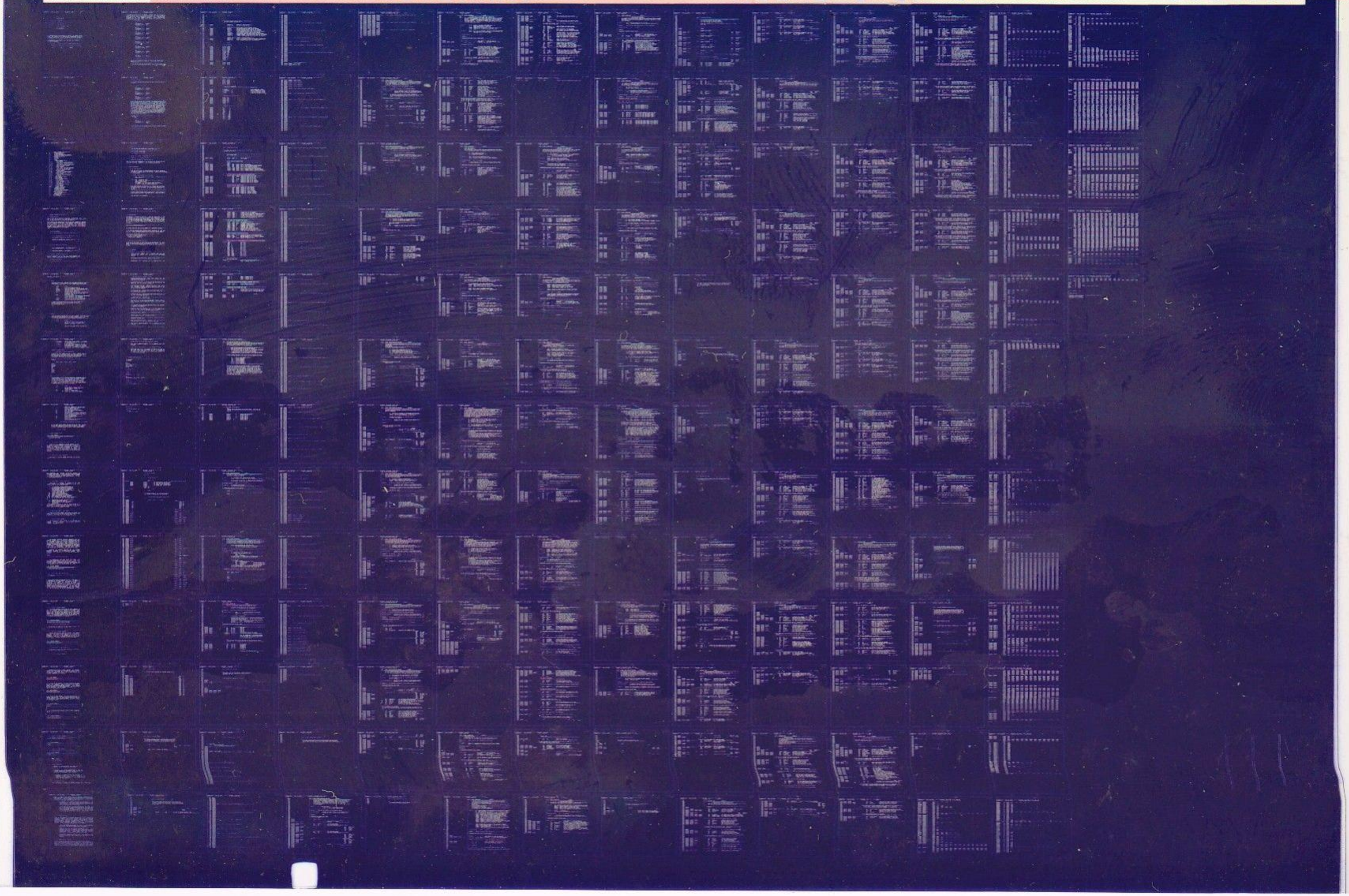
DHV11

DHV-11 FUNC TST PT1
CVDHAA0

AH-T653A-MC
FICHE 1 OF 1



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.REM &
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!DENTIFICATION

PRODUCT CODE: AC-T652A-MC

PRODUCT NAME: CVDHAA0 DHV-11 FUNC TST PART1

PRODUCT DATE: 31 OCTOBER 1983

MAINTAINER: EDSHE - DIAGNOSTICS GROUP

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

ORIGINAL RELEASE: 31-OCT-83 BERT KLEINSCHMIDT

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1.0 GENERAL PROGRAM CONSIDERATIONS

1.1 PROGRAM ABSTRACT

CVDHA IS PART ONE OF THE DHV-11 FUNCTIONAL VERIFICATION TEST. THIS PART OF THE TEST VERIFIES THAT RESET AND REGISTER ACCESS FUNCTIONS OF THE DHV BOARD UNDER TEST ARE FUNCTIONING CORRECTLY.

THIS DIAGNOSTIC HAS BEEN WRITTEN FOR USE WITH THE DIAGNOSTIC RUNTIME SERVICES SOFTWARE (SUPERVISOR). THESE SERVICES PROVIDE THE INTERFACE TO THE OPERATOR AND TO THE SOFTWARE ENVIRONMENT. THIS PROGRAM CAN BE USED WITH XXDP+, ACT, APT, SLIDE AND PAPER TAPE. FOR A COMPLETE DESCRIPTION OF THE RUNTIME SERVICES, REFER TO THE XXDP+ USER'S MANUAL. THERE IS A BRIEF DESCRIPTION OF THE RUNTIME SERVICES IN THE OPERATING INSTRUCTIONS-COMMANDS OF THIS DOCUMENT.

1.2 SYSTEM REQUIREMENTS

THE FOLLOWING HARDWARE IS REQUIRED TO RUN THE DHV FVT:

- O LSI-11 PROCESSOR WITH AT LEAST 32 KBYTES OF RAM.
- O DHV11 BOARDS INSTALLED ON THE Q-BUS.
- O APPROPRIATE PROGRAM LOAD DEVICE SUPPORTING XXDP+ MEDIA OR A DOWN-LINE LOADING SYSTEM.

1.3 RELATED DOCUMENTS AND STANDARDS

- O DHV-11 HARDWARE MANUAL - THIS MANUAL DESCRIBES THE FUNCTIONS AND USES OF THE DHV-11 DEVICE.
- O XXDP+ USER'S MANUAL - DESCRIBES THE RUNNING OF DIAGNOSTICS UNDER THE XXDP+ MONITOR.

1.4 DIAGNOSTIC HIERARCY PREREQUISITES

THE LSI-11 PROCESSOR, THE Q-BUS, THE SYSTEM MEMORY, THE CONSOLE TERMINAL, AND THE LOAD MEDIA ARE ASSUMED TO HAVE BEEN TESTED AND FOUND WORKING BEFORE THIS PROGRAM IS RUN.

2.0 OPERATING INSTRUCTIONS

THIS SECTION CONTAINS A BRIEF DESCRIPTION OF THE RUNTIME

SERVICES. FOR DETAILED INFORMATION, REFER TO THE XXDP+ USER'S MANUAL (CHQUS).

2.1 COMMANDS

THERE ARE ELEVEN LEGAL COMMANDS FOR THE DIAGNOSTIC RUNTIME SERVICES (SUPERVISOR). THIS SECTION LISTS THE COMMANDS AND GIVES A VERY BRIEF DESCRIPTION OF THEM. THE XXDP+ USER'S MANUAL HAS MORE DETAILS.

COMMAND	EFFECT
START	START THE DIAGNOSTIC FROM AN INITIAL STATE
RESTART	START THE DIAGNOSTIC WITHOUT INITIALIZING
CONTINUE	CONTINUE AT TEST THAT WAS INTERRUPTED (AFTER ^C)
PROCEED	CONTINUE FROM AN ERROR HALT
EXIT	RETURN TO XXDP+ MONITOR (XXDP+ OPERATION ONLY!)
ADD	ACTIVATE A UNIT FOR TESTING (ALL UNITS ARE CONSIDERED TO BE ACTIVE AT START TIME
DROP	DEACTIVATE A UNIT
PRINT	PRINT STATISTICAL INFORMATION (IF IMPLEMENTED BY THE DIAGNOSTIC - SEE PERFOMANCE AND PROGRESS REPORTS SECTION OF THIS DOCUMENT)
DISPLAY	TYPE A LIST OF ALL DEVICE INFORMATION
FLAGS	TYPE THE STATE OF ALL FLAGS (SEE FLAGS SECTION)
ZFLAGS	CLEAR ALL FLAGS (SEE FLAGS SECTION)

A COMMAND CAN BE RECOGNIZED BY THE FIRST THREE CHARACTERS. SO YOU MAY, FOR EXAMPLE, TYPE "STA" INSTEAD OF "START". MORE INFORMATION CAN BE FOUND WITHIN THE SECTION LABELLED EXTENDED COMMAND SYNTAX

2.2 SWITCHES

THERE ARE SEVERAL SWITCHES WHICH ARE USED TO MODIFY SUPERVISOR OPERATION. THESE SWITCHES ARE APPENDED TO THE LEGAL COMMANDS. ALL OF THE LEGAL SWITCHES ARE TABULATED BELOW WITH A BRIEF DESCRIPTION OF EACH. IN THE DESCRIPTIONS BELOW, A DECIMAL NUMBER IS DESIGNATED BY "DDDDD".

SWITCH	EFFECT
/TESTS:LIST	EXECUTE ONLY THOSE TESTS SPECIFIED IN THE LIST. LIST IS A STRING OF TEST NUMBERS, FOR EXAMPLE - /TESTS:1:5:7-10. THIS LIST WILL CAUSE TESTS 1,5,7,8,9,10 TO BE RUN. ALL OTHER TESTS WILL NOT BE RUN.

```
                /PASS:DDDDD     EXECUTE DDDDD PASSES (DDDDD = 1 TO 64000)
                /FLAGS:FLGS     SET SPECIFIED FLAGS.SEE THE FLAGS SECTION
                                OF THIS DOCUMENT.
                /EOP:DDDDD      REPORT END OF PASS MESSAGE AFTER EVERY
                                DDDDD PASSES ONLY.  (DDDDD = 1 TO 64000)
                /UNITS:LIST     TEST/ADD/DROP ONLY THOSE UNITS SPECIFIED
                                IN THE LIST.  LIST EXAMPLE - /UNITS:0:5:10-12
                                USE UNITS 0,5,10,11,12 (UNIT NUMBERS = 0-63)

        EXAMPLE OF SWITCH USAGE:

                START/TESTS:1-5/PASS:1000/EOP:100

        THE EFFECT OF THIS COMMAND WILL BE: 1) TESTS 1 THROUGH 5 WILL BE
        EXECUTED, 2) ALL UNITS WILL TESTED 1000 TIMES AND 3) THE END OF
        PASS MESSAGES WILL BE PRINTED AFTER EACH 100 PASSES ONLY.  A
        SWITCH CAN BE RECOGNIZED BY THE FIRST THREE CHARACTERS.  YOU MAY,
        FOR EXAMPLE, TYPE "/TES:1-5" INSTEAD OF "/TESTS:1-5".

        BELOW IS A TABLE THAT SPECIFIES WHICH SWITCHES CAN BE USED BY EACH
        COMMAND.

                TESTS   PASS    FLAGS   EOP     UNITS
                ------------------------------------
        START     X       X       X       X       X
        RESTART   X       X       X       X       X
        CONTINUE          X       X       X
        PROCEED                   X
        DROP                                      X
        ADD                                       X
        PRINT
        DISPLAY                                   X
        FLAGS
        ZFLAGS
        EXIT


2.3  FLAGS

        FLAGS ARE USED TO SET UP CERTAIN OPERATIONAL PARAMETERS SUCH AS
        LOOPING ON ERROR.  ALL FLAGS ARE CLEARED AT STARTUP AND REMAIN
        CLEARED UNTIL EXPLICITLY SET USING THE FLAGS SWITCH.  FLAGS
        ARE ALSO CLEARED AFTER A START COMMAND UNLESS SET USING THE
        FLAG SWITCH.  THE ZFLAGS COMMAND MAY ALSO BE USED TO CLEAR
        ALL FLAGS.  WITH THE EXCEPTION OF THE START AND ZFLAGS COMMANDS,
        NO COMMANDS AFFECT THE STATE OF THE FLAGS;  THEY REMAIN SET OR
        CLEARED AS SPECIFIED BY THE LAST FLAG SWITCH.

                FLAG            EFFECT
                ----            ----------------------------------
                HOE             HALT ON ERROR - CONTROL IS RETURNED TO
                                RUNTIME SERVICES COMMAND MODE
                LOE             LOOP ON ERROR
                IER*            INHIBIT ALL ERROR REPORTS
                IBR*            INHIBIT ALL ERROR REPORTS EXCEPT
                                FIRST LEVEL  (FIRST LEVEL CONTAINS
```

```
                        PROGRAM DOCUMENT

                        ERROR TYPE, NUMBER, PC, TEST AND UNIT)
                IXR*    INHIBIT EXTENDED ERROR REPORTS (THOSE
                        CALLED BY PRINTX MACRO'S)
                PRI     DIRECT MESSAGES TO LINE PRINTER
                PNT     PRINT TEST NUMBER AS TEST EXECUTES
                BOE     "BELL" ON ERROR
                UAM     UNATTENDED MODE (NO MANUAL INTERVENTION)
                ISR     INHIBIT STATISTICAL REPORTS (DOES NOT
                        APPLY TO DIAGNOSTICS WHICH DO NOT SUPPORT
                        STATISTICAL REPORTING)
                IDR     INHIBIT PROGRAM DROPPING OF UNITS
                ADR     EXECUTE AUTODROP CODE
                LOT     LOOP ON TEST
                EVL     EXECUTE EVALUATION (ON DIAGNOSTICS WHICH
                        HAVE EVALUATION SUPPORT)

                *SEE THE ERROR INFORMATION SECTION OF THIS DOCUMENT.


    SEE THE XXDP+ USER'S MANUAL FOR MORE DETAILS ON FLAGS.  YOU MAY
    SPECIFY MORE THAN ONE FLAG WITH THE FLAG SWITCH.  FOR EXAMPLE,
    TO CAUSE THE PROGRAM TO LOOP ON ERROR, INHIBIT ERROR REPORTS
    AND TYPE A "BELL" ON ERROR, YOU MAY USE THE FOLLOWING STRING:

            /FLAGS:LOE:IER:BOE


2.4  EXTENDED COMMAND SYNTAX

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


2.4.1.1  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.), SEPERATED BY
COLONS, THAT SPECIFY THE TESTS TO BE EXECUTED.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 "EFFECT OF START COMMAND"
SECTION.


2.4.1.2  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).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 "EFFECT OF START COMMAND" SECTION.

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

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

HOE	HALT ON ERROR, CAUSING COMMAND MODE TO BE ENTERED WHEN AN ERROR IS ENCOUNTERED.
LOE	LOOP ON ERROR, CAUSING THE DIAGNOSTIC TO LOOP CONTINUOUSLY WITHIN THE SMALLEST DEFINED BLOCK OF CODING (SEGMENT, SUBTEST, OR TEST) CONTAINING THE ERROR.
IER	INHIBIT ERROR REPORTING.
IBE	INHIBIT BASIC ERROR REPORTS.
IXE	INHIBIT EXTENDED ERROR REPORTS.
PRI	DIRECT ALL MESSAGES TO A LINE PRINTER.
PNT	PRINT NUMBER OF TEST BEING EXECUTED.
BOE	BELL ON ERROR (NOT RELATED TO BELL PROMPTING).
UAM	RUN IN UNATTENDED MODE, BYPASSING MANUAL INTERVENTION (ILLEGAL FOR THIS DIAGNOSTIC).
ISR	INHIBIT STATISTICAL REPORTS.
IDU	INHIBIT DROPPING OF UNITS BY DIAGNOSTIC. (HAS NO EFFECT IN THIS 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 "EFFECT OF START COMMAND" SECTION.

2.4.1.4 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 "EFFECT OF START COMMAND" SECTION.

2.4.1.5 EFFECT OF START COMMAND -

THE EFFECT OF THE START COMMAND IS TO INITIATE THE HARDWARE PARAMETER DIALOGUE, THE SOFTWARE PARAMETER DIALOGUE, THE INITIALIZATION QUESTIONS, AND THEN THE DIAGNOSTIC COMMENCES TESTING.

THE HARDWARE PARAMETER DIALOGUE COMMENCES WITH THE QUESTION "# UNITS (D) ?" TO WHICH THE OPERATOR SHOULD REPLY WITH THE NUMBER OF UNITS TO BE TESTED. FOLLOWING THIS ARE THE QUESTIONS WHEREBY THE P-TABLES THEMSELVES ARE BUILT. EACH P-TABLE IS A CORE-RESIDENT TABLE CONTAINING ALL THE HARDWARE INFORMATION FOR ONE COMPLETE UNIT.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. FOR THE ACTUAL HARDWARE P-TABLE QUESTIONS SEE THE "HARDWARE PARAMETERS" SECTION.

FOLLOWING THE HARDWARE QUESTIONS ARE THE SOFTWARE QUESTIONS TO BUILD THE SOFTWARE TABLES, WHICH DEFINE OPERATING PARAMETERS OF THE DIAGNOSTIC PROGRAM. THESE QUESTIONS ARE DESCRIBED IN THE "SOFTWARE PARAMETERS" SECTION.

EXAMPLE:

```
STA/TESTS:1:3-4:/PASS:3/FLAGS:IER:HOE=1
```

THIS COMMAND WILL CAUSE THREE PASSES TO BE MADE, WITH EACH PASS CONSISTING OF TESTS 1,3, AND 4. 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.

2.4.2 RESTART COMMAND -

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

2.4.2.1 TESTS, PASS, AND FLAGS SWITCHES -

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

2.4.2.2 UNITS SWITCH (/UNITS:<UNIT-LIST>) - <UNIT-LIST> IS

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

COMMAND.

2.4.2.3 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 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, OR C) A CONTROL/C WAS ENTERED BY THE OPERATOR.

2.4.3 CONTINUE COMMAND -

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

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

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

2.4.3.2 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.

2.4.4 PROCEED COMMAND -

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

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

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

2.4.4.2 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.

2.4.5 ADD COMMAND -

****

ADD/UNITS:<UNIT-LIST>

****

2.4.6 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.

2.4.7 DROP COMMAND -

****

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

****

2.4.8 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.

2.4.9 PRINT COMMAND -

****

PRI(NT)

****

2.4.9.1 EFFECT OF PRINT COMMAND - ERROR SUMMARY REPORTING IS NOT IMPLEMENTED IN THIS DIAGNOSTIC, SO THIS COMMAND HAS NO EFFECT.

2.4.10 DISPLAY COMMAND -

****

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

****

2.4.10.1 EFFECT OF DISPLAY COMMAND -

THE HARDWARE P-TABLES FOR ALL UNITS ARE PRINTED IN THE FORMAT IN WHICH THEY WERE ENTERED.

2.4.11 FLAGS COMMAND -

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

2.4.11.1 EFFECT OF FLAGS COMMAND -

THE CURRENT SETTINGS OF ALL FLAGS ARE PRINTED.

2.4.12 ZFLAGS COMMAND -

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

2.4.13 ZFLAGS COMMAND -

ALL FLAGS ARE CLEARED.

2.4.14 CONTROL CHARACTERS -

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

Z A CONTROL/Z (Z) ENTERED DURING ONE OF THE TWO OPERATOR DIALOGUES-- HARDWARE P-TABLE DIALOGUE OR SOFTWARE P-TABLE DIALOGUE CAUSES THE DEFAULTS TO BE TAKEN FOR THE REMAINDER OF THAT DIALOGUE.

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

2.5 HARDWARE QUESTIONS

WHEN A DIAGNOSTIC IS STARTED, THE RUNTIME SERVICES WILL PROMPT THE USER FOR HARDWARE INFORMATION BY TYPING "CHANGE HW (L) ?" YOU MUST

ANSWER "Y" AFTER A START COMMAND UNLESS THE HARDWARE INFORMATION HAS BEEN "PRELOADED" USING THE SETUP UTILITY (SEE CHAPTER 6 OF THE XXDP+ USER'S MANUAL). WHEN YOU ANSWER THIS QUESTION WITH A "Y", THE RUNTIME SERVICES WILL ASK FOR THE NUMBER OF UNITS (IN DECIMAL). YOU WILL THEN BE ASKED THE FOLLOWING QUESTIONS FOR EACH UNIT:

1. CSR ADDRESS - THIS QUESTION REQUESTS THE CSR ADDRESS OF THE SPECIFIED DHV11. THE DEFAULT ANSWER FOR THIS QUESTION IS THE LOWEST ADDRESS IN THE PDP-11 FLOATING ADDRESS SPACE IN WHICH A DHV-11 CAN BE PLACED (160020 OCTAL).

2. ACTIVE LINES BIT MAP - THIS QUESTION REQUESTS AN OCTAL BIT MAP OF THE SERIAL COMMUNICATION LINES ON THE DHV11 WHICH ARE BEING SELECTED FOR TESTING. IF THE BIT IN THE BIT MAP IS SET WHICH CORRESPONDS TO A PARTICULAR LINE (I.E. BIT 3 FOR LINE 3) THAT LINE WILL BE TESTED BY THE FVT. THE DEFAULT ANSWER FOR THIS QUESTION IS 377 OCTAL WHICH SELECTS ALL LINES.

2.6 SOFTWARE QUESTIONS

AFTER YOU HAVE ANSWERED THE HARDWARE QUESTIONS OR AFTER A RESTART OR CONTINUE COMMAND, THE RUNTIME SERVICES WILL ASK FOR SOFTWARE PARAMETERS. THESE PARAMETERS WILL GOVERN SOME DIAGNOSTIC SPECIFIC OPERATION MODES. YOU WILL BE PROMPTED BY "CHANGE SW (L) ?" IF YOU WISH TO CHANGE ANY PARAMETERS, ANSWER BY TYPING "Y". THE FOLLOWING SOFTWARE P-TABLE QUESTIONS ARE ASKED BY THE PROGRAM IF THE OPERATOR INDICATES THAT THE SOFTWARE PARAMETERS ARE TO BE CHANGED:

1. REPORT UNIT NUMBER AS EACH UNIT IS TESTED - THIS QUESTION ASKS WHETHER THE PROGRAM SHOULD REPORT THE NUMBER OF THE UNIT WHICH IT IS TESTING AS IT BEGINS TO TEST EACH UNIT.

2. NUMBER OF INDIVIDUAL DATA ERRORS TO REPORT ON A LINE - THIS QUESTION ASKS FOR THE NUMBER OF DATA ERRORS WHICH SHOULD BE REPORTED INDIVIDUALLY BY THIS PROGRAM FOR EACH LINE FOR EACH TRANSMISSION TEST. ERRORS WHICH ARE NOT REPORTED INDIVIDUALLY ARE REPORTED IN SUMMARY ERROR REPORTS.

3. ROM VERSION PRINTOUT ON THE FIRST PASS - THIS QUESTION ASKS WHETHER THE PROGRAM SHOULD PRINT OUT THE VERSIONS OF THE ON BOARD 8051 PROCESSOR ROMS DURING THE FIRST PASS OF THE PROGRAM.

2.7 EXTENDED P-TABLE DIALOGUE

WHEN YOU ANSWER THE HARDWARE QUESTIONS, YOU ARE BUILDING ENTRIES IN A TABLE THAT DESCRIBES THE DEVICES UNDER TEST. THE SIMPLEST WAY TO BUILD THIS TABLE IS TO ANSWER ALL QUESTIONS FOR EACH UNIT TO BE TESTED. IF YOU HAVE A MULTIPLEXED DEVICE SUCH AS A MASS STORAGE CONTROLLER WITH SEVERAL DRIVES OR A COMMUNICATION DEVICE WITH SEVERAL LINES, THIS BECOMES TEDIOUS SINCE MOST OF THE ANSWERS ARE REPETITIOUS.

```
        TO ILLUSTRATE A MORE EFFICIENT METHOD, SUPPOSE YOU ARE TESTING A
        FICTIONAL DEVICE, THE XY11.  SUPPOSE THIS DEVICE CONSISTS OF A CONTROL
        MODULE WITH EIGHT UNITS (SUB-DEVICES) ATTACHED TO IT.  THESE UNITS ARE
        DESCRIBED BY THE OCTAL NUMBERS 0 THROUGH 7.  THERE IS ONE HARDWARE
        PARAMETER THAT CAN VARY AMONG UNITS CALLED THE Q-FACTOR.  THIS
        Q-FACTOR MAY BE 0 OR 1.  BELOW IS A SIMPLE WAY TO BUILD A TABLE FOR
        ONE XY11 WITH EIGHT UNITS.
                        # UNITS (D) ?  8<CR>

                        UNIT 1
                        CSR ADDRESS (O) ?  160000<CR>
                        SUB-DEVICE # (O) ?  0<CR>
                        Q-FACTOR (O) 0 ?  1<CR>

                        UNIT 2
                        CSR ADDRESS (O) ?  160000<CR>
                        SUB-DEVICE # (O) ?  1<CR>
                        Q-FACTOR (O) 1 ?  0<CR>

                        UNIT 3
                        CSR ADDRESS (O) ?  160000<CR>
                        SUB-DEVICE # (O) ?  2<CR>
                        Q-FACTOR (O) 0 ?  <CR>

                        UNIT 4
                        CSR ADDRESS (O) ?  160000<CR>
                        SUB-DEVICE # (O) ?  3<CR>
                        Q-FACTOR (O) 0 ?  <CR>

                        UNIT 5
                        CSR ADDRESS (O) ?  160000<CR>
                        SUB-DEVICE # (O) ?  4<CR>
                        Q-FACTOR (O) 0 ?  <CR>

                        UNIT 6
                        CSR ADDRESS (O) ?  160000<CR>
                        SUB-DEVICE # (O) ?  5<CR>
                        Q-FACTOR (O) 0 ?  <CR>

                        UNIT 7
                        CSR ADDRESS (O) ?  160000<CR>
                        SUB-DEVICE # (O) ?  6<CR>
                        Q-FACTOR (O) 0 ?  1<CR>

                        UNIT 8
                        CSR ADDRESS (O)  160000<CR>
                        SUB-DEVICE # (O) ?  7<CR>

                        Q-FACTOR (O) 1 ?  <CR>

        NOTICE THAT THE DEFAULT VALUE FOR THE Q-FACTOR CHANGES WHEN A
        NON-DEFAULT RESPONSE IS GIVEN.  BE CAREFUL WHEN SPECIFYING
        MULTIPLE UNITS!

        AS YOU CAN SEE FROM THE ABOVE EXAMPLE, THE HARDWARE PARAMETERS
        DO NOT VARY SIGNIFICANTLY FROM UNIT TO UNIT.  THE PROCEDURE SHOWN IS
```

NOT VERY EFFICIENT.

THE RUNTIME SERVICES CAN TAKE MULTIPLE UNIT SPECIFICATIONS HOWEVER.
LET'S BUILD THE SAME TABLE USING THE MULTIPLE SPECIFICATION
FEATURE.

```
# UNITS (D) ?  8<CR>

UNIT 1
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  0,1<CR>
Q-FACTOR (O) 0 ?  1,0<CR>

UNIT 3
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  2-5<CR>
Q-FACTOR (O) 0 ?  0<CR>

UNIT 7
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  6,7<CR>
Q-FACTOR (O) 0 ?  1<CR>
```

AS YOU CAN SEE IN THE ABOVE DIALOGUE, THE RUNTIME SERVICES WILL
BUILD AS MANY ENTRIES AS IT CAN WITH THE INFORMATION GIVEN IN ANY
ONE PASS THROUGH THE QUESTIONS. IN THE FIRST PASS, TWO ENTRIES
ARE BUILT SINCE TWO SUB-DEVICES AND Q-FACTORS WERE SPECIFIED. THE
SERVICES ASSUME THAT THE CSR ADDRESS IS 160000 FOR BOTH SINCE IT
WAS SPECIFIED ONLY ONCE. IN THE SECOND PASS, FOUR ENTRIES WERE
BUILT. THIS IS BECAUSE FOUR SUB-DEVICES WERE SPECIFIED. THE
"-" CONSTRUCT TELLS THE RUNTIME SERVICES TO INCREMENT THE DATA
FROM THE FIRST NUMBER TO THE SECOND. IN THIS CASE, SUB-DEVICES
2, 3, 4 AND 5 WERE SPECIFIED. (IF THE SUB-DEVICE WERE SPECIFIED
BY ADDRESSES, THE INCREMENT WOULD BE BY 2 SINCE ADDRESSES MUST
BE ON AN EVEN BOUNDARY.) THE CSR ADDRESSES AND Q-FACTORS FOR
THE FOUR ENTRIES ARE ASSUMED TO BE 160000 AND 0 RESPECTIVELY
SINCE THEY WERE ONLY SPECIFIED ONCE. THE LAST TWO UNITS ARE
SPECIFIED IN THE THIRD PASS.

THE WHOLE PROCESS COULD HAVE BEEN ACCOMPLISHED IN ONE PASS AS
SHOWN BELOW.

```
# UNITS (D) ?  8<CR>

UNIT 1
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  0-7<CR>
Q-FACTOR (O) 0 ?  0,1,0,,,,1,1<CR>
```

AS YOU CAN SEE FROM THIS EXAMPLE, NULL REPLIES (COMMAS ENCLOSING
A NULL FIELD) TELL THE RUNTIME SERVICES TO REPEAT THE LAST REPLY.

2.8 QUICK START-UP PROCEDURE (XXDP+)

TO START-UP THIS PROGRAM:

1. BOOT XXDP+
2. GIVE THE DATE AND ANSWER THE LSI AND 50HZ (IF THERE IS A CLOCK AND THE QUESTION IS ASKED) QUESTIONS
3. TYPE 'R NAME', WHERE NAME IS THE NAME OF THE BIN OR BIC FILE FOR THIS PROGRAM
4. TYPE 'START'
5. ANSWER THE 'CHANGE HW' QUESTION WITH 'Y'
6. ANSWER ALL THE HARDWARE QUESTIONS
7. ANSWER THE 'CHANGE SW' QUESTION WITH 'N'

WHEN YOU FOLLOW THIS PROCEDURE YOU WILL BE USING ONLY THE DEFAULTS FOR FLAGS AND SOFTWARE PARAMETERS. FOR DEFAULT INFORMATION SEE THE SECTIONS WITHIN THIS DOCUMENT ON FLAGS,AND HARDWARE QUESTIONS.

3.0 ERROR INFORMATION

3.1 TYPES OF ERROR MESSAGES

THERE ARE THREE LEVELS OF ERROR MESSAGES THAT MAY BE ISSUED BY A DIAGNOSTIC: GENERAL, BASIC AND EXTENDED. GENERAL ERROR MESSAGES ARE ALWAYS PRINTED UNLESS THE 'IER' FLAG IS SET (SEE THE FLAGS SECTION OF THIS DOCUMENT).

THE GENERAL ERROR MESSAGE IS OF THE FORM:

```
NAME  TYPE  NUMBER  ON UNIT NUMBER  TST NUMBER PC:XXXXXX
ERROR MESSAGE
```

,WHERE; NAME = DIAGNOSTIC NAME
TYPE = ERROR TYPE (SYS FATAL, DEV FATAL, HARD OR SOFT)
NUMBER = ERROR NUMBER
UNIT NUMBER = 0 - N (N IS LAST UNIT IN PTABLE)
TST NUMBER = TEST AND SUBTEST WHERE ERROR OCCURRED
PC:XXXXXX = ADDRESS OF ERROR MESSAGE CALL

BASIC ERROR MESSAGES ARE MESSAGES THAT CONTAIN SOME ADDITIONAL INFORMATION ABOUT THE ERROR. THESE ARE ALWAYS PRINTED UNLESS THE 'IER' OR 'IBR' FLAGS ARE SET (SEE THE FLAGS SECTION OF THIS DOCUMENT).
THESE MESSAGES ARE PRINTED AFTER THE ASSOCIATED GENERAL MESSAGE.

EXTENDED ERROR MESSAGES CONTAIN SUPPLEMENTARY ERROR INFORMATION SUCH AS REGISTER CONTENTS OR GOOD/BAD DATA. THESE ARE ALWAYS PRINTED UNLESS THE 'IER', 'IBR' OR 'IXR' FLAGS ARE SET (SEE THE

FLAGS SECTION OF THIS DOCUMENT).
THESE MESSAGES ARE PRINTED AFTER THE ASSOCIATED GENERAL ERROR

MESSAGE AND ANY ASSOCIATED BASIC ERROR MESSAGES.

3.2 ERROR MESSAGES

THIS PROGRAM IS INTENDED TO PROVIDE A GO/NO-GO INDICATION OF THE FUNCTIONALITY OF DHV-11 BOARDS. TO EXECUTE THE PROGRAM IN THIS MODE THE OPERATOR CAN RUN WITH THE INHIBIT BASIC ERROR REPORTING SWITCH. IN THIS MODE THE PROGRAM PRINTS ERROR MESSAGES WHICH CONTAIN THE ERROR MESSAGE HEADER DESCRIBED ABOVE, PLUS THE NAME OF THE FAILING TEST. FOR A LIST OF THE TEST NAMES IN THIS PROGRAM SEE THE TEST SUMMARIES SECTION OF THIS DOCUMENT. AN EXAMPLE OF SUCH AN ERROR MESSAGE IS THE FOLLOWING:

```
CVDHA DVC FTL ERR 01603 ON UNIT 02 TST 015 SUB 000 PC: 015244
DEVICE REGISTER WORD READ/WRITE TEST
```

THIS ERROR INDICATES THAT A FATAL ERROR WAS ENCOUNTERED WITHIN THE TEST WHICH TESTS THE READ/WRITE CAPABILITY OF THE DHV-11 REGISTERS.

IF THE OPERATOR REQUIRES MORE EXTENSIVE ERROR REPORTING HE CAN RUN WITH ALL ERROR REPORTING ENABLED BY NOT USING THE INHIBIT REPORTING SWITCHES. THE ABOVE ERROR MESSAGE WOULD THEN BECOME THE FOLLOWING:

```
CVDHA DVC FTL ERR 01603 ON UNIT 02 TST 015 SUB 000 PC: 015244
DEVICE REGISTER WORD READ/WRITE TEST
  BAD BIT(S) IN DEVICE TBUFFAD1 REGISTER FOR LINE  7 (D).
    EXPECTED DATA: 000000 (O).
    ACTUAL DATA:   000023 (O).
```

4.0 PERFORMANCE AND PROGRESS REPORTS

AT THE END OF EACH PASS, THE PASS COUNT IS GIVEN ALONG WITH THE TOTAL NUMBER OF ERRORS REPORTED SINCE THE DIAGNOSTIC WAS STARTED. THE "EOP" SWITCH CAN BE USED TO CONTROL HOW OFTEN THE END OF PASS MESSAGE IS PRINTED. FOR FUTHER INFORMATION SEE THE SWITCHES SECTION OF THIS DOCUMENT.

5.0 TEST SUMMARIES

THE FOLLOWING TESTS ARE INCLUDED WITHIN CVDHA:

1. DEVICE REGISTER ADDRESS TEST - VERIFIES THAT THE UUT REGISTERS WILL RESPOND WITHT THE PROPER Q-BUS HANDSHAKING WHEN ACCESSED. VERIFIES THAT THE UUT IS AT THE PROPER ADDRESS.

2. MASTER.RESET (SELFTEST) TEST - VERIFIES THAT THE MASTER.RESET BIT CLEARS WITHIN A SPECIFIED TIME OF IT BEING SET.

3. MASTER.RESET (SKIP SELFTEST) TEST - VERIFIES THAT THE MASTER.RESET BIT CLEARS WITHIN A SHORT TIME AFTER IT IS SET

IF THE SKIP SELFTEST SEQUENCE IS USED.

4. RECEPTION HANDSHAKING TESTS - THESE TESTS VERIFY THAT THE HANDSHAKING BITS WHICH ARE NECESSARY FOR THE READING OF CODES FROM THE FIFO ARE WORKING.

5. RX.CHARACTER FIELD TEST - VERIFIES THAT THE DATA BITS OF THE CODES IN THE FIFO AFTER A RESET AND SKIP SELFTEST ARE CONSISTANT WITH THE SKIP SELFTEST CODES.

6. RECEPTION FLAG FIELD TEST - VERIFIES THAT THE 3 DATA STATUS BITS (OVERRRUN, FRAMING, AND PARITY ERROR BITS) ARE ALL SET ON ALL OF THE SKIP SELFTEST CODES IN THE FIFO AFTER A RESET AND SKIP SELFTEST SEQUENCE.

7. RX.DATA.AVAIL TEST - VERIFIES THAT THE RX.DATA.AVAIL BIT IS SET WHEN THE SKIP SELFTEST CODES ARE IN THE FIFO AND THAT IT CLEARS AFTER THEY ARE READ.

8. RX.DATA.VALID TEST - VERIFIES THAT THE RX.DATA.VALID BIT IS SET FOR EACH VALID SKIP SELFTEST CODE IN THE FIFO AND CLEAR AFTER ALL VALID CODES ARE READ.

9. RX.LINE FIELD TEST - VERIFIES THAT THE RX.LINE FIELDS ARE CORRECT FOR THE SKIP SELFTEST CODES.

10. BMP RUN TEST - THIS TEST RUNS THE BMP AND VERIFIES THAT IT DOES NOT FAIL WITHIN A SPECIFIED PERIOD. THIS TEST SHOULD SIGNAL PROBLEMS THAT THE BMP CODES COULD CAUSE WITH LATER TESTS.

11. SKIP SELFTEST TEST - THIS TEST VERIFIES THAT IF THE SELFTEST IS SKIPPED THE PROPER CODES ARE PLACED IN THE FIFO AND THAT NO ERRORS ARE ENCOUNTERED.

12. DIAGNOSTIC.FAIL (SKIP SELFTEST) TEST - THIS TEST VERIFIES, BY USING THE SKIP SELFTEST SEQUENCE, THAT THE DIAGNOSTIC.FAIL BIT WILL GO TO BOTH THE ACTIVE AND INACTIVE STATES.

13. SELFTEST RUN TEST - VERIFIES THAT NO ERRORS ARE FOUND BY THE EXECUTION OF THE SELFTEST.

14. SELFTEST FAIL TEST - VERIFIES THAT THE SELFTEST WILL REPORT ERRORS CORRECTLY WHEN IT IS FORCED TO FAIL.

15. ROM VERSION PRINTOUT TEST - IF REQUESTED, REPORTS THE VERSION NUMBERS OF THE 8051 ROMS.

16. WORD ACCESS READ/WRITE TEST - VERIFIES THAT THE REGISTERS RESPOND CORRECTLY TO WORD READ AND WRITE ACCESSES.

17. WORD ACCESS READ/MODIFY/WRITE TEST - VERIFIES THAT THE REGISTERS RESPOND CORRECTLY TO READ/MODIFY/WRITE WORD ACCESSES.

18. BYTE ACCESS READ/WRITE TEST - VERIFIES THAT THE REGISTERS

RESPOND CORRECTLY TO BYTE READ AND WRITE ACCESSES.

19. BYTE ACCESS READ/MODIFY/WRITE TEST - VERIFIES THAT THE REGISTERS RESPOND CORRECTLY TO READ/MODIFY/WRITE BYTE ACCESSES.

20. ID.BIT TEST - VERIFIES THAT THE ID.BIT READS AS A ZERO.

21. REPORT BMP CODES TEST - THIS PSEUDO TEST REPORTS THE FIRST 32 BMP CODES WHICH WERE DISCOVERED IN THE FIFO DURING THE EXECUTION OF THE OTHER TESTS. THIS AVOIDS THE INTERRUPTION OF OTHER TESTS BY THESE CODES, IF THEY ARE NOT CRITICAL TO THE TESTS BEING PERFORMED.

6.0 EXAMPLE ERROR FREE PASS

THE FOLLOWING IS AN EXAMPLE OF AN ERROR FREE PASS DIALOGUE:

```
.R CVDHAA0
CVDHAA0.BIC

DRS
CVDHAA0
DHV-11 FUNC TST PART1
UNIT IS DHV-11
RESTART ADDR: 147670
DR>STA

CHANGE HW (L)  ? Y


# UNITS (D)  ? 2

UNIT 0
CSR ADDRESS:  (O)  160020 ? ^Z

UNIT 1
CSR ADDRESS:  (O)  160020 ? 160040
ACTIVE LINE BIT MAP:  (O)  377 ? 10

CHANGE SW (L) ? N

TESTING UNIT :  0

 ROM VERSION NUMBERS: PROC_1 =  1   PROC_2 =  1
```

```
CVDHAAO DHV-11 FUNC TST PART1   MACY11 30A(1052)  12-JUL-83  10:52  PAGE 21
CVDHAA.P11    12-JUL-83 00:42           PROGRAM DOCUMENT

        TESTING UNIT

         ROM VERSION NUMBERS: PROC_1 =  1   PROC_2 =  1

        CVDHA EOP    1
            0 CUMULATIVE ERRORS

        ...

                &
```

```
                                .LIST SEQ,LOC,BIN,MEB

                                .NLIST CND


                                .SBTTL  PROGRAM HEADER


                                        .MCALL  SVC
000000'                                 SVC                             ; INITIALIZE SUPERVISOR MACROS
        000001                  SVCINS= 1       ; LIST INSTRUCTIONS, SHIFTED RIGHT
        000001                  SVCTST= 1       ; LIST TEST TAGS, SHIFTED RIGHT
        000001                  SVCSUB= 1       ; LIST SUBTEST TAGS, SHIFTED RIGHT
        000001                  SVCGBL= 1       ; LIST GLOBAL TAGS, SHIFTED RIGHT
        000001                  SVCTAG= 1       ; LIST OTHER TAGS, SHIFTED RIGHT
                                .ENABL  ABS
                                .ENABL  AMA
        002000                  .       =       2000

002000                                  BGNMOD

                                ;++
                                ; THE PROGRAM HEADER IS THE INTERFACE BETWEEN
                                ; THE DIAGNOSTIC PROGRAM AND THE SUPERVISOR.
                                ;--

002000                                  POINTER BGNRPT,BGNSW,BGNSFT,BGNDU,ERRTBL


002000                          HEADER  CVDHA,A,0,15,0,PRI07
002000
002000      103                 L$NAME::
002001      126                         .ASCII /C/
002002      104                         .ASCII /V/
002003      110                         .ASCII /D/
002004      101                         .ASCII /H/
002005      000                         .ASCII /A/
002006      000                         .BYTE   0
002007      000                         .BYTE   0
002010                                  .BYTE   0
002010      101                 L$REV::
002011                                  .ASCII  /A/
002011      060                 L$DEPO::
002012                                  .ASCII  /0/
002012  000000                  L$UNIT::
002014                                  .WORD   0
002014  000015                  L$TIML::
002016                                  .WORD   15
002016  025612                  L$HPCP::
002020                                  .WORD   L$HARD
002020  025702                  L$SPCP::
002022                                  .WORD   L$SOFT
002022  002176                  L$HPTP::
002024                                  .WORD   L$HW
002024  002204                  L$SPTP::
002026                                  .WORD   L$SW
                                L$LADP::
```

```
1060  002026  026220
1061  002030
1062  002030  000000
1063  002032
1064  002032  000000
1065  002034
1066  002034  000000
1067  002036
1068  002036  000000
1069  002040
1070  002040  002124
1071  002042
1072  002042  000340
1073  002044
1074  002044  000000
1075  002046
1076  002046  000000
1077  002050
1078  002050      003
1079  002051      003
1080  002052
1081  002052  000000
1082  002054  000000
1083  002056
1084  002056  000000
1085  002060
1086  002060  002734
1087  002062
1088  002062  017036
1089  002064
1090  002064  000000
1091  002066
1092  002066  000000
1093  002070
1094  002070  000000
1095  002072
1096  002072  017666
1097  002074
1098  002074  000000
1099  002076
1100  002076  002744
1101  002100
1102  002100  104035
1103  002102
1104  002102  002664
1105  002104
1106  002104  017052
1107  002106
1108  002106  017650
1109  002110
1110  002110  017646
1111  002112
1112  002112  017044
1113  002114
1114  002114  000000
1115  002116
```

```
                .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   PRI07
L$ENVI::
                .WORD   0
L$EXP1::
                .WORD   0
L$MREV::
                .BYTE   C$REVISION
                .BYTE   C$EDIT
L$EF::
                .WORD   0
                .WORD   0
L$SPC::
                .WORD   0
L$DEVP::
                .WORD   L$DVTYP
L$REPP::
                .WORD   L$RPT
L$EXP4::
                .WORD   0
L$EXP5::
                .WORD   0
L$AUT::
                .WORD   0
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::
```

```
  1116  002116  000000                                          .WORD   0
  1117  002120                                          L$HIME::
  1118  002120  000000                                          .WORD   0
  1119
```

```
1120                                    .SBTTL  DISPATCH TABLE
1121
1122                                    ;++
1123                                    ; THE DISPATCH TABLE CONTAINS THE STARTING ADDRESS OF EACH TEST.
1124                                    ; IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
1125                                    ;--
1126
1127  002122                                    DISPATCH 20
1128  002122  000024                                                    .WORD   20
1129  002124                                                  L$DISPATCH::
1130  002124  020004                                                    .WORD   T1
1131  002126  020274                                                    .WORD   T2
1132  002130  020524                                                    .WORD   T3
1133  002132  020770                                                    .WORD   T4
1134  002134  021166                                                    .WORD   T5
1135  002136  021360                                                    .WORD   T6
1136  002140  021576                                                    .WORD   T7
1137  002142  022004                                                    .WORD   T8
1138  002144  022212                                                    .WORD   T9
1139  002146  022400                                                    .WORD   T10
1140  002150  022614                                                    .WORD   T11
1141  002152  023042                                                    .WORD   T12
1142  002154  023324                                                    .WORD   T13
1143  002156  023624                                                    .WORD   T14
1144  002160  024224                                                    .WORD   T15
1145  002162  024442                                                    .WORD   T16
1146  002164  024664                                                    .WORD   T17
1147  002166  025136                                                    .WORD   T18
1148  002170  025414                                                    .WORD   T19
1149  002172  025530                                                    .WORD   T20
1150
```

```
1151
1152
1153                                    .SBTTL  DEFAULT HARDWARE P-TABLE
1154
1155                                    ;++
1156                                    ; THE DEFAULT HARDWARE P-TABLE CONTAINS DEFAULT VALUES OF
1157                                    ; THE TEST-DEVICE PARAMETERS.  THE STRUCTURE OF THIS TABLE
1158                                    ; IS IDENTICAL TO THE STRUCTURE OF THE HARDWARE P-TABLES,
1159                                    ; AND IS USED AS A "TEMPLATE" FOR BUILDING THE P-TABLES.
1160                                    ;--
1161
1162  002174                                    BGNHW   DFPTBL
1163  002174  000002                                                                   .WORD   L10000-L$HW/2
1164  002176                                                                  L$HW::
1165  002176                                                                  DFPTBL::
1166
1167  002176  160020                           .WORD   160020  ;DEFAULT CSR ADDRESS.
1168  002200  000377                           .WORD   377     ;DEFAULT ACTIVE LINES BIT MAP.
1169
1170  002202                                    ENDHW
1171  002202                                                                  L10000:
```

```
1172
1173
1174                                    .SBTTL  SOFTWARE P-TABLE
1175
1176                                    ;++
1177                                    ; THE SOFTWARE TABLE CONTAINS VARIOUS DATA USED BY THE
1178                                    ; PROGRAM AS OPERATIONAL PARAMETERS.  THESE PARAMETERS ARE
1179                                    ; SET UP AT ASSEMBLY TIME AND MAY BE VARIED BY THE OPERATOR
1180                                    ; AT RUN TIME.
1181                                    ;--
1182
1183  002202                                    BGNSW   SFPTBL
1184  002202  000002                                                                   .WORD   L10001-L$SW/2
1185  002204                                                                  L$SW::
1186  002204                                                                  SFPTBL::
1187
1188  002204  000021                    OPTION::        .WORD   21      ;BIT MAP OF PROGRAM CONTROL FLAGS
1189  002206  000000                    NDERPT::        .WORD   0       ;DEFAULT NUMBER OF INDIVIDUAL DATA ERRORS TO RPT
1190
1191  002210                                    ENDSW
1192  002210                                                                  L10001:
```

```
                                .SBTTL  GLOBAL EQUATES SECTION



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

000010                                  NUMLNS==10      ;NUMBER OF LINES ON DHV11 IS 8.
000377                                  MAPLNS==377     ;BIT MAP OF LINES ON DHV11.

                                ;****** DEVICE REGISTER OFFSETS FROM THE CSR'S ADDRESS ******
000000                                  CSR0==0         ;CSR REGISTER OFFSET FROM THE CSR ADDRESS
000002                                  RBUF0==2        ;RECEIVE REGISTER OFFSET FROM THE CSR ADDRESS
000002                                  TXCHR0==2       ;TRANSMIT REGISTER OFFSET FROM THE CSR ADDRESS
000004                                  LPR0==4         ;LINE PARAMETER REGISTER OFFSET FROM THE CSR ADDRESS
000006                                  STAT0==6        ;STATUS REGISTER OFFSET FROM THE CSR ADDRESS
000010                                  LNCTR0==10      ;LINE CONTROL REGISTER OFFSET FROM THE CSR ADDRESS
000012                                  TXAD10==12      ;TRANSMIT ADDRESS 1 REGISTER OFFSET FROM THE CSR ADDRESS
000014                                  TXAD20==14      ;TRANSMIT ADDRESS 2 REGISTER OFFSET FROM THE CSR ADDRESS
000016                                  TXBFC0==16      ;TRANSMIT COUNT REGISTER OFFSET FROM THE CSR ADDRESS

                                ;****** EQUATES USED WITH RESPECT TO THE RX BUFFER ******
000020                                  RXBETX==16.     ;LEVEL OF RX BUFFER AT WHICH TO RE-ENABLE TRANSMISSION.
000030                                  RXBDTX==24.     ;LEVEL OF RX BUFFER AT WHICH TO DISABLE TRANSMISSION.
000100                                  RXBFUL==64.     ;TOTAL CHARACTER CAPACITY OF THE RX BUFFER.


