TERMINAL FLAG
3765 022102                      SETVEC  #4,#CONST,#0 ;SETUP BUS TIMEOUT VECTER TO TEST FOR A CONSOLE
3766 022102 012746 000000      MOV     #0,-(SP)
3767 022106 012746 022556      MOV     #CONST,-(SP)
3768 022112 012746 000004      MOV     #4,-(SP)
3769 022116 012746 000003      MOV     #3,-(SP)
3770 022122 104437                      TRAP   C+SVEC
3771 022124 062706 000010      ADD     #10,SP
3772 022130 005737 177564      TST     #0177564      ;TRY TO ACCESS THE CONSOLE TERMINAL'S "XCSR"
3773 022134                      CLRVEC  #4              ;WE SHOULD BE THROUGH WITH THIS BY NOW
3774 022134 012700 000004      MOV     #4,R0
    
```

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INITIALIZE SECTION

```

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

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3831 022314 022020          CMP      (R0),.(R0).      ;ADD 4 TO VECTOR TO GET ADDRESS OF "B" VECTOR
3832 022316 010037 002362  MOV      RO,MPOVEC      ;SETUP "B" VECTOR POINTER
3833
3834 022322 012100          MOV      (R1),.RO        ;GET DMV11 DEVICE PRIORITY
3835 022324 006200          ASR      RO              ; RE-POSITION IT
3836 022326 006200          ASR      RO
3837 022330 006200          ASR      RO
3838 022332 006200          ASR      RO
3839 022334 010037 002364  MOV      RO,MPRIOR      ;SETUP OUR VARIABLE FOR INT. VECTOR INIT'S
3840
3841 022340 022121          CMP      (R1),.(R1).      ;SKIP OVER SWITCH #'S 1 & 2
3842 022342 012137 002366  MOV      (R1),.BRDTYP    ;GET DMV-11 BOARD TYPE
3843 022346 022111          CMP      (R1),.(R1)      ;SKIP OVER CONNECTOR FLAG
3844
3845 022350 012100          MOV      (R1),.RO        ;GET CONTROL FLAGS
3846 022352 012703 000006  MOV      #6,R3          ;POSITION THEM PROPERLY IN THE WORD
3847 022356 006200          154:  ASR      RO
3848 022360 077302          SOB      R3,154
3849 022362 010037 002370  MOV      RO,PT.CTL      ;PUT IT WHERE TESTS EXPECT TO FIND IT
3850
3851          ; TEST THE VARIOUS CONTROL FLAGS & REPORT NON-STANDARD ACTION RESULTING FROM
3852          ; THEIR SETTINGS
3853
3854 022366 023727 002306 000001  CMP      STARES,#1      ;FIRST PASS SINCE STA OR RES ??
3855 022374 001030          BNE      404            ; IF NO: SKIP POSSIBLE PRINTOUT
3856
3857 022376 032737 000001 002370  BIT      #PU24,PT.CTL    ;IF THE PROCESSOR ISN'T STRAPPED TO COME UP
3858 022404 001024          BNE      404            ;THROUGH INTERRUPT VECTOR 24 & 26.
3859 022406          PRINTF   #CFMT2,#DCOKTS,#MLTEST ;TELL THE OPERATOR THAT NO DCOK TESTING
3860 022406 012746 000015          MOV      #MLTEST,-(SP)
3861 022412 012746 000014          MOV      #DCOKTS,-(SP)
3862 022416 012746 022655          MOV      #CFMT2,-(SP)
3863 022422 012746 000003          MOV      #3,-(SP)
3864 022426 010600          MOV      SP,RO
3865 022430 104417          TRAP    C:PNTF
3866 022432 062706 000010          ADD      #10,SP
3867 022436          PRINTF   #CFMT3          ;WILL BE DONE
3868 022436 012746 022735          MOV      #CFMT3,-(SP)
3869 022442 012746 000001          MOV      #1,-(SP)
3870 022446 010600          MOV      SP,RO
3871 022450 104417          TRAP    C:PNTF
3872 022452 062706 000004          ADD      #4,SP
3873 022456          404:
3874
3875 022456          CONTIN: ;ENTER HERE WHEN A "CONTINUE" COMMAND IS ISSUED
3876
3877 022456          SETVEC   #MPIVEC,#MPIHAN,#MPRIOR ;SETUP "A" INT. VECTOR
3878 022456 013746 002364          MOV      #MPRIOR,-(SP)
3879 022462 012746 006066          MOV      #MPIHAN,-(SP)
3880 022466 013746 002360          MOV      #MPIVEC,-(SP)
3881 022472 012746 000003          MOV      #3,-(SP)
3882 022476 104437          TRAP    C:SVEC
3883 022500 062706 000010          ADD      #10,SP
3884 022504 005037 006136          CLR      IMILNK        ;WE DON'T WANT THE HANDLER TO LINK ELSEWHERE
3885 022510          SETVEC   #MPOVEC,#MPOHAN,#MPRIOR ;SETUP "B" INT VECTOR
3886 022510 013746 002364          MOV      #MPRIOR,-(SP)

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3887 022514 012746 006140          MOV      @MPOHAN,-(SP)
3888 022520 013746 002362          MOV      @MPOVEC,-(SP)
3889 022524 012746 000003          MOV      @3,-(SP)
3890 022530 104437                   TRAP     C@SVEC
3891 022532 062706 000010          ADD      @10,SP
3892 022536 005037 006210          CLR      INOLNK      ;WE DON'T WANT THE HANDLER TO LINK ELSEWHERE
3893 022542 005037 002274          CLR      INTWCH     ;RESET "INTERRUPT WATCH" FLAGS (BOTH "A" & "B")
3894
3895 022546 012737 000001 002302    MOV      @1,FRSTIM   ;MARK FLAG FOR NEXT TIME THROUGH
3896 022554                   ENDINIT             ;END OF "INIT" CODE
3897 022554                   L10022:
3898 022554 104411                   TRAP     C@INIT
3899
3900          ; ***** SUBROUTINES USED BY "INIT" CODE *****
3901          ;
3902          ; INTERRUPT HANDLER FOR CONSOLE TERMINAL PRESENCE TESTING
3903
3904 022556 012737 177777 002314    CONTST: MOV      @-1,CONSOL ;INDICATE THAT NO CONSOLE TERMINAL EXISTS!
3905 022564 000002                   RTI              ;RETURN
3906
3907          ; FORMATS FOR FORCED MESSAGES
3908          ;.LIST
3909          ;.EVEN
022566 047045 040445 052040    CFHT0:  .ASCIZ  /%MMA TEST #D2%M SUBTEST 3 CAN'T RUN -- NO CSR @ 177564/
022655      045 022516 020101    CFHT2:  .ASCIZ  /%MMA TESTS #D2%M AND #D2%M CAN'T RUN -- CPU NOT/
022735      045 022516 032123    CFHT3:  .ASCIZ  /%MMS4%MASTRAPPED TO POWER-UP THROUGH VECTOR 24/

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AUTO DROP UNIT SECTION

3960 023126 000240
3961
3962 023130
3963 023130
3964 023130 104461
3965
3966 023132 050237 002412
3967 023136 000002
3968

AD.OK: NOP
ENDAUTO

;(FOR PATCHING IN A HALT IF NECESSARY)

L10023: TRAP C#AUTO

AD.HIT: BIS R2.TMPO
RTI

;FLAG THE HIT IF WE GET IT!
;RETURN

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CLEANUP CODING SECTION

.SBTTL CLEANUP CODING SECTION

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

3969
3970
3971
3972
3973
3974
3975
3976 023140
3977 023140
3978 023140
3979 023140 013700 002360
3980 023144 104436
3981 023146
3982 023146 013700 002362
3983 023152 104436
3984 023154
3985 023154
3986 023154 104412

BGNCLN

CLRVEC BAMPIVEC

CLRVEC BAMPPOVEC

ENDCLN

L#CLEAN::

;RETURN VECTORS TO SUPERVISOR

MOV BAMPIVEC,RO
TRAP C#CVEC

MOV BAMPPOVEC,RO
TRAP C#CVEC

L10024:
TRAP C#CLEAN

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TEST 1 -- VIA TIMER 2 ONE SHOT MODE

.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
BGNSUB
T1::
T1.1: TRAP C#BSUB

JSR PC,MSTCLR ;INIT DMV & ENTER M-LOOP
BCC 16 ;IF NO ERROR, PROCEED WITH TESTING
ERROR ;ELSE, REPORT ERROR
ESCAPE TST ; & EXIT TEST
TRAP C#ERROR
TRAP C#ESCAPE

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4052
4053
4054
4055
4056
4057
4058
4059 023164
4060 023164
4061 023164
4062 023164 104402
4063
4064
4065 023166 004737 003514
4066 023172 103003
4067 023174
4068 023174 104460
4069 023176
4070 023176 104410

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TEST 1 -- VIA TIMER 2 ONE SHOT MODE

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4071 023200 000700                                .WORD L10027-.
4072 023202 004537 004630      14:  JSR    R5,INITT2      ;INITIALIZE TIMER # 2
4073 023206 002000                                ; 2000 ==> LATCHES (PREVENTS IMMED. TIMEOUT)
4074 023210 000000                                ; MODE 0 & "T2" INT. ENABLE FLAG CLEARED
4075 023212 103003                                BCC    .+10      ;IF NO ERROR, PROCEED
4076 023214                                ERROR                                ;ELSE, REPORT IT
4077 023214 104460                                TRAP   C#ERROR
4078 023216                                ESCAPE TST      ;      AND EXIT THIS TEST
4079 023216 104410                                TRAP   C#ESCAPE
4080 023220 000660                                .WORD L10027-.
4081 023222 004737 024134      JSR    PC,GETT2   ;IS "T2" SET?
4082 023226 102002                                BVC    .+6      ;IF NO ERROR, PROCEED
4083 023230                                ESCAPE SUB      ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4084 023230 104410                                TRAP   C#ESCAPE
4085 023232 000644                                .WORD L10030-.
4086 023234 103033                                BCC    6#
4087 023236                                GEDF   EMS1B,ERR51 ;NO, GOOD.
4088                                ;YES, REPORT IT'S NOT BEING CLEARED @ INIT.
4089                                ;      "DEVICE FATAL" ERROR # 9
4089 023236 104455                                TRAP   C#ERDF
4090 023240 000011                                .WORD 9
4091 023242 020734                                .WORD EMS1B
4092 023244 011176                                .WORD ERR51
4093
4094
4095 -----
4096 023246 112737 000002 002435      MOVB   #2,TMP9+1
4097 023254 004537 004042      JSR    R5,WRITE   ;INIT TIMER # 2 BY WRITING INTO
4098 023260 120011                                T2CH                                ;T2C-H (ADDR 09)
4099 023262 002435                                TMP9+1
4100 023264 103003                                BCC    .+10      ;IF NO ERROR, PROCEED
4101 023266                                ERROR                                ;ELSE, REPORT IT
4102 023266 104460                                TRAP   C#ERROR
4103 023270                                ESCAPE TST      ;      AND EXIT THIS TEST
4104 023270 104410                                TRAP   C#ESCAPE
4105 023272 000606                                .WORD L10027-.
4106 023274 004737 024134      JSR    PC,GETT2   ;IS "T2" SET?
4107 023300 102002                                BVC    .+6      ;IF NO ERROR, PROCEED
4108 023302                                ESCAPE SUB      ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4109 023302 104410                                TRAP   C#ESCAPE
4110 023304 000572                                .WORD L10030-.
4111 023306 103006                                BCC    6#
4112 023310                                GEDF   EMS1B,ERR51 ;NO, GOOD.
4113                                ;YES, REPORT IT'S NOT BEING CLEARED @ INIT.
4114                                ;      "DEVICE FATAL" ERROR # 10
4114 023310 104455                                TRAP   C#ERDF
4115 023312 000012                                .WORD 10
4116 023314 020734                                .WORD EMS1B
4117 023316 011176                                .WORD ERR51
4118 023320                                ESCAPE SUB      ;AND EXIT SUBTEST
4119 023320 104410                                TRAP   C#ESCAPE
4120 023322 000554                                .WORD L10030-.
4121
4122 -----
4123
4124 023324 004537 024102      6#:  JSR    R5,LODT2C ;LOAD TIMER # 2
4125 023330 252                7#:  .BYTE 252
4126 023331 252                8#:  .BYTE 252

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TEST 1 -- VIA TIMER 2 ONE SHOT MODE

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4127
4128
4129
4130 023332 004537 003616      JSR    R5,READ      ;READ THE LOW COUNTER
4131 023336 120010              T2CL
4132 023340 002432              TMP8
4133 023342 103003              BCC    .+10         ;IF NO ERROR, PROCEED
4134 023344                      ERROR              ;ELSE, REPORT IT
4135 023344 104460              ESCAPE TST          ;      AND EXIT THIS TEST      TRAP    C#ERROR
4136 023346                      ;                                ;                                TRAP    C#ESCAPE
4137 023346 104410                      ;                                ;                                .WORD  L10027-.
4138 023350 000530              CMPB   TMP8,7#      ;MAKE SURE THE COUNTER IS DECREMENTING
4139 023352 123737 002432 023330  BNE    12#          ;IT IS, NOW SEE IF THE HIGH COUNTER IS TOO
4140 023360 001004              GEDF   EM50D,ERR51 ;IT WASN'T -- REPORT THE ERROR
4141 023362                      ;      "DEVICE FATAL" ERROR # 11
4142                      ;                                ;                                TRAP    C#ERDF
4143 023362 104455                      ;                                ;                                .WORD  11
4144 023364 000013                      ;                                ;                                .WORD  EM50D
4145 023366 017453                      ;                                ;                                .WORD  ERR51
4146 023370 011176
4147 023372 012703 000100      12#:  MOV    #100,R3   ;INIT. TIMEOUT VALUE
4148 023376 004537 003616      13#:  JSR    R5,READ   ;READ THE HIGH COUNTER
4149 023402 120011              T2CH
4150 023404 002434              TMP9
4151 023406 103003              BCC    .+10         ;IF NO ERROR, PROCEED
4152 023410                      ERROR              ;ELSE, REPORT IT
4153 023410 104460              ESCAPE TST          ;      AND EXIT THIS TEST      TRAP    C#ERROR
4154 023412                      ;                                ;                                TRAP    C#ESCAPE
4155 023412 104410                      ;                                ;                                .WORD  L10027-.
4156 023414 000464              CMPB   TMP9,8#      ;DID IT CHANGE FROM THE LOADED VALUE?
4157 023416 123737 002434 023331  BNE    14#          ;YES, PROCEED WITH TESTING
4158 023424 001007              SOB    R3,13#       ;NO, IF NO TIMEOUT, TRY AGAIN
4159 023426 077315              GEDF   EM51E,ERR51 ;ELSE, REPORT THAT HIGH COUNTER ISN'T RUNNING
4160 023430                      ;      "DEVICE FATAL" ERROR # 12
4161                      ;                                ;                                TRAP    C#ERDF
4162 023430 104455                      ;                                ;                                .WORD  12
4163 023432 000014                      ;                                ;                                .WORD  EM51E
4164 023434 021050                      ;                                ;                                .WORD  ERR51
4165 023436 011176
4166 023440              ESCAPE SUB          ;      WE CAN'T PROCEED WITH TESTING EITHER
4167 023440 104410                      ;                                ;                                TRAP    C#ESCAPE
4168 023442 000434                      ;                                ;                                .WORD  L10030-.
4169
4170
4171 023444 005003 024134      14#:  CLR    R3          ;INITIALIZE TIMEOUT COUNTER
4172 023446 004737              JSR    PC,GETT2     ;WAIT FOR TIMER TO COUNT DOWN
4173 023452 102002              BVC    .+6         ;IF NO ERROR, PROCEED
4174 023454                      ESCAPE SUB          ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4175 023454 104410                      ;                                ;                                TRAP    C#ESCAPE
4176 023456 000420                      ;                                ;                                .WORD  L10030-.
4177 023460 103406
4178 023462 077307              BCS    16#          ;DONE.
4179 023464                      SOB    R3,15#       ;NOT YET, TIMEOUT?
4180                      GEDF   EM51P,ERR51 ;YES, REPORT NO "T2" INT. FLAG
4181 023464 104455                      ;      "DEVICE FATAL" ERROR # 13
4182 023466 000015                      ;                                ;                                TRAP    C#ERDF
4183                      ;                                ;                                .WORD  13

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TEST 1 -- VIA TIMER 2 ONE SHOT MODE

```

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

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TEST 1 -- VIA TIMER 2 ONE SHOT MODE

```

4239 023614 001 180: .BYTE 1 ;ALMOST IMMEDIATE TIMEOUT
4240 023615 000 190: .BYTE 0 ; (ADDRESS OF HIGH BYTE FOR T2C-H (ADDR 09))
4241 -----
4242
4243 023616 004737 024134 JSR PC,GETT2 ;WAS "T2" SET BY THE ABOVE OPERATION?
4244 023622 102002 BVC .+6 ;IF NO ERROR, PROCEED
4245 023624 ESCAPE SUB ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4246 023624 104410 TRAP C#ESCAPE
4247 023626 000250 .WORD L10030-.
4248 023630 103406 BCS 200 ;YES, OK -- CONTINUE ERROR CHECKING
4249 023632 GEDF EM51F,ERR51 ;NO, BAD NEWS! REPORT THE FAILURE
4250 ; "DEVICE FATAL" ERROR # 16
4251 023632 104455 TRAP C#ERDF
4252 023634 000020 .WORD 16
4253 023636 021104 .WORD EM51F
4254 023640 011176 .WORD ERR51
4255 023642 ESCAPE SUB ; AND GET OUT OF SUBTEST
4256 023642 104410 TRAP C#ESCAPE
4257 023644 000232 .WORD L10030-.
4258 023646 004537 003616 200: JSR R5,READ ;READ T2C-H (ADDR 09) TO SEE IF THIS CLEARS "T2"
4259 023652 120011 T2CH ;(THIS VALUE ISN'T CHECKED BECAUSE IT CAN BE
4260 023654 002434 TMP9 ; ALMOST ANYTHING)
4261 023656 103003 BCC .+10 ;IF NO ERROR, PROCEED
4262 023660 ERROR ;ELSE, REPORT IT
4263 023660 104460 TRAP C#ERROR
4264 023662 ESCAPE TST ; AND EXIT THIS TEST
4265 023662 104410 TRAP C#ESCAPE
4266 023664 000214 .WORD L10027-.
4267 023666 004737 024134 JSR PC,GETT2 ;PUT THE CURRENT "T2" VALUE INTO THE CARRY BIT
4268 023672 102002 BVC .+6 ;IF NO ERROR, PROCEED
4269 023674 ESCAPE SUB ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4270 023674 104410 TRAP C#ESCAPE
4271 023676 000200 .WORD L10030-.
4272 023700 103405 BCS 210 ;IF SET, READING T2CH DIDN'T CLEAR IT -- OK!
4273 023702 GEDF EM50G,ERR51 ;IF CLEARED! BAD VIA CHIP!
4274 ; "DEVICE FATAL" ERROR # 17
4275 023702 104455 TRAP C#ERDF
4276 023704 000021 .WORD 17
4277 023706 017610 .WORD EM50G
4278 023710 011176 .WORD ERR51
4279 023712 000400 BR 280 ;BYPASS THE REST OF THIS SECTION OF TESTING
4280
4281 023714 210: -----
4282 ;
4283
4284 023714 004537 003616 280: JSR R5,READ ;READ T2C-L (ADDR 08)
4285 023720 120010 T2CL ;(THIS VALUE ISN'T CHECKED BECAUSE IT CAN BE
4286 023722 002432 TMP8 ; ALMOST ANYTHING)
4287 023724 103003 BCC .+10 ;IF NO ERROR, PROCEED
4288 023726 ERROR ;ELSE, REPORT IT
4289 023726 104460 TRAP C#ERROR
4290 023730 ESCAPE TST ; AND EXIT THIS TEST
4291 023730 104410 TRAP C#ESCAPE
4292 023732 000146 .WORD L10027-.
4293 023734 004737 024134 JSR PC,GETT2 ;IS "T2" CLEARED NOW
4294 023740 102002 BVC .+6 ;IF NO ERROR, PROCEED

```


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TEST 1 -- VIA TIMER 2 ONE SHOT MODE

```

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

```


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TEST 1 -- VIA TIMER 2 ONE SHOT MODE

4407 024162 106100
4408 024164 106100
4409 024166 106100
4410 024170 012600
4411 024172 000207
4412

ROLB RO
ROLB RO
ROLB RO
MOV (SP),RO
RTS PC

; "IRQ" GOES INTO CARRY BIT
; "T1" GOES INTO CARRY BIT
; "T2" GOES INTO CARRY BIT
; RESTORE RO

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

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

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024174
024174 004737 003514
024200 103003
024202
024202 104460
024204
024204 104410
024206 000612
024210 105037 002437
024214 005037 002252
024220 004537 003616
024224 120013
024226 002440
024230 103003
024232 104460
024234
024234 104410
024236 000562
024240 113737 002440 002441
024246 142737 000034 002441
024254 004537 004042
024260 120013
024262 002441
024264 103003
024266 104460
024270
024270 104410
024272 000526
024274 004537 003616
024300 120016
024302 002446
024304 103003
024306 104460
024310
024310 104410
024312 000506

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

;
; BGNTST
; T2::
; JSR PC,MSTCLR ;INIT DMV & ENTER M-LOOP
; BCC 10 ;IF NO ERROR, PROCEED WITH TESTING
; ERROR ;ELSE, REPORT ERROR
; TRAP C#ERROR
; ESCAPE TST ; & EXIT TEST
; TRAP C#ESCAPE
; .WORD L10031-.
10: CLRB TMPA*1 ;CLEAR THE "WRITE" DATA FOR ERROR MESSAGES
CLR TDATA ;THIS IS A FLAG TO INDICATE THAT "SR" HASN'T
;BEEN LOADED YET.
; JSR R5,READ ;GET CURRENT "ACR" CONTENTS (SHOULD BE 000)
; ACR
; TMPB
; BCC .*10 ;IF NO ERROR, PROCEED
; ERROR ;ELSE, REPORT IT
; TRAP C#ERROR
; ESCAPE TST ; AND EXIT THIS TEST
; TRAP C#ESCAPE
; .WORD L10031-.
; MOVB TMPB,TMPB*1 ;MOVE IT FROM I/P BUFFER TO O/P BUFFER
; BICB @<BIT2*BIT3*BIT4>,TMPB*1 ;MAKE SURE CURRENT MODE IS 0
; JSR R5,WRITE ;FORCE IT TO THAT MODE (MODE 0)
; ACR
; TMPB*1
; BCC .*10 ;IF NO ERROR, PROCEED
; ERROR ;ELSE, REPORT IT
; TRAP C#ERROR
; ESCAPE TST ; AND EXIT THIS TEST
; TRAP C#ESCAPE
; .WORD L10031-.
; JSR R5,READ ;READ IER INCASE IT'S NEEDED FOR ERROR MESSAGES
; IENR
; TMPB
; BCC .*10 ;IF NO ERROR, PROCEED
; ERROR ;ELSE, REPORT IT
; TRAP C#ERROR
; ESCAPE TST ; AND EXIT THIS TEST
; TRAP C#ESCAPE
; .WORD L10031-.

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

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4469 024314 004737 025022      JSR   PC,GETSR      ;SAMPLE SR INTERRUPT FLAG -- IT SHOULD BE 0
4470 024320 102002      BVC   .+6          ;IF NO ERROR, PROCEED
4471 024322      ESCAPE TST         ;ELSE, IT'S ALREADY BEEN REPORTED -- EXIT
4472 024322 104410      TRAP  C#ESCAPE
4473 024324 000474      .WORD L10031-.
4474 024326 103014      BCC   4#          ;IT IS, GOOD.
4475 024330 004537 003616      JSR   R5,READ     ;READ SR FOR ERROR MESSAGE
4476 024334 120012      SR
4477 024336 002436      TMPA
4478 024340 103003      BCC   .+10       ;IF NO ERROR, PROCEED
4479 024342      ERROR           ;ELSE, REPORT IT
4480 024342 104460      TRAP  C#ERROR
4481 024344      ESCAPE TST         ; AND EXIT THIS TEST
4482 024344 104410      TRAP  C#ESCAPE
4483 024346 000452      .WORD L10031-.
4484 024350      GEDF   EM52A,ERR52 ;IT ISN'T! REPORT SR NOT INITIALLY CLEARED
4485      ; "DEVICE FATAL" ERROR # 21
4486 024350 104455      TRAP  C#ERDF
4487 024352 000025      .WORD 21
4488 024354 021457      .WORD EM52A
4489 024356 011270      .WORD ERR52
4490 024360 152737 000010 002441 4# : BISB  #BIT3,TMPB+1 ;SET SHIFT REG. TO MODE 2
4491 024366 004537 004042      JSR   R5,WRITE
4492 024372 120013      ACR
4493 024374 002441      TMPB+1
4494 024376 103003      BCC   .+10       ;IF NO ERROR, PROCEED
4495 024400      ERROR           ;ELSE, REPORT IT
4496 024400 104460      TRAP  C#ERROR
4497 024402      ESCAPE TST         ; AND EXIT THIS TEST
4498 024402 104410      TRAP  C#ESCAPE
4499 024404 000414      .WORD L10031-.
4500 024406 112737 000204 002447      MOVB  #BIT7+BIT2,TMPE+1 ;ENABLE SR INTERRUPTS WITHIN DMV-11
4501 024414 004537 004042      JSR   R5,WRITE     ; (WE WILL NOT BE ALLOWING THEM TO GIVE US
4502 024420 120016      IENR ; A Q-BUS INTERRUPT)
4503 024422 002447      TMPE+1
4504 024424 103003      BCC   .+10       ;IF NO ERROR, PROCEED
4505 024426      ERROR           ;ELSE, REPORT IT
4506 024426 104460      TRAP  C#ERROR
4507 024430      ESCAPE TST         ; AND EXIT THIS TEST
4508 024430 104410      TRAP  C#ESCAPE
4509 024432 000366      .WORD L10031-.
4510 024434 004537 003616      JSR   R5,READ     ;READ IER INCASE IT'S NEEDED FOR ERROR MESSAGES
4511 024440 120016      IENR
4512 024442 002446      TMPE
4513 024444 103003      BCC   .+10       ;IF NO ERROR, PROCEED
4514 024446      ERROR           ;ELSE, REPORT IT
4515 024446 104460      TRAP  C#ERROR
4516 024450      ESCAPE TST         ; AND EXIT THIS TEST
4517 024450 104410      TRAP  C#ESCAPE
4518 024452 000346      .WORD L10031-.
4519 024454 105037 002437      CLRB  TMPA+1      ;LOAD SR WITH PROPER VALUE....
4520 024460 005737 002366      TST   BRDYP       ; NOTE: THE INPUT LEAD (CB2) WILL EITHER BE
4521 024464 001403      BEQ   5#          ; TIED HI(M8064) OR LO(M8053).
4522 024466 112737 000377 002437      MOVB  #377,TMPA+1 ; IF M8064, THEN LOAD SR WITH 000.
4523 024474 004537 004042      JSR   R5,WRITE     ; IF M8053, THEN LOAD SR WITH 377.
4524 024500 120012      SR              ; THIS ALSO STARTS THE SHIFTING OPERATION.