002210                                      EQUALS
                                ;
                                ; BIT DIFINITIONS
                                ;
100000                          BIT15== 100000
040000                          BIT14== 40000
020000                          BIT13== 20000
010000                          BIT12== 10000
004000                          BIT11== 4000
002000                          BIT10== 2000
001000                          BIT09== 1000
000400                          BIT08== 400
000200                          BIT07== 200
000100                          BIT06== 100
000040                          BIT05== 40
000020                          BIT04== 20
000010                          BIT03== 10
000004                          BIT02== 4
000002                          BIT01== 2
000001                          BIT00== 1
                                ;
001000                          BIT9==  BIT09
000400                          BIT8==  BIT08
000200                          BIT7==  BIT07
000100                          BIT6==  BIT06
```

```
1249            000040                  BIT5==  BIT05
1250            000020                  BIT4==  BIT04
1251            000010                  BIT3==  BIT03
1252            000004                  BIT2==  BIT02
1253            000002                  BIT1==  BIT01
1254            000001                  BIT0==  BIT00
1255                                    ;
1256                                    ; EVENT FLAG DEFINITIONS
1257                                    ;   EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
1258                                    ;
1259            000040                  EF.START==      32.                     ; START COMMAND WAS ISSUED
1260            000037                  EF.RESTART==    31.                     ; RESTART COMMAND WAS ISSUED
1261            000036                  EF.CONTINUE==   30.                     ; CONTINUE COMMAND WAS ISSUED
1262            000035                  EF.NEW==        29.                     ; A NEW PASS HAS BEEN STARTED
1263            000034                  EF.PWR==        28.                     ; \ POWER-FAIL/POWER-UP OCCURRED
1264                                    ;
1265                                    ;
1266                                    ; PRIORITY LEVEL DEFINITIONS
1267                                    ;
1268            000340                  PRI07== 340
1269            000300                  PRI06== 300
1270            000240                  PRI05== 240
1271            000200                  PRI04== 200
1272            000140                  PRI03== 140
1273            000100                  PRI02== 100
1274            000040                  PRI01== 40
1275            000000                  PRI00== 0
1276                                    ;
1277                                    ;OPERATOR FLAG BITS
1278                                    ;
1279            000004                  EVL==       4
1280            000010                  LOT==      10
1281            000020                  ADR==      20
1282            000040                  IDU==      40
1283            000100                  ISR==     100
1284            000200                  UAM==     200
1285            000400                  BOE==     400
1286            001000                  PNT==    1000
1287            002000                  PRI==    2000
1288            004000                  IXE==    4000
1289            010000                  IBE==   10000
1290            020000                  IER==   20000
1291            040000                  LOE==   40000
1292            100000                  HOE==  100000
1293
```

```
1294
1295
1296                                    .SBTTL  GLOBAL DATA SECTION
1297
1298                                    ;++
1299                                    ; THE GLOBAL DATA SECTION CONTAINS DATA THAT ARE USED
1300                                    ; IN MORE THAN ONE TEST.
1301                                    ;--
1302
1303                                    ;*****************************************************************************
1304                                    ;       UNIT VARIBLE AREA
1305                                    ;*****************************************************************************
1306
1307  002210  000377                            ACTLNS:: .WORD  377     ;ACTIVE LINE BIT MAP.
1308  002212  000000                            UNITN:: .WORD   0       ;UNIT NUMBER.
1309
1310                                    ;*****************************************************************************
1311                                    ;       DEVICE REGISTER ADDRESS TABLE
1312                                    ;*****************************************************************************
1313  002214                                    DRADRT::
1314  002214  160020                            CSRA::  .WORD   160020  ;DHV-11 CSR ADDRESS
1315  002216  160022                    TXCHA:: RBUFA:: .WORD   160022  ;DHV-11 RECEIVE/TRANSMIT BUFFER ADDRESS
1316  002220  160024                            LPRA::  .WORD   160024  ;DHV-11 LINE PARAMETER REGISTER ADDRESS
1317  002222  160026                            STATA:: .WORD   160026  ;DHV-11 STATUS REGISTER ADDRESS
1318  002224  160030                            LNCTRA:: .WORD  160030  ;DHV-11 LINE CONTROL REGISTER ADDRESS
1319  002226  160032                            TXAD1A:: .WORD  160032  ;DHV-11 TRANSMIT BUFFER 1 REGISTER ADDRESS
1320  002230  160034                            TXAD2A:: .WORD  160034  ;DHV-11 TRANSMIT BUFFER 2 REGISTER ADDRESS
1321  002232  160036                            TXBFCA:: .WORD  160036  ;DHV-11 TRANSMIT BUFFER COUNT REGISTER ADDRESS
1322
1323
1324                                    ;*****************************************************************************
1325                                    ;       BIT MASK TABLE OF UN-USED DHV DEVICE REGISTER BITS.
1326                                    ;*****************************************************************************
1327  002234  137660                            UNBTTB::.WORD   137660  ;UNUSED BIT MASK FOR THE CSR
1328  002236  177777                                    .WORD   177777  ;UNUSED BIT MASK FOR THE RBUF/TX REG
1329  002240  000007                                    .WORD   7       ;UNUSED BIT MASK FOR THE LPR
1330  002242  177777                                    .WORD   177777  ;UNUSED BIT MASK FOR THE STAT
1331  002244  166051                                    .WORD   166051  ;UNUSED BIT MASK FOR THE LNCTRL
1332  002246  000000                                    .WORD   0       ;UNUSED BIT MASK FOR THE TBUFFAD1
1333  002250  077700                                    .WORD   77700   ;UNUSED BIT MASK FOR THE TBUFFAD2
1334  002252  000000                                    .WORD   0       ;UNUSED BIT MASK FOR THE TBUFFCT
1335
1336                                    ;*****************************************************************************
1337                                    ;       REGISTER MESSAGE ADDRESS TABLE
1338                                    ;*****************************************************************************
1339  002254  004507                            RMATBB:: .WORD  DR00MG  ;ADDRESS OF ''CSR'' MESSAGE.
1340  002256  004513                                    .WORD   DR02MG  ;ADDRESS OF 'RBUF'' MESSAGE.
1341  002260  004520                                    .WORD   DR04MG  ;ADDRESS OF 'LPR'' MESSAGE.
1342  002262  004524                                    .WORD   DR06MG  ;ADDRESS OF 'STAT'' MESSAGE.
1343  002264  004531                                    .WORD   DR10MG  ;ADDRESS OF 'LNCTRL'' MESSAGE.
1344  002266  004540                                    .WORD   DR12MG  ;ADDRESS OF 'TBUFFAD1'' MESSAGE.
1345  002270  004551                                    .WORD   DR14MG  ;ADDRESS OF 'TBUFAD2'' MESSAGE.
1346  002272  004562                                    .WORD   DR16MG  ;ADDRESS OF ''TBUFFCT'' MESSAGE.
1347
1348                                    ;*****************************************************************************
1349                                    ;       ASSORTED GLOBAL VARIABLES:
```

```
1350
1351  002274  000001                ;*****************************************************************************
1352  002276  000000                        TSTNUM:: .WORD  1       ;STORAGE FOR THE TEST NUMBER.
1353  002300  000000                        IESTAT:: .WORD  0       ;STORAGE FOR THE INTERRUPT ENABLE BIT STATES.
1354  002302  000000                        PASCNT:: .WORD  0       ;STO'G FOR PASS COUNT USED IN ROM VERSION# TST.
1355  002304  000000                        TP4VEC:: .WORD  0       ;STORAGE FOR THE NORMAL 004 TRAP VECTOR.
1356  002306  000000                        TP4FLG:: .WORD  0       ;FLAGS SET WHEN AN EXPECTED 004 TRAP OCCURS.
1357  002310  000000                        WORD1::  .WORD  0       ;LOCATION FOR PASSING INDIRECT PARAMETERS.
1358                                        CTRLCF:: .WORD  0       ;STORAGE FOR THE CONTROL-C FLAG.
1359
1360                                ;*****************************************************************************
1361                                ;       LINE TIME CLOCK VARIABLES AND STORAGE.
1362  002312  177546                ;*****************************************************************************
1363  002314  000300                        CLKCSR:: .WORD  177546  ;CSR ADDRESS OF THE LTC.
1364  002316  000100                        CLKBRL:: .WORD  PRI06   ;INTERRUPT PRIORITY LEVEL OF THE LTC.
1365  002320  000074                        CLKVEC:: .WORD  100     ;INTERRUPT VECTOR ADDRESS OF THE LTC.
1366  002322  000000                        CLKHRZ:: .WORD  60.     ;INTERRUPT FREQUENCY OF THE LTC.
1367  002324  000000                        TIMER1:: .WORD  0       ;HARDWARE CLOCK COUNTER #1.
1368  002326  000170                        TIMER2:: .WORD  0       ;HARDWARE CLOCK COUNTER #2.
1369  002330  000170                        TIMER3:: .WORD  120.    ;HARDWARE BREAK COUNTER LOCATION.
1370  002332  000021                        BCOUNT:: .WORD  120.    ;BREAK COUNT VALUE IN CLOCK TICKS.
1371  002334  000062                        MSTICK:: .WORD  17.     ;NUMBER OF MILLI-SECONDS PER LTC TICK.
1372                                        MSLCNT:: .WORD  62      ;LOOP COUNT (USED BY MSLOOP) TO DELAY 1 MS.
1373
1374                                ;*****************************************************************************
1375                                ;       MEMMORY MANAGEMENT VARIABLES AND FLAGS.
1376  002336  177572                ;*****************************************************************************
1377  002340  000000                        MMSR0:: .WORD   177572  ;ADDRESS OF MEM MGT STATUS REGISTER #0.
1378  002342  000000                        MMPRES:: .WORD  0       ;MEM MGT PRESENT FLAG (0 IF MM NOT PRESENT).
1379  002344  172340                        MMENAB:: .WORD  0       ;MEM MGT ENABLED FLAG (0 IF MM NOT ENABLED).
1380                                        PAR0A:: .WORD   172340  ;ADDRESS OF MEM MGT PAR #0.
1381
1382                                ;*****************************************************************************
1383                                ;       TABLE OF WORDS WITH CORRESPONDING BIT SET FOR GENERATION OF BIT MAPS.
1384  002346  000001                ;*****************************************************************************
1385  002350  000002                BITTBL:: .WORD  1               ;BIT 0 SET.
1386  002352  000004                        .WORD   2               ;BIT 1 SET.
1387  002354  000010                        .WORD   4               ;BIT 2 SET.
1388  002356  000020                        .WORD   10              ;BIT 3 SET.
1389  002360  000040                        .WORD   20              ;BIT 4 SET.
1390  002362  000100                        .WORD   40              ;BIT 5 SET.
1391  002364  000200                        .WORD   100             ;BIT 6 SET.
1392  002366  000400                        .WORD   200             ;BIT 7 SET.
1393  002370  001000                        .WORD   400             ;BIT 8 SET.
1394  002372  002000                        .WORD   1000            ;BIT 9 SET.
1395  002374  004000                        .WORD   2000            ;BIT 10 SET.
1396  002376  010000                        .WORD   4000            ;BIT 11 SET.
1397  002400  020000                        .WORD   10000           ;BIT 12 SET.
1398  002402  040000                        .WORD   20000           ;BIT 13 SET.
1399  002404  100000                        .WORD   40000           ;BIT 14 SET.
1400                                        .WORD   100000          ;BIT 15 SET.
1401
1402                                ;*****************************************************************************
1403                                ;*      GPR SAVE AREA ZERO.
1404  002406                        ;*****************************************************************************
1405  002406  000000                GPRS0B::                        ;BASE OF GPR SAVE AREA NUMBER ZERO.
                                        .WORD   0               ;WORD 1, STORAGE FOR R1.
```

```
1406  002410  000000                    .WORD   0               ;WORD 2, STORAGE FOR R2.
1407  002412  000000                    .WORD   0               ;WORD 3, STORAGE FOR R3.
1408  002414  000000                    .WORD   0               ;WORD 4, STORAGE FOR R4.
1409  002416  000000                    .WORD   0               ;WORD 5, STORAGE FOR R5.
1410
1411                              ;*****************************************************************************
1412                              ;*      TRANSMISSION AND RECEPTION VARIABLES, POINTERS, AND FLAGS.
1413                              ;*****************************************************************************
1414  002420  000000              ERSMRF:: .WORD  0       ;ERROR SUMMARY REPORT FLAGS.
1415  002422  000020              ERCNTB:: .BLKW  16.     ;TABLE OF ERROR COUNTERS.
1416
1417                              ;*****************************************************************************
1418                              ;       STORAGE AREA FOR THE BMP CODE QUEUE.
1419                              ;*****************************************************************************
1420  002462  000000              BMPCQP::        .WORD   0       ;POINTER USED TO ACCESS THE NEXT CELL IN QUE.
1421  002464  000100              BMPCQB::        .BLKW   64.     ;STORAGE FOR 32 CELLS, TEST# PLUS BMP CODE.
1422  002664                      BMPCQE::                        ;LAST ADDRESS PLUS 2 OF THE BMP CODE QUEUE.
1423
1424  002664                      ERRTBL                                                  L$ERRTBL::
1425  002664
1426  002664  000000              ERRTYP::        .WORD   0
1427  002666  000000              ERRNBR::        .WORD   0
1428  002670  000000              ERRMSG::        .WORD   0
1429  002672  000000              ERRBLK::        .WORD   0
1430
1431                              .EVEN
```

```
1432                            .SBTTL  GPR HANDLING ROUTINES FOR SUBROUTINE CALLS.
1433                            ;*******************************************************************************
1434                            ;*      THERE ARE 4 ROUTINES AND MACRO DEFINITIONS USED FOR THE HANDLING OF
1435                            ;*      GPR VALUES DURING SUBROUTINE CALLS WITHIN THIS PROGRAM.  THE FOUR
1436                            ;*      ROUTINES/MACRO CALLS HAVE THE FOLLOWING NAMES:
1437                            ;*
1438                            ;*      SAVE - MACRO DEFINITION USED AT THE BEGINNING OF A SUBROUTINE TO
1439                            ;*              SAVE THE GPR CONTENTS FOR LATER RESTORATION.
1440                            ;*      PASS - MACRO DEFINITION USED AT THE END OF A SUBROUTINE TO RESTORE
1441                            ;*              THE PREVIOUSLY SAVED GPR CONTENTS AND TO LEAVE THE CONTENTS
1442                            ;*              OF THE SPECIFIED GPR(S) INTACT (NOT RESTORED).
1443                            ;*      PREG05 - SUBROUTINE WHICH IS CALLED FROM THE SAVE AND PASS MACRO
1444                            ;*              EXPANSIONS WHICH ACTUALLY PERFORMS THE ACTIONS ON THE GPRS.
1445                            ;*
1446                            ;*      DURING A SUBROUTINE WHICH USES THESE GPR SAVE ROUTINES THE VALUES
1447                            ;*      OF THE GPRS ARE STORED ON THE STACK IN THE FOLLOWING STACK FRAME:
1448                            ;*
1449                            ;*              SP    -> RET PC INTO PREG05 ROUTINE.
1450                            ;*              SP+2  -> GPR R0 CONTENTS.
1451                            ;*              SP+4  -> GPR R1 CONTENTS.
1452                            ;*              SP+6  -> GPR R2 CONTENTS.
1453                            ;*              SP+8  -> GPR R3 CONTENTS.
1454                            ;*              SP+10 -> GPR R4 CONTENTS.
1455                            ;*              SP+12 -> GPR R5 CONTENTS.
1456                            ;*              SP+14 -> RET PC INTO CALLER OF SUB'TNE WHICH CALLED PREG05.
1457                            ;*
1458                            ;*      EACH LEVEL OF SUB'TNE CALLING USES 8 WORDS OF STACK OVERHEAD.
1459                            ;*      THE SAVE AND PASS MACROS CAN ALSO BE USED IN "STRAIGHT LINE CODE"
1460                            ;*      TO SAVE AND RESTORE THE GPR VALUES.  IN ANY CASE, AFTER THE
1461                            ;*      ISSUING OF A PASS CALL THE GPRS WILL BE RESTORED TO THE VALUES
1462                            ;*      THEY HAD PRIOR TO THE LAST SAVE CALL (EXCEPT FOR THE EXCEPTED,
1463                            ;*      OR PASSED INTACT, GPRS SPECIFIED AS PARAMETERS TO THE PASS CALL)
1464                            ;*      AND THE SP WILL ALSO BE RESTORED TO ITS CONDITION BEFORE THE LAST
1465                            ;*      SAVE CALL.  THE PROGRAMMER MUST BE SURE THAT THE SP HAS THE SAME
1466                            ;*      VALUE WHEN THE PASS MACRO IS CALLED AS IT HAD IMMEDIATELY AFTER
1467                            ;*      THE SAVE MACRO WAS CALLED.
1468                            ;*******************************************************************************
```

```
1469                                    .SBTTL GPR FRAME ACCESS EQUATES
1470                                            ;+++
1471                                            ;EQUATES THAT ALLOW ACCESS TO THE STACK FRAME.  THESE ARE THE
1472                                            ;OFFSETS INTO THE STACK FOR REGISTERS SAVED DURING THE PREGOS
1473                                            ;ROUTINE.
1474                                            ;---
1475
1476            000036                          LPCSLT==        36      ;OFFSET FOR LAST RETURN PC.
1477            000016                          PCSLOT==        16      ;OFFSET FOR RETURN PC.
1478            000014                          R5SLOT==        14      ;OFFSET FOR R5.
1479            000012                          R4SLOT==        12      ;OFFSET FOR R4.
1480            000010                          R3SLOT==        10      ;OFFSET FOR R3.
1481            000006                          R2SLOT==        6       ;OFFSET FOR R2.
1482            000004                          R1SLOT==        4       ;OFFSET FOR R1.
1483            000002                          R0SLOT==        2       ;OFFSET FOR R0.
```

```
                        .SBTTL  GLOBAL MACRO DEFINITION         - SAVE -
                        ;*******************************************************************************
                        ;*      THIS MACRO IS USED AT THE BEGINNING OF A SUBROUTINE TO SAVE THE
                        ;*      CONTENTS OF THE GPRS R0 THRU R5.
                        ;*
                        ;* INPUTS:      SP - UNCHANGED SINCE SUBROUTINE WAS ENTERED
                        ;*              R5SLOT - OFFSET TO STACK SLOT FOR R5 (EQUATED TO 14 OCTAL)
                        ;*
                        ;* OUTPUTS:     GPR SAVE AREA ON THE STACK IS LOADED WITH THE CONTENTS OF GPRS
                        ;*              TOP OF STACK - LOADED WITH THE RETURN ADDRESS INTO PREG05
                        ;*
                        ;* CALLING SEQUENCE:    SAVE
                        ;*
                        ;* COMMENTS:    NO ARGUMENTS ARE ALLOWED.
                        ;*              THE PASS MACRO SHOULD BE CALLED TO RESTORE THE GPR VALUES.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: PREG05.
                        ;*******************************************************************************

                                .MACRO  SAVE
                                .LIST
                                        JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                                .NLIST
                                .ENDM   SAVE
```

```
1508                            .SBTTL  GLOBAL MACRO DEFINITION         - PASS -
1509                            ;*********************************************************************************
1510                            ;*      THIS MACRO IS USED IN CONJUNCTION WITH THE SAVE MACRO.  IT IS
1511                            ;*      CALLED AT END OF A SUBROUTINE TO PASS PARAMETERS IN GPRS BACK TO THE
1512                            ;*      CALLING ROUTINE BY ALTERING THE GPR SAVE AREA ON THE STACK AND THEN
1513                            ;*      RETURNING TO PREG05 TO RESTORE THE GPRS TO THEIR SAVED VALUES.
1514                            ;*
1515                            ;* INPUTS:      ONLY ALLOWED ARGUMENTS ARE "R0" THRU "R5".
1516                            ;*              R0SLOT THRU R5SLOT MUST BE EQUATED TO THEIR RESPECTIVE GPR SAVE
1517                            ;*                      SLOT OFFSETS BEFORE CALLING THIS MACRO.
1518                            ;*
1519                            ;* OUTPUTS:     THE GPR VALUES ARE PUT IN THEIR RESPECTIVE SLOTS ON THE STACK.
1520                            ;*
1521                            ;* CALLING SEQUENCE:    PASS    R0,R1,...
1522                            ;*
1523                            ;* COMMENTS:    ANY COMBINATION OF GPR ARGUMENTS MAY BE LISTED IN ANY ORDER.
1524                            ;*              FOR EXAMPLE  THE FOLLOWING ARE LEGAL:
1525                            ;*                      PASS    R1
1526                            ;*                      PASS    R4,R0,R2
1527                            ;*              THE GPRS LISTED AS ARGUMENTS WILL BE PASSED INTACT TO THE
1528                            ;*              CALLING ROUTINE, ALL OTHER GPRS WILL BE RESTORED.
1529                            ;*              THE SP MUST BE AT ITS ORIGINAL VALUE WHEN PASS IS CALLED.
1530                            ;*
1531                            ;*              THE MACRO CALL
1532                            ;*                      PASS    R0,R3
1533                            ;*              EXPANDS INTO THE FOLLOWING ASSEMBLY CODE:
1534                            ;*                      MOV     R0,R0SLOT(SP)           ;PUT R0 IN STACK SLOT.
1535                            ;*                      MOV     R3,R3SLOT(SP)           ;PUT R3 IN STACK SLOT.
1536                            ;*                      JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
1537                            ;*              IN THIS EXAMPLE GPRS R1, R2, R4, AND R5 WILL BE RESTORED TO
1538                            ;*              THEIR VALUES CONTAINED IN THE STACK FRAME AND R0 AND R3
1539                            ;*              WILL BE LEFT AT THEIR VALUES PRIOR TO THIS PASS CALL.
1540                            ;*
1541                            ;* SUBORDINATE ROUTINES CALLED: (PREGRT - LABEL WITHIN PREG05, VALUE ON STACK.)
1542                            ;*********************************************************************************
1543
1544                                    .MACRO  PASS    A,B,C,D,E,F
1545                                    .IRP    X,<A,B,C,D,E,F>
1546                                    .IF     NB,X
1547                                    .LIST
1548                                            MOV     X,X'SLOT(SP)            ;PUT X IN STACK SLOT.
1549                                    .NLIST
1550                                    .ENDC
1551                                    .ENDM
1552                                    .LIST
1553                                            JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
1554                                    .NLIST
1555                                    .ENDM   PASS
```

```
                        .SBTTL GLOBAL SUBROUTINE                - PREG05 -
                        ;*******************************************************************************
                        ;*      PRESERVE REGISTERS R0 THROUGH R5 FOR SUBROUTINE CALLS.
                        ;*
                        ;* INPUTS:      THE RETURN ADDRESS BACK INTO THE CALLING ROUTINE MUST BE IN
                        ;*              GPR R5.  (I.E.- MACROS USE "JSR  R5,PREG05".)
                        ;*
                        ;* OUTPUTS:     REGISTERS R0 THROUGH R5 ARE SAVED ON THE STACK.
                        ;*
                        ;*CALLING SEQUENCE:     SAVE            ;MACRO EXPANSION CALLS PREG05.
                        ;*                      [SUBROUTINE CODE]...
                        ;*                      PASS            ;MACRO EXPANSION RECALLS PREG05.
                        ;*
                        ;*COMMENTS:     THIS ROUTINE IS RE-ENTRANT.
                        ;*
                        ;*              PARAMETERS MAY BE PASSED OUT OF A SUBROUTINE BY MODIFYING THE
                        ;*              REGISTER SAVE AREA ON THE STACK.  USE THE PASS GPRN MACRO
                        ;*              TO RETURN GPR VALUES INTACT.
                        ;*              USE THE RNSLOT OFFSETS FROM THE SP TO PASS OTHER PARAMETERS.
                        ;*              [EXAMPLE:       MOV    VALUE,R0SLOT(SP)        ]
                        ;*              MAKE SURE THE SP IS AT ITS ORIGINAL VALUE WHEN YOU DO THIS.
                        ;*
                        ;*SUBORDINATE ROUTINES CALLED:  NONE.
                        ;*******************************************************************************

002674                  PREG05:                 ;R5 HAS BEEN LOADED ON THE STACK BY THE SUBROUTINE CALL
002674  010446                  MOV     R4,-(SP)        ;SAVE R4
002676  010346                  MOV     R3,-(SP)        ;SAVE R3
002700  010246                  MOV     R2,-(SP)        ;SAVE R2
002702  010146                  MOV     R1,-(SP)        ;SAVE R1
002704  010046                  MOV     R0,-(SP)        ;SAVE R0
002706  010546                  MOV     R5,-(SP)        ;PUSH RETURN PC ON TOP OF STACK
002710  016605  000014          MOV     R5SLOT(SP),R5   ;RESTORE R5 TO VALUE IT HAD BEFORE CALLS

002714  004736                  JSR     PC,@(SP)+       ;CALL THE SUBROUTINE AT THE RETURN ADDRESS
                                                        ;FROM THE PREG05 CALL, PUTTING THE PRESENT
                                                        ;PC ON THE STACK AS A RETURN ADDRESS INTO
                                                        ;THIS (PREG05) ROUTINE.

                                ;+++
                                ;THE FOLLOWING CODE IS EXECUTED WHEN THE CALLING ROUTINE DOES A
                                ;"RETURN" [JSR  PC,@(SP)+] USING THE PC DEPOSITED ON THE STACK ABOVE.
                                ;---

002716  012605          PREGRT:: MOV    (SP)+,R5        ;PUT RETURN PC IN R5.
002720  012600                  MOV     (SP)+,R0        ;RESTORE R0.
002722  012601                  MOV     (SP)+,R1        ;RESTORE R1.
002724  012602                  MOV     (SP)+,R2        ;RESTORE R2.
002726  012603                  MOV     (SP)+,R3        ;RESTORE R3.
002730  012604                  MOV     (SP)+,R4        ;RESTORE R4.

002732  000205                  RTS     R5              ;RETURN TO THE SUBROUTINE WHICH CALLED PREG05.
                                                          ;RESTORING R5 IN THE PROCESS.
```

```
                                .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
                                ;
002734                                  DEVTYP  <DHV-11>
002734                                                          L$DVTYP::
002734  044104  026526  030461                                          .ASCIZ  /DHV-11/
002742     000
        002744                                                  .EVEN


                                ; TEST DESCRIPTION
                                ;
002744                                  DESCRIPT        <DHV-11 FUNC TST PART1>
002744                                                          L$DESC::
002744  044104  026526  030461                                          .ASCIZ  /DHV-11 FUNC TST
002752  043040  047125  020103
002760  051524  020124  040520
002766  052122  000061
                                                                .EVEN
                                .EVEN
```

```
1640
1641
1642                                    ;
1643                                    ; FORMAT STATEMENTS USED IN PRINT CALLS
1644                                    ;
1645
1646
1647
1648
1649
1650            .NLIST BIN
1651            .SBTTL  GLOBAL MESSAGE AREA
1652                    ; ********* FORMAT STATEMENTS **********
1653   002772   MFUNIT:: .ASCIZ /%N%A TESTING UNIT :%D4%A(D)%N/
1654   003000
1655   003006
1656   003014
1657   003022
1658   003030   EF0503:: .ASCIZ /%T%N/
1659   003035   EF1401:: .ASCIZ /%N%A ROM VERSION NUMBERS: PROC_1 = %D2%A(D)    PROC_2 = %D2%A(D)%N/
1660   003042
1661   003050
1662   003056
1663   003064
1664   003072
1665   003100
1666   003106
1667   003114
1668   003122
1669   003130
1670   003136
1671   003137   EF1402:: .ASCIZ /%T%A ROM VERSION NUMBER %T%N/
1672   003144
1673   003152
1674   003160
1675   003166
1676   003174   EF1601:: .ASCIZ /%A  %T%A ABORTED %N/
1677   003202
1678   003210
1679   003216
1680   003220   EF1602:: .ASCIZ /%A    EXPECTED DATA: %06%A (O).%N/
1681   003226
1682   003234
1683   003242
1684   003250
1685   003256
1686   003262   EF1603:: .ASCIZ /%A    ACTUAL DATA:   %06%A (O).%N/
1687   003270
1688   003276
1689   003304
1690   003312
1691   003320
1692   003324   EF1604:: .ASCIZ /%A  BAD BIT(S) IN DEVICE %T%A REGISTER FOR LINE %D2%A (D).%N/
1693   003332
1694   003340
1695   003346
```

```
1696  003354
1697  003362
1698  003370
1699  003376
1700  003404
1701  003412
1702  003420
1703  003421  EF9001:: .ASCIZ /%A  UNEXPECTED %T%A FOUND IN RECEIVE CHAR FIFO:%N/
1704  003426
1705  003434
1706  003442
1707  003450
1708  003456
1709  003464
1710  003472
1711  003500
1712  003503  EF9002:: .ASCIZ /%A    CODE IS ASSOCIATED WITH LINE: %D2%A(D)%N/
1713  003510
1714  003516
1715  003524
1716  003532
1717  003540
1718  003546
1719  003554
1720  003562  EF9003:: .ASCIZ /%A      CODE IS: %O3%A(O)%N/
1721  003570
1722  003576
1723  003604
1724  003612
1725  003616  EF9004:: .ASCIZ /%A    %T%A VALUE: %O3%A(O)%N/
1726  003624
1727  003632
1728  003640
1729  003646
1730  003653  EF9005:: .ASCIZ /%A    %T%A VALUE: NONE%N/
1731  003660
1732  003666
1733  003674
1734  003702
1735  003704  EF9006:: .ASCIZ /%A  %T%A %D2%A(D)%N/
1736  003712
1737  003720
1738  003726
1739  003730  EF9010:: .ASCIZ /%A    NUMBER OF ERRORS DETECTED ON LINE %D2%A(D) IS %D5%A(D)%N/
1740  003736
1741  003744
1742  003752
1743  003760
1744  003766
1745  003774
1746  004002
1747  004010
1748  004016
1749  004024
1750  004027  EF9016:: .ASCIZ /%A  UNEXPECTED %T%A FOR LINE %D2%A(D) IN FIFO AFTER RESET:%N/
1751  004034
```

```
1752  004042
1753  004050
1754  004056
1755  004064
1756  004072
1757  004100
1758  004106
1759  004114
1760  004122
1761  004124  EF9017:: .ASCIZ /%A    %T%A (WITH ERROR FLAGS) IS %06%A(O)%N/
1762  004132
1763  004140
1764  004146
1765  004154
1766  004162
1767  004170
1768  004176
1769  004200  EF9018:: .ASCII /%A  %T%A IN SELFTEST CODE FIFO SLOT FOR LINE %D2/
1770  004206
1771  004214
1772  004222
1773  004230
1774  004236
1775  004244
1776  004252
1777  004260          .ASCIZ /%A(D) AFTER RESET.%N/
1778  004266
1779  004274
1780  004302
1781  004305  EF9019:: .ASCIZ /%A  %T%A %06%A(O)%N/
1782  004312
1783  004320
1784  004326
1785  004331  EF9301:: .ASCIZ /%A %T%D2%A(D),  BMP CODE REPORTED :%03%A(O)%N/
1786  004336
1787  004344
1788  004352
1789  004360
1790  004366
1791  004374
1792  004402
1793  004407  EF9302:: .ASCIZ /%A  OVERFLOW OCCURRED (MORE THAN 31 BMP CODES FOUND IN QUEUE)%N/
1794  004414
1795  004422
1796  004430
1797  004436
1798  004444
1799  004452
1800  004460
1801  004466
1802  004474
1803  004502
1804                ;********** ERROR MESSAGES *************
1805  004507  DR00MG:: .ASCIZ /CSR/
1806  004513  DR02MG:: .ASCIZ /RBUF/
1807  004520  DR04MG:: .ASCIZ /LPR/
```

```
1808  004524  DR06MG:: .ASCIZ /STAT/
1809  004531  DR10MG:: .ASCIZ /LNCTRL/
1810  004536
1811  004540  DR12MG:: .ASCIZ /TBUFFAD1/
1812  004546
1813  004551  DR14MG:: .ASCIZ /TBUFFAD2/
1814  004556
1815  004562  DR16MG:: .ASCIZ /TBUFFCT/
1816  004570
1817  004572  EM0103:: .ASCIZ /DEVICE REGISTER ACCESS ERRORS/
1818  004600
1819  004606
1820  004614
1821  004622
1822  004630  EM0201:: .ASCIZ /MASTER RESET (PERFORM SELFTEST) TEST /
1823  004636
1824  004644
1825  004652
1826  004660
1827  004666
1828  004674
1829  004676  EM0202:: .ASCIZ /  MASTER RESET BIT DID NOT CLEAR AFTER BOARD RESET./
1830  004704
1831  004712
1832  004720
1833  004726
1834  004734
1835  004742
1836  004750
1837  004756
1838  004762          .ASCIZ /    WAITED 5 SECONDS.  BIT DEFECTIVE OR FIRMWARE HUNG./
1839  004770
1840  004776
1841  005004
1842  005012
1843  005020
1844  005026
1845  005034
1846  005042
1847  005050
1848  005051  EM0203:: .ASCIZ /  MASTER RESET BIT CLEAR IMMEDIATELY AFTER BOARD RESET./
1849  005056
1850  005064
1851  005072
1852  005100
1853  005106
1854  005114
1855  005122
1856  005130
1857  005136
1858  005141          .ASCIZ /    BIT DEFECTIVE OR BOARD FIRMWARE ERROR./
1859  005146
1860  005154
1861  005162
1862  005170
1863  005176
```

```
1864  005204
1865  005212
1866  005214  EM0204:: .ASCIZ \  MR BIT WENT CLEAR WITHIN 1/2 SECOND OF BOARD RESET.\
1867  005222
1868  005230
1869  005236
1870  005244
1871  005252
1872  005260
1873  005266
1874  005274
1875  005302          .ASCIZ /    BIT DEFECTIVE OR SELFTEST WAS (INCORRECTLY) SKIPPED./
1876  005310
1877  005316
1878  005324
1879  005332
1880  005340
1881  005346
1882  005354
1883  005362
1884  005370
1885  005373  EM0301:: .ASCIZ /MASTER RESET (SKIP SELFTEST) TEST /
1886  005400
1887  005406
1888  005414
1889  005422
1890  005430
1891  005436  EM0302:: .ASCIZ /  MR BIT CLR WITHIN 10 MILISECOND AFTER BOARD RESET./
1892  005444
1893  005452
1894  005460
1895  005466
1896  005474
1897  005502
1898  005510
1899  005516
1900  005523          .ASCIZ /    BIT DEFECTIVE OR BOARD FIRMWARE ERROR./
1901  005530
1902  005536
1903  005544
1904  005552
1905  005560
1906  005566
1907  005574
1908  005576  EM0303:: .ASCIZ \  MR BIT WENT CLEAR 1/5 TO 5 SECONDS AFTER RESET.\
1909  005604
1910  005612
1911  005620
1912  005626
1913  005634
1914  005642
1915  005650
1916  005656
1917  005660          .ASCIZ /    SELFTEST DID NOT GET SKIPPED (SHOULD HAVE BEEN SKIPPED)./
1918  005666
1919  005674
```

```
1920  005702
1921  005710
1922  005716
1923  005724
1924  005732
1925  005740
1926  005746
1927  005754
1928  005755  EM0401:: .ASCIZ /RBUF REGISTER RX CHARACTER FIELD TEST /
1929  005762
1930  005770
1931  005776
1932  006004
1933  006012
1934  006020
1935  006024  EM0402:: .ASCIZ /  IMPROPER CODE FOUND IN RX FIFO AFTER DUT RESET./
1936  006032
1937  006040
1938  006046
1939  006054
1940  006062
1941  006070
1942  006076
1943  006104
1944  006106          .ASCIZ /    EXPECTED: SELFTEST CODE.   ACTUAL: IMPROPER CODE./
1945  006114
1946  006122
1947  006130
1948  006136
1949  006144
1950  006152
1951  006160
1952  006166
1953  006174  EM0501:: .ASCIZ /RBUF REGISTER ERROR FLAGS FIELD TEST /
1954  006202
1955  006210
1956  006216
1957  006224
1958  006232
1959  006240
1960  006242  EM0502:: .ASCIZ /  RX ERROR FLAG(S) FOUND CLEAR ON SELFTEST CODE./
1961  006250
1962  006256
1963  006264
1964  006272
1965  006300
1966  006306
1967  006314
1968  006322
1969  006323          .ASCIZ /    EXPECTED: ALL ERROR FLAGS SET,  ACTUAL: FLAG(S) CLEAR./
1970  006330
1971  006336
1972  006344
1973  006352
1974  006360
1975  006366
```

```
1976  006374
1977  006402
1978  006410
1979  006416  EM0601:: .ASCIZ /CSR RX.DATA.AVAIL BIT TEST /
1980  006424
1981  006432
1982  006440
1983  006446
1984  006452  EM0602:: .ASCIZ /  RX.DATA.AVAIL BIT FOUND CLEAR AFTER RESET COMPLETION./
1985  006460
1986  006466
1987  006474
1988  006502
1989  006510
1990  006516
1991  006524
1992  006532
1993  006540
1994  006542           .ASCIZ /    EXPECTED BIT TO BE SET FROM SELFTEST CODES IN FIFO./
1995  006550
1996  006556
1997  006564
1998  006572
1999  006600
2000  006606
2001  006614
2002  006622
2003  006630
2004  006632  EM0603:: .ASCIZ /  RX.DATA.AVAIL BIT COULD NOT BE CLEARED BY PURGING FIFO./
2005  006640
2006  006646
2007  006654
2008  006662
2009  006670
2010  006676
2011  006704
2012  006712
2013  006720
2014  006724           .ASCIZ /    600 CHARS READ FROM FIFO WITHOUT R.D.A BIT CLEARING./
2015  006732
2016  006740
2017  006746
2018  006754
2019  006762
2020  006770
2021  006776
2022  007004
2023  007012
2024  007015  EM0701:: .ASCIZ /RBUF RX.DATA.VALID BIT TEST /
2025  007022
2026  007030
2027  007036
2028  007044
2029  007052  EM0702:: .ASCIZ /  RX.DATA.VALID BIT FOUND CLEAR AFTER RESET COMPLETION./
2030  007060
2031  007066
```

```
2032  007074
2033  007102
2034  007110
2035  007116
2036  007124
2037  007132
2038  007140
2039  007142          .ASCIZ /    EXPECTED BIT TO BE SET FROM SELFTEST CODES IN FIFO./
2040  007150
2041  007156
2042  007164
2043  007172
2044  007200
2045  007206
2046  007214
2047  007222
2048  007230
2049  007232  EM0703:: .ASCIZ /  RX.DATA.VALID BIT COULD NOT BE CLEARED BY PURGING FIFO./
2050  007240
2051  007246
2052  007254
2053  007262
2054  007270
2055  007276
2056  007304
2057  007312
2058  007320
2059  007324          .ASCIZ /    600 CHARS READ FROM FIFO WITHOUT R.D.V BIT CLEARING./
2060  007332
2061  007340
2062  007346
2063  007354
2064  007362
2065  007370
2066  007376
2067  007404
2068  007412
2069  007415  EM0801:: .ASCIZ /RBUF RX.LINE.NUMBER FIELD TEST /
2070  007422
2071  007430
2072  007436
2073  007444
2074  007452
2075  007455  EM0802:: .ASCIZ /  LINE NUMBER IS WRONG ON A SELFTEST CODE./
2076  007462
2077  007470
2078  007476
2079  007504
2080  007512
2081  007520
2082  007526
2083  007530  EM0901:: .ASCIZ /CHECK FOR BMP_CODES TEST/
2084  007536
2085  007544
2086  007552
2087  007560
```

```
2088  007561  EM0902:: .ASCIZ /UNEXPECTED BMP CODES FOUND./
2089  007566
2090  007574
2091  007602
2092  007610
2093  007615  EM1001:: .ASCIZ /DIAGNOSTIC FAIL (SKP SELFTEST) TEST/
2094  007622
2095  007630
2096  007636
2097  007644
2098  007652
2099  007660
2100  007661  EM1002:: .ASCIZ /  SKIP SELF-TEST TOOK TOO LONG TO COMPLETE, > 50 MS./
2101  007666
2102  007674
2103  007702
2104  007710
2105  007716
2106  007724
2107  007732
2108  007740
2109  007746  EM1003:: .ASCIZ /  SKIP SELF-TEST COMPLETED TOO SOON, < 10 MS./
2110  007754
2111  007762
2112  007770
2113  007776
2114  010004
2115  010012
2116  010020
2117  010024  EM1101:: .ASCIZ /SKIP SELF-TEST TEST/
2118  010032
2119  010040
2120  010046
2121  010050  EM1201:: .ASCIZ /SELF-TEST TEST/
2122  010056
2123  010064
2124  010067  EM1202:: .ASCIZ /  SELF-TEST TOOK TOO LONG TO COMPLETE, > 3 SECONDS./
2125  010074
2126  010102
2127  010110
2128  010116
2129  010124
2130  010132
2131  010140
2132  010146
2133  010153  EM1203:: .ASCIZ \  SELF-TEST COMPLETED TOO SOON, < 1/2 SECOND.\
2134  010160
2135  010166
2136  010174
2137  010202
2138  010210
2139  010216
2140  010224
2141  010231  EM1204:: .ASCIZ /  SELF-TEST DID NOT EXECUTE/
2142  010236
2143  010244
```

```
2144  010252
2145  010260
2146  010265  EM1205:: .ASCIZ /  DIAG_FAIL BIT BAD/
2147  010272
2148  010300
2149  010306
2150  010311  EM1301:: .ASCIZ /FAIL SELF-TEST TEST/
2151  010316
2152  010324
2153  010332
2154  010335  EM1302:: .ASCIZ / SELF-TEST ERROR REPORTING BAD/
2155  010342
2156  010350
2157  010356
2158  010364
2159  010372
2160  010377  EM1401:: .ASCIZ /ROM VERSION_NUMBER TEST/
2161  010402
2162  010410
2163  010416
2164  010424  EM1402:: .ASCIZ /  FIFO EMPTY, ONE OR MORE ROM VERSION_NUMBERS MISSING/
2165  010432
2166  010440
2167  010446
2168  010454
2169  010462
2170  010470
2171  010476
2172  010504
2173  010512  EM1403:: .ASCIZ /  ROM VERSION_NUMBER FOUND OUT OF SEQUENCE/
2174  010520
2175  010526
2176  010534
2177  010542
2178  010550
2179  010556
2180  010564
2181  010565  EM1404:: .ASCIZ /  ONF OR MORE ROM VERSION_NUMBERS MISSING/
2182  010572
2183  010600
2184  010606
2185  010614
2186  010622
2187  010630
2188  010636
2189  010637  EM1405:: .ASCIZ /    PROC_1/
2190  010644
2191  010652  EM1406:: .ASCIZ /    PROC_2/
2192  010660
2193  010665  EM1407:: .ASCIZ /NOT FOUND/
2194  010672
2195  010677  EM1408:: .ASCIZ /FOUND/
2196  010704
2197  010705  EM1601:: .ASCIZ /TIMEOUT OCCURRED WAITING FOR MASTER RESET TO CLEAR/
2198  010712
2199  010720
```

```
2200  010726
2201  010734
2202  010742
2203  010750
2204  010756
2205  010764
2206  010770  EM1604:: .ASCIZ \DEVICE REGISTER WORD READ/WRITE TEST \
2207  010776
2208  011004
2209  011012
2210  011020
2211  011026
2212  011034
2213  011036  EM1701:: .ASCIZ \DEVICE REGISTER WORD READ/MODIFY/WRITE TEST \
2214  011044
2215  011052
2216  011060
2217  011066
2218  011074
2219  011102
2220  011110
2221  011113  EM1801:: .ASCIZ \DEVICE REGISTER BYTE READ/WRITE TEST \
2222  011120
2223  011126
2224  011134
2225  011142
2226  011150
2227  011156
2228  011161  EM1901:: .ASCIZ \DEVICE REGISTER BYTE READ/MODIFY/WRITE TEST \
2229  011166
2230  011174
2231  011202
2232  011210
2233  011216
2234  011224
2235  011232
2236  011236  EM2001:: .ASCIZ /DEVICE STAT REGISTER ID BIT TEST /
2237  011244
2238  011252
2239  011260
2240  011266
2241  011274
2242  011300  EM2002:: .ASCIZ /ID BIT BAD.  EXPECTED: CLEAR, ACTUAL: SET./
2243  011306
2244  011314
2245  011322
2246  011330
2247  011336
2248  011344
2249  011352
2250  011353  EM9009:: .ASCIZ /EXPECTED OR CORRECT/
2251  011360
2252  011366
2253  011374
2254  011377  EM9010:: .ASCIZ /ACTUAL OR MEASURED /
2255  011404
```

```
2256  011412
2257  011420
2258  011423  EM9014:: .ASCIZ /SUMMARY REPORTS FOR LINES WITH EXCESSIVE NUMBERS OF ERRORS:/
2259  011430
2260  011436
2261  011444
2262  011452
2263  011460
2264  011466
2265  011474
2266  011502
2267  011510
2268  011516
2269  011517  EM9017:: .ASCII /  FIFO WILL NOT PURGE (DATA.VALID STUCK SET),/
2270  011524
2271  011532
2272  011540
2273  011546
2274  011554
2275  011562
2276  011570
2277  011574          .ASCIZ / REMAINDER OF TEST SKIPPED./
2278  011602
2279  011610
2280  011616
2281  011624
2282  011630  EM9018:: .ASCIZ /NO CODE/
2283  011636
2284  011640  EM9019:: .ASCIZ /NON-SELFTEST/
2285  011646
2286  011654
2287  011655  EM9020:: .ASCIZ /SELFTEST ERROR CODE/
2288  011662
2289  011670
2290  011676
2291  011701  EM9022:: .ASCIZ /DATA CHARACTER/
2292  011706
2293  011714
2294  011720  EM9023:: .ASCIZ /MODEM STATUS CODE/
2295  011726
2296  011734
2297  011742  EM9024:: .ASCIZ /SELFTEST CODE/
2298  011750
2299  011756
2300  011760  EM9026:: .ASCIZ /     LPR CONTENTS: /
2301  011766
2302  011774
2303  012002
2304  012004  EM9301:: .ASCIZ /BMP CODE REPORT/
2305  012012
2306  012020
2307  012024  EM9302:: .ASCIZ /BMP CODE FOUND IN TEST /
2308  012032
2309  012040
2310  012046
2311  012054  EM9303:: .ASCIZ /THE LAST BMP CODE WAS FOUND IN TEST /
```

```
2312  012062
2313  012070
2314  012076
2315  012104
2316  012112
2317  012120
2318  012121  EM9304:: .ASCIZ /UNEXPECTED BMP CODES FOUND DURING THIS PASS/
2319  012126
2320  012134
2321  012142
2322  012150
2323  012156
2324  012164
2325  012172
2326                  .EVEN
2327                              .LIST BIN
```

```
2328
2329
2330
2331                            .SBTTL  GLOBAL ERROR REPORT SECTION
2332
2333                            ;++
2334                            ; THE GLOBAL ERROR REPORT SECTION CONTAINS MESSAGE PRINTING AREAS
2335                            ; USED BY MORE THAN ONE TEST TO OUTPUT ADDITIONAL ERROR INFORMATION.  PRINTB
2336                            ; (BASIC) AND PRINTX (EXTENDED) CALLS ARE USED TO CALL PRINT SERVICES.
2337                            ;--
```

```
                                .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER0101 -
                                ;*******************************************************************************
                                ;*      THIS IS AN ERROR REPORTING SUBROUTINE WHICH PRINTS ADDITIONAL ERROR
                                ;*      INFORMATION IF AN ERROR IS DETECTED IN TEST 1 (REGISTER ADDRESS
                                ;*      ACCESS TEST).  THIS SUBROUTINE REPORTS THE TYPE OF ACCESS (READ OR
                                ;*      WRITE OR BOTH) WHICH CAUSED A BUS TIME-OUT TRAP (004 TRAP).
                                ;*      A MESSAGE INDICATING THAT THE DHV MAY BE AT THE WRONG Q-BUS ADDRESS
                                ;*      IS ALSO PRINTED.
                                ;*
                                ;* INPUTS:      R5 - ERROR FLAG WORD.
                                ;*                      IF BIT 0 IS SET, A READ ERROR OCCURED.
                                ;*                      IF BIT 1 IS SET, A WRITE ERROR OCCURED.
                                ;*
                                ;* OUTPUTS:     MESSAGES ARE PRINTED AT THE OPERATOR CONSOLE.
                                ;*
                                ;* CALLING SEQUENCE:    INCLUDE THE LABEL "ER0101" AS THE MESSAGE POINTER
                                ;*                      PARAMETER IN THE DRS ERROR REPORT MACRO CALL.
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;* SUBORDINATE ROUTINES USED: NONE.
                                ;*******************************************************************************

012176                                  BGNMSG  ER0101
012176                                                                          ER0101::
012176                                  SAVE                    ;SAVE THE GPR CONTENTS.
012176  004537  002674                                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.