```


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TEST 3 -- NPR CONTROL REGISTER - MASTER CLEAR

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

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4669 025062
4670 025062 004737 003514
4671 025066 103003
4672 025070
4673 025070 104460
4674 025072
4675 025072 104410
4676 025074 000352
4677
4678 025076 004737 005134
4679 025102 103002
4680 025104
4681 025104 104460
4682 025106 000557
4683
4684 025110 012702 002740
4685 025114 010237 002256
4686 025120 010237 025234
4687
4688 025124 004537 005004
4689 025130 002632
4690 025132 002654
4691 025134 000011
4692 025136 013701 025132
4693 025142 010137 002254
4694 025146 012703 000001
4695
4696
4697
4698
4699
4700
4701
4702
4703 025152 121112
4704 025154 001003
4705 025156 022122
4706 025160 077304
4707 025162 000412
4708
4709 025164 163701 025132
4710 025170 010137 002300

```

```

;*****
;*
;* 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
;
; JSR PC,MSTCLR ;INIT DMV & START UP MAINT. LOOP
; BCC 1# ;IF NO ERROR, PROCEED WITH TESTING
; ERROR ;ELSE REPORT ERROR
;
; ESCAPE TST ; & EXIT TEST
;
; TRAP C#ERROR
;
; TRAP C#ESCAPE
; .WORD L10032-.
;
; 1# : JSR PC,NPREAD ;GET CONTENTS OF ALL NPR REGISTERS INTO BT2
; BCC 30# ;IF AN ERROR OCCURED,
; ERROR ;REPORT IT &
;
; TRAP C#ERROR
; BR 24# ; EXIT
;
; 30# : MOV #BT2,R2 ;POINT TO NPR REGISTER CONTENTS
; MOV R2,BDATA ;USE IT ALSO FOR ERROR HANDLING
; MOV R2,13# ;SETUP ALSO FOR READ BACK
;
; JSR R5,MOVSW ;GET THE "EXPECTED" RESULTS TOO
; NPRMCR
; 12# : BT1
; 11# : 9.
; MOV 12#,R1 ;POINT TO TABLE OF EXPECTED REGISTER CONTENTS
; MOV R1,GDATA ;USE IT ALSO FOR ERROR HANDLING
; MOV #1,R3 ;COUNT OF # OF NPR REGISTERS BEING PROCESSED
; ;FOR NOW, ONLY THE CONTROL REGISTER IS CHECKED!!
;
;*****
; PLEASE NOTE THAT "GDATA" & "BDATA" NOW CONTAIN POINTERS -- NOT DATA!
; THIS IS A DEVIANT AND THEREFORE SHOULD BE BORNE IN MIND WHEN TRYING TO
; FOLLOW THIS DEVIOUS LOGIC.
;*****
;
; 2# : CMPB (R1),(R2) ;CHECK ONE BYTE
; BNE 3# ;GO REPORT FAILURE IF ANY ERROR IS FOUND
; CMP (R1)+,(R2)+ ;BUMP POINTERS -- TABLES ARE ACTUALLY WORD TABLES
; SOB R3,2# ;LOOP IF NOT DONE YET
; BR 4# ;ELSE, PROCEED WITH TESTING
;
; 3# : SUB 12#,R1 ;CALCULATE THE REGISTER # CAUSING THE FAILURE
; MOV R1,REGNUM ;IDENTIFY FAULTY REGISTER

```


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TEST 3 -- NPR CONTROL REGISTER - MASTER CLEAR

```

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

```


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TEST 4 -- NPR DATA-OUT

.SBTTL TEST 4 -- NPR DATA-OUT

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;*****
;*
;* 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
;
;-----
;
; NPROTS = #T
; JSR PC,MSTCLR ;INIT DMV & START UP MAINT. LOOP
; BCC 1# ;IF NO ERROR, PROCEED WITH TEST
; ERROR ;ELSE, REPORT IT
;
; ESCAPE TST ; & EXIT TEST
;
; TRAP C#ERROR
; TRAP C#ESCAPE
; .WORD L10033-.

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;-----
;
; 1# : BGNSUB ;----- MAIN MEMORY WORD DATA-OUT TESTING -----
; T4.1:
; TRAP C#BSUB
;
; MOV PATF,4# ;SETUP COUNT OF # OF WORDS IN TEST PATTERN
;
; JSR R5,NPRMOV ;MOVE DATA THROUGH THE NPR LOGIC
; 2# : PATF+2 ; ADDRESS OF DATA
; 3# : BUFAREA ; BUFFER AREA
; 4# : 0 ;*** MODIFIED FROM ABOVE *** -- WORD COUNT
; NPRDL ; OPERATION TO BE UTILIZED
;
; BCC 7# ;IF ERROR, REPORT IT

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4840 000004
4841 025450 004737 003514
4842 025454 103003
4843 025456
4844 025456 104460
4845 025460
4846 025460 104410
4847 025462 000474
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4851 025464
4852 025464
4853 025464 104402
4854 025466 013737 002506 025504
4855
4856 025474 004537 005266
4857 025500 002510
4858 025502 002654
4859 025504 000000
4860 025506 000044
4861
4862 025510 103025

```


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TEST 4 -- NPR DATA-OUT

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4863 025512          134:  ERROR
4864 025512 104460
4865 025514 005737 002412          TST      TMP0          ;WE JUST REPORTED ONE ERROR BUT WAS IT A TIMEOUT
4866 025520 001421          BEQ      74          ;ERROR? IF SO, PROCEED WITH TESTING. ELSE,
4867 025522 022737 000006 002204  CMP      @NPRTOE,ERRNBR ;WE WILL HAVE TO REPORT IT HERE AND NOW.
4868 025530 001415          BEQ      74          ;THE TIMEOUT ERROR WAS ALREADY REPORTED.
4869 025532 012737 000002 002202  MOV      @T.EHRD,ERRTYP ;IT WASN'T REPORTED YET, SETUP FOR IT NOW:
4870 025540 012737 000006 002204  MOV      @NPRTOE,ERRNBR
4871 025546 012737 016316 002206  MOV      @EM26E,ERRMSG
4872 025554 012737 007314 002210  MOV      @ERR11,ERRBLK
4873 025562 000753          BR       134          ;LOOP BACK TO CAUSE REPORT @ PROPER PC LOCATION
4874
4875 025564 013701 025500          74:  MOV      24,R1          ;POINT TO GOOD DATA
4876 025570 013702 025502          MOV      34,R2          ;      & ACTUAL DATA
4877 025574 013703 025504          MOV      44,R3          ;GET WORD COUNT
4878 025600 005037 002276          CLR      ERRFLG        ;RESET ERROR FLAG
4879
4880 025604 022122          54:  CMP      (R1)+,(R2)+  ;CHECK RECEIVED DATA
4881 025606 001007          BNE      64          ;ERROR, GO REPORT IT
4882 025610 077303          114: SOB      R3,54          ;GOOD, IF MORE DO IT AGAIN
4883 025612 005737 002276          TST      ERRFLG        ;ELSE, SEE IF WE MUST FINISH AN ERROR MESSAGE
4884 025616 001440          BEQ      104          ;NO, TEST IT AGAIN BUT WITH BYTE TRANSFERS
4885 025620 004737 013076          JSR      PC,NULERR     ;YES, USE COMMON ROUTINE TO END ERROR MESSAGE
4886 025624 000435          BR       104          ;WE CAN TEST IT AGAIN BUT WITH BYTE TRANSFERS
4887
4888 025626 010146          64:  MOV      R1,-(SP)      ;SAVE THIS FOR FURTHER TESTING
4889 025630 014137 002254          MOV      -(R1),GDATA  ;SETUP FOR ERROR REPORT
4890 025634 014237 002256          MOV      -(R2),BDATA
4891 025640 010237 002252          MOV      R2,TDATA     ;LSI-11'S MEMORY ADDRESS
4892 025644 163701 025500          SUB      24,R1        ;CALCULATE THE OFFSET AT WHICH THE
4893 025650 006201          ASR      R1          ; DATA COMPARISON ERROR OCCURED
4894 025652 010137 002300          MOV      R1,REGNUM    ;THE ERROR MESSAGE WILL REPORT THIS TOO
4895 025656 005737 002276          TST      ERRFLG        ;HAVE WE ALREADY REPORTED AN ERROR HERE?
4896 025662 001007          BNE      84          ;YES, THEN WE ONLY PRINT DATA THIS TIME
4897 025664 005237 002276          INC      ERRFLG        ;NO, SET FLAG & REPORT THE WHOLE MESSAGE
4898 025670          GEDF     EM26B,ERR9   ;WORD NPR TRANSFER DMV ==> LSI
4899          ; "DEVICE FATAL" ERROR # 28
4900 025670 104455          TRAP    C#ERDF
4901 025672 000034          .WORD   28
4902 025674 016226          .WORD   EM26B
4903 025676 007300          .WORD   ERR9
4904 025700 000402          BR       94          ; RESUME TESTING
4905
4906 025702 004737 012574          84:  JSR      PC,ERR94    ;IDENTIFY THE FAILING DATA
4907 025706 012601          94:  MOV      (SP)+,R1     ;RESTORE POINTERS
4908 025710 013702 002252          MOV      TDATA,R2
4909 025714 005722          TST      (R2)+
4910 025716 000734          BR       114          ;AND RESUME TESTING
4911
4912 025720          104:  ENDSUB
4913 025720
4914 025720 104403          L10034: TRAP    C#ESUB
4915
4916          ;-----
4917
4918 025722          BGNSUB          ;----- MAIN MEMORY BYTE DATA-OUT TESTING -----

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TEST 4 -- NPR DATA-OUT

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4919 025722
4920 025722 104402
4921 025724 013737 002456 025742      MOV      PATB,4#      ;SETUP COUNT OF # OF WORDS IN TEST PATTERN
4922
4923 025732 004537 005266                JSR      R5,NPRMOV   ;MOVE DATA THROUGH THE NPR LOGIC
4924 025736 002460                2#:     PATB+2       ; ADDRESS OF DATA
4925 025740 002654                3#:     BUFAREA     ; BUFFER AREA
4926 025742 000000                4#:     0           ;*** MODIFIED FROM ABOVE *** -- BYTE COUNT
4927 025744 000054                NPRDLB           ; OPERATION TO BE UTILIZED
4928
4929 025746 103025                BCC      7#        ;IF ERROR, REPORT IT
4930 025750                13#:    ERROR
4931 025750 104460
4932 025752 005737 002412                TST      TMP0       ;WE JUST REPORTED ONE ERROR BUT WAS IT A TIMEOUT
4933 025756 001421                BEQ      7#        ;ERROR? IF SO, PROCEED WITH TESTING. ELSE.
4934 025760 022737 000006 002204                CMP      @NPRTOE,ERRNBR ;WE WILL HAVE TO REPORT IT HERE AND NOW.
4935 025766 001415                BEQ      7#        ;THE TIMEOUT ERROR WAS ALREADY REPORTED.
4936 025770 012737 000002 002202                MOV      @T.EHRD,ERRTYP ;IT WASN'T REPORTED YET, SETUP FOR IT NOW:
4937 025776 012737 000006 002204                MOV      @NPRTOE,ERRNBR
4938 026004 012737 016316 002206                MOV      @EM26E,ERRMSG
4939 026012 012737 007314 002210                MOV      @ERR11,ERRBLK
4940 026020 000753                BR       13#       ;LOOP BACK TO CAUSE REPORT @ PROPER PC LOCATION
4941
4942 026022 013701 025736                7#:     MOV      2#,R1   ;POINT TO GOOD DATA
4943 026026 013702 025740                MOV      3#,R2       ; & ACTUAL DATA
4944 026032 013703 025742                MOV      4#,R3       ;GET BYTE COUNT
4945 026036 005037 002276                CLR      ERRFLG     ;RESET ERROR FLAG
4946
4947 026042 122122                5#:     CMPB     (R1)+,(R2)+ ;CHECK RECEIVED DATA
4948 026044 001007                BNE      6#        ;ERROR, GO REPORT IT
4949 026046 077303                11#:    SOB      R3,5#   ;GOOD, IF MORE DO IT AGAIN
4950 026050 005737 002276                TST      ERRFLG     ;ELSE, SEE IF WE MUST FINISH AN ERROR MESSAGE
4951 026054 001437                BEQ      10#       ;NO, THEN WE CAN EXIT THE TEST
4952 026056 004737 013076                JSR      PC,NULERR  ;YES, OUTPUT THE REQUIRED BLANK LINES. NOW
4953 026062 000434                BR       10#       ;THEN WE CAN EXIT THE TEST
4954
4955 026064 010146                6#:     MOV      R1,-(SP) ;SAVE THIS FOR FURTHER TESTING
4956 026066 114137 002254                MOVB     -(R1),GDATA ;SETUP FOR ERROR REPORT
4957 026072 114237 002256                MOVB     -(R2),BDATA
4958 026076 010237 002252                MOV      R2,TDATA   ;LSI-11'S MEMORY ADDRESS
4959 026102 163701 025736                SUB      2#,R1      ;CALCULATE THE OFFSET AT WHICH THE
4960
4961 026106 010137 002300                MOV      R1,REGNUM  ; DATA COMPARISON ERROR OCCURED
4962 026112 005737 002276                TST      ERRFLG     ;THE ERROR MESSAGE WILL REPORT THIS TOO
4963 026116 001007                BNE      8#        ;HAVE WE ALREADY REPORTED AN ERROR HERE?
4964 026120 005237 002276                INC      ERRFLG     ;YES, THEN WE ONLY PRINT DATA THIS TIME
4965 026124                GEDF     EM26C,ERR10 ;NO, SET FLAG & REPORT THE WHOLE MESSAGE
4966
4967 026124 104455                ;BYTE NPR TRANSFER DMV ==> LSI
4968 026126 000035                ; "DEVICE FATAL" ERROR # 29
4969 026130 016251                TRAP     C#ERDF
4970 026132 007306                .WORD   29
4971 026134 000402                .WORD   EM26C
4972
4973 026136 004737 012732                8#:     BR       9#
4974 026142 012601                9#:     MOV      (SP)+,R1 ; RESUME TESTING
; IDENTIFY THE FAILING DATA
; RESTORE POINTERS

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TEST 4 -- NPR DATA-OUT

4975 026144 013702 002252
4976 026150 005202
4977 026152 000735
4978
4979 026154
4980 026154
4981 026154 104403
4982 026156
4983 026156
4984 026156 104401

MOV TDATA,R2
INC R2
BR 110 ;AND RESUME TESTING
100: ENDSUB
ENDTST

L10035: TRAP C#ESUB
L10033: TRAP C#ETST

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TEST 5 -- NPR DATA-IN

.SBTTL TEST 5 -- NPR DATA-IN

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026160
026160 004737 003514
026164 103003
026166 104460
026170
026170 104410
026172 000234
026174
026174 013737 002506 026212
026202 004537 005266
026206 002510
026210 002654
026212 000000
026214 000004
026216 103025
026220
026220 104460
026222 005737 002412
026226 001421
026230 022737 000006 002204
026236 001415
026240 012737 000002 002202
026246 012737 000006 002204
026254 012737 016316 002206
026262 012737 007314 002210
026270 000753
026272 013701 026206
026276 013702 026210
026302 013703 026212

.....
: 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
: JSR PC,MSTCLR ;INI: DMV & START UP MAINT. LOOP T5::
: BCC 10 ;IF NO ERROR, PROCEED WITH TEST
: ERROR ;ELSE, REPORT IT
: ESCAPE TST ; & EXIT TEST TRAP C!ERROR
: .WORD L10036-.
10: MOV PATF,40 ;SETUP COUNT OF # OF WORDS IN TEST PATTERN
26: JSR R5,NPRMOV ;MOVE DATA THROUGH THE NPR LOGIC
30: PATF*2 ; ADDRESS OF DATA
34: BUFAREA ; BUFFER AREA
40: 0 ;... MODIFIED FROM ABOVE ... -- WORD COUNT
: NPRLD ; OPERATION TO BE UTILIZED
: BCC 70 ;IF ERROR, REPORT IT
130: ERROR TRAP C!ERROR
: TST TMPO ;WE JUST REPORTED ONE ERROR BUT WAS IT A TIMEOUT
: BEQ 70 ;ERROR? IF SO, PROCEED WITH TESTING. ELSE,
: CMP @NPRTOE,ERRNBR ;WE WILL HAVE TO REPORT IT HERE AND NOW.
: BEQ 70 ;THE TIMEOUT ERROR WAS ALREADY REPORTED.
: MOV @T,EMRD,ERRTYP ;IT WASN'T REPORTED YET, SETUP FOR IT NOW:
: MOV @NPRTOE,ERRNBR
: MOV @EM26E,ERRMSG
: MOV @ERR11,ERRBLK
: BR 130 ;LOOP BACK TO CAUSE REPORT & PROPER PC LOCATION
70: MOV 20,R1 ;POINT TO GOOD DATA
: MOV 30,R2 ; & ACTUAL DATA
: MOV 40,R3 ;GET WORD COUNT

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TEST 5 -- NPR DATA-IN

```

5041 026306 005037 002276          CLR      ERRFLG          ;RESET ERROR FLAG
5042
5043 026312 022122          50:     CMP      (R1), (R2) ;CHECK RECEIVED DATA
5044 026314 001007          BNE     60             ;ERROR, GO REPORT IT
5045 026316 077303          110:    SOB     R3, 50     ;GOOD, IF MORE DO IT AGAIN
5046 026320 005737 002276          TST     ERRFLG        ;ELSE, SEE IF WE MUST FINISH AN ERROR MESSAGE
5047 026324 001440          BEQ     100           ;NO, THEN WE CAN EXIT THE TEST
5048 026326 004737 013076          JSR     PC, MULERR    ;YES, USE COMMON ROUTINE TO END ERROR MESSAGE
5049 026332 000435          BR     100           ;THEN WE CAN EXIT THE TEST
5050
5051 026334 010246          60:     MOV     R2, -(SP)   ;SAVE THIS FOR FURTHER TESTING
5052 026336 014137 002254          MOV     -(R1), GDATA ;SETUP FOR ERROR REPORT
5053 026342 014237 002256          MOV     -(R2), BDATA
5054 026346 010137 002252          MOV     R1, TDATA    ;LSI-11'S MEMORY ADDRESS
5055 026352 163701 026206          SUB     20, R1        ;CALCULATE THE OFFSET AT WHICH THE
5056 026356 006201          ASR     R1            ; DATA COMPARISON ERROR OCCURED
5057 026360 010137 002300          MOV     R1, REGNUM   ;THE ERROR MESSAGE WILL REPORT THIS TOO
5058 026364 005737 002276          TST     ERRFLG        ;HAVE WE ALREADY REPORTED AN ERROR HERE?
5059 026370 001007          BNE     80             ;YES, THEN WE ONLY PRINT DATA THIS TIME
5060
5061 026372 005237 002276          INC     ERRFLG        ;NO, SET FLAG & REPORT THE WHOLE MESSAGE
5062 026376          GEDF    EM26D, ERR9  ;WORD NPR TRANSFER LSI ==> DMV
5063                                     ; "DEVICE FATAL" ERROR # 30
5064 026376 104455          TRAP   C#ERDF
5065 026400 000036          .WORD 30
5066 026402 016274          .WORD EM26D
5067 026404 007300          .WORD ERR9
5068 026406 000402          BR     90             ; RESUME TESTING
5069
5070 026410 004737 012574          80:     JSR     PC, ERR90 ;IDENTIFY THE FAILING DATA
5071 026414 012602          90:     MOV     (SP), R2  ;RESTORE POINTERS
5072 026416 013701 002252          MOV     TDATA, R1
5073 026422 005721          TST     (R1)
5074 026424 000734          BR     110           ;AND RESUME TESTING
5075
5076 026426          100:    ENDTST
5077 026426
5078 026426
5079 026426 104401          L10036: TRAP   C#ETST

```


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TEST 6 -- NPR XFER ABORT

.SBTTL TEST 6 -- NPR XFER ABORT

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026430 104402

026432 004737 003514

026436 103003

026440

026440 104460

026442

026442 104410

026444 000164

026446 012737 000001 002412

026454 012737 160000 002420

026462 012737 000044 002414

026470 004537 004042

026474 000070

026476 002420

026500 103003

026502

026502 104460

026504

026504 104410

026506 000122

026510 004537 004042

026514 000071

026516 002421

026520 103003

026522

026522 104460

026524

026524 104410

026526 000102

026530 004537 004054

026534 000072

026536 000200

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

==== SUBTEST # 1 -- NPR OUTPUT TO NON-EXISTENT LOCATION FORCING NPR-ABORT ====

BGNSUB

T6::

T6.1:

JSR PC,MSTCLR ;INIT DMV & ENTER M-LOOP
BCC .+10 ;IF NO ERROR, PROCEED WITH TESTING
ERROR ;ELSE, REPORT ERROR TRAP C#BSUB
ESCAPE SUB ; & EXIT TEST TRAP C#ERROR
MOV #1,TMP0 ;DISABLE PRINTOUT OF TIMEOUT-COUNT BY ERR11 TRAP C#ESCAPE
MOV #160000,TMP3 ;SETUP 11'S ADDRESS .WORD L10040-.
MOV #NPRDL,TMP1 ;CONTROL REG. VALUE FOR NPR-OUT COMMAND
JSR R5,WRITE ;SETUP ADDRESS OUT REGISTERS
NPRACL
TMP3
BCC .+10 ;IF NO ERROR, PROCEED
ERROR ;ELSE, REPORT IT TRAP C#ERROR
ESCAPE SUB ; AND EXIT THIS TEST TRAP C#ESCAPE
JSR R5,WRITE .WORD L10040-.
NPRACL
TMP3+1
BCC .+10 ;IF NO ERROR, PROCEED
ERROR ;ELSE, REPORT IT TRAP C#ERROR
ESCAPE SUB ; AND EXIT THIS TEST TRAP C#ESCAPE
JSR R5,WRITEI .WORD L10040-.
NPRACL
NPRBS7 ; (THIS SETS BS7 & CLEARS EXTENDED ADDR. BITS)

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TEST 6 -- NPR XFER ABORT

5136	026540	103003		BCC	..10		;IF NO ERROR, PROCEED		
5137	026542			ERROR			;ELSE, REPORT IT		
5138	026542	104460		ESCAPE	SUB			TRAP	C#ERROR
5139	026544						AND EXIT THIS TEST		
5140	026544	104410						TRAP	C#ESCAPE
5141	026546	000062						.WORD	L10040-.
5142	026550	004537	004042	JSR	R5,WRITE		;INITIATE THE NPR-OUT OPERATION		
5143	026554	123004		NPRCTL					
5144	026556	002414		TMP1					
5145	026560	103003		BCC	..10		;IF NO ERROR, PROCEED		
5146	026562			ERROR			;ELSE, REPORT IT		
5147	026562	104460		ESCAPE	SUB			TRAP	C#ERROR
5148	026564						AND EXIT THIS TEST		
5149	026564	104410						TRAP	C#ESCAPE
5150	026566	000042						.WORD	L10040-.
5151	026570	004537	003616	JSR	R5,READ		;READ BACK THE CONTROL-STATUS REGISTER		
5152	026574	123004		NPRCTL					
5153	026576	002416		TMP2					
5154	026600	103003		BCC	..10		;IF NO ERROR, PROCEED		
5155	026602			ERROR			;ELSE, REPORT IT		
5156	026602	104460		ESCAPE	SUB			TRAP	C#ERROR
5157	026604						AND EXIT THIS TEST		
5158	026604	104410						TRAP	C#ESCAPE
5159	026606	000022						.WORD	L10040-.
5160	026610	132737	000200 002416	BITB	#NPRABT, TMP2		;THE ABORT BIT SHOULD BE SET		
5161	026616	001004		BNE	201		;IT IS. EXIT SUBTEST		
5162	026630			GEDF	EM26G,ERR11		;IT DIDN'T. REPORT MISSING NPR ABORT		
5163							; "DEVICE FATAL" ERROR # 31		
5164	026620	104455						TRAP	C#ERDF
5165	026622	000037						.WORD	31
5166	026624	016402						.WORD	EM26G
5167	026626	007314						.WORD	ERR11
5168	026630			201:	ENDSUB				
5169	026630								
5170	026630	104403						L10040:	
5171								TRAP	C#ESUB
5172									
5173	026632								
5174	026632			BGNSUB					
5175	026632	104402						T6.2:	
5176	026634	004737	003514	JSR	PC,MSTCLR		;INIT DMV & ENTER M-LOOP	TRAP	C#BSUB
5177	026640	103003		BCC	..10		;IF NO ERROR, PROCEED WITH TESTING		
5178	026642			ERROR			;ELSE, REPORT ERROR		
5179	026642	104460		ESCAPE	SUB			TRAP	C#ERROR
5180	026644						& EXIT TEST		
5181	026644	104410						TRAP	C#ESCAPE
5182	026646	000164						.WORD	L10041-.
5183	026650	012737	000001 002412	MOV	#1, TMP0		;DISABLE PRINTOUT OF TIMEOUT-COUNT BY ERR11		
5184									
5185	026656	012737	002654 002420	MOV	#BUFAREA, TMP3		;SETUP 11'S ADDRESS		
5186	026664	012737	000044 002414	MOV	#NPRDL, TMP1		;CONTROL REG. VALUE FOR NPR-OUT COMMAND		
5187	026672	004537	004042	JSR	R5,WRITE		;SETUP ADDRESS OUT REGISTERS		
5188	026676	000070		NPRAOL					
5189	026700	002420		TMP3					
5190	026702	103003		BCC	..10		;IF NO ERROR, PROCEED		
5191	026704			ERROR			;ELSE, REPORT IT		

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TEST 6 -- NPR XFER ABORT

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

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

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

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5414 027522          ESCAPE SUB          ; AND EXIT THIS SUBTEST
5415 027522 104410          TRAP          C#ESCAPE
5416 027524 000224          .WORD          L10043-.
5417 027526 112737 000004 002417  MOVB  #NPRLD,TMP2+1 ;SETUP CONTROL VALUE TO DO NPR-IN
5418 027534 004537 004042  JSR   R5,WRITE      ;PERFORM THE "EXTENDED" DATA-IN NPR
5419 027540 123004          NPRCTL
5420 027542 002417          TMP2+1
5421 027544 103003          BCC   .+10         ;IF NO ERROR, PROCEED
5422 027546          ERROR          ;ELSE, REPORT IT
5423 027546 104460          ESCAPE SUB          ; AND EXIT THIS SUBTEST
5424 027550          TRAP          C#ERROR
5425 027550 104410          TRAP          C#ESCAPE
5426 027552 000176          .WORD          L10043-.
5427
5428
5429 027554 004537 003616  ;***** CHECK THE NPR OPERATION (DATA/NPRCTL) *****
5430 027560 123004          JSR   R5,READ      ;CHECK THE NPR OPERATION
5431 027562 002416          NPRCTL
5432 027564 103003          TMP2
5433 027566          BCC   .+10         ;IF NO ERROR, PROCEED
5434 027566 104460          ERROR          ;ELSE, REPORT IT
5435 027570          ESCAPE SUB          ; AND EXIT THIS TEST
5436 027570 104410          TRAP          C#ERROR
5437 027572 000156          TRAP          C#ESCAPE
5438 027574 004537 003616  JSR   R5,READ      ;GET THE DATA WE SHOULD HAVE JUST LOADED INTO
5439 027600 123001          NPRDRH          ; THE NPR DATA REGISTERS FROM THE
5440 027602 002257          BDATA+1         ; EXTENDED MEMORY AREA
5441 027604 103003          BCC   .+10         ;IF NO ERROR, PROCEED
5442 027606          ERROR          ;ELSE, REPORT IT
5443 027606 104460          ESCAPE SUB          ; AND EXIT THIS TEST
5444 027610          TRAP          C#ERROR
5445 027610 104410          TRAP          C#ESCAPE
5446 027612 000136          .WORD          L10043-.
5447 027614 004537 003616  JSR   R5,READ
5448 027620 123000          NPRDRL
5449 027622 002256          BDATA
5450 027624 103003          BCC   .+10         ;IF NO ERROR, PROCEED
5451 027626          ERROR          ;ELSE, REPORT IT
5452 027626 104460          ESCAPE SUB          ; AND EXIT THIS TEST
5453 027630          TRAP          C#ERROR
5454 027630 104410          TRAP          C#ESCAPE
5455 027632 000116          .WORD          L10043-.
5456 027634 132737 000300 002416  BITB  #300,TMP2    ;DID IT ABORT OR HANG?
5457 027642 001414          BEQ   144          ;NO, GOOD. PROCEED WITH SUBTEST
5458 027644 100005          BPL   104          ;YES, WHICH ONE?
5459 027646          GEDF  EM27A,ERR12 ;ABORT, REPORT IT AS SUCH.
5460
5461 027646 104455          ; "DEVICE FATAL" ERROR # 35
5462 027650 000043          TRAP          C#ERDF
5463 027652 016437          .WORD          35
5464 027654 007456          .WORD          EM27A
5465 027656 000404          .WORD          ERR12
5466
5467
5468 027660 104455          BR    124          ;AND EXIT
5469 027662 000044          GEDF  EM27B,ERR12 ;HANG, REPORT IT AS SUCH.
                    104:
                    ; "DEVICE FATAL" ERROR # 36
                    TRAP          C#ERDF
                    .WORD          36

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5470 027664 016461 .WORD EM27B
5471 027666 007456 .WORD ERR12
5472 027670 124: ESCAPE SUB ; AND EXIT SUBTEST
5473 027670 104410 TRAP C#ESCAPE
5474 027672 000056 .WORD L10043-
5475 027674 023737 002256 002254 144: CMP BDATA,GDATA ;DID WE READ THE TEST DATA USING THE NPR?
5476 027702 001406 BEQ 20# ;YES, WELL THIS ONE WORKED.
5477 027704 GEDF EM27C,ERR12 ;NO! REPORT THE ERROR.
5478 ; "DEVICE FATAL" ERROR # 37
5479 027704 104455 TRAP C#ERDF
5480 027706 000045 .WORD 37
5481 027710 016502 .WORD EM27C
5482 027712 007456 .WORD ERR12
5483 027714 ESCAPE SUB ; EXIT FROM SUBTEST AFTER PRINTING ERROR MSG.
5484 027714 104410 TRAP C#ESCAPE
5485 027716 000032 .WORD L10043-
5486 027720 062737 002000 002442 204: ADD #BIT10,TMPC ;POINT TO NEXT PAGE ADDRESS REG. VALUE
5487 027726 001410 BEQ 63# ;IF 0, WE'RE DONE
5488 027730 023737 002442 002436 CMP TMPC,TMPA ;IF GREATER THEN MAXIMUM VALUE,
5489 027736 101004 BHI 63# ; WE'RE DONE TOO.
5490 027740 105237 002451 INCB TMPF+1 ;ELSE, INCREMENT NPR'S EXTENDED ADDR. REG.
5491 027744 000137 027244 JMP 2# ;AND GO BACK TO DO THIS ADDRESS
5492
5493 027750 634: ENDSUB
5494 027750 L10043:
5495 027750 104403 TRAP C#ESUB
5496 ;-----
5497
5498 027752 BGNSUB ;TEST THE NPR-OUT USING EXTENDED ADDR. BITS
5499 027752 T7.2:
5500 027752 104402 TRAP C#BSUB
5501 027754 012737 002000 002442 MOV #BIT10,TMPC ;INITIALIZE PAGE ADDRESS REG. VARIABLE
5502 027762 112737 000001 002451 MOVB #BIT0,TMPF+1 ;INITIALIZE NPR EXTENDED ADDRESS REG. VARIABLE
5503 027770 004737 030560 JSR PC,XINIT ;INITIALIZE THE MMU
5504
5505 ;***** WRITE/READ/VERIFY NPRAOH,NPRAOL *****
5506 027774 004537 004054 JSR R5,WRITEI ;POINT NPR REGISTERS TO 0
5507 030000 000070 NPRAOL
5508 030002 000000 0
5509 030004 004537 004054 JSR R5,WRITEI
5510 030010 000071 NPRAOH
5511 030012 000000 0
5512 030014 004537 003616 JSR R5,READ ;READ BACK THE ADDRESS & VERIFY IT
5513 030020 000070 NPRAOL
5514 030022 002434 TMP9
5515 030024 004537 003616 JSR R5,READ
5516 030030 000071 NPRAOH
5517 030032 002435 TMP9+1
5518 030034 023727 002434 000000 CMP TMP9,#000000 ;IS IT CORRECT?
5519 030042 001427 BEQ 2# ;YES, PROCEED.
5520 030044 013737 002434 002256 MOV TMP9,BDATA ;NO, SETUP FOR & REPORT LOADING FAILURE
5521 030052 012737 000000 002254 MOV #000000,GDATA
5522 030060 012737 000004 002300 MOV #4,REGNUM ;IDENTIFY NPRAIH AS THE CULPRIT
5523 030066 105737 002434 TSTB TMP9 ;IS THAT REALLY TRUE?
5524 030072 001002 BNE 1# ;MAYBE. BUT, NPRAIL IS DEFINATELY AT FAULT
5525 030074 005237 002300 INC REGNUM ; SO IDENTIFY IT AS SUCH

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5526 030100          10:  GEDF  EM26A,ERR14  ;REPORT THE FAILURE
5527                                     ; "DEVICE FATAL" ERROR # 38
5528 030100 104455                                     TRAP  C#ERDF
5529 030102 000046                                     .WORD 38
5530 030104 016204                                     .WORD EM26A
5531 030106 011002                                     .WORD ERR14
5532 030110          ESCAPE SUB  ; AND EXIT THIS SUBTEST
5533 030110 104410                                     TRAP  C#ESCAPE
5534 030112 000442                                     .WORD L10044-.
5535 030114 012737 123456 002420  MOV  #123456,TMP3  ;USE THIS AS INITIAL BACKGROUND PATTERN
5536
5537 ;*****
5538 ;***** MAIN SUBTEST #2 LOOP STARTS HERE *****
5539 ;*****
5540
5541 ;***** TMP3 => 1ST LOCATION OF EACH EXTENDED MEMORY BLOCK *****
5542 030122 062737 021475 002420 20:  ADD  #21475,TMP3  ;GENERATE THE PATTERN WE'LL USE THIS TIME
5543 030130 013737 002420 002414  MOV  TMP3,TMP1  ;PUT HERE FOR ERROR HANDLER
5544 030136 005137 002414  COM  TMP1
5545
5546 030142 012737 002000 002446 40:  MOV  #BIT10,TMPE  ;REFILL ALL TEST LOCATIONS STARTING HERE
5547 030150 004537 030700  JSR  R5,XMWRIT  ;WRITE BACKGROUND PATTERN GENERATED ABOVE
5548 030154 002446  TMPE  ; POINTER TO ADDRESS (IN "PAR" FORMAT)
5549 030156 002420  TMP3  ; POINTER TO DATA (TO BE WRITTEN)
5550 030160 103003  BCC  .+10  ;IF NO ERROR, PROCEED
5551 030162  ERROR  ;ELSE, REPORT IT
5552 030162 104460          ESCAPE SUB  ; AND EXIT THIS TEST          TRAP  C#ERROR
5553 030164
5554 030164 104410                                     TRAP  C#ESCAPE
5555 030166 000366                                     .WORD L10044-.
5556 030170 062737 002000 002446  ADD  #BIT10,TMPE  ;INCREMENT THE PAGE ADDR. REG. VALUE
5557 030176 001404  BEQ  60  ;DONE IF IT GOES TO ZERO
5558 030200 023737 002446 002436  CMP  TMPE,TMPA  ;IS THE NEW VALUE WITHIN CURRENT MEMORY?
5559 030206 101760  BLOS  40  ;YES, THE WRITE IT TOO.
5560                                     ;NO, DONE.
5561
5562 ;***** WRITE/READ/VERIFY NPRAIX *****
5563 030210 004537 004042 60:  JSR  R5,WRITE  ;SETUP NPR EXTENDED ADDR. REG BITS
5564 030214 000072  NPRAOX
5565 030216 002451  TMPF+1
5566 030220 103003  BCC  .+10  ;IF NO ERROR, PROCEED
5567 030222  ERROR  ;ELSE, REPORT IT
5568 030222 104460          ESCAPE SUB  ; AND EXIT THIS TEST          TRAP  C#ERROR
5569 030224
5570 030224 104410                                     TRAP  C#ESCAPE
5571 030226 000326                                     .WORD L10044-.
5572 030230 004537 003616  JSR  R5,READ  ;READ IT BACK & VERIFY THAT IT'S CORRECT
5573 030234 000072  NPRAOX
5574 030236 002450  TMPF
5575 030240 103003  BCC  .+10  ;IF NO ERROR, PROCEED
5576 030242  ERROR  ;ELSE, REPORT IT
5577 030242 104460          ESCAPE SUB  ; AND EXIT THIS TEST          TRAP  C#ERROR
5578 030244
5579 030244 104410                                     TRAP  C#ESCAPE
5580 030246 000306                                     .WORD L10044-.
5581 030250 123737 002450 002451  CMPB TMPF,TMPF+1  ;DID IT LOAD CORRECTLY?

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

```


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TEST 7 -- NPR EXTENDED ADDRESS BIT TEST

```

5638 030446 016437 .WORD EM27A
5639 030450 007456 .WORD ERR12
5640 030452 000404
5641 030454
5642
5643 030454 104455
5644 030456 000051
5645 030460 016461
5646 030462 007456
5647 030464
5648 030464 104410
5649 030466 000066
5650 030470 004537 030776
5651 030474 002442
5652 030476 002256
5653 030500 023737 002256 002254
5654 030506 001406
5655 030510
5656
5657 030510 104455
5658 030512 000052
5659 030514 016502
5660 030516 007456
5661 030520
5662 030520 104410
5663 030522 000032
5664 030524 062737 002000 002442 201:
5665 030532 001410
5666 030534 023737 002442 002436
5667 030542 101004
5668 030544 105237 002451
5669 030550 000137 030122
5670
5671
5672 030554
5673 030554
5674 030554 104403
5675 030556
5676 030556
5677 030556 104401
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5682
5683
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5685 030560 010046
5686 030562 010146
5687 030564 010346
5688 030566 013737 000004 031122
5689
5690 030574 012700 077406
5691
5692
5693

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```

101: BR 121 ;AND EXIT
GEDF EM27B,ERR12 ;HANG, REPORT IT AS SUCH.
; "DEVICE FATAL" ERROR # 41
TRAP C1ERDF
;WORD 41
;WORD EM27B
;WORD ERR12
121: ESCAPE SUB ; AND EXIT SUBTEST
TRAP C1ESCAPE
;WORD L10044-.
141: JSR R5,XMREAD ;GET THE DATA WE SHOULD HAVE JUST LOADED INTO
TMPC
BDATA
CMP BDATA,GDATA ;DID WE READ THE TEST DATA USING THE NPR?
BEQ 201 ;YES, WELL THIS ONE WORKED.
GEDF EM27C,ERR12 ;NO! REPORT THE ERROR.
; "DEVICE FATAL" ERROR # 42
TRAP C1ERDF
;WORD 42
;WORD EM27C
;WORD ERR12
ESCAPE SUB ; EXIT FROM SUBTEST AFTER PRINTING ERROR MSG.
TRAP C1ESCAPE
;WORD L10044-.
201: ADD #BIT10,TMPC ;POINT TO NEXT PAGE ADDRESS REG. VALUE
BEQ 631 ;IF 0, WE'RE DONE
CMP TMPC,TMPA ;IF GREATER THEN MAXIMUM VALUE,
BHI 631 ; WE'RE DONE TOO.
INCB TMPC+1 ;ELSE, INCREMENT NPR'S EXTENDED ADDR. REG.
JMP 21 ;AND GO BACK TO DO THIS ADDRESS
631: ENDSUB
L10044: TRAP C1ESUB
ENDTST
L10042: TRAP C1ETST
;*****
; XMINIT -- SUBROUTINE TO INITIALIZE EXTENDED MEMORY (ALIAS: MEMORY MANAGEMENT
; UNIT) HARDWARE REGISTERS.
;*****
XMINIT: MOV R0,-(SP) ;SAVE WORKING REGISTERS
MOV R1,-(SP)
MOV R3,-(SP)
MOV #04,XM4HOL ;SETUP #4 TRAP VALUE (JUST IN CASE)
MOV #77406,R0 ;"PDR" INITIALIZATION VALUE
; 774 = FULL PAGE ACCESS
; 0 = UPWARD EXPANSION
; 6 = RESIDENT READ/WRITE

```

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TEST 7 -- NPR EXTENDED ADDRESS BIT TEST

```

5694 030600 012701 172300      MOV      #172300,R1      ;ADDRESS OF KPAR0
5695 030604 012703 000010      MOV      #8.,R3        ;LOOP VALUE -- # OF PDR'S
5696 030610 010021              18:     MOV      R0,(R1).    ;SETUP 1 PDR
5697 030612 077302              SOB      R3,18        ;IF ANOTHER PDR, DO IT TOO
5698                                ;ELSE, FALL THROUGH & INITIALIZE PAR'S
5699
5700 030614 005000              CLR      R0            ;INITIALIZATION VALUE FOR KPAR0
5701 030616 012701 172340      MOV      #172340,R1    ;ADDRESS OF KPAR0
5702 030622 012703 000007      MOV      #7.,R3        ;LOOP VALUE -- ONLY FIRST 7 PAR'S DONE BY LOOP
5703 030626 010021              28:     MOV      R0,(R1).    ;SETUP 1 PAR
5704 030630 062700 000200      ADD      #200,R0       ;CALCULATE NEXT PAR'S INITIALIZATION VALUE
5705 030634 077304              SOB      R3,28        ;IF ANOTHER PAR, DO IT TOO
5706 030636 012721 177600      MOV      #177600,(R1). ;ELSE, SETUP KPAR7 FOR I/O PAGE ACCESSING
5707
5708 030642              SETVEC  #250,#XMINTH,#7 ;SETUP OUR OWN TRAP CATCHER FOR ABORT HANDLING
5709 030642 012746 000007      MOV      #7,-(SP)      ;
5710 030646 012746 031124      MOV      #XMINTH,-(SP) ;
5711 030652 012746 000250      MOV      #250,-(SP)   ;
5712 030656 012746 000003      MOV      #3,-(SP)    ;
5713 030662 104437              TRAP    C+SVEC        ;
5714 030664 062706 000010      ADD      #10,SP       ;
5715 030670 012603              MOV      (SP),R3       ;RESTORE CALLER'S REGISTERS
5716 030672 012601              MOV      (SP),R1       ;
5717 030674 012600              MOV      (SP),R0       ;
5718 030676 000207              RTS      PC            ;RETURN
5719
5720 ;
5721 ; *****
5722 ; XPMRIT -- SUBROUTINE TO WRITE ONE WORD INTO AN EXTENDED MEMORY LOCATION.
5723 ;
5724 ; CALLING SEQUENCE:
5725 ;
5726 ; JSR      R5,XPMRIT
5727 ; <PRINTER TO HIGH ORDER BITS OF ADDRESS IN "PAR" FORMAT>
5728 ; <POINTER TO DATA TO BE WRITTEN>
5729 ; *****
5730
5731 030700 010146      XPMRIT: MOV      R1,-(SP)      ;SAVE REGISTER(S)
5732
5733 030702 012701 172354      MOV      #172354,R1    ;ADDRESS OF KPAR6
5734 030706 011146      MOV      (R1),-(SP)    ;SAVE CURRENT KPAR6 VALUE
5735 030710 013517      MOV      #R5),(R1)    ;SETUP "PAR" FOR THIS WRITE
5736 030712 011137 002426      MOV      (R1),TMP6    ;SAVE ADDRESS FOR ERROR MESSAGE
5737 030716 012737 000060 172516      MOV      #BIT4-BITS,#172516 ;ENABLE 22 BIT & I/O PAGE ADDRESSING IN SR3
5738 030724 000241      CLC                    ;CLEAR OUR ERROR FLAG
5739 030726 013737 000004 031122      MOV      #B#4,XM4HOL  ;* SETUP TRAP CATCHER #4 (BECAUSE OF MAPPING)
5740 030734 012737 031074 000004      MOV      #XM4INT,#B#4 ;
5741 030742 052737 000001 177572      BIS      #1,#177572   ;ENABLE MEMORY MANAGEMENT
5742 030750 013537 140000      MOV      #R5),#140000 ;WRITE ONE WORD IN THE SPECIFIED PAGE
5743 030754 042737 000001 177572      BIC      #1,#177572   ;TURN OFF MEMORY MANAGEMENT
5744 030762 013737 031122 000004      MOV      XM4HOL,#B#4  ;* RESTORE SUPERVISOR TRAP VECTOR #4
5745 030770 012611      MOV      (SP),(R1)    ;RESTORE KPAR6
5746
5747 030772 012601      MOV      (SP),R1      ;RESTORE CALLER'S REGISTER(S)
5748 030774 000205      RTS      R5          ;RETURN
5749

```


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TEST 7 -- NPR EXTENDED ADDRESS BIT TEST

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5762 030776 010146
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5764 031000 012701 172354
5765 031004 011146
5766 031006 013511
5767 031010 011137 002426
5768 031014 012737 000060 172516
5769 031022 000241
5770 031024 013737 000004 031122
5771 031032 012737 031074 000004
5772 031040 052737 000001 177572
5773 031046 013735 140000
5774 031052 042737 000001 177572
5775 031060 013737 031122 000004
5776 031066 012611
5777
5778 031070 012601
5779 031072 000205
5780
5781
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5785 031074 042737 000001 177572
5786 031102 013737 031122 000004
5787 031110 000240
5788 031112 000240
5789 031114 000240
5790 031116 000177 146662
5791 031122 000000
5792
5793
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5797 031124
5798 031124
5799 031124 010037 002372
5800 031130 010137 002374
5801 031134 010237 002376
5802 031140 010337 002400
5803 031144 010437 002402
5804 031150 010537 002404
5805 031154 016637 000002 002406

```

```

;*****
; XMPREAD -- SUBROUTINE TO READ FROM AN EXTENDED MEMORY LOCATION.
;
; CALLING SEQUENCE:
;
; JSR R5,XMPREAD
; <PRINTER TO HIGH ORDER BITS OF ADDRESS IN "PAR" FORMAT>
; <POINTER TO DATA RECEIVING LOCATION>
;*****

```

```

XMPREAD: MOV R1,-(SP) ;SAVE REGISTER(S)
;*****
MOV @172354,R1 ;ADDRESS OF KPAR6
MOV (R1),-(SP) ;SAVE CURRENT KPAR6 VALUE
MOV @R5+,(R1) ;SETUP "PAR" FOR THIS READ
MOV (R1),TMP6 ;SAVE ADDRESS FOR ERROR MESSAGE
MOV @BIT4+BITS,@172516 ;ENABLE 22 BIT & I/O PAGE ADDRESSING IN SR3
CLC ;CLEAR OUR ERROR FLAG
MOV @04,XM4HOL ;* SETUP TRAP CATCHER @4 (BECAUSE OF MAPPING)
MOV @XM4INT,@04 ;*
BIS @1,@177572 ;ENABLE MEMORY MANAGEMENT
MOV @140000,@R5+ ;READ ONE WORD IN THE SPECIFIED PAGE
BIC @1,@177572 ;TURN OFF MEMORY MANAGEMENT
MOV XM4HOL,@04 ;* RESTORE SUPERVISOR TRAP VECTOR @4
MOV (SP)+,(R1) ;RESTORE KPAR6
MOV (SP)+,R1 ;RESTORE CALLER'S REGISTER(S)
RTS R5 ;RETURN

```

```

;*****
; HANDLER FOR BLOC 4 TRAP PROCESSING (FOR TESTS 7 & 8)
;*****
XM4INT: BIC @1,@177572 ;TURN OFF MEMORY MANAGEMENT
MOV XM4HOL,@04 ;* RESTORE SUPERVISOR TRAP VECTOR @4
NOP ;*
NOP ;*
NOP ;*
JMP @4 ;NOW JUMP THRU IT !
XM4HOL: 0

```

```

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

```

```

BGNSRV XMINTH
;*****
MOV R0,REG0 ;SAVE GENERAL REGISTERS
MOV R1,REG1
MOV R2,REG2
MOV R3,REG3
MOV R4,REG4
MOV R5,REG5
MOV 2(SP),REG6 ;SAVE PSW FROM ERROR TRAP
;*****

```


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TEST 7 -- NPR EXTENDED ADDRESS BIT TEST

```

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

```

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TEST 8 -- SPECIAL MFG EXTENDED BIT TEST

.SBTTL TEST 8 -- SPECIAL MFG EXTENDED BIT TEST

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

```
;
;          BGNTST
;
;          T8::
;
;          BIT      #2,PT.CTL      ;IS THIS A MFG SPECIAL Q22 SYSTEM?
;          BNE      .+6             ;YES: GO START TEST
;          EXIT     TST             ; NO: SKIP THIS TEST
;
;                                     TRAP      C#EXIT
;                                     .WORD     L10046-.
;
;          JSR      PC,MSTCLR      ;INIT DMV & ENTER M-LOOP
;          BCC      1#             ;IF NO ERROR, PROCEED WITH TESTING
;          ERROR    ;ELSE, REPORT ERROR
;
;                                     TRAP      C#ERROR
;          EXIT     TST             ; & EXIT TEST
;
;                                     TRAP      C#EXIT
;                                     .WORD     L10046-.
;-----
```

```
;-----
;== SUBTEST #1 : TEST THE NPR-IN EXTENDED ADDRESS BITS
;-----
1# :          BGNSUB
;
;          T8.1:
;                                     TRAP      C#BSUB
;
;          JSR      PC,XMINIT      ;INITIALIZE THE MMU
;          CLR      R4             ;CLEAR INDEX
;
;          CLR      R2             ;SETUP EXTENDED MEM BACKGROUND PATTERN
;          MOV      XLOC0(R2),XVAL0(R2) ;(IN XVAL0 => XVAL6)
;          TST      (R2)+
;          CMP      R2,#14.
;          BNE      2#
```

```
;----- MAIN LOOP STARTS HERE -----
;
;          WRITE XVAL0, XVAL1, XVAL2, ... XVAL6 INTO THE SEVEN SPECIFIC
```

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TEST 8 -- SPECIAL MFG EXTENDED BIT TEST

```

5888 ;* EXTENDED ADDRESSES SPECIFIED BY XLOC0 THRU XLOC6 USING 11/23 MMU
5889 ;* (XLOC'S SPECIFY THE UPPER TWO BYTES OF THE 3 BYTE EXTENDED ADDR)
5890
5891 031356 005002 CLR R2 ;CLEAR LOCAL INDEX
5892 031360 016237 032542 002440 11: MOV XVALO(R2),TMPB ;SETUP DATA POINTER
5893 031366 016237 032524 002436 MOV XLOCO(R2),TMPA ;SETUP/ADJUST PAR VALUE
5894 031374 006337 002436 ASL TMPA
5895 031400 006337 002436 ASL TMPA
5896 031404 004537 030700 JSR R5,XMWRIT ;WRITE BACKGROUND PATTERN
5897 031410 002436 TMPA ; POINTER TO PAR VALUE
5898 031412 002440 TMPB ; POINTER TO DATA
5899
5900 031414 005722 TST (R2)+ ;BUMP INDEX
5901 031416 020227 000016 CMP R2,#14. ;ALL 'XLOC' EXTENDED ADDRESSES WRITTEN?
5902 031422 001356 BNE 11: ; NO: WRITE ANOTHER
5903
5904 ;***** SETUP DMV'S NPR ADDRESSING REGISTERS *****
5905 ;***** (WRITE/READ/VERIFY NPRAIH,NPRAIL,NPRAIX) *****
5906 031424 116437 032525 031460 3: MOVB XLOCO+1(R4),4: ;SETUP NPRAIX VALUE.
5907 031432 004537 004054 JSR R5,WRITEI ;POINT NPR REGISTERS TO EXTENDED ADDRESS
5908 031436 000074 NPRAIL
5909 031440 000000 0
5910 031442 004537 004054 JSR R5,WRITEI
5911 031446 000075 NPRAIH
5912 031450 000000 0
5913 031452 004537 004054 JSR R5,WRITEI
5914 031456 000076 NPRAIX
5915 031460 000000 4: 00
5916 031462 004537 003616 JSR R5,READ ;READ BACK THE ADDRESS
5917 031466 000074 NPRAIL
5918 031470 002256 BDATA
5919 031472 004537 003616 JSR R5,READ
5920 031476 000075 NPRAIH
5921 031500 002257 BDATA+1
5922 031502 004537 003616 JSR R5,READ
5923 031506 000076 NPRAIX
5924 031510 002434 TMP9
5925
5926 031512 005737 002256 TST BDATA ;***** NOW CHECK THEM *****
5927 031516 001413 BEQ 6: ;NPRAIL,NPRAIH=0 ?
5928 031520 003037 002254 CLR GDATA ; YES: TRY CHECKING NPRAIX
5929 031524 012737 000007 002300 MOV #7,REGNUM ; NO: REPORT ERROR...
5930 031532 105737 002256 TSTB BDATA
5931 031536 001020 BNE 7:
5932 031540 005237 002300 INC REGNUM
5933 031544 000415 BR 7:
5934 031546 013737 031460 002254 6: MOV 4:,GDATA ;SET UP NPRAIX EXPECTED
5935 031554 013737 002434 002256 MOV TMP9,BDATA ;SET UP NPRAIX READ...
5936 031562 023737 002254 002256 CMP GDATA,BDATA ;DOES NPRAIX=EXPECTED ?
5937 031570 001411 BEQ 9: ; YES: CONTINUE
5938 031572 012737 000006 002300 MOV #6,REGNUM ; NO: REPORT ERROR
5939 031600 7: GEDF EM26A,ERR14
5940 ; "DEVICE FATAL" ERROR # 44
5941 031600 104455 TRAP C:ERDF
5942 031602 000054 .WORD 44
5943 031604 016204 .WORD EM26A

```


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TEST 8 -- SPECIAL MFG EXTENDED BIT TEST

```

5944 031606 011002                                     .WORD  ERR14
5945 031610                                     ESCAPE  SUB
5946 031610 104410                                     TRAP   C$ESCAPE
5947 031612 000152                                     .WORD  L10047-.
5948
5949 ;***** SETUP/START/CHECK THE NPR OPERATION (DATA/NPRCTL) *****
5950 031614 112737 000004 002417 94:  MOVB  @NPRLD,TMP2+1 ;SETUP CONTROL VALUE TO DO NPR-IN
5951
5952 031622 004537 004042          JSR   R5,WRITE ;PERFORM THE "EXTENDED" DATA-IN NPR
5953 031626 123004          NPRCTL
5954 031630 002417          TMP2+1
5955 031632 004537 003616          JSR   R5,READ ;CHECK THE NPR OPERATION
5956 031636 123004          NPRCTL
5957 031640 002416          TMP2
5958 031642 004537 003616          JSR   R5,READ ;GET THE DATA WE SHOULD HAVE JUST LOADED INTO
5959 031646 123001          NPRDRH ; THE NPR DATA REGISTERS FROM THE
5960 031650 002257          BDATA+1 ; EXTENDED MEMORY AREA
5961 031652 004537 003616          JSR   R5,READ
5962 031656 123000          NPRDRL
5963 031660 002256          BDATA
5964 031662 132737 000300 002416          BITB  #300,TMP2 ;DID IT ABORT OR HANG?
5965 031670 001414          BEQ   144 ; NO: GOOD. PROCEED WITH SUBTEST
5966 031672 100005          BPL   104 ; YES: WHICH ONE?
5967 031674          GEDF  EM27A,ERR12 ;ABORT, REPORT IT AS SUCH.
5968 ; "DEVICE FATAL" ERROR # 45
5969 031674 104455                                     TRAP   C$ERDF
5970 031676 000055                                     .WORD  45
5971 031700 016437                                     .WORD  EM27A
5972 031702 007456                                     .WORD  ERR12
5973 031704 000404
5974 031706          BR   124 ;AND EXIT
5975 104:  GEDF  EM27B,ERR12 ;HANG, REPORT IT AS SUCH.
5976 ; "DEVICE FATAL" ERROR # 46
5976 031706 104455                                     TRAP   C$ERDF
5977 031710 000056                                     .WORD  46
5978 031712 016461                                     .WORD  EM27B
5979 031714 007456                                     .WORD  ERR12
5980 031716          124:  ESCAPE  SUB ; AND EXIT SUBTEST
5981 031716 104410                                     TRAP   C$ESCAPE
5982 031720 000044                                     .WORD  L10047-.
5983
5984 ;***** NOW CHECK DATA READ AGAINST EXPECTED VALUE *****
5985 031722 016437 032524 002254 144:  MOV   XLOC0(R4),GDATA ;SET UP EXPECTED READ VALUE
5986
5987 031730 023737 002256 002254          CMP   BDATA,GDATA ;DID WE READ THE TEST DATA USING THE NPR?
5988 031736 001406          BEQ   154 ;
5989 031740          GEDF  EM27C,ERR12 ; NO: REPORT THE ERROR.
5990 ; "DEVICE FATAL" ERROR # 47
5991 031740 104455                                     TRAP   C$ERDF
5992 031742 000057                                     .WORD  47
5993 031744 016502                                     .WORD  EM27C
5994 031746 007456                                     .WORD  ERR12
5995 031750          ESCAPE  SUB ; AND EXIT FROM SUBTEST
5996 031750 104410                                     TRAP   C$ESCAPE
5997 031752 000012                                     .WORD  L10047-.
5998
5999 031754 005724          154:  TST   (R4)+ ; YES: BUMP INDEX