012202  032705  000001                  BIT     #BIT0,R5        ;TEST FOR READ ERROR.
012206  001410                          BEQ     2$              ;SKIP READ ERROR MSG IF NO READ ERROR.
012210                                  PRINTB  #MSG1           ;PRINT READ ERROR MESSAGE.
012210  012746  012302                                                          MOV     #MSG1,-(SP)
012214  012746  000001                                                          MOV     #1,-(SP)
012220  010600                                                                  MOV     SP,R0
012222  104414                                                                  TRAP    C$PNTB
012224  062706  000004                                                          ADD     #4,SP
012230  032705  000002          2$:     BIT     #BIT1,R5        ;TEST FOR WRITE ERROR.
012234  001410                          BEQ     4$              ;SKIP WRITE ERROR MSG IF NO WRITE ERROR.
012236                                  PRINTB  #MSG2           ;PRINT WRITE ERROR MESSAGE.
012236  012746  012360                                                          MOV     #MSG2,-(SP)
012242  012746  000001                                                          MOV     #1,-(SP)
012246  010600                                                                  MOV     SP,R0
012250  104414                                                                  TRAP    C$PNTB
012252  062706  000004                                                          ADD     #4,SP
012256                          4$:     PRINTX  #MSG3           ;SUGGEST THAT DHV MAY BE AT WRONG ADDRESS.
012256  012746  012437                                                          MOV     #MSG3,-(SP)
012262  012746  000001                                                          MOV     #1,-(SP)
012266  010600                                                                  MOV     SP,R0
012270  104415                                                                  TRAP    C$PNTX
012272  062706  000004                                                          ADD     #4,SP
012276                                  PASS                    ;RESTORE THE GPR CONTENTS.
012276  004736                                      JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
012300                                  ENDMSG
012300                                                                          L10002:
012300  104423                                                                  TRAP    C$MSG
```

```
2394  012302  040445  052502  020123  MSG1::  .ASCIZ  /%ABUS TIME-OUT TRAP CAUSED BY READ ATTEMPT.%N/
2395  012310  044524  042515  047455
2396  012316  052125  052040  040522
2397  012324  020120  040503  051525
2398  012332  042105  041040  020131
2399  012340  042522  042101  040440
2400  012346  052124  046505  052120
2401  012354  022456  000116
2402  012360  040445  052502  020123  MSG2::  .ASCIZ  /%ABUS TIME-OUT TRAP CAUSED BY WRITE ATTEMPT.%N/
2403  012366  044524  042515  047455
2404  012374  052125  052040  040522
2405  012402  020120  040503  051525
2406  012410  042105  041040  020131
2407  012416  051127  052111  020105
2408  012424  052101  042524  050115
2409  012432  027124  047045     000
2410  012437     045  042101  053110  MSG3::  .ASCIZ  /%ADHV MAY BE AT THE WRONG Q-BUS ADDRESS.%N%N/
2411  012444  046440  054501  041040
2412  012452  020105  052101  052040
2413  012460  042510  053440  047522
2414  012466  043516  050440  041055
2415  012474  051525  040440  042104
2416  012502  042522  051523  022456
2417  012510  022516  000116
2418
2419                                  .EVEN
```

```
2420                                    .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER0201 -
2421                                    ;*****************************************************************************
2422                                    ;*      THIS IS AN ERROR REPORTING SUBROUTINE WHICH PRINTS 2 CONTIGUOUS
2423                                    ;*      ASCII ERROR MESSAGES.  THE ADDRESS OF THE FIRST MESSAGE IS PASSED
2424                                    ;*      AS AN INPUT PARAMETER AND THE ADDRESS OF THE SECOND IS FOUND BY
2425                                    ;*      SEARCHING FOR THE END OF THE FIRST MESSAGE.
2426                                    ;*
2427                                    ;* INPUTS:      R1 - ADDRESS OF THE FIRST MESSAGE TO PRINT.
2428                                    ;*
2429                                    ;* OUTPUTS:     A MESSAGES IS PRINTED AT THE OPERATOR CONSOLE.
2430                                    ;*
2431                                    ;* CALLING SEQUENCE:    LOAD THE ADDRESS OF THE FIRST MESSAGE IN R1.
2432                                    ;*                      INCLUDE THE LABEL "ER0201" AS THE MESSAGE POINTER
2433                                    ;*                      PARAMETER IN THE DIAG SUPER ERROR REPORT MACRO CALL.
2434                                    ;*
2435                                    ;* COMMENTS:    THE MESSAGE IS PRINTED AS BASIC ERROR INFORMATION.
2436                                    ;*              THE SECOND MESSAGE SHOULD FOLLOW THE FIRST ONE IN THE PROGRAM
2437                                    ;*              MEMORY.  EACH MESSAGE SHOULD BE DEFINED USING .ASCIZ
2438                                    ;*
2439                                    ;* SUBORDINATE ROUTINES USED: NONE.
2440                                    ;*****************************************************************************
2441
2442  012514                            BGNMSG  ER0201
2443  012514                                                                    ER0201::
2444  012514                            SAVE                    ;SAVE THE GPR CONTENTS.
2445  012514  004537  002674                    JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
2446
2447  012520  010102                     MOV     R1,R2
2448  012522  105722                2$:  TSTB    (R2)+           ;CHECK FOR A ZERO BYTE (END OF MESSAGE).
2449  012524  001376                    BNE     2$              ;LOOP UNTIL NEXT MESSAGE IS FOUND.
2450
2451  012526                            PRINTB  #EF0503,R1      ;PRINT THE FIRST MESSAGE.
2452  012526  010146                                                    MOV     R1,-(SP)
2453  012530  012746  003030                                           MOV     #EF0503,-(SP)
2454  012534  012746  000002                                           MOV     #2,-(SP)
2455  012540  010600                                                   MOV     SP,R0
2456  012542  104414                                                   TRAP    C$PNTB
2457  012544  062706  000006                                           ADD     #6,SP
2458  012550                            PRINTB  #EF0503,R2      ;PRINT THE SECOND MESSAGE.
2459  012550  010246                                                   MOV     R2,-(SP)
2460  012552  012746  003030                                           MOV     #EF0503,-(SP)
2461  012556  012746  000002                                           MOV     #2,-(SP)
2462  012562  010600                                                   MOV     SP,R0
2463  012564  104414                                                   TRAP    C$PNTB
2464  012566  062706  000006                                           ADD     #6,SP
2465
2466  012572                            PASS                    ;RESTORE THE GPR CONTENTS.
2467  012572  004736                            JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
2468
2469  012574                            ENDMSG
2470  012574                                                            L10003:
2471  012574  104423                                                           TRAP    C$MSG
```

```
2472                                    .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER0503 -
2473                                    ;*****************************************************************************
2474                                    ;*      THIS IS AN ERROR REPORTING SUBROUTINE WHICH PRINTS AN ADDITIONAL ERROR
2475                                    ;*      MESSAGE WHOSE ADDRESS IS PASSED AS AN INPUT PARAMETER.
2476                                    ;*
2477                                    ;* INPUTS:      R1 - ADDRESS OF THE MESSAGE TO PRINT.
2478                                    ;*
2479                                    ;* OUTPUTS:     A MESSAGES IS PRINTED AT THE OPERATOR CONSOLE.
2480                                    ;*
2481                                    ;* CALLING SEQUENCE:    LOAD THE ADDRESS OF THE MESSAGE IN R1.
2482                                    ;*                      INCLUDE THE LABEL 'ER0503' AS THE MESSAGE POINTER
2483                                    ;*                      PARAMETER IN THE DIAG SUPER ERROR REPORT MACRO CALL.
2484                                    ;*
2485                                    ;* COMMENTS:    THE MESSAGE IS PRINTED AS BASIC ERROR INFORMATION.
2486                                    ;*
2487                                    ;* SUBORDINATE ROUTINES USED: NONE.
2488                                    ;*****************************************************************************
2489
2490  012576                                    BGNMSG  ER0503
2491  012576                                                                              ER0503::
2492
2493  012576                                    PRINTB  #EF0503,R1      ;PRINT THE MESSAGE.
2494  012576  010146                                                                        MOV     R1,-(SP)
2495  012600  012746  003030                                                                MOV     #EF0503,-(SP)
2496  012604  012746  000002                                                                MOV     #2,-(SP)
2497  012610  010600                                                                        MOV     SP,R0
2498  012612  104414                                                                        TRAP    C$PNTB
2499  012614  062706  000006                                                                ADD     #6,SP
2500
2501  012620                                    ENDMSG
2502  012620                                                                          L10004:
2503  012620  104423                                                                        TRAP    C$MSG
```

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER1401 -
                        ;*****************************************************************************
                        ;*      THIS IS AN ERROR REPORTING SUBROUTINE WHICH PRINTS ADDITIONAL ERROR
                        ;*      INFORMATION IF AN ERROR IS DETECTED IN THE ROM VERSION TEST.
                        ;*      THIS SUBROUTINE ANALYSES THE INPUT PARAMETERS WHICH CONTAIN THE
                        ;*      ROM VERSION NUMBERS FOR PROC_1 AND PROC_2 AND REPORTS THE APPROPRIATE
                        ;*      ERROR MESSAGE TO THE OPERATOR.
                        ;*
                        ;* INPUTS:      R1 - CONTAINS THE ADDRESS OF THE FIRST MESSAGE TO BE REPORTED.
                        ;*              R3 - CONTAINS THE ROM VERSION NUMBER OF PROC_1.
                        ;*              R4 _ CONTAINS THE ROM VERSION NUMBER OF PROC_2.
                        ;*
                        ;* OUTPUTS:     BASIC AND EXTENDED ERROR MESSAGES ARE REPORTED AT THE
                        ;*              OPERATORS CONSOLE.
                        ;*
                        ;* CALLING SEQUENCE:    INCLUDE THE LABEL "ER1401" AS THE MESSAGE POINTER
                        ;*                      PARAMETER IN THE DRS ERROR REPORT MACRO CALL.
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES USED: NONE.
                        ;*****************************************************************************

                                BGNMSG  ER1401
012622                                                                  ER1401::
012622                          PRINTB  #EF0503,R1              ;REPORT THE ERROR MESSAGE PASSED IN.
012622  010146                                                          MOV     R1,-(SP)
012624  012746  003030                                                  MOV     #EF0503,-(SP)
012630  012746  000002                                                  MOV     #2,-(SP)
012634  010600                                                          MOV     SP,R0
012636  104414                                                          TRAP    C$PNTB
012640  062706  000006                                                  ADD     #6,SP

                        ;+
                        ; DETERMINE WHICH ROM VERSION NUMBER(S) ARE MISSING.
                        ;-

012644  012705  000143          MOV     #99.,R5                 ;GET INVALID ROM NUMBER.
012650  012701  010637          MOV     #EM1405,R1              ;SELECT PROC_1 MESSAGE.
012654  012702  010665          MOV     #EM1407,R2              ;SELECT THE "NOT FOUND" MESSAGE.
012660  120305                  CMPB    R3,R5                   ;CHECK PROC_1 ROM VERSION NUMBER.
012662  001402                  BEQ     2$                      ;GO REPORT PROC_1 CODE NOT FOUND.
012664  012702  010677          MOV     #EM1408,R2              ;SELECT "FOUND" MESSAGE.
012670  004737  012722  2$:     JSR     PC,50$                  ;GO REPORT MESSAGE.

012674  012701  010652          MOV     #EM1406,R1              ;SELECT PROC_2 MESSAGE.
012700  012702  010665          MOV     #EM1407,R2              ;SELECT THE "NOT FOUND" MESSAGE.
012704  120405                  CMPB    R4,R5                   ;CHECK PROC_2 ROM VERSION NUMBER.
012706  001402                  BEQ     4$                      ;GO REPORT PROC_2 CODE NOT FOUND.
012710  012702  010677          MOV     #EM1408,R2              ;SELECT "FOUND" MESSAGE.
012714  004737  012722  4$:     JSR     PC,50$                  ;GO REPORT THE MESSAGE.
012720  000413                  BR      60$                     ;EXIT.

012722                  50$:    PRINTX  #EF1402,R1,R2           ;REPORT THE MESSAGE.
012722  010246                                                          MOV     R2,-(SP)
```

```
2560  012724  010146                                                    MOV     R1,-(SP)
2561  012726  012746  003137                                            MOV     #EF1402,-(SP)
2562  012732  012746  000003                                            MOV     #3,-(SP)
2563  012736  010600                                                    MOV     SP,R0
2564  012740  104415                                                    TRAP    C$PNTX
2565  012742  062706  000010                                            ADD     #10,SP
2566  012746  000207                    RTS     PC                      ;RETURN.
2567  012750                     60$:    ENDMSG
2568  012750                                                    L10005:
2569  012750  104423                                                    TRAP    C$MSG
```

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER1601 -
                        ;*****************************************************************************
                        ;*      THIS AN ERROR REPORTING SUBROUTINE WHICH PRINTS ADDITIONAL ERROR
                        ;*      INFORMATION IF AN ERROR IS DETECTED IN ONE OF THE DEVICE REGISTER
                        ;*      ACCESS TESTS.
                        ;*      THIS SUBROUTINE REPORTS THE ACTUAL AND EXPECTED FROM THE DEVICE
                        ;*      REGISTER(S) WHICH IS(ARE) IN FAULTY.
                        ;*
                        ;* INPUTS:      R1 - ACTUAL DATA (UNUSED BITS SET TO 0).
                        ;*              R2 - EXPECTED DATA (UNUSED BITS SET TO 0).
                        ;*              R3 - OFFSET (IN BYTES) TO THE REGISTER BEING TESTED.
                        ;*              R5 - LINE NUMBER OF REGISTER BEING TESTED.
                        ;*              RMATBB - LABEL AT BASE OF REGISTER MESSAGE ADDRESS TABLE.
                        ;*
                        ;* OUTPUTS:     MESSAGES ARE PRINTED AT THE OPERATORS CONSOLE.
                        ;*
                        ;* CALLING SEQUENCE:    INCLUDE THE LABLE "ER1601" AS THE MESSAGE POINTER
                        ;*                      PARAMETER IN THE DRS ERROR REPORT MACRO CALL.
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: NONE
                        ;*****************************************************************************
012752                          BGNMSG  ER1601
012752                                                                  ER1601::
012752  016304  002254          MOV     RMATBB(R3),R4   ;FETCH ADDRESS OF REGISTER NAME MESSAGE.
012756                  PRINTB  #EF1604,R4,R5   ;REPORT BASIC MESSAGE (REG NAME AND LINE #).
012756  010546                                                          MOV     R5,-(SP)
012760  010446                                                          MOV     R4,-(SP)
012762  012746  003324                                                  MOV     #EF1604,-(SP)
012766  012746  000003                                                  MOV     #3,-(SP)
012772  010600                                                          MOV     SP,R0
012774  104414                                                          TRAP    C$PNTB
012776  062706  000010                                                  ADD     #10,SP
013002                  PRINTX  #EF1602,R2      ;PRINT THE EXPECTED DATA.
013002  010246                                                          MOV     R2,-(SP)
013004  012746  003220                                                  MOV     #EF1602,-(SP)
013010  012746  000002                                                  MOV     #2,-(SP)
013014  010600                                                          MOV     SP,R0
013016  104415                                                          TRAP    C$PNTX
013020  062706  000006                                                  ADD     #6,SP
013024                  PRINTX  #EF1603,R1      ;PRINT THE ACTUAL DATA.
013024  010146                                                          MOV     R1,-(SP)
013026  012746  003262                                                  MOV     #EF1603,-(SP)
013032  012746  000002                                                  MOV     #2,-(SP)
013036  010600                                                          MOV     SP,R0
013040  104415                                                          TRAP    C$PNTX
013042  062706  000006                                                  ADD     #6,SP
013046                  ENDMSG
013046                                                          L10006:
013046  104423                                                          TRAP    C$MSG
```

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER1603 -
                        ;*****************************************************************************
                        ;*      THIS ERROR REPORTING ROUTINE IS USED TO PRINT OUT A BASIC ERROR
                        ;*      MESSAGE, ALONG WITH A MESSAGE INFORMING THE OPERATOR WHICH TEST IS
                        ;*      ABOUT TO BE ABORTED.
                        ;*
                        ;* INPUTS:      R1 - CONTAINS THE ADDRESS OF THE MESSAGE TO BE PRINTED.
                        ;*              ERRMSG - CONTAINS THE ADDRESS OF THE MESSAGE THAT INDICATES
                        ;*              THE TEST THAT IS BEING PERFORMED, EG DMA, BREAK ETC.
                        ;*
                        ;* OUTPUTS:     MESSAGES ARE PRINTED AT THE OPERATORS CONSOLE.
                        ;*              "TESTNAME TEST ABORTED"
                        ;*
                        ;* CALLING SEQUENCE:    INCLUDE THE LABLE "ER1603" AS THE MESSAGE POINTER
                        ;*                      PARAMETER IN THE DRS ERROR REPORT MACRO CALL.
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                        ;*****************************************************************************
                                BGNMSG  ER1603
013050                                                                  ER1603::
013050                          SAVE                    ;SAVE THE CONTENTS OF THE GPRS.
013050  004537  002674                    JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                        
013054                           PRINTB #EF0503,R1      ;PRINT BASIC MESSAGE ON OPERATORS CONSOLE.
013054  010146                                                          MOV     R1,-(SP)
013056  012746  003030                                                  MOV     #EF0503,-(SP)
013062  012746  000002                                                  MOV     #2,-(SP)
013066  010600                                                          MOV     SP,R0
013070  104414                                                          TRAP    C$PNTB
013072  062706  000006                                                  ADD     #6,SP
                        
013076  013702  002670          MOV     ERRMSG,R2       ;GET THE "TEST MESSAGE".
013102                           PRINTB #EF1601,R2      ;PRINT "TEST ABORTED" MESSAGE.
013102  010246                                                          MOV     R2,-(SP)
013104  012746  003174                                                  MOV     #EF1601,-(SP)
013110  012746  000002                                                  MOV     #2,-(SP)
013114  010600                                                          MOV     SP,R0
013116  104414                                                          TRAP    C$PNTB
013120  062706  000006                                                  ADD     #6,SP
                        
013124                  PASS            ;RESTORE THE CONTENTS OF THE GPRS.
013124  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
013126                  ENDMSG
013126                                                                  L10007:
013126  104423                                                          TRAP    C$MSG
```

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER9004 -
                        ;*******************************************************************************
                        ;*      THIS IS AN ERROR REPORTING SUBROUTINE WHICH REPORTS ERROR SUMMARIES
                        ;*      FOR LINES WHICH HAVE EXCEEDED THE SPECIFIED MAXIMUM NUMBER OF
                        ;*      INDIVIDUAL RECEPTION ERRORS.
                        ;*
                        ;* INPUTS:      R1 - ADDRESS OF MESSAGE TO PRINT FIRST.
                        ;*              ERCNTB - LABEL AT BASE OF LINE ERROR COUNTERS TABLE.
                        ;*              ERSMRF - "REPORT ERROR SUMMARY FOR LINE" FLAGS.
                        ;*
                        ;* OUTPUTS:     A MESSAGE IS PRINTED AT THE OPERATOR CONSOLE.
                        ;*
                        ;* CALLING SEQUENCE:    INCLUDE THE LABEL "ER9004" AS THE MESSAGE POINTER
                        ;*                      PARAMETER IN THE DIAG SUPER ERROR REPORT MACRO CALL.
                        ;*
                        ;* COMMENTS:    THE MESSAGE IS PRINTED AS BASIC AND EXTENDED ERROR INFORMATION.
                        ;*              THE CONTENTS OF GPR'S R2, R3, R4, AND R5 ARE DESTROYED.
                        ;*
                        ;* SUBORDINATE ROUTINES USED: NONE.
                        ;*******************************************************************************

013130                          BGNMSG  ER9004
013130                                                                  ER9004::
                        
013130                          PRINTB  #EF0503,#EM9014 ;REPORT THE SECONDARY ERROR MESSAGE.
013130  012746  011423                                                          MOV     #EM9014,-(SP)
013134  012746  003030                                                          MOV     #EF0503,-(SP)
013140  012746  000002                                                          MOV     #2,-(SP)
013144  010600                                                                  MOV     SP,R0
013146  104414                                                                  TRAP    C$PNTB
013150  062706  000006                                                          ADD     #6,SP
013154  005002                  CLR     R2              ;CLEAR THE LINE COUNTER.
013156  013703  002420          MOV     ERSMRF,R3       ;GET THE ERROR SUMMARY FLAGS.
013162  005004                  CLR     R4              ;CLEAR "LINE COUNTER TIMES 2" OFFSET.
013164  000241          2$:     CLC                     ;CLEAR THE CARRY FOR THE FOLLOWING ROTATE.
013166  006003                  ROR     R3              ;SHIFT ANOTHER ERROR SUMMARY FLAG INTO CARRY.
013170  103013                BCC     4$              ;SKIP PRINTING MESSAGE IF FLAG FOR LINE CLEAR.
013172                          PRINTX  #EF9010,R2,ERCNTB(R4)
013172  016446  002422                                                          MOV     ERCNTB(R4),-(SP)
013176  010246                                                                  MOV     R2,-(SP)
013200  012746  003730                                                          MOV     #EF9010,-(SP)
013204  012746  000003                                                          MOV     #3,-(SP)
013210  010600                                                                  MOV     SP,R0
013212  104415                                                                  TRAP    C$PNTX
013214  062706  000010                                                          ADD     #10,SP
013220  012405          4$:     MOV     (R4)+,R5        ;INCREMENT THE LINE OFFSET BY 2.
013222  005202                  INC     R2              ;INCREMT THE LINE COUNTER.
013224  005703                  TST     R3              ;CHECK THE ERROR SUMMARY FLAGS.
013226  001356                BNE     2$              ;IF MORE FLAGS SET, LOOP TO DO OTHER LINES.

013230                          ENDMSG
013230                                                                  L10010:
013230  104423                                                                  TRAP    C$MSG
```

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER9007 -
                        ;*******************************************************************************
                        ;*      THIS IS AN ERROR REPORTING SUBROUTINE WHICH IS USED TO REPORT THAT
                        ;*      SOMETHING OTHER THAN A SELFTEST CODE WAS FOUND IN A SELFTEST CODE
                        ;*      FIFO SLOT DURING THE REMOVAL OF THE SELFTEST CODES FROM THE FIFO.
                        ;*      THIS ROUTINE IS USED BY THE RSTRPT ROUTINE.
                        ;*
                        ;* INPUTS:      R1 - ADDRESS OF ERROR MESSAGE QUALIFIER STRING.
                        ;*              R2 - INCORRECT CODE AS READ FROM THE SELFTEST CODE FIFO SLOT.
                        ;*              R3 - LINE NUMBER ASSOCIATED WITH THE SELFTEST FIFO SLOT.
                        ;*
                        ;* OUTPUTS:     A MESSAGE IS PRINTED AT THE OPERATOR CONSOLE.
                        ;*
                        ;* CALLING SEQUENCE:    INCLUDE THE LABEL "ER9007" AS THE MESSAGE POINTER
                        ;*                      PARAMETER IN THE DIAG SUPER EPROR REPORT MACRO CALL.
                        ;*
                        ;* COMMENTS:    THE MESSAGE IS PRINTED AS BASIC AND EXTENDED ERROR INFORMATION.
                        ;*
                        ;* SUBORDINATE ROUTINES USED: NONE.
                        ;*******************************************************************************

013232                          BGNMSG  ER9007
013232                                                          ER9007::

013232  042703  177760              BIC     #177760,R3      ;REMOVE ALL BUT LINE # BITS FROM LINE # WORD.
013236                          PRINTB  #EF9018,R1,R3   ;REPORT SECONDARY ERROR MESSAGE.
013236  010346                                                  MOV     R3,-(SP)
013240  010146                                                  MOV     R1,-(SP)
013242  012746  004200                                          MOV     #EF9018,-(SP)
013246  012746  000003                                          MOV     #3,-(SP)
013252  010600                                                  MOV     SP,R0
013254  104414                                                  TRAP    C$PNTB
013256  062706  000010                                          ADD     #10,SP
013262                          PRINTX  #EF9017,R1,R2   ;REPORT THE ACTUAL INCORRECT CODE.
013262  010246                                                  MOV     R2,-(SP)
013264  010146                                                  MOV     R1,-(SP)
013266  012746  004124                                          MOV     #EF9017,-(SP)
013272  012746  000003                                          MOV     #3,-(SP)
013276  010600                                                  MOV     SP,R0
013300  104415                                                  TRAP    C$PNTX
013302  062706  000010                                          ADD     #10,SP

013306                          ENDMSG
013306                                                  L10011:
013306  104423                                                  TRAP    C$MSG
```

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER9008 -
                        ;*******************************************************************************
                        ;*      THIS IS AN ERROR REPORTING SUBROUTINE WHICH IS USED TO REPORT THAT
                        ;*      AN UNEXPECTED CODE OR CHARACTER HAS BEEN FOUND IN THE DUT RECEIVE
                        ;*      CHARACTER FIFO.
                        ;*
                        ;* INPUTS:      R1 - ADDRESS OF PARTIAL ERROR MESSAGE STRING.
                        ;*              R2 - INCORRECT CODE AS READ FROM THE SELFTEST CODE FIFO SLOT.
                        ;*
                        ;* OUTPUTS:     A MESSAGE IS PRINTED AT THE OPERATOR CONSOLE.
                        ;*
                        ;* CALLING SEQUENCE:    INCLUDE THE LABEL "ER9008" AS THE MESSAGE POINTER
                        ;*                      PARAMETER IN THE DIAG SUPER ERROR REPORT MACRO CALL.
                        ;*
                        ;* COMMENTS:    THE MESSAGE IS PRINTED AS BASIC AND EXTENDED ERROR INFORMATION.
                        ;*
                        ;* SUBORDINATE ROUTINES USED: NONE.
                        ;*******************************************************************************

013310                          BGNMSG  ER9008
013310                                                                  ER9008::

                        ;+
                        ; EXTRACT THE LINE NUMBER FROM THE INCORRECT CODE OR CHARACTER WHICH WAS READ
                        ;    FROM THE SELFTEST CODE FIFO SLOT.
                        ;-

013310  010203                   MOV     R2,R3
013312  000303                   SWAB    R3
013314  042703  177760           BIC     #177760,R3      ;CALCULATE LINE NUMBER OF CODE.
013320                  PRINTB  #EF9016,R1,R3   ;REPORT TYPE OF INCORRECT CODE FOUND.
013320  010346                                                          MOV     R3,-(SP)
013322  010146                                                          MOV     R1,-(SP)
013324  012746  004027                                                  MOV     #EF9016,-(SP)
013330  012746  000003                                                  MOV     #3,-(SP)
013334  010600                                                          MOV     SP,R0
013336  104414                                                          TRAP    C$PNTB
013340  062706  000010                                                  ADD     #10,SP
013344                  PRINTX  #EF9017,R1,R2   ;REPORT THE ACTUAL INCORRECT CODE.
013344  010246                                                          MOV     R2,-(SP)
013346  010146                                                          MOV     R1,-(SP)
013350  012746  004124                                                  MOV     #EF9017,-(SP)
013354  012746  000003                                                  MOV     #3,-(SP)
013360  010600                                                          MOV     SP,R0
013362  104415                                                          TRAP    C$PNTX
013364  062706  000010                                                  ADD     #10,SP