```

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TEST 8 -- SPECIAL MFG EXTENDED BIT TEST

```

6000 031756 020427 000016          CMP    R4,#14.          ;ARE WE DONE W/ALL EXTENDED LOCATIONS
6001 031762 001220          BNE    3#              ; NO: DO NEXT EXTENDED LOCATION
6002
6003 031764          63#:  ENDSUB          ;YES: END SUBROUTINE
6004 031764
6005 031764 104403          L10047: TRAP    C#SUB
6006
6007
6008
6009
6010
6011
6012 031766          ;-----
6013 031766          ;== SUBTEST #2 : TEST THE NPR-OUT EXTENDED ADDRESS BITS
6014 031766 104402          ;-----
6015 031770 004737 030560          BGNSUB          ;TEST THE NPR-OUT USING EXTENDED ADDR. BITS
6016 031774 005004          T8.2:          TRAP    C#SUB
6017
6018
6019 031776 005002          ;----- MAIN LOOP STARTS HERE -----
6020 032000 012762 125252 032542  T8LP: CLR    R2          ;SETUP EXTENDED MEM BACKGROUND PATTERN
6021 032006 005722          3#:  MOV    #125252,XVAL0(R2) ;(125252 IN XVAL0 => XVAL6)
6022 032010 020227 000016          TST    (R2)+          ; THIS IS DONE FOR ERROR REPORTING
6023 032014 001371          CMP    R2,#14.        ; PURPOSES.
6024
6025          ;* WRITE (USING MMU) XVAL0, XVAL1, XVAL2, ... XVAL6 (IE: 125252) INTO
6026          ;* THE SEVEN SPECIFIC EXTENDED ADDRESSES SPECIFIED BY XLOC0 THRU XLOC6
6027          ;* (XLOC'S SPECIFY THE UPPER TWO BYTES OF THE 3 BYTE EXTENDED ADDR)
6028
6029 032016 005002          CLR    R2          ;CLEAR LOCAL INDEX
6030 032020 016237 032542 002440 11#: MOV    XVAL0(R2),TMPB ;SETUP DATA POINTER
6031 032026 016237 032524 002436          MOV    XLOC0(R2),TMPA ;SETUP/ADJUST PAR VALUE
6032 032034 006337 002436          ASL    TMPA
6033 032040 006337 002436          ASL    TMPA
6034 032044 004537 030700          JSR    R5,XMWRIT     ;WRITE BACKGROUND PATTERN INTO EXTENDED MEMORY
6035 032050 002436          TMPA          ; POINTER TO PAR VALUE
6036 032052 002440          TMPB          ; POINTER TO DATA (DATA = 125252)
6037
6038
6039 032054 005722          TST    (R2)+          ;BUMP INDEX
6040 032056 020227 000016          CMP    R2,#14.        ;ALL 'XLOC' EXTENDED ADDRESSES WRITTEN?
6041 032062 001356          BNE    11#          ; NO: WRITE ANOTHER
6042
6043          ;* WE NOW CHANGE ONE LOCATION IN THE "XVAL" BACKGROUND TABLE.
6044          ;* AFTER OUR DMV NPR OUT, THIS TABLE WILL REPRESENT THE
6045          ;* EXPECTED VALUES OF OUR EXTENDED MEMORY.
6046          MOV    #052525,XVAL0(R4) ;SETUP EXPECTED PATTERN AFTER NPR-OUT
6047          ;XVAL0 => XVAL6 NOW = EXPECTED PATTERN
6048
6049          ;***** SETUP DMV NPR ADDRESSING REGISTERS *****
6050          ;***** (WRITE/READ/VERIFY NPRAOH,NPRAOL,NPRAOX) *****
6051 032072 116437 032525 032126          MOVB   XLOC0+1(R4),5# ;INIT NPRAOX VALUE
6052 032100 004537 004054          JSR    R5,WRITEI     ;POINT NPR REGISTERS TO EXTENDED ADDRESS
6053 032104 000070          NPRAOL
6054 032106 000000          0
6055 032110 004537 004054          JSR    R5,WRITEI
6056 032114 000071          NPRAOH

```


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TEST 8 -- SPECIAL MFG EXTENDED BIT TEST

```

6056 032116 000000
6057 032120 004537 004054
6058 032124 000072
6059 032126 000000
6060 032130 004537 003616
6061 032134 000070
6062 032136 002256
6063 032140 004537 003616
6064 032144 000071
6065 032146 002257
6066 032150 004537 003616
6067 032154 000072
6068 032156 002434
6069
6070 032160 005737 002256
6071 032164 001413
6072 032166 005037 002254
6073 032172 012737 000004 002300
6074 032200 105737 002256
6075 032204 001020
6076 032206 005237 002300
6077 032212 000415
6078 032214 013737 032126 002254 64:
6079 032222 013737 002434 002256
6080 032230 023737 002254 002256
6081 032236 001411
6082 032240 012737 000003 002300
6083 032246
6084
6085 032246 104455
6086 032250 000060
6087 032252 016204
6088 032254 011002
6089 032256
6090 032256 104410
6091 032260 000240
6092
6093
6094 032262 012737 052525 002254 94:
6095
6096
6097 032270 004537 004042
6098 032274 123001
6099 032276 002255
6100 032300 004537 004042
6101 032304 123000
6102 032306 002254
6103
6104
6105 032310 112737 000044 002417
6106
6107 032316 004537 004042
6108 032322 123004
6109 032324 002417
6110 032326 004537 003616
6111 032332 123004

```

```

0
JSR R5,WRITEI
NPRAOX
00
54: JSR R5,READ ;READ BACK THE ADDRESS
NPRAOL
BDATA
JSR R5,READ
NPRAOH
BDATA+1
JSR R5,READ
NPRAOX
TMP9
;***** NOW CHECK THEM *****
TST BDATA ;NPRAOL,NPRAOH=0 ?
BEQ 64 ; YES: TRY CHECKING NPRAOX
CLR GDATA ; NO: REPORT ERROR...
MOV #4,REGNUM
TSTB BDATA
BNE 74
INC REGNUM
BR 74
64: MOV 54,GDATA ;SET UP NPRAOX EXPECTED
MOV TMP9,BDATA ;SET UP NPRAOX READ...
CMP GDATA,BDATA ;DOES NPRAOX=EXPECTED ?
BEQ 94 ; YES: CONTINUE
MOV #3,REGNUM ; NO: REPORT ERROR
GEDF EM26A,ERR14
; "DEVICE FATAL" ERROR # 48
TRAP C$ERDF
WORD 48
WORD EM26A
WORD ERR14
ESCAPE SUB
TRAP C$ESCAPE
WORD L10050-.
;***** SETUP/START/CHECK THE NPR OPERATION (DATA/NPRCTL) *****
94: MOV #052525,GDATA ;DATA DMV WILL NPR TO TOP LOC
;***** LOAD (DMV) TEST PATTERN *****
JSR R5,WRITE ;LOAD UP THE TEST PATTERN TO BE
NPDRH ;WRITTEN INTO EXTENDED MEMORY BY
GDATA+1 ;THE DMV
JSR R5,WRITE
NPDRL
GDATA
;***** PERFORM/CHECK NPR OPERATION (BUT NOT DATA) *****
MOVB #NPDRL,TMP2+1 ;SETUP CONTROL VALUE TO DO NPR-OUT
JSR R5,WRITE ;PERFORM THE "EXTENDED" DATA-OUT NPR
NPRCTL
TMP2+1
JSR R5,READ ;CHECK THE NPR OPERATION
NPRCTL

```


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TEST 8 -- SPECIAL MFG EXTENDED BIT TEST

```

6112 032334 002416          TMP2
6113 032336 132737 000300 002416  BITB    #300,TMP2      ;DID IT ABORT OR HANG?
6114 032344 001414          BEQ     14#          ;NO, GOOD.  PROCEED WITH SUBTEST
6115 032346 100005          BPL     10#          ;YES, WHICH ONE?
6116 032350          GEDF    EM27A,ERR12 ;ABORT, REPORT IT AS SUCH.
6117          ;          "DEVICE FATAL" ERROR # 49
6118 032350 104455          TRAP   C#ERDF
6119 032352 000061          .WORD 49
6120 032354 016437          .WORD EM27A
6121 032356 007456          .WORD ERR12
6122 032360 000404          BR      12#
6123 032362          GEDF    EM27B,ERR12 ;AND EXIT
6124          ;          "DEVICE FATAL" ERROR # 50
6125 032362 104455          TRAP   C#ERDF
6126 032364 000062          .WORD 50
6127 032366 016461          .WORD EM27B
6128 032370 007456          .WORD ERR12
6129 032372          12#:   ESCAPE  SUB      ; AND EXIT SUBTEST
6130 032372 104410          TRAP   C#ESCAPE
6131 032374 000124          .WORD L10050-.
6132
6133          ;***** READ EXTENDED MEM INTO LOCAL RAM (RXVAL0-6) *****
6134 032376 005002          14#:   CLR     R2          ;CLEAR LOCAL INDEX
6135 032400 016237 032524 002436  15#:   MOV     XLOC0(R2),TMPA ;SETUP/ADJUST PAR VALUE
6136 032406 006337 002436          ASL     TMPA
6137 032412 006337 002436          ASL     TMPA
6138 032416 004537 030776          JSR     R5,XMREAD      ;READ EXTENDED MEM BACKGROUND PATTERN
6139 032422 002436          TMPA          ; POINTER TO PAR VALUE
6140 032424 002440          TMPB          ; POINTER TO DATA STORAGE
6141 032426 013762 002440 032560  MOV     TMPB,RXVAL0(R2) ;# SAVE ACTUAL EXTENDED DATA
6142 032434 062702 000002          ADD     #2,R2          ;BUMP INDEX
6143 032440 020227 000016          CMP     R2,#14.        ;ALL 'XLOC' EXTENDED ADDRESSES READ?
6144 032444 001355          BNE     15#          ; NO: READ ANOTHER
6145
6146          ;***** NOW CHECK EXPECTED VS. ACTUAL EXT. MEM VALUES *****
6147 032446 005002          CLR     R2
6148 032450 026262 032560 032542  16#:   CMP     RXVAL0(R2),XVAL0(R2)
6149 032456 001406          BEQ     17#
6150 032460          GEDF    EM60N,ERR60
6151          ;          "DEVICE FATAL" ERROR # 51
6152 032460 104455          TRAP   C#ERDF
6153 032462 000063          .WORD 51
6154 032464 021711          .WORD EM60N
6155 032466 011720          .WORD ERR60
6156 032470          ESCAPE  SUB
6157 032470 104410          TRAP   C#ESCAPE
6158 032472 000026          .WORD L10050-.
6159 032474 005722          17#:   TST     (R2)+
6160 032476 020227 000016          CMP     R2,#14.
6161 032502 001362          BNE     16#
6162
6163          20#:   TST     (R4)+
6164 032504 005724          CMP     R4,#14.
6165 032506 020427 000016          BEQ     63#
6166 032512 001402          JMP     T8LP
6167 032514 000137 031776          ; YES: BUMP INDEX
6167 032520          ; ARE WE DONE W/ALL EXTENDED LOCATIONS
6167          ; YES: END
6167          ; NO: GO DO SOME MORE
6167          63#:   ENDSUB

```

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TEST 8 -- SPECIAL MFG EXTENDED BIT TEST

6168 032520
6169 032520 104403
6170 032522
6171 032522
6172 032522 104401
6173
6174
6175 032524 037400
6176 032526 037000
6177 032530 036400
6178 032532 035400
6179 032534 033400
6180 032536 027400
6181 032540 017400
6182
6183 032542 000000
6184 032544 000000
6185 032546 000000
6186 032550 000000
6187 032552 000000
6188 032554 000000
6189 032556 000000
6190
6191 032560 000000
6192 032562 000000
6193 032564 000000
6194 032566 000000
6195 032570 000000
6196 032572 000000
6197 032574 000000

MFEND: ENDTST

XLOC0: 37400
XLOC1: 37000
XLOC2: 36400
XLOC3: 35400
XLOC4: 33400
XLOC5: 27400
XLOC6: 17400

XVAL0: 0
XVAL1: 0
XVAL2: 0
XVAL3: 0
XVAL4: 0
XVAL5: 0
XVAL6: 0

RXVAL0: 0
RXVAL1: 0
RXVAL2: 0
RXVAL3: 0
RXVAL4: 0
RXVAL5: 0
RXVAL6: 0

;ADDRESS 17600000 POINTER
;ADDRESS 17400000 POINTER
;ADDRESS 17200000 POINTER
;ADDRESS 16600000 POINTER
;ADDRESS 15600000 POINTER
;ADDRESS 13600000 POINTER
;ADDRESS 07600000 POINTER

L10050: TRAP C#ESUB
L10046: TRAP C#ETST

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

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6200
6201
6202
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6249
6250
6251
6252
6253

032576
032576 004737 003514
032602 103003
032604
032604 104460
032606
032606 104432
032610 001272

.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
: JSR PC,MSTCLR ;ISSUE MASTER CLEAR & ENTER MAINT. LOOP T9::
: BCC 1# ;IF NO ERROR, CONTINUE
: ERROR ;ELSE, REPORT IT AND TRAP C#ERROR
: EXIT TST ;EXIT THIS TEST TRAP C#EXIT
: .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

: 1#:
: BGNSUB
: T9.1:
: TRAP C#BSUB
: MOV # -1,INTWCH ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
: CLR INTFLG ;CLEAR BOTH INTERRUPT FLAGS

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

```

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

```


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

```

6366
6367 033130 005037 002272      114:  CLR      INTFLG      ;CLEAR BOTH INTERRUPT FLAGS
6368 033134 112777 000021 147156  MOV     #IENBA,IENBB,BSSELO ;ENABLE BOTH INTERRUPTS
6369 033142 012703 010000      MOV     #4096.,R3          ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
6370 033146 077301                SOB     R3,,              ; BY SITTING HERE FOR A WHILE
6371 033150 105737 002272      TSTB   INTFLG          ;DID AN "A" INTERRUPT OCCUR?
6372 033154 001007                BNE    124             ;YES, GOOD. GO TEST THE "B" INTERRUPT
6373 033156 012737 000007 002254  MOV     #7,GDATA        ;NO, TELL ERROR HANDLER WHAT WE HAD DONE
6374 033164                GEDF   EM35,ERR1       ;REPORT MISSING INTERRUPT ON "ENABLE"
6375                                ; "DEVICE FATAL" ERROR # 58
6376 033164 104455                TRAP   C1ERDF
6377 033166 000072                .WORD 58
6378 033170 016552                .WORD EM35
6379 033172 006212                .WORD ERR1
6380
6381 033174 105737 002273      124:  TSTB   INTFLG+1       ;DID A "B" INTERRUPT OCCUR?
6382 033200 001407                BEQ    134             ;NO, GOOD. NOW TRY HITTING THE "B" INTERRUPT
6383 033202 012737 000010 002254  MOV     #8.,GDATA        ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6384 033210                GEDF   EM34B,ERR1     ;REPORT THE UNEXPECTED INTERRUPT
6385                                ; "DEVICE FATAL" ERROR # 59
6386 033210 104455                TRAP   C1ERDF
6387 033212 000073                .WORD 59
6388 033214 016540                .WORD EM34B
6389 033216 006212                .WORD ERR1
6390
6391 033220                134:  ENDSUB
6392 033220
6393 033220 104403                L10053: TRAP   C1ESUB
6394
6395
6396
6397
6398
6399
6400
6401
6402
6403
6404
6405
6406
6407
6408
6409
6410
6411
6412
6413 033222                BGNSUB
6414 033222
6415 033222 104402                T9.3: TRAP   C1BSUB
6416 033224 012737 177777 002274  MOV     #-1,INTWCH       ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
6417 033232 005037 002272      CLR     INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
6418 033236 112777 000000 147054  MOV     #0,BSSELO       ;DISABLE INTERRUPTS AGAIN
6419 033244 004537 004054      JSR    R5,WRITEI       ;CAUSE AN INTERRUPT PENDING ON "B"
6420 033250 123005                IRQREG
6421 033252 000004                IRQA

```

TEST FOR "B" INTERRUPT WHEN ENABLED

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

BGNSUB

T9.3:

TRAP C1BSUB

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

```

6422 033254 103003          BCC      32#          ;IF AN ERROR OCCURED,
6423 033256                ERROR          ;REPORT IT &
6424 033256 104460                TRAP      C#ERROR
6425 033260                ESCAPE  TST          ; EXIT
6426 033260 104410                TRAP      C#ESCAPE
6427 033262 000620                .WORD    L10051-.
6428
6429 033264 105737 002272      32#:   TSTB     INTFLG          ;DID AN "A" INTERRUPT OCCUR?
6430 033270 001407                BEQ      14#          ;NO, GOOD. GO TEST THE "B" INTERRUPT
6431 033272 012737 000011 002254      MOV      #9.,GDATA    ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6432 033300                GEDF     EM34,ERR1    ;REPORT THE UNEXPECTED INTERRUPT
6433                                ; "DEVICE FATAL" ERROR # 60
6434 033300 104455                TRAP      C#ERDF
6435 033302 000074                .WORD    60
6436 033304 016526                .WORD    EM34
6437 033306 006212                .WORD    ERR1
6438
6439 033310 105737 002273      14#:   TSTB     INTFLG+1    ;DID A "B" INTERRUPT OCCUR?
6440 033314 001407                BEQ      15#          ;NO, GOOD. NOW TRY LETTING ONE THROUGH
6441 033316 012737 000012 002254      MOV      #10.,GDATA   ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6442 033324                GEDF     EM34B,ERR1  ;REPORT THE UNEXPECTED INTERRUPT
6443                                ; "DEVICE FATAL" ERROR # 61
6444 033324 104455                TRAP      C#ERDF
6445 033326 000075                .WORD    61
6446 033330 016540                .WORD    EM34B
6447 033332 006212                .WORD    ERR1
6448
6449 033334 005037 002272      15#:   CLR      INTFLG          ;CLEAR BOTH INTERRUPT FLAGS
6450 033340 112777 000021 146752      MOVB     #IENBA:IENBB,8BSELO ;ENABLE BOTH INTERRUPTS
6451 033346 012703 010000      MOV      #4096.,R3    ;GIVE THE INTERRUPT SOME TIME TO HAPPEN
6452 033352 077301                SOB      R3.,          ; BY SITTING HERE FOR A WHILE
6453 033354 105737 002272      TSTB     INTFLG          ;DID AN "A" INTERRUPT OCCUR?
6454 033360 001407                BEQ      16#          ;NO, GOOD. GO TEST THE "B" INTERRUPT
6455 033362 012737 000013 002254      MOV      #11.,GDATA   ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6456 033370                GEDF     EM34,ERR1    ;REPORT THE UNEXPECTED INTERRUPT
6457                                ; "DEVICE FATAL" ERROR # 62
6458 033370 104455                TRAP      C#ERDF
6459 033372 000076                .WORD    62
6460 033374 016526                .WORD    EM34
6461 033376 006212                .WORD    ERR1
6462
6463 033400 105737 002273      16#:   TSTB     INTFLG+1    ;DID A "B" INTERRUPT OCCUR?
6464 033404 001007                BNE     17#          ;YES, GOOD. NOW TRY HITTING THE "B" INTERRUPT
6465 033406 012737 000014 002254      MOV      #12.,GDATA   ;NO, TELL ERROR HANDLER WHAT WE HAD DONE
6466 033414                GEDF     EM35B,ERR1  ;REPORT MISSING INTERRUPT ON "ENABLE"
6467                                ; "DEVICE FATAL" ERROR # 63
6468 033414 104455                TRAP      C#ERDF
6469 033416 000077                .WORD    63
6470 033420 016573                .WORD    EM35B
6471 033422 006212                .WORD    ERR1
6472
6473 033424                17#:   ENDSUB
6474 033424                L10054:
6475 033424 104403                TRAP      C#ESUB
6476
6477

```

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

```

6478      : TEST FOR "A" INTERRUPT BUT NO "B" WHEN BOTH ENABLED & FORCED
6479      :
6480      : 1. DISABLE BOTH INTERRUPTS
6481      :
6482      : 2. ASSERT BOTH "A" & "B" REQUEST BITS TO 0:
6483      :     FORCING BOTH "A" & "B" (BUT ONLY GETTING "A")
6484      :
6485      : 3. CHECK FOR NO "A" INTERRUPT
6486      :
6487      : 4. CHECK FOR NO "B" INTERRUPT
6488      :
6489      : 5. ENABLE BOTH INTERRUPTS
6490      :
6491      : 6. CHECK FOR "A" INTERRUPT
6492      :
6493      : 7. CHECK FOR NO "B" INTERRUPT
6494      :
6495 033426      BGNSUB
6496 033426
6497 033426 104402
6498 033430 012737 177777 002274      MOV    #1,INTWCH      ;TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
6499 033436 005037 002272      CLR    INTFLG        ;CLEAR BOTH INTERRUPT FLAGS
6500 033442 112777 000000 146650      MOVB  #0,BSSELO     ;DISABLE INTERRUPTS AGAIN
6501 033450 004537 004054      JSR   R5,WRITEI     ;CAUSE AN INTERRUPT PENDING ON BOTH "A" & "B"
6502 033454 123005
6503 033456 000000
6504 033460 103003
6505 033462
6506 033462 104460
6507 033464
6508 033464 104410
6509 033466 000414
6510
6511 033470 105737 002272      314:  TSTB  INTFLG      ;DID AN "A" INTERRUPT OCCUR?
6512 033474 001407      BEQ   104           ;NO, GOOD. GO TEST THE "B" INTERRUPT
6513 033476 012737 000015 002254      MOV   #13.,GDATA   ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6514 033504      GEDF  EM34,ERR1    ;REPORT THE UNEXPECTED INTERRUPT
6515
6516 033504 104455      ; "DEVICE FATAL" ERROR # 64
6517 033506 000100      TRAP  C#ERDF
6518 033510 016526      .WORD 64
6519 033512 006212      .WORD EM34
6520
6521 033514 105737 002273      104:  TSTB  INTFLG+1    ;DID A "B" INTERRUPT OCCUR?
6522 033520 001407      BEQ   114           ;NO, GOOD. NOW TRY LETTING ONE THROUGH
6523 033522 012737 000016 002254      MOV   #14.,GDATA   ;YES, TELL ERROR HANDLER WHAT WE HAD DONE
6524 033530      GEDF  EM34B,ERR1  ;REPORT THE UNEXPECTED INTERRUPT
6525
6526 033530 104455      ; "DEVICE FATAL" ERROR # 65
6527 033532 000101      TRAP  C#ERDF
6528 033534 016540      .WORD 65
6529 033536 006212      .WORD EM34B
6530
6531 033540 005037 002272      114:  CLR   INTFLG        ;CLEAR BOTH INTERRUPT FLAGS
6532 033544 112777 000021 146546      MOVB  #IENBA:IENBB,BSSELO ;ENABLE BOTH INTERRUPTS
6533 033552 012703 010000      MOV   #4096.,R3    ;GIVE THE INTERRUPT SOME TIME TO HAPPEN

```


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

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6534 033556 077301          SOB      R3,,          ; BY SITTING HERE FOR A WHILE
6535 033560 105737 002272    TSTB    INTFLG      ; DID AN "A" INTERRUPT OCCUR?
6536 033564 001007          BNE     12#         ; YES, GOOD. GO TEST THE "B" INTERRUPT
6537 033566 012737 000017 002254 MOV     #15.,GDATA ; NO, TELL ERROR HANDLER WHAT WE HAD DONE
6538 033574          GEDF    EM35,ERR1 ; REPORT MISSING INTERRUPT ON "ENABLE"
6539          ;          "DEVICE FATAL" ERROR # 66
6540 033574 104455          TRAP    C#ERDF
6541 033576 000102          .WORD  66
6542 033600 016552          .WORD  EM35
6543 033602 006212          .WORD  ERR1
6544
6545 033604 105737 002273    12#:   TSTB    INTFLG+1 ; DID A "B" INTERRUPT OCCUR?
6546 033610 001407          BEQ     13#         ; NO, GOOD. NOW TRY HITTING THE "B" INTERRUPT
6547 033612 012737 000020 002254 MOV     #16.,GDATA ; YES, TELL ERROR HANDLER WHAT WE HAD DONE
6548 033620          GEDF    EM34B,ERR1 ; REPORT THE UNEXPECTED INTERRUPT
6549          ;          "DEVICE FATAL" ERROR # 67
6550 033620 104455          TRAP    C#ERDF
6551 033622 000103          .WORD  67
6552 033624 016540          .WORD  EM34B
6553 033626 006212          .WORD  ERR1
6554
6555 033630          13#:   ENDSUB
6556 033630          L10055:
6557 033630 104403          TRAP    C#ESUB
6558
6559
6560          ;-----
6561          ; TEST FOR "A" INTERRUPT WHILE ENABLED
6562          ;
6563          ; 1. ENABLE BOTH INTERRUPTS
6564          ;
6565          ; 2. ASSERT "B" REQUEST BIT TO 1:
6566          ;     DISABLING "B" & FORCING "A"
6567          ;
6568          ; 3. CHECK FOR "A" INTERRUPT
6569          ;
6570          ; 4. CHECK FOR NO "B" INTERRUPT
6571          ;
6572          ; BGNSUB
6573          ;
6574          ; T9.5:
6575          ; TRAP    C#BSUB
6576          ;
6577          ; MOV     # -1,INTWCH ; TELL BOTH HANDLERS TO "WATCH" FOR INTERRUPTS
6578          ; CLR     INTFLG      ; CLEAR BOTH INTERRUPT FLAGS
6579          ; MOVB   #IENBA!IENBB,BSSELO ; ENABLE BOTH INTERRUPTS
6580          ; JSR    R5,WRITEI   ; CAUSE AN INTERRUPT PENDING ON "A"
6581          ;          ; BUT NOT ON "B"
6582          ;
6583          ; IRQREG
6584          ; IRQB
6585          ; BCC    31#         ; IF AN ERROR OCCURED,
6586          ; ERROR          ; REPORT IT &
6587          ;
6588          ; ESCAPE TST          ; QUIT
6589          ; TRAP    C#ERROR
6590          ; TRAP    C#ESCAPE
6591          ; .WORD  L10051-.
6592
6593          ;
6594          ; 31#:
6595          ; MOV     #4096.,R3   ; GIVE THE INTERRUPT SOME TIME TO HAPPEN
6596          ; SOB      R3,,          ; BY SITTING HERE FOR A WHILE
6597          ; TSTB    INTFLG      ; DID AN "A" INTERRUPT OCCUR?

```


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

```

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

```

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

```

6646 034040          GEDF  EM34,ERR1      ;REPORT THE UNEXPECTED INTERRUPT
6647                                     ; "DEVICE FATAL" ERROR # 70
6648 034040 104455                                     TRAP  C#ERDF
6649 034042 000106                                     .WORD 70
6650 034044 016526                                     .WORD EM34
6651 034046 006212                                     .WORD ERR1
6652
6653 034050 105737 002273      16#:  TSTB  INTFLG+1      ;DID A "B" INTERRUPT OCCUR?
6654 034054 001007                                     BNE   17#
6655 034056 012737 000026 002254      MOV   #22.,GDATA
6656 034064          GEDF  EM35B,ERR1      ;NO, TELL ERROR HANDLER WHAT WE HAD DONE
6657                                     ;REPORT MISSING INTERRUPT ON "ENABLE"
6658                                     ; "DEVICE FATAL" ERROR # 71
6658 034064 104455                                     TRAP  C#ERDF
6659 034066 000107                                     .WORD 71
6660 034070 016573                                     .WORD EM35B
6661 034072 006212                                     .WORD ERR1
6662
6663 034074          17#:  ENDSUB
6664 034074          L10057:
6665 034074 104403          TRAP  C#ESUB
6666
6667 034076 005037 002274      CLR   INTWCH      ;TELL HANDLERS TO STOP WATCHING FOR INTERRUPTS
6668 034102          ENDTST
6669 034102          L10051:
6670 034102 104401          TRAP  C#ETST
    
```

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TEST 10 -- BUS RESET WITH DISABLE INIT SET

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6721

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

```
*****
;*
;* TEST 10 -- BUS RESET WITH DISABLE INIT SET
;*
;* A BYTE SELECT REGISTER (BSEL3) IS LOADED WITH 377, DISABLE INIT BIT IS SET
;* IN THE NPR CONTROL REGISTER, AND A BUS RESET INSTRUCTION IS EXECUTED. THE
;* PROGRAM THEN CHECKS THAT THE DMV-11 WAS NOT CLEARED, BY CHECKING FOR 377
;* STILL IN BSEL3
;*
;-----*****
```

```

;
;       BGNTST
;
;                                     T10::
;       BIT      #BIT0,PFLAG      ;IF BUS RESETS ARE NOT ALLOWED,
;       BNE      10#              ; BYPASS THIS TEST
;                                     ;ELSE,
;       JSR      PC,MSTCLR        ;INIT DMV & START UP THE MAINT. LOOP
;       BCC      1#              ;IF AN ERROR OCCURED,
;       ERROR    ;REPORT IT &
;                                     TRAP      C#ERROR
;       ESCAPE   TST              ; EXIT
;                                     TRAP      C#ESCAPE
;                                     .WORD    L10060-
;
;       1#:     JSR      R5,WRITEI  ;NOW SET "DISABLE INIT"
;       NPRCTL  DMVDAI!DMVPU!NPRGO
;
;       ;THE "NPRGO" BIT IS SET BECAUSE ASSERTING IT
;       ;TO A ZERO WOULD KICK OFF AN NPR OPERATION!
;       ;THE "DMVPU" BIT MUST ALWAYS BE SET WHENEVER
;       ;THE NPR-CONTROL REGISTER IS LOADED.
;
;       MOVB    #377,BSEL3        ;THIS REGISTER WILL ONLY GET ALTERED IF THE
;       ;DMV-11 IS SUCCESSFULLY RESET; THE "DMVPU"
;       ;BIT WILL BE CLEARED, THE MICRO-DIAGNOSTIC
;       ;WILL BE STARTED, AND FINDING "DMVPU" CLEARED.
;       ;IT WILL CLEAR ALL BSEL REGISTERS (INCLUDING
;       ;BSEL3) AND PERFORM THE 17 TESTS IS CONTAINS.
;       ;OF COURSE, IF THIS ALL HAPPENS, THAN THIS
;       ;TEST WILL HAVE FAILED!
;
;       BRESET
;       ;THE "SUPERVISOR" WILL DO A BUS RESET FOR US
;                                     TRAP      C#RESET
;       MOV     #4096.,R3         ;DELAY FOR A BIT SO THE MICRO-DIAG. CAN DO
;       SOB     R3,.              ;ITS THING IF IT'S GOING TO
;       CMPB   #377,BSEL3        ;IF A FAILURE OCCURED, THIS SHOULD HAVE BEEN
;       BEQ    10#              ;ALTERED BY NOW. IF NOT, ALL'S WELL -- EXIT
;       GEDF   EM40,ERR1         ;ELSE, "DISABL INIT" DIDN'T STOP "BUS RESET"
;
;       "DEVICE FATAL" ERROR # 72
```


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TEST 10 -- BUS RESET WITH DISABLE INIT SET

6722 034166 104455
6723 034170 000110
6724 034172 016614
6725 034174 006212
6726
6727 034176
6728 034176
6729 034176 104401

104: ENDTST

TRAP C#ERDF
.WORD 72
.WORD EM40
.WORD ERR1

L10060:
TRAP C#ETST

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 TEST 11 -- MASTER CLEAR WITH DISABLE INIT SET

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 6745 034200
 6746 034200 004737 003514
 6747 034204 103003
 6748 034206
 6749 034206 104460
 6750 034210
 6751 034210 104410
 6752 034212 000030
 6753 034214 004537 004054
 6754 034220 123004
 6755 034222 000105
 6756
 6757
 6758
 6759
 6760
 6761 034224 004737 003514
 6762 034230 103004
 6763 034232
 6764
 6765 034232 104455
 6766 034234 000111
 6767 034236 016671
 6768 034240 006212
 6769 034242
 6770 034242
 6771 034242 104401

```
.SBTTL TEST 11 -- MASTER CLEAR WITH DISABLE INIT SET
;*****
;*
;* TEST 11 -- MASTER CLEAR WITH DISABLE INIT SET
;*
;* THE "DISABL INIT" BIT IN THE NPR CONTROL REGISTER IS SET AND A MASTER CLEAR
;* IS ISSUED. IF THE MASTER CLEAR SUBROUTINE DETECTS AN ERROR, THE MASTER
;* CLEAR WILL NOT HAVE FUNCTIONED PROPERLY. WHERE THE NORMAL ERROR MESSAGE
;* (QUEUED UP BY "MASCLR") IS NORMALLY PRINTED, THIS TEST WILL PRINT ITS OWN
;* INSTEAD.
;*
;-----*****
;
; BGNTST
;
;                               T11::
; JSR PC,MSTCLR ;INIT DMV & START UP THE MAINT. LOOP
; BCC 1# ;IF AN ERROR OCCURED,
; ERROR ;REPORT IT &
;                               TRAP C$ERROR
; ESCAPE TST ; EXIT
;                               TRAP C$ESCAPE
;                               .WORD L10061-.
; 1#: JSR R5,WRITEI ;NOW SET "DISABLE INIT"
; NPRCTL
; DMVDAI!DMVPU!NPRGO
;
; THE "NPRGO" BIT IS SET BECAUSE ASSERTING IT
; TO A ZERO WOULD KICK OFF AN NPR OPERATION!
; THE "DMVPU" BIT MUST ALWAYS BE SET WHENEVER
; THE NPR-CONTROL REGISTER IS LOADED.
;
; JSR PC,MSTCLR ;INIT THE DMV & RESTART THE M-LOOP
; BCC 2# ;IF AN ERROR OCCURED, IGNORE QUEUED ERROR AND
; GEDF EM41,ERR1 ;REPORT THAT "DISABL INIT" STOPPED MASTER CLEAR
; ; "DEVICE FATAL" ERROR # 73
;                               TRAP C$ERDF
;                               .WORD 73
;                               .WORD EM41
;                               .WORD ERR1
; 2#: ENDTST
;
;                               L10061:
;                               TRAP C$ETST
```

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TEST 12 -- DCOK H LO BIT

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.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

```

; DCOKTS = $T ;DEFINE TEST # FOR "INIT" SECTION
; BIT @PU24,PT.CTL ;IS POWER-UP STRAPPED FOR OPTION 0?
; BNE 1$ ;YES, THEN WE CAN DO THIS TEST
; EXIT TST ;NO, WE CAN'T DO THIS TEST UNLESS IT IS!
; TRAP C$EXIT
; .WORD L10062-.

1$: BIT @BIT0,PFLAG ;IF BUS RESETS ARE ALLOWED.
; BEQ 2$ ; PERFORM THIS TEST
; EXIT TST ;ELSE, BYPASS IT
; TRAP C$EXIT
; .WORD L10062-.

2$: DELAY 40. ;DELAY TO PREVENT TST # ROACHING
; MOV @40..(PC)+
; .WORD 0
; MOV L$DLY,(PC)+
; .WORD 0
; DEC -6(PC)
; BNE -.4
; DEC -22(PC)
; BNE .-20

```

; SUBTEST #1: DCOK H LO (RESET DMV)

BGNSUB

; <====> TEST FOR POWER-DOWN/UP & DMV-11 RESET

```

; T12.1:
; JSR PC,MSTCLR ;INIT DMV & START UP THE MAINT. LOOP TRAP C$BSUB
; BCC 3$ ;IF AN ERROR OCCURED,
; ERROR ;REPORT IT &
; TRAP C$ERROR
; ESCAPE SUB ; EXIT
; TRAP C$ESCAPE
; .WORD L10063-.

```


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TEST 12 -- DCOK H LO BIT

```

6828 034342          34:  SETVEC  #24,#54,#7      ;SETUP VECTOR FOR POWER FAIL INTERRUPT HANDLER
6829 034342 012746 000007          MOV      #7,-(SP)
6830 034346 012746 034450          MOV      #54,-(SP)
6831 034352 012746 000024          MOV      #24,-(SP)
6832 034356 012746 000003          MOV      #3,-(SP)
6833 034362 104437          TRAP    C#SVEC
6834 034364 062706 000010          ADD     #10,SP
6835 034370 112737 177777 002274  MOVB    #-1,INTWCH      ;EXPECT AN "A" INTERRUPT (IF "DCOK" FAILS!)
6836 034376 105037 002272          CLR     INTFLG         ;CLEAR THE FLAG IN CASE WE WANT TO DETECT IT
6837 034402 152777 000001 145710  BISB    #IENBA,#BSELO  ;NOW ENABLE "A" INTERRUPTS
6838
6839 034410 010637 002454          MOV     SP,OLDSP      ;SAVE THE STACK POINTER
6840
6841          ;
6842          ;
6843          ;
6844 034414 012777 177506 145712  MOV     #177400!LSIDCL!DMVPU!NPRGO,#SEL6 ;VALUE TO BE LOADED INTO
6845 034422 012777 123004 145700  MOV     #NPRCTL,#SEL4  ;THE NPR CONTROL REGISTER
6846 034430 112777 000042 145666  MOVB    #MRILOC!<IRQA#8.>,#SEL2 ;TELL M-LOOP TO WRITE IT & INTERRUPT
6847          ;US JUST BEFORE REQUESTING ANOTHER
6848          ;M-LOOP COMMAND.
6849
6850          ;
6851          ;
6852          ;
6853          ;
6854          ;
6855          ;
6856          ;
6857 034436 000001          44:  WAIT          ;HANG HERE UNTIL INTERRUPTED
6858
6859          ;
6860          ;
6861          ;
6862          ;
6863          ;
6864          ;
6865 034440          GEDF    EM42A,ERR1    ;REPORT MISSING POWER-UP
6866          ;          "DEVICE FATAL" ERROR # 74
6867 034440 104455          TRAP    C#ERDF
6868 034442 000112          .WORD  74
6869 034444 016746          .WORD  EM42A
6870 034446 006212          .WORD  ERR1
6871
6872 034450          54:
6873
6874          ;
6875          ;
6876          ;
6877          ;
6878          ;
6879          ;
6880          ;
6881          ;
6882          ;
6883          ;

```

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

BUT FIRST!

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

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TEST 12 -- DCOK H LO BIT

```

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

```


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TEST 12 -- DCOK W LO BIT

```

6940 034576 000154
6941 034600
6942 034600 012746 000007
6943 034604 012746 034702
6944 034610 012746 000024
6945 034614 012746 000003
6946 034620 104437
6947 034622 062706 000010
6948 034626 010637 002454
6949
6950 034632 004537 004166
6951 034636 034756
6952 034640 000040
6953
6954 034642 112777 000377 145464
6955
6956 034650 012777 000077 145452
6957 034656 012777 000005 145440
6958
6959
6960
6961 034664 012703 010000
6962 034670 077301
6963
6964
6965
6966 034672
6967
6968 034672 104455
6969 034674 000114
6970 034676 016746
6971 034700 006212
6972
6973
6974
6975 034702 013706 002454
6976 034706
6977 034706 012700 000024
6978 034712 104436
6979 034714
6980 034714 012700 000000
6981 034720 104441
6982 034722 122777 000377 145404
6983 034730 001404
6984 034732
6985
6986 034732 104455
6987 034734 000115
6988 034736 017074
6989 034740 006212
6990
6991 034742 004737 003346
6992 034746 103001
6993 034750
6994 034750 104460
6995 034752

20:  SETVEC  #24,#56,#7      ;SETUP VECTOR FOR POWER FAIL INTERRUPT HANDLER
                                .WORD  L10064-.
                                MOV     #7,-(SP)
                                MOV     #56,-(SP)
                                MOV     #24,-(SP)
                                MOV     #3,-(SP)
                                TRAP    C#SVEC
                                ADD     #10,SP

                                MOV     SP,OLDSP      ;SAVE THE STACK POINTER

                                JSR     R5,MOVLTD     ;MOVE THE MICRO CODE INTO THE DMV
                                ;         THIS IS WHERE IT STARTS
                                EPCODE-SMCODE       ;         THIS IS ITS SIZE IN BYTES

                                MOVB    #377,BSEL6    ;WRITE ALL 1'S TO BSEL6

                                MOV     #77,BSEL4     ;START ADDRESS OF MICROCODE
                                MOV     #EXECUT,BSEL2  ;INITIATE M-CODE

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

                                MOV     #4096.,R3    ;STALL FOR A BIT (UCODE SHOULD HALT US HERE)
                                SOB     R3,,

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

                                GEDF    EM42A,ERR1   ;REPORT MISSING POWER-UP
                                ;         "DEVICE FATAL" ERROR # 76
                                TRAP    C#ERDF
                                .WORD   76
                                .WORD   EM42A
                                .WORD   ERR1

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

56:  MOV     OLDSP,SP      ;RESTORE THE STACK
                                CLRVEC #24        ;RETURN THE VECTOR TO THE SUPERVISOR
                                MOV     #24,R0
                                TRAP    C#CVEC

                                SETPRI #0         ;MAKE SURE WE'RE BACK RUNNING AT 0 AGAIN!
                                MOV     #0,R0
                                TRAP    C#SPRI

                                CMPB    #377,BSEL6   ;THIS REGISTER SHOULD NOT HAVE BEEN CLEARED
                                BEQ     106         ;IT ISN'T, ALL IS OK -- EXIT SUBTEST
                                GEDF    EM42C,ERR1   ;IT IS, THEN REPORT THE FAILURE
                                ;         "DEVICE FATAL" ERROR # 77
                                TRAP    C#ERDF
                                .WORD   77
                                .WORD   EM42C
                                .WORD   ERR1

106: JSR     PC,MASCLR     ;* AT THIS POINT "DINIT" IS STILL SET *
                                BCC     110         ;MAKE SURE THE DMV IS PROPERLY RESET!
                                ERROR  110         ;EVERYTHING OK, EXIT SUBR AND TEST.
                                ;REPORT MASCLR ERROR
                                TRAP    C#ERROR

110:

```


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TEST 12 -- DCOK H LO BIT

6996 034752
6997 034752
6998 034752 104403
6999 034754
7000 034754
7001 034754 104401

ENDSUB

ENDTST

L10064: TRAP C#ESUB

L10062: TRAP C#ETST

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SUBTEST 2'S M-CODE -- COMPLETE

```

7002          .SBTTL  SUBTEST 2'S M-CODE -- COMPLETE
7003          ;-----
7004          ; 6502 MICROCODE FOR TEST #11/ SUBTEST #2
7005          ;-----
7006          SMCODE:
7007          .BYTE 251,125      ;A9 55      LDA #GOBSY1!HALT!PWRUP!DINIT
7008          .BYTE 215,4,246   ;8D 04 A6 STA NPRCTL      :SET DISABLE INIT/HALT
7009          .BYTE 251,105     ;A9 45     LDA #GOBSY1!PWRUP!DINIT
7010          .BYTE 215,4,246   ;8D 04 A6 STA NPRCTL      :CLEAR HALT
7011          .BYTE 352         ;EA       NOP             :WAIT A WHILE
7012          .BYTE 352         ;EA       NOP
7013          .BYTE 352         ;EA       NOP
7014          .BYTE 251,107     ;A9 47     LDA #GOBSY1!PWRUP!SDCOK!DINIT
7015          .BYTE 215,4,246   ;8D 04 A6 STA NPRCTL      :SET DCOK
7016          .BYTE 251,105     ;A9 45     LDA #GOBSY1!PWRUP!DINIT
7017          .BYTE 215,4,246   ;8D 04 A6 STA NPRCTL      :CLEAR DCOK
7018          .BYTE 251,3       ;A9 03     LDA #103        :DELAY FOR 16.8 USEC
7019          .BYTE 205,0       ;85 00     STA SPO         :BUS INIT IS 10 USEC
7020          .BYTE 306,0       ;C6 00 54 :DEC SPO        :
7021          .BYTE 320,374     ;D0 FC     BNE 54          :
7022          .BYTE 140         ;60       RTS           :RETURN TO M-LOOP
7023          .EVEN
7024          EMCODE:
7025          ;-----

```


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TEST 13 -- HALT MODE VERIFICATION

```

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

```

WAIT FOR BSEL7 TO CLEAR. THEN DROP
"DISABLE INIT" AND EXIT TO M-LOOP.

DMV-11'S OPERATIONS:

CLEAR BSEL7 AND WAIT FOR IT TO GO
NON-ZERO AGAIN PUTTING BOTH
PROCESSORS IN SYNC. WITH EACH
OTHER

SET HALT, "DCOK H LO", & "DISABL
INIT" AND PERFORM 2 NOP'S AS A
1 MICROSECOND DELAY

CLEAR "DCOK H LO", SET "HALT" &
"DISABL INIT"

NPR-OUT THE FOLLOWING:

LOC:	CONTENTS
24	000000 VECTOR TO LOC 0
26	000340 8 PRIORITY 7
0	012700 MOV #-1,R0
2	177777

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TEST 13 -- HALT MODE VERIFICATION

```

7194      ;      BGNTST
7195 035016
7196      000015
7197 035016 032737 000001 002370 HLTEST = $T      ;DEFINE TEST # FOR "INIT" SECTION
7198 035024 001002                                BIT      #PU24,PT.CTL ;IS POWER-UP STRAPPED FOR OPTION 0?
7199 035026                                BNE      5#          ;YES, THEN WE CAN DO THIS TEST
7200 035026 104432                                EXIT     TST         ;NO, WE CAN'T DO THIS TEST UNLESS IT IS!
7201 035030 000772                                TRAP    C#EXIT
7202                                .WORD   L10065-.
7203 035032 032737 000001 002316 5#:  BIT      #BIT0,PFLAG ;IF BUS RESETS ARE ALLOWED,
7204 035040 001402                                BEQ     2#          ; PERFORM THIS TEST
7205 035042                                EXIT     TST         ;ELSE, BYPASS IT
7206 035042 104432                                TRAP    C#EXIT
7207 035044 000756                                .WORD   L10065-.
7208
7209                                2#:  DELAY  40.      ;DELAY TO PREVENT TST # ROACHING
7210 035046 012727 000050                                MOV     #40.,(PC)+
7211 035052 000000                                .WORD   0
7212 035054 013727 002116                                MOV     L#DLY,(PC)+
7213 035060 000000                                .WORD   0
7214 035062 005367 177772                                DEC     -6(PC)
7215 035066 001375                                BNE     -.4
7216 035070 005367 177756                                DEC     -22(PC)
7217 035074 001367                                BNE     .-20
7218
7219 035076      ;-----
7220 035076      1#:  BGNSUB                                T13.1:
7221 035076 104402                                TRAP    C#BSUB
7222 035100 004737 003514      JSR     PC,MSTCLR ;RESET DMV & ENTER M-LOOP
7223 035104 103003      BCC     2#          ;IF NO ERROR HERE, CONTINUE
7224 035106      ERROR                                ;ELSE, REPORT THE ERROR
7225 035106 104460                                TRAP    C#ERROR
7226 035110      ESCAPE TST                                ; & EXIT THE TEST
7227 035110 104410                                TRAP    C#ESCAPE
7228 035112 000710                                .WORD   L10065-.
7229 035114
7230 035114 004537 004166      2#:  JSR     R5,MOVLTD ;MOVE THE MICRO CODE INTO THE DMV
7231 035120 036024      MC1      ; THIS IS WHERE IT STARTS
7232 035122 000114      MC2-MC1 ; THIS IS ITS SIZE IN BYTES
7233
7234 035124 005037 002412      CLR     TMP0      ;INITIALIZE THE COUNTER
7235 035130      SETVEC #24,#24#,#7 ;SETUP POWER-UP VECTOR
7236 035130 012746 000007                                MOV     #7,-(SP)
7237 035134 012746 035304                                MOV     #24#,-(SP)
7238 035140 012746 000024                                MOV     #24,-(SP)
7239 035144 012746 000003                                MOV     #3,-(SP)
7240 035150 104437                                TRAP    C#SVEC
7241 035152 062706 000010                                ADD     #10,SP
7242 035156 012777 000077 145144      MOV     #77,#SEL4 ;START ADDRESS OF MICROCODE
7243 035164 112777 177777 145144      MOV     #-1,#SEL7 ;SET FLAG (#SEL7)
7244 035172 012777 000005 145124      MOV     #EXECUT,#SEL2 ;INITIATE M-CODE
7245
7246 035200 005002
7247 035202 105777 145130      3#:  CLR     R2
7248 035206 001405      TSTB  #SEL7 ;WAIT FOR FLAG TO BE CLEARED
7249 035210 077204      BEQ     5#
      SOB   R2,3#

```


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TEST 13 -- HALT MODE VERIFICATION

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

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TEST 13 -- HALT MODE VERIFICATION

```

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

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TEST 13 -- HALT MODE VERIFICATION

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

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 SUBTEST 1'S M-CODE -- ASSIGNMENTS

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

```

;*****
; MICRO-CODE FOR SUBROUTINE # 1
;*****
    
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7458
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 7460
 7461
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 7463
 7464 036024
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```

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 =#01
;0006 0000 BIT1 =#02
;0007 0000 BIT2 =#04
;0008 0000 BIT4 =#020
;0009 0000 BIT5 =#040
;0010 0000 BIT6 =#0100
;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
    
```

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SUBTEST 1'S M-CODE -- ASSIGNMENTS

```

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


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SUBTEST 1'S M-CODE -- ROUTINE

7570						:0075 0065 70 FB	BVS	NPRWAT	
7571	036074	352				.BYTE 352			
7572						:0075 0067 EA	NOP		; SHOULD COMPLETE HERE
7573						:0076 0068			
7574	036075	255	000	246		.BYTE 255,0,246			
7575						:0077 0068 AD 00 A6	LDA	NPRDIL	; MOVE THE WORD JUST READ INTO
7576	036100	205	024			.BYTE 205,24			
7577						:0078 0068 85 14	STA	BSEL4	; SEL4
7578	036102	255	001	246		.BYTE 255,1,246			
7579						:0079 006D AD 01 A6	LDA	NPRDIH	
7580	036105	205	025			.BYTE 205,25			
7581						:0080 0070 85 15	STA	BSEL5	
7582						:0088 0072			
7583						:0089 0072			; DROP "HALT" AND SET "DCOK H LO" & "DISABL INIT"
7584						:0090 0072			
7585	036107	251	125			.BYTE 251,125			
7586						:0091 0072 A9 55	LDA	@NONPR!PWRUP!DISINI!HALT	
7587	036111	215	004	246		.BYTE 215,4,246			
7588						:0092 0074 8D 04 A6	STA	NPCRTL	
7589	036114	251	107			.BYTE 251,107			
7590						:0093 0077 A9 47	LDA	@NONPR!PWRUP!SDCLOW!DISINI	
7591	036116	215	004	246		.BYTE 215,4,246			
7592						:0094 0079 8D 04 A6	STA	NPRCTL	
7593						:0095 007C			
7594						:0096 007C			; NOW LET THE 11 CPU GO THROUGH THE POWER-UP SEQUENCE
7595						:0097 007C			
7596	036121	251	105			.BYTE 251,105			
7597						:0098 007C A9 45	LDA	@NONPR!PWRUP!DISINI	
7598	036123	215	004	246		.BYTE 215,4,246			
7599						:0099 007E 8D 04 A6	STA	NPRCTL	
7600						:0100 0081			
7601						:0101 0081			; WHEN BSEL7 IS CLEARED, CLEAR "DISABL INIT"
7602						:0102 0081			
7603	036126	245	027			.BYTE 245,27			
7604						:0103 0081 A5 17	WAIT2 LDA	BSEL7	
7605	036130	320	374			.BYTE 320,374			
7606						:0104 0083 D0 FC	BNE	WAIT2	
7607						:0105 0085			
7608	036132	251	104			.BYTE 251,104			
7609						:0106 0085 A9 44	LDA	@NONPR!PWRUP	
7610	036134	215	004	246		.BYTE 215,4,246			
7611						:0107 0087 8D 04 A6	STA	NPRCTL	
7612						:0108 008A			
7613						:0109 008A			; USE A STANDARD SUBROUTINE RETURN TO GET BACK INTO
7614						:0110 008A			; THE MAINTENANCE LOOP
7615						:0111 008A			
7616	036137	140				.BYTE 140			
7617						:0112 008A 60	RTS		
7618						:0113 0088			
7619									
7620									
7621						; ERRORS = 0000			
7622						.SBTTL SUBTEST 1'S M-CODE -- SYMBOL TABLE			
7623						; BIT0 0001 BIT1 0002 BIT2 0004 BIT4 0010			
7624									
7625									

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 SUBTEST 1'S M-CODE -- SYMBOL TABLE

7626	:	BITS	0020	BIT6	0040	BSEL4	0014	BSEL5	0015
7627	:	BSEL7	0017	DELAY	006E	DISINI	0001	HALT	0010
7628	:	INOUT	0020	NONPR	0040	NPRAIH	003D	NPRAIL	003C
7629	:	NPRAIX	003E	NPRCTL	A604	NPRDIH	A601	NPRDIL	A600
7630	:	NPRRED	0004	NPRMAT	005D	PWRUP	0004	SDCLOW	0002
7631	:	STARAM	003F	WAIT1	0043	WAIT2	0078		

END OF ASSEMBLY(V6A)
 SYMBOLS LEFT = 1473 OUT OF 1500

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

7637	:	BIT0		50		37			
7638	:	BIT1	60	36					
7639	:	BIT2	70	35					
7640	:	BIT4	80	34					
7641	:	BIT5	90	33					
7642	:	BIT6	100	32					
7643	:	BSEL4	140	58		78			
7644	:	BSEL5	150	60		80			
7645	:	BSEL7	160	15		16	51	53	100
7646	:	DELAY	860	87					
7647	:	DISINI	370	91		96			
7648	:	HALT		340		63	71		
7649	:	INOUT	330						
7650	:	NONPR	320	63		91	96	103	
7651	:	NPRAIH	210	61					
7652	:	NPRAIL	200	21		22	59		
7653	:	NPRAIX	220	70					
7654	:	NPRCTL	310	64		72	74	92	104
7655	:	NPRDIH	270	79					
7656	:	NPRDIL	260	27		77			
7657	:	NPRRED	410	71					
7658	:	NPRMAT	740	75					
7659	:	PWRUP	350	41		63	91	96	103
7660	:	SDCLOW	360	91					
7661	:	STARAM	450	48					
7662	:	WAIT1	530	54					
7663	:	WAIT2	1000	101					

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

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7708
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7710

036140 000010

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

.....
; MICRO-CODE FOR SUBROUTINE # 2
;.....

.RADIX 8.
MC2:

;LINE# LOC CODE LINE
;0002 0000 **10000

;0003 0000
;0004 0000 ;EQUATES FOR BIT DEFINITIONS

;0005 0000 BIT0 =81
;0006 0000 BIT1 =82
;0007 0000 BIT2 =84
;0008 0000 BIT4 =820
;0009 0000 BIT6 =8100

;0010 0000
;0011 0000
;0012 0000 ;ADDRESS EQUATES FOR CSR REGISTERS
;0013 0000 BSEL7 =817

;0014 0000
;0015 0000
;0016 0000 ;NPR ADDRESS REGISTER EQUATES
;0017 0000 NPRACL = 80038 ;OUT NPR ADRS LO REG
;0018 0000 NPRACH = NPRACL+1 ;OUT NPR ADRS HI REG
;0019 0000 NPRAOX = NPRACL+2 ;OUT NPR EXTENDED ADRS REG
;0020 0000

;0021 0000
;0022 0000 ;NPR DATA REG EQUATES
;0023 0000 NPRDOL = 8A600 ;OUT NPR DATA I.O REG
;0024 0000 NPRDOH = NPRDOL+1 ;OUT NPR DATA HI REG
;0025 0000

;0026 0000
;0027 0000 ;NPR CONTROL REG EQUATES
;0028 0000 NPRCTL = 8A604 ;NPR CONTROL REGISTER
;0029 0000 NONPR = BIT6 ;USED TO PREVENT AN NPR
;0030 0000 HALT = BIT4 ;SET DURING MOP MODE ONLY
;0031 0000 PWRUP = BIT2 ;CLEARED BY BUS INIT
;0032 0000 SDCLW = BIT1 ;SET TO 1 TO RESET LSI-11 FOR MOP BOOT
;0033 0000 DISINI = BIT0 ;SET TO 1 TO DISABLE BUS INIT TO 6502

;0034 0000
;0035 0000
;0036 0000 ;MISCELLANEOUS EQUATES
;0037 0000 STARAM = 8003F ;STARTING ADRS OF GEN'L PURPOSE RAM
;0038 0000

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SUBTEST 2'S M-CODE -- ROUTINE