013370                  ENDMSG
013370                                                          L10012:
013370  104423                                                          TRAP    C$MSG
```

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER9301 -
                        ;*******************************************************************************
                        ;*      THIS IS AN ERROR REPORTING SUBROUTINE WHICH PRINTS ANY BMP CODES
                        ;*      THAT ARE FOUND IN THE BMP CODE QUEUE, TOGETHER WITH THE THE NUMBER OF
                        ;*      THE TEST THAT WAS EXECUTING AT THE TIME THE BMP CODE WAS LOGGED.
                        ;*
                        ;* INPUTS:      R1 - THE ADDRESS OF THE FIRST MESSAGE TO BE REPORTED.
                        ;*              R2 - THE ADDRESS OF THE NEXT EMPTY CELL IN THE QUEUE.
                        ;*
                        ;* OUTPUTS:     THE TEST NUMBER FOLLOWED BY THE BMP CODE ARE PRINTED AT THE
                        ;*              OPERATOR CONSOLE.
                        ;*
                        ;* CALLING SEQUENCE:    INCLUDE THE LABEL "ER9301" AS THE MESSAGE POINTER
                        ;*                      PARAMETER IN THE DIAG SUPER ERROR REPORT MACRO CALL.
                        ;*
                        ;* COMMENTS:    THE MESSAGE IS PRINTED AS BASIC ERROR INFORMATION.
                        ;*
                        ;* SUBORDINATE ROUTINES USED: NONE.
                        ;*******************************************************************************

013372                          BGNMSG  ER9301
013372                                                                  ER9301::
013372                          SAVE                    ;SAVE THE GPRS ON THE STACK.
013372  004537  002674                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.

013376                          PRINTB  #EF0503,R1      ;REPORT UNEXPECTED BMP CODES FOUND.
013376  010146                                                          MOV     R1,-(SP)
013400  012746  003030                                                  MOV     #EF0503,-(SP)
013404  012746  000002                                                  MOV     #2,-(SP)
013410  010600                                                          MOV     SP,R0
013412  104414                                                          TRAP    C$PNTB
013414  062706  000006                                                  ADD     #6,SP
013420  012703  002464                  MOV     #BMPCQB,R3      ;GET THE START ADDRESS OF THE BMP CODE QUEUE.
013424  012705  012024                  MOV     #EM9302,R5      ;GET THE MESSAGE TO BE REPORTED.
013430  012301          2$:             MOV     (R3)+,R1        ;GET THE NUMBER OF THE TEST THAT WAS EXECUTING.
013432  012304                          MOV     (R3)+,R4        ;GET BMP CODE THAT WAS REPORTED OFF THE QUEUE.
013434  004737  013516                  JSR     PC,50$          ;GO REPORT THE BMP CODE.
013440  020302                          CMP     R3,R2           ;CHECK IF ALL CODES HAVE BEEN REPORTED.
013442  103772                          BLO     2$              ;IF IT IS NOT THE LAST BMP CODE THEN LOOP.
                        ;+
                        ; CHECK IF OVERFLOW HAS OCCURRED.
                        ;  THE CONDITIONS FOR OVERFLOW ARE: THE POINTER CONTAINS THE ADDRESS OF THE
                        ;  LAST CELL IN THE QUEUE, AND A BMP CODE HAS ALREADY BEEN WRITTEN INTO THAT
                        ;  CELL.
                        ;-
013444  020227  002660                  CMP     R2,#BMPCQE-4    ;CHECK IF THE POINTER IS AT THE LAST LOCATION.
013450  001036                          BNE     60$             ;EXIT IF NOT AT THE LAST LOCATION.
013452  005762  000002                  TST     2(R2)           ;CHECK FOR A BMP CODE IN THE LAST CELL
013456  001433                          BEQ     60$             ;EXIT IF NO OVERFLOW HAS OCCURED, CELL EMPTY.
013460  012301                          MOV     (R3)+,R1        ;GET THE TEST NUMBER OFF THE QUEUE.
013462  011304                          MOV     (R3),R4         ;GET THE BMP CODE OFF THE QUEUE.
013464  012705  012054                  MOV     #EM9303,R5      ;SELECT THE MESSAGE TO BE REPORTED.
013470                                  PRINTX  #EF9302         ;REPORT OVERFLOW CONDITION.
013470  012746  004407                                                  MOV     #EF9302,-(SP)
013474  012746  000001                                                  MOV     #1,-(SP)
013500  010600                                                          MOV     SP,R0
```

```
2874  013502  104415                                                          TRAP    C$PNTX
2875  013504  062706  000004                                                  ADD     #4,SP
2876  013510  004737  013516                JSR     PC,50$          ;REPORT THE LAST BMP CODE PLACED ON THE QUEUE.
2877  013514  000414                       BR      60$             ;EXIT.
2878
2879  013516                        50$:    PRINTX  #EF9301,R5,R1,R4  ;PRINT THE MESSAGE.
2880  013516  010446                                                          MOV     R4,-(SP)
2881  013520  010146                                                          MOV     R1,-(SP)
2882  013522  010546                                                          MOV     R5,-(SP)
2883  013524  012746  004331                                                  MOV     #EF9301,-(SP)
2884  013530  012746  000004                                                  MOV     #4,-(SP)
2885  013534  010600                                                          MOV     SP,R0
2886  013536  104415                                                          TRAP    C$PNTX
2887  013540  062706  000012                                                  ADD     #12,SP
2888  013544  000207                       RTS     PC              ;RETURN.
2889  013546                        60$:    PASS                    ;RESTORE THE GPR CONTENTS.
2890  013546  004736                                JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
2891
2892  013550                        ENDMSG
2893  013550                                                        L10013:
2894  013550  104423                                                          TRAP    C$MSG
```

```
                                .SBTTL  GLOBAL SUBROUTINES SECTION


                                ;++
                                ; THE GLOBAL SUBROUTINES SECTION CONTAINS THE SUBROUTINES
                                ; THAT ARE USED IN MORE THAN ONE TEST.
                                ;--
```

```
                        .SBTTL  GLOBAL SUBROUTINE                - CALMSL -
                        ;++ ************************************************************************
                        ;*              - CALIBRATE MILLI SECOND LOOP COUNT SUBROUTINE -
                        ;*      THIS SUBROUTINE CALIBRATES THE TIMING LOOP WHICH IS USED IN THE MSLOOP
                        ;*      ROUTINE.  THIS SUBROUTINE CALCULATES A VALUE FOR THE MSLCNT VARIABLE
                        ;*      WHICH IS THE NUMBER OF SOFTWARE LOOPS WHICH TAKES 1 MS TO EXECUTE IN
                        ;*      THE MSLOOP ROUTINE.  THIS ROUTINE CALIBRATES THE COUNT BY USING THE
                        ;*      LINE TIME CLOCK (LTC), SO IF NO LTC IS AVAILABLE THE DEFAULT VALUE FOR
                        ;*      THE DELAY COUNT MUST BE USED.
                        ;*
                        ;*
                        ;* INPUTS:      MSLCNT - DEFAULT 1 MS DELAY LOOP COUNT VALUE, OR
                        ;*                       VALUE FROM PREVIOUS CALIBRATION.
                        ;*              MSTICK - NUMBER OF MS PER LTC CLOCK TICK.
                        ;*              TIMER1 - TIMER COUNTER CHANGED BY LTC INTERRUPT SERVICE RTN.
                        ;*              CLKHRZ - NUMBER OF LTC CLICKS PER SECOND (50 OR 60).
                        ;*
                        ;* OUTPUTS:     CARRY - SET IF LTC IS AVAILABLE, AND NEW CALIBRATION PERFORMED.
                        ;*              MSLCNT - NEW 1 MS DELAY LOOP COUNT VALUE IF LTC AVAILABLE, OR
                        ;*                       UNCHANGED IF NO LTC IS AVAILABLE.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,CALMSL
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: UNSDIV,OOPS.
                        ;-- ************************************************************************

013552                  CALMSL:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
013552  004537  002674          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
013556  005037  013772          CLR     62$             ;CLEAR THE 2ND TIME FLAG.
                        ;+
                        ; SYNCHRONIZE WITH THE LTC.
                        ;-
013562  012705  000001  2$:     MOV     #1,R5           ;SET OUTER LOOP COUNTER TO 1 LOOP.
                                                        ;INCREASE THE VALUE LOADED INTO THIS COUNTER IF THE <**
                                                        ;FOLLOWING LOOP FAILS ON FUTURE, FASTER PROCESSORS. <**
013566  005000                  CLR     R0              ;CLEAR THE WAIT FOR CLOCK INT COUNTER.
013570  012737  000001  002322  MOV     #1,TIMER1       ;SET UP COUNT OF 1 TO SYNCH WITH LTC.
013576  005737  002322  4$:     TST     TIMER1          ;CHECK FOR COUNTER HAVING GONE TO ZERO.
013602  001410                  BEQ     6$              ;JUMP OUT OF LOOP IF LTC HAS INTERRUPTED.
013604  005200                  INC     R0              ;COUNT THIS ITERATION OF THE INNER LOOP.
013606  001373                  BNE     4$              ;LOOP IF COUNTER HAS NOT TURNED OVER.
013610  005305                  DEC     R5              ;DECREMENT THE INNER LOOP COUNTER.
013612  003371                  BGT     4$              ;LOOP IF OUTER LOOP COUNT NOT UP.
                        ;+
                        ; IF WE GOT NO LTC INTERRUPT, INDICATE THAT THERE IS NO LTC AVAILABLE.
                        ; LTC MUST BE FLAKEY, OR NOT REALLY AN LTC AT ALL.
                        ;-
013614  005037  002320          CLR     CLKHRZ          ;CLEAR LTC FREQUENCY WORD TO INDICATE NO LTC.
013620  000241                  CLC                     ;INDICATE FAILURE FOR RETURN.
013622  000461                  BR      60$             ;BYPASS THE FOLLOWING CALIBRATION PROCEDURES.
                        ;+
                        ; WE ARE NOW SYNCHRONIZED WITH THE LTC.
                        ; SET UP FOR THE CALIBRATION LOOP.
                        ;-
```

```
 2958  013624  012704  002322          6$:     MOV     #TIMER1,R4      ;WILL TEST TIMER1 IN THE LOOP BELOW.
 2959  013630  005001                          CLR     R1              ;CLEAR THE OUTER LOOP COUNTER.
 2960  013632  005002                          CLR     R2              ;INDICATE TO CHECK ALL BITS OF TIMER1.
 2961  013634  005003                          CLR     R3              ;INDICATE TO CHECK FOR TIMER1 CLEAR.
 2962  013636  012714  000001                  MOV     #1,(R4)         ;LOAD TIMER1 WITH COUNT OF 1.
 2963
 2964  013642  013705  002334          8$:     MOV     MSLCNT,R5       ;LOAD MS LOOP COUNT.
 2965  013646  011400                  10$:    MOV     (R4),R0         ;GET THE TIMER1 VALUE.
 2966  013650  010037  013774                  MOV     R0,64$          ;SAVE WORD (LIKE IN THE REAL LOOP).
 2967  013654  040200                          BIC     R2,R0           ;LEAVE ALL THE BITS.
 2968  013656  020003                          CMP     R0,R3           ;COMPARE AGAINST ZERO.
 2969  013660  000261                          SEC                     ;SET CARRY IN CASE OF SUCCESS.
 2970  013662  001406                          BEQ     12$             ;EXIT LOOP IF TIMER1 HAS CLEARED.
 2971  013664  005305                          DEC     R5              ;COUNT DOWN THE INSIDE MS LOOP COUNT.
 2972  013666  001367                          BNE     10$             ;LOOP IF MS NOT UP.
 2973  013670  005301                          DEC     R1              ;DECREMENT THE MS TIME COUNT.
 2974  013672  001363                          BNE     8$              ;KEEP LOOPING.
 2975  013674  004737  014316                  JSR     PC,OOPS         ;WE OVERFLOWED, SOMETHING IS WRONG, ABORT.
 2976                                  ;+
 2977                                  ; WE HAVE NOW HAVE LOOP COUNT INFORMATION FOR ONE CLOCK TICK.
 2978                                  ; WE HAVE NEGATIVE OF NUMBER OF OUTER LOOPS IN R1, EACH IS MSLCNT INNER LOOPS.
 2979                                  ; WE HAVE THE PORTION OF THE LAST OUTER LOOP NOT EXECUTED, IN R5.
 2980                                  ; NOW WE CALCULATE THE TOTAL NUMBER OF INNER LOOPS EXECUTED.
 2981                                  ;-
 2982  013700  005401                  12$:    NEG     R1              ;GET NUMBER OF OUTER LOOPS.
 2983  013702  013702  002334                  MOV     MSLCNT,R2       ;GET THE NUMBER OF INNER LOOPS PER OUTER LOOP.
 2984  013706  010203                          MOV     R2,R3           ;COPY NUMBER OF LOOPS FOR MULTIPLY.
 2985  013710  160502                          SUB     R5,R2           ;CALC # OF INNER LOOPS DONE IN LAST OUTER LOOP
 2986  013712  010204                          MOV     R2,R4           ;  AND ADD TO ACCUMULATOR LSWORD.
 2987  013714  005005                          CLR     R5              ;CLEAR ACCUMULATOR MSWORD.
 2988  013716  005301                  14$:    DEC     R1              ;CHECK R1 FOR 0 CONDITION
 2989  013720  100403                          BMI     16$             ; SKIP MULTIPLICATION IF ZERO
 2990  013722  060304                          ADD     R3,R4           ;MULTIPLY NUMBER OF INNER
 2991  013724  005505                          ADC     R5              ; LOOPS PER OUTER LOOP BY
 2992  013726  000773                          BR      14$             ;NUMBER OF OUTER LOOPS PERFORMED.
 2993                                  ;+
 2994                                  ; DIVIDE THE TOTAL NUMBER OF INNER LOOPS BY THE NUMBER OF MS PER LTC TICK.
 2995                                  ;-
 2996  013730  013701  002332          16$:    MOV     MSTICK,R1       ;# OF MS PER LTC TICK IS DIVISOR.
 2997  013734  010403                          MOV     R4,R3           ;LSWORD OF LOOP COUNT IS LSWORD OF DIVIDEND.
 2998  013736  010502                          MOV     R5,R2           ;MSWORD OF LOOP COUNT IS MSWORD OF DIVIDEND.
 2999  013740  004737  016340                  JSR     PC,UNSDIV       ;DIVIDE NUMBER OF LOOPS BY MS PER LTC TICK.
 3000  013744  103402                          BCS     18$             ;BYPASS OOPS IF WE'RE OK.
 3001  013746  004737  014316                  JSR     PC,OOPS         ;CLOCK ROUTINES ARE NOT LONG ENOUGH, OR BUG.
 3002  013752  010137  002334          18$:    MOV     R1,MSLCNT       ;SET NEW VALUE FOR MS LOOP COUNT.
 3003  013756  005137  013772                  COM     62$             ;SET THE 2ND ITERATION FLAGS IF 1ST ITERATION.
 3004  013762  001277                          BNE     2$              ;BRANCH IF ONLY ONE ITERATION DONE.
 3005  013764  000261                          SEC                     ;SET THE SUCCESS FLAG FOR EXIT.
 3006
 3007  013766                          60$:    PASS                    ;RESTORE GPRS,
 3008  013766  004736                                  JSR     PC,@(SP)+       ;RETURN TO PREGOS SUBRT.
 3009  013770  000207                          RTS     PC              ; CARRY - SUCCESS FLAG. SET IF SUCCESS.
 3010
 3011  013772  000000          62$:    .WORD   0                       ;2ND CALIBRATION ITERATION FLAGS.
 3012  013774  000000          64$:    .WORD   0                       ;DUMMY WORD FOR STORAGE OF THE READ WORD.
```

```
                                .SBTTL  GLOBAL SUBROUTINE               - CKTRAP -
                                ;*********************************************************************************
                                ;*      CHECK TRAP ROUTINE -
                                ;*      THIS SUBROUTINE IS USED TO CHECK FOR A BUS TIME-OUT TRAP (004 TRAP)
                                ;*      WHICH IS CAUSED BY AN ACCESS TO A NON-EXISTENT MEMORY OR I/O LOCATION.
                                ;*      IF THE TRAP DOES NOT OCCUR, THIS ROUTINE RETURNS A SUCCESS INDICATION.
                                ;*
                                ;* INPUTS:      R0 - SOURCE ADDRESS FOR MOVE.
                                ;*              R1 - DESTINATION ADDRESS FOR MOVE.
                                ;*              (R0) - SOURCE FOR THE MOVE.
                                ;*
                                ;* OUTPUTS:     (R1) - WRITTEN TO THE CONTENTS OF (R0).
                                ;*              CARRY FLAG - SET ON RETURN IF NO 004 TRAP DETECTED.
                                ;*              TP4FLG - NONZERO IF TRAP OCCURRED, CLEARED OTHERWISE.
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,CKTRAP
                                ;*
                                ;* COMMENTS:    IF THIS SUBROUTINE CAUSES A TRAP, EITHER THE ADDRESS WHICH
                                ;*              IS LABELED ADRPTR WILL BE THE TRAP PC ADDRESS ON THE STACK.
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: NONE.
                                ;*********************************************************************************

013776                          CKTRAP:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
013776  004537  002674                         JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
014002  005037  002304                 CLR     TP4FLG          ;CLEAR THE 004 TRAP FLAGS.
014006  011011                         MOV     (R0),(R1)       ;PERFORM THE MOVE IN QUESTION.
014010  005737  002304         ADRPTR:: TST     TP4FLG          ;CHECK FOR OCCURENCE OF TRAP.
014014  000261                         SEC                     ;INDICATE SUCCESS.
014016  001401                         BEQ     60$             ;EXIT WITH SUCCESS IF TRAP DID NOT OCCUR.
014020  000241                         CLC                     ;INDICATE FAILURE.
014022                          60$:    PASS                    ;RESTORE GPRS.
014022  004736                                 JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
014024  000207                         RTS     PC
```

```
3047                                    .SBTTL  GLOBAL SUBROUTINE               - CLR16W -
3048                                    ;++ ************************************************************************
3049                                    ;*                      - CLEAR SIXTEEN WORDS ROUTINE -
3050                                    ;*      THIS SUBROUTINE CLEARS 16 WORDS STARTING WITH THE SPECIFIED WORD.
3051                                    ;*
3052                                    ;* INPUTS:      R0 - ADDRESS OF THE FIRST WORD TO CLEAR.
3053                                    ;*
3054                                    ;* OUTPUTS:     (R0) TO (R0+15) - 16 WORDS OF MEMORY ARE CLEARED TO 0.
3055                                    ;*
3056                                    ;* CALLING SEQUENCE:    JSR     PC,CLR16W
3057                                    ;*
3058                                    ;* COMMENTS:
3059                                    ;*
3060                                    ;* SUBORDINATE ROUTINES CALLED: NONE.
3061                                    ;-- ************************************************************************
3062
3063  014026                            CLR16W:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
3064  014026  004537  002674                           JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
3065  014032  012701  000020                   MOV     #16.,R1                 ;SET THE LOOP COUNTER TO 16.
3066  014036  005020                    2$:     CLR     (R0)+                   ;CLEAR A WORD OF MEMORY.
3067  014040  005301                            DEC     R1                      ;COUNT THIS LOOP.
3068  014042  001375                           BNE     2$                      ;LOOP IF NOT 16 WORD CLEARED.
3069  014044                            60$:    PASS                            ;RESTORE GPRS.
3070  014044  004736                                   JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
3071  014046  000207                           RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - CNTERR -
                        ;++ ************************************************************************
                        ;*                              - COUNT ERROR ROUTINE -
                        ;*      THIS SUBROUTINE IS USED TO COUNT A 'DATA" ERROR ON THE SPECIFIED
                        ;*      LINE.  IT CHECKS WHETHER ERROR SUMMARY REPORTING IS ACTIVE, OR SHOULD
                        ;*      BE MADE ACTIVE ON THIS LINE, AND ACTIVATES IT IF NECESSARY.
                        ;*
                        ;* INPUTS:      R5 - LINE NUMBER OF LINE UNDER CONSIDERATION.
                        ;*              ERCNTB - LABEL AT BASE OF ERROR COUNTERS TABLE.
                        ;*              ERSMRF - ERROR SUMMARY FLAGS (BIT SET IF LINE IN SUMMARY MODE).
                        ;*              NDERPT - NUMBER OF INDIVIDUAL DATA ERRORS TO REPORT ON A LINE.
                        ;*
                        ;* OUTPUTS:     CARRY - SET IF LINE IS IN ERROR SUMMARY MODE.
                        ;*              ERCNT - ERROR COUNTER INCREMENTED FOR SPECIFIED LINE.
                        ;*              ERSMRF - BIT SET IF LINE SHOULD BE IN SUMMARY MODE.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,CNTERR
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                        ;-- ************************************************************************

014050                  CNTERR:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
014050  004537  002674                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                        ;+
                        ; COUNT THE ERROR ON THE COUNTER FOR THE SPECIFIED LINE.
                        ;-
014054  006305                  ASL     R5                      ;FORM WORD OFFSET FROM LINE NUMBER.
014056  016501  002422          MOV     ERCNTB(R5),R1           ;GET THE PRESENT ERROR COUNT FOR THIS LINE.
014062  005201                  INC     R1                      ;COUNT ERROR.
014064  103402                  BCS     2$                      ;OVERFLOW?  YES, DON'T UPDATE COUNTER IN TABLE.
014066  010165  002422          MOV     R1,ERCNTB(R5)           ;UPDATE ERROR COUNTER TABLE ENTRY.
014072  005737  002206  2$:     TST     NDERPT
014076  001411                  BEQ     60$                     ;SUMMARYS DISABLED?  YES, EXIT WITH CARRY 0.
014100  020137  002206          CMP     R1,NDERPT               ;NO,  CHECK FOR ENOUGH ERRORS FOR SUMMARY USE.
014104  101002                  BHI     4$                      ;ENOUGH ERRORS TO USE SUMMARY?  YES, GO HANDLE.
014106  000241                  CLC                             ;INDICATE NOT TO USE SUMMARY REPORT YET.
014110  000404                  BR      60$                     ;EXIT WITH CARRY 0.
014112  056537  002346  002420  4$:     BIS     BITTBL(R5),ERSMRF       ;SET THE ERROR SUMMARY FLAG FOR LINE.
014120  000261                  SEC                             ;INDICATE TO USE SUMMARY REPORT.
014122                  60$:    PASS                            ;RESTORE GPRS.
014122  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
014124  000207                  RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE                - DELAY -
                        ;*****************************************************************************
                        ;*                              - DELAY SUBROUTINE -
                        ;*      THIS SUBROUTINE IS USED TO DELAY A VARIABLE NUMBER OF MILLI-SECONDS.
                        ;*
                        ;* INPUTS:      R4 - CONTAINS THE NUMBER OF MS TO DELAY.
                        ;*               MSLCNT.
                        ;*
                        ;* OUTPUTS:     NONE.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,DELAY
                        ;*
                        ;* COMMENTS:    IF NO HARDWARE CLOCK INTERRUPTS ARE OCCURING, CONTROL-CS WILL
                        ;*              NOT BE HONORED FOR THE DURATION OF THE DELAY.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                        ;*****************************************************************************

014126                  DELAY:: SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
014126  004537  002674            JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
014132  010401            MOV     R4,R1           ;PASS NUMBER OF MS DELAY AS TIME-OUT VALUE.
014134  012702  177777      MOV     #-1,R2          ;TELL MSLOOP ROUTINE TO CHECK ALL BITS.
014140  005003            CLR     R3              ;TELL MSLOOP RTN TO CHECK FOR ALL BITS CLEAR.
014142  012704  014164      MOV     #62$,R4         ;TELL MSLOOP TO CHECK DUMMY NON-ZERO WORD.
014146  004737  014302      JSR     PC,MSLOOP       ;DELAY THE REQUESTED # OF MS.
014152  103002            BCC     60$             ;EXIT ROUTINE IF WE TIMED-OUT.]
014154  004737  014316      JSR     PC,OOPS         ;IF NO TIME-OUT, BAD PROGRAM OR HOST MACHINE.
014160                  60$:    PASS                    ;RESTORE GPRS.
014160  004736                      JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
014162  000207            RTS     PC

014164  177777          62$:    .WORD   -1              ;DUMMY, NON-ZERO WORD.
```

```
                        .SBTTL  GLOBAL SUBROUTINE                - MSLGET -
                        ;*****************************************************************************
                        ;*      - MILLI SECONDS LOOP WHICH RETURNS READ WORD AND REMAINING TIME -
                        ;*      THIS SUBROUTINE IS A GENERAL PURPOSE TEST LOOP SUBROUTINE.  IT IS USED
                        ;*      TO VERIFY THAT A CERTAIN ACTION OCCURS BEFORE A TIME-OUT PERIOD.  THE
                        ;*      CALLING ROUTINE PASSES IN WHICH BITS SHOULD BE SET AND CLEARED FOR THE
                        ;*      DESIRED CONDITION AND THE TIME-OUT VALUE IN MILLI-SECONDS.
                        ;*      THIS ROUTINE CHECKS FOR THE DESIRED CONDITION UPON ENTRANCE INTO THE
                        ;*      ROUTINE AND THEN ONCE EACH MILLI-SECOND THERE AFTER.
                        ;*      UPON RETURN, THE LAST WORD WHICH WAS READ TO CHECK FOR THE CONDITION
                        ;*      IS RETURNED BY THIS SUBROUTINE.
                        ;*
                        ;* INPUTS:      R1 - TIME-OUT VALUE IN MILLI-SECONDS (UP TO 64K MS).
                        ;*              R2 - BIT MAP OF BITS TO TEST (1 INDICATES TO TEST THE BIT).
                        ;*              R3 - DESIRED STATES OF THE INDICATED FIELDS IN R2.
                        ;*              R4 - ADDRESS OF THE WORD TO TEST.
                        ;*              MSLCNT - MILLI SECOND SOFTWARE LOOP COUNT.
                        ;*
                        ;* OUTPUTS:     R0 - THE LAST WORD WHICH WAS READ TO CHECK FOR THE CONDITION.
                        ;*              R1 - REMAINING NUMBER OF MS IN TIME-OUT TIME.
                        ;*              CARRY - SUCCESS FLAG (SET IF CONDITION IS MET BEFORE TIME-OUT).
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,MSLGET
                        ;*
                        ;* COMMENTS:    THIS ROUTINE WORKS WITH OR WITHOUT A HARDWARE CLOCK, BUT THE
                        ;*              CALIBRATION IS ONLY GUARENTEED WHEN A LINE CLOCK IS AVAILABLE
                        ;*              ON THE SYSTEM.
                        ;*              THIS ROUTINE CAN BE USED AS A DELAY ROUTINE, BY SPECIFYING THE
                        ;*              DESIRED DELAY AS THE TIME-OUT AND SPECIFYING A CONDITION TO
                        ;*              LOOK FOR WHICH WILL NOT BE MET DURING THE DELAY.
                        ;*              IF A TIME-OUT VALUE OF 0 IS SPECIFIED, THIS ROUTINE CHECKS FOR
                        ;*              THE DESIRED CONDITION BEFORE RETURNING.  IT INDICATES SUCCESS
                        ;*              IF THE CONDITION IS MET, FAILURE OTHERWISE.
                        ;*
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                        ;*****************************************************************************
                        
014166                  MSLGET:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
014166  004537  002674                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                        ;+
                        ; SET UP MASK FOR REMOVING UNUSED BITS IN THE TEST WORD, AND CLEAR UNUSED
                        ; BITS IN THE DESIRED STATE WORD TO ALLOW DIRECT COMPARISON.
                        ;-
014172  005102                  COM     R2              ;GET MASK OF UNUSED BITS.
014174  040203                  BIC     R2,R3           ;MASK OUT UNUSED BITS IN DESIRED STATE WORD.
                        ;+
                        ; HANDLE THE TEST AND EXIT IF WE HAVE A 0 TIME-OUT VALUE.
                        ;-
014176  005701                  TST     R1              ;TEST THE TIME-OUT VALUE FOR ZERO.
014200  001011                  BNE     2$              ;IF NON-ZERO TIME-OUT, GO LOOP AND TEST.
014202  011400                  MOV     (R4),R0         ;GET THE WORD TO TEST BEFORE EXITING.
014204  010037  014300          MOV     R0,62$          ;SAVE VALUE SO WE CAN RETURN IT.
014210  040200                  BIC     R2,R0           ;MASK OUT UNTESTED BITS OF WORD.
014212  020003                  CMP     R0,R3           ;COMPARE AGAINST DESIRED STATE WORD.
014214  000261                  SEC                     ;INDICATE SUCCESS IN CASE WORDS ARE EQUAL.
```

```
3204  014216  001420                        BEQ     6$              ;EXIT WITH SUCCESS IF WORDS ARE EQUAL.
3205  014220  000241                        CLC                     ;INDICATE FAILURE (TIME-OUT).
3206  014222  000416                        BR      6$              ;EXIT WITH FAILURE, WORDS AREN'T EQUAL.
3207                                  ;+
3208                                  ; NON-ZERO TIME-OUT VALUE.  LOOP, WAITING FOR CONDITION OR TIME-OUT.
3209                                  ;-
3210  014224  013705  002334          2$:     MOV     MSLCNT,R5       ;LOAD MS LOOP COUNT.
3211  014230  011400                  4$:     MOV     (R4),R0         ;GET THE WORD TO TEST.
3212  014232  010037  014300                  MOV     R0,62$          ;SAVE WORD IN CASE THIS IS THE LAST.
3213  014236  040200                        BIC     R2,R0           ;MASK OUT UNTESTED BITS OF WORD.
3214  014240  020003                        CMP     R0,R3           ;COMPARE AGAINST DESIRED STATE WORD.
3215  014242  000261                        SEC                     ;SET CARRY IN CASE OF SUCCESS.
3216  014244  001405                        BEQ     6$              ;EXIT WITH SUCCESS IF WORDS ARE EQUAL.
3217  014246  005305                        DEC     R5              ;COUNT DOWN THE INSIDE MS LOOP COUNT.
3218  014250  001367                        BNE     4$              ;LOOP IF MS NOT UP.
3219  014252  005301                        DEC     R1              ;DECREMENT THE MS TIME COUNT.
3220  014254  001363                        BNE     2$              ;IF TIME NOT UP, LOOP TO COUNT ANOTHER MS.
3221  014256  000241                        CLC                     ;CLEAR CARRY, WE TIMED-OUT.
3222                                  ;+
3223                                  ; HAVE EITHER FOUND CONDITION, OR TIMED-OUT (POSSIBLY FROM 0 TIME-OUT VALUE).
3224                                  ; RESTORE THE LAST CONTENTS READ FROM THE TEST WORD.  EXIT ROUTINE.
3225                                  ;-
3226  014260  013700  014300          6$:     MOV     62$,R0          ;PASS OUT THE LAST READ WORD.
3227  014264                          60$:    PASS    R0,R1           ;RESTORE GPRS, EXCEPT THE FOLLOWING:
3228  014264  010066  000002                                  MOV     R0,R0SLOT(SP)           ;PUT R0 IN STACK SLOT.
3229  014270  010166  000004                                  MOV     R1,R1SLOT(SP)           ;PUT R1 IN STACK SLOT.
3230  014274  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
3231                                                            ;R0 - LAST READ WORD CHECKED FOR CONDITION.
3232                                                            ;R1 - REMAINING TIME (0 IF TIME-OUT OCCURED).
3233  014276  000207                        RTS     PC              ;CARRY - SET IF SUCCESS, CLEAR IF TIME-OUT.
3234                                  ;+
3235                                  ; LOCAL STORAGE.
3236                                  ;-
3237  014300  000000                  62$:    .WORD   0               ;STORAGE FOR THE LAST READ WORD.
```

```
                        .SBTTL  GLOBAL SUBROUTINE                - MSLOOP -
                        ;*********************************************************************************
                        ;*      - TEST LOOP SUBROUTINE -
                        ;*      THIS SUBROUTINE IS A GENERAL PURPOSE TEST LOOP SUBROUTINE.  IT IS USED
                        ;*      TO VERIFY THAT A CERTAIN ACTION OCCURS BEFORE A TIME-OUT PERIOD.  THE
                        ;*      CALLING ROUTINE PASSES IN WHICH BITS SHOULD BE SET AND CLEARED FOR THE
                        ;*      DESIRED CONDITION AND THE TIME-OUT VALUE IN MILLI-SECONDS.
                        ;*      THIS ROUTINE CHECKS FOR THE DESIRED CONDITION UPON ENTRANCE INTO THE
                        ;*      ROUTINE AND THEN ONCE EACH MILLI-SECOND THEREAFTER.
                        ;*
                        ;* INPUTS:      R1 - TIME-OUT VALUE IN MILLI-SECONDS (UP TO 64K MS).
                        ;*              R2 - BIT MAP OF BITS TO TEST (1 INDICATES TO TEST THE BIT).
                        ;*              R3 - DESIRED STATES OF THE INDICATED FIELDS IN R2.
                        ;*              R4 - ADDRESS OF THE WORD TO TEST.
                        ;*              MSLCNT - MILLI SECOND SOFTWARE LOOP COUNT.
                        ;*
                        ;* OUTPUTS:     CARRY - SUCCESS FLAG (SET IF CONDITION IS MET BEFORE TIME-OUT).
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,MSLOOP
                        ;*
                        ;* COMMENTS:    THIS ROUTINE WORKS WITH OR WITHOUT A HARDWARE CLOCK, BUT THE
                        ;*              CALIBRATION IS ONLY GUARENTEED WHEN A LINE CLOCK IS AVAILABLE
                        ;*              ON THE SYSTEM.
                        ;*              THIS ROUTINE CAN BE USED AS A DELAY ROUTINE, BY SPECIFYING THE
                        ;*              DESIRED DELAY AS THE TIME-OUT AND SPECIFYING A CONDITION TO
                        ;*              LOOK FOR WHICH WILL NOT BE MET DURING THE DELAY.
                        ;*              IF A TIME-OUT VALUE OF 0 IS SPECIFIED, THIS ROUTINE CHECKS FOR
                        ;*              THE DESIRED CONDITION BEFORE RETURNING.  IT INDICATES SUCCESS
                        ;*              IF THE CONDITION IS MET, FAILURE OTHERWISE.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: MSLGET.
                        ;*********************************************************************************

014302                  MSLOOP:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
014302  004537  002674                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.

                        ;+
                        ; CALLING THE MSLGET ROUTINE FROM THE MSLOOP ROUTINE ISOLATES THE CALLER OF
                        ; MSLOOP FROM THE RETURNED TEST WORD AND REMAINING TIME-OUT VALUES.
                        ;-
014306  004737  014166          JSR     PC,MSLGET       ;CALL THE MULTI-PURPOSE MS LOOP AND SEARCH RTN.

014312                  60$:    PASS                    ;RESTORE GPRS,
014312  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
014314  000207          RTS     PC                      ;CARRY - SET IF SUCCESS, CLEAR IF TIME-OUT.
```

```
                                .SBTTL  GLOBAL SUBROUTINE                - OOPS -
                                ;++ ************************************************************************
                                ;*                      - PROGRAM ABORT SUBROUTINE -
                                ;*      THIS SUBROUTINE IS USED TO ABORT THE PROGRAM WHEN A FATAL ERROR IS
                                ;*      DETECTED IN THE PROGRAM OR THE HOST SYSTEM HARDWARE.  AN ERROR MESSAGE
                                ;*      IS PRINTED GIVING SOME INFORMATION ABOUT THE NATURE OF THE ABORT.
                                ;*
                                ;* INPUTS:      R1 - ERROR CODE GIVING REASON FOR ABORT.
                                ;*
                                ;* OUTPUTS:     AN ERROR MESSAGE IS PRINTED.
                                ;*              A LIST OF RETURN PC VALUES FOR ALL SUBROUTINE CALLS IS PRINTED.
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,OOPS
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: NONE.
                                ;-- ************************************************************************
                                
014316                          OOPS::  SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
014316  004537  002674                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                                    ; REPORT "HOST COMPUTER HARDWARE OR SOFTWARE BUG ENCOUNTERED." ERROR.
                                        ERRSF   101,EM0101
                                                                                TRAP    C$ERSF
                                                                                .WORD   101
                                                                                .WORD   EM0101
                                                                                .WORD   0
                                    ; REPORT "PROGRAM HUNG, WAITING FOR A CONTROL-C."
                                        PRINTF  #EM0102
                                                                                MOV     #EM0102,-(SP)
                                                                                MOV     #1,-(SP)
                                                                                MOV     SP,R0
                                                                                TRAP    C$PNTF
                                                                                ADD     #4,SP
                                2$:     BREAK                   ;LOOK FOR OPERATOR CONTROL-C INPUT.
                                                                                TRAP    C$BRK
                                        BR      2$              ;INFINITE LOOP.
                                60$:    PASS                    ;DON'T NEED THIS, BUT SOMEBODY MAY CHANGE THIS
                                                        JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                        RTS     PC              ; ROUTINE IN THE FUTURE, SO BE CONSISTANT.

                                EM0101:: .ASCIZ /HOST COMPUTER HARDWARE OR SOFTWARE BUG ENCOUNTERED./

                                EM0102:: .ASCIZ /%N%APROGRAM HUNG, WAITING FOR A CONTROL-C. <**************%N%N/
```

```
  3339  014512  047522  026514  027103
  3340  014520  036040  025052  025052
  3341  014526  025052  025052  025052
  3342  014534  025052  022452  022516
  3343  014542  000116
  3344                                  .EVEN
```

```
                        .SBTTL  GLOBAL SUBROUTINE                - PUFIFO -
                        ;*****************************************************************************
                        ;*      - PURGE THE FIFO
                        ;*      THIS ROUTINE TRIES TO REMOVE ALL THE CHARACTERS FROM THE FIFO.
                        ;*      ANY BMP CODES THAT ARE FOUND ARE SAVED ON THE BMP CODE QUEUE.
                        ;*
                        ;* INPUTS:      RBUFA- CONTAINS THE  ADDRESS OF THE RECEIVER.
                        ;*
                        ;*
                        ;* OUTPUTS:     CARRY BIT - INDICATES THE STATE OF THE FIFO, SET:= PURGED.
                        ;*              BMPCQ - THE CONTENTS OF THE BMP CODE QUEUE MAY BE UPDATED.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,PUFIFO
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: SAVBMP.
                        ;*****************************************************************************

014544                  PUFIFO::SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
014544  004537  002674                JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
014550  012701  001000          MOV     #512.,R1        ;SET MAXIMUM TRY COUNT OF 512.
014554  013704  002216          MOV     RBUFA,R4        ;GET ADDRESS OF THE RECEIVER BUFFER REGISTER.

014560  011402          2$:     MOV     (R4.,R2         ;GET THE CONTENTS OF THE RECEIVER BUFFER REG.
014562  100016                  BPL     6$              ;EXIT IF THE FIFO IS EMPTY, DATA_VALID CLR.
                        ;+
                        ; CHECK IF THE READ CHARACTER IS ACTUALLY A BMP CODE.
                        ;  IF IT IS, THEN SAVE IT ON THE BMP CODE QUEUE TO BE REPORTED LATER.
                        ;-
014564  012700  070000          MOV     #70000,R0       ;GENERATE A BIT MAP OF CHAR ERROR BITS
014570  040200                  BIC     R2,R0           ; WHICH ARE NOT SET FOR CHAR.
014572  001006                  BNE     4$              ;THROW CHAR AWAY IF NOT BMP OR SELFTEST CODE.
                        ;+
                        ; CHECK IF THE READ DATA IS MODEM STATUS , BMP OR SELFTEST?.
                        ;-
014574  012700  000300          MOV     #300,R0         ; CHECK IF BMP OR SELFTEST?.
014600  040200                  BIC     R2,R0           ;TRY TO CLEAR BMP FLAGS IN THE READ DATA.
014602  001002                  BNE     4$              ;IF IT IS MODEM OR SELFTEST CODE THROW IT AWAY.
014604  004737  016032          JSR     PC,SAVBMP       ;SAVE BMP CODE ON THE QUEUE.

014610  005301          4$:     DEC     R1              ;DECREMENT THE TRY COUNT.
014612  001362                  BNE     2$              ;LOOP TO TRY AGAIN.
014614  000241                  CLC                     ;CLEAR CARRY,TO INDICATE FIFO NOT PURGED.
014616  000401                  BR      60$             ;EXIT WITH CARRY CLEAR.
014620  000261          6$:     SEC                     ;SET CARRY, TO INDICATE FIFO PURGED.

014622                  60$:    PASS                    ;RESTORE GPRS,
014622  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                                        ;CARRY BIT, SET INDICATES FIFO PURGED.
014624  000207                  RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE                - RDPDR -
                        ;*****************************************************************************
                        ;*      - READ AND VERIFY DATA PATTERN FROM DEVICE REGISTERS ROUTINE -
                        ;*      THIS ROUTINE READS AND VERIFIES THE ROTATED DATA PATTERN WHICH HAS
                        ;*      BEEN WRITTEN BY THE WDPDR SUBROUTINE.
                        ;*      EACH ACTIVE LINE'S REGISTER'S CONTENTS IS READ AND COMPARED WITH THE
                        ;*      WRITTEN DATA.
                        ;*      AFTER THE UNUSED AND READ ONLY (RO) BITS ARE MASKED OUT, ANY ERRORS ARE
                        ;*      REPORTED FROM THIS ROUTINE.
                        ;*      THIS ROUTINE WILL TAKE INTO ACCOUNT THE TYPE OF WRITE OPERATION WHICH
                        ;*      WAS PERFORMED BY THE WDPDR SUBROUTINE.
                        ;*
                        ;* INPUTS:      R2 - USED TO PASS IN THE DATA PATTERN TO BE ROTATED & VERIFIED.
                        ;*              R3 - BYTE INDICATOR (- => LO BYTE, + => HI BYTE, 0 => BOTH).
                        ;*              R4 - OPERATION TYPE INDICATOR (- => BIC, + => BIS, 0 => MOV).
                        ;*              ACTLNS - BIT MAP OF ACTIVE LINES ON THE DEVICE UNDER TEST.
                        ;*              CSRA - CONTAINS THE CSR ADDRESS OF THE DEVICE UNDER TEST.
                        ;*              DRADRT - BASE ADDRESS OF DEVICE REGISTER ADDRESS TABLE.
                        ;*              ERCNTB - LABEL AT BASE OF ERROR COUNTERS TABLE FOR LINES.
                        ;*              ERRMSG - SET UP WITH THE PROPER ERROR MESSAGE FOR THIS TEST.
                        ;*              ERRNBR - SET UP WITH THE PROPER ERROR NUMBER.
                        ;*              LPRO - EQUATED TO LPR REG OFFSET FROM DEVICE CSR ADDRESS.
                        ;*              NUMLNS - NUMBER OF LINES ON THE DEVICE UNDER TEST.
                        ;*              NDERPT - NUMBER OF INDIVIDUAL DATA ERRORS TO REPORT ON A LINE.
                        ;*              TXBFCO - EQUATED TO TBUFFCT REG OFFSET FROM DEVICE CSR ADDRESS.
                        ;*              UNBTTB - BASE ADDRESS OF THE UNUSED BIT TABLE.
                        ;*
                        ;* OUTPUTS:     ERROR MESSAGES MAY BE PRINTED AT THE OPERATOR'S CONSOLE.
                        ;*              ERCNT - ERROR COUNTERS TABLE IS UPDATED FOR LINE UNDER TEST.
                        ;*              ERRBLK - CONTENTS DESTROYED.
                        ;*              ERSMRF - ERROR SUMMARY FLAGS BIT SET IF LINE IN SUMMARY MODE.
                        ;*              UUT CSR - ALL BITS CLEARED, EXCEPT IND.ADR.REG FIELD DESTROYED.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,RDPDR
                        ;*
                        ;* COMMENTS:    FOR BYTE ACCESSES, ONLY THE SPECIFIED BYTE IS VERIFIED.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: ER1601,ROLDAP.
                        ;-- *****************************************************************************

014626                  RDPDR:: SAVE                            ;SAVE CONTENTS OF GPRS R0 THRU R5.
014626  004537  002674                 JSR     R5,SAVE         ;CALL REGISTER SAVE SUBRT.
014632  012737  012752  002672          MOV     #ER1601,ERRBLK  ;SET UP THE ADDRESS OF THE ERROR REPORT RTN.
                        ;+
                        ; DETERMINE WHETHER REGISTER DATA SHOULD BE INVERTED FROM DATA PATTERN.
                        ;-
014640  005704                  TST     R4              ;CHECK THE OPERAND TYPE INDICATOR.
014642  100001                BPL     2$              ;BIC WRITE PERFOR ED?  NO, USE STANDARD DATA.
014644  005102                  COM     R2              ;YES, INVERT THE DATA PATTERN.
                        ;+
                        ; SET UP OUTER LOOP.
                        ;-
014646  005005          2$:     CLR     R5              ;CLEAR LINE COUNTER TO SELECT LINE 0.
                        ;+
                        ; THE OUTER LOOP FOLLOWS.  EACH PASS THROUGH THIS LOOP READS AND COMPARES DATA
                        ; FROM ALL OF THE DEVICE REGISTERS FOR A PARTICULAR LINE IF THE LINE IS ACTIVE.
```

```
3452                                    ;-
3453  014650  010237  015044            4$:     MOV     R2,70$          ;SAVE THE OUTER LOOP DATA PATTERN.
3454  014654  010577  165334                    MOV     R5,@CSRA        ;SET CSR IND.ADR.REG FIELD TO THIS LINE.
3455  014660  010500                            MOV     R5,R0
3456  014662  006300                            ASL     R0
3457  014664  036037  002346  002210            BIT     BITTBL(R0),ACTLNS
3458  014672  001452                          BEQ     16$             ;IS THE LINE ACTIVE?  NO, SKIP THE LINE.
3459  014674  012703  000004                    MOV     #LPR0,R3        ;YES, INITIALIZE REGISTER OFFSET FOR LPR.
3460                                    ;+
3461                                    ;       THE INNER LOOP FOLLOWS.  EACH PASS THROUGH THIS LOOP READS AND COMPARES
3462                                    ;       DATA FROM A DEVICE REGISTER.
3463                                    ;-
3464  014700  010204                    6$:     MOV     R2,R4           ;SAVE THE INNER LOOP DATA PATTERN.
3465  014702  046302  002234                    BIC     UNBTTB(R3),R2   ;REMOVE UNUSED BITS FROM EXPECTED DATA.
3466  014706  016300  002214                    MOV     DRADRT(R3),R0
3467  014712  005766  000010                    TST     R3SLOT(SP)      ;CHECK THE ACCESS TYPE INDICATOR.
3468  014716  001002                          BNE     8$              ;BYTE ACCESS?  YES, GO PERFORM BYTE READ.
3469  014720  011001                            MOV     (R0),R1         ;NO, PERFORM WORD READ OF DEVICE REGISTER.
3470  014722  000416                          BR      12$
3471  014724  100410                    8$:     BMI     10$             ;LOW BYTE ACCESS?  YES, GO DO LOW BYTE READ.
3472  014726  005200                            INC     R0              ;HIGH BYTE ACCESS.  FORM HIGH BYTE ADDRESS.
3473  014730  111001                            MOVB    (R0),R1         ;READ THE HI BYTE OF THE DUT REGISTER.
3474  014732  000301                            SWAB    R1              ;PUT HI BYTE BACK INTO THE HI BYTE.
3475  014734  042701  000377                    BIC     #377,R1         ;REMOVE THE UNUSED BYTE IN ACTUAL DATA.
3476  014740  042702  000377                    BIC     #377,R2         ;REMOVE THE UNUSED BYTE IN EXPECTED DATA.
3477  014744  000405                          BR      12$
3478  014746  111001                    10$:    MOVB    (R0),R1         ;READ THE LOW BYTE OF THE DUT REGISTER.
3479  014750  042701  177400                    BIC     #177400,R1      ;REMOVE THE UNUSED BYTE.
3480  014754  042702  177400                    BIC     #177400,R2      ;FORM EXPECTED LOW BYTE FOR COMAPARISON.
3481
3482  014760  046301  002234            12$:    BIC     UNBTTB(R3),R1   ;REMOVE UNUSED BITS FROM ACTUAL DATA.
3483  014764  020102                            CMP     R1,R2           ;COMPARE ACTUAL AND EXPECTED DATA.
3484  014766  001404                          BEQ     14$             ;ACTUAL = EXPECTED?  YES, SKIP ERROR.
3485  014770  004737  014050                  JSR     PC,CNTERR       ;NO, COUNT THE ERROR, CHECK FOR ERROR SUMMARY.
3486  014774  103401                          BCS     14$             ;USE ERROR SUMMARY?  YES, SKIP ERROR.
                                        ;NO, REPORT 'BAD BIT(S) IN DEVICE XXXXX REGISTER FOR LINE NN (D)."
3487
3488  014776                                  ERROR
3489  014776  104460                                                                  TRAP    C$ERROR
3490  015000  010402                    14$:    MOV     R4,R2           ;RESTORE THE INNER LOOP DATA PATTERN.
3491  015002  004737  015416                  JSR     PC,ROLDAP       ;ROTATE DATA PATTERN LEFT, NOT THROUGH CARRY.
3492  015006  062703  000002                    ADD     #2,R3           ;SET REGISTER OFFSET TO THE NEXT REGISTER.
3493  015012  020327  000016                    CMP     R3,#TXBFCO      ;COMPARE REG OFFSET WITH OFFSET OF LAST REG.
3494  015016  003730                          BLE     6$              ;LOOP IF NOT ALL REG DONE FOR THIS LINE.
3495                                  ;+
3496                                  ; BACK INTO THE OUTER LOOP.  NOW SET UP FOR NEXT LINE.  LOOP IF NOT DONE.
3497                                  ;-
3498  015020  013702  015044            16$:    MOV     70$,R2          ;SET UP TO ROTATE THE DATA PATTERN.
3499  015024  004737  015416                  JSR     PC,ROLDAP       ;ROTATE THE DATA PATTERN.
3500  015030  005205                            INC     R5              ;COUNT THIS LINE
3501  015032  020527  000010                    CMP     R5,#NUMLNS      ;COMPARE LINE COUNT WITH NUMBER OF LINES.
3502  015036  002704                          BLT     4$              ;LOOP IF SOME LINES NOT DONE.
3503
3504  015040                            60$:    PASS                    ;RESTORE GPRS.
3505  015040  004736                                    JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
3506  015042  000207                          RTS     PC
3507
```

```
  3508  015044  000000                70$:    .WORD   0               ;STORAGE FOR DATA PATTERN OUTSIDE INNER LOOP.
```

```
3509                                    .SBTTL  GLOBAL SUBROUTINE                - REGTST -
3510                                    ;++ ************************************************************************
3511                                    ;*                              - REGISTERS TEST SUBROUTINE -
3512                                    ;*      SUBROUTINE TO TEST THE DEVICE UNDER TEST (DUT) REGISTERS.  THE USED
3513                                    ;*      BITS OF THE REGISTERS ARE EITHER ALL CLEARED OR ALL SET AND THEN THE
3514                                    ;*      DATA PATTERN IS WRITTEN AND VERIFIED USING EITHER WORD OR BYTE
3515                                    ;*      ACCESSES IN READ/WRITE OR READ/MODIFY/WRITE MODE.
3516                                    ;*
3517                                    ;* INPUTS:      R3 - BYTE INDICATOR (- => LOW, + => HIGH, 0 => BOTH BYTES).
3518                                    ;*              R4 - ACCESS MODE (-1 => SET THEN BIC, 1 => CLEAR THEN BIS,
3519                                    ;*                      (-2 => SET THEM MOV, +2 CLEAR THEN MOV).
3520                                    ;*              ERRNBR - SET UP WITH INITIAL ERROR NUMBER.
3521                                    ;*
3522                                    ;* OUTPUTS:     GPRS0 - GPR SAVE AREA 0 IS DESTROYED.
3523                                    ;*              DEVICE UNDER TEST REGISTERS ARE WRITTEN.
3524                                    ;*              ERROR MESSAGES MAY BE PRINTED AT THE OPERATORS CONSOLE.
3525                                    ;*
3526                                    ;* CALLING SEQUENCE:    JSR     PC,REGTST
3527                                    ;*
3528                                    ;* COMMENTS:    THIS ROUTINE LOOP 16 TIMES WRITING THE SAME DATA PATTERN
3529                                    ;*              ROTATED LEFT ONCE EACH ITERATION.
3530                                    ;*              THIS ROUTINE CAN REPORT ERRORS INITIAL ERRNBR THRU INITIAL+2.
3531                                    ;*
3532                                    ;* SUBORDINATE ROUTINES CALLED: RDPDR,RCLDAP,SWAP0,WDPDR
3533                                    ;-- ************************************************************************
3534
3535  015046                            REGTST:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
3536  015046  004537  002674                    JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
3537                                    ;+
3538                                    ; SET UP THE GPRS FOR THE WRITTING OF THE DATA PATTERN.
3539                                    ;-
3540  015052  012705  000020                    MOV     #16.,R5         ;SET UP LOOP COUNTER TO COUNT 16 ITERATIONS.
3541  015056  012702  167410                    MOV     #167410,R2      ;INITIALIZE THE DATA PATTERN.
3542  015062  032704  000001                    BIT     #BIT0,R4        ;TEST FOR R/W ACCESS.
3543  015066  001001                            BNE     2$              ;R/M/W ACCESS?  YES, R4 IS ALL SET UP.
3544  015070  005004                            CLR     R4              ;NO, INDICATE R/W ACCESS.
3545  015072                            2$:
3546                                    ;+
3547                                    ; SET UP THE GPRS FOR THE CLEARING OR SETTING OF ALL THE USED BITS.
3548                                    ;-
3549  015072  010400                            MOV     R4,R0           ;PASS OPERATION TYPE INDICATOR AROUND SWAP0.
3550  015074  004737  016156                    JSR     PC,SWAP0        ;GET ALTERNATE GPR SET IN R1 THRU R5.
3551  015100  013701  002666                    MOV     ERRNBR,R1       ;SAVE THE INITIAL ERROR NUMBER.
3552  015104  010004                            MOV     R0,R4
3553  015106  005404                            NEG     R4              ;SET UP OP TYPE FOR CLEARING OR SETTING.
3554  015110  005002                            CLR     R2              ;SET UP CLEAR WRITE PATTERN.
3555  015112  026627  000012  000002            CMP     R4SLOT(SP),#2   ;TEST FOR CLEAR THEN MOV TEST SEQUENCE.
3556  015120  001401                            BEQ     4$              ;CLEAR THEN MOV?  YES, LEAVE WRITE PAT CLEAR.
3557  015122  005102                            COM     R2              ;NO, SET ALL BITS OF WRITE PATTERN.
3558  015124  005003                    4$:     CLR     R3              ;INDICATE THAT WORD ACCESSES SHOULD BE USED.
3559  015126  005000                            CLR     R0              ;SET ALTERNATE BYTE EXPECTED DATA PAT TO CLEAR.
3560  015130  026627  000012  177776            CMP     R4SLOT(SP),#-2  ;TEST FOR SET THEN MOV TEST SEQUENCE.
3561  015136  001001                            BNE     6$              ;SET THEN MOV?  YES, LEAVE ALT BYTE PAT CLEAR.
3562  015140  005100                            COM     R0              ;NO, SET ALT BYTE EXPECTED DATA PAT TO ALL 1'S.
3563  015142  004737  016156            6$:     JSR     PC,SWAP0        ;RESTORE SWAPPED GPR VALUES TO R1 THRU R5.
3564                                    ;+
```

```
3565                                    ; START OF DATA PATTERN LOOP.
3566                                    ;-
3567  015146                            8$:
3568                                        ;+
3569                                        ; SET OR CLEAR ALL THE USED BITS OF THE DEVICE REGISTERS FOR ALL LINES.
3570                                        ; VERIFY THAT ALL THE BITS WERE SET OR CLEARED CORRECTLY.
3571                                        ;-
3572  015146  004737  016156                   JSR     PC,SWAP0        ;GET ALTERNATE GPRS FOR SETTING INTIAL STATES.
3573  015152  004737  016550                   JSR     PC,WDPDR        ;GO CLEAR ALL USED REGISTER BITS, ALL LINES.
3574  015156  010137  002666                    MOV     R1,ERRNBR       ;SET UP ERROR NUMBER TO INITIAL ERRNBR.
3575  015162  004737  014626                   JSR     PC,RDPDR        ;VERIFY ALL USED REGISTER BITS, ALL LINES.
3576  015166  004737  016156                   JSR     PC,SWAP0        ;RESTORE MAIN GPRS CONTENTS.
3577                                        ;+
3578                                        ; WRITE DATA PATTERNS, ALL LOWER BYTE USED BITS, ALL REGISTERS, ALL LINES.
3579                                        ; VERIFY THAT THE DATA PATTERN WAS WRITTEN CORRECTLY.
3580                                        ;-
3581  015172  004737  016550                   JSR     PC,WDPDR        ;WRITE DATA PATTERN TO DEVICE REGISTERS.
3582  015176  005237  002666                    INC     ERRNBR          ;SET ERROR NUMBER TO INITIAL+1.
3583  015202  004737  014626                   JSR     PC,RDPDR        ;VERIFY DATA PATTERN IN ALTERRED BYTE(S).
3584  015206  005703                            TST     R3              ;CHECK THE BYTE INDICATOR.
3585  015210  001411                           BEQ     10$             ;WORD ACCESS?  YES, SKIP SECOND BYTE CHECK.
3586                                        ;+
3587                                        ; CHECK THAT THE ALTERNATE (UNMODIFIED) BYTE IS CLEAR OR SET AS EXPECTED.
3588                                        ;-
3589  015212  010201                            MOV     R2,R1           ;SAVE THE DATA PATTERN.
3590  015214  010002                            MOV     R0,R2           ;GET THE ALTERNATE BYTE EXPECTED DATA.
3591  015216  005403                            NEG     R3              ;INDICATE THAT OTHER BYTE IS TO BE CHECKED.
3592  015220  005237  002666                    INC     ERRNBR          ;SET ERROR NUMBER TO INITIAL+2.
3593  015224  004737  014626                   JSR     PC,RDPDR        ;VERIFY DATA PATS IN OTHER BYTES OF REGISTERS.
3594  015230  005403                            NEG     R3              ;RESTORE BYTE INDICATOR.
3595  015232  010102                            MOV     R1,R2           ;RESTORE DATA PATTERN.
3596                                        ;+
3597                                        ; PEPARE THE NEXT DATA PATTERN AND LOOP IF NOT DONE.
3598                                        ;-
3599  015234  004737  015416            10$:    JSR     PC,ROLDAP       ;ROTATE DATA PATTERN LEFT, NOT THROUGH CARRY.
3600  015240  005305                             DEC     R5              ;COUNT THIS ITERATION OF THE LOOP.
3601  015242  003341                            BGT     8$              ;ALL PATTERNS DONE?  NO, LOOP.
3602                                                                    ;YES, RESTORE ERROR NUMBER AND EXIT.
3603  015244  013737  002406  002666  60$:     MOV     GPRS0B,ERRNBR   ;GET THE ERROR NUMBR FROM GPR SWAP STORAGE.
3604  015252                                    PASS                    ;RESTORE GPRS.
3605  015252  004736                                            JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
3606  015254  000207                            RTS     PC
```

```
3607                            .SBTTL  GLOBAL SUBROUTINE                - REPSMR -
3608                            ;++ ************************************************************************
3609                            ;*                      - REPORT ERROR SUMMARY ROUTINE -
3610                            ;*      THIS SUBROUTINE REPORTS AN ERROR SUMMARY FOR THOSE LINES WHICH HAVE
3611                            ;*      EXCEEDED THE NUMBER OF INDIVIDUAL ERRORS TO REPORT FOR A SINGLE LINE
3612                            ;*      IN A SINGLE TEST.  THIS PARAMETER CAN BE SPECIFIED BY THE OPERATOR IF
3613                            ;*      HE/SHE ANSWERS THE SOFTWARE PARAMETER QUESTIONS.
3614                            ;*
3615                            ;* INPUTS:      ERCNTB - LABEL AT BASE OF LINE ERROR COUNTERS TABLE.
3616                            ;*              ERRMSG - ADDRESS OF PRIMARY ERROR MESSAGE.
3617                            ;*              ERRNBR - ERROR NUMBER OF ERRORS IN THIS ROUTINE.
3618                            ;*              ERSMRF - "REPORT ERROR SUMMARY FOR LINE" FLAGS.
3619                            ;*
3620                            ;* OUTPUTS:     ERRBLK - ADDRESS OF ERROR REPORTING ROUTINE (DESTROYED).
3621                            ;*              SUMMARY MESSAGES MAY BE PRINTED AT THE OPERATOR CONSOLE.
3622                            ;*
3623                            ;* CALLING SEQUENCE:    JSR     PC,REPSMR
3624                            ;*
3625                            ;* COMMENTS:    IF NO LINES HAVE EXCEEDED THE MAXIMUM NUMBER OF INDIVIDUAL
3626                            ;*              ERRORS TO REPORT, NO MESSAGES ARE PRINTED BY THIS ROUTINE.
3627                            ;*              ERROR SUMMARIES IN THIS ROUTINE ARE REPORTED AS ERRORS.
3628                            ;*              THE CONTENTS OF ERRBLK ARE DESTROYED.
3629                            ;*
3630                            ;* SUBORDINATE ROUTINES CALLED:
3631                            ;-- ************************************************************************
3632
3633  015256                    REPSMR:: SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
3634  015256  004537  002674                    JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
3635  015262  005737  002420            TST     ERSMRF          ;CHECK THE "PRINT LINE ERROR SUMMARY" FLAGS.
3636  015266  001404                    BEQ     60$             ;EXIT WITHOUT ACTION IF NO SUMMARY FLAGS SET.
3637                            ;+
3638                            ; WE HAVE SOME ERROR SUMMARIES TO REPORT.
3639                            ;-
3640  015270  012737  013130  002672            MOV     #ER9004,ERRBLK  ;SELECT ERROR REPORTING ROUTINE.
3641                            ;+
3642                            ; REPORT
3643                            ;       "ERROR SUMMARY REPORT FOR LINES WITH EXCESSIVE NUMBERS OF ERRORS:"
3644                            ;-
3645  015276                        ERROR
3646  015276  104460                                                                  TRAP    C$ERROR
3647
3648  015300                    60$:    PASS                     ;RESTORE GPRS.
3649  015300  004736                                JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
3650  015302  000207                    RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - RESETT -
                        ;*****************************************************************************
                        ;*              - RESET DEVICE UNDER TEST -
                        ;*      THIS SUBROUTINE IS USED TO RESET THE DUT TO A KNOWN STATE.
                        ;*      IF RESET DOES NOT SUCCESFULLY COMPLETE, IE. TIME-OUT OCCURS, THEN
                        ;*      AN ABORT TEST ERROR MESSAGE IS REPORTED.
                        ;*
                        ;* INPUTS:      CSRA - CONTAINS THE ADDRESS OF THE CSR
                        ;*              TXBFCA - CONTAINS ADDRESS OF DUT DMA BUFFER COUNT REGISTER.
                        ;*              ERRTBL- ERRTYP,ERNBR,AND ERRMSG SET UP CORRECTLY.
                        ;*
                        ;* OUTPUTS:     THE DUT PERFORMS ITS RESET FUNCTION INTO A KNOWN STATE.
                        ;*              CARRY - CLEAR INDICATES THE TEST IS TO BE ABORTED.
                        ;*              ERRBLK - VALUE MAY BE DESTROYED.
                        ;*              IESTAT - TX AND RX INTERRUPT FLAGS ARE CLEARED.
                        ;*              TX AND RX INTERRUPT ENABLE BITS IN THE DUT'S CSR ARE CLEARED.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,RESETT
                        ;*
                        ;* COMMENTS:    THIS SUBROUTINE CAN REPORT ERRORS WITH NUMBERS INITIAL ERRNBR
                        ;*              THIS ROUTINE DOES NOT DESTROY THE VALUE OF ERRNBR.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: DELAY,MSLGET.
                        ;*****************************************************************************

015304                  RESETT:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
015304  004537  002674                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
015310  012702  000040          MOV     #BIT05,R2       ;SET BIT MASK OF MASTER RESET BIT.
                        ;+
                        ; TEST THE STATE OF THE MASTER RESET BIT IN THE CSR.
                        ;  IF MR IS SET THEN WAIT FOR SELF-TEST TO COMPLETE.
                        ;   IF TIME-OUT OCCURS, REPORT THE ERROR AND PASS-OUT ABORT TEST INDICATOR.
                        ;-
015314  013704  002214          MOV     CSRA,R4         ;GET THE ADDRESS OF THE DUT'S CSR.
015320  030214          BIT     R2,(R4)         ;CHECK STATE OF MASTER RESET BIT.
015322  001406          BEQ     2$              ;DON'T DELAY IF MR IS ALREADY CLEAR.
015324  005003          CLR     R3              ;SET UP DESIRED STATE OF MASTER RESET BIT.
015326  012701  004704          MOV     #2500.,R1       ;PASS TIME-OUT VALUE OF 2.5 SECONDS.
015332  004737  014166          JSR     PC,MSLGET       ;WAIT FOR SELF-TEST TO COMPLETE, MR CLEAR.
015336  103012          BCC     4$              ;GO REPORT ERROR IF TIMEOUT OCCURRED.

                        ;+
                        ; SET MASTER RESET BIT IN CSR.  CLEAR TX AND RX ENABLE BITS, ETC.
                        ;  SKIP THE SELFTEST.
                        ;  TIME-OUT OF 2.5 SECS, JUST IN CASE THE SELF-TEST EXECUTES.
                        ;-
015340  010277  164650  2$:     MOV     R2,@CSRA        ;SET MASTER RESET BIT, DISABLE TX AND RX INTS.
015344  004737  016100          JSR     PC,SKPSTS       ;TRY TO SKIP THE SELFTEST.
                          ;+
                          ;   SET SELF-TEST TIME-OUT OF 2.5 SECONDS, AND WAIT FOR M.R TO CLEAR.
                          ;   IF TIME-OUT OCCURS, THEN REPORT THE FATAL ERROR AND PASS-OUT THE ABORT
                          ;   TEST INDICATOR.
                          ;-
015350  005003                  CLR     R3              ;SET UP DESIRED STATE OF MASTER RESET BIT.
015352  012701  004704          MOV     #2500.,R1       ;PASS TIME-OUT VALUE OF 2.5 SECONDS.
015356  004737  014166          JSR     PC,MSLGET       ;WAIT FOR SELF-TEST TO COMPLETE, MR CLEAR.
```

```
3707  015352  103410                  BCS     6$              ;SKIP ERROR REPORT IF MR CLEARED IN TIME.
3708                                  ;+
3709                                  ; SET UP ERROR MESSAGE TO REPORT "FATAL ERROR FOUND DURING RESET,TEST ABORTED".
3710                                  ; INDICATE TEST IS TO BE ABORTED BY CLEARING THE CARRY BIT.
3711                                  ;-
3712  015364  012701  010705          4$:     MOV     #EM1601,R1      ;PASS ERROR MESSAGE TO REPORT.
3713  015370  012737  013050  002672          MOV     #ER1603,ERRBLK ;PASS ADDRESS OF ERROR HANDLING ROUTINE.
3714                                          ;REPORT ERROR "TIME-OUT OCCURRED WAITING FOR MASTER RESET TO CLEAR"
3715                                          ; "TEST ABORTED"
3716  015376                                  ERROR                   ;               >>>>> ERROR <<<<<
3717  015376  104460                                                                          TRAP    C$ERROR
3718  015400  000241                          CLC                     ;INDICATE TEST IS TO BE ABORTED.
3719  015402  000403                          BR      60$             ;EXIT THIS SUBROUTINE, ABORT TEST INDICATOR.
3720                                  ;+
3721                                  ; CLEAR TX AND RX INTERRUPT ENABLE STATUS FLAGS IN IESTAT.
3722                                  ; EXIT WITH CONTINUE TEST INDICATOR SET (IE,CARRY SET).
3723                                  ;-
3724  015404  005037  002276          6$:      CLR    IESTAT          ;CLEAR TX AND RX INTERRUPT STATUS FLAGS.
3725  015410  000261                           SEC                    ;INDICATE SUCCESS, CONTINUE TEST.
3726
3727  015412                          60$:    PASS                    ;RESTORE GPRS, PASS THE FOLLOWING INTACT:
3728  015412  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
3729                                                                  ;CARRY BIT:IF CLEAR,INDICATES ABORT TEST.
3730  015414  000207                          RTS     PC
3731
```

```
3732                                    .SBTTL  GLOBAL SUBROUTINE                - ROLDAP -
3733                                    ;*************************************************************************
3734                                    ;*      - ROTATE LEFT DATA PATTERN
3735                                    ;*      THIS ROUTINE ROTATES THE PASSED INPUT DATA PATTERN LEFT,WITHOUT GOING
3736                                    ;*      THROUGH THE CARRY.THE CARRY IS INITIALLY SET OR CLEARED DEPENDING
3737                                    ;*      UPON THE STATE OF THE MSB OF THE DATA PATTERN,BEFORE A ROL INSTRUCTION
3738                                    ;*      IS EXECUTED.
3739                                    ;*
3740                                    ;* INPUTS:      R2 - CONTAINS THE DATA PATTERN TO BE ROTATED
3741                                    ;*
3742                                    ;* OUTPUTS:     R2 - CONTAINS THE ROTATED DATA PATTERN
3743                                    ;*
3744                                    ;* CALLING SEQUENCE:    JSR     PC,ROLDAP
3745                                    ;*
3746                                    ;* COMMENTS:
3747                                    ;*
3748                                    ;* SUBORDINATE ROUTINES CALLED: NONE
3749                                    ;*************************************************************************
3750
3751  015416                            ROLDAP::SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
3752  015416  004537  002674                   JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
3753  015422  010202                    MOV     R2,R2                   ;SET PROCESSOR STATUS CODES
3754  015424  005702                    TST     R2                      ;CHECK MSB
3755  015426  100402                    BMI     2$                      ;BRANCH IF SET
3756  015430  000241                    CLC                             ;CLEAR CARRY BIT IF MSB CLEAR
3757  015432  000401                    BR      4$                      ;
3758  015434  000261                2$: SEC                             ;SET CARRY IF MSB SET
3759  015436  006102                4$: ROL     R2                      ;ROTATE DATA PATTERN LEFT
3760  015440                        60$:PASS    R2                      ;RESTORE GPRS,EXCEPT
3761  015440  010266  000006                  MOV     R2,R2SLOT(SP)           ;PUT R2 IN STACK SLOT.
3762  015444  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
3763                                                                    ;R2 - CONTAINS THE ROTATED DATA PATTERN
3764  015446  000207                    RTS     PC
```

```
3765                            .SBTTL  GLOBAL SUBROUTINE                - RSTRPT -
3766                            ;++ ************************************************************************
3767                            ;*                      - REPORT ANY RESET ERRORS ROUTINE -
3768                            ;*      THIS ROUTINE DETERMINES IF ANY ERROR CODES ARE AMONG THE DIAGNOSTIC
3769                            ;*      CODES REPORTED PLACED IN THE DUT RECEIVED CHARACTER FIFO BY THE
3770                            ;*      SELF-TEST.  IF ANY NON BMP ERROR CODES ARE FOUND, OR IF OTHER ERRORS
3771                            ;*      ARE ENCOUNTERED, APPROPRIATE ERRORS ARE REPORTED.  ANY BMP CODES THAT
3772                            ;*      ARE FOUND, ARE PLACED ON THE BMP CODE QUEUE TO BE REPORTED LATER.
3773                            ;*      THIS ROUTINE ALSO PURGES THE DUT FIFO LOOKING FOR ANY CHARACTERS
3774                            ;*      OR MODEM STATUS CODES.  IF ANY ARE FOUND, ERRORS ARE REPORTED.
3775                            ;*
3776                            ;* INPUTS:      ERRMSG - ADDRESS OF THE PRIMARY ERROR MESSAGE.
3777                            ;*              ERRNBR - ERROR NUMBER OF FIRST ERROR REPORTED BY THIS ROUITNE.
3778                            ;*              NUMLNS - EQUATED TO THE NUMBER OF LINE ON THE DUT.
3779                            ;*              RBUFA - CONTAINS ADDRESS OF THE DUT RECEIVER FIFO.
3780                            ;*
3781                            ;* OUTPUTS:     CARRY - SUCCESS FLAG (SET IF FIFO CLEARED SUCCESSFULLY).
3782                            ;*              ERRBLK - ADDRESS OF THE ERROR REPORT ROUTINE (DESTROYED).
3783                            ;*              ERROR MESSAGES CAN BE PRINTED AT THE OPERATORS CONSOLE.
3784                            ;*
3785                            ;* CALLING SEQUENCE:    JSR     PC,RSTRPT
3786                            ;*
3787                            ;* COMMENTS:    THIS SUBROUTINE CAN REPORT ERRORS WITH NUMBERS INITIAL ERRNBR
3788                            ;*              THRU INITIAL ERRNBR+4.
3789                            ;*              THIS ROUTINE DOES NOT DESTROY THE VALUE OF ERRNBR.
3790                            ;*
3791                            ;* SUBORDINATE ROUTINES CALLED: ER0503,ER9007,ER9008,SAVBMP.
3792                            ;-- ************************************************************************
3793
3794  015450                    RSTRPT:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
3795  015450  004537  002674                             JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
3796                            ;+
3797                            ; READ CORRECT NUMBER (NUMBER OF LINE ON DUT) OF CHARS FROM THE FIFO.
3798                            ; VERIFY THAT EACH CHAR IS A SELFTEST SUCCESS CODE.
3799                            ;-
3800  015454  005003                            CLR     R3              ;CLEAR THE CODE COUNTER.
3801  015456  013705  002666                    MOV     ERRNBR,R5       ;SAVE ERRNBR FOR RESTORATION LATER.
3802  015462  017702  164530    2$:             MOV     @RBUFA,R2       ;READ A CHAR FROM THE DUT FIFO.
3803  015466  100412                          BMI     4$              ;SKIP ERROR IF DATA.VALID SET FOR CHAR.
3804                                ;+
3805                                ; WE EXPECT A SELFTEST CODE, BUT THIS FIFO SLOT IS EMPTY.
3806                                ;-
3807  015470  010537  002666                        MOV     R5,ERRNBR       ;RESTORE ERROR NUMBER TO INTITIAL VALUE.
3808  015474  012701  011630                        MOV     #EM9018,R1      ;PASS ERROR MESSAGE INFO TO ER9007 ROUTINE.
3809  015500  012737  013232  002672                MOV     #ER9007,ERRBLK  ;SELECT PROPER ERROR REPORT ROUTINE.
3810                                ;+
3811                                ; REPORT ERROR WITH NUMBER INITIAL ERRNRB.
3812                                ;   'NO SELFTEST CODE IN SELFTEST CODE FIFO SLOT FOR LINE NN AFTER RESET.''
3813                                ;-
3814  015506                            ERROR                       ;               >>>>> ERROR <<<<<.
3815  015506  104460                                                                          TRAP    C$FRROR
3816                                ;+
3817                                ; INIDICATE ''SUCCESS'' (BECAUSE FIFO IS PURGED), AND EXIT THIS ROUTINE.
3818                                ;-
3819  015510  000261                            SEC                     ;SET SUCCESS FLAG.
3820  015512  000545                          BR      60$               ;EXIT ROUTINE.
```

```
3821                                        ;+
3822                                        ; DETERMINE IF THIS IS NOT A SELFTEST CODE.
3823                                        ;-
3824  015514  012700  070001          4$:      MOV    #70001,R0        ;GENERATE BIT MAP OF ANY CLEAR ERROR BITS OR
3825  015520  040200                           BIC    R2,R0            ;  BIT 0 WHICH ARE CLEAR.
3826  015522  001033                          BNE    8$               ;GO TO REPORT ERROR IF THIS IS NOT A TEST CODE.
3827                                        ;+
3828                                        ; WE HAVE A TEST CODE (EITHER BMP OR SELFTEST CODE).
3829                                        ; DETERMINE WHAT TYPE OF CODE WE HAVE.
3830                                        ;-
3831  015524  032702  000200                    BIT    #BIT7,R2         ;TEST ROM VERSION CODE INDICATOR BIT.
3832  015530  001443                          BEQ    10$              ;SKIP ERRORS IF SELFTEST ROM VERSION CODE.
3833  015532  120227  000203                    CMPB   R2,#203          ;CHECK IF SKIP SELF TEST CODE.
3834  015536  001440                          BEQ    10$              ;SKIP ERROR REPORT IF SKIP SELF TEST CODE FOUND
3835  015540  120227  000201                    CMPB   R2,#201          ;CHECK IF NULL CODE PRESENT.
3836  015544  001435                          BEQ    10$              ;SKIP ERROR REPORT IF SELF TEST NULL CODE.
3837  015546  012700  000300                    MOV    #300,R0          ;TEST CODE TYPE BITS FOR BOTH CODE
3838  015552  040200                           BIC    R2,R0            ;  TYPE BITS SET (INDICATING BMP CODE).
3839  015554  001003                          BNE    6$               ;IF IT IS NOT A BMP CODE GO REPORT ERROR.
3840  015556  004737  016032                    JSR    PC,SAVBMP        ;SAVE THE BMP CODE ON THE QUEUE.
3841  015562  000426                          BR     10$              ;GO GET THE NEXT CHARACTER FROM THE FIFO.
3842                                        ;+
3843                                        ; WE HAVE A SELFTEST ERROR CODE.
3844                                        ;-
3845  015564  010537  002666           6$:      MOV    R5,ERRNBR        ;RESTORE ERROR NUMBER TO INTITIAL VALUE.
3846  015570  005237  002666                    INC    ERRNBR           ;CALCULATE INITIAL ERROR NUMBER PLUS 1.
3847  015574  012701  011655                    MOV    #EM9020,R1       ;PASS ERROR MESSAGE INFO TO ER9008 ROUTINE.
3848  015600  012737  013310  002672           MOV    #ER9008,ERRBLK   ;SELECT PROPER ERROR REPORT ROUTINE.
3849                                        ;+
3850                                        ; REPORT ERROR WITH NUMBER INITIAL ERRNRB + 1.
3851                                        ;    'UNEXPECTED SELFTEST ERROR CODE FOR LINE NN IN FIFO AFTER RESET:"
3852                                        ;-
3853  015606                                   ERROR                   ;              >>>>> ERROR <<<<<.
3854  015606  104460                                                                          TRAP    C$ERROR
3855  015610  000413                          BR     10$              ;GO TO END OF LOOP.
3856                                        ;+
3857                                        ; WE HAVE A NON-SELFTEST CODE (EITHER BMP CODE OR DATA CHAR).
3858                                        ;-
3859  015612  010537  002666           8$:      MOV    R5,ERRNBR        ;RESTORE ERROR NUMBER TO INTITIAL VALUE.
3860  015616  062737  000002  002666           ADD    #2,ERRNBR        ;CALCULATE INITIAL ERROR NUMBER PLUS 2.
3861  015624  012701  011640                    MOV    #EM9019,R1       ;PASS ERROR MESSAGE INFO TO ER9007 ROUTINE.
3862  015630  012737  013232  002672           MOV    #ER9007,ERRBLK   ;SELECT PROPER ERROR REPORT ROUTINE.
3863                                        ;+
3864                                        ; REPORT ERROR WITH NUMBER INITIAL ERRNRB + 2.
3865                                        ;    'NON-SELFTEST CODE IN SELFTEST CODE FIFO SLOT FOR LINE NN AFTER RESET."
3866                                        ;-
3867  015636                                   ERROR                   ;              >>>>> ERROR <<<<<.
3868  015636  104460                                                                          TRAP    C$ERROR
3869                                        ;+
3870                                        ; END OF LOOP, LOOP IF NOT ALL CHARS HAVE BEEN READ FROM THE FIFO.
3871                                        ;-
3872  015640  005203                   10$:     INC    R3               ;SET CODE COUNTER FOR NEXT ITERATION OF LOOP.
3873  015642  020327  000010                    CMP    R3,#NUMLNS       ;TEST FOR ALL CODES READ.
3874  015646  002705                          BLT    2$               ;LOOP IF NOT CHARS READ FROM FIFO.
3875                                        ;+
3876                                        ; PURGE THE FIFO UNTIL DATA.VALID IS CLEAR OR UNTIL TOO MANY CHARS ARE READ.
```

```
3877                                    ;-
3878  015650  012704  000022                    MOV     #18.,R4         ;INITIALIZE THE CHARACTER COUNTER.
3879  015654  010537  002666                    MOV     R5,ERRNBR       ;GET INITIAL VALUE OF THE ERROR NUMBER.
3880  015660  062737  000003  002666            ADD     #3,ERRNBR       ;CALCULATE ERROR NUMBER OF NEXT ERROR.
3881  015666  012737  013310  002672            MOV     #ER9008,ERRBLK  ;SELECT PROPER ERROR REPORT ROUTINE.
3882  015674  017702  164316              12$:  MOV     @RBUFA,R2       ;READ A CHARACTER FROM THE DUT FIFO.
3883  015700  000261                        SEC                     ;INDICATE SUCCESS IN CASE DATA.VALID IS CLEAR.
3884  015702  100051                        BPL     60$             ;EXIT ROUTINE WITH SUCCESS IF DATA.VALID CLEAR.
3885                                  ;+
3886                                  ; WE HAVE A CHARACTER.
3887                                  ; DETERMINE IF CHARACTER IS A DATA CHARACTER.
3888                                  ;-
3889  015704  012700  070000                    MOV     #70000,R0       ;TEST BITS 12 THRU 14 OF THE
3890  015710  040200                        BIC     R2,R0           ;  CODE READ FROM THE DUT FIFO.
3891  015712  001403                        BEQ     14$             ;SKIP THIS ERROR IF CODE IS NOT A DATA CHAR.
3892                                  ;+
3893                                  ; WE HAVE AN UNEXPECTED DATA CHARACTER: SET UP AND GO TO REPORT ERROR.
3894                                  ;-
3895  015714  012701  011701                    MOV     #EM9022,R1      ;SELECT ERROR MSG INFO FOR ER0808 ROUTINE.
3896  015720  000423                        BR      22$             ;GO TO REPORT THIS ERROR.
3897                                  ;+
3898                                  ; WE HAVE AN UNEXPECTED CODE.
3899                                  ; DETERMINE IF THE CODE IS A MODEM STATUS CODE.
3900                                  ;-
3901  015722  032702  000001              14$:  BIT     #BIT0,R2        ;TEST MODEM STATUS INDICATOR BIT OF CODE.
3902  015726  001003                        BNE     16$             ;SKIP THIS ERROR IF NOT MODEM STATUS CODE.
3903                                  ;+
3904                                  ; WE HAVE A MODEM STATUS CODE: SET UP AND GO TO REPORT ERROR.
3905                                  ;-
3906  015730  012701  011720                    MOV     #EM9023,R1      ;SELECT ERROR MSG INFO FOR ER0808 ROUTINE.
3907  015734  000415                        BR      22$             ;GO TO REPORT THIS ERROR.
3908                                  ;+
3909                                  ; WE HAVE AN ONBOARD TEST CODE.
3910                                  ; DETERMINE IF THIS CODE IS A BMP CODE.
3911                                  ;-
3912  015736  032702  000200              16$:  BIT     #BIT7,R2        ;TEST THE ROM VERSION BIT OF THE CODE.
3913  015742  001404                        BEQ     18$             ;GOTO SET UP FOR SELFTEST CODE IF ROM VERSION.
3914  015744  012700  000300                    MOV     #300,R0
3915  015750  040200                        BIC     R2,R0           ;TEST THE ERROR TYPE BITS OF THE CODE.
3916  015752  001403                        BEQ     20$             ;SKIP THIS ERROR IF BMP CODE.
3917                                  ;+
3918                                  ; WE HAVE A SELFTEST CODE: SET UP AND GO TO REPORT ERROR.
3919                                  ;-
3920  015754  012701  011742              18$:  MOV     #EM9024,R1      ;SELECT ERROR MSG INFO FOR ER0808 ROUTINE.
3921  015760  000403                        BR      22$             ;GO TO REPORT THIS ERROR.
3922                                  ;+
3923                                  ; WE HAVE A BMP CODE: SAVE IT ON THE QUEUE.
3924                                  ;-
3925  015762  004737  016032              20$:  JSR     PC,SAVBMP       ;SAVE THE BMP CODE ON THE QUEUE.
3926  015766  000401                        BR      24$             ;
3927                                  ;+
3928                                  ; REPORT THE ERROR WITH ERROR NUMBER OF INITIAL ERRNBR + 3.
3929                                  ;    'UNEXPECTED XXX XXXX FOR LINE NN IN FIFO AFTER RESET:"
3930                                  ;-
3931  015770                          22$:  ERROR                   ;               >>>>> ERROR <<<<<.
3932  015770  104460                                                                  TRAP    C$ERROR
```

```
3933                                        ;+
3934                                        ; END OF LOOP.
3935                                        ; COUNT THE CHARACTER WE JUST RECEIVED, AND CHECK FOR TOO MANY RECEIVED.
3936                                        ;-
3937  015772  005304                  24$:     DEC     R4                  ;COUNT THIS CHARACTER.
3938  015774  001337                           BNE     12$                 ;LOOP IF NOT TOO MANY CHARACTERS PURGED.
3939                                      ;+
3940                                      ; WE READ TOO MANY VALID CHARACTERS WHILE TRYING TO PURGE THE FIFO.
3941                                      ; REPORT ERROR AND EXIT WITHOUT SUCCESS.
3942                                      ;    "FIFO WILL NOT PURGE (DATA.VALID STUCK SET), REMAINDER OF TEST SKIPPED."
3943                                      ;-
3944  015776  012701  011517              MOV     #EM9017,R1          ;SELECT PROPER ERROR MESSAGE.
3945  016002  010537  002666              MOV     R5,ERRNBR           ;GET INITIAL ERROR NUMBER.
3946  016006  062737  000004  002666      ADD     #4,ERRNBR           ;CALCULATE INITIAL ERRNBR + 4.
3947  016014  012737  012576  002672      MOV     #ER0503,ERRBLK      ;SELECT PROPER ERROR REPORT ROUTINE.
3948                                      ;PRINT ERROR REPORT.
3949  016022                              ERROR                       ;                >>>>> ERROR <<<<<.
3950  016022  104460                                                                          TRAP    C$ERROR
3951  016024  000241                      CLC                         ;CLEAR THE SUCCESS FLAG.
3952
3953  016026                      60$:    PASS                        ;RESTORE GPRS,
3954  016026  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
3955  016030  000207                      RTS     PC                  ; CARRY - SUCCESS FLAG (SET IF FIFO IS PURGED).
```

```
                        .SBTTL  GLOBAL SUBROUTINE                - SAVBMP -
                        ;++ ************************************************************************
                        ;*                        - SAVE BMP CODES ROUTINE -
                        ;*      THIS ROUTINE SAVES THE PARAMETER PASSED IN, ONTO THE BMP CODE QUEUE
                        ;*      TOGETHER WITH THE NUMBER OF THE CURRENTLY EXECUTING TEST.
                        ;*
                        ;* INPUTS:      R2 - CONTAINS THE BMP CODE THAT IS TO BE PLACED ON THE QUEUE.
                        ;*              BMPCQP - CONTAINS ADDRESS OF NEXT LOCATION IN THE BMP QUEUE.
                        ;*              BMPCQB - LABEL AT BASE OF THE BMP CODE QUEUE.
                        ;*              BMPCQE - LABEL OF NEXT LOCATION AFTER THE END OF THE BMP QUEUE.
                        ;*              TSTNUM - CONTAINS THE NUMBER OF THE CURRENT TEST.
                        ;*
                        ;* OUTPUTS:     BMPCQP -  INCREMENTED BY 4.
                        ;*              THE CONTENTS OF THE BMP CODE QUEUE ARE UPDATED.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,SAVBMP
                        ;*
                        ;* COMMENTS:    IF THE OVERFLOW OCCURS THEN THE LAST LOCATION WILL BE
                        ;*              OVERWRITTEN BY ANY SUBSEQUENT ATTEMPTS TO UPDATE THE QUEUE.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                        ;-- ************************************************************************

016032                  SAVBMP:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
016032  004537  002674                 JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
016036  013704  002462          MOV     BMPCQP,R4       ;GET THE POINTER TO THE NEXT LOCATION IN QUEUE.
016042  113724  002274          MOVB    TSTNUM,(R4)+    ;SAVE THE CURRENT TEST NUMBER ON THE QUEUE.
016046  005204                  INC     R4              ;INCREMENT THE POINTER TO GIVE AN EVEN ADDRESS.
016050  042702  177400          BIC     #177400,R2      ;CLEAR THE UNWANTED BITS FROM THE BMP CODE.
016054  010224                  MOV     R2,(R4)+        ;SAVE THE BMP CODE ON THE QUEUE.
016056  020427  002664          CMP     R4,#BMPCQE      ;CHECK IF OVERFLOW WILL OCCUR THE NEXT TIME.
016062  103402                  BLO     2$              ;GO SAVE THE POINTER IF WE WILL NOT OVERFLOW.
016064  162704  000004          SUB     #4,R4           ;RESET THE POINTER TO THE LAST LOCATION IN QUE.
016070  010437  002462  2$:     MOV     R4,BMPCQP       ;SAVE THE POINTER.

016074                  60$:    PASS                    ;RESTORE GPRS.
016074  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
016076  000207                  RTS     PC
```

```
                                .SBTTL  GLOBAL SUBROUTINE                - SKPSTS -
                                ;++ ************************************************************************
                                ;*                      - SKIP SELFTEST ROUTINE -
                                ;*      THIS SUBROUTINE IS USED TO SKIP THE SELFTEST AFTER A DUT RESET HAS BEEN
                                ;*      INITIATED.  IT MUST BE ENTERED IMMEDIATELY AFTER SETTING THE DUT MASTER
                                ;*      RESET ROUTINE OR AFTER THE EXECUTION OF A BUS RESET (BECAUSE OF TIMING
                                ;*      CONSIDERATIONS).
                                ;*
                                ;* INPUTS:      CSRA - CONTAINS ADDRESS OF THE DUT CSR.
                                ;*              TXBFCA - CONTAINS ADDRESS OF DUT DMA BUFFER COUNT REGISTER.
                                ;*
                                ;* OUTPUTS:     SKIP SELFTEST CODES ARE WRITTEN TO THE DUT REGISTERS.
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,SKPSTS
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: DELAY.
                                ;-- ************************************************************************

016100                          SKPSTS:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
016100  004537  002674                           JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
016104  012704  000012                  MOV     #10.,R4         ;PASS DELAY VALUE OF 10 MILLI-SECONDS.
016110  004737  014126                 JSR     PC,DELAY        ;DELAY FOR 10 MILLI-SECONDS.
                                ;+
                                ; WRITE SKIP SELF-TEST CODE (52525) TO ALL THE INDEXED DUT REGISTERS.
                                ;-
016114  012701  000050                  MOV     #NUMLNS!BIT05,R1 ;FORM IND.ADR.REG FIELD (PLUS M.R. BIT) WORD.
                                       ;THE ABOVE INCLUSION OF THE M.R. BIT IS NECESSARY BECAUSE OF THE
                                       ;  LACK OF A M.R. BIT WRITE LOCK-OUT ON THE DHV-11.
016120  012703  052525                  MOV     #52525,R3       ;INITIALISE THE SKIP SELF-TEST CODE.
016124  005301                 4$:      DEC     R1              ;SELECT THE NEXT SET OF DEVICE REGISTERS.
016126  013704  002214                  MOV     CSRA,R4         ;GET THE ADDRESS OF THE CSR OF THE DUT.
016132  010124                  MOV     R1,(R4)+        ;SELECT A BANK OF DUT REGISTERS.
016134  010324                 6$:      MOV     R3,(R4)+        ;WRITE THE CODE TO A DUT REGISTER.
016136  020437  002232                  CMP     R4,TXBFCA       ;COMPARE POINTER WITH LAST REGISTER ADDRESS.
016142  103774                 BLO     6$              ;LOOP IF NOT ALL REGS DONE IN THIS BANK.
016144  032701  000017                  BIT     #17,R1          ;TEST FOR IND.ADR.REG FIELD DECREMENTED TO 0.
016150  001365                 BNE     4$              ;LOOP UNTIL ALL REGISTERS CONTAIN THE CODE.

016152                          60$:    PASS                    ;RESTORE GPRS.
016152  004736                                   JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
016154  000207                 RTS     PC
```

```
                                .SBTTL  GLOBAL SUBROUTINE                - SWAP0 -
                                ;++ ************************************************************************
                                ;*                      - SWAP GPRS WITH GPR SET 0 ROUTINE -
                                ;*      THIS SUBROUTINE SWAPS THE PRESENT CONTENTS OF GPRS R1 THRU R5 WITH
                                ;*      THE CONTENTS OF THE NUMBER ZERO GPR SAVE AREA.  THE CONTENTS OF R0
                                ;*      ARE NOT ALTERED BY THIS SUBROUTINE.
                                ;*
                                ;* INPUTS:      GPR CONTENTS R1 THRU R5.
                                ;*              GPRS0B - LABEL AT BASE OF GPR SAVE AREA NUMBER ZERO.
                                ;*
                                ;* OUTPUTS:     R1 THRU R5 CONTAIN THE PREVIOUS CONTENTS OF GPR SAVE AREA
                                ;*                      ZERO WORDS 1 THRU 5 RESPECTIVELY.
                                ;*              GPRS0 - GPR SAVE AREA 0 WORDS 1 THRU 5, CONTAIN PREVIOUS
                                ;*                      CONTENTS OF GPRS R1 THRU R5 RESPECTIVELY.
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,SWAP0
                                ;*
                                ;* COMMENTS:    THE STATE OF THE CARRY FLAG IS NOT ALTERRED BY THIS ROUTINE.
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: NONE.
                                ;-- ************************************************************************

016156  010046                  SWAP0::  MOV    R0,-(SP)        ;SAVE THE CONTENTS OF R0.
                                ;+
                                ; LOAD THE STACK FROM THE GPRS.
                                ;-
016160  010146                          MOV     R1,-(SP)        ;SAVE THE CONTENTS OF R1.
016162  010246                          MOV     R2,-(SP)        ;SAVE THE CONTENTS OF R2.
016164  010346                          MOV     R3,-(SP)        ;SAVE THE CONTENTS OF R3.
016166  010446                          MOV     R4,-(SP)        ;SAVE THE CONTENTS OF R4.
016170  010546                          MOV     R5,-(SP)        ;SAVE THE CONTENTS OF R5.
                                ;+
                                ; LOAD THE GPRS FROM THE GPR SAVE AREA 0.
                                ;-
016172  012700  002406                  MOV     #GPRS0B,R0      ;GET THE BASE ADDRESS OF GPR SAVE AREA 0.
016176  012001                          MOV     (R0)+,R1        ;LOAD R1 WITH GPR SAVE AREA 0 WORD 1.
016200  012002                          MOV     (R0)+,R2        ;LOAD R1 WITH GPR SAVE AREA 0 WORD 2.
016202  012003                          MOV     (R0)+,R3        ;LOAD R1 WITH GPR SAVE AREA 0 WORD 3.
016204  012004                          MOV     (R0)+,R4        ;LOAD R1 WITH GPR SAVE AREA 0 WORD 4.
016206  012005                          MOV     (R0)+,R5        ;LOAD R1 WITH GPR SAVE AREA 0 WORD 5.
                                ;+
                                ; LOAD THE GPR SAVE AREA 0 FROM THE STACK.
                                ;-
016210  012640                          MOV     (SP)+,-(R0)     ;LOAD GPR SAVE AREA 0 WORD 5 WITH SAVED R5.
016212  012640                          MOV     (SP)+,-(R0)     ;LOAD GPR SAVE AREA 0 WORD 4 WITH SAVED R4.
016214  012640                          MOV     (SP)+,-(R0)     ;LOAD GPR SAVE AREA 0 WORD 3 WITH SAVED R3.
016216  012640                          MOV     (SP)+,-(R0)     ;LOAD GPR SAVE AREA 0 WORD 2 WITH SAVED R2.
016220  012640                          MOV     (SP)+,-(R0)     ;LOAD GPR SAVE AREA 0 WORD 1 WITH SAVED R1.

016222  012600                          MOV     (SP)+,R0        ;RESTORE THE INITIAL VALUE OF R0.

016224  000207                         RTS     PC
```

```
                                        .SBTTL  GLOBAL SUBROUTINE                - TSABRT -
                                        ;++ ************************************************************************
                                        ;*                        - TEST ABORT ROUTINE -
                                        ;*      THIS SUBROUTINE IS USED WHEN A NON-TEST RELATED ERROR HAS BEEN FOUND
                                        ;*      DURING THE EXECUTION OF THE CURRENT TEST.
                                        ;*      IT IS USED TO INFORM THE OPERATOR THAT THE CURRENT TEST HAS BEEN
                                        ;*      ABORTED.
                                        ;*
                                        ;* INPUTS:      ERRMSG - CONTAINS THE NAME OF THE CURRENT TEST.
                                        ;*              ERRNBR - CONTAINS THE CORRECT ERROR NUMBER.
                                        ;*              THE REMAINDER OF THE ERRTBL IS CORRECTLY INITIALISED.
                                        ;*
                                        ;* OUTPUTS:     MESSAGES ARE REPORTED TO THE OPERATOR.
                                        ;*
                                        ;* CALLING SEQUENCE:    JSR     PC,TSABRT
                                        ;*
                                        ;* COMMENTS:
                                        ;*
                                        ;* SUBORDINATE ROUTINES CALLED: ER1603.
                                        ;-- ************************************************************************

016226                                  TSABRT:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
016226  004537  002674                                JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
016232  012701  016250                        MOV     #2$,R1          ;PASS ADDRESS OF FIRST MESSAGE TO BE REPORTED.
016236  012737  013050  002672                MOV     #ER1603,ERRBLK  ;SET-UP THE ERROR REPORTING ROUTINE.
016244                                      ERROR                   ;                       >>>>> ERROR <<<<<.
016244  104460                                                                                    TRAP    C$ERROR
016246  000432                              BR      60$
016250  047040  047117  051055  2$:         .ASCIZ / NON-RELATED TEST ERROR FOUND DURING TEST EXECUTION/
016256  046105  052101  042105
016264  052040  051505  020124
016272  051105  047522  020122
016300  047506  047125  020104
016306  052504  044522  043516
016314  052040  051505  020124
016322  054105  041505  052125
016330  047511  000116
                                        .EVEN
016334                                  60$:    PASS                            ;RESTORE GPRS.
016334  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
016336  000207                                  RTS     PC
```

```
                                .SBTTL  GLOBAL SUBROUTINE               - UNSDIV -
                                ;++ ************************************************************************
                                ;*                      - UNSIGNED DIVIDE ROUTINE -
                                ;*      THIS SUBROUTINE IS USED TO DIVIDE A 32 BIT UNSIGNED DIVIDEND BY A
                                ;*      16 BIT UNSIGNED DIVISOR GIVING A 16 BIT QUOTIENT.  ALL NUMBERS ARE
                                ;*      CONSIDERED TO BE UNSIGNED.  A SUCCESS FLAG IS NOT SET ON RETURN IF
                                ;*      THE QUOTIENT WAS TOO BIG TO BE CONTAINED IN 16 BITS.
                                ;*
                                ;* INPUTS:      R1 - THE DIVISOR, UNSIGNED, 16 BITS.
                                ;*              R2 - MOST SIGNIFICANT WORD OF THE DIVIDEND, UNSIGNED, 16 BITS.
                                ;*              R3 - LEAST SIGNIFICANT WORD OF THE DIVIDEND, UNSIGNED, 16 BITS.
                                ;*
                                ;* OUTPUTS:     R1 - QUOTIENT, UNSIGNED, 16 BITS (177777 IF OVERFLOW).
                                ;*              CARRY - SUCCESS FLAG, SET IF COMPLETE QUOTIENT FITS IN 16 BITS.
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,UNSDIV
                                ;*
                                ;* COMMENTS:    IF THE DIVISOR IS 0 THE QUOTIENT IS RETURNED AS ALL ONES
                                ;*              (177777) AND THE CARRY IS CLEAR REGARDLESS OF THE DIVIDEND.
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: NONE.
                                ;-- ************************************************************************

016340                          UNSDIV:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
016340  004537  002674                        JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                                ;+
                                ; CHECK FOR QUOTIENT GREATER THAN 16 BITS CONDITION.
                                ;-
016344  010204                          MOV     R2,R4                   ;GET MSW OF DIVIDEND FOR SUBTRACT.
016346  160104                          SUB     R1,R4                   ;SUBTRACT DIVISOR FROM MSW OF DIVIDEND.
016350  103403                          BCS     2$                      ;IF IT DIDN'T GO, WE HAVE QUOTIENT < 16 BITS.
016352  012701  177777                  MOV     #-1,R1                  ;SET QUOTIENT TO ALL ONES (177777),
016356  000442                          BR      60$                     ;EXIT WITH CARRY CLEAR.
                                ;+
                                ; SET UP COUNTERS AND VARIOUS WORKING GPRS.
                                ;-
016360  005004                  2$:     CLR     R4                      ;CLEAR THE LSW OF THE DIVISOR.
016362  000241                          CLC                             ;CLEAR CARRY FOR THE SHIFT OF THE DIVISOR.
016364  006001                          ROR     R1                      ; DIVISOR BY
016366  006004                          ROR     R4                      ; 2(UNSIGNED)
016370  012700  000020                  MOV     #16.,R0                 ;SET UP INITIAL SHIFT COUNT TO 16.
                                ;+
                                ; THE SUBTRACT AND SHIFT LOOP.
                                ;-
016374  010246                  4$:     MOV     R2,-(SP                 ;SAVE MSWORD OF DIVIDEND.
016376  010346                          MOV     R3,-(SP)                ;SAVE LSWORD OF DIVIDEND.
016400  160403                          SUB     R4,R3                   ;LSWORD DIVIDEND - LSWORD OF DIVISOR.
016402  005602                          SBC     R2                      ;MSWORD DIVIDEND - BORROW .
016404  103402                          BCS     6$                      ;IF BORROW FROM BORROW SUBTRACT, IT DIDN'T GO.
016406  160102                          SUB     R1,R2                   ;MSWORD DIVIDEND - MSWORD OF DIVISOR.
016410  103003                          BCC     8$                      ;IF NO BORROW, IT WENT, CARRY IS CLEAR.
                                    ;+
                                    ; IT DIDN'T GO, SO WE SHIFT A 1 INTO THE QUOTIENT (COMPLEMENTED LATER).
                                    ; CARRY IS SET.
                                    ;-
016412  012603                  6$:     MOV     (SP)+,R3                ;RESTORE LSWORD OF DIVIDEND.
```

```
 4186  016414  012602                        MOV     (SP)+,R2        ;RESTORE MSWORD OF DIVIDEND.
 4187  016416  000401                        BR      10$             ;GOTO SHIFT 1 INTO THE QUOTIENT.
 4188                                    ;+
 4189                                    ; IT WENT, SO WE RESTORE THE STACK AND SHIFT A 0 INTO QUOTIENT (WILL BE
 4190                                    ; COMPLEMENTED LATER).   CARRY IS CLEAR.
 4191                                    ;-
 4192  016420  012626                    8$:     MOV     (SP)+,(SP)+     ;POP THE SAVED DIVIDEND OFF OF THE STACK.
 4193                                    ;+
 4194                                    ; SHIFT THE RESULT OF THE SUBTRACT ATTEMPT INTO THE QUOTIENT SHIFT REG.
 4195                                    ;-
 4196  016422  006105                    10$:    ROL     R5              ;SHIFT NEXT BIT INTO THE INVERTED QUOTIENT.
 4197  016424  000241                        CLC                     ;DIVIDE THE
 4198  016426  006001                        ROR     R1              ;  DEVISOR BY
 4199  016430  006004                        ROR     R4              ;  2 (UNSIGNED).
 4200  016432  005300                        DEC     R0              ;COUNT THIS SHIFT AND SUBTRACT.
 4201  016434  001357                        BNE     4$              ;LOOP FOR ANOTHER SHIFT & SUB IF NOT DONE.
 4202  016436  005105                        COM     R5              ;GET QUOTIENT FROM INVERTED QUOTIENT.
 4203                                    ;+
 4204                                    ; NOW WE EITHER ROUND UP OR LEAVE QUOTIENT ALONE.
 4205                                    ;-
 4206  016440  000241                        CLC                     ;CLEAR THE CARRY FOR THE SHIFT OF THE DIVIDEND.
 4207  016442  006103                        ROL     R3              ;MULTIPLY LSWORD OF DIVIDEND BY 2, MSWORD IS 0.
 4208  016444  103402                        BCS     12$             ;IF CARRY FROM SHIFT, ROUND UP.
 4209  016446  160403                        SUB     R4,R3           ;SUBTRACT DIVISOR FROM DIVIDEND.
 4210  016450  103403                        BCS     14$             ;IF BORROW, DON'T ROUND UP.
 4211                                    ;+
 4212                                    ; ROUND UP, EXTRA SUBTRACT WENT.
 4213                                    ;-
 4214  016452  005205                    12$:    INC     R5              ;INCREMENT THE QUOTIENT BY ONE.
 4215  016454  001001                        BNE     14$             ;IF NO OVERFLOW, WE LEAVE THE ROUND UP.
 4216  016456  005305                        DEC     R5              ;DON'T LET ROUNDING CAUSE OVERFLOW.
 4217                                    ;+
 4218                                    ; ALL DONE, PASS QUOTIENT AND EXIT.
 4219                                    ;-
 4220  016460  010501                    14$:    MOV     R5,R1           ;PASS QUOTIENT BACK IN R1.
 4221  016462  000261                        SEC                     ;INDICATE NO OVERFLOW.
 4222
 4223  016464                             60$:    PASS    R1              ;RESTORE GPRS, LEAVE THE FOLLOWING INTACT:
 4224  016464  010166  000004                                    MOV     R1,R1SLOT(SP)           ;PUT R1 IN STACK SLOT.
 4225  016470  004736                                            JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
 4226                                                                      ;R1 - 16 BIT, UNSIGNED QUOTIENT,
 4227  016472  000207                        RTS     PC                  ;CARRY - SET INDICATES NO OVERFLOW (SUCCESS).
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - WAIBIS -
                        ;++ ************************************************************************
                        ;*                      - WAIT FOR BIT SET ROUTINE -
                        ;*      THIS SUBROUTINE WAITS FOR THE SPECIFIED BIT TO BECOME SET.  IF THE
                        ;*      SPECIFIED BIT GOES TO A SET STATE WITHIN THE SPECIFIED TIME-OUT
                        ;*      PERIOD A SUCCESS INDICATION IS RETURNED BY THIS ROUTINE.
                        ;*      THE LAST VALUE WHICH IS READ LOOKING FOR THE CONDITION IS RETURNED TO
                        ;*      ALLOW THE USE OF THIS ROUTINE TO LOOK FOR DESTRUCTIVE READ CONDITIONS.
                        ;*
                        ;* INPUTS:      R1 - TIME-OUT VALUE AND BIT NUMBER INDICATION:
                        ;*                BITS 15 THRU 12 - NUMBER OF BIT TO TEST (RANGE 0 THRU 15).
                        ;*                BITS 11 THRU 0  - TIME-OUT VALUE IN MILLI-SECONDS (4095 MAX).
                        ;*              R2 - ADDRESS OF WORD CONTAINING THE BIT TO TEST.
                        ;*                   MSLCNT.
                        ;*
                        ;* OUTPUTS:     R2 - THE LAST WORD WHICH WAS READ TO CHECK FOR THE CONDITION.
                        ;*              CARRY - SUCCESS FLAG (CARRY SET IF BIT SET BEFORE TIME-OUT).
                        ;*
                        ;* CALLING SEQUENCE:    MOV     #130040,R1      ;PASS BIT 11 (13 OCTAL) AND
                        ;*                                              ;  32 (40 OCTAL) MS DELAY.
                        ;*                      MOV     #LABEL,R2       ;TEST BIT IN WORD AT 'LABEL'.
                        ;*                      JSR     PC,WAIBIS       ;WAIT 32 MS FOR BIT 11 TO SET.
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: MSLGET.
                        ;-- ************************************************************************

016474                  WAIBIS:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
016474  004537  002674          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
016500  010204                  MOV     R2,R4           ;SET UP THE ADDRESS PARAMETER FOR MSLGET.
016502  010102                  MOV     R1,R2
016504  042701  170000          BIC     #170000,R1      ;SEPERATE DELAY COUNT OUT OF PASSED PARAMETER.
016510  042702  007777          BIC     #7777,R2        ;SEPERATE LINE NUMBER FIELD OF PASSED PARAM.
016514  000302                  SWAB    R2              ;PUT LINE NUMBER FIELD IN LSBYTE.
016516  006202                  ASR     R2              ;SHIFT THE LINE NUMBER FIELD INTO THE PROPER
016520  006202                  ASR     R2              ;  POSITION TO USE IT AS A WORD TABLE OFFSET
016522  006202                  ASR     R2              ;  FOR THE TABLE LOOKUP OF THE LINE BIT MAP.
016524  016202  002346          MOV     BITTBL(R2),R2   ;GET BIT MAP OF LINE TO TEST FROM TABLE.
016530  010203                  MOV     R2,R3           ;INDICATE THAT THE BIT SHOULD BE SET.
016532  004737  014166          JSR     PC,MSLGET       ;WAIT FOR THE BIT TO BE SET WITHIN TIME-OUT.
                                                        ;  CARRY IS CORRECT UPON MSLGET RETURN.
016536  010002                  MOV     R0,R2           ;PASS LAST VALUE READ AS OUTPUT PARAMETER.
016540                  60$:    PASS    R2              ;RESTORE GPRS, EXCEPT THE FOLLOWING:
016540  010266  000006                          MOV     R2,R2SLOT(SP)           ;PUT R2 IN STACK SLOT.
016544  004736                              JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                                        ;  R2 - LAST VALUE READ LOOKING FOR CONDITION.
016546  000207                  RTS     PC              ;  CARRY - SUCCESS FLAG (SET IF BIT FOUND SET).
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - WDPDR -
                        ;++ ************************************************************************
                        ;*                      - WRITE DATA PATTERN TO DEVICE REGISTERS -
                        ;*      THIS ROUTINE WRITES A ROTATED DATA PATTERN TO EACH OF THE 6 DEVICE
                        ;*      REGISTERS OF EACH ACTIVE LINE OF THE DEVICE UNDER TEST.
                        ;*      THE DATA PATTERN IS ROTATED ONCE AFTER EACH WRITE TO A DEVICE REGISTER
                        ;*              ON A PARTICULAR LINE.  THE STARTING DATA PATTERN FOR EACH LINE
                        ;*              IS ROTATED ONCE AFTER WRITING ALL THE REGISTERS ON A PARTICULAR
                        ;*              LINE.  THIS LEADS TO THE FOLLOWING DATA PATTERN:
                        ;*                      LINE 0, REGISTER 0 - SHIFTED 0 BIT POSITIONS
                        ;*                      LINE 0, REGISTER 1 - SHIFTED 1 BIT POSITION
                        ;*                      ...
                        ;*                      LINE 1, REGISTER 0 - SHIFTED 1 BIT POSITION
                        ;*                      LINE 2, REGISTER 1 - SHIFTED 2 BIT POSITIONS
                        ;*                      ...
                        ;*      ANY BITS FIELDS IN THE DEVICE REGISTERS THAT CANNOT BE ALTERED
                        ;*      ARE MASKED OUT OF THE DATA PATTERN BEFORE IT IS WRITTEN.
                        ;*      THIS ROUTINE WILL USE EITHER MOV, MOVB, BIS, BISB, BIC, OR BICB
                        ;*      INSTRUCTIONS.  THE UPPER OR LOWER BYTE CAN BE SPECIFIED FOR WRITING.
                        ;*
                        ;* INPUTS:      R2 - USED TO PASS IN THE DATA PATTERN TO BE ROTATED & WRITTEN.
                        ;*              R3 - BYTE INDICATOR (- => LO BYTE, + => HI BYTE, 0 => BOTH).
                        ;*              R4 - OPERATION TYPE INDICATOR (- => BIC, + => BIS, 0 => MOV).
                        ;*              ACTLNS - BIT MAP OF THE ACTIVE LINES ON THE DEVICE UNDER TEST.
                        ;*              CSRA - CONTAINS THE CSR ADDRESS OF THE DEVICE UNDER TEST.
                        ;*              DRADRT - BASE ADDRESS OF DEVICE REGISTER ADDRESS TABLE.
                        ;*              LPRO - EQUATED TO LPR REG OFFSET FROM DEVICE CSR ADDRESS.
                        ;*              NUMLNS - NUMBER OF LINES ON THE DEVICE UNDER TEST.
                        ;*              TXBFCO - EQUATED TO TBUFFCT REG OFFSET FROM DEVICE CSR ADDRESS.
                        ;*              UNBTTB - BASE ADDRESS OF THE UNUSED BIT TABLE.
                        ;*
                        ;* OUTPUTS:     DEVICE REGISTERS ON ALL ACTIVE DEVICE LINES ARE MODIFIED.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,WDPDR
                        ;*
                        ;* COMMENTS:    THIS ROUTINE DOES NOT WRITE ANY DATA TO THE TX.CHAR REGISTERS.
                        ;*              THE CSR IS CLEARED EXCEPT FOR THE IND.ADR.REG FIELD.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: ROLDAP.
                        ;-- ************************************************************************

016550                  WDPDR:: SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
016550  004537  002674                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                        ;+
                        ; SET UP OUTER LOOP WHICH WRITES THE DATA PATTERN TO EACH LINE'S REGISTERS
                        ;-
016554  005005                  CLR     R5              ;CLEAR LINE COUNTER TO SELECT LINE 0.
                        ;+
                        ; THE OUTER LOOP FOLLOWS.  EACH PASS THROUGH THIS LOOP WRITES DATA TO ALL OF
                        ; THE DEVICE REGISTERS FOR A PARTICULAR LINE IF IT IS ACTIVE.
                        ;-
016556  010204          2$:     MOV     R2,R4           ;SAVE THE OUTER LOOP DATA PATTERN.
016560  010577  163430          MOV     R5,@CSRA        ;SET CSR IND.ADR.REG FIELD TO THIS LINE.
016564  006305                  ASL     R5              ;TURN LINE NUMBER INTO A WORD OFFSET.
016566  036537  002346  002210          BIT     BITTBL(R5),ACTLNS
016574  001451                  BEQ     20$             ;LINE ACTIVE?  NO, SKIP THIS LINE.
```

```
 4332  016576  012701  000004                    MOV     #LPRO,R1        ;YES, INITIALIZE THE REGISTER OFFSET.
 4333                                        ;+
 4334                                        ;  THE INNER LOOP FOLLOWS.  EACH PASS THROUGH THIS LOOP WRITES DATA TO A
 4335                                        ;  DEVICE REGISTER.
 4336                                        ;-
 4337  016602  010200                    4$:     MOV     R2,R0
 4338  016604  046100  002234                    BIC     UNBTTB(R1),R0   ;CLEAR BIT FIELDS FOR UNUSED REGISTER BITS.
 4339  016610  016103  002214                    MOV     DRADRT(R1),R3   ;GET THE ADDRESS OF THE DEVICE REGISTER.
 4340  016614  005766  000010                    TST     R3SLOT(SP)      ;CHECK THE OPERAND TYPE INDICATOR.
 4341  016620  003402                            BLE     6$              ;HIGH BYTE?  NO, SKIP HIGH BYTE ADDRESS SET UP.
 4342  016622  005203                            INC     R3              ;YES, SET THE REG ADDRESS TO THE HIGH BYTE.
 4343  016624  000300                            SWAB    R0              ;MOVE HIGH BYTE DATA INTO THE LOW BYTE.
 4344  016626  005766  000010            6$:     TST     R3SLOT(SP)      ;CHECK THE OPERAND TYPE INDICATOR.
 4345  016632  001412                            BEQ     12$             ;WORD ACCESS?  YES, GO PERFORM WORD ACCESS.
                                            ;+
                                            ;PERFORM BYTE ACCESS TO THE SPECIFIED BYTE OF THE SPECIFIED REGISTER.
                                            ;-
 4349  016634  005766  000012                    TST     R4SLOT(SP)      ;NO, CHECK THE ACCESS TYPE INDICATOR.
 4350  016640  100403                        BMI     8$              ;USE BIC?  YES, GO PERFORM BICB INSTRUCTION.
 4351  016642  001404                        BEQ     10$             ;USE MOV?  YES, GO PERFORM MOVB INSTRUCTION.
 4352  016644  150013                        BISB    R0,(R3)         ;NEITHER.  PERFORM BISB ACCESS TO REGISTER.
 4353  016646  000415                        BR      18$
 4354  016650  140013            8$:     BICB    R0,(R3)         ;PERFORM BICB ACCESS TO REGISTER.
 4355  016652  000413                        BR      18$
 4356  016654  110013            10$:    MOVB    R0,(R3)         ;PERFORM MOVB ACCESS TO REGISTER.
 4357  016656  000411                        BR      18$
                                            ;+
                                            ;PERFORM WORD ACCESS TO THE SPECIFIED REGISTER.
                                            ;-
 4361  016660  005766  000012            12$:    TST     R4SLOT(SP)      ;CHECK THE ACCESS TYPE INDICATOR.
 4362  016664  100403                        BMI     14$             ;USE BIC?  YES, GO PERFORM BIC INSTRUCTION.
 4363  016666  001404                        BEQ     16$             ;USE MOV?  YES, GO PERFORM MOV INSTRUCTION.
 4364  016670  050013                        BIS     R0,(R3)         ;NEITHER.  PERFORM BIS ACCESS TO REGISTER.
 4365  016672  000403                        BR      18$
 4366  016674  040013            14$:    BIC     R0,(R3)         ;PERFORM BIC ACCESS TO REGISTER.
 4367  016676  000401                        BR      18$
 4368  016700  010013            16$:    MOV     R0,(R3)         ;PERFORM MOV ACCESS TO REGISTER.
                                            ;+
                                            ; PREPARE THE DATA PATTERN AND OFFSET FOR THE NEXT REGISTER ON THIS LINE.
                                            ;-
 4372  016702  004737  015416            18$:    JSR     PC,ROLDAP       ;ROTATE DATA PATTERN LEFT, NOT THROUGH CARRY.
 4373  016706  062701  000002                    ADD     #2,R1           ;INCREMENT OFFSET FOR NEXT REGISTER.
 4374  016712  020127  000016                    CMP     R1,#TXBFCO      ;COMPARE REG OFFSET WITH OFFSET OF LAST REG.
 4375  016716  003731                            BLE     4$              ;LOOP IF NOT ALL REG DONE FOR THIS LINE.
                                            ;+
                                            ; BACK INTO THE OUTER LOOP.  NOW SET UP FOR NEXT LINE.  LOOP IF NOT DONE.
                                            ;-
 4379  016720  010402            20$:    MOV     R4,R2           ;SET UP TO ROTATE THE DATA PATTERN.
 4380  016722  004737  015416                JSR     PC,ROLDAP       ;ROTATE THE DATA PATTERN.
 4381  016726  006205                        ASR     R5              ;CONVERT BACK TO LINE NUMBER FROM WORD OFFSET.
 4382  016730  005205                        INC     R5              ;COUNT THIS LINE.
 4383  016732  020527  000010                CMP     R5,#NUMLNS      ;COMPARE LINE COUNT WITH NUMBER OF LINES.
 4384  016736  002707                        BLT     2$              ;LOOP IF SOME LINES NOT DONE.
 4385
 4386  016740                            60$:    PASS                            ;RESTORE GPRS.
 4387  016740  004736                                    JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
```

```
 4388  016742  000207                          RTS     PC
```

```
                                .SBTTL  INTERRUPT SERVICE ROUTINE       - CLKINT -
                                ;+ ************************************************************************
                                ;*      THIS ROUTINE IS EXECUTED CLKHRZ TIMES PER SECOND.  IT DECREMENTS THE
                                ;*      TWO TIMER COUNTERS DOWN TO ZERO.
                                ;*
                                ;* INPUTS:      TIMER1 - TIMER COUNTER #1.
                                ;*              TIMER2 - TIMER COUNTER #2.
                                ;*              TIMER3 - TIMER COUNTER FOR CALL OF BREAK MACRO.
                                ;*
                                ;* OUTPUTS:     THE 2 TIMER COUNTERS ARE DECREMENTED IF THEY ARE NOT ZERO.
                                ;*
                                ;* CALLING SEQUENCE:    PUT #CLKINT IN THE CLOCK INTERRUPT VECTOR SLOT.
                                ;*                      PUT THE DESIRED TIME PERIOD (SECONDS TIMES CLKHRZ) IN
                                ;*                      EITHER TIMER1 OR TIMER2 AND POLL THE RESPECTIVE TIMER
                                ;*                      COUNTER TO DETECT ITS GOING TO 0 ON TIME-OUT.
                                ;*
                                ;* COMMENTS:    THE 2 COUNTERS WILL NOT WRAPAROUND BUT WILL STOP AT 0.  THIS
                                ;*              ALLOWS THE DETECTION OF A TIME-OUT ANY TIME AFTER THE TIME-OUT
                                ;*              HAS OCCURRED UNTIL THE TIMER COUNTER IS SET TO ANOTHER VALUE.
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: NONE.
                                ;-- ************************************************************************
                                
016744  005737  002322        CLKINT:: TST     TIMER1          ;CHECK FOR TIMER1 AT ZERO.
016750  001402                         BEQ     2$              ;BRANCH TO LEAVE IT AT ZERO IF IT IS ZERO.
016752  005337  002322                 DEC     TIMER1          ;DECREMENT TIME COUNT.
016756  005737  002324        2$:      TST     TIMER2          ;CHECK FOR TIMER2 AT ZERO.
016762  001402                         BEQ     4$              ;BRANCH TO LEAVE IT ALONE IF IT'S ALREADY ZERO.
016764  005337  002324                 DEC     TIMER2          ;DECREMENT TIME COUNT.
016770  005337  002326        4$:      DEC     TIMER3          ;DECREMENT THE BREAK COUNT.
016774  001006                         BNE     60$             ;EXIT IF NOT TIME TO CALL BREAK.
016776  013737  002330  002326        MOV     BCOUNT,TIMER3   ;SET UP TIME TILL NEXT BREAK.
017004  010046                         MOV     R0,-(SP)        ;SAVE CONTENTS OF R0 FROM BREAK MACRO.
017006                                 BREAK                   ;CHECK FOR OPERATOR CONTROL/C.
017006  104422                                                         TRAP    C$BRK
017010  012600                         MOV     (SP)+,R0        ;RESTORE CONTENTS OF R0.
017012  000002                 60$:    RTI
```

```
4426                                    .SBTTL  GLOBAL TRAP SERVICE ROUTINE     - TP4RTN -
4427                                    ;*************************************************************************
4428                                    ;*      BUS TIME-OUT TRAP (004 TRAP) SERVICE ROUTINE -
4429                                    ;*      THIS ROUTINE IS USED DURING THE DEVICE REGISTER ADDRESS ACCESS TEST.
4430                                    ;*      IT DETERMINES IF THE 004 TRAP WAS CAUSED BY AN "EXPECTED" ERROR OR
4431                                    ;*      NOT BY EXAMINING THE RETURN PC VALUE ON THE STACK.  IF THE TRAP IS
4432                                    ;*      UNEXPECTED, THIS ROUTINE JUMPS TO THE NORMAL DIAGNOSTIC SUPERVISOR
4433                                    ;*      004 TRAP HANDLING ROUTINE.
4434                                    ;*
4435                                    ;* INPUTS:      SP - POINTS TO THE PC WHERE THE TRAP OCCURED.
4436                                    ;*              ADRPTR - LABEL AT THE ADDRESS WHERE "EXPECTED" TRAPS OCCUR.
4437                                    ;*              TP4FLG - 004 TRAP FLAGS.
4438                                    ;*
4439                                    ;* OUTPUTS:     TP4FLG - BIT 15 IS SET IF "EXPECTED" TRAP OCCURED.
4440                                    ;*
4441                                    ;* CALLING SEQUENCE:    PUT ADDRESS POINTED TO BY TP4RTN IN 004 VECTOR.
4442                                    ;*                      OCCURENCE OF 004 TRAP VECTORS TO THIS ROUTINE.
4443                                    ;*
4444                                    ;* COMMENTS:    ANY 004 TRAP WHICH OCCURS AT AN ADDRESS OTHER THAN THAT LABELED
4445                                    ;*              ADRPTR WILL BE HANDLED BY THE NORMAL 004 TRAP SERVICE ROUTINE.
4446                                    ;*
4447                                    ;* SUBORDINATE ROUTINES CALLED: NONE.
4448                                    ;*************************************************************************
4449
4450  017014  021627  014010            TP4RTN:: CMP    (SP),#ADRPTR    ;COMPARE EXPECTED ADR AGAINST TRAP RET PC.
4451  017020  001402                           BEQ    2$              ;IF THEY MATCH, CONTINUE THIS ROUTINE.
4452  017022  000177  163254                   JMP    @TP4VEC         ;IF NOT,JUMP TO NORMAL 004 TRAP SERVICE RTN.
4453  017026  052737  100000  002304  2$:      BIS    #BIT15,TP4FLG   ;SET THE 004 TRAP OCCURED FLAG.
4454  017034  000002                           RTI                    ;ALL DONE, GO BACK TO THE TEST.
```

```
4455
4456
4457                                    .SBTTL  REPORT CODING SECTION
4458
4459                                    ;++
4460                                    ; THE REPORT CODING SECTION CONTAINS THE
4461                                    ; "PRINTS" CALLS THAT GENERATE STATISTICAL REPORTS.
4462                                    ;--
4463
4464  017036                                    BGNRPT
4465  017036                                                                    L$RPT::
4466
4467  017036                                    EXIT    RPT
4468  017036  000167                                                                   .WORD   J$JMP
4469  017040  000000                                                                   .WORD   L10014-2-.
4470
4471                                    .EVEN
4472
4473  017042                                    ENDRPT
4474  017042                                                                    L10014:
4475  017042  104425                                                                   TRAP    C$RPT
```

```
                                .SBTTL  PROTECTION TABLE


                                ;++
                                ; THIS TABLE IS USED BY THE RUNTIME SERVICES
                                ; TO PROTECT THE LOAD MEDIA.
                                ;--

017044                                  BGNPROT
017044                                                                  L$PROT::

017044  177777                          -1              ;OFFSET INTO P-TABLE FOR CSR ADDRESS
017046  177777                          -1              ;OFFSET INTO P-TABLE FOR MASSBUS ADDRESS
017050  177777                          -1              ;OFFSET INTO P-TABLE FOR DRIVE NUMBER

017052                                  ENDPROT
```

```
                                .SBTTL  INITIALIZE SECTION
                                ;++
                                ;*****************************************************************************
                                ;*      THIS SECTION CONTAINS THE CODE WHICH IS PERFORMED AT THE BEGINNING OF
                                ;*      EACH PASS OR AFTER A CONTINUE COMMAND.
                                ;*      THIS CODE PERFORMS THE FOLLOWING ACTIONS:
                                ;*
                                ;*      MOVES THE INFORMATION HELD IN THE HARDWARE P-TABLE INTO THE GLOBAL
                                ;*      DATA AREA.
                                ;*
                                ;*****************************************************************************
                                ;--
017052                                  BGNINIT
017052                                                                  L$INIT::
                                ;SEE IF PROGRAM JUST STARTED, BR IF YES
017052                                  READEF  #EF.START
017052  012700  000040                                                  MOV     #EF.START,R0
017056  104447                                                          TRAP    C$REFG
017060                                  BCOMPLETE       NEWSTA
017060  103416                                                          BCS     NEWSTA
                                ;SEE IF PROGRAM JUST RESTARTED, BR IF YES
017062                                  READEF  #EF.RESTART
017062  012700  000037                                                  MOV     #EF.RESTART,R0
017066  104447                                                          TRAP    C$REFG
017070                                  BCOMPLETE       NEWRES
017070  103555                                                          BCS     NEWRES
                                ;SEE IF THIS IS A NEW PASS, BR IF YES
017072                                  READEF  #EF.NEW
017072  012700  000035                                                  MOV     #EF.NEW,R0
017076  104447                                                          TRAP    C$REFG
017100                                  BCOMPLETE       NEWPAS
017100  103554                                                          BCS     NEWPAS
                                ;SEE IF PROGRAM WAS JUST CONTINUED
017102                                  READEF  #EF.CONTINUE
017102  012700  000036                                                  MOV     #EF.CONTINUE,R0
017106  104447                                                          TRAP    C$REFG
017110                                  BNCOMPLETE      GETPRM
017110  103160                                                          BCC     GETPRM
017112  000137  017632                  JMP     ENDIT
017116                          NEWSTA:
017116                                  BRESET                  ;RESET THE BUS TO PREVENT ILLEGAL INTERRUPTS.
017116  104433                                                          TRAP    C$RESET
                                ;+
                                ; SET UP FOR LINE TIME CLOCK INTERRUPTS.
                                ;-
017120                                  CLOCK   L,R1            ;GET THE CLOCK PARAMETERS.
017120  012700  000114                                                  MOV     #'L,R0
017124  104462                                                          TRAP    C$CLCK
017126  010001                                                          MOV     R0,R1
017130  012137  002312                  MOV     (R1)+,CLKCSR            ;STORE CLOCK CSR ADDRESS.
017134  012137  002314                  MOV     (R1)+,CLKBRL            ;STORE CLOCK BUS REQ INT LEVEL.
017140  012137  002316                  MOV     (R1)+,CLKVEC            ;STORE CLOCK INTERRUPT VECTOR.
017144  012137  002320                  MOV     (R1)+,CLKHRZ            ;STORE CLOCK FREQUENCY.
017150  023727  002320  000062          CMP     CLKHRZ,#50.             ;TEST FOR 50HZ LINE FREQUENCY.
```

```
 4549  017156  001004                          BNE     2$                      ;BRANCH IF CLOCK IS NOT 50HZ.
 4550  017160  012737  000024  002332          MOV     #20.,MSTICK             ;INDICATE 20MS PER CLOCK TICK.
 4551  017166  000403                          BR      4$
 4552  017170  012737  000021  002332  2$:     MOV     #17.,MSTICK             ;INDICATE 17 MS PER CLOCK TICK.
 4553  017176                          4$:     SETVEC  CLKVEC,#CLKINT,PRI06    ;INITIALIZE CLOCK INTERRUPT VECTOR.
 4554  017176  013746  000300                                                          MOV     PRI06,-(SP)
 4555  017202  012746  016744                                                          MOV     #CLKINT,-(SP)
 4556  017206  013746  002316                                                          MOV     CLKVEC,-(SP)
 4557  017212  012746  000003                                                          MOV     #3,-(SP)
 4558  017216  104437                                                                 TRAP    C$SVEC
 4559  017220  062706  000010                                                          ADD     #10,SP
 4560  017224  013700  002320                  MOV     CLKHRZ,R0               ;INITIALIZE THE BREAK COUNT
 4561  017230  006300                          ASL     R0                      ; TO CAUSE A BREAK
 4562  017232  010037  002330                  MOV     R0,BCOUNT               ; EVERY 2 SECONDS.
 4563  017236                          SETPRI  #PRI05                          ;ALLOW CLOCK INTERRUPTS DISABLE OTHERS.
 4564  017236  012700  000240                                                          MOV     #PRI05,R0
 4565  017242  104441                                                                 TRAP    C$SPRI
 4566                                  ;+
 4567                                  ; ENABLE THE LINE TIME CLOCK (LTC) CHECKING TO MAKE SURE THAT THE CSR
 4568                                  ; IS ACCESSABLE.
 4569                                  ;    FIRST SET UP TO CATCH ANY 004 TRAPS WHICH OCCUR:
 4570                                  ;-
 4571  017244  013737  000004  002302          MOV     4,TP4VEC        ;SAVE THE EXISTING 004 TRAP VECTOR.
 4572  017252  012737  017014  000004          MOV     #TP4RTN,4       ;SET 004 TRAP VECTOR TO OUR SERVICE RTN ADR.
 4573                                  ;+
 4574                                  ;    ENABLE LTC CHECKING FOR 004 TRAP IN CASE CSR IS NOT THERE.
 4575                                  ;-
 4576  017260  005037  002304                  CLR     TP4FLG          ;CLEAR THE 004 TRAP FLAG.
 4577  017264  012737  000100  002306          MOV     #BIT6,WORD1     ;SET UP TO SET BIT6 OF THE LTC CSR.
 4578  017272  012700  002306                  MOV     #WORD1,R0       ;SET UP WORD1 AS THE CKTRAP MOVE SOURCE.
 4579  017276  013701  002312                  MOV     CLKCSR,R1       ;SET UP LTC CSR AS DESTINATION FOR CKTRAP MOVE.
 4580  017302  004737  013776                  JSR     PC,CKTRAP       ;MOVE AND CHECK FOR TRAP.
 4581  017306  013737  002302  000004          MOV     TP4VEC,4        ;RESTORE THE NORMAL 004 TRAP VECTOR.
 4582  017314  103403                          BCS     6$              ;IF NO TRAP, LTC IS THERE SO CONTINUE.
 4583  017316  005037  002320                  CLR     CLKHRZ          ;CLEAR LTC FREQUENCY WORD TO INDICATE NO LTC.
 4584  017322  000402                          BR      8$              ;BYPASS THE FOLLOWING CALIBRATION PROCEDURES.
 4585                                  ;+
 4586                                  ; CALIBRATE THE DELAY ROUTINE MILLI-SECOND DELAY COUNT VALUE.
 4587                                  ;-
 4588  017324  004737  013552          6$:     JSR     PC,CALMSL
 4589                                  ;+
 4590                                  ; CHECK FOR MEMMORY MANAGEMENT PRESENT ON THIS MACHINE.
 4591                                  ; IF MEM MGT IS PRESENT, DISABLE IT.
 4592                                  ;-
 4593  017330  013737  000004  002302  8$:     MOV     4,TP4VEC        ;SAVE THE EXISTING 004 TRAP VECTOR.
 4594  017336  012737  017014  000004          MOV     #TP4RTN,4       ;SET 004 TRAP VECTOR TO OUR SERVICE RTN ADR.
 4595  017344  005037  002304                  CLR     TP4FLG          ;CLEAR THE 004 TRAP FLAG.
 4596  017350  005037  002306                  CLR     WORD1           ;PREPARE TO CLEAR THE MEM MGT SR0 REGISTER.
 4597  017354  012700  002306                  MOV     #WORD1,R0       ;SELECT CLEARED WORD AS CKTRAP RTN SOURCE.
 4598  017360  013701  002336                  MOV     MMSR0,R1        ;SELECT MEM MGT SR0 REGISTER AS DESTINATION.
 4599  017364  005037  002340                  CLR     MMPRES          ;INDICATE NO MEM MGT PRESENT IN CASE IT ISN'T.
 4600  017370  005037  002342                  CLR     MMENAB          ;INDICATE MEM MGT IS NOT ENABLED.
 4601  017374  004737  013776                  JSR     PC,CKTRAP       ;CLEAR THE MEM MCT SR0 REG AND CHECK FOR TRAP.
 4602  017400  013737  002302  000004          MOV     TP4VEC,4        ;RESTORE THE NORMAL 004 TRAP VECTOR.
 4603  017406  103003                          BCC     10$             ;SKIP INDICATING MEM MGT PRESENT IF IT ISN'T.
 4604  017410  012737  000001  002340          MOV     #1,MMPRES       ;INDICATE THAT MEM MGT IS PRESENT.
```

```
                                10$:    CLR     PASCNT          ;CLR COUNTER USED IN REPORTING ROM VERSION #.
                                        BR      NEWPAS

                                NEWRES: BRESET                  ;AVOID ILLEGAL INTERRUPT PROBLEMS.
                                                                                TRAP    C$RESET
                                         CLR    PASCNT          ;CLR COUNTER USED IN REPORTING ROM VERSION #.
                                NEWPAS:
                                        MOV     #-1,UNITN       ;RESET LOGICAL DEVICE TO -1
                                ;+
                                ; INCREMENT THE PASS COUNTER, CORRECT FOR ANY OVERFLOW.
                                ;  THIS COUNTER IS USED IN THE ROM VERSION TEST.
                                ;-
                                         INC    PASCNT          ;INCREMENT THE PASS COUNTER.
                                        BNE     GETPRM          ;BRANCH IF WE HAVE NOT YET! OVERFLOWED.
                                         DEC    PASCNT          ;SET PASS COUNT TO 177777 OCTAL.

                                ; GET THE HARDWARE PARAMETERS FOR THIS UNIT.
                                GETPRM:
                                        INC     UNITN           ;INCREMENT LOGICAL DEVICE NUMBER
                                        CMP     UNITN,L$UNIT    ;SEE IF MAXIMUM UNIT NO. EXCEEDED
                                        BGE     NEWPAS          ;BR IF YES

                                        GPHARD  UNITN,R1        ;GET P-TABLE POINTER INTO R1
                                                                                MOV     UNITN,R0
                                                                                TRAP    C$GPHRD
                                                                                MOV     R0,R1
                                        BCOMPLETE       30$     ;BR IF DEVICE AVAILABLE
                                                                                BCS     30$
                                        BR      GETPRM          ;SKIP THIS DEVICE


                                        ;************ HARDWARE PARAMETER MOVING CODE ****************
                                30$:    MOV     (R1)+,CSRA      ;STORE DHV-11 CSR ADDRESS IN DEV.REG.ADDRESS TABLE
                                        MOV     (R1)+,ACTLNS    ;STORE THE ACTIVE LINES BIT MAP.
                                ;+
                                ;       CALCULTATE DEVICE REGISTER ADDRESSES,AND PUT THEM IN THE
                                ;       DEVICE REGISTER ADDRESS TABLE.
                                ;-
                                        MOV     CSRA,R1         ;COPY CSR ADDRESS
                                        INC     R1              ;INCREMENT CSR ADDRESS
                                        INC     R1              ; COPY BY 2.
                                        MOV     #7,R3           ;SET UP REGISTER COUNT
                                        MOV     #RBUFA,R2       ;GET LOCATION WHERE RBUF ADDRESS GOES IN TABLE
                                12$:    MOV     R1,(R2)+        ;STORE REGISTER ADDRESS IN TABLE
                                        INC     R1              ;INCREMENT REGISTER ADDRESS
                                        INC     R1              ; BY 2,FOR THE NEXT DEVICE REGISTER.
                                        DEC     R3              ;DECREMENT REGISTER COUNT
                                        BNE     12$             ;LOOP IF NOT DONE
                                ;+
                                ; INITIALISE THE BMP CODE QUEUE.
                                ;-
                                         MOV    #BMPCQB,R0      ;GET THE START ADDRESS OF THE QUEUE.
                                         MOV    #BMPCQE,R1      ;GET THE END ADDRESS OF THE QUEUE.
                                         MOV    R0,BMPCQP       ;SET THE POINTER TO THE START OF THE QUEUE.
                                14$:     CLR    (R0)+           ;CLEAR OUT THE CONTENTS OF THE QUEUE.
                                         CMP    R0,R1           ;CHECK IF END OF QUEUE HAS BEEN REACHED.
```

```
 4661  017564  103775                          BLO     14$             ;LOOP IF NOT ALL DONE.
 4662                                          ;+
 4663                                          ; REPORT THE UNIT NUMBER IF THE SOFTWARE P-TABLE QUESTION WAS ANSWERED YES,
 4664                                          ;  AND THE MAXIMUM UNIT NUMBER IS GREATER THAN 1.
 4665                                          ;-
 4666  017566  032737  000020  002204          BIT     #BIT4,OPTION    ;CHECK IF THE QUESTION WAS ANSWERED YES.
 4667  017574  001416                          BEQ     16$             ;SKIP REPORTING UNIT NUMBER IF IT IS DISABLED.
 4668  017576  023727  002012  000001          CMP     L$UNIT,#1       ;CHECK MAXIMUM NUMBER OF UNITS SELECTED.
 4669  017604  003412                          BLE     16$             ;DO NOT REPORT UNIT NUMBER IF MAX NUMBER < 1.
 4670  017606                                  PRINTF  #MFUNIT,UNITN   ;REPORT UNIT NUMBER.
 4671  017606  013746  002212                                                  MOV     UNITN,-(SP)
 4672  017612  012746  002772                                                  MOV     #MFUNIT,-(SP)
 4673  017616  012746  000002                                                  MOV     #2,-(SP)
 4674  017622  010600                                                          MOV     SP,R0
 4675  017624  104417                                                          TRAP    C$PNTF
 4676  017626  062706  000006                                                  ADD     #6,SP
 4677  017632                          16$:
 4678
 4679  017632  005037  002310          ENDIT:  CLR     CTRLCF          ;CLR THE CTRL-C TEST ABORT FLAG.
 4680                                          ;+
 4681                                          ; SET THE PROCESSOR PRIORITY TO ALLOW LTC INTERRUPTS BUT NOT OTHERS.
 4682                                          ;-
 4683  017636                                  SETPRI  #PRI07                  ;SET PROCESSOR PRIORITY TO 5.
 4684  017636  012700  000340                                                  MOV     #PRI07,R0
 4685  017642  104441                                                          TRAP    C$SPRI
 4686
 4687  017644                                  ENDINIT
 4688  017644                                                          L10016:
 4689  017644  104411                                                          TRAP    C$INIT
```

```
4690
4691
4692                                    .SBTTL  AUTODROP SECTION
4693
4694
4695                                    ;++
4696                                    ; THIS CODE IS EXECUTED IMMEDIATELY AFTER THE INITIALIZE CODE IF
4697                                    ; THE "ADR" FLAG WAS SET.  THE UNIT(S) UNDER TEST ARE CHECKED TO
4698                                    ; SEE IF THEY WILL RESPOND.  THOSE THAT DON'T ARE IMMEDIATELY
4699                                    ; DROPPED FROM TESTING.
4700                                    ;--
4701
4702  017646                                    BGNAUTO
4703  017646                                                                  L$AUTO::
4704
4705
4706  017646                                    ENDAUTO
4707  017646                                                                  L10017:
4708  017646  104461                                                                 TRAP    C$AUTO
```

```
4709
4710
4711                                    .SBTTL  CLEANUP CODING SECTION
4712
4713                                    ;++
4714                                    ; THE CLEANUP CODING SECTION CONTAINS THE CODING THAT IS PERFORMED
4715                                    ; AFTER THE HARDWARE TESTS HAVE BEEN PERFORMED.
4716                                    ;--
4717
4718  017650                                    BGNCLN
4719  017650                                                                          L$CLEAN::
4720
4721  017650  005737  002310                     TST     CTRLCF          ;DID WE GET HERE BY CTRL-C FROM TEST?
4722  017654  001401                            BEQ     2$              ;CTRL-C FROM TEST?  NO, SKIP BUS RESET.
4723  017656                                    BRESET                  ;YES, CLR ANY DMAS OR OUTSTANDING INTERRUPTS.
4724  017656  104433                                                                  TRAP    C$RESET
4725  017660                                  2$:
4726  017660                                    EXIT    CLN
4727  017660  104432                                                                  TRAP    C$EXIT
4728  017662  000002                                                                  .WORD   L10020-.
4729
4730
4731                                    .EVEN
4732
4733  017664                                    ENDCLN
4734  017664                                                                  L10020:
4735  017664  104412                                                                  TRAP    C$CLEAN
```

```
4736
4737
4738                                    .SBTTL  DROP UNIT SECTION
4739
4740                                    ;++
4741                                    ; THE DROP-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
4742                                    ; TO NO LONGER BE TESTED.
4743                                    ;--
4744
4745  017666                                    BGNDU
4746  017666                                                                          L$DU::
4747  017666                                     PRINTF #DROP,R0        ;REPORT UNIT THAT HAS BEEN DROPPED.
4748  017666  010046                                                                 MOV     R0,-(SP)
4749  017670  012746  017712                                                        MOV     #DROP,-(SP)
4750  017674  012746  000002                                                        MOV     #2,-(SP)
4751  017700  010600                                                                MOV     SP,R0
4752  017702  104417                                                                TRAP    C$PNTF
4753  017704  062706  000006                                                        ADD     #6,SP
4754  017710  000427                           BR      EDROP          ;BRANCH AROUND THE MESSAGE.
4755
4756  017712  040445  052440  044516  DROP:   .ASCIZ/%A UNIT%D6%A DROPPED FROM FURTHER TESTING.%N/
4757  017720  022524  033104  040445
4758  017726  042040  047522  050120
4759  017734  042105  043040  047522
4760  017742  020115  052506  052122
4761  017750  042510  020122  042524
4762  017756  052123  047111  027107
4763  017764  047045     000
4764          017770                    .EVEN
4765  017770                    EDROP:
4766  017770                    EXIT    DU
4767  017770  000167                                                              .WORD   J$JMP
4768  017772  000000                                                              .WORD   L10021-2-.
4769
4770
4771
4772  017774                    ENDDU
4773  017774                                                          L10021:
4774  017774  104453                                                                TRAP    C$DU
```

```
4775
4776
4777                                    .SBTTL  ADD UNIT SECTION
4778
4779                                    ;++
4780                                    ; THE ADD-UNIT SECTION CONTAINS ANY CODE THE PROGRAMMER WISHES
4781                                    ;  TO BE EXECUTED IN CONJUNCTION WITH THE ADDING OF A UNIT BACK
4782                                    ;  TO THE TEST CYCLE.
4783                                    ;--
4784
4785  017776                                    BGNAU
4786  017776                                                                  L$AU::
4787  017776                                    EXIT    AU
4788  017776  000167                                                                .WORD   J$JMP
4789  020000  000000                                                                .WORD   L10022-2-.
4790
4791
4792                                    .EVEN
4793
4794  020002                                    ENDAU
4795  020002                                                                  L10022:
4796  020002  104452                                                                TRAP    C$AU
4797
```

```
                                .SBTTL  HARDWARE TEST           - ADRA -
                                ;++
                                ;*****************************************************************************
                                ;*                          - REGISTER ADDRESS TEST -
                                ;*
                                ;*      THIS TEST VERIFIES THAT THE Q-BUS CAN READ AND WRITE TO THE DHV11
                                ;*      DEVICE REGISTERS.  IF THE DHV11 DOES NOT RESPOND TO THE ACCESS
                                ;*      ATTEMPTS (IF THE DHV11 IS AT THE WRONG ADDRESS, FOR EXAMPLE) THE
                                ;*      004 BUS TIME-OUT TRAP IS DETECTED BY THIS ROUTINE AND AN ERROR
                                ;*      IS REPORTED.
                                ;*
                                ;*****************************************************************************
                                ;--

020004                          BGNTST
020004                                                                  T1::
        000001                  TNUM == 1               ;THIS TEST MUST ALWAYS BE INCLUDED AS TEST 1.
020004  012737  000001  002274   MOV    #TNUM,TSTNUM    ;SET THE TEST NUMBER TO 1.
020012  012737  177777  002310   MOV    #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
                                ;+
                                ; SET UP TO CATCH ANY 004 TRAPS WHICH OCCUR:
                                ;-
020020  013737  000004  002302   MOV    4,TP4VEC        ;SAVE THE EXISTING 004 TRAP VECTOR.
020026  012737  017014  000004   MOV    #TP4RTN,4       ;SET 004 TRAP VECTOR TO OUR SERVICE RTN ADR.
020034  005005                   CLR    R5              ;CLEAR THE ERROR FLAGS.

                                ;+
                                ; SET UP FOR THE INITIAL ITERATION OF THE TEST LOOP:
                                ;-
020036  005004                   CLR    R4              ;CLEAR THE LINE COUNTER.

                                ;+
                                ; HERE BEGINS THE LOOP TO TEST THE REGISTERS FOR A LINE.
                                ;    FIRST TEST THE CSR AND SET THE IND.ADR.REG (I.A.R) FIELD.
                                ;-
020040  005037  002304          2$:     CLR    TP4FLG          ;CLEAR THE 004 TRAP FLAG.
020044  013700  002214                  MOV    CSRA,R0         ;SET UP CSR AS THE CKTRAP MOVE SOURCE.
020050  012701  020264                  MOV    #52$,R1         ;SET UP DESTINATION LOCATION FOR CKTRAP MOVE.
020054  004737  013776                  JSR    PC,CKTRAP       ;MOVE AND CHECK FOR TRAP.
020060  103402                          BCS    4$              ;IF NO TRAP, BYPASS ERROR.
020062  052705  100001                  BIS    #100001,R5      ;SET FATAL READ ERROR FLAGS.
020066  042737  000017  020264  4$:     BIC    #17,52$         ;CLEAR THE I.A.R FIELD OF THE CSR DATA.
020074  050437  020264                  BIS    R4,52$          ;OR IN THE LINE COUNTER TO THE I.A.R FIELD.
020100  010100                          MOV    R1,R0           ;USE OLD DESTINATION FOR SOURCE OF CKTRAP MOVE.
020102  013701  002214                  MOV    CSRA,R1         ;SET UP CSR AS THE CKTRAP MOVE DESTINATION.
020106  004737  013776                  JSR    PC,CKTRAP       ;MOVE AND CHECK FOR TRAP.
020112  103403                          BCS    6$              ;IF NO TRAP, BYPASS ERROR.
020114  052705  100002                  BIS    #100002,R5      ;SET FATAL WRITE ERROR FLAGS.
020120  000440                          BR     40$             ;EXIT AND REPORT FATAL ERROR.
                                ;+
                                ;    NOW, WE TEST EACH REGISTER FOR THIS LINE.
                                ;-
020122  012702  000010          6$:     MOV    #10,R2          ;INIT REGISTER COUNTER TO 8.
020126  013737  002214  020262          MOV    CSRA,50$                ;INITIALIZE THE REGISTER POINTER.
020134  012700  020262          8$:     MOV    #50$,R0         ;SET UP REGISTER AS THE SOURCE FOR CKTRAP MOVE.
020140  012701  020264                  MOV    #52$,R1         ;SET UP LOCAL STORAGE AS THE DES FOR CKTRAP.
```

```
 4854  020144  004737  013776              JSR     PC,CKTRAP       ;PERFORM THE MOVE, CHECK FOR TRAP.
 4855  020150  103402                      BCS     10$             ;IF NO TRAP, BYPASS THE SETTING OF ERROR FLAGS.
 4856  020152  052705  100001               BIS     #100001,R5      ;SET FATAL READ ERROR FLAGS.
 4857  020156  010100              10$:     MOV     R1,R0           ;USE OLD DEST AS SRC FOR CKTRAP MOVE.
 4858  020160  012701  020262               MOV     #50$,R1         ;SET UP REGISTER AS THE DEST FOR CKTRAP MOVE.
 4859  020164  004737  013776              JSR     PC,CKTRAP       ;PERFORM THE MOVE, CHECK FOR TRAP.
 4860  020170  103402                      BCS     12$             ;IF NO TRAP, BYPASS THE SETTING OF ERROR FLAGS.
 4861  020172  052705  100002               BIS     #100002,R5      ;SET FATAL WRITE ERROR FLAGS.
 4862  020176  005237  020262      12$:     INC     50$             ;INCREMENT THE REGISTER
 4863  020202  005237  020262               INC     50$             ; POINTER BY 2.
 4864  020206  005302                       DEC     R2              ;COUNT THE REGISTER.
 4865  020210  001351                      BNE     8$              ;LOOP TO TEST THE NEXT REGISTER ADDRESS.
 4866
 4867                                      ;+
 4868                                      ; NOW WE SET UP TO TEST THE NEXT LINE, OR TO EXIT IF WE ARE DONE.
 4869                                      ;-
 4870  020212  005204                       INC     R4              ;INCREMENT THE LINE COUNTER.
 4871  020214  020427  000010               CMP     R4,#NUMLNS      ;COMPARE LINE COUNTER AGAINST NUMBER OF LINES.
 4872  020220  002707                      BLT     2$              ;LOOP TO TEST THE NEXT LINE IF WE'RE NOT DONE.
 4873
 4874                                      ;+
 4875                                      ; DONE CHECKING DEVICE REGISTER ADDRESSES.
 4876                                      ;    REPORT ANY ERRORS AND EXIT.
 4877                                      ;-
 4878  020222  013737  002302  000004  40$:     MOV     TP4VEC,4        ;RESTORE THE NORMAL 004 TRAP VECTOR.
 4879  020230  005705                       TST     R5              ;CHECK THE ERROR FLAGS.
 4880  020232  100015                      BPL     60$             ;EXIT ROUTINE IF NO ERRORS.
 4881                                  ; REPORT 'DEVICE REGISTER ACCESS ERRORS"
 4882  020234                               ERRDF   101,EM0103,ER0101;              >>>>> ERROR #101 <<<<<.
 4883  020234  104455                                                                  TRAP    C$ERDF
 4884  020236  000145                                                                  .WORD   101
 4885  020240  004572                                                                  .WORD   EM0103
 4886  020242  012176                                                                  .WORD   ER0101
 4887
 4888  020244                              DODU    UNITN           ;DROP THIS UNIT FROM FUTHER TESTING.
 4889  020244  013700  002212                                                         MOV     UNITN,R0
 4890  020250  104451                                                                 TRAP    C$DODU
 4891  020252  005037  002310               CLR     CTRLCF          ;INDICATE NO CTRL-C ABORT FROM TEST.
 4892  020256                              DOCLN                   ;ABORT THIS SUB PASS.
 4893  020256  104444                                                                 TRAP    C$DCLN
 4894  020260  000402                      BR      60$             ;
 4895                                  ;+
 4896                                  ; LOCAL STORAGE.
 4897                                  ;-
 4898  020262  000000              50$:    .WORD   0       ;STORAGE FOR THE SOURCE OR DEST OF THE CKTRAP MOVE.
 4899  020264  000000              52$:    .WORD   0       ;STORAGE FOR THE SOURCE OR DEST OF THE CKTRAP MOVE.
 4900  020266  005037  002310      60$:     CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
 4901  020272                              ENDTST
 4902  020272                                                                  L10023:
 4903  020272  104401                                                                 TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - MRSTA -
                                ;++ ************************************************************************
                                ;*              - MASTER RESET WITH SELFTEST TEST -
                                ;*      THIS TEST VERIFIES THAT THE MASTER RESET BIT WILL CLEAR AFTER A DEVICE
                                ;*      RESET AND THE PERFORMANCE OF THE DUT ROM BASED SELFTEST.
                                ;*
                                ;-- ************************************************************************
                                        BGNTST
                                                                                        T2::
                                        TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 020274  012737  000002  002274          MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (2)
 020302  012737  177777  002310          MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
 020310                                 SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
 020310  012700  000240                                                          MOV     #PRI05,R0
 020314  104441                                                                  TRAP    C$SPRI
 020316  012737  000001  002664          MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
 020324  012737  004630  002670          MOV     #EM0201,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
 020332  012737  012514  002672          MOV     #ER0201,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                ;+
                                ; WAIT UP TO 5 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
                                ;-
 020340  012701  011610                  MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
 020344  012702  000040                  MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
 020350  005003                          CLR     R3              ;WAITING FOR BIT TO CLEAR.
 020352  013704  002214                  MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
 020356  004737  014166                 JSR     PC,MSLGET       ;WAIT FOR DUT CSR MR BIT TO CLEAR.
 020362  103410                          BCS     2$              ;SKIP TO RESET DUT IF MR CLEAR.
                                ;+
                                ; DUT MASTER RESET BIT DID NOT GO CLEAR.  DEVICE MAY BE STUCK IN SOME
                                ;  ODD STATE.  TRY TO RESET DEVICE WITH A BUS RESET.
                                ;-
 020364                                 BRESET                  ;NO, TRY TO JOG DEVICE WITH BUS RESET.
 020364  104433                                                                  TRAP    C$RESET
 020366  004737  016100                 JSR     PC,SKPSTS       ;TRY TO SKIP THE SELFTEST.
 020372  012701  011610                  MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
 020376  004737  014166                 JSR     PC,MSLGET       ;WAIT FOR DUT CSR MR BIT TO CLEAR.
 020402  103016                          BCC     4$              ;GO REPORT ERROR IF MR BIT DID NOT CLEAR.
                                ;+
                                ; SET THE MASTER RESET BIT AND VERIFY THAT IT CLEARS WITHIN THE PROPER TIME.
                                ;-
 020404  012701  011610         2$:      MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
 020410  010214                          MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
 020412  004737  014166                 JSR     PC,MSLGET       ;WAIT FOR DUT CSR MR BIT TO CLEAR.
 020416  103010                          BCC     4$              ;GO REPORT ERROR IF MR BIT DID NOT CLEAR.
 020420  012702  011610                  MOV     #5000.,R2
 020424  160102                          SUB     R1,R2           ;CALCULATE # OF MS FOR MR TO CLEAR.
 020426  001413                          BEQ     6$              ;GO REPORT ERROR IF MR CLEAR IMMEDIATELY.
 020430  020227  000764                  CMP     R2,#500.
 020434  002417                         BLT     8$              ;GO REPORT ERROR IF MR CLEAR IN < 1/2 SECOND.
 020436  000424                          BR      60$             ;EXIT THE TEST WITHOUT ERROR.
                                ;+
                                ; ERROR REPORTS:
                                ;-
                                    ;REPORT MR BIT WOULD NOT CLEAR AFTER A DUT RESET.
 020440  012737  000311  002666 4$:      MOV     #201.,ERRNBR    ;SET THE ERROR NUMBER IN ERROR TABLE.
 020446  012701  004676                  MOV     #EM0202,R1      ;SELECT ERROR MESSAGE.
```

```
 4960  020452                                ERROR                   ;REPORT ERROR.          >>>>> ERROR #201 <<<<<
 4961  020452  104460                                                                                TRAP    C$ERROR
 4962  020454  000415                        BR      60$             ;EXIT THE TEST.
 4963
 4964                                  ;REPORT MR BIT CLEAR IMMEDIATELY AFTER DUT RESET.
 4965  020456  012737  000312  002666  6$:    MOV     #202.,ERRNBR    ;SET THE ERROR NUMBER IN ERROR TABLE.
 4966  020464  012701  005051                MOV     #EM0203,R1      ;SELECT ERROR MESSAGE.
 4967  020470                                ERROR                   ;REPORT ERROR.          >>>>> ERROR #202 <<<<<
 4968  020470  104460                                                                                TRAP    C$ERROR
 4969  020472  000406                        BR      60$             ;EXIT THE TEST.
 4970
 4971                                  ;REPORT MR CLEAR WITHIN 1/2 SECOND OF DUT RESET.
 4972  020474  012737  000313  002666  8$:    MOV     #203.,ERRNBR    ;SET THE ERROR NUMBER IN ERROR TABLE.
 4973  020502  012701  005214                MOV     #EM0204,R1      ;SELECT ERROR MESSAGE.
 4974  020506                                ERROR                   ;REPORT ERROR.          >>>>> ERROR #203 <<<<<
 4975  020506  104460                                                                                TRAP    C$ERROR
 4976
 4977  020510                          60$:  SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
 4978  020510  012700  000340                                                                        MOV     #PRI07,R0
 4979  020514  104441                                                                                TRAP    C$SPRI
 4980  020516  005037  002310                CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 4981  020522                                ENDTST
 4982  020522                                                                        L10024:
 4983  020522  104401                                                                                TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - MRSSTA -
                                ;++ ************************************************************************
                                ;*              - MASTER RESET WITH SKIP SELFTEST TEST -
                                ;*      THIS TEST VERIFIES THAT THE MASTER RESET BIT WILL CLEAR AFTER A DEVICE
                                ;*      RESET AND THE SKIPPING OF THE DUT ROM BASED SELFTEST.
                                ;*
                                ;-- ************************************************************************
                                        BGNTST
                                                                                        T3::
                                        TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
020524 012737 000003 002274              MOV    #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (3)
020532 012737 177777 002310              MOV    #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
                                        SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
020540 012700 000240                                                            MOV     #PRI05,R0
020544 104441                                                                   TRAP    C$SPRI
020546 012737 000001 002664              MOV    #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
020554 012737 005373 002670              MOV    #EM0301,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
020562 012737 012514 002672              MOV    #ER0201,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                ;+
                                ; WAIT UP TO 5 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
                                ;-
020570 012701 011610             MOV    #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
020574 012702 000040             MOV    #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
020600 005003                    CLR    R3              ;WAITING FOR BIT TO CLEAR.
020602 013704 002214             MOV    CSRA,R4         ;BIT IS IN THE DUT'S CSR.
020606 004737 014166             JSR    PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
020612 103410                    BCS    2$              ;SKIP TO RESET DUT IF MR CLEAR.
                                ;+
                                ; DUT MASTER RESET BIT DID NOT GO CLEAR.  DEVICE MAY BE STUCK IN SOME
                                ;  ODD STATE.  TRY TO RESET DEVICE WITH A BUS RESET.
                                ;-
                                        BRESET                  ;NO, TRY TO JOG DEVICE WITH BUS RESET.
020614                                                                  TRAP    C$RESET
020614 104433
020616 004737 016100             JSR    PC,SKPSTS       ;TRY TO SKIP THE SELFTEST.
020622 012701 011610             MOV    #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
020626 004737 014166             JSR    PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
020632 103024                    BCC    6$              ;GO REPORT ERROR IF MR BIT DID NOT CLEAR.
                                ;+
                                ; SET THE MASTER RESET BIT, TRY TO SKIP THE SELFTEST, AND VERIFY THAT THE
                                ;  MR BIT CLEARS WITHIN 1/5 SECOND.
                                ;-
020634 012701 000310     2$:     MOV    #200.,R1        ;TIME-OUT VALUE IS 1/5 SECOND.
020640 010214                    MOV    R2,(R4)         ;SET THE DUT MASTER RESET BIT.
020642 004737 016100             JSR    PC,SKPSTS       ;TRY TO SKIP THE SELFTEST.
020646 004737 014166             JSR    PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
020652 103007                    BCC    4$              ;GO FIND OUT WHAT IS WRONG IF MR NOT CLEAR.
020654 012702 000310             MOV    #200.,R2
020660 160102                    SUB    R1,R2           ;CALCULATE # OF MS FOR MR TO CLEAR.
020662 020227 000012             CMP    R2,#10.
020666 002415                    BLT    8$              ;GO REPORT ERROR IF MR CLEAR IN < 10 MS.
020670 000431                    BR     60$             ;EXIT THE TEST WITHOUT ERROR.
                                ;+
                                ; MR DID NOT CLEAR WITHIN 1/5 SECOND, SEE IF IT CLEARS WITHIN 5 SECONDS.
                                ;-
020672 012701 011300     4$:     MOV    #4800.,R1       ;TIME-OUT VALUE IS 5 SECONDS MINUS 1/5 SECOND.
020676 004737 014166             JSR    PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
```

```
5040  020702  103416                          BCS     10$             ;GO REPORT ERROR IF MR CLEARED FINALLY.
5041                                  ;+
5042                                  ; ERROR REPORTS:
5043                                  ;-
5044                                      ;REPORT MR BIT WOULD NOT CLEAR AFTER A DUT RESET.
5045  020704  012737  000455  002666  6$:     MOV     #0301.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
5046  020712  012701  004676                  MOV     #EM0202,R1      ;SELECT ERROR MESSAGE.
5047  020716                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0301 <<<<<
5048  020716  104460                                                                                  TRAP    C$ERROR
5049  020720  000415                          BR      60$             ;EXIT THE TEST.
5050
5051                                      ;REPORT MR BIT CLEAR WITHIN 10 MS AFTER DUT RESET.
5052  020722  012737  000456  002666  8$:     MOV     #0302.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
5053  020730  012701  005436                  MOV     #EM0302,R1      ;SELECT ERROR MESSAGE.
5054  020734                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0302 <<<<<
5055  020734  104460                                                                                  TRAP    C$ERROR
5056  020736  000406                          BR      60$             ;EXIT THE TEST.
5057
5058                                      ;REPORT MR CLEARED BETWEEN 1/5 SECOND AND 5 SECONDS OF DUT RESET.
5059  020740  012737  000457  002666  10$:    MOV     #0303.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
5060  020746  012701  005576                  MOV     #EM0303,R1      ;SELECT ERROR MESSAGE.
5061  020752                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0303 <<<<<
5062  020752  104460                                                                                  TRAP    C$ERROR
5063
5064  020754                          60$:    SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
5065  020754  012700  000340                                                                          MOV     #PRI07,R0
5066  020760  104441                                                                                  TRAP    C$SPRI
5067  020762  005037  002310                  CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
5068  020766                                  ENDTST
5069  020766                                                                                  L10025:
5070  020766  104401                                                                                  TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - RXCHRA -
                                ;++ ************************************************************************
                                ;*              - RBUF REGISTER RX CHARACTER FIELD TEST -
                                ;*      THIS TEST VERIFIES THAT THE RX CHARACTER FIELD OF THE DUT RBUF REGISTER
                                ;*      APPEARS TO BE FUNCTIONING CORRECTLY.  THIS TEST USES THE CODES WHICH
                                ;*      SHOULD BE IN THE FIFO AFTER A BOARD RESET AND SKIP SELFTEST SEQUENCE.
                                ;*
                                ;-- ************************************************************************
020770                                  BGNTST
020770                                                                          T4::
020770                                  SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
020770  012700  000240                                                        MOV     #PRI05,R0
020774  104441                                                                TRAP    C$SPRI
        000004                          INUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
020776  012737  000004  002274          MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (4)
021004  012737  177777  002310          MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
021012  012737  000001  002664          MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
021020  012737  005755  002670          MOV     #EM0401,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
021026  012737  012514  002672          MOV     #ER0201,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                ;+
                                ; SET THE DUT CSR MASTER RESET (MR) BIT, PERFORM THE SKIP SELFTEST SEQUENCE,
                                ;  AND WAIT UP TO 5 SECONDS FOR THE MR BIT TO CLEAR.
                                ;-
021034  012701  011610                  MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
021040  012702  000040                  MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
021044  005003                          CLR     R3              ;WAITING FOR BIT TO CLEAR.
021046  013704  002214                  MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
021052  010214                          MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
021054  004737  016100                  JSR     PC,SKPSTS       ;SKIP THE SELFTEST.
021060  004737  014166                  JSR     PC,MSLGET       ;WAIT FOR DUT CSR MR BIT TO CLEAR.
021064  103015                          BCC     4$              ;GO REPORT ERROR IF MR DID NOT CLEAR.
                                ;+
                                ; READ 6 CHARACTERS FROM THE DUT AND VERIFY THAT THEY ARE VALID SELFTEST
                                ;  CODES.
                                ;-
021066  012400                          MOV     (R4)+,R0        ;INCREMENT POINTER TO POINT TO DUT RBUF REGSTR.
021070  012701  000006                  MOV     #6,R1           ;INITIALIZE THE LOOP COUNTER.
021074  011402                  2$:     MOV     (R4),R2         ;READ A CHARACTER FROM THE DUT RBUF REGISTER.
021076  010200                          MOV     R2,R0
021100  042700  177476                  BIC     #177476,R0      ;REMOVE ALL dUT BITS SPECIFIC TO SELFTEST CODE.
021104  020027  000201                  CMP     R0,#201         ;CHECK THAT BITS 0,6, AND 7 ARE CORRECT.
021110  001012                          BNE     6$              ;GO REPORT ERROR IF CODE IS NOT SELFTEST CODE.
021112  005301                          DEC     R1              ;COUNT THIS LOOP ITERATION.
021114  001367                          BNE     2$              ;LOOP IF NOT ALL LINES DONE.
021116  000415                          BR      60$             ;EXIT TEST, NO ERROR FOUND.
                                ;+
                                ; ERROR REPORTS:
                                ;-
                                    ;REPORT MR BIT WOULD NOT CLEAR AFTER A DUT RESET.
021120  012737  000621  002666  4$:      MOV     #0401.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
021126  012701  004676                  MOV     #EM0202,R1      ;SELECT ERROR MESSAGE.
021132                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0401 <<<<<
021132  104460                                                                        TRAP    C$ERROR
021134  000406                          BR      60$             ;EXIT THE TEST.
```

```
5127                                    ;REPORT IMPROPER CODE FOUND IN DUT RBUF AFTER RESET (SKIP SELFTEST).
5128  021136  012737  000622  002666  6$:     MOV     #0402.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
5129  021144  012701  006024                  MOV     #EM0402,R1      ;SELECT ERROR MESSAGE.
5130  021150                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0402 <<<<<
5131  021150  104460                                                                                TRAP    C$ERROR
5132
5133  021152                          60$:    SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
5134  021152  012700  000340                                                                        MOV     #PRI07,R0
5135  021156  104441                                                                               TRAP    C$SPRI
5136  021160  005037  002310                  CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
5137  021164                                  ENDTST
5138  021164                                                                        L10026:
5139  021164  104401                                                                               TRAP    C$ETST
```

```
5140                                    .SBTTL  HARDWARE TEST           - RXFFDA -
5141                                    ;++ ************************************************************************
5142                                    ;*              - RBUF REGISTER RX FLAG FIELD TEST -
5143                                    ;*      THIS TEST VERIFIES THAT THE FIELD OF 3 FLAG BITS IN THE RBUF READS
5144                                    ;*      AS ALL ONES WHEN THE SELFTEST CODES ARE BEING READ FROM THE DUT
5145                                    ;*      AFTER A BOARD RESET AND SKIP SELFTEST SEQUENCE.
5146                                    ;*
5147                                    ;-- ************************************************************************
5148  021166                                    BGNTST
5149  021166                                                                                    T5::
5150  021166                                    SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
5151  021166  012700  000240                                                                  MOV     #PRI05,R0
5152  021172  104441                                                                          TRAP    C$SPRI
5153          000005                     TNUM == TNUM + 1             ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
5154  021174  012737  000005  002274            MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (5)
5155  021202  012737  177777  002310            MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
5156  021210  012737  000001  002664            MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
5157  021216  012737  006174  002670            MOV     #EM0501,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
5158  021224  012737  012514  002672            MOV     #ER0201,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
5159                                    ;+
5160                                    ; SET THE DUT CSR MASTER RESET (MR) BIT, PERFORM THE SKIP SELFTEST SEQUENCE,
5161                                    ;  AND WAIT UP TO 5 SECONDS FOR THE MR BIT TO CLEAR.
5162                                    ;-
5163  021232  012701  011610                    MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
5164  021236  012702  000040                    MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
5165  021242  005003                             CLR     R3              ;WAITING FOR BIT TO CLEAR.
5166  021244  013704  002214                    MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
5167  021250  010214                             MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
5168  021252  004737  016100                    JSR     PC,SKPSTS       ;SKIP THE SELFTEST.
5169  021256  004737  014166                    JSR     PC,MSLGET       ;WAIT FOR DUT CSR MR BIT TO CLEAR.
5170  021262  103013                             BCC     4$              ;GO REPORT ERROR IF MR DID NOT CLEAR.
5171                                    ;+
5172                                    ; READ 8 CHARACTERS FROM THE DUT AND VERIFY THAT ALL 3 RX ERROR FLAGS ARE
5173                                    ;  SET FOR EACH CHARACTERS.
5174                                    ;-
5175  021264  012400                             MOV     (R4)+,R0        ;INCREMENT POINTER TO POINT TO DUT RBUF REGSTR.
5176  021266  012701  000010                    MOV     #8.,R1          ;INITIALIZE THE LOOP COUNTER.
5177  021272  011402                    2$:     MOV     (R4),R2         ;READ A CHARACTER FROM THE DUT RBUF REGISTER.
5178  021274  012700  070000                    MOV     #70000,R0
5179  021300  040200                             BIC     R2,R0           ;CALCULATE BIT MAP OF CLEAR RX ERROR FLAGS.
5180  021302  001012                            BNE     6$              ;GO REPORT ERROR IF NOT ALL RX ERROR FLAGS SET.
5181  021304  005301                             DEC     R1              ;COUNT THIS LOOP ITERATION.
5182  021306  001371                            BNE     2$              ;LOOP IF NOT ALL LINES DONE.
5183  021310  000415                            BR      60$             ;EXIT TEST, NO ERROR FOUND.
5184
5185                                    ;+
5186                                    ; ERROR REPORTS:
5187                                    ;-
5188                                        ;REPORT MR BIT WOULD NOT CLEAR AFTER A DUT RESET.
5189  021312  012737  000765  002666  4$:      MOV     #0501.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
5190  021320  012701  004676                    MOV     #EM0202,R1      ;SELECT ERROR MESSAGE.
5191  021324                                    ERROR                   ;REPORT ERROR.          >>>>> ERROR #0501 <<<<<
5192  021324  104460                                                                           TRAP    C$ERROR
5193  021326  000406                            BR      60$             ;EXIT THE TEST.
5194
5195                                        ;REPORT ONE OR MORE RX ERROR FLAGS FOUND SET WITH SELFTEST CODE.
```

```
 5196  021330  012737  000766  002666  6$:     MOV     #0502.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
 5197  021336  012701  006242                  MOV     #EM0502,R1      ;SELECT ERROR MESSAGE.
 5198  021342                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0502 <<<<<
 5199  021342  104460                                                                          TRAP    C$ERROR
 5200
 5201  021344                          60$:    SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
 5202  021344  012700  000340                                                                  MOV     #PRI07,R0
 5203  021350  104441                                                                          TRAP    C$SPRI
 5204  021352  005037  002310                  CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 5205  021356                                  ENDTST
 5206  021356                                                                          L10027:
 5207  021356  104401                                                                          TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - RDAA -
                                ;++ ************************************************************************
                                ;*              - CSR RX DATA AVAILABLE BIT TEST -
                                ;*      THIS TEST VERIFIES THAT THE DUT CSR RX DATA AVAILABLE BIT IS SET BY THE
                                ;*      INCLUSION OF THE SELFTEST CODES IN THE DUT FIFO AND THAT THE BIT CLEARS
                                ;*      AFTER THE FIFO HAS BEEN EMPTIED.
                                ;*
                                ;-- ************************************************************************
021360                                  BGNTST
                                                                                T6::
021360                                  SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
021360  012700  000240                                                          MOV     #PRI05,R0
021364  104441                                                                  TRAP    C$SPRI
        000006                           TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
021366  012737  000006  002274           MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (6)
021374  012737  177777  002310           MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE WITHIN A TEST.
021402  012737  000001  002664           MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
021410  012737  006416  002670           MOV     #EM0601,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
021416  012737  012514  002672           MOV     #ER0201,ERRBLK ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                ;+
                                ; SET THE DUT CSR MASTER RESET (MR) BIT, PERFORM THE SKIP SELFTEST SEQUENCE,
                                ;  AND WAIT UP TO 5 SECONDS FOR THE MR BIT TO CLEAR.
                                ;-
021424  012701  011610                   MOV     #5000.,R1      ;TIME-OUT VALUE IS 5.0 SECONDS.
021430  012702  000040                   MOV     #BIT05,R2      ;WAITING FOR MASTER RESET BIT.
021434  005003                           CLR     R3             ;WAITING FOR BIT TO CLEAR.
021436  013704  002214                   MOV     CSRA,R4        ;BIT IS IN THE DUT'S CSR.
021442  010214                           MOV     R2,(R4)        ;SET THE DUT MASTER RESET BIT.
021444  004737  016100                  JSR     PC,SKPSTS      ;SKIP THE SELFTEST.
021450  004737  014166                  JSR     PC,MSLGET      ;WAIT FOR DUT CSR MR BIT TO CLEAR.
021454  103016                          BCC     4$             ;GO REPORT ERROR IF MR DID NOT CLEAR.
                                ;+
                                ; CHECK THAT THE RX DATA AVAILABLE BIT IS SET.
                                ;-
021456  032714  000200                    BIT     #BIT7,(R4)     ;TEST THE DUT RX.DATA.AVAIL BIT.
021462  001422                          BEQ     6$             ;GO REPORT ERROR IF BIT IS NOT SET.
                                ;+
                                ; READ CHARACTERS FROM THE DUT RX FIFO AND WAIT FOR RX.DATA.AVAIL TO GO CLEAR.
                                ;-
021464  012705  001130                   MOV     #600.,R5       ;ALLOW READING 600 CHARS BEFORE ERROR.
021470  010403                           MOV     R4,R3
021472  012300                           MOV     (R3)+,R0       ;CALCULATE THE RBUF ADDRESS.
021474  011300                  2$:      MOV     (R3),R0        ;READ A CHARACTER FROM THE RX FIFO.
021476  032714  000200                   BIT     #BIT7,(R4)     ;TEST THE DUT RX.DATA.AVAIL BIT.
021502  001427                          BEQ     60$            ;EXIT TEST WITHOUT ERROR IF RX.DATA.AVAIL CLR.
021504  005305                           DEC     R5             ;COUNT THE CHARACTER JUST READ.
021506  001372                          BNE     2$             ;LOOP IF NOT TOO MANY CHARS READ FROM FIFO.
021510  000416                           BR     8$             ;GO REPORT ERROR IF RX.DATA.AVAIL WOULDN'T CLR.

                                ;+
                                ; ERROR REPORTS:
                                ;-
                                    ;REPORT MR BIT WOULD NOT CLEAR AFTER A DUT RESET.
021512  012737  001131  002666  4$:      MOV     #0601.,ERRNBR  ;SET THE ERROR NUMBER IN ERROR TABLE.
021520  012701  004676                   MOV     #EM0202,R1     ;SELECT ERROR MESSAGE.
021524                                  ERROR                  ;REPORT ERROR.          >>>>> ERROR #0601 <<<<<
```

```
5264  021524  104460                                                          TRAP    C$ERROR
5265  021526  000415                  BR      60$             ;EXIT THE TEST.
5266
5267                          ;REPORT THAT RX.DATA.AVAIL BIT WAS NOT SET AFTER A RESET COMPLETION.
5268  021530  012737  001132  002666  6$:     MOV     #0602.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
5269  021536  012701  006452          MOV     #EM0602,R1      ;SELECT ERROR MESSAGE.
5270  021542                          ERROR                   ;REPORT ERROR.          >>>>> ERROR #0602 <<<<<
5271  021542  104460                                                          TRAP    C$ERROR
5272  021544  000406                  BR      60$             ;EXIT THE TEST.
5273
5274                          ;REPORT THAT RX.DATA.AVAIL BIT COULD NOT BE CLEARED BY PURGING FIFO.
5275  021546  012737  001133  002666  8$:     MOV     #0603.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
5276  021554  012701  006632          MOV     #EM0603,R1      ;SELECT ERROR MESSAGE.
5277  021560                          ERROR                   ;REPORT ERROR.          >>>>> ERROR #0603 <<<<<
5278  021560  104460                                                          TRAP    C$ERROR
5279
5280  021562                  60$:    SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
5281  021562  012700  000340                                                  MOV     #PRI07,R0
5282  021566  104441                                                          TRAP    C$SPRI
5283  021570  005037  002310          CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
5284  021574                          ENDTST
5285  021574                                                          L10030:
5286  021574  104401                                                          TRAP    C$ETST
```

```
5287                                    .SBTTL  HARDWARE TEST           - RDVA -
5288                                    ;++ ************************************************************************
5289                                    ;*              - RBUF RX DATA VALID BIT TEST -
5290                                    ;*      THIS TEST VERIFIES THAT THE DUT RBUF RX DATA VALID BIT IS SET BY THE
5291                                    ;*      INCLUSION OF THE SELFTEST CODES IN THE DUT FIFO AND THAT THE BIT CLEARS
5292                                    ;*      AFTER THE FIFO HAS BEEN EMPTIED.
5293                                    ;*
5294                                    ;-- ************************************************************************
5295  021576                                    BGNTST
5296  021576                                                                                          T7::
5297  021576                                    SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
5298  021576  012700  000240                                                                        MOV     #PRI05,R0
5299  021602  104441                                                                                TRAP    C$SPRI
5300          000007                             TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
5301  021604  012737  000007  002274            MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (7)
5302  021612  012737  177777  002310            MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
5303  021620  012737  000001  002664            MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
5304  021626  012737  007015  002670            MOV     #EM0701,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
5305  021634  012737  012514  002672            MOV     #ER0201,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
5306                                    ;+
5307                                    ; SET THE DUT CSR MASTER RESET (MR) BIT, PERFORM THE SKIP SELFTEST SEQUENCE,
5308                                    ;  AND WAIT UP TO 5 SECONDS FOR THE MR BIT TO CLEAR.
5309                                    ;-
5310  021642  012701  011610                    MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
5311  021646  012702  000040                    MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
5312  021652  005003                             CLR     R3              ;WAITING FOR BIT TO CLEAR.
5313  021654  013704  002214                    MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
5314  021660  010214                             MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
5315  021662  004737  016100                    JSR     PC,SKPSTS       ;SKIP THE SELFTEST.
5316  021666  004737  014166                    JSR     PC,MSLGET       ;WAIT FOR DUT CSR MR BIT TO CLEAR.
5317  021672  103012                            BCC     4$              ;GO REPORT ERROR IF MR DID NOT CLEAR.
5318                                    ;+
5319                                    ; CHECK THAT THE RX DATA VALID BIT IS SET.
5320                                    ;-
5321  021674  012400                             MOV     (R4)+,R0        ;INCREMENT POINTER TO PNT TO DUT RBUF REG.
5322  021676  005714                             TST     (R4)            ;TEST THE DUT RX.DATA.VALID BIT.
5323  021700  100016                            BPL     6$              ;GO REPORT ERROR IF BIT IS NOT SET.
5324                                    ;+
5325                                    ; READ CHARACTERS FROM THE DUT RX FIFO AND WAIT FOR RX.DATA.VALID TO GO CLEAR.
5326                                    ;-
5327  021702  012705  001130                    MOV     #600.,R5        ;ALLOW READING 600 CHARS BEFORE ERROR.
5328  021706  011400                    2$:     MOV     (R4),R0         ;READ A CHARACTER FROM THE RX FIFO.
5329  021710  100027                            BPL     60$             ;EXIT TEST WITHOUT ERROR IF BIT IS CLEAR.
5330  021712  005305                             DEC     R5              ;COUNT THE CHARACTER JUST READ.
5331  021714  001374                            BNE     2$              ;LOOP IF NOT TOO MANY CHARS READ FROM FIFO.
5332  021716  000416                             BR     8$              ;GO REPORT ERROR IF RX.DATA.VALID WOULDN'T CLR.
5333
5334                                    ;+
5335                                    ; ERROR REPORTS:
5336                                    ;-
5337                                        ;REPORT MR BIT WOULD NOT CLEAR AFTER A DUT RESET.
5338  021720  012737  001275  002666    4$:     MOV     #0701.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
5339  021726  012701  004676                    MOV     #EM0202,R1      ;SELECT ERROR MESSAGE.
5340  021732                                    ERROR                   ;REPORT ERROR.          >>>>> ERROR #0701 <<<<<
5341  021732  104460                                                                                TRAP    C$ERROR
5342  021734  000415                            BR      60$             ;EXIT THE TEST.
```

```
5343
5344                                    ;REPORT THAT RX.DATA.VALID BIT WAS NOT SET AFTER A RESET COMPLETION.
5345  021736  012737  001276  002666  6$:   MOV    #0702.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
5346  021744  012701  007052              MOV    #EM0702,R1      ;SELECT ERROR MESSAGE.
5347  021750                             ERROR                  ;REPORT ERROR.          >>>>> ERROR #0702 <<<<<
5348  021750  104460                                                                        TRAP    C$ERROR
5349  021752  000406                             BR     60$             ;EXIT THE TEST.
5350
5351                                    ;REPORT THAT RX.DATA.VALID BIT COULD NOT BE CLEARED BY PURGING FIFO.
5352  021754  012737  001277  002666  8$:   MOV    #0703.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
5353  021762  012701  007232              MOV    #EM0703,R1      ;SELECT ERROR MESSAGE.
5354  021766                             ERROR                  ;REPORT ERROR.          >>>>> ERROR #0703 <<<<<
5355  021766  104460                                                                        TRAP    C$ERROR
5356
5357  021770                          60$:   SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
5358  021770  012700  000340                                                              MOV     #PRI07,R0
5359  021774  104441                                                                      TRAP    C$SPRI
5360  021776  005037  002310              CLR    CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
5361  022002                             ENDTST
5362  022002                                                                          L10031:
5363  022002  104401                                                                      TRAP    C$ETST
```

```
5364                                    .SBTTL  HARDWARE TEST           - RLNA -
5365                                    ;++ ************************************************************************
5366                                    ;*              - RBUF RX LINE NUMBER FIELD TEST -
5367                                    ;*      THIS TEST VERIFIES THAT THE DUT RBUF RX LINE NUMBER FIELD IS WORKING
5368                                    ;*      CORRECTLY BY UTILIZING THE SELFTEST CODES WHICH ARE PUT IN THE RX
5369                                    ;*      FIFO AFTER A BOARD RESET.
5370                                    ;*
5371                                    ;-- ************************************************************************
5372  022004                                    BGNTST
5373  022004                                                                          T8::
5374  022004                                    SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
5375  022004  012700  000240                                                          MOV     #PRI05,R0
5376  022010  104441                                                                  TRAP    C$SPRI
5377           000010                           TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
5378  022012  012737  000010  002274            MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (8)
5379  022020  012737  177777  002310            MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
5380  022026  012737  000001  002664            MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
5381  022034  012737  007415  002670            MOV     #EM0801,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
5382                                    ;+
5383                                    ; SET THE DUT CSR MASTER RESET (MR) BIT, PERFORM THE SKIP SELFTEST SEQUENCE,
5384                                    ;  AND WAIT UP TO 5 SECONDS FOR THE MR BIT TO CLEAR.
5385                                    ;-
5386  022042  012701  011610                    MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
5387  022046  012702  000040                    MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
5388  022052  005003                             CLR     R3              ;WAITING FOR BIT TO CLEAR.
5389  022054  013704  002214                    MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
5390  022060  010214                             MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
5391  022062  004737  016100                    JSR     PC,SKPSTS       ;SKIP THE SELFTEST.
5392  022066  004737  014166                    JSR     PC,MSLGET       ;WAIT FOR DUT CSR MR BIT TO CLEAR.
5393  022072  103016                            BCC     4$              ;GO REPORT ERROR IF MR DID NOT CLEAR.
5394                                    ;+
5395                                    ; READ CHARACTERS FROM THE DUT RX FIFO AND VERIFY THAT THE LINE NUMBERS ARE
5396                                    ;  CORRECT.
5397                                    ; ONE CHARACTER IS READ FROM THE FIFO FOR EACH POSSIBLE LINE ON THE DUT.
5398                                    ;-
5399  022074  005001                             CLR     R1              ;CLEAR THE LINE COUNTER.
5400  022076  012400                             MOV     (R4)+,R0        ;INCREMENT POINTER TO PNT TO THE DUT RBUF REG.
5401  022100  011402                    2$:      MOV     (R4),R2         ;READ A CHARACTER FROM THE DUT RX FIFO.
5402  022102  010203                             MOV     R2,R3
5403  022104  000303                             SWAB    R3
5404  022106  042703  177760                    BIC     #177760,R3      ;REMOVE ALL BUT LINE NUMBER BITS.
5405  022112  020301                             CMP     R3,R1           ;COMPARE WITH EXPECTED LINE NUMBER.
5406  022114  001017                            BNE     6$              ;GO REPORT ERROR IF LINE NUMBERS DON'T MATCH.
5407  022116  005201                             INC     R1              ;INCREMENT THE EXPECTED LINE NUMBER.
5408  022120  020127  000010                    CMP     R1,#NUMLNS      ;COMPARE WITH NUMBER OF LINES ON DUT.
5409  022124  001365                            BNE     2$              ;LOOP UNTIL CODES FOR ALL LINES ARE READ.
5410  022126  000423                             BR      6C$             ;EXIT TEST WITHOUT ERROR.
5411
5412                                    ;+
5413                                    ; ERROR REPORTS:
5414                                    ;-
5415                                        ;REPORT MR BIT WOULD NOT CLEAR AFTER A DUT RESET.
5416  022130  012737  001441  002666    4$:      MOV     #0801.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
5417  022136  012737  012576  002672             MOV     #ER0503,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
5418  022144  012701  004676                    MOV     #EM0202,R1      ;SELECT ERROR MESSAGE.
5419  022150                                    ERROR                   ;REPORT ERROR.          >>>>> ERROR #0801 <<<<<
```

```
                                                                                    TRAP    C$ERROR
5420  022150  104460
5421  022152  000411                        BR      60$             ;EXIT THE TEST.
5422
5423                                  ;REPORT THAT RX LINE NUMBER FIELD IS WRONG FOR SELFTEST CODE.
5424  022154  012737  001442  002666  6$:   MOV     #0802.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
5425  022162  012737  012514  002672        MOV     #ER0201,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
5426  022170  012701  007455              MOV     #EM0802,R1      ;SELECT ERROR MESSAGE.
5427  022174                              ERROR                   ;REPORT ERROR.          >>>>> ERROR #0802 <<<<<
5428  022174  104460                                                                      TRAP    C$ERROR
5429
5430  022176                        60$:  SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
5431  022176  012700  000340                                                             MOV     #PRI07,R0
5432  022202  104441                                                                     TRAP    C$SPRI
5433  022204  005037  002310              CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
5434  022210                              ENDTST
5435  022210                                                                  L10032:
5436  022210  104401                                                                    TRAP    C$ETST
```

```
5437                                    .SBTTL  HARDWARE TEST           - BMPCHK -
5438                                    ;++ ************************************************************************
5439                                    ;*              - BMP CHECK TEST -
5440                                    ;*      THIS TEST IS USED TO VERIFY THAT THE DUT DOES NOT IMMEDIATELY FAIL
5441                                    ;*      THE ON-BOARD BACKGROUND-MONITOR PROGRAM, AND HENCE INVALIDATE
5442                                    ;*      SUCCEEDING TESTS.
5443                                    ;*      THIS TEST LOOKS FOR BMP CODES IN THE FIFO FOR A SET PERIOD IMMEDIATELY
5444                                    ;*      AFTER THE SELF-TEST IS SKIPPED.
5445                                    ;*      ANY BMP CODES THAT ARE FOUND ARE SAVED ON THE QUEUE AND ARE ALSO
5446                                    ;*      REPORTED IN THIS TEST.
5447                                    ;*
5448                                    ;-- ************************************************************************
5449  022212                            BGNTST
5450  022212                                                                          T9::
5451  022212                            SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
5452  022212  012700  000240                                                        MOV     #PRI05,R0
5453  022216  104441                                                                TRAP    C$SPRI
5454          000011                     TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
5455  022220  012737  000011  002274     MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (9)
5456  022226  012737  177777  002310     MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
5457  022234  012737  000001  002664     MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
5458  022242  012737  001605  002666     MOV     #0901.,ERRNBR   ;SET THE ERROR NUMBER.
5459                                    ;+
5460                                    ; WAIT UP TO 3 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
5461                                    ;  IF TIME-OUT OCCURS, THEN EXIT THIS TEST.
5462                                    ;-
5463  022250  012701  005670             MOV     #3000.,R1       ;TIME-OUT VALUE IS 3.0 SECONDS.
5464  022254  012702  000040             MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
5465  022260  005003                     CLR     R3              ;WAITING FOR BIT TO CLEAR.
5466  022262  013704  002214             MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
5467  022266  004737  014166            JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
5468  022272  103027                     BCC     50$             ;ABORT THE TEST IF MR DID NOT CLEAR.
5469                                    ;+
5470                                    ; RESET THE DUT, SKIP THE SELF-TEST.
5471                                    ;-
5472  022274  010214                     MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
5473  022276  004737  016100            JSR     PC,SKPSTS       ;WRITE THE SKIP SELFTEST CODES TO THE DUT.
5474                                    ;+
5475                                    ; WAIT FOR MASTER RESET TO CLEAR. DELAY FOR 500 MILLI-SECS BEFORE PURGING
5476                                    ; THE FIFO.
5477                                    ;-
5478  022302  012704  000764             MOV     #500.,R4        ;TIME-OUT VALUE IS 500 MILLI-SECONDS.
5479  022306  004737  014126            JSR     PC,DELAY        ;WAIT FOR BMP TO BEGIN EXECUTION.
5480  022312  004737  014544            JSR     PC,PUFIFO       ;PURGE THE FIFO, SAVING ANY BMP CODES.
5481  022316  103015                     BCC     50$             ;ABORT THE TEST IF THE FIFO DID NOT CLEAR.
5482                                    ;+
5483                                    ; REPORT THE ERROR IF ANY BMP CODES WERE FOUND.
5484                                    ;-
5485  022320  013702  002462             MOV     BMPCQP,R2       ;GET THE CONTENTS OF THE POINTER TO THE BMP Q.
5486  022324  012703  002464             MOV     #BMPCQB,R3      ;GET THE START ADDRESS OF THE QUEUE.
5487  022330  020203                     CMP     R2,R3           ;SEE IF THE POINTER HAS MOVED FROM THE BASE.
5488  022332  001414                    BEQ     60$             ;EXIT NO CODES IN THE QUEUE.
5489                                    ;+
5490                                    ; THERE IS AT LEAST ONE BMP CODE IN THE QUEUE. REPORT THE ERROR.
5491                                    ;-
5492                                            ;REPORT ERROR BMP CODE FOUND IN TEST NN, BMP CODE:NNNNNN''
```

```
 5493  022334  012701  007561                    MOV     #EM0902,R1      ;PASS THE MESSAGE TO BE REPORTED.
 5494  022340                                    ERRDF   0901,EM0901,ER9301 ;          >>>>> ERROR #0901 <<<<<.
                                                                                      TRAP    C$ERDF
 5495  022340  104455                                                                .WORD   901
 5496  022342  001605                                                                .WORD   EM0901
 5497  022344  007530                                                                .WORD   ER9301
 5498  022346  013372
 5499  022350  000405                            BR      60$
 5500
 5501  022352  012737  001606  002666  50$:      MOV     #902.,ERRNBR    ;SET >>>>> ERROR #0902 <<<<<.
 5502  022360  004737  016226                    JSR     PC,TSABRT       ;REPORT NON-TEST RELATED ERROR.
 5503
 5504  022364                            60$:    SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
                                                                                      MOV     #PRI07,R0
 5505  022364  012700  000340                                                        TRAP    C$SPRI
 5506  022370  104441
 5507  022372  005037  002310                    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 5508  022376                                    ENDTST
                                                                                    L10033:
 5509  022376                                                                       TRAP    C$ETST
 5510  022376  104401
```

```
                                        .SBTTL  HARDWARE TEST           - SKSELF -
                                        ;++ ************************************************************************
                                        ;*              - SKIP SELF-TEST TEST -
                                        ;*      THIS TEST VERIFIES THAT THE DUT SKIPS THE SELF-TEST WITHIN THE
                                        ;*      TIME ALLOWED, AND THAT THE FIFO CONTAINS THE CORRECT CODES AFTER ITS
                                        ;*      COMPLETION.
                                        ;*
                                        ;-- ************************************************************************
022400                                          BGNTST
022400                                                                          T10::
022400                                          SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
022400  012700  000240                                                          MOV     #PRI05,R0
022404  104441                                                                  TRAP    C$SPRI
        000012                           TNUM == TNUM + 1               ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
022406  012737  000012  002274           MOV     #TNUM,TSTNUM           ;SET UP THE TEST NUMBER.        (10)
022414  012737  177777  002310           MOV     #-1,CTRLCF             ;INDICATE THAT WE ARE WITHIN A TEST.
022422  012737  000001  002664           MOV     #1,ERRTYP              ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
022430  012737  007615  002670           MOV     #EM1001,ERRMSG         ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE
022436  012737  012576  002672           MOV     #ER0503,ERRBLK         ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                        ;+
                                        ; WAIT UP TO 3 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
                                        ;  IF TIME-OUT OCCURS, THEN EXIT THIS TEST.
                                        ;-
022444  012701  005670                   MOV     #3000.,R1              ;TIME-OUT VALUE IS 3.0 SECONDS.
022450  012702  000040                   MOV     #BIT05,R2              ;WAITING FOR MASTER RESET BIT.
022454  005003                           CLR     R3                     ;WAITING FOR BIT TO CLEAR.
022456  013704  002214                   MOV     CSRA,R4                ;BIT IS IN THE DUT'S CSR.
022462  004737  014166                   JSR     PC,MSLGET              ;WAIT FOR DUT CSR MR BIT TO CLEAR.
022466  103037                           BCC     50$                    ;ABORT THE TEST IF MR DID NOT CLEAR.
                                        ;+
                                        ; DETERMINE IF THE DUT TAKES TOO SHORT OR TOO LONG A TIME TO SKIP THE SELF-TEST
                                        ;  SET-UP A TIME-OUT OF 50 MILLI-SECOND, IF MR IS CLEAR IN LESS THAN 10 MILLI
                                        ;   -SECOND, OR GREATER THAN 50 MILLI-SECONDS, REPORT THE ERROR.
                                        ;-
022470  012701  000062                   MOV     #50.,R1                ;TIME-OUT VALUE IS 50 MILLI-SECONDS.
022474  010214                           MOV     R2,(R4)                ;SET THE DUT MASTER RESET BIT.
022476  004737  016100                   JSR     PC,SKPSTS              ;WRITE THE SKIP SELFTEST CODES TO THE DUT.
022502  004737  014166                   JSR     PC,MSLGET              ;WAIT FOR DUT CSR MR BIT TO CLEAR.
022506  103011                           BCC     2$                     ;GO REPORT ERR IF SKIPPING STEST TOOK TOO LONG.
022510  020127  000050                   CMP     R1,#40.
022514  003015                           BGT     4$                     ;GO REP ERR IF SELFTEST COMPLETED IN < 10 MS.
                                        ;+
                                        ; SELF-TEST COMPLETED WITHIN 10 MILLI-SEC TO 50 MILLI-SECONDS.
                                        ;  VERIFY THAT THE SELF-TEST CODES IN THE FIFO ARE "GOOD" CODES ,IE THE DUT
                                        ;  SUCCESSFULLY COMPLETED THE SELF-TEST.
                                        ; THIS SUBROUTINE REPORTS ERRORS WITH NUMBERS >>>>> 1003 THRU 1007 <<<<<.
                                        ;-
022516  012737  001753  002666           MOV     #1003.,ERRNBR          ;SET ERROR NUMBER TO 1003.
022524  004737  015450                   JSR     PC,RSTRPT              ;CHECK SELF-TEST CODES IN THE FIFO.
022530  000423                           BR      60$                    ;EXIT TEST.
                                        ;+
                                        ; ERROR REPORTS:
                                        ;-
                                            ;REPORT SKIP SELF-TEST TOOK TOO LONG.
```

```
 5567  022532  012737  001751  002666  2$:     MOV     #1001.,ERRNBR   ;SET THE ERROR NUMBER IN THE ERROR TABLE.
 5568  022540  012701  007661                  MOV     #EM1002,R1      ;SELECT ERROR MESSAGE.
 5569  022544                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #1001 <<<<<
 5570  022544  104460                                                                          TRAP    C$ERROR
 5571  022546  000414                          BR      60$             ;EXIT THE TEST.
 5572
 5573                                  ;REPORT SKIP SELF-TEST COMPLETED TOO SOON.
 5574  022550  012737  001752  002666  4$:     MOV     #1002.,ERRNBR   ;SET THE ERROR NUMBER IN THE ERROR TABLE.
 5575  022556  012701  007746                  MOV     #EM1003,R1      ;SELECT ERROR MESSAGE.
 5576  022562                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #1002 <<<<<
 5577  022562  104460                                                                          TRAP    C$ERROR
 5578  022564  000405                          BR      60$             ;EXIT THE TEST.
 5579
 5580  022566  012737  001753  002666  50$:    MOV     #1003.,ERRNBR   ;SET ERROR NUMBER.
 5581  022574  004737  016226                  JSR     PC,TSABRT       ;REPORT NON-TEST RELATED ERROR.
 5582
 5583  022600                          60$:    SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
 5584  022600  012700  000340                                                                  MOV     #PRI07,R0
 5585  022604  104441                                                                          TRAP    C$SPRI
 5586  022606  005037  002310                  CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 5587  022612                                  ENDTST
 5588  022612                                                                          L10034:
 5589  022612  104401                                                                          TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - DFSKST -
                               ;++ ******************************************************************************
                               ;*              - DIAGNOSTIC FAIL BIT, SKIP SELF-TEST TEST -
                               ;*      THIS TEST VERIFIES THAT THE DIAGNOSTIC FAIL BIT OF THE DUT, CORRECTLY
                               ;*      CHANGES STATE AS THE ON-BOARED SELFTEST IS SKIPPED.
                               ;*
                               ;-- ******************************************************************************
022614                                 BGNTST
                                                                                T11::
022614                                 SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
022614  012700  000240                                                          MOV     #PRI05,R0
022620  104441                                                                  TRAP    C$SPRI
                                        TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
000013
022622  012737  000013  002274         MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (11)
022630  012737  177777  002310         MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
022636  012737  000001  002664         MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
022644  012737  010024  002670         MOV     #EM1101,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
022652  012737  012576  002672         MOV     #ER0503,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                               ;+
                               ; WAIT UP TO 3 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
                               ;  IF TIME-OUT OCCURS, THEN EXIT THIS TEST.
                               ;-
022660  012701  005670                 MOV     #3000.,R1       ;TIME-OUT VALUE IS 3.0 SECONDS.
022664  012702  000040                 MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
022670  005003                         CLR     R3              ;WAITING FOR BIT TO CLEAR.
022672  013704  002214                 MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
022676  004737  014166                 JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
022702  103044                         BCC     50$             ;ABORT THE TEST IF MR DID NOT CLEAR.
                               ;+
                               ; RESET THE DUT, SKIP THE SELF-TEST.
                               ;-
022704  010214                         MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
022706  004737  016100                 JSR     PC,SKPSTS       ;WRITE THE SKIP SELFTEST CODES TO THE DUT.
                               ;+
                               ; SET TIME OUT OF 5 MILLI SECONDS, WAIT FOR DIAG_FAIL BIT TO SET.
                               ;  IF TIME-OUT OCCURS GO REPORT THE ERROR.
                               ;-
022712  012701  000005                 MOV     #5,R1           ;TIME-OUT VALUE IS 5 MILLI-SECONDS.
022716  012702  020000                 MOV     #BIT13,R2       ;WAITING FOR DIAGNOSTIC FAIL BIT.
022722  010203                         MOV     R2,R3           ;WAITING FOR BIT TO SET.
022724  013704  002214                 MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
022730  004737  014166                 JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_DF BIT TO CLEAR.
022734  103020                         BCC     4$              ;IF DIAG_FAIL DID NOT SET, GO REPORT ERROR.
                               ;+
                               ; SET TIME-OUT OF 15 MILLI-SECS, WAIT FOR DIAG_FAIL TO CLEAR.
                               ;  IF TIME-OUT OCCURS GO REPORT THE ERROR.
                               ;  VERIFY THE DIAG_FAIL BIT IS IN A STABLE STATE BEFORE CONTINUING.  LOOP
                               ;  BACK IF THE STATE WAS TRANSITORY, USING THE REMAINDER OF THE 15 MS TIME-OUT.
                               ;-
022736  012701  000017                 MOV     #15.,R1         ;TIME-OUT VALUE IS 15 MILLI-SECONDS.
022742  005003                 2$:     CLR     R3              ;WAITING FOR BIT TO CLEAR.
022744  004737  014166                 JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_DF BIT TO CLEAR.
022750  103012                         BCC     4$              ;IF DIAG_FAIL DID NOT CLEAR, GO REPORT ERROR.
```

```
5646  022752  010105                          MOV     R1,R5           ;SAVE THE REMAINING TIME-OUT VALUE.
5647  022754  012701  000001                  MOV     #1,R1           ;SET TIME-OUT OF 1 MILLI-SECOND.
5648  022760  052703  020000                  BIS     #BIT13,R3       ;WAIT FOR BIT TO SET.
5649  022764  004737  014166                 JSR     PC,MSLGET       ;DOUBLE CHECK TO ELIMINATE NOISE PROBLEMS.
5650  022770  103016                         BCC     60$             ;EXIT IF DIAG FAIL BIT STILL CLEAR.
5651  022772  010501                          MOV     R5,R1           ;PASS THE REMAINING TIME-OUT VALUE.
5652  022774  000762                         BR      2$              ;LOOP TO CHECK AGAIN.
5653                                  ;+
5654                                  ; ERROR REPORTS:
5655                                  ;-
5656                                      ;REPORT DIAGNOSTIC FAI' BIT BAD.
5657  022776  012737  002115  002666  4$:      MOV     #1101.,ERRNBR   ;SET THE ERROR NUMBER IN THE ERROR TABLE.
5658  023004  012701  010265                  MOV     #EM1205,R1      ;SELECT ERROR MESSAGE.
5659  023010                                 ERROR                   ;REPORT ERROR.          >>>>> ERROR #1101 <<<<<
5660  023010  104460                                                                                 TRAP    C$ERROR
5661  023012  000405                         BR      60$             ;EXIT THE TEST.
5662
5663  023014  012737  002116  002666  50$:     MOV     #1102.,ERRNBR   ;SET THE ERROR NUMBER FOR TSABRT RTN.
5664  023022  004737  016226                 JSR     PC,TSABRT       ;REPORT NON-TEST RELATED ERROR.
5665
5666  023026                          60$:    SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
5667  023026  012700  000340                                                                         MOV     #PRI07,R0
5668  023032  104441                                                                                 TRAP    C$SPRI
5669  023034  005037  002310                  CLR     CTRLCF          ;INDICATE THAT WE COMPLETED A TEST.
5670  023040                                 ENDTST
5671  023040                                                                                 L10035:
5672  023040  104401                                                                                 TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - SELFTS -
                                ;++ ************************************************************************
                                ;*              - SELF-TEST TEST -
                                ;*      THIS TEST VERIFIES THAT THE DUT'S SELF-TEST EXECUTES WITHIN THE
                                ;*      TIME ALLOWED, AND THAT THE FIFO CONTAINS THE CORRECT CODES AFTER ITS
                                ;*      COMPLETION.
                                ;*
                                ;-- ************************************************************************
023042                          BGNTST
023042                                                                  T12::
023042                          SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
023042  012700  000240                                                  MOV     #PRI05,R0
023046  104441                                                          TRAP    C$SPRI
                                 TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
000014
023050  012737  000014  002274   MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (12)
023056  012737  177777  002310   MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
023064  012737  000001  002664   MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
023072  012737  010050  002670   MOV     #EM1201,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
023100  012737  012576  002672   MOV     #ER0503,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                ;+
                                ; WAIT UP TO 3 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
                                ;  IF TIME-OUT OCCURS, THEN EXIT THIS TEST.
                                ;-
023106  012701  005670           MOV     #3000.,R1       ;TIME-OUT VALUE IS 3.0 SECONDS.
023112  012702  000040           MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
023116  005003                   CLR     R3              ;WAITING FOR BIT TO CLEAR.
023120  013704  002214           MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
023124  004737  014166           JSR     PC,MSLGET       ;WAIT FOR DUT CSR MR BIT TO CLEAR.
023130  103062                   BCC     50$             ;ABORT THE TEST IF MR DID NOT CLEAR.
                                ;+
                                ; DETERMINE IF THE SELF-TEST TAKES TOO SHORT OR TOO LONG A TIME TO COMPLETE.
                                ;  SET-UP A TIME-OUT OF 3 SECOND, IF MR IS CLEAR IN LESS THAN 1/2 SECOND, OR
                                ;  GREATER THAN 3 SECONDS, REPORT THE ERROR.
                                ;-
023132  012701  005670           MOV     #3000.,R1       ;TIME-OUT VALUE IS 3.0 SECONDS.
023136  010214                   MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
023140  004737  014166           JSR     PC,MSLGET       ;WAIT FOR DUT CSR MR BIT TO CLEAR.
023144  103030                   BCC     4$              ;GO REPORT ERROR SELFTEST TOOK TOO LONG.
023146  012702  005670           MOV     #3000.,R2
023152  160102                   SUB     R1,R2           ;CALCULATE # OF MS SELFTEST TO COMPLETE.
023154  020227  000062           CMP     R2,#50.
023160  002431                   BLT     6$              ;SELFTEST SKIPPED?  YES, GO REPORT ERROR.
023162  020227  000764           CMP     R2,#500.
023166  002434                   BLT     8$              ;GO REP ERR IF SELFTEST COMPLETED IN < 1/2 SEC.
                                ;+
                                ; SELF-TEST COMPLETED WITHIN 1SEC TO 3 SECONDS.
                                ;  CHECK THE STATE OF THE DIAGNOSTIC FAIL BIT, REPORT ERROR IF IT IS SET.
                                ;-
023170  032714  020000           BIT     #BIT13,(R4)     ;DETERMINE IF THE DIAG FAIL BIT IS CLEAR.
023174  001406                   BEQ     2$              ;SKIP ERROR REPORT IF BIT IS CLEAR.
                                ;REPORT DIAGNOSTIC FAIL BIT BAD.
023176  012737  002264  002666   MOV     #1204.,ERRNBR   ;SET ERROR NUMBER TO IN ERROR TABLE.
023204  012701  010265           MOV     #EM1205,R1      ;SELECT THE ERROR MESSAGE.
023210                           ERROR                   ;               >>>>> ERROR #1204 <<<<<
023210  104460                                                          TRAP    C$ERROR
                                ;+
```

```
                                        ; VERIFY THAT THE SELF-TEST CODES IN THE FIFO ARE "GOOD" CODES ,IE THE DUT
                                        ; SUCCESSFULLY COMPLETED THE SELF-TEST.
                                        ; THIS SUBROUTINE REPORTS ERRORS WITH NUMBERS >>>>> 1205 THRU 1209 <<<<<.
                                        ;-
023212  012737  002265  002666  2$:     MOV     #1205.,ERRNBR   ;SET ERROR NUMBER TO 1205.
023220  004737  015450                  JSR     PC,RSTRPT       ;CHECK SELF-TEST CODES IN THE FIFO.
023224  000431                          BR      60$             ;EXIT TEST.
                                        ;+
                                        ; ERROR REPORTS:
                                        ;-
                                            ;REPORT SELF-TEST TOOK TOO LONG TO COMPLETE.
023226  012737  002261  002666  4$:     MOV     #1201.,ERRNBR   ;SET THE ERROR NUMBER IN THE ERROR TABLE.
023234  012701  010067                  MOV     #EM1202,R1      ;SELECT ERROR MESSAGE.
023240                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #1201 <<<<<
023240  104460                                                                                  TRAP    C$ERROR
023242  000422                          BR      60$             ;EXIT THE TEST.

                                            ;REPORT SELF-TEST DID NOT EXECUTE AFTER DUT RESET.
023244  012737  002262  002666  6$:     MOV     #1202.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
023252  012701  010231                  MOV     #EM1204,R1      ;SELECT ERROR MESSAGE.
023256                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #1202 <<<<<
023256  104460                                                                                  TRAP    C$ERROR

                                            ;REPORT SELF-TEST COMPETED TOO SOON.
023260  012737  002263  002666  8$:     MOV     #1203.,ERRNBR   ;SET THE ERROR NUMBER IN THE ERROR TABLE.
023266  012701  010153                  MOV     #EM1203,R1      ;SELECT ERROR MESSAGE.
023272                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #1203 <<<<<
023272  104460                                                                                  TRAP    C$ERROR
023274  000405                          BR      60$             ;EXIT THE TEST.

023276  012737  002272  002666  50$:    MOV     #1210.,ERRNBR   ;SET THE ERROR NUMBER FOR TSABRT RTN.
023304  004737  016226                  JSR     PC,TSABRT       ;REPORT NON-TEST RELATED ERROR.

023310                          60$:    SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
023310  012700  000340                                                          MOV     #PRI07,R0
023314  104441                                                                  TRAP    C$SPRI
023316  005037  002310                  CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
023322                                  ENDTST
023322                                                                  L10036:
023322  104401                                                                  TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - STFAIL -
                                ;++ ************************************************************************
                                ;*              - SELF-TEST FAIL TEST -
                                ;*      THIS TEST VERIFIES THAT THE DUT WILL REPORT SELFTEST ERRORS VIA THE
                                ;*      FIFO.  AND THAT THE DIAGNOSTIC FAIL BIT WILL INDICATE THE ERROR.
                                ;*      THIS IS ACCOMPLISHED VIA A SOFTWARE 'HOOK' IN THE SELF-TEST, WHICH
                                ;*      FORCES A "PROC1 TO RAM ERROR" TO BE PLACED IN THE FIFO.
                                ;*
                                ;-- ************************************************************************
023324                                  BGNTST
023324                                                                  T13::
023324                                  SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
023324  012700  000240                                                  MOV     #PRI05,R0
023330  104441                                                          TRAP    C$SPRI
        000015                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
023332  012737  000015  002274          MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (13)
023340  012737  177777  002310          MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
023346  012737  000001  002664          MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
023354  012737  010311  002670          MOV     #EM1301,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
023362  012737  012576  002672          MOV     #ER0503,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
023370  012737  002425  002666          MOV     #1301.,ERRNBR   ;SET ERROR NUMBER TO 1301.
                                ;+
                                ; WAIT UP TO 3 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
                                ;  IF TIME-OUT OCCURS, THEN EXIT THIS TEST.
                                ;-
023376  012701  005670                  MOV     #3000.,R1       ;TIME-OUT VALUE IS 3.0 SECONDS.
023402  012702  000040                  MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
023406  005003                          CLR     R3              ;WAITING FOR BIT TO CLEAR.
023410  013704  002214                  MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
023414  004737  014166                  JSR     PC,MSLGET       ;WAIT FOR DUT CSR MR BIT TO CLEAR.
023420  103071                          BCC     50$             ;GO REPORT ERROR IF MR DID NOT CLEAR.
                                ;+
                                ; RESET THE DUT, DELAY FOR 25 MILLI-SECONDS BEFORE WRITING THE FAIL_SELF_TEST
                                ; CODE TO TBUFFCT REGISTER ON CHANNEL 0.
                                ;-
023422  010214                          MOV     R2,(R4)         ;SET DUT MASTER RESET BIT, SELECT CHANNEL 0.
023424  012704  000031                  MOV     #25.,R4         ;PASS DELAY PERIOD OF 25 MILLI SECS.
023430  004737  014126                  JSR     PC,DELAY        ;WAIT FOR SELFTEST TO INITIALISE.
023434  012777  146314  156570          MOV     #146314,@TXBFCA ;WRITE THE FAIL SELF-TEST CODE TO TBUFFCT REG.
                                ;+
                                ; WAIT UP TO 2 SECONDS FOR THE SELF-TEST TO COMPLETE.
                                ;  IF TIME-OUT OCCURS, THEN EXIT THIS TEST.
                                ;-
023442  005237  002666                  INC     ERRNBR          ;SET ERROR NUMBER TO 1302.
023446  012701  003720                  MOV     #2000.,R1       ;TIME-OUT VALUE IS 2.0 SECONDS.
023452  013704  002214                  MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
023456  004737  014166                  JSR     PC,MSLGET       ;WAIT FOR DUT CSR MR BIT TO CLEAR.
023462  103050                          BCC     50$             ;GO REPORT ERROR IF MR DID NOT CLEAR.
                                ;+
                                ; VERIFY THE DIAGNOSTIC FAIL BIT IS SET, INDICATING THE ERROR.
                                ; REPORT ERROR IF DIAGNOSTIC FAIL BIT IS CLEAR.
                                ;-
023464  005237  002666                  INC     ERRNBR          ;SET ERROR NUMBER TO 1303.
023470  032714  020000                  BIT     #BIT13,(R4)     ;CHECK THE STATE OF THE DIAG_FAIL BIT.
023474  001437                          BEQ     8$              ;GO REPORT ERROR IF DIAG_FAIL BIT CLEAR.
```

```
5825                                    ;+
5826                                    ; REMOVE THE 8 SELF-TEST CODES FORM THE FIFO, AND VERIFY THAT AT LEAST
5827                                    ; ONE IS A PROC1 TO RAM ERROR CODE (231).
5828                                    ;-
5829  023476  005237  002666                       INC     ERRNBR          ;SET ERROR NUMBER TO 1304.
5830  023502  012700  000010                       MOV     #8.,R0          ;SET MAXIMUM READ COUNT.
5831  023506  005001                               CLR     R1              ;CLEAR THE CORRECT CODE COUNTER.
5832  023510  005003                               CLR     R3              ;CLEAR THE ROM VERSION 0 FLAG.
5833  023512  013704  002216                       MOV     RBUFA,R4        ;GET ADDRESS OF THE RECEIVER BUFFER REGISTER.
5834  023516  011402                     2$:       MOV     (R4),R2         ;READ A CODE FROM THE FIFO.
5835  023520  100031                             BPL     50$             ;GO REPORT ERROR IF THE FIFO IS EMPTY.
5836  023522  042702  007400                       BIC     #7400,R2        ;REMOVE THE LINE NUMBER FROM THE CODE.
5837  023526  120227  170231                       CMPB    R2,#170231      ;IS IT THE CORRECT ERROR CODE?.
5838  023532  001001                             BNE     4$              ;SKIP NEXT INSTRUCTION, IF NOT A 231 CODE.
5839  023534  005201                               INC     R1              ;INCREMENT COUNTER.
5840  023536  042702  000002                4$:    BIC     #BIT1,R2        ;REMOVE PROCESSOR INDICATOR BIT.
5841  023542  020227  170001                       CMP     R2,#170001      ;COMPARE WITH ROM VERSION #0 CODE.
5842  023546  001002                             BNE     6$              ;ROM VERSION #0?  NO, SKIP SETTING FLAG.
5843  023550  012703  177777                       MOV     #-1,R3          ;YES, SET THE ROM VERSION #0 FLAGS.
5844  023554  005300                     6$:       DEC     R0              ;DECREMENT MAX READ COUNTER.
5845  023556  001357                             BNE     2$              ;LOOP IF 8 CODES HAVE NOT BEEN READ.
5846  023560  005701                               TST     R1              ;WERE ANY 231 CODES FOUND?.
5847  023562  001012                             BNE     60$             ;YES, THEN EXIT.
5848  023564  005703                               TST     R3              ;CHECK THE ROM VERSION #1 INDICATOR.
5849  023566  001010                             BNE     60$             ;ROM VERSION 0 IN EITHER PROCESSOR?  YES, EXIT.
5850  023570  005237  002666                       INC     ERRNBR          ;NO, SET ERROR NUMBER TO 1305 AND REPORT ERROR.
5851                                  ;REPORT SELF-TEST ERROR REPORTING BAD.
5852  023574  012701  010335                8$:    MOV     #EM1302,R1      ;SELECT ERROR MESSAGE.
5853  023600                                       ERROR                   ;REPORT ERROR.          >>>>> ERROR <<<<<
5854  023600  104460                                                                                       TRAP    C$ERROR
5855  023602  000402                             BR      60$             ;EXIT THE TEST.
5856
5857  023604  004737  016226          50$:     JSR     PC,TSABRT       ;REPORT NON-RELATED TEST ERROR.
5858
5859  023610                           60$:     SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
5860  023610  012700  000340                                                                    MOV     #PRI07,R0
5861  023614  104441                                                                            TRAP    C$SPRI
5862  023616  005037  002310                     CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
5863  023622                                   ENDTST
5864  023622                                                                          L10037:
5865  023622  104401                                                                            TRAP    C$ETST
```

```
5866
5867
5868                                    .SBTTL  HARDWARE TEST           - ROMVER -
5869                                    ;++ ************************************************************************
5870                                    ;*              - ROM VERSION TEST -
5871                                    ;*      THIS TEST VERIFIES THAT THE DUT'S SELF-TEST PLACES VALID ROM VERSION
5872                                    ;*      NUMBERS IN THE FIFO AFTER IT HAS BEEN SKIPPED.  THE ROM VERSION NUMBERS
5873                                    ;*      WILL BE REPORTED (ON THE FIRST PASS ONLY), IF AN AFFIRMATIVE ANSWER
5874                                    ;*      WAS GIVEN TO THE SOFTWARE P-TABLE QUESTION.
5875                                    ;*
5876                                    ;-- ************************************************************************
5877  023624                                    BGNTST
5878  023624                                                                                    T14::
5879  023624                                    SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
5880  023624  012700  000240                                                                    MOV     #PRI05,R0
5881  023630  104441                                                                           TRAP    C$SPRI
5882          000016                             TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
5883  023632  012737  000016  002274             MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (14)
5884  023640  012737  177777  002310             MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
5885  023646  012737  000001  002664             MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
5886  023654  012737  010374  002670             MOV     #EM1401,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
5887  023662  012737  012576  002672             MOV     #ER0503,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
5888                                    ;+
5889                                    ; WAIT UP TO 3 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
5890                                    ;  IF TIME-OUT OCCURS, THEN EXIT THIS TEST.
5891                                    ;-
5892  023670  012701  005670                   MOV     #3000.,R1       ;TIME-OUT VALUE IS 3.0 SECONDS.
5893  023674  012702  000040                   MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
5894  023700  005003                           CLR     R3              ;WAITING FOR BIT TO CLEAR.
5895  023702  013704  002214                   MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
5896  023706  004737  014166                   JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
5897  023712  103131                           BCC     50$             ;ABORT THE TEST IF MR DID NOT CLEAR.
5898                                    ;+
5899                                    ; SET THE MASTER RESET BIT, AND SKIP THE SELF TEST.
5900                                    ;-
5901  023714  010214                           MOV     R2,(R4)         ;SET THE MASTER RESET BIT.
5902  023716  004737  016100                   JSR     PC,SKPSTS       ;SKIP THE SELF TEST.
5903  023722  012701  005670                   MOV     #3000.,R1       ;TIME-OUT VALUE IS 3.0 SECONDS.
5904  023726  004737  014166                   JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
5905  023732  103121                           BCC     50$             ;ABORT THE TEST IF MR DID NOT CLEAR.
5906                                    ;+
5907                                    ; REMOVE CHARACTERS FROM THE FIFO UNTIL EITHER;
5908                                    ; (A) THE FIFO IS PURGED, GO REPORT THE ERROR.
5909                                    ; (B) THE MAXIMUM TRY COUNTER IS ZERO, GO REPORT THE ERROR.
5910                                    ; (C) PROC_1'S ROM VERSION NUMBER WAS FOUND BEFORE PROC_2'S, GO REPORT ERROR.
5911                                    ; (D) BOTH ROM VERSION NUMBERS HAVE BEEN FOUND.
5912                                    ;-
5913  023734  012705  000040                   MOV     #4*NUMLNS,R5    ;SET MAXIMUM TRY COUNTER.
5914  023740  012703  000143                   MOV     #99.,R3         ;SET AN INVALID ROM VERSION NUMBER FOR PROC_1.
5915  023744  010304                           MOV     R3,R4           ;SET AN INVALID ROM VERSION NUMBER FOR PROC_2.
5916  023746  012737  002571  002666           MOV     #1401.,ERRNBR   ;SET THE ERROR NUMBER TO 1401.
5917  023754  012701  010424                   MOV     #EM1402,R1      ;SELECT MESSAGE TO BE REPORTED IF FIFO EMPTY.
5918
5919  023760  017702  156232           2$:     MOV     @RBUFA,R2       ;READ THE NEXT CHAR FROM THE FIFO.
5920  023764  100077                           BPL     12$             ;GO REPORT ERROR IF FIFO EMPTY.
5921                                    ;+
```

```
                        ;  CHECK IF THE READ DATA IS A BMP CODE.
                        ;-
023766  012700  000301          MOV     #301,R0         ;SET-UP A BIT MASK OF A BMP CODE.
023772  040200                  BIC     R2,R0           ;TRY TO CLEAR THE BIT MASK WITH THE READ DATA.
023774  001003                  BNE     4$              ;BRANCH IF NOT A BMP CODE.
023776  004737  016032          JSR     PC,SAVBMP       ;SAVE THE BMP CODE ON THE QUEUE.
024002  000435                  BR      8$              ;
                        ;+
                        ;  CHECK IF THE READ DATA IS A SELF-TEST CODE.
                        ;-
024004  012700  000201  4$:     MOV     #201,R0         ;SET-UP A BIT MASK OF A SELFTEST CODE.
024010  040200                  BIC     R2,R0           ;TRY TO CLEAR THE BIT MASK WITH THE READ DATA.
024012  001431                  BEQ     8$              ;BRANCH IF IT IS A SELFTEST CODE.
                        ;+
                        ;  THE READ DATA IS A ROM VERSION NUMBER, DETERMINE WHICH ONE IT IS.
                        ;-
024014  032702  000002          BIT     #BIT1,R2        ;CHECK THE PROCESSOR NUMBER BIT IN THE CODE.
024020  001407                  BEQ     6$              ;BRANCH IF IT IS PROC_1 ROM VERSION NUMBER.
024022  010204                  MOV     R2,R4           ;SAVE PROC_2 ROM VERSION NUMBER.
024024  042704  177603          BIC     #177603,R4      ;CLEAR ANY UNWANTED BITS.
024030  000241                  CLC                     ;CLEAR THE CARRY BIT.
024032  006004                  ROR     R4              ;SHIFT THE CODES ALONG TO GET THE ROM
024034  006004                  ROR     R4              ;  VERSION NUMBER IN THE LOW 5 BITS.
024036  000417                  BR      8$              ;
024040  010203  6$:     MOV     R2,R3           ;SAVE PROC_1 ROM VERSION NUMBER.
024042  042703  177603          BIC     #177603,R3      ;CLEAR ANY UNWANTED BITS.
024046  000241                  CLC                     ;CLEAR THE CARRY BIT.
024050  006003                  ROR     R3              ;SHIFT THE CODE ALONG TO GET THE ROM
024052  006003                  ROR     R3              ;  VERSION NUMBER IN THE LOW 5 BITS.
024054  020427  000143          CMP     R4,#99.         ;CHECK IF WE HAVE RECEIVE PROC_2 ROM CODE.
024060  001016                  BNE     10$             ;GO REPORT BOTH ROM VERSION NUMBERS.
                        ;+
                        ;  RECEIVED ROM VERSION NUMBERS OUT OF SEQUENCE.
                        ;    IE, PROC_1'S ROM VERSION NUMBER FOUND IN THE FIFO BEFORE PROC_2'S.
                        ;-
024062  012701  010512          MOV     #EM1403,R1      ;SELECT THE ERROR MESSAGE TO BE REPORTED.
024066  012737  002572  002666  MOV     #1402.,ERRNBR   ;SET THE ERROR NUMBER.
024074  000433                  BR      12$             ;GO REPORT ERROR.
024076  005305  8$:     DEC     R5              ;DECREMENT THE MAX TRY COUNTER.
024100  001327                  BNE     2$              ;LOOP TO GET THE NEXT CHAR FROM THE FIFO.
024102  012701  010565          MOV     #EM1404,R1      ;SELECT THE ERROR MESSAGE TO BE REPORTED.
024106  012737  002573  002666  MOV     #1403.,ERRNBR   ;SET THE ERROR NUMBER.
024114  000423                  BR      12$             ;GIVE UP, GO REPORT ERROR.
                        ;+
                        ;  IF THIS IS THE FIRST PASS, AND SOFTWARE P-TABLE QUESTION WAS ANSWERED YES,
                        ;  THEN REPORT THE ROM VERSION NUMBERS TO THE OPERATOR.
                        ;-
024116  032737  000001  002204  10$:     BIT     #BIT0,OPTION    ;CHECK ON THE STATE OF THE SOFTWARE SWITCH.
024124  001431                  BEQ     60$             ;EXIT IF NO ROM VERSION PRINTOUT WAS REQUESTED.
024126  023727  002300  000001  CMP     PASCNT,#1       ;CHECK IF THIS IS THE FIRST PASS.
024134  003025                  BGT     60$             ;EXIT IF ROM VERS HAVE ALREADY BEEN REPORTED.
024136                          PRINTB  #EF1401,R3,R4   ;PRINT THE ROM VERSION NUMBERS.
024136  010446                                                          MOV     R4,-(SP)
024140  010346                                                          MOV     R3,-(SP)
```

```
5978  024142  012746  003035                                                          MOV     #EF1401,-(SP)
5979  024146  012746  000003                                                          MOV     #3,-(SP)
5980  024152  010600                                                                  MOV     SP,R0
5981  024154  104414                                                                  TRAP    C$PNTB
5982  024156  062706  000010                                                          ADD     #10,SP
5983  024162  000412                      BR      60$             ;EXIT THIS TEST.
5984                                ;-
5985                                ; ERROR REPORTS:
5986                                ;-
5987  024164  012737  012622  002672  12$:   MOV     #ER1401,ERRBLK  ;SELECT THE ERROR REPORTING ROUTINE.
5988  024172                        ERROR                           ;REPORT ERROR.          >>>>> ERROR <<<<<
5989  024172  104460                                                                  TRAP    C$ERROR
5990  024174  000405                      BR      60$
5991
5992  024176  012737  002575  002666  50$:   MOV     #1405.,ERRNBR   ;SET UP ERROR NUMBER FOR TSABRT RTN.
5993  024204  004737  016226                  JSR     PC,TSABRT       ;REPORT NON-TEST RELATED ERROR.
5994
5995  024210                        60$:    SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
5996  024210  012700  000340                                                          MOV     #PRI07,R0
5997  024214  104441                                                                  TRAP    C$SPRI
5998  024216  005037  002310                  CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
5999  024222                        ENDTST
6000  024222                                                                  L10040:
6001  024222  104401                                                                  TRAP    C$ETST
```

```
                                        .SBTTL  HARDWARE TEST           - REGWRW -
                                        ;++ ************************************************************************
                                        ;*              - DEVICE REGISTER WORD ACCESS READ AND WRITE TEST -
                                        ;*
                                        ;* THIS TEST VERIFIES THAT THE DEVICE REGISTERS CAN BE READ AND WRITTEN
                                        ;* CORRECTLY USING WORD ACCESSES.
                                        ;*
                                        ;-- ************************************************************************

                                              BGNTST
                                                                                          T15::
                                               SETPRI #PRI05            ;ALLOW THE LTC TO INTERRUPT.
024224                                                                                    MOV     #PRI05,R0
024224                                                                                    TRAP    C$SPRI
024224  012700  000240
024230  104441
        000017                                 TNUM == TNUM + 1         ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
024232  012737  000017  002274               MOV     #TNUM,TSTNUM     ;SET UP THE TEST NUMBER.        (16)
024240  012737  177777  002310               MOV     #-1,CTRLCF       ;INDICATE THAT WE ARE WITHIN A TEST.
024246  012737  000001  002664               MOV     #1,ERRTYP        ;SET UP DEVICE FATAL INDICATOR IN ERROR TYPE.
024254  012737  003101  002666               MOV     #1601.,ERRNBR    ;SET UP ERROR NUMBER IN THE ERROR TABLE.
024262  012737  010770  002670               MOV     #EM1604,ERRMSG   ;SET UP ERROR MESSAGE FOR TEST IN ERROR TABLE.
024270  005037  002420                       CLR     ERSMRF           ;CLEAR THE ERROR SUMMARY FLAGS.
024274  012700  002422                       MOV     #ERCNTB,R0
024300  004737  014026                      JSR     PC,CLR16W        ;CLEAR THE ERROR COUNTER TABLE.
                                        ;+
                                        ; RESET THE DUT TO A KNOWN STATE, DO NOT REMOVE THE STATUS CODES FROM THE FIFO.
                                        ;  CLEAR TX AND RX INTERRUPT ENABLE BITS IN THE CSR.
                                        ; THIS SUBROUTINE REPORTS ERRORS >>>>> 1601 <<<<<.
                                        ;-
024304  004737  015304                       JSR     PC,RESETT        ;RESET THE DHV-11, REPORT ANY ERRORS FOUND.
024310  103402                              BCS     .+6              ;FATAL RESET ERROR?  NO, CONTINUE WITH TEST.
024312  000137  024434                      JMP     60$              ;YES,  EXIT THE TEST.
                                        ;+
                                        ; VERIFY READ/WRITE CAPABILIT/ TO INDIRECT ADDRESS FIELD OF CSR
                                        ;-
024316  005237  002666                       INC     ERRNBR           ;SET THE ERROR REPORT NUMBER TO 1602.
024322  012702  000017                       MOV     #17,R2           ;SET LOOP COUNT.
024326  013704  002214                       MOV     CSRA,R4          ;GET CSR ADDRESS.
024332  010214                      2$:      MOV     R2,(R4)          ;WRITE COUNT TO CSR.
024334  011401                               MOV     (R4),R1          ;READ BACK THE CONTENTS OF THE CSR
024336  042701  177760                       BIC     #177760,R1       ;MASK OUT ALL BUT THE IND.ADR.REG FIELD.
024342  020102                               CMP     R1,R2            ;CHECK FOR CORRECT DATA WRITTEN/READ.
024344  001406                              BEQ     4$               ;IS EXPECTED DATA BAD?  NO, SKIP ERROR REPORT.
                                           ;REPORT 'BAD BIT(S) IN DEVICE CSR REGISTER FOR LINE  0 (D).'
024346  012737  012752  002672               MOV     #ER1601,ERRBLK   ;SELECT THE PROPER ERROR REPORT ROUTINE.
024354  005003                               CLR     R3               ;SET OFFSET TO 0 TO CAUSE REPORT OF CSR REG.
024356  005005                               CLR     R5               ;CAUSE REPORT OF LINE 0.
024360                                      ERROR                    ;  >>>>> ERROR # 1602 <<<<<
024360  104460                                                                          TRAP    C$ERROR
024362  005302                      4$:      DEC     R2               ;DECREMENT LOOP COUNT/IND.ADD.REG ADDRESS.
024364  002362                              BGE     2$               ;LOOP BACK TO TEST NEXT ADDRESS IF NOT DONE.
                                        ;+
                                        ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL REGISTERS ON ALL
                                        ;   ACTIVE LINES.  BEFORE WRITING EACH PATTERN, CLEAR ALL THE BITS.
                                        ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1603 - 1605 <<<<<.
                                        ;-
024366  005237  002666                       INC     ERRNBR           ;SET THE ERROR NUMBER TO 1603.
```

```
6058  024372  005003                          CLR     R3              ;INDICATE THAT WORD ACCESSES ARE TO BE USED.
6059  024374  012704  000002                  MOV     #2,R4           ;INDICATE R/W ACCESS, CLEAR FIRST.
6060  024400  004737  015046                JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
6061                                  ;+
6062                                  ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL REGISTERS ON ALL
6063                                  ;   ACTIVE LINES.  BEFORE WRITING EACH PATTERN, SET ALL THE BITS.
6064                                  ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1606 - 1608 <<<<<.
6065                                  ;-
6066  024404  012737  003106  002666          MOV     #1606.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
6067  024412  005003                          CLR     R3              ;INDICATE THAT WORD ACCESSES ARE TO BE USED.
6068  024414  005404                          NEG     R4              ;INDICATE R/W ACCESS, SET FIRST.
6069  024416  004737  015046                JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
6070                                  ;+
6071                                  ; PRINT ERROR SUMMARY REPORTS IF NECESSARY.
6072                                  ;   THE FOLLOWING ROUTINE REPORTS ERRORS WITH NUMBER >>>>> ERROR # 1609 <<<<<
6073                                  ;-
6074  024422  012737  003111  002666          MOV     #1609.,ERRNBR   ;SET UP ERROR NUMBER FOR NEXT RTN.
6075  024430  004737  015256                JSR     PC,REPSMR       ;REPORT ERROR SUMMARY IF NECESSARY.
6076  024434  005037  002310          60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
6077  024440                                  ENDTST
6078  024440                                                                  L10041:
6079  024440  104401                                                                  TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - REGWRM -
                                ;++ ************************************************************************
                                ;*      - DEVICE REGISTER WORD ACCESS READ/MODIFY/WRITE TEST -
                                ;*
                                ;* THIS TEST VERIFIES THAT THE DEVICE REGISTERS CAN BE WRITTEN CORRECTLY
                                ;* USING WORD READ/MODIFY/WRITE ACCESSES.
                                ;*
                                ;-- ************************************************************************

                                        BGNTST
                                                                                T16::
                                         SETPRI #PRI05          ;ALLOW THE LTC TO INTERRUPT.
                                                                                MOV     #PRI05,R0
                                                                                TRAP    C$SPRI
                                         TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
                                         MOV    #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (17)
                                         MOV    #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
                                         MOV    #1,ERRTYP       ;SET UP DEVICE FATAL INDICATOR IN ERROR TYPE.
                                         MOV    #1701.,ERRNBR   ;SET UP ERROR NUMBER IN THE ERROR TABLE.
                                         MOV    #EM1701,ERRMSG  ;SET UP ERROR MESSAGE FOR TEST IN ERROR TABLE.
                                         CLR    ERSMRF          ;CLEAR THE ERROR SUMMARY FLAGS.
                                         MOV    #ERCNTB,R0
                                        JSR     PC,CLR16W       ;CLEAR THE ERROR COUNTER TABLE.
                                ;+
                                ; RESET THE DUT TO A KNOWN STATE, DO NOT REMOVE THE STATUS CODES FROM THE FIFO.
                                ;  CLEAR TX AND RX INTERRUPT ENABLE BITS IN THE CSR.
                                ; THIS SUBROUTINE REPORTS ERRORS >>>>> 1701 <<<<<.
                                ;-
                                        JSR     PC,RESETT       ;RESET THE DHV-11, REPORT ANY ERRORS FOUND.
                                        BCS     .+6             ;FATAL RESET ERROR?  NO, CONTINUE WITH TEST.
                                        JMP     60$             ;YES,  EXIT THE TEST.
                                ;+
                                ; VERIFY READ/MODIFY/WRITE CAPABILITY TO INDIRECT ADDRESS FIELD OF CSR
                                ;-
                                         INC    ERRNBR          ;SET THE ERROR REPORT NUMBER TO 1702.
                                         MOV    #17,R2          ;SET LOOP COUNT.
                                         MOV    CSRA,R4         ;GET CSR ADDRESS.
                                2$:      BIC    #17,(R4)        ;CLEAR THE DUT CSR USING READ/MODIFY/WRITE.
                                         BIS    R2,(R4)         ;WRITE COUNT TO CSR USING READ/MODIFY/WRITE.
                                         MOV    (R4),R1         ;READ BACK THE CONTENTS OF THE CSR
                                         BIC    #177760,R1      ;MASK OUT ALL BUT THE IND.ADR.REG FIELD.
                                         CMP    R1,R2           ;CHECK FOR CORRECT DATA WRITTEN/READ.
                                        BEQ     4$              ;IS EXPECTED DATA BAD?  NO, SKIP ERROR REPORT.
                                    ;REPORT 'BAD BIT(S) IN DEVICE CSR REGISTER FOR LINE  0 (D)."
                                         MOV    #ER1601,ERRBLK  ;SELECT THE PROPER ERROR REPORT ROUTINE.
                                         CLR    R3              ;SET OFFSET TO 0 TO CAUSE REPORT OF CSR REG.
                                         CLR    R5              ;CAUSE REPORT OF LINE 0.
                                        ERROR                   ;  >>>>> ERROR # 1702 <<<<<
                                                                                TRAP    C$ERROR
                                4$:      DEC    R2              ;DECREMENT LOOP COUNT/IND.ADD.REG ADDRESS.
                                        BGE     2$              ;LOOP BACK TO TEST NEXT ADDRESS IF NOT DONE.
                                ;+
                                ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL REGISTERS ON ALL
                                ;   ACTIVE LINES USING R/M/W.  BEFORE WRITING EACH PATTERN, CLEAR ALL THE BITS.
                                ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1703 - 1705 <<<<<.
                                ;-
```

```
6136  024610  005237  002666          INC     ERRNBR          ;SET THE ERROR NUMBER TO 1703.
6137  024614  005003                  CLR     R3              ;INDICATE THAT WORD ACCESSES ARE TO BE USED.
6138  024616  012704  000001          MOV     #1,R4           ;INDICATE R/M/W ACCESS, CLEAR FIRST.
6139  024622  004737  015046          JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
6140                                  ;+
6141                                  ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL REGISTERS ON ALL
6142                                  ;   ACTIVE LINES USING R/M/W.  BEFORE WRITING EACH PATTERN, SET ALL THE BITS.
6143                                  ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1706 - 1708 <<<<<.
6144                                  ;-
6145  024626  012737  003252  002666          MOV     #1706.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
6146  024634  005003                  CLR     R3              ;INDICATE THAT WORD ACCESSES ARE TO BE USED.
6147  024636  005404                  NEG     R4              ;INDICATE R/M/W ACCESS, SET FIRST.
6148  024640  004737  015046          JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
6149                                  ;+
6150                                  ; PRINT ERROR SUMMARY REPORTS IF NECESSARY.
6151                                  ;   THE FOLLOWING ROUTINE REPORTS ERRORS WITH NUMBER >>>>> ERROR # 1709 <<<<<
6152                                  ;-
6153  024644  012737  003255  002666          MOV     #1709.,ERRNBR   ;SET UP ERROR NUMBER FOR NEXT RTN.
6154  024652  004737  015256          JSR     PC,REPSMR       ;REPORT ERROR SUMMARY IF NECESSARY.
6155  024656  005037  002310  60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
6156  024662                  ENDTST
6157  024662                                                          L10042:
6158  024662  104401                                                          TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - REGBRW -
                                ;++ ************************************************************************
                                ;*              - DEVICE REGISTER BYTE ACCESS READ AND WRITE TEST -
                                ;*
                                ;* THIS TEST VERIFIES THAT THE DEVICE REGISTERS CAN BE READ AND WRITTEN
                                ;* CORRECTLY USING BYTE ACCESSES.
                                ;*
                                ;-- ************************************************************************

                                        BGNTST
                                                                                        T17::
                                         SETPRI #PRI05          ;ALLOW THE LTC TO INTERRUPT.
024664                                                                                  MOV     #PRI05,R0
024664                                                                                  TRAP    C$SPRI
024664  012700  000240
024670  104441
                000021
                                         TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
024672  012737  000021  002274          MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (18)
024700  012737  177777  002310          MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
024706  012737  000001  002664          MOV     #1,ERRTYP       ;SET UP DEVICE FATAL INDICATOR IN ERROR TYPE.
024714  012737  003411  002666          MOV     #1801.,ERRNBR   ;SET UP ERROR NUMBER IN THE ERROR TABLE.
024722  012737  011113  002670          MOV     #EM1801,ERRMSG  ;SET UP ERROR MESSAGE FOR TEST IN ERROR TABLE.
024730  005037  002420                  CLR     ERSMRF          ;CLEAR THE ERROR SUMMARY FLAGS.
024734  012700  002422                  MOV     #ERCNTB,R0
024740  004737  014026                 JSR     PC,CLR16W       ;CLEAR THE ERROR COUNTER TABLE.
                                ;+
                                ; RESET THE DUT TO A KNOWN STATE, DO NOT REMOVE THE STATUS CODES FROM THE FIFO.
                                ;  CLEAR TX AND RX INTERRUPT ENABLE BITS IN THE CSR.
                                ; THIS SUBROUTINE REPORTS ERRORS >>>>> 1801 <<<<<.
                                ;-
024744  004737  015304                  JSR     PC,RESETT       ;RESET THE DHV-11, REPORT ANY ERRORS FOUND.
024750  103402                         BCS     .+6             ;FATAL RESET ERROR?  NO, CONTINUE WITH TEST.
024752  000137  025130                 JMP     60$             ;YES,  EXIT THE TEST.
024756  012737  003412  002666          MOV     #1802.,ERRNBR   ;SET THE ERROR REPORT NUMBER TO 1802.
                                ;+
                                ; VERIFY READ/WRITE CAPABILITY TO INDIRECT ADDRESS FIELD OF CSR.
                                ; USE BYTE ACCESSES.
                                ;-
024764  012702  000017                  MOV     #17,R2          ;SET LOOP COUNT.
024770  013704  002214                  MOV     CSRA,R4         ;GET CSR ADDRESS.
024774  110214                 2$:      MOVB    R2,(R4)         ;WRITE COUNT TO CSR.
024776  111401                         MOVB    (R4),R1         ;READ BACK THE CONTENTS OF THE CSR
025000  042701  177760                 BIC     #177760,R1      ;MASK OUT ALL BUT THE IND.ADR.REG FIELD.
025004  020102                         CMP     R1,R2           ;CHECK FOR CORRECT DATA WRITTEN/READ.
025006  001406                        BEQ     4$              ;IS EXPECTED DATA BAD?  NO, SKIP ERROR REPORT.
                                    ;REPORT 'BAD BIT(S) IN DEVICE CSR REGISTER FOR LINE  0 (D).'
025010  012737  012752  002672          MOV     #ER1601,ERRBLK  ;SELECT THE PROPER ERROR REPORT ROUTINE.
025016  005003                         CLR     R3              ;SET OFFSET TO 0 TO CAUSE REPORT OF CSR REG.
025020  005005                         CLR     R5              ;CAUSE REPORT OF LINE 0.
025022                                 ERROR                   ;  >>>>> ERROR # 1802 <<<<<
025022  104460                                                                        TRAP    C$ERROR
025024  005302                 4$:      DEC     R2              ;DECREMENT LOOP COUNT/IND.ADD.REG ADDRESS.
025026  002362                         BGE     2$              ;LOOP BACK TO TEST NEXT ADDRESS IF NOT DONE.
                                ;+
                                ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL LOWER BYTES OF ALL
                                ;   REGISTERS ON ALL ACTIVE LINES.  USE READ/WRITE ACCESSES.  BEFORE WRITING
                                ;   EACH PATTERN, CLEAR ALL THE USED BITS OF ALL ACTIVE REGISTERS.
                                ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1803 - 1805 <<<<<.
```

```
6215                                    ;-
6216  025030  005237  002666            INC     ERRNBR          ;SET THE ERROR NUMBER TO 1803.
6217  025034  012703  177777            MOV     #-1,R3          ;INDICATE THAT LO BYTE ACCESSES ARE TO BE USED.
6218  025040  012704  000002            MOV     #2,R4           ;INDICATE R/W ACCESS, CLEAR FIRST.
6219  025044  004737  015046           JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
6220                                    ;+
6221                                    ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL HIGH BYTES OF ALL
6222                                    ;   REGISTERS ON ALL ACTIVE LINES.  USE READ/WRITE ACCESSES.  BEFORE WRITING
6223                                    ;   EACH PATTERN, CLEAR ALL THE USED BITS OF ALL ACTIVE REGISTERS.
6224                                    ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1806 - 1808 <<<<<.
6225                                    ;-
6226  025050  012737  003416  002666            MOV     #1806.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
6227  025056  005403                    NEG     R3              ;INDICATE THAT HI BYTE ACCESSES ARE TO BE USED.
6228  025060  004737  015046           JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
6229                                    ;+
6230                                    ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL LOWER BYTES OF ALL
6231                                    ;   REGISTERS ON ALL ACTIVE LINES.  USE READ/WRITE ACCESSES.  BEFORE WRITING
6232                                    ;   EACH PATTERN, SET ALL THE USED BITS OF ALL ACTIVE REGISTERS.
6233                                    ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1809 - 1811 <<<<<.
6234                                    ;-
6235  025064  012737  003421  002666            MOV     #1809.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
6236  025072  005403                    NEG     R3              ;INDICATE THAT LO BYTE ACCESSES ARE TO BE USED.
6237  025074  005404                    NEG     R4              ;INDICATE R/W ACCESS, SET FIRST.
6238  025076  004737  015046           JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
6239                                    ;+
6240                                    ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL HIGH BYTES OF ALL
6241                                    ;   REGISTERS ON ALL ACTIVE LINES.  USE READ/WRITE ACCESSES.  BEFORE WRITING
6242                                    ;   EACH PATTERN, SET ALL THE USED BITS OF ALL ACTIVE REGISTERS.
6243                                    ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1812 - 1814 <<<<<.
6244                                    ;-
6245  025102  012737  003424  002666            MOV     #1812.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
6246  025110  005403                    NEG     R3              ;INDICATE THAT HI BYTE ACCESSES ARE TO BE USED.
6247  025112  004737  015046           JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
6248                                    ;+
6249                                    ; PRINT ERROR SUMMARY REPORTS IF NECESSARY.
6250                                    ;   THE FOLLOWING ROUTINE REPORTS ERRORS WITH NUMBER >>>>> ERROR # 1815 <<<<<
6251                                    ;-
6252  025116  012737  003427  002666            MOV     #1815.,ERRNBR   ;SET UP ERROR NUMBER FOR NEXT RTN.
6253  025124  004737  015256           JSR     PC,REPSMR       ;REPORT ERROR SUMMARY IF NECESSARY.
6254  025130  005037  002310   60$:     CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
6255  025134                           ENDTST
6256  025134                                                                  L10043:
6257  025134  104401                                                                  TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - REGBRM -
                                ;++ ************************************************************************
                                ;*              - DEVICE REGISTER BYTE ACCESS READ/MODIFY/WRITE TEST -
                                ;*
                                ;* THIS TEST VERIFIES THAT THE DEVICE REGISTERS CAN BE READ AND WRITTEN
                                ;* CORRECTLY USING BYTE ACCESSES IN READ/MODIFY/WRITE MODE.
                                ;*
                                ;-- ************************************************************************

                                        BGNTST
                                                                                        T18::
                                         SETPRI #PRI05          ;ALLOW THE LTC TO INTERRUPT.
025136  012700  000240                                                          MOV     #PRI05,R0
025142  104441                                                                 TRAP    C$SPRI
                000022                  TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
025144  012737  000022  002274          MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (19)
025152  012737  177777  002310          MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
025160  012737  000001  002664          MOV     #1,ERRTYP       ;SET UP DEVICE FATAL INDICATOR IN ERROR TYPE.
025166  012737  003555  002666          MOV     #1901.,ERRNBR   ;SET UP ERROR NUMBER IN THE ERROR TABLE.
025174  012737  011161  002670          MOV     #EM1901,ERRMSG  ;SET UP ERROR MESSAGE FOR TEST IN ERROR TABLE.
025202  005037  002420                  CLR     ERSMRF          ;CLEAR THE ERROR SUMMARY FLAGS.
025206  012700  002422                  MOV     #ERCNTB,R0
025212  004737  014026                  JSR     PC,CLR16W       ;CLEAR THE ERROR COUNTER TABLE.
                                ;+
                                ; RESET THE DUT TO A KNOWN STATE, DO NOT REMOVE THE STATUS CODES FROM THE FIFO.
                                ;  CLEAR TX AND RX INTERRUPT ENABLE BITS IN THE CSR.
                                ; THIS SUBROUTINE REPORTS ERRORS >>>>> 1901 <<<<<.
                                ;-
025216  004737  015304                  JSR     PC,RESETT       ;RESET THE DHV-11, REPORT ANY ERRORS FOUND.
025222  103402                          BCS     .+6             ;FATAL RESET ERROR?  NO, CONTINUE WITH TEST.
025224  000137  025406                  JMP     60$             ;YES,  EXIT THE TEST.
025230  012737  003556  002666           MOV    #1902.,ERRNBR   ;SET THE ERROR REPORT NUMBER TO 1902.
                                ;+
                                ; VERIFY READ/WRITE CAPABILITY TO INDIRECT ADDRESS FIELD OF CSR.
                                ; USE BYTE ACCESSES.
                                ;-
025236  012702  000017                   MOV    #17,R2          ;SET LOOP COUNT.
025242  013704  002214                   MOV    CSRA,R4         ;GET CSR ADDRESS.
025246  142714  000017          2$:      BICB   #17,(R4)        ;CLEAR THE DUT CSR USING READ/MODIFY/WRITE.
025252  150214                           BISB   R2,(R4)         ;WRITE COUNT TO CSR USING READ/MODIFY/WRITE.
025254  111401                           MOVB   (R4),R1         ;READ BACK THE CONTENTS OF THE CSR
025256  042701  177760                   BIC    #177760,R1      ;MASK OUT ALL BUT THE IND.ADR.REG FIELD.
025262  020102                           CMP    R1,R2           ;CHECK FOR CORRECT DATA WRITTEN/READ.
025264  001406                          BEQ     4$              ;IS EXPECTED DATA BAD?  NO, SKIP ERROR REPORT.
                                    ;REPORT 'BAD BIT(S) IN DEVICE CSR REGISTER FOR LINE  0 (D)."
025266  012737  012752  002672           MOV    #ER1601,ERRBLK  ;SELECT THE PROPER ERROR REPORT ROUTINE.
025274  005003                           CLR    R3              ;SET OFFSET TO 0 TO CAUSE REPORT OF CSR REG.
025276  005005                           CLR    R5              ;CAUSE REPORT OF LINE 0.
025300                                  ERROR                  ;  >>>>> ERROR # 1902 <<<<<
025300  104460                                                                  TRAP    C$ERROR
025302  005302          4$:      DEC    R2              ;DECREMENT LOOP COUNT/IND.ADD.REG ADDRESS.
025304  002360                          BGE     2$              ;LOOP BACK TO TEST NEXT ADDRESS IF NOT DONE.
                                ;+
                                ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL LOWER BYTES OF ALL
                                ;   REGISTERS ON ALL ACTIVE LINES.  USE READ/MODIFY/WRITE ACCESSES.  BEFORE
                                ;   WRITING EACH PATTERN, CLEAR ALL THE USED BITS OF ALL ACTIVE REGISTERS.
```

```
6314                                    ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1903 - 1905 <<<<<.
6315                                    ;-
6316  025306  005237  002666                  INC     ERRNBR          ;SET THE ERROR NUMBER TO 1903.
6317  025312  012703  177777                  MOV     #-1,R3          ;INDICATE THAT LO BYTE ACCESSES ARE TO BE USED.
6318  025316  012704  000001                  MOV     #1,R4           ;INDICATE R/M/W ACCESS, CLEAR FIRST.
6319  025322  004737  015046                 JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
6320                                    ;+
6321                                    ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL HIGH BYTES OF ALL
6322                                    ;   REGISTERS ON ALL ACTIVE LINES.  USE READ/MODIFY/WRITE ACCESSES.  BEFORE
6323                                    ;   WRITING EACH PATTERN, CLEAR ALL THE USED BITS OF ALL ACTIVE REGISTERS.
6324                                    ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1906 - 1908 <<<<<.
6325                                    ;-
6326  025326  012737  003562  002666          MOV     #1906.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
6327  025334  005403                          NEG     R3              ;INDICATE THAT HI BYTE ACCESSES ARE TO BE USED.
6328  025336  004737  015046                 JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
6329                                    ;+
6330                                    ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL LOWER BYTES OF ALL
6331                                    ;   REGISTERS ON ALL ACTIVE LINES.  USE READ/MODIFY/WRITE ACCESSES.  BEFORE
6332                                    ;   WRITING EACH PATTERN, SET ALL THE USED BITS OF ALL ACTIVE REGISTERS.
6333                                    ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1909 - 1911 <<<<<.
6334                                    ;-
6335  025342  012737  003565  002666          MOV     #1909.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
6336  025350  005403                          NEG     R3              ;INDICATE THAT LO BYTE ACCESSES ARE TO BE USED.
6337  025352  005404                          NEG     R4              ;INDICATE R/M/W ACCESS, SET FIRST.
6338  025354  004737  015046                 JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
6339                                    ;+
6340                                    ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL HIGH BYTES OF ALL
6341                                    ;   REGISTERS ON ALL ACTIVE LINES.  USE READ/MODIFY/WRITE ACCESSES.  BEFORE
6342                                    ;   WRITING EACH PATTERN, SET ALL THE USED BITS OF ALL ACTIVE REGISTERS.
6343                                    ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1912 - 1914 <<<<<.
6344                                    ;-
6345  025360  012737  003570  002666          MOV     #1912.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
6346  025366  005403                          NEG     R3              ;INDICATE THAT HI BYTE ACCESSES ARE TO BE USED.
6347  025370  004737  015046                 JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
6348                                    ;+
6349                                    ; PRINT ERROR SUMMARY REPORTS IF NECESSARY.
6350                                    ;   THE FOLLOWING ROUTINE REPORTS ERRORS WITH NUMBER >>>>> ERROR # 1915 <<<<<
6351                                    ;-
6352  025374  012737  003573  002666          MOV     #1915.,ERRNBR   ;SET UP ERROR NUMBER FOR NEXT RTN.
6353  025402  004737  015256                 JSR     PC,REPSMR       ;REPORT ERROR SUMMARY IF NECESSARY.
6354  025406  005037  002310          60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
6355  025412                                 ENDTST
6356  025412                                                                  L10044:
6357  025412  104401                                                                  TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - IDBIT -
                                ;++ ************************************************************************
                                ;*              - DEVICE REGISTER ID BIT TEST -
                                ;*
                                ;*      THIS TEST VERIFIES THAT THE DUT STAT REGISTER ID BIT READS AS CLEAR.
                                ;*
                                ;-- ************************************************************************

                                        BGNTST
                                                                                        T19::
                                         SETPRI #PRI05          ;ALLOW THE LTC TO INTERRUPT.
                                                                                        MOV     #PRI05,R0
025414  012700  000240                                                                  TRAP    C$SPRI
                                         TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
000023
025422  012737  000023  002274          MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (20)
025430  012737  177777  002310          MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
025436  012737  000001  002664          MOV     #1,ERRTYP       ;SET UP DEVICE FATAL INDICATOR IN ERROR TYPE.
025444  012737  003721  002666          MOV     #2001.,ERRNBR   ;SET UP ERROR NUMBER IN THE ERROR TABLE.
025452  012737  011236  002670          MOV     #EM2001,ERRMSG  ;SET UP ERROR MESSAGE FOR TEST IN ERROR TABLE.
                                ;+
                                ; RESET THE DUT TO A KNOWN STATE, DO NOT REMOVE THE STATUS CODES FROM THE FIFO.
                                ;  CLEAR TX AND RX INTERRUPT ENABLE BITS IN THE CSR.
                                ; THIS SUBROUTINE REPORTS ERRORS >>>>> 2001 <<<<<.
                                ;-
025460  004737  015304                  JSR     PC,RESETT       ;RESET THE DHV-11, REPORT ANY ERRORS FOUND.
025464  103016                          BCC     60$             ;FATAL RESET ERROR?  YES,  EXIT THE TEST.
                                ;+
                                ; READ THE STAT REGISTER ID BIT AND VERIFY THAT IT IS CLEAR.
                                ;-
025466  017701  154530                   MOV     @STATA,R1      ;READ THE STAT REGISTER CONTENTS.
025472  032701  000400                   BIT     #BIT8,R1       ;CHECK THE ID BIT.
025476  001411                         BEQ     60$             ;ID BIT CLEAR?  YES, EXIT THE TEST.
025500  012737  003722  002666          MOV     #2002.,ERRNBR   ;NO,  SET THE ERROR REPORT NUMBER TO 2002.
025506  012701  011300                   MOV     #EM2002,R1     ;GET THE PROPER ERROR MESSAGE.
025512  012737  012576  002672          MOV     #ER0503,ERRBLK  ;SELECT THE PROPER ERROR REPORT ROUTINE.
025520                                  ERROR                   ;ERROR NUMBER >>>>> 2002 <<<<<
025520  104460                                                                          TRAP    C$ERROR
025522  005037  002310          60$:     CLR     CTRLCF         ;INDICATE THAT WE COMPLETED THE TEST.
025526                                  ENDTST
025526                                                                          L10045:
025526  104401                                                                          TRAP    C$ETST
```

```
                                        .SBTTL  HARDWARE TEST           - REPBMP -
                                        ;++ ************************************************************************
                                        ;*                          - REPORT ANY BMP CODES IN THE QUEUE -
                                        ;*      THIS IS A PSEUDO-TEST USED TO REPORT ANY BMP CODES THAT WERE FOUND
                                        ;*      IN THE DUT'S FIFO DURING PREVIOUS TEST, AND LOGGED IN THE BMP CODE
                                        ;*      QUEUE.
                                        ;*      IT IS UNLIKELY THAT RUNNING THIS PSEUDO-TEST ALONE WILL PRODUCE ANY
                                        ;*      ERROR REPORTS.
                                        ;*
                                        ;-- ************************************************************************
025530                                          BGNTST
025530                                                                                  T20::
        000024                           TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
025530  012737  000024  002274           MOV    #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (93)
025536  012737  177777  002310           MOV    #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
025544  013702  002462                   MOV    BMPCQP,R2       ;GET THE CONTENTS OF THE POINTER.
025550  012703  002464                   MOV    #BMPCQB,R3      ;GET THE START ADDRESS OF THE QUEUE.
025554  020203                           CMP    R2,R3           ;SEE IF THE POINTER HAS MOVED FROM THE BASE.
025556  001411                           BEQ    60$             ;EXIT NO CODES IN THE QUEUE.
                                        ;+
                                        ; THERE IS AT LEAST ONE BMP CODE IN THE QUEUE. REPORT THE ERROR.
                                        ;-
                                         ;REPORT ERROR BMP CODE FOUND IN TEST NN, BMP CODE:NNNNNN''

025560  012701  012121                   MOV    #EM9304,R1      ;PASS THE FIRST MESSAGE TO BE REORTED.
025564                                   ERRDF  9301,EM9301,ER9301 ;                    >>>>> ERROR #9301 <<<<<.
025564  104455                                                                                  TRAP    C$ERDF
025566  022125                                                                                  .WORD   9301
025570  012004                                                                                  .WORD   EM9301
025572  013372                                                                                  .WORD   ER9301

025574  012737  002464  002462           MOV    #BMPCQB,BMPCQP  ;SET POINTER BACK TO THE BEGINING OF THE QUE.

025602  005037  002310           60$:    CLR    CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
025606                                   ENDTST
025606                                                                                  L10046:
025606  104401                                                                                  TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE PARAMETER CODING SECTION



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

025610                                  BGNHRD
025610  000011                                                          .WORD L10047-L$HARD/2
025612                                                          L$HARD::

                                ;DEVICE CSR ADDRESS QUESTION:
025612                                  GPRMA   HWPTQ1,0,0,160000,177776,YES
025612  000031                                                          .WORD   T$CODE
025614  025634                                                          .WORD   HWPTQ1
025616  160000                                                          .WORD   T$LOLIM
025620  177776                                                          .WORD   T$HILIM

                                ;ACTIVE LINES BIT MAP QUESTION:
025622                                  GPRMD   HWPTQ3,2,0,MAPLNS,0,MAPLNS,YES
025622  001032                                                          .WORD   T$CODE
025624  025652                                                          .WORD   HWPTQ3
025626  000377                                                          .WORD   MAPLNS
025630  000000                                                          .WORD   T$LOLIM
025632  000377                                                          .WORD   T$HILIM
025634                                  ENDHRD
                                                                        .EVEN
025634                                                          L10047:


025634  051503  020122  042101        HWPTQ1: .ASCIZ  /CSR ADDRESS: /
025642  051104  051505  035123
025650  000040
025652  041501  044524  042526        HWPTQ3: .ASCIZ  /ACTIVE LINE BIT MAP: /
025660  046040  047111  020105
025666  044502  020124  040515
025674  035120  000040
                                .EVEN
```

```
                                .SBTTL  SOFTWARE PARAMETER CODING SECTION

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

025700                                  BGNSFT
025700  000013                                                          .WORD L10050-L$SOFT/2
025702                                                          L$SOFT::

                                ;UNIT NUMBER PRINTOUT QUESTION:
025702                                  GPRML   SWPTQ1,0,20,YES
025702  000130                                                          .WORD   T$CODE
025704  025730                                                          .WORD   SWPTQ1
025706  000020                                                          .WORD   20
                                ;NUMBER OF INDIVIDUAL DATA ERRORS TO REPORT ON A LINE QUESTION:
025710                                  GPRMD   SWPTQ2,2,D,177777,0,177777,YES
025710  001052                                                          .WORD   T$CODE
025712  026004                                                          .WORD   SWPTQ2
025714  177777                                                          .WORD   177777
025716  000000                                                          .WORD   T$LOLIM
025720  177777                                                          .WORD   T$HILIM
                                ;ROM VERSION PRINTOUT ON FIRST PASS QUESTION:
025722                                  GPRML   SWPTQ3,0,1,YES
025722  000130                                                          .WORD   T$CODE
025724  026073                                                          .WORD   SWPTQ3
025726  000001                                                          .WORD   1

                                        .EVEN

025730                                  ENDSFT
                                                                        .EVEN
025730                                                          L10050:

025730  042522  047520  052122  SWPTQ1: .ASCIZ  /REPORT UNIT NUMBER AS EACH UNIT IS TESTED: /
025736  052440  044516  020124
025744  052516  041115  051105
025752  040440  020123  040505
025760  044103  052440  044516
025766  020124  051511  052040
025774  051505  042524  035104
026002  000040
026004  052516  041115  051105  SWPTQ2: .ASCIZ  /NUMBER OF INDIVIDUAL DATA ERRORS TO REPORT ON A LINE: /
026012  047440  020106  047111
026020  044504  044526  052504
026026  046101  042040  052101
026034  020101  051105  047522
026042  051522  052040  020117
```

```
 6537  026050  042522  047520  052122
 6538  026056  047440  020116  020101
 6539  026064  044514  042516  020072
 6540  026072     000
 6541  026073     122  046517  053040          SKTQ3: .ASCIZ  /ROM VERSION PRINTOUT ON THE FIRST PASS: /
 6542  026100  051105  044523  047117
 6543  026106  050040  044522  052116
 6544  026114  052517  020124  047117
 6545  026122  052040  042510  043040
 6546  026130  051111  052123  050040
 6547  026136  051501  035123  000040
 6548                                          .EVEN
```

```
6549
6550
6551  026144                          $PATCH::
6552  026144  000024                          .BLKW   24
6553
6554
6555
6556
6557
6558  026214                          LASTAD
6559                                                                    .EVEN
6560  026214  000000                                                    .WORD   0
6561  026216  000000                                                    .WORD   0
6562  026220                          L$LAST::
6563  026220                          ENDMOD
6564
6565
6566
6567
6568
6569
6570
6571          000001                          .END
```

```
ACTLNS  002210 G          1307#  3457   4330   4638*
ADR   = 000020 G          1281#
ADRPTR  014010 G          3040#  4450
ASSEMB= 000010            1014
BCOUNT  002330 G          1369#  4420   4562*
BITTBL  002346 G          1384#  3111   3457   4266   4330
BIT0  = 000001 G          1254#  2366   3542   3901   5971
BIT00 = 000001 G          1243#  1254
BIT01 = 000002 G          1242#  1253
BIT02 = 000004 G          1241#  1252
BIT03 = 000010 G          1240#  1251
BIT04 = 000020 G          1239#  1250
BIT05 = 000040 G          1238#  1249   3678   4021   4926   5006   5095   5164   5232   5311   5387   5464   5537
                          5615   5697   5796   5893
BIT06 = 000100 G          1237#  1248
BIT07 = 000200 G          1236#  1247
BIT08 = 000400 G          1235#  1246
BIT09 = 001000 G          1234#  1245
BIT1  = 000002 G          1253#  2374   5840   5939
BIT10 = 002000 G          1233#
BIT11 = 004000 G          1232#
BIT12 = 010000 G          1231#
BIT13 = 020000 G          1230#  5630   5648   5721   5823
BIT14 = 040000 G          1229#
BIT15 = 100000 G          1228#  4453
BIT2  = 000004 G          1252#
BIT3  = 000010 G          1251#
BIT4  = 000020 G          1250#  4666
BIT5  = 000040 G          1249#
BIT6  = 000100 G          1248#  4577
BIT7  = 000200 G          1247#  3831   3912   5242   5251
BIT8  = 000400 G          1246#  6388
BIT9  = 001000 G          1245#
BMPCQB  002464 G          1421#  2850   4656   5486   6415   6430
BMPCQE  002664 G          1422#  2863   3986   4657
BMPCQP  002462 G          1420#  3981   3989*  4658*  5485   6414   6430*
BOE   = 000400 G          1285#
CALMSL  013552 G          2930#  4588
CKTRAP  013776 G          3036#  4580   4601   4836   4843   4854   4859
CLKBRL  002314 G          1363#  4545*
CLKCSR  002312 G          1362#  4544*  4579
CLKHRZ  002320 G          1365#  2951*  4547*  4548   4560   4583*
CLKINT  016744 G          4412#  4555
CLKVEC  002316 G          1364#  4546*  4556
CLR16W  014026 G          3063#  6024   6102   6181   6280
CNTERR  014050 G          3095#  3485
CSRA    002214 G          1314#  3454*  3684   3697*  4026   4328*  4637*  4643   4834   4842   4851   4928   5008
                          5097   5166   5234   5313   5389   5466   5539   5617   5632   5699   5798   5815   5895
                          6038   6116   6196   6295
CSRO  = 000000 G          1208#
CTRLCF  002310 G          1357#  4679*  4721   4816*  4891*  4900*  4915*  4980*  4995*  5067*  5086*  5136*  5155*
                          5204*  5223*  5283*  5302*  5360*  5379*  5433*  5456*  5507*  5528*  5586*  5606*  5669*
                          5688*  5765*  5786*  5862*  5884*  5998*  6018*  6076*  6096*  6155*  6175*  6254*  6274*
                          6354*  6373*  6395*  6413*  6432*
C$AU  = 000052            1014#  4796
C$AUTO= 000061            1014#  4708
```