```

7711 .SBTTL SUBTEST 2'S M-CODE -- ROUTINE
7712 ;0039 0000
7713 ;004C 0000      **STARAM      ;START OF MICROCODE IN RAM
7714 036140 251 000 .BYTE 251,000
7715 ;0042 003F A9 00      LDA #0      ;CLEAR BSEL7
7716 036142 205 027 .BYTE 205,027
7717 ;0043 0041 85 17      STA BSEL7
7718 ;0044 0043
7719 036144 245 027 .BYTE 245,027
7720 ;0045 0043 A5 17      WAIT1 LDA BSEL7 ;WAIT FOR IT TO GO <> 0
7721 036146 360 374 .BYTE 360,374
7722 ;0046 0045 F0 FC      BEQ WAIT1
7723 ;0047 0047
7724 ;0048 0047      ; WE SHOULD NOW BE IN SYNC WITH THE 11 PROCESSOR
7725 ;0049 0047
7726 ;0050 0047
7727 ;0051 0047
7728 ;0052 0047      ; THE NEXT SEQUENCE WILL SEND THE 11 CPU THROUGH
7729 ;0053 0047      ; A POWER-UP SEQUENCE AND RESET EVERYTHING ELSE ON THE
7730 ;0054 0047      ; Q-BUS. WE HAVE PREVENTED OURSELVES FROM BEING RESET
7731 036150 251 125 .BYTE 251,125      ; BY SETTING "DISABL INIT".
7732 ;0054 0047 A9 55      LDA #NONPR!HALT!PWRUP!DISINI
7733 036152 215 004 246 .BYTE 215,004,246
7734 ;0054 0049 8D 04 A6      STA NPRCTL
7735 ;0054 004C
7736 ;0054 004C      ; DELAY TO ALLOW "HALT" TO TAKE EFFECT (ABOUT
7737 ;0054 004C      ; 100 MICROSECONDS).
7738 036155 240 041 .BYTE 240,41
7739 ;0054 004C A0 21      LDY #21 ;INITIAL VALUE OF COUNTER
7740 036157 210 .BYTE 210
7741 ;0054 004E 88      DELAY DEY ;(33. FOR .6 US CYCLE)
7742 036160 320 375 .BYTE 320,375
7743 ;0054 004F D0 FD      BNE DELAY
7744 036162 251 127 .BYTE 251,127
7745 ;0055 0051 A9 57      LDA #NONPR!HALT!PWRUP!SDCLOW!DISINI
7746 036164 215 004 246 .BYTE 215,004,246
7747 ;0056 0053 8D 04 A6      STA NPRCTL ;HANG THE 11 CPU ETC.
7748 036167 251 165 .BYTE 251,165
7749 ;0057 0056 A9 75      LDA #NONPR!HALT!PWRUP!DISINI!NPROUT
7750 036171 215 004 246 .BYTE 215,004,246
7751 ;0058 0058 8D 04 A6      STA NPRCTL ;NOW LET IT "POWER-UP"
7752 ;0059 0058
7753 036174 251 000 .BYTE 251,000
7754 ;0060 0058 A9 00      LDA #0 ;SETUP NPR ADDR OUT HIGH FOR
7755 036176 205 071 .BYTE 205,071
7756 ;0061 005D 85 39      STA NPRAOH ; ALL NPR'S
7757 036200 205 072 .BYTE 205,072
7758 ;0062 005F 85 3A      STA NPRAOX ;THE EXTENDED BYTE TOO
7759 036202 252 .BYTE 252
7760 ;0063 0061 AA      TAX ;INITALIZE DATA TABLE INDEX
7761 ;0064 0062
7762 ;0065 0062      ; WE ARE NOW SETUP TO MOVE THE "MOV" INSTRUCTION INTO
7763 ;0066 0062      ; LOCATION 0 OF THE 11'S MEMORY
7764 ;0067 0062
7765 036203 251 024 .BYTE 251,024
7766 ;0068 0062 A9 14      LDA #824 ;POINT TO 11'S POWER-UP VEC.

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SUBTEST 2'S M-CODE -- ROUTINE

7767	036205	205	070		.BYTE	205,070			
7768					:0069	0064 85 38	STA	NPRAOL	
7769	036207	040	305	000	.BYTE	040,305,000			
7770					:0070	0066 20 C5 00	JSR	NPR	;MOVE TO 24
7771	036212	040	305	000	.BYTE	040,305,000			
7772					:0071	0069 20 C5 00	JSR	NPR	;MOVE TO 26
7773					:0072	006C			
7774	036215	251	000		.BYTE	251,000			
7775					:0073	006C A9 00	LDA	#0	
7776	036217	205	070		.BYTE	205,070			
7777					:0074	006E 85 38	STA	NPRAOL	;POINT TO THE 11'S LOC. 0
7778	036221	040	305	000	.BYTE	040,305,000			
7779					:0075	0070 20 C5 00	JSR	NPR	;MOVE TO LOC 0
7780	036224	040	305	000	.BYTE	040,305,000			
7781					:0076	0073 20 C5 00	JSR	NPR	;MOVE TO LOC 2
7782	036227	040	305	000	.BYTE	040,305,000			
7783					:0077	0076 20 C5 00	JSR	NPR	;MOVE TO 4
7784					:0078	0079			
7785					:0079	0079			
7786					:0080	0079			
7787					:0081	0079			
7788					:0082	0079			
7789					:0083	0079			
7790	036232	251	107		.BYTE	251,107			
7791					:0084	0079 A9 47	LDA	#NONPR!PWRUP!SDCLOW!DISINI	
7792	036234	215	004	246	.BYTE	215,004,246			
7793					:0085	0078 8D 04 A6	STA	NPRCTL	
7794	036237	251	145		.BYTE	251,145			
7795					:0086	007E A9 65	LDA	#NONPR!PWRUP!DISINI!NPROUT	
7796	036241	215	004	246	.BYTE	215,004,246			
7797					:0087	0080 8D 04 A6	STA	NPRCTL	
7798	036244	352			.BYTE	352			
7799					:0087	0083 EA	NOP		
7800	036245	352			.BYTE	352			
7801					:0087	0084 EA	NOP		
7802					:0088	0085			
7803					:0089	0085			
7804					:0090	0085			
7805	036246	040	305	000	.BYTE	040,305,000			
7806					:0091	0085 20 C5 00	JSR	NPR	;MOVE TO LOC 6
7807	036251	240	166		.BYTE	240,166			
7808					:0092	0088 A0 76	LDY	#0166	;THIS IS HOW MANY WE'LL DO
7809	036253	040	305	000	.BYTE	040,305,000			
7810					:0093	008A 20 C5 00	FILOOP JSR	NPR	;WRITE 1 WORD
7811	036256	312			.BYTE	312			
7812					:0094	008D CA	DEX		;BACK UP THE DATA POINTER
7813	036257	312			.BYTE	312			
7814					:0095	008E CA	DEX		; -- WE WANT THE SAME WORD
7815	036260	210			.BYTE	210			
7816					:0096	008F 88	DEY		;IF NOT DONE,
7817	036261	320	370		.BYTE	320,370			
7818					:0097	0090 D0 F8	BNE	FILOOP	; DO IT AGAIN
7819	036263	240	006		.BYTE	240,006			
7820					:0098	0092 A0 06	LDY	#06	;ELSE, SETUP TO DO 6 MORE
7821	036265	350			.BYTE	350			
7822					:0099	0094 E8	INX		; WORDS

; NOW THAT WE'VE TAKEN CONTROL OF THE 11'S POWER-
; UP VECTOR, FORCE HIM THROUGH IT. BUT DON'T LET
; HIS BINIT RESET US (BY KEEPING "DISABL INIT"
; SET)

; NOW WE CAN NPR-OUT THE REST OF THE DATA WE HAVE

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SUBTEST 2'S M-CODE -- ROUTINE

7823	036266	350			.BYTE 350						
7824					:0100 0095 E8	INX				;POINT TO NEXT WORD	
7825	036267	040	305	000	.BYTE 040,305,000						
7826					:0101 0096 20 C5 00	ENDLOP JSR	NPR			;MOVE THE LAST 6 WORDS	
7827	036272	210			.BYTE 210						
7828					:0102 0099 88	DEY				;IF NOT DONE,	
7829	036273	320	372		.BYTE 320,372						
7830					:0103 009A D0 FA	BNE	ENDLOP			; DO IT AGAIN	
7831					:0104 009C					;ELSE, THE SIMULATED "DOWN-	
7832					:0105 009C					; LINE LOAD" IS COMPLETE	
7833					:0106 009C						
7834	036275	251	004		.BYTE 251,004						
7835					:0107 009C A9 04	LDA	#4			; AND THE 11'S LOC. 4	
7836	036277	205	070		.BYTE 205,070						
7837					:0108 009E 85 38	STA	NPRAOL				
7838	036301	040	305	000	.BYTE 040,305,000						
7839					:0109 00A0 20 C5 00	JSR	NPR			;OVER-WRITE THE "BR ."	
7840					:0110 00A3					;INSTRUCTION TO LET THE JUST	
7841					:0111 00A3					;LOADED ROUTINE BE EXECUTED	
7842					:0112 00A3						
7843	036304	251	104		.BYTE 251,104						
7844					:0113 00A3 A9 44	LDA	#NONPR!PWRUP				
7845	036306	215	004	246	.BYTE 215,004,246						
7846					:0114 00A5 8D 04 A6	STA	NPRCTL			;LET BINIT RESET US AGAIN	
7847					:0115 00A8						
7848	036311	140			.BYTE 140						
7849					:0116 00A8 60	RTS				;RETURN TO MAINTENANCE LOOP	
7850					:0117 00A9						
7851					:0118 00A9						
7852					:0119 00A9						
7853					:0120 00A9						
7854					:0121 00A9						
7855					:0122 00A9						
7856					:0123 00A9						
7857					:0124 00A9						
7858					:0125 00A9						
7859					:0126 00A9						
7860					:0127 00A9						
7861	036312	000000			.WORD 000000						
7862					:0128 00A9 00 00						
7863	036314	000340			.WORD 000340						
7864					:0128 00A8 00 E0						
7865	036316	012700	177777		MOV # -1,R0						
7866					:0129 00AD 15 C0						
7867					:0129 00AF FF FF						
7868	036322	000777			BR						
7869					:0129 00B1 01 FF						
7870	036324	005001			CLR R1						
7871					:0130 00B3 0A 01						
7872	036326	062701			.WORD 062701						
7873					:0131 00B5 65 C1						
7874	036330	010037	002412		MOV R0,#TMP0						
7875					:0132 00B7 10 1F						
7876					:0133 00B9 00 00						
7877	036334	013706	002454		MOV #OLDSP,SP						
7878					:0134 00BB 17 C6						

;*****
; DATABL -- DATA TABLE CONTAINING THE DATA THAT
; IS TO BE NPR'D INTO THE 11'S MEMORY
;*****

DATABL
.DBYTE 0,8340 ;LOC'S 24 & 26

.DBYTE 8012700,-1,8777 ;LOC'S 0 --> 4

.DBYTE 8005001 ;LOC. 6
.DBYTE 8062701 ;LOC'S 10 --> 362
.DBYTE 8010037 ;LOC 364 "MOV"
.DBYTE 0 ;LOC 366
.DBYTE 8013706 ;LOC 370 "MOV"

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SUBTEST ?'S M-CODE -- ROUTINE

7879					:0135 008D 00 00
7880	036340	000137	035642		JMP BMLTST2
7881					:0136 008F 00 5F
7882					:0137 00C1 00 00
7883	036344	000240			NOP
7884					:0138 00C3 00 A0
7885					:0139 00C5
7886					:0140 00C5
7887					:0141 00C5
7888					:0142 00C5
7889					:0143 00C5
7890					:0144 00C5
7891					:0145 00C5
7892					:0146 00C5
7893					:0147 00C5
7894					:0148 00C5
7895					:0149 00C5
7896					:0150 00C5
7897					:0151 00C5
7898					:0152 00C5
7899					:0153 00C5
7900					:0154 00C5
7901					:0155 00C5
7902					:0156 00C5
7903					:0157 00C5
7904					:0158 00C5
7905					:0159 00C5
7906					:0160 00C5
7907					:0161 00C5
7908	036346	265	251		.BYTE 265,251
7909					:0162 00C5 B5 A9
7910	036350	215	000	246	.BYTE 215,000,246
7911					:0163 00C7 8D 00 A6
7912	036353	265	252		.BYTE 265,252
7913					:0164 00CA B5 AA
7914	036355	215	001	246	.BYTE 215,001,246
7915					:0165 00CC 8D 01 A6
7916					:0166 00CF
7917	036360	255	004	246	.BYTE 255,004,246
7918					:0167 00CF AD 04 A6
7919	036363	215	004	246	.BYTE 215,004,246
7920					:0168 00D2 8D 04 A6
7921					:0169 00D5
7922	036366	350			.BYTE 350
7923					:0170 00D5 E8
7924	036367	350			.BYTE 350
7925					:0171 00D6 E8
7926					:0172 00D7
7927					:0173 00D7
7928					:0174 00D7
7929	036370	054	004	246	.BYTE 054,004,246
7930					:0175 00D7 2C 04 A6
7931	036373	160	373		.BYTE 160,373
7932					:0176 00DA 70 FB
7933	036375	352			.BYTE 352
7934					:0177 00DC EA

```
.DBYTE 0 ;LOC 372
.DBYTE 8000137 ;LOC 374 "JMP"
.DBYTE 0 ;LOC 376
.DBYTE 8000240 ;"NOP" FOR LOC 4
```

```
; THE THREE WORDS FOR LOCATIONS 366, 372, & 376 ARE
; ASSEMBLED IN WHEN THIS CODE IS INCLUDED INTO THE
; DIAGNOSTIC
```

```
*****
;
; "NPR" SUBROUTINE:
;
; 1 TAKE THE DATA FROM THE DATA TABLE AS INDEXED BY
; "X" AND PUT IT INTO THE NPR DATA OUT REGISTERS
;
; 2 GET THE CURRENT SETTING OF THE NPR CONTROL REG.
; AND WRITE IT BACK TO CAUSE A WORD NPR-OUT
;
; 3 INCREMENT THE NPR-OUT-ADDRESS-LOW REGISTER
;
; 4 WAIT FOR "GOBUSY" TO GO LOW
;
; 5 RETURN TO CALLER
;
*****
```

```
NPR LDA DATABL,X ;LOAD THE DATA-OUT REG'S
STA NPRDOL
LDA DATABL+1,X
STA NPRDOH
LDA NPRCTL
STA NPRCTL ;KICK OFF A WORD NPR-OUT
INX ;POINT TO THE NEXT DATA
INX ; WORD
NPRWAT
BIT NPRCTL ;WAIT FOR THE NPR TO
BVS NPRWAT ; COMPLETE
NOP
```

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 SUBTEST 2'S M-CODE -- ROUTINE

```

7935 036376 346 070 .BYTE 346,070
7936 ;0178 00DD E6 38 INC NPRAOL ;POINT TO THE NEXT WORD
7937 036400 346 070 .BYTE 346,070
7938 ;0179 00DF E6 38 INC NPRAOL ;OF THE 11'S MEMORY
7939 ;0180 00E1
7940 036402 140 .BYTE 140
7941 ;0181 00E1 60 RTS ;RETURN TO CALLER
7942 ;0182 00E2
7943 ;
7944 ;
7945 ;ERRORS = 0000
7946 ;
7947 .SBTTL SUBTEST 2'S M-CODE -- SYMBOL TABLE
7948 ;
7949 ; BIT0 0001 BIT1 0002 BIT2 0004 BIT4 0010
7950 ; BIT6 0040 BSEL7 0017 DATABL 009D DISINI 0001
7951 ; ENDLOP 008A FILOOP 007E HALT 0010 NONPR 0040
7952 ; NPR 00B9 NPRAOH 0039 NPRAOL 0038 NPRAOX 003A
7953 ; NPRCTL A604 NPRDOH A601 NPRDOL A600 NPRWAT 00CB
7954 ; PWRUP 0004 SDCLW 0002 STARAH 003F WAIT1 0043
7955 ;
7956 ;END OF ASSEMBLY(V6A)
7957 ;SYMBOLS LEFT = 1476 OUT OF 1500
7958 ;
7959 ;COMPAS MICROSYSTEMS MINMIC CROSS ASSEMBLER PAGE C-1
7960 .SBTTL SUBTEST 2'S M-CODE -- CROSS REFERENCE TABLE (CREF V01-05 )
7961 ;
7962 ;
7963 ;BIT0 50 33
7964 ;BIT1 60 32
7965 ;BIT2 70 31
7966 ;BIT4 80 30
7967 ;BIT6 90 29
7968 ;BSEL7 130 43 45
7969 ;DATABL 1270 162 164
7970 ;DISINI 330 55 57 84 86
7971 ;ENDLOP 1010 103
7972 ;FILOOP 930 97
7973 ;HALT 300 55 57
7974 ;NONPR 290 55 57 84 86 113
7975 ;NPR 70 71 75 76 77 91 93
7976 ; 101 109 1620
7977 ;NPRAOH 180 61
7978 ;NPRAOL 170 18 19 69 74 108 178
7979 ; 179
7980 ;NPRAOX 190 62
7981 ;NPRCTL 280 56 58 85 87 114 167
    
```

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SUBTEST 2'S M-CODE -- CROSS REFERENCE TABLE (CREF V01-05)

7982							
7983							
7984							
7985							
7986							
7987							
7988							
7989							
7990	036403						
7991		036404					

:	168	175					
;NPRDOH	240	165					
;NPRDOL	230	24	163				
;NPRWAT	1740	176					
;PWRUP	310	55	57	84	86	113	
;SDCLOW	320	55	84				
;STARAM	370	40					
;WAIT1	450	46					
MC2END:							
.EVEN							

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HARDWARE PARAMETER CODING SECTION

.SBTTL HARDWARE PARAMETER CODING SECTION

7992
7993
7994
7995
7996
7997
7998
7999
8000
8001
8002
8003
8004
8005
8006
8007
8008
8009
8010
8011
8012
8013
8014
8015
8016
8017
8018
8019
8020
8021
8022
8023
8024
8025
8026
8027
8028
8029
8030
8031
8032
8033
8034
8035
8036
8037
8038
8039
8040
8041
8042
8043
8044

036404
036404 000030
036406
036406
036410 036466
036412 160020
036414 177776
036416
036416 001031
036420 036514
036422 000000
036424 000674
036426
036426 002J32
036430 036545
036432 007000
036434 000000
036436 000007
036440
036440 007130
036442 036661
036444 000100
036446
036446 005032
036450 036576
036452 000007
036454 000000
036456 000002
036460
036460 007130
036462 036743
036464 000200
036466
036466
036466 042504 044526 042503
036514 042504 044526 042503
036545 104 053105 041511

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

BGNHRD

.WORD L10070-L#HARD/2
L#HARD::

GPRMA ADDRES,0,0,160020,177776,YES

.WORD T#CODE
.WORD ADDRES
.WORD T#LOLIM
.WORD T#HILIM

GPRMA VECTOR,2,0,0,674,YES

.WORD T#CODE
.WORD VECTOR
.WORD T#LOLIM
.WORD T#HILIM

GPRMD PRIRTY,4,0,7000,0,7,YES

.WORD T#CODE
.WORD PRIRTY
.WORD 7000
.WORD T#LOLIM
.WORD T#HILIM

GPRML PU24.M,16,100,YES

.WORD T#CODE
.WORD PU24.M
.WORD 100

GPRMD BDTY.M,12,0,7,0,2,YES

.WORD T#CODE
.WORD BDTY.M
.WORD 7
.WORD T#LOLIM
.WORD T#HILIM

GPRML XMFG.M,16,200,YES

.WORD T#CODE
.WORD XMFG.M
.WORD 200

ENDHRD

.EVEN
L10070:

.NLIST BEX
ADDRES: .ASCIZ /DEVICE CSR ADDRESS : /
VECTOR: .ASCIZ /DEVICE VECTOR ADDRESS : /
PRIRTY: .ASCIZ /DEVICE PRIORITY LEVEL : /

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HARDWARE PARAMETER CODING SECTION

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

8045 037010

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PATCH AREA FOR DEBUG

8065
8066 037012
8067 037112 037112
8068 037112 000240
8069 037114 000240
8070 037116 000240
8071
8072
8073
8074
8075 037120
8076 037120
8077
8078 037120 000000
8079 037122 000000
8080 037124
8081 000001

.SBTTL PATCH AREA FOR DEBUG
PATCH:

. = +100
NOP
NOP
NOP

.SBTTL "ENDMOD" & "LASTAD"
ENDMOD
LASTAD

.EVEN
.WORD 0
.WORD 0

L\$LAST::
.END

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CVDNBC.P11 12-SEP-84 05:04 CROSS REFERENCE TABLE -- USER SYMBOLS

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

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CROSS REFERENCE TABLE -- USER SYMBOLS

BSEL6	002334	17230	1988	2087	2249	6954*	6982												
BSEL7	002336	17250	2250	6907	7243*	7247	7259*	7297*	7332*	7336	7349*								
BSLT0	000020	15500																	
BSLT1	000021	15510																	
BSLT2	000022	15530																	
BSLT3	000023	15540																	
BSLT4	000024	15560																	
BSLT5	000025	15570																	
BSLT6	000026	15590																	
BSLT7	000027	15600																	
BSR0	002212	16180	2243*	3539															
BSR1	002214	16200	2244*	3537															
BSR10	002232	16330	2251*	3581															
BSR11	002234	16340	2252*	3579															
BSR12	002236	16350	2253*	3577															
BSR13	002240	16360	2254*	3575															
BSR14	002242	16370	2255*	3602															
BSR15	002244	16380	2256*	3600															
BSR16	002246	16390	2257*	3598															
BSR17	002250	16400	2258*	3596															
BSR2	002216	16220	2245*	3535															
BSR3	002220	16240	2246*	3533															
BSR4	002222	16260	2247*	3560															
BSR5	002224	16280	2248*	3558															
BSR6	002226	16300	2249*	3556															
BSR7	002230	16320	2250*	3554															
BT1	002654	19020	4690																
BT2	002740	19030	2554	2558	2562	2566	2570	2574	2578	2582	2586	4684	4729						
BUFARE	002654	18790	1885	1902	1903	4858	4925	5021	5185	7319	7359	7377	7403						
CFHT0	022566	3785	39080																
CFHT2	022655	3862	39080																
CFHT3	022735	3868	39080																
CONSOL	002314	16640	3764*	3781	3904*														
CONTIN	022456	3756	38750																
CONTST	022556	3767	39040																
CSREGS-	000010	14460																	
C#AU	000052	11770	4014																
C#AUTO-	000061	11770	3964																
C#BRK	000022	11770																	
C#BSEG-	000004	11770																	
C#BSUB-	000002	11770	4062	4853	4920	5103	5175	5292	5500	5875	6014	6251	6333	6415					
		6497	6573	6627	6820	6932	7221	7304											
C#CEFG-	000045	11770																	
C#CLCX-	000062	11770																	
C#CLEA-	000012	11770	3986																
C#CLOS-	000035	11770																	
C#CLP1-	000006	11770																	
C#CVEC-	000036	11770	3775	3953	3980	3983	6895	6978	7284										
C#DCLN-	000044	11770																	
C#DODU-	000051	11770	3958																
C#DRPT-	000024	11770																	
C#DU	000053	11770	4001																
C#EDIT-	000003	11770	1252																
C#ERDF-	000055	11770	2814	2848	4089	4114	4143	4162	4181	4206	4231	4251	4275	4301					
		4325	4348	4486	4559	4594	4627	4713	4758	4800	4900	4967	5064	5164					
		5236	5321	5396	5461	5468	5479	5528	5588	5636	5643	5657	5941	5969					

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	4435	4447	4458	4467	4472	4482	4498	4508	4517	4531	4546	4555	4564
	4573	4590	4599	4609	4623	4632	4636	4669	4675	4718	4763	4770	4805
	4839	4846	4852	4913	4919	4980	4983	5007	5013	5078	5098	5102	5109
	5122	5131	5140	5149	5158	5169	5174	5181	5194	5203	5212	5221	5230
	5241	5244	5268	5274	5281	5291	5326	5340	5349	5363	5378	5387	5401
	5415	5425	5436	5445	5454	5473	5484	5494	5499	5533	5554	5570	5579
	5593	5620	5629	5648	5662	5673	5676	5798	5855	5860	5868	5874	5946
	5981	5996	6004	6013	6090	6130	6157	6168	6171	6223	6229	6250	6262
	6310	6332	6344	6392	6414	6426	6474	6496	6508	6556	6572	6584	6610
	6626	6638	6664	6669	6685	6694	6728	6745	6751	6770	6792	6797	6803
	6819	6826	6921	6931	6939	6997	7000	7195	7200	7206	7220	7227	7278
	7299	7303	7310	7398	7453	7456	8006	8060	8076				
F#CLEA= 000007	1177#	3977	3985										
F#DU = 000016	1177#	3995	4000										
F#END = 000041	1177#	1179	2828	2862	2880	2890	2965	3116	3125	3134	3175	3231	3306
	3359	3394	3453	3498	3899	3965	3987	4002	4015	4059	4061	4070	4079
	4084	4104	4109	4119	4137	4155	4167	4175	4196	4201	4221	4226	4246
	4256	4265	4270	4291	4296	4315	4320	4330	4343	4361	4363	4365	4367
	4429	4435	4447	4458	4467	4472	4482	4498	4508	4517	4531	4546	4555
	4564	4573	4590	4599	4609	4623	4632	4636	4638	4669	4675	4718	4763
	4770	4805	4807	4839	4846	4852	4913	4915	4919	4980	4982	4983	4985
	5007	5013	5078	5080	5098	5102	5109	5122	5131	5140	5149	5158	5169
	5171	5174	5181	5194	5203	5212	5221	5230	5241	5243	5244	5246	5268
	5274	5281	5291	5326	5340	5349	5363	5378	5387	5401	5415	5425	5436
	5445	5454	5473	5484	5494	5496	5499	5533	5554	5570	5579	5593	5620
	5629	5648	5662	5673	5675	5676	5678	5831	5855	5860	5868	5874	5946
	5981	5996	6004	6006	6013	6090	6130	6157	6168	6170	6171	6173	6223
	6229	6250	6262	6310	6312	6332	6344	6392	6394	6414	6426	6474	6476
	6496	6508	6556	6558	6572	6584	6610	6612	6626	6638	6664	6666	6669
	6671	6685	6694	6728	6730	6745	6751	6770	6772	6792	6797	6803	6819
	6826	6921	6923	6931	6939	6997	6999	7000	7002	7195	7200	7206	7220
	7227	7278	7299	7301	7303	7310	7398	7453	7455	7456	7458	8043	8065
	8076												
F#HARD= 000004	1177#	8006	8041										
F#HM = 000013	1177#	1327	1353										
F#INIT= 000006	1177#	3727	3897										
F#JMP = 000050	1177#	5274	5281	5860	5868	6229	6797	6803	7200	7206			
F#MOD = 000000	1177#	1179	8076										
F#MSG = 000011	1177#	2875	2878	2884	2888	2894	2963	2969	3114	3120	3123	3129	3132
	3138	3173	3179	3229	3237	3304	3312	3357	3364	3392	3398	3451	3468
	3496												
F#PROT= 000021	1177#	3714	3719										
F#PMR = 000017	1177#												
F#RPT = 000012	1177#												
F#SEG = 000003	1177#												
F#SOFT= 000005	1177#	8060	8063										
F#SRV = 000010	1177#	2807	2826	2841	2860	5798	5829						
F#SUB = 000002	1177#	4062	4361	4853	4913	4920	4980	5103	5169	5175	5241	5292	5494
	5500	5673	5875	6004	6014	6168	6251	6310	6333	6392	6415	6474	6497
	6556	6573	6610	6627	6664	6820	6921	6932	6997	7221	7299	7304	7453
	1177#	1362	1366										
F#SM = 000014	1177#	4060	4365	4430	4636	4670	4805	4840	4983	5008	5078	5099	5244
F#TEST= 000001	5269	5676	5856	6171	6224	6669	6686	6728	6746	6770	6793	7000	7196
	7456												
GDATA 002254	1646#	2036#	2076#	2119#	2182#	2896	2918	2996	3025	3052	3197	3334	3348
	3512	3633	3674	4693#	4735#	4736#	4743	4776#	4785	4889#	4956#	5052#	5314#

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L#CCP	002106	G	1280#		
L#CLEA	023140	G	1281	3977#	
L#CO	002032	G	1236#		
L#DEPO	002011	G	1218#		
L#DESC	003274	G	1273	1928#	
L#DESP	002076	G	1272#		
L#DEVP	002060	G	1258#		
L#DISP	002124	G	1243	1303#	
L#DLY	002116	G	1288#	6809	7212
L#DTP	002040	G	1242#		
L#DTYP	002034	G	1238#		
L#DU	023156	G	1269	3995#	
L#DUT	002072	G	1268#		
L#DVTY	003254	G	1259	1916#	
L#EF	002052	G	1253#		
L#ENVI	002044	G	1246#		
L#ERRT	002202	G	1277	1608#	
L#ETP	002102	G	1276#		
L#EXP1	002046	G	1248#		
L#EXP4	002064	G	1262#		
L#EXP5	002066	G	1264#		
L#HARD	036406	G	1225	8006	8007#
L#HIME	002120	G	1290#	5276	
L#HPCP	002016	G	1224#		
L#HPTP	002022	G	1228#		
L#HW	002160	G	1229	1327	1328#
L#ICP	002104	G	1278#		
L#INIT	022020	G	1279	3727#	
L#LADP	002026	G	1232#		
L#LAST	037124	G	1233	8080#	
L#LOAD	002100	G	1274#		
L#LUN	002074	G	1270#		
L#MREV	002050	G	1250#		
L#NAME	002000	G	1207#		
L#PRIO	002042	G	1244#		
L#PROT	022012	G	1285	3714#	
L#PRT	002112	G	1284#		
L#REPP	002062	G	1260#		
L#REV	002010	G	1216#		
L#SOFT	037012	G	8060	8061#	
L#SPC	002056	G	1256#		
L#SPCP	002020	G	1226#		
L#SPTP	002024	G	1230#		
L#STA	002030	G	1234#		
L#SW	002202	G	1362	1363#	
L#TEST	002114	G	1286#		
L#TIML	002014	G	1222#		
L#UNIT	002012	G	1220#		
L10000	002200		1327	1353#	
L10001	002202		1362	1366#	
L10002	006134		2826#		
L10003	006206		2860#		
L10004	006216		2878#		
L10005	006230		2888#		
L10006	006530		2963#		
L10007	007276		3114#		

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SEL2	002324	1718*	2265	6957*	7244*	7333*								
SEL4	002330	1721*	2064*	2107*	2149*	2170*	2266	6845*	6956*	7242*	7258*	7288	7331*	
SEL6	002334	1724*	2130	2150*	2171*	2267	6844*							
SFPTBL	002202	1364*												
SLT0	= 000020	1549*	1550	1551	1552	1553	1554	1555	1556	1557	1558	1559	1560	
SLT2	= 000022	1552*												
SLT4	= 000024	1555*												
SLT6	= 000026	1558*												
SMCODE	034756	6951	6952	7006*										
SR	= 120012	1576*	4476	4524	4549	4567	4603							
STALL	005132	2543*	4611	4612	4613									
STARES	002306	1661*	3760*	3793*	3799*	3854								
STARST	022072	3735	3760*											
SVCGBL	= 000000	1177*	1179	1186*	1207	1216	1218	1220	1222	1224	1226	1228	1230	1232
		1234	1236	1238	1240	1242	1244	1246	1248	1250	1253	1256	1258	1260
		1262	1264	1266	1268	1270	1272	1274	1276	1278	1280	1282	1284	1286
		1288	1290	1303	1328	1329	1363	1364	1608	1916	1928	2807	2841	2875
		2884	2894	2969	3120	3129	3138	3179	3237	3312	3364	3398	3468	3714
		3727	3927	3977	3995	4011	5798	8007	8061	8080*	8081			
SVCINS	= 000001	1177*	1183*	1208	1209	1210	1211	1212	1213	1214	1215	1217	1219	1221
		1223	1225	1227	1229	1231	1233	1235	1237	1239	1241	1243	1245	1247
		1249	1251	1252	1254	1255	1257	1259	1261	1263	1265	1267	1269	1271
		1273	1275	1277	1279	1281	1283	1285	1287	1289	1291	1302	1304	1305
		1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1327	1362
		1917	1920	1929	1936	1999	2000	2001	2002	2039	2040	2041	2042	2079
		2080	2081	2082	2122	2123	2124	2125	2185	2186	2187	2188	2738	2739
		2740	2741	2814	2815	2816	2817	2827	2848	2849	2850	2851	2861	2879
		2899	2900	2901	2902	2903	2904	2905	2906	2916	2917	2918	2919	2920
		2921	2922	2923	2927	2928	2929	2930	2931	2932	2933	2935	2936	2937
		2938	2939	2940	2941	2942	2943	2945	2946	2947	2948	2949	2950	2952
		2953	2954	2955	2956	2957	2958	2959	2960	2964	2972	2973	2974	2975
		2976	2977	2978	2980	2981	2982	2983	2984	2989	2990	2991	2992	2993
		2994	2998	2999	3000	3001	3002	3003	3004	3005	3006	3007	3008	3009
		3012	3013	3014	3015	3016	3017	3018	3019	3020	3021	3022	3023	3030
		3031	3032	3033	3034	3035	3036	3037	3038	3039	3040	3041	3046	3047
		3048	3049	3050	3051	3054	3055	3056	3057	3058	3059	3060	3061	3062
		3063	3064	3065	3066	3067	3068	3069	3070	3071	3074	3075	3076	3077
		3078	3079	3080	3081	3082	3083	3084	3085	3086	3087	3088	3089	3090
		3091	3094	3095	3096	3097	3098	3099	3100	3101	3102	3103	3104	3105
		3106	3107	3108	3109	3110	3111	3115	3124	3133	3142	3143	3144	3145
		3146	3147	3149	3150	3151	3152	3153	3154	3155	3157	3158	3159	3160
		3161	3162	3163	3165	3166	3167	3168	3169	3170	3174	3181	3182	3183
		3184	3185	3187	3188	3189	3190	3191	3195	3196	3197	3198	3199	3200
		3201	3202	3203	3204	3205	3206	3207	3208	3212	3213	3214	3215	3216
		3222	3223	3224	3225	3226	3230	3239	3240	3241	3242	3243	3245	3246
		3247	3248	3249	3251	3252	3253	3254	3255	3257	3258	3259	3260	3261
		3263	3264	3265	3266	3267	3268	3269	3270	3271	3273	3274	3275	3276
		3277	3278	3279	3280	3281	3283	3284	3285	3286	3287	3288	3289	3290
		3291	3293	3294	3295	3296	3297	3298	3299	3300	3301	3305	3317	3318
		3319	3320	3321	3322	3323	3332	3333	3334	3335	3336	3337	3338	3339
		3343	3344	3345	3346	3347	3348	3349	3350	3351	3352	3353	3358	3379
		3380	3381	3382	3383	3384	3385	3386	3387	3388	3393	3406	3407	3408
		3409	3410	3412	3413	3414	3415	3416	3417	3418	3419	3420	3421	3422
		3423	3425	3426	3427	3428	3429	3430	3431	3432	3433	3434	3435	3436
		3437	3438	3439	3440	3444	3445	3446	3447	3448	3452	3470	3471	3472
		3473	3474	3476	3477	3478	3479	3480	3483	3484	3485	3486	3487	3488

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3489	3490	3497	3524	3525	3526	3527	3528	3529	3530	3532	3533	3534
3535	3536	3537	3538	3539	3540	3541	3542	3543	3544	3546	3547	3548
3549	3550	3551	3553	3554	3555	3556	3557	3558	3559	3560	3561	3562
3563	3564	3565	3567	3568	3569	3570	3571	3572	3574	3575	3576	3577
3578	3579	3580	3581	3582	3583	3584	3585	3586	3588	3589	3590	3591
3592	3593	3595	3596	3597	3598	3599	3600	3601	3602	3603	3604	3605
3606	3607	3616	3617	3618	3619	3620	3623	3624	3625	3626	3627	3628
3631	3632	3633	3634	3635	3636	3637	3638	3640	3641	3642	3643	3644
3645	3654	3655	3656	3657	3658	36	3662	3663	3664	3665	3666	3669
3670	3671	3672	3673	3674	3675	3676	3677	3678	3679	3681	3682	3683
3684	3685	3686	3694	3695	3696	3697	3698	3732	3733	3735	3738	3739
3741	3744	3745	3747	3750	3751	3753	3766	3767	3768	3769	3770	3771
3774	3775	3784	3785	3786	3787	3788	3789	3807	3808	3809	3811	3860
3861	3862	3863	3864	3865	3866	3868	3869	3870	3871	3872	3878	3879
3880	3881	3882	3883	3886	3887	3888	3889	3890	3891	3898	3930	3931
3932	3933	3934	3935	3952	3953	3957	3958	3964	3979	3980	3982	3983
3986	3998	4001	4014	4062	4068	4070	4071	4077	4079	4080	4084	4085
4089	4090	4091	4092	4102	4104	4105	4109	4110	4114	4115	4116	4117
4119	4120	4135	4137	4138	4143	4144	4145	4146	4153	4155	4156	4162
4163	4164	4165	4167	4168	4175	4176	4181	4182	4183	4184	4194	4196
4197	4201	4202	4206	4207	4208	4209	4219	4221	4222	4226	4227	4231
4232	4233	4234	4246	4247	4251	4252	4253	4254	4256	4257	4263	4265
4266	4270	4271	4275	4276	4277	4278	4289	4291	4292	4296	4297	4301
4302	4303	4304	4313	4315	4316	4320	4321	4325	4326	4327	4328	4330
4331	4343	4344	4348	4349	4350	4351	4358	4362	4366	4401	4433	4435
4436	4445	4447	4448	4456	4458	4459	4465	4467	4468	4472	4473	4480
4482	4483	4486	4487	4488	4489	4496	4498	4499	4506	4508	4509	4515
4517	4518	4529	4531	4532	4544	4546	4547	4553	4555	4556	4559	4560
4561	4562	4564	4565	4571	4573	4574	4588	4590	4591	4594	4595	4596
4597	4599	4600	4607	4609	4610	4621	4623	4624	4627	4628	4629	4630
4632	4633	4637	4643	4673	4675	4676	4681	4713	4714	4715	4716	4718
4719	4725	4732	4741	4758	4759	4760	4761	4763	4764	4768	4770	4771
4783	4800	4801	4802	4803	4806	4844	4846	4847	4853	4864	4900	4901
4902	4903	4914	4920	4931	4967	4968	4969	4970	4981	4984	5011	5013
5014	5027	5064	5065	5066	5067	5079	5103	5107	5109	5110	5120	5122
5123	5129	5131	5132	5138	5140	5141	5147	5149	5150	5156	5158	5159
5164	5165	5166	5167	5170	5175	5179	5181	5182	5192	5194	5195	5201
5203	5204	5210	5212	5213	5219	5221	5222	5228	5230	5231	5236	5237
5238	5239	5242	5245	5272	5274	5275	5281	5282	5292	5321	5322	5323
5324	5326	5327	5338	5340	5341	5347	5349	5350	5361	5363	5364	5376
5378	5379	5385	5387	5388	5396	5397	5398	5399	5401	5402	5413	5415
5416	5423	5425	5426	5434	5436	5437	5443	5445	5446	5452	5454	5455
5461	5462	5463	5464	5468	5469	5470	5471	5473	5474	5479	5480	5481
5482	5484	5485	5495	5500	5528	5529	5530	5531	5533	5534	5552	5554
5555	5568	5570	5571	5577	5579	5580	5588	5589	5590	5591	5593	5594
5618	5620	5621	5627	5629	5630	5636	5637	5638	5639	5643	5644	5645
5646	5648	5649	5657	5658	5659	5660	5662	5663	5674	5677	5709	5710
5711	5712	5713	5714	5821	5822	5823	5824	5830	5860	5861	5866	5868
5869	5875	5941	5942	5943	5944	5946	5947	5969	5970	5971	5972	5976
5977	5978	5979	5981	5982	5991	5992	5993	5994	5996	5997	6005	6014
6085	6086	6087	6088	6090	6091	6118	6119	6120	6121	6125	6126	6127
6128	6130	6131	6152	6153	6154	6155	6157	6158	6169	6172	6227	6229
6230	6251	6260	6262	6263	6270	6271	6272	6273	6280	6281	6282	6283
6294	6295	6296	6297	6304	6305	6306	6307	6311	6333	6342	6344	6345
6352	6353	6354	6355	6362	6363	6364	6365	6376	6377	6378	6379	6386
6387	6388	6389	6393	6415	6424	6426	6427	6434	6435	6436	6437	6444

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		6445	6446	6447	6458	6459	6460	6461	6468	6469	6470	6471	6475	6497
		6506	6508	6509	6516	6517	6518	6519	6526	6527	6528	6529	6540	6541
		6542	6543	6550	6551	6552	6553	6557	6573	6582	6584	6585	6594	6595
		6596	6597	6604	6605	6606	6607	6611	6627	6636	6638	6639	6648	6649
		6650	6651	6658	6659	6660	6661	6665	6670	6692	6694	6695	6715	6722
		6723	6724	6725	6729	6749	6751	6752	6765	6766	6767	6768	6771	6797
		6798	6803	6804	6807	6808	6809	6810	6811	6812	6813	6814	6820	6824
		6826	6827	6829	6830	6831	6832	6833	6834	6867	6868	6869	6870	6894
		6895	6897	6898	6911	6912	6913	6914	6918	6922	6932	6937	6939	6940
		6942	6943	6944	6945	6946	6947	6968	6969	6970	6971	6977	6978	6980
		6981	6986	6987	6988	6989	6994	6998	7001	7200	7201	7206	7207	7210
		7211	7212	7213	7214	7215	7216	7217	7221	7225	7227	7228	7236	7237
		7238	7239	7240	7241	7252	7253	7254	7255	7268	7269	7270	7271	7276
		7278	7279	7283	7284	7286	7287	7292	7293	7294	7295	7300	7304	7308
		7310	7311	7323	7324	7325	7326	7327	7328	7341	7342	7343	7344	7364
		7365	7369	7370	7371	7372	7382	7383	7387	7388	7389	7390	7395	7398
		7399	7410	7411	7418	7419	7420	7421	7431	7432	7433	7434	7442	7443
		7444	7445	7450	7454	7457	8006	8010	8011	8012	8013	8015	8016	8017
		8018	8020	8021	8022	8023	8024	8026	8027	8028	8030	8031	8032	8033
		8034	8036	8037	8038	8041	8060	8063	8077	8078	8079			
SVCSUB- 000001		1177#	1185#	4061	4852	4919	5102	5174	5291	5499	5874	6013	6250	6332
		6414	6496	6572	6626	6819	6931	7220	7303					
SVCTAG- 000001		1177#	1187#	1353	1366	2826	2860	2878	2888	2963	3114	3123	3132	3173
		3229	3304	3357	3392	3451	3496	3897	3963	3985	4000	4013	4361	4365
		4634	4805	4913	4980	4983	5078	5169	5241	5244	5494	5673	5676	5829
		6004	6168	6171	6310	6392	6474	6556	6610	6664	6669	6728	6770	6921
		6997	7000	7299	7453	7456	8042	8064						
SVCTST- 000001		1177#	1184#	4059	4429	4669	4839	5007	5098	5268	5855	6223	6685	6745
		6792	7195											
SMPBOT- 121000		1502#												
SMPDDC- 121400		1503#												
S#LSYM- 010000		1177#	1354#	1367#	2827#	2861#	2879#	2889#	2964#	3115#	3124#	3133#	3174#	3230#
		3305#	3358#	3393#	3452#	3497#	3898#	3964#	3986#	4001#	4014#	4362#	4366#	4637#
		4806#	4914#	4981#	4984#	5079#	5170#	5242#	5245#	5495#	5674#	5677#	5830#	6005#
		6169#	6172#	6311#	6393#	6475#	6557#	6611#	6665#	6670#	6729#	6771#	6922#	6998#
		7001#	7300#	7454#	7457#	8043#	8065#							
TDATA 002252		1645#	3441	3640	3681	4438#	4534#	4891#	4908	4958#	4975	5054#	5072	
TMPA 002436		1769#	3417	3434	4437#	4477	4519#	4522#	4525	4550	4568	4578	4581	4604
		5286#	5367	5488	5558	5666	5893#	5894#	5895#	5897	6031#	6032#	6033#	6035
		6135#	6136#	6137#	6139									
TMPB 002440		1770#	2304#	2305#	2328	2331	2333#	2337	2385#	2386#	2410	2413	2415#	2419
		3366	3401	3415	3432	4442	4449#	4450#	4453	4490#	4493	5892#	5898	6030#
		6036	6140	6141										
TMPC 002442		1771#	3404	3430	5294#	5409	5486#	5488	5501#	5598	5651	5664#	5666	
TMPD 002444		1772#	3428	4398	4406	4541	4585	4618	4640	4648				
TMPE 002446		1773#	2319#	2323	2401#	2405	3413	3426	4462	4500#	4503	4512	5355#	5357
		5365#	5367	5546#	5548	5556#	5558							
TMPF 002450		1774#	3203	5295#	5373	5382	5389	5391	5392	5490#	5502#	5565	5574	5581
		5583	5584	5668#										
TMP0 002412		1759#	2727#	2728	3139	3142	3266	3936#	3954	3966#	4865	4932	5028	5111#
		5183#	5808#	7234#	7258	7261#	7288	7348#	7425	7874#				
TMP1 002414		1760#	2732#	3150	3219	3265	5114#	5144	5186#	5216	5335	5344	5351	5543#
		5544#	5599	5809#										
TMP2 002416		1761#	2733#	3158	3199	3264	5153	5160	5225	5232	5417#	5420	5431	5456
		5610#	5615	5624	5631	5810#	5950#	5954	5957	5964	6105#	6109	6112	6113
TMP3 002420		1762#	2734#	2735#	3165	3209	3263	5113#	5117	5126	5185#	5189	5198	5351#

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CROSS REFERENCE TABLE -- USER SYMBOLS

T#CODE= 007130	8010#	8015#	8020#	8026#	8030#	8036#								
T#ERRN= 000126	1177#	2815#	2849#	4090#	4115#	4144#	4163#	4182#	4207#	4232#	4252#	4276#	4302#	
	4326#	4349#	4487#	4360#	4595#	4628#	4714#	4759#	4801#	4901#	4968#	5065#	5165#	
	5237#	5322#	5397#	5462#	5469#	5480#	5529#	5589#	5637#	5644#	5658#	5942#	5970#	
	5977#	5992#	6086#	6119#	6126#	6153#	6271#	6281#	6295#	6305#	6353#	6363#	6377#	
	6387#	6435#	6445#	6459#	6469#	6517#	6527#	6541#	6551#	6595#	6605#	6649#	6659#	
	6723#	6766#	6868#	6912#	6969#	6987#	7253#	7269#	7293#	7342#	7370#	7388#	7419#	
	7432#	7443#												
T#EXCP= 000000	8010#	8014	8015#	8019	8020#	8025	8030#	8035						
T#FLAG= 000040	4070#	4079#	4084#	4104#	4109#	4119#	4137#	4155#	4167#	4175#	4196#	4201#	4221#	
	4226#	4246#	4256#	4265#	4270#	4291#	4296#	4315#	4320#	4330#	4343#	4435#	4447#	
	4458#	4467#	4472#	4482#	4498#	4508#	4517#	4531#	4546#	4555#	4564#	4573#	4590#	
	4599#	4609#	4623#	4632#	4675#	4718#	4763#	4770#	4846#	5013#	5109#	5122#	5131#	
	5140#	5149#	5158#	5181#	5194#	5203#	5212#	5221#	5230#	5274#	5281#	5326#	5340#	
	5349#	5363#	5378#	5387#	5401#	5415#	5425#	5436#	5445#	5454#	5473#	5484#	5533#	
	5554#	5570#	5579#	5593#	5620#	5629#	5648#	5662#	5860#	5868#	5946#	5981#	5996#	
	6090#	6130#	6157#	6229#	6262#	6344#	6426#	6508#	6584#	6638#	6694#	6751#	6797#	
	6803#	6826#	6939#	7200#	7206#	7227#	7278#	7310#	7398#					
T#GMAN= 000000	1177#													
T#HILI= 000002	8010#	8013	8015#	8018	8020#	8024	8030#	8034						
T#LAST= 000001	1177#	8078#												
T#LOLI= 000000	8010#	8012	8015#	8017	8020#	8023	8030#	8033						
T#LSYM= 010000	1177#	1354	1367	2827	2861	2879	2889	2964	3115	3124	3133	3174	3230	
	3305	3358	3393	3452	3497	3898	3964	3986	4001	4014	4362	4366	4637	
	4806	4914	4981	4984	5079	5170	5242	5245	5495	5674	5677	5830	6005	
	6169	6172	6311	6393	6475	6557	6611	6665	6670	6729	6771	6922	6998	
	7001	7300	7454	7457	8043	8065								
T#LTND= 000015	8081#													
T#NEST= 177777	1177#	1179#	1327#	1353#	1362#	1366#	2807#	2826#	2841#	2860#	2875#	2878#	2884#	
	2888#	2894#	2963#	2969#	3114#	3120#	3123#	3129#	3132#	3138#	3173#	3179#	3229#	
	3237#	3304#	3312#	3357#	3364#	3392#	3398#	3451#	3468#	3496#	3714#	3719#	3727#	
	3897#	3927#	3963#	3977#	3985#	3995#	4000#	4011#	4013#	4060#	4062#	4361#	4365#	
	4430#	4636#	4670#	4805#	4840#	4853#	4913#	4920#	4980#	4983#	5008#	5078#	5099#	
	5103#	5169#	5175#	5241#	5244#	5269#	5292#	5494#	5500#	5673#	5676#	5798#	5829#	
	5856#	5875#	6004#	6014#	6168#	6171#	6224#	6251#	6310#	6333#	6392#	6415#	6474#	
	6497#	6556#	6573#	6610#	6627#	6664#	6669#	6686#	6728#	6746#	6770#	6793#	6820#	
	6921#	6932#	6997#	7000#	7196#	7221#	7299#	7304#	7453#	7456#	8006#	8041#	8060#	
	8063#	8076#												
T#NSO = 000000	1179#	8076												
T#NS1 = 000005	1327#	1353	1362#	1366	2807#	2826	2841#	2860	2875#	2878	2884#	2888	2894#	
	2963	2969#	3114	3120#	3123	3129#	3132	3138#	3173	3179#	3229	3237#	3304	
	3312#	3357	3364#	3392	3398#	3451	3468#	3496	3714#	3719	3727#	3897	3927#	
	3963	3977#	3985	3995#	4000	4011#	4013	4060#	4365	4430#	4636	4670#	4805	
	4840#	4983	5008#	5078	5099#	5244	5269#	5676	5798#	5829	5856#	6171	6224#	
	6669	6686#	6728	6746#	6770	6793#	7000	7196#	7456	8006#	8041	8060#	8063	
T#NS2 = 000002	4062#	4361	4853#	4913	4920#	4980	5103#	5169	5175#	5241	5292#	5494	5500#	
	5673	5875#	6004	6014#	6168	6251#	6310	6333#	6392	6415#	6474	6497#	6556	
	6573#	6610	6627#	6664	6820#	6921	6932#	6997	7221#	7299	7304#	7453		
T#PTNU= 000000	1177#													
T#SAVL = 177777	1177#													
T#SEGL = 177777	1177#													
T#SUBN= 000002	1177#	4059#	4061#	4429#	4669#	4839#	4852#	4919#	5007#	5098#	5102#	5174#	5268#	
	5291#	5499#	5855#	5874#	6013#	6223#	6250#	6332#	6414#	6496#	6572#	6626#	6685#	
	6745#	6792#	6819#	6931#	7195#	7220#	7303#							
T#TAGL = 177777	1177#													
T#TAGN= 010072	1177#	1327#	1362#	2807#	2841#	2875#	2884#	2894#	2969#	3120#	3129#	3138#	3179#	