CVDHAA0 DHV-11 FUNC TST PART1 MACY11 30A(1052) 12-JUL-83 10:52 PAGE 159
CVDHAA.P11 12-JUL-83 00:42 CROSS REFERENCE TABLE -- USER SYMBOLS

```
C$BRK = 000022          1014#  3318  4423
C$BSEG= 000004          1014#
C$BSUB= 000002          1014#
C$CEFG= 000045          1014#
C$CLCK= 000062          1014#  4542
C$CLEA= 000012          1014#  4735
C$CLOS= 000035          1014#
C$CLP1= 000006          1014#
C$CVEC= 000036          1014#
C$DCLN= 000044          1014#  4893
C$DODU= 000051          1014#  4890
C$DRPT= 000024          1014#
C$DU  = 000053          1014#  4774
C$EDIT= 000003          1014#  1079
C$ERDF= 000055          1014#  4883  5495  6425
C$ERHR= 000056          1014#
C$ERRO= 000060          1014#  3489  3646  3717  3815  3854  3868  3932  3950  4115  4961  4968  4975
                        5048   5055  5062  5124  5131  5192  519C  5264  5271  5278  5341  5348  5355
                        5420   5428  5570  5577  5660  5727  5743  5750  5756  5854  5989  6049  6128
                        6207   6307  6394
C$ERSF= 000054          1014#  3306
C$ERSO= 000057          1014#
C$ESCA= 000010          1014#
C$ESEG= 000005          1014#
C$ESUB= 000003          1014#
C$ETST= 000001          1014#  4903  4983  5070  5139  5207  5286  5363  5436  5510  5589  5672  5768
                        5865   6001  6079  6158  6257  6357  6398  6435
C$EXIT= 000032          1014#  4727
C$GETB= 000026          1014#
C$GETW= 000027          1014#
C$GMAN= 000043          1014#
C$GPHR= 000042          1014#  4629
C$GPLO= 000030          1014#
C$GPRI= 000040          1014#
C$INIT= 000011          1014#  4689
C$INLP= 000020          1014#
C$MANI= 000050          1014#
C$MEM = 000031          1014#
C$MSG = 000023          1014#  2392  2471  2503  2569  2622  2670  2723  2768  2817  2894
C$OPEN= 000034          1014#
C$PNTB= 000014          1014#  2372  2380  2456  2463  2498  2535  2604  2654  2663  2700  2755  2804
                        2848   5981
C$PNTF= 000017          1014#  3315  4675  4752
C$PNTS= 000016          1014#
C$PNTX= 000015          1014#  2386  2564  2611  2618  2714  2763  2812  2874  2886
C$QIO = 000377          1014#
C$RDBU= 000007          1014#
C$REFG= 000047          1014#  4512  4518  4524  4530
C$RESE= 000033          1014#  4536  4609  4724  4936  5016
C$REVI= 000003          1014#  1078
C$RFLA= 000021          1014#
C$RPT = 000025          1014#  4475
C$SEFG= 000046          1014#
C$SPRI= 000041          1014#  4565  4685  4918  4979  4998  5066  5083  5135  5152  5203  5220  5282
                        5299   5359  5376  5432  5453  5506  5525  5585  5603  5668  5685  5764  5783
                        5861   5881  5997  6015  6093  6172  6271  6370
```

```
C$SVEC= 000037            1014#   4558
C$TPRI= 000013            1014#
DELAY   014126 G          3134#   4017    5479    5807
DFPTBL  002176 G          1165#
DIAGMC= 000000            1014
DRADRT  002214 G          1313#   3466    4339
DROP    017712            4749    4756#
DR00MG  004507 G          1339    1805#
DR02MG  004513 G          1340    1806#
DR04MG  004520 G          1341    1807#
DR06MG  004524 G          1342    1808#
DR10MG  004531 G          1343    1809#
DR12MG  004540 G          1344    1811#
DR14MG  004551 G          1345    1813#
DR16MG  004562 G          1346    1815#
EDROP   017770            4754    4765#
EF.CON= 000036 G          1261#   4529
EF.NEW= 000035 G          1262#   4523
EF.PWR= 000034 G          1263#
EF.RES= 000037 G          1260#   4517
EF.STA= 000040 G          1259#   4511
EF0503  003030 G          1658#   2453    2460    2495    2532    2651    2697    2845
EF1401  003035 G          1659#   5978
EF1402  003137 G          1671#   2561
EF1601  003174 G          1676#   2660
EF1602  003220 G          1680#   2608
EF1603  003262 G          1686#   2615
EF1604  003324 G          1692#   2601
EF9001  003421 G          1703#
EF9002  003503 G          1712#
EF9003  003562 G          1720#
EF9004  003616 G          1725#
EF9005  003653 G          1730#
EF9006  003704 G          1735#
EF9010  003730 G          1739#   2711
EF9016  004027 G          1750#   2801
EF9017  004124 G          1761#   2760    2809
EF9018  004200 G          1769#   2752
EF9019  004305 G          1781#
EF9301  004331 G          1785#   2883
EF9302  004407 G          1793#   2871
EM0101  014362 G          3308    3324#
EM0102  014446 G          3312    3333#
EM0103  004572 G          1817#   4885
EM0201  004630 G          1822#   4920
EM0202  004676 G          1829#   4959    5046    5122    5190    5262    5339    5418
EM0203  005051 G          1848#   4966
EM0204  005214 G          1866#   4973
EM0301  005373 G          1885#   5000
EM0302  005436 G          1891#   5053
EM0303  005576 G          1908#   5060
EM0401  005755 G          1928#   5088
EM0402  006024 G          1935#   5129
EM0501  006174 G          1953#   5157
EM0502  006242 G          1960#   5197
EM0601  006416 G          1979#   5225
```

EM0602	006452	G	1984#	5269										
EM0603	006632	G	2004#	5276										
EM0701	007015	G	2024#	5304										
EM0702	007052	G	2029#	5346										
EM0703	007232	G	2049#	5353										
EM0801	007415	G	2069#	5381										
EM0802	007455	G	2075#	5426										
EM0901	007530	G	2083#	5497										
EM0902	007561	G	2088#	5493										
EM1001	007615	G	2093#	5530										
EM1002	007661	G	2100#	5568										
EM1003	007746	G	2109#	5575										
EM1101	010024	G	2117#	5608										
EM1201	010050	G	2121#	5690										
EM1202	010067	G	2124#	5741										
EM1203	010153	G	2133#	5754										
EM1204	010231	G	2141#	5748										
EM1205	010265	G	2146#	5658	5725									
EM1301	010311	G	2150#	5788										
EM1302	010335	G	2154#	5852										
EM1401	010374	G	2160#	5886										
EM1402	010424	G	2164#	5917										
EM1403	010512	G	2173#	5958										
EM1404	010565	G	2181#	5964										
EM1405	010637	G	2189#	2543										
EM1406	010652	G	2191#	2550										
EM1407	010665	G	2193#	2544	2551									
EM1408	010677	G	2195#	2547	2554									
EM1601	010705	G	2197#	3712										
EM1604	010770	G	2206#	6021										
EM1701	011036	G	2213#	6099										
EM1801	011113	G	2221#	6178										
EM1901	011161	G	2228#	6277										
EM2001	011236	G	2236#	6376										
EM2002	011300	G	2242#	6391										
EM9009	011353	G	2250#											
EM9010	011377	G	2254#											
EM9014	011423	G	2258#	2696										
EM9017	011517	G	2269#	3944										
EM9018	011630	G	2282#	3808										
EM9019	011640	G	2284#	3861										
EM9020	011655	G	2287#	3847										
EM9022	011701	G	2291#	3895										
EM9023	011720	G	2294#	3906										
EM9024	011742	G	2297#	3920										
EM9026	011760	G	2300#											
EM9301	012004	G	2304#	6427										
EM9302	012024	G	2307#	2851										
EM9303	012054	G	2311#	2869										
EM9304	012121	G	2318#	6423										
ENDIT	017632		4533	4679#										
ERCNTB	002422	G	1415#	2709	3101	3104*	6023	6101	6180	6279				
ERRBLK	002672	G	1429#	3438*	3640*	3713*	3809*	3848*	3862*	3881*	3947*	4113*	4921*	5001*	5089*
			5158*	5226*	5305*	5417*	5425*	5531*	5609*	5691*	5789*	5887*	5987*	6045*	6124*
			6203*	6303*	6392*										
ERRMSG	002670	G	1428#	2657	4920*	5000*	5088*	5157*	5225*	5304*	5381*	5530*	5608*	5690*	5788*

```
                    5886* 6021* 6099* 6178* 6277* 6376*
ERRNBR  002666 G    1427# 3551  3574* 3582* 3592* 3603* 3801  3807* 3845* 3846* 3859* 3860* 3879*
                    3880* 3945* 3946* 4958* 4965* 4972* 5045* 5052* 5059* 5121* 5128* 5189* 5196*
                    5261* 5268* 5275* 5338* 5345* 5352* 5416* 5424* 5458* 5501* 5560* 5567* 5574*
                    5580* 5657* 5663* 5724* 5733* 5740* 5747* 5753* 5759* 5790* 5813* 5822* 5829*
                    5850* 5916* 5959* 5965* 5992* 6020* 6036* 6057* 6066* 6074* 6098* 6114* 6136*
                    6145* 6153* 6177* 6190* 6216* 6226* 6235* 6245* 6252* 6276* 6289* 6316* 6326*
                    6335* 6345* 6352* 6375* 6390*
ERRTYP  002664 G    1426# 4919* 4999* 5087* 5156* 5224* 5303* 5380* 5457* 5529* 5607* 5689* 5787*
                    5885* 6019* 6097* 6176* 6275* 6374*
ERSMRF  002420 G    1414# 2703  3111* 3635  6022* 6100* 6179* 6278*
ER0101  012176 G    2362# 4886
ER0201  012514 G    2443# 4921  5001  5089  5158  5226  5305  5425
ER0503  012576 G    2491# 3947  5417  5531  5609  5691  5789  5887  6392
ER1401  012622 G    2528# 5987
ER1601  012752 G    2594# 3438  6045  6124  6203  6303
ER1603  013050 G    2645# 3713  4113
ER9004  013130 G    2693# 3640
ER9007  013232 G    2746# 3809  3862
ER9008  013310 G    2789# 3848  3881
ER9301  013372 G    2839# 5498  6428
EVL     = 000004 G  1279#
ESEND   = 002100    1014#
ESLOAD= 000035      1014# 1102
FSAU    = 000015    1014# 4786  4795
FSAUTO= 000020      1014# 4703  4707
FSBGN   = 000040    1014# 1024  2362  2443  2491  2528  2594  2645  2693  2746  2789  2839  4465
                    4470  4485  4508  4703  4719  4727  4746  4769  4786  4790  4813  4902  4912
                    4982  4992  5069  5080  5138  5149  5206  5217  5285  5296  5362  5373  5435
                    5450  5509  5522  5588  5600  5671  5682  5767  5780  5864  5878  6000  6012
                    6078  6090  6157  6169  6256  6268  6356  6367  6397  6410  6434  6452  6495
                    6564
FSCLEA= 000007      1014# 4719  4734
FSDU    = 000016    1014# 4746  4773
FSEND   = 000041    1014# 1024  2393  2472  2504  2570  2623  2671  2724  2769  2818  2895  4468
                    4476  4690  4709  4727  4736  4767  4775  4788  4797  4813  4902  4904  4912
                    4982  4984  4992  5069  5071  5080  5138  5140  5149  5206  5208  5217  5285
                    5287  5296  5362  5364  5373  5435  5437  5450  5509  5511  5522  5588  5590
                    5600  5671  5673  5682  5767  5769  5780  5864  5866  5878  6000  6002  6012
                    6078  6080  6090  6157  6159  6169  6256  6258  6268  6356  6358  6367  6397
                    6399  6410  6434  6436  6471  6521  6564
FSHARD= 000004      1014# 6452  6469
FSHW    = 000013    1014# 1163  1171
FSINIT= 000006      1014# 4508  4688
FSJMP   = 000050    1014# 4468  4727  4767  4788
FSMOD   = 000000    1014# 1024  6564
FSMSG   = 000011    1014# 2362  2391  2443  2470  2491  2502  2528  2568  2594  2621  2645  2669
                    2693  2722  2746  2767  2789  2816  2839  2893
FSPROT= 000021      1014# 4485  4492
FSPWR   = 000017    1014#
FSRPT   = 000012    1014# 4465  4474
FSSEG   = 000003    1014#
FSSOFT= 000005      1014# 6495  6519
FSSRV   = 000010    1014#
FSSUB   = 000002    1014#
FSSW    = 000014    1014# 1184  1192
```