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T\$TEMP= 000000

3237#	3312#	3364#	3398#	3468#	3714#	3727#	3927#	3977#	3995#	4011#	4060#	4062#
4430#	4670#	4840#	4853#	4920#	5008#	5099#	5103#	5175#	5269#	5292#	5500#	5798#
5856#	5875#	6014#	6224#	6251#	6333#	6415#	6497#	6573#	6627#	6686#	6746#	6793#
6820#	6932#	7196#	7221#	7304#	8006#	8060#						
1304#	1305#	1306#	1307#	1308#	1309#	1310#	1311#	1312#	1313#	1314#	1315#	1316#
1317#	1353#	1366#	2826#	2860#	2878#	2888#	2963#	3114#	3123#	3132#	3173#	3229#
3304#	3357#	3392#	3451#	3496#	3719#	3897#	3963#	3985#	4000#	4013#	4070#	4071#
4079#	4080#	4084#	4085#	4104#	4105#	4109#	4110#	4119#	4120#	4137#	4138#	4155#
4156#	4167#	4168#	4175#	4176#	4196#	4197#	4201#	4202#	4221#	4222#	4226#	4227#
4246#	4247#	4256#	4257#	4265#	4266#	4270#	4271#	4291#	4292#	4296#	4297#	4315#
4316#	4320#	4321#	4330#	4331#	4343#	4344#	4361#	4365#	4435#	4436#	4447#	4448#
4458#	4459#	4467#	4468#	4472#	4473#	4482#	4483#	4498#	4499#	4508#	4509#	4517#
4518#	4531#	4532#	4546#	4547#	4555#	4556#	4564#	4565#	4573#	4574#	4590#	4591#
4599#	4600#	4609#	4610#	4623#	4624#	4632#	4633#	4636#	4675#	4676#	4718#	4719#
4763#	4764#	4770#	4771#	4805#	4846#	4847#	4913#	4980#	4983#	5013#	5014#	5078#
5109#	5110#	5122#	5123#	5131#	5132#	5140#	5141#	5149#	5150#	5158#	5159#	5169#
5181#	5182#	5194#	5195#	5203#	5204#	5212#	5213#	5221#	5222#	5230#	5231#	5241#
5244#	5274#	5275#	5281#	5282#	5326#	5327#	5340#	5341#	5349#	5350#	5363#	5364#
5378#	5379#	5387#	5388#	5401#	5402#	5415#	5416#	5425#	5426#	5436#	5437#	5445#
5446#	5454#	5455#	5473#	5474#	5484#	5485#	5494#	5533#	5534#	5554#	5555#	5570#
5571#	5579#	5580#	5593#	5594#	5620#	5621#	5629#	5630#	5648#	5649#	5662#	5663#
5673#	5676#	5829#	5860#	5861#	5868#	5869#	5946#	5947#	5981#	5982#	5996#	5997#
6004#	6090#	6091#	6130#	6131#	6157#	6158#	6168#	6171#	6229#	6230#	6262#	6263#
6310#	6344#	6345#	6392#	6426#	6427#	6474#	6508#	6509#	6556#	6584#	6585#	6610#
6638#	6639#	6664#	6669#	6694#	6695#	6728#	6751#	6752#	6770#	6797#	6798#	6803#
6804#	6826#	6827#	6921#	6939#	6940#	6997#	7000#	7200#	7201#	7206#	7207#	7227#
7228#	7278#	7279#	7299#	7310#	7311#	7398#	7399#	7453#	7456#	8010#	8015#	8020#
8026#	8030#	8036#	8041#	8063#	8076#							
1177#	4059#	4061#	4429#	4669#	4839#	4852#	4919#	5007#	5098#	5102#	5174#	5268#
5291#	5499#	5855#	5874#	6013#	6223#	6250#	6332#	6414#	6496#	6572#	6626#	6685#
6745#	6792#	6819#	6931#	7195#	7220#	7303#	8081#					
1177#	2814#	2848#	2879#	2889#	2905#	2922#	2932#	2942#	2949#	2959#	2964#	2977#
2983#	2993#	3008#	3022#	3040#	3050#	3070#	3090#	3110#	3115#	3124#	3133#	3146#
3154#	3162#	3169#	3174#	3184#	3190#	3207#	3215#	3225#	3230#	3242#	3248#	3254#
3260#	3270#	3280#	3290#	3300#	3305#	3322#	3338#	3352#	3358#	3387#	3393#	3409#
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3585#	3592#	3606#	3619#	3627#	3637#	3644#	3657#	3665#	3678#	3685#	3697#	3733#
3739#	3745#	3751#	3770#	3775#	3788#	3808#	3865#	3871#	3882#	3890#	3898#	3934#
3953#	3958#	3964#	3980#	3983#	3986#	3998#	4001#	4014#	4062#	4068#	4070#	4077#
4079#	4084#	4089#	4102#	4104#	4109#	4114#	4119#	4135#	4137#	4143#	4153#	4155#
4162#	4167#	4175#	4181#	4194#	4196#	4201#	4206#	4219#	4221#	4226#	4231#	4246#
4251#	4256#	4263#	4265#	4270#	4275#	4289#	4291#	4296#	4301#	4313#	4315#	4320#
4325#	4330#	4343#	4348#	4358#	4362#	4366#	4401#	4433#	4435#	4445#	4447#	4456#
4458#	4465#	4467#	4472#	4480#	4482#	4486#	4496#	4498#	4506#	4508#	4515#	4517#
4529#	4531#	4544#	4546#	4553#	4555#	4559#	4564#	4571#	4573#	4588#	4590#	4594#
4599#	4607#	4609#	4621#	4623#	4627#	4632#	4637#	4643#	4673#	4675#	4681#	4713#
4718#	4725#	4732#	4741#	4758#	4763#	4768#	4770#	4783#	4800#	4806#	4844#	4846#
4853#	4864#	4900#	4914#	4920#	4931#	4967#	4981#	4984#	5011#	5013#	5027#	5064#
5079#	5103#	5107#	5109#	5120#	5122#	5129#	5131#	5138#	5140#	5147#	5149#	5156#
5158#	5164#	5170#	5175#	5179#	5181#	5192#	5194#	5201#	5203#	5210#	5212#	5219#
5221#	5228#	5230#	5236#	5242#	5245#	5272#	5274#	5281#	5292#	5321#	5326#	5338#
5340#	5347#	5349#	5361#	5363#	5376#	5378#	5385#	5387#	5396#	5401#	5413#	5415#
5423#	5425#	5434#	5436#	5443#	5445#	5452#	5454#	5461#	5468#	5473#	5479#	5484#
5495#	5500#	5528#	5533#	5552#	5554#	5568#	5570#	5577#	5579#	5588#	5593#	5618#
5620#	5627#	5629#	5636#	5643#	5648#	5657#	5662#	5674#	5677#	5713#	5860#	5866#
5868#	5875#	5941#	5946#	5969#	5976#	5981#	5991#	5996#	6005#	6014#	6085#	6090#

T\$TEST= 000015

T\$TSTM= 177777

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W3	= 003062	1888#	1889	3092										
W4	= 003064	1889#	1890											
W5	= 003066	1890#	1891											
W6	= 003070	1891#	1892											
W7	= 003072	1892#	1893											
W8	= 003074	1893#	1894											
W9	= 003076	1894#	1895											
XDATA	002260	1648#	3195	3332	3344	3513*	3514*	3631	3670					
XLOC0	032524	3485	5880	5893	5906	5985	6031	6050	6135	6175#				
XLOC1	032526	6176#												
XLOC2	032530	6177#												
XLOC3	032532	6178#												
XLOC4	032534	6179#												
XLOC5	032536	6180#												
XLOC6	032540	6181#												
XPMFG.M	036743	8037	8044#											
XPMINIT	030560	5296	5503	5685#	5876	6015								
XPMINTH	031124 G	5710	5798#											
XPMREAD	030776	5650	5762#	6138										
XPMRIT	030700	5356	5408	5547	5597	5731#	5896	6034						
XPMHOL	031122	5688*	5739*	5744	5770*	5775	5786	5791#						
XPMINT	031074	5740	5771	5785#										
XORGB	012162	3193	3324	3511#	3629	3667								
XORSH	005064	2511#	3024											
XVAL0	032542	3484	5880*	5892	6020*	6030	6045*	6148	6183#					
XVAL1	032544	6184#												
XVAL2	032546	6185#												
XVAL3	032550	6186#												
XVAL4	032552	6187#												
XVAL5	032554	6188#												
XVAL6	032556	6189#												
X\$ALMA=	000000	1177#												
X\$FALS=	000040	1177#												
X\$OFFS=	000400	1177#												
X\$TRUE=	000020	1177#												
\$E	= 000126	1595#	1998#	2038#	2078#	2121#	2184#	2737#	2742	2813#	2847#	4088#	4113#	4142#
		4161#	4180#	4205#	4230#	4250#	4274#	4300#	4324#	4347#	4485#	4558#	4593#	4626#
		4712#	4757#	4799#	4899#	4966#	5063#	5163#	5235#	5320#	5395#	5460#	5467#	5478#
		5527#	5587#	5635#	5642#	5656#	5820#	5940#	5968#	5975#	5990#	6084#	6117#	6124#
		6151#	6269#	6279#	6293#	6303#	6351#	6361#	6375#	6385#	6433#	6443#	6457#	6467#
		6515#	6525#	6539#	6549#	6593#	6603#	6647#	6657#	6721#	6764#	6866#	6910#	6967#
		6985#	7251#	7267#	7291#	7340#	7368#	7386#	7417#	7430#	7441#			
\$LSTIN=	000001	1181#												
\$LSTTA=	000001	1182#												
\$MPCSR=	160000 G	1710#	1715	1716	1718	1719	1721	1722	1724	1725	1727	1728	1730	1731
		1733	1734	1736	1737									
\$T	= 000015	1595#	4015#	4413#	4655#	4807#	4840	4985#	5080#	5246#	5832#	6198#	6671#	6730#
		6772#	6793	7026#	7196									
.	= 037124	1173#	1782	1807#	1808	1879#	1920#	1936#	2010#	3232#	3307#	3455#	3499#	3909#
		4071	4075	4080	4082	4085	4100	4105	4107	4110	4120	4133	4138	4151
		4156	4168	4173	4176	4192	4197	4199	4202	4217	4222	4224	4227	4244
		4247	4257	4261	4266	4268	4271	4287	4292	4294	4297	4311	4316	4318
		4321	4331	4341	4344	4356	4436	4443	4448	4454	4459	4463	4468	4470
		4473	4478	4483	4494	4499	4504	4509	4513	4518	4527	4532	4536	4542
		4547	4551	4556	4565	4569	4574	4586	4591	4600	4605	4610	4619	4624
		4633	4676	4719	4764	4771	4847	5014	5105	5110	5118	5123	5127	5132

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CROSS REFERENCE TABLE -- USER SYMBOLS

5136	5141	5145	5150	5154	5159	5177	5182	5190	5195	5199	5204	5208
5213	5217	5222	5226	5231	5275	5282	5327	5336	5341	5345	5350	5359
5364	5374	5379	5383	5388	5402	5411	5416	5421	5426	5432	5437	5441
5446	5450	5455	5474	5485	5534	5550	5555	5566	5571	5575	5580	5594
5616	5621	5625	5630	5649	5663	5858	5861	5869	5947	5982	5997	6091
6131	6158	6230	6263	6288	6345	6370	6427	6452	6509	6534	6585	6588
6639	6642	6695	6717	6752	6798	6804	6812	6814	6827	6940	6962	7201
7207	7215	7217	7228	7279	7311	7399	7868	7991#	8045#	8067#		

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CROSS REFERENCE TABLE -- MACRO NAMES

IOSETU	10	11770													
IOSTAR	10	11770													
KT11	10	11770													
LASTAD	10	11770	8076												
MANUAL	10	11770													
MEMORY	10	11770													
MSG	40150	4021	44130	4419	46550	4661	48070	4813	49850	4991	50800	5086	52460	5252	58320
	5838	61900	6204	66710	6677	67300	6736	67720	6778	70260	7032				
M#BYTE	10	11770	12070	1213	1214	1215									
M#CHEC	10	11770	52740	52810	58600	58680	62290	67970	68030	72000	72060				
M#CNT0	10	11770	80100	80150	80200	80260	80300	80360							
M#COUN	10	11770	29000	29160	29270	29350	29450	29520	29720	29800	29890	29980	30120	30300	30460
	30540	30740	30940	31420	31490	31570	31650	31810	31870	31950	32120	32220	32390	32450	32510
	32570	32630	32730	32830	32930	33170	33320	33430	33790	34060	34120	34250	34440	34700	34760
	34830	35240	35320	35460	35530	35670	35740	35880	35950	36160	36230	36310	36400	36540	36610
	36690	36810	36940	37840	38600	38680									
M#DATA	10	11770	12070	1216	1218	1220	1222	1224	1226	1228	1230	1232	1234	1236	1238
	1240	1242	1244	12460	1248	1250	1253	1256	1258	1260	1262	1264	1266	1268	1270
	1272	1274	1276	1278	1280	1282	1284	1286	1288	1290	19160	19280			
M#DECR	10	11770	13530	13660	28260	28600	28780	28880	29630	31140	31230	31320	31730	32290	33040
	33570	33920	34510	34960	37190	38970	39630	39850	40000	40130	43610	43650	46360	48050	49130
	49800	49830	50780	51690	52410	52440	54940	56730	56760	58290	60040	61680	61710	63100	63920
	64740	65560	66100	66640	66690	67280	67700	69210	69970	70000	72990	74530	74560	80410	80630
	80760														
M#DEFA	10	11770	80100	80150	80200	80260	80300	80360							
M#ENDE	10	11770	13530	13660	28260	28600	28780	28880	29630	31140	31230	31320	31730	32290	33040
	33570	33920	34510	34960	38970	39630	39850	40000	40130	43610	43650	46360	48050	49130	49800
	49830	50780	51690	52410	52440	54940	56730	56760	58290	60040	61680	61710	63100	63920	64740
	65560	66100	66640	66690	67280	67700	69210	69970	70000	72990	74530	74560	80410	80630	80760
M#ERRI	10	11770	28140	28480	40890	41140	41430	41620	41810	42060	42310	42510	42750	43010	43250
	43480	44860	45590	45940	46270	47130	47580	48000	49000	49670	50640	51640	52360	53210	53960
	54610	54680	54790	55280	55880	56360	56430	56570	59410	59690	59760	59910	60850	61180	61250
	61520	62700	62800	62940	63040	63320	63620	63760	63860	64340	64440	64580	64680	65160	65260
	65400	65500	65940	66040	66480	66580	67220	67650	68670	69110	69680	69860	72520	72680	72920
	73410	73690	73870	74180	74310	74420									
M#ESCA	10	11770	40700	4071	40790	4080	40840	4085	41040	4105	41090	4110	41190	4120	41370
	4138	41550	4156	41670	4168	41750	4176	41960	4197	42010	4202	42210	4222	42260	4227
	42460	4247	42560	4257	42650	4266	42700	4271	42910	4292	42960	4297	43150	4316	43200
	4321	43300	4331	43430	4344	44350	4436	44470	4448	44580	4459	44670	4468	44720	4473
	44820	4483	44980	4499	45080	4509	45170	4518	45310	4532	45460	4547	45550	4556	45640
	4565	45730	4574	45900	4591	45990	4600	46090	4610	46230	4624	46320	4633	46750	4676
	47180	4719	47630	4764	47700	4771	48460	4847	50130	5014	51090	5110	51220	5123	51310
	5132	51400	5141	51490	5150	51580	5159	51810	5182	51940	5195	52030	5204	52120	5213
	52210	5222	52300	5231	53260	5327	53400	5341	53490	5350	53630	5364	53780	5379	53870
	5388	54010	5402	54150	5416	54250	5426	54360	5437	54450	5446	54540	5455	54730	5474
	54840	5485	55330	5534	55540	5555	55700	5571	55790	5580	55930	5594	56200	5621	56290
	5630	56480	5649	56620	5663	59460	5947	59810	5982	59960	5997	60900	6091	61300	6131
	61570	6158	62620	6263	63440	6345	64260	6427	65080	6509	65840	6585	66380	6639	66940
	6695	67510	6752	68260	6827	59390	6940	72270	7228	72780	7279	73100	7311	73980	7399
M#ESCS	10	11770	40700	40790	40840	41040	41090	41190	41370	41550	41670	41750	41960	42010	42210
	42260	42460	42560	42650	42700	42910	42960	43150	43200	43300	43430	44350	44470	44580	44670
	44720	44820	44980	45080	45170	45310	45460	45550	45640	45730	45900	45990	46090	46230	46320
	46750	47180	47630	47700	48460	50130	51090	51220	51310	51400	51490	51580	51810	51940	52030
	52120	52210	52300	53260	53400	53490	53630	53780	53870	54010	54150	54250	54360	54450	54540
	54730	54840	55330	55540	55700	55790	55930	56200	56290	56480	56620	59460	59810	59960	60900
	61300	61570	62620	63440	64260	65080	65840	66940	67510	68260	69390	72270	72780	73100	73100

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CROSS REFERENCE TABLE -- MACRO NAMES

MSEXCP	7398#														
MSEXIT	1#	1177#	8010#	8015#	8020#	8030#									
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MSEXSE	1#	1177#	5274#	5281#	5860#	5868#	6229#	6797#	6803#	7200#	7206#				
MEXTJ	1#	1177#	5274#	5281#	5860#	5868#	6229#	6797#	6803#	7200#	7206#				
M#GEN	1#	1177#	1179#	1207#	1216#	1218#	1220#	1222#	1224#	1226#	1228#	1230#	1232#	1234#	1236#
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	1270#	1272#	1274#	1276#	1278#	1280#	1282#	1284#	1286#	1288#	1290#	1303#	1328#	1329#	1353#
	1363#	1364#	1366#	1608#	1916#	1928#	2807#	2826#	2841#	2860#	2875#	2878#	2884#	2888#	2894#
	2963#	2969#	3114#	3120#	3123#	3129#	3132#	3138#	3173#	3179#	3229#	3237#	3304#	3312#	3357#
	3364#	3392#	3398#	3451#	3468#	3496#	3714#	3727#	3897#	3927#	3963#	3977#	3985#	3995#	4000#
	4011#	4013#	4059#	4061#	4361#	4365#	4429#	4636#	4669#	4805#	4839#	4852#	4913#	4919#	4980#
	4983#	5007#	5078#	5098#	5102#	5169#	5174#	5241#	5244#	5268#	5291#	5494#	5499#	5673#	5676#
	5798#	5829#	5855#	5874#	6004#	6013#	6168#	6171#	6223#	6250#	6310#	6332#	6392#	6414#	6474#
	6496#	6556#	6572#	6610#	662#	6664#	6669#	6685#	6728#	6745#	6770#	6792#	6819#	6921#	6931#
	6997#	7000#	7195#	7220#	7299#	7303#	7453#	7456#	8007#	8042#	8061#	8064#	8080#		
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M#GETS	1#	1177#	1353#	1366#	2826#	2860#	2878#	2888#	2963#	3114#	3123#	3132#	3173#	3229#	3304#
	3357#	3392#	3451#	3496#	3719#	3897#	3963#	3985#	4000#	4013#	4361#	4365#	4636#	4805#	4913#
	4980#	4983#	5078#	5169#	5241#	5244#	5494#	5673#	5676#	5829#	6004#	6168#	6171#	6310#	6392#
	6474#	6556#	6610#	6664#	6669#	6728#	6770#	6921#	6997#	7000#	7299#	7453#	7456#	8041#	8063#
	8076#														
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	4226#	4246#	4256#	4265#	4270#	4291#	4296#	4315#	4320#	4330#	4343#	4435#	4447#	4458#	4467#
	4472#	4482#	4498#	4508#	4517#	4531#	4546#	4555#	4564#	4573#	4590#	4599#	4609#	4623#	4632#
	4675#	4718#	4763#	4770#	4846#	5013#	5109#	5122#	5131#	5140#	5149#	5158#	5181#	5194#	5203#
	5212#	5221#	5230#	5274#	5281#	5326#	5340#	5349#	5363#	5378#	5387#	5401#	5415#	5425#	5436#
	5445#	5454#	5473#	5484#	5533#	5554#	5570#	5579#	5593#	5620#	5629#	5648#	5662#	5860#	5868#
	5946#	5981#	5996#	6090#	6130#	6157#	6229#	6262#	6344#	6426#	6508#	6584#	6638#	6694#	6751#
	6797#	6803#	6826#	6939#	7200#	7206#	7227#	7278#	7310#	7398#					
M#GNGB	1#	1177#	1179#	1207#	1216#	1218#	1220#	1222#	1224#	1226#	1228#	1230#	1232#	1234#	1236#
	1238#	1240#	1242#	1244#	1246#	1248#	1250#	1253#	1256#	1258#	1260#	1262#	1264#	1266#	1268#
	1270#	1272#	1274#	1276#	1278#	1280#	1282#	1284#	1286#	1288#	1290#	1302#	1303	1327#	1328
	1329	1362#	1363	1364	1606#	1916#	1928#	2807#	2841#	2875#	2884#	2894#	2969#	3120#	3129#
	3138#	3179#	3237#	3312#	3364#	3398#	3468#	3714#	3727#	3927#	3977#	3995#	4011#	5798#	8006#
	8007	8060#	8061	8077#	8080										
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	1235	1236#	1237	1238#	1239	1240#	1241	1242#	1243	1244#	1245	1246#	1247	1248#	1249
	1250#	1251	1252	1253#	1254	1255#	1256#	1257	1258#	1259	1260#	1261	1262#	1263	1264#
	1265	1266#	1267	1268#	1269	1270#	1271	1272#	1273	1274#	1275	1276#	1277	1278#	1279
	1280#	1281	1282#	1283	1284#	1285	1286#	1287	1288#	1289	1290#	1291	1302#	1304#	1305#
	1306#	1307#	1308#	1309#	1310#	1311#	1312#	1313#	1314#	1315#	1316#	1327#	1362#	1916#	1917
	1920	1928#	1929	1936	1999	2000	2001	2002	2039	2040	2041	2042	2079	2080	2081
	2082	2122	2123	2124	2125	2185	2186	2187	2188	2738	2739	2740	2741	2814#	2815#
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	2993#	2994	2998#	2999	3000#	3001	3002#	3003	3004#	3005#	3006#	3007	3008#	3009	3012#
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	3034#	3035	3036#	3037#	3038#	3039	3040#	3041	3046#	3047#	3048#	3049	3050#	3051	3054#
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	3070#	3071	3074#	3075	3076#	3077	3078#	3079	3080#	3081	3082#	3083	3084#	3085	3086#

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CROSS REFERENCE TABLE -- MACRO NAMES

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3146#	3147	3149#	3150	3151#	3152#	3153	3154#	3155	3157#	3158	3159#	3160#	3161	3162#
3163	3165#	3166#	3167#	3168	3169#	3170	3174#	3181#	3182#	3183	3184#	3185	3187#	3188#
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3241	3242#	3243	3245#	3246#	3247	3248#	3249	3251#	3252#	3253	3254#	3255	3257#	3258#
3259	3260#	3261	3263#	3264#	3265#	3266#	3267#	3268#	3269	3270#	3271	3273#	3274#	3275#
3276#	3277#	3278#	3279	3280#	3281	3283#	3284#	3285#	3286#	3287#	3288#	3289	3290#	3291
3293#	3294#	3295#	3296#	3297#	3298#	3299	3300#	3301	3305#	3317#	3318#	3319#	3320#	3321
3322#	3323	3332#	3333#	3334#	3335#	3336#	3337	3338#	3339	3343#	3344	3345#	3346	3347#
3348	3349#	3350#	3351	3352#	3353	3358#	3379#	3380	3381#	3382	3383#	3384#	3385#	3386
3387#	3388	3393#	3406#	3407#	3408	3409#	3410	3412#	3413	3414#	3415	3416#	3417	3418#
3419#	3420#	3421	3422#	3423	3425#	3426	3427#	3428	3429#	3430	3431#	3432	3433#	3434
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3473#	3474	3476#	3477#	3478	3479#	3480	3483#	3484#	3485#	3486#	3487#	3488	3489#	3490
3497#	3524#	3525#	3526#	3527#	3528	3529#	3530	3532#	3533	3534#	3535	3536#	3537	3538#
3539	3540#	3541#	3542	3543#	3544	3546#	3547#	3548#	3549	3550#	3551	3553#	3554	3555#
3556	3557#	3558	3559#	3560	3561#	3562#	3563	3564#	3565	3567#	3568#	3569#	3570	3571#
3572	3574#	3575	3576#	3577	3578#	3579	3580#	3581	3582#	3583#	3584	3585#	3586	3588#
3589#	3590#	3591	3592#	3593	3595#	3596	3597#	3598	3599#	3600	3601#	3602	3603#	3604#
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CROSS REFERENCE TABLE -- MACRO NAMES

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CROSS REFERENCE TABLE -- MACRO NAMES

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	3694#	3695	3766#	3767	3768	3769	3784#	3785	3786	3860#	3861	3862	3863	3868#	3869
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	5712	6829#	6830	6831	6832	6942#	6943	6944	6945	7236#	7237	7238	7239	7323#	7324
	7325	7326													
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	3124	3132#	3133	3142#	3146	3149#	3154	3157#	3162	3165#	3169	3173#	3174	3181#	3184
	3187#	3190	3195#	3207	3212#	3215	3222#	3225	3229#	3230	3239#	3242	3245#	3248	3251#
	3254	3257#	3260	3263#	3270	3273#	3280	3283#	3290	3293#	3300	3304#	3305	3317#	3322
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	3532#	3543	3546#	3550	3553#	3564	3567#	3571	3574#	3585	3588#	3592	3595#	3606	3616#
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	3952#	3953	3957#	3958	3963#	3964	3979#	3980	3982#	3983	3985#	3986	3998#	4000#	4001
	4013#	4014	4061#	4062	4068#	4070#	4077#	4079#	4084#	4089	4102#	4104#	4109#	4114	4119#
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	4226#	4231	4246#	4251	4256#	4263#	4265#	4270#	4275	4289#	4291#	4296#	4301	4313#	4315#
	4320#	4325	4330#	4343#	4348	4358#	4361#	4362	4365#	4366	4401#	4433#	4435#	4445#	4447#
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CVDNBCO DMV11 MCTRL DIAG #2
CVDN3C.P11 12-SEP-84 05:04

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CROSS REFERENCE TABLE -- MACRO NAMES

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	7327	7341	7364#	7365	7369	7382#	7383	7387	7395#	7398#	7410#	7411	7418	7431	7442
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	3174#	3184#	3190#	3207#	3215#	3225#	3230#	3242#	3248#	3254#	3260#	3270#	3280#	3290#	3300#
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CVDMBCO DMV11 MCTRL DIAG #2 MACY11 30A(1052) 27-SEP-84 09:05 PAGE 219
CVDMBC.P11 12-SEP-84 05:04 CROSS REFERENCE TABLE -- MACRO NAMES

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XFERF	1#	1177#													
XFERT	1#	1177#													
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	4485	4558	4593	4626	4712	4757	4799	4899	4966	5063	5163	5235	5320	5395	5460
	5467	5478	5527	5587	5635	5642	5656	5940	5968	5975	5990	6084	6117	6124	6151
	6269	6279	6293	6303	6351	6361	6375	6385	6433	6443	6457	6467	6515	6525	6539
	6549	6593	6603	6647	6657	6721	6764	6866	6910	6967	6985	7251	7267	7291	7340
	7368	7386	7417	7430	7441										
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\$GESF	1595#														
\$GESFT	1595#														
\$GTDF	1595#	1998	2038	2078	2121	2184	2737	5820							
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\$GTSFT	1595#														

. ABS. 037124 000

ERRORS DETECTED: 0

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