CVDHAA0 DHV-11 FUNC TST PART1 MACY11 30A(1052) 12-JUL-83 10:52 PAGE 163
CVDHAA.P11 12-JUL-83 00:42 CROSS REFERENCE TABLE -- USER SYMBOLS

```
F$TEST= 000001          1014#  4814   4902   4913   4982   4993   5069   5081   5138   5150   5206   5218   5285
                        5297   5362   5374   5435   5451   5509   5523   5588   5601   5671   5683   5767   5781
                        5864   5879   6000   6013   6078   6091   6157   6170   6256   6269   6356   6368   6397
                        6411   6434
GETPRM  017452          4532   4618   4622#  4633
GPRSOB  002406 G        1404#  3603   4071
G$CNTO= 000200          1014#
G$DELM= 000372          1014#
G$DISP= 000003          1014#
G$EXCP= 000400          1014#
G$HILI= 000002          1014#
G$LOLI= 000001          1014#
G$NO  = 000000          1014#
G$OFFS= 000400          1014#  6457   6463   6500   6505   6512
G$OFSI= 000376          1014#  6457   6463   6500   6505   6512
G$PRMA= 000001          1014#  6457
G$PRMD= 000002          1014#  6463   6505
G$PRML= 000000          1014#  6500   6512
G$RADA= 000140          1014#
G$RADB= 000000          1014#
G$RADD= 000040          1014#  6505
G$RADL= 000120          1014#  6500   6512
G$RADO= 000020          1014#  6457   6463
G$XFER= 000004          1014#
G$YES = 000010          1014#  6457   6463   6500   6505   6512
HELP  = 000000             1#  1007   1014   1019   1032   1120   1151   1172   1193   1196   1224   1294   1424
                        1610   1627   1639   1640   1646   1648   1649   2329   2896   4455   4477   4493   4690
                        4705   4709   4721   4730   4736   4747   4775   4787   6436   6455   6472   6481   6498
                        6523   6549   6554
HOE   = 100000 G        1292#
HWPTQ1  025634          6458   6473#
HWPTQ3  025652          6464   6476#
IBE   = 010000 G        1289#
IDU   = 000040 G        1282#
IER   = 020000 G        1290#
IESTAT  002276 G        1352#  3724*
ISR   = 000100 G        1283#
IXE   = 004000 G        1288#
I$AU  = 000041          1014#  4786#  4797#
I$AUTO= 000041          1014#  4703#  4709#
I$CLN = 000041          1014#  4719#  4727   4736#
I$DU  = 000041          1014#  4746#  4775#
I$HRD = 000041          6452#  6471#
I$INIT= 000041          1014#  4508#  4690#
I$MOD = 000041          1014#  1024#  6564#
I$MSG = 000041          1014#  2362#  2393#  2443#  2472#  2491#  2504#  2528#  2570#  2594#  2623#  2645#  2671#
                        2693#  2724#  2746#  2769#  2789#  2818#  2839#  2895#
I$PROT= 000040          1014#  4485#
I$PTAB= 000041          1014#
I$PWR = 000041          1014#
I$RPT = 000041          1014#  4465#  4476#
I$SEG = 000041          1014#  4813   4912   4992   5080   5149   5217   5296   5373   5450   5522   5600   5682
                        5780   5878   6012   6090   6169   6268   6367   6410
I$SETU= 000041          1014#
I$SFT = 000041          6495#  6521#
I$SRV = 000041          1014#
```

CVDHAAO DHV-11 FUNC TST PART1 MACY11 30A(1052) 12-JUL-83 10:52 PAGE 164
CVDHAA.P11 12-JUL-83 00:42 CROSS REFERENCE TABLE -- USER SYMBOLS

```
I$SUB = 000041          1014#   4813    4912    4992    5080    5149    5217    5296    5373    5450    5522    5600    5682
                        5780    5878    6012    6090    6169    6268    6367    6410
I$TST = 000041          1014#   4813#   4902#   4904#   4912#   4982#   4984#   4992#   5069#   5071#   5080#   5138#   5140#
                        5149#   5206#   5208#   5217#   5285#   5287#   5296#   5362#   5364#   5373#   5435#   5437#   5450#
                        5509#   5511#   5522#   5588#   5590#   5600#   5671#   5673#   5682#   5767#   5769#   5780#   5864#
                        5866#   5878#   6000#   6002#   6012#   6078#   6080#   6090#   6157#   6159#   6169#   6256#   6258#
                        6268#   6356#   6358#   6367#   6397#   6399#   6410#   6434#   6436#
J$JMP = 000167          1014#   4468    4767    4788
LNCTRA  002224 G        1318#
LNCTRO= 000010 G        1213#
LOE   = 040000 G        1291#
LOT   = 000010 G        1280#
LPCSLT= 000036 G        1476#
LPRA    002220 G        1316#
LPRO  = 000004 G        1211#   3459    4332
L$ACP   002110 G        1109#
L$APT   002036 G        1067#
L$AU    017776 G        4786#
L$AUT   002070 G        1093#
L$AUTO  017646 G        1110    4703#
L$CCP   002106 G        1107#
L$CLEA  017650 G        1108    4719#
L$CO    002032 G        1063#
L$DEPO  002011 G        1045#
L$DESC  002744 G        1100    1631#
L$DESP  002076 G        1099#
L$DEVP  002060 G        1085#
L$DISP  002124 G        1070    1129#
L$DLY   002116 G        1115#
L$DTP   002040 G        1069#
L$DTYP  002034 G        1065#
L$DU    017666 G        1096    4746#
L$DUT   002072 G        1095#
L$DVTY  002734 G        1086    1622#
L$EF    002052 G        1080#
L$ENVI  002044 G        1073#
L$ERRT  002664 G        1104    1425#
L$ETP   002102 G        1103#
L$EXP1  002046 G        1075#
L$EXP4  002064 G        1089#
L$EXP5  002066 G        1091#
L$HARD  025612 G        1052    6452    6453#
L$HIME  002120 G        1117#
L$HPCP  002016 G        1051#
L$HPTP  002022 G        1055#
L$HW    002176 G        1056    1163    1164#
L$ICP   002104 G        1105#
L$INIT  017052 G        1106    4508#
L$LADP  002026 G        1059#
L$LAST  026220 G        1060    6562#
L$LOAD  002100 G        1101#
L$LUN   002074 G        1097#
L$MREV  002050 G        1077#
L$NAME  002000 G        1034#
L$PRIO  002042 G        1071#
L$PROT  017044 G        1112    4485#
```

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CVDHAA0 DHV-11 FUNC TST PART1   MACY11 30A(1052)  12-JUL-83  10:52  PAGE 165
CVDHAA.P11    12-JUL-83 00:42          CROSS REFERENCE TABLE -- USER SYMBOLS

L$PRT   002112 G          1111#
L$REPP  002062 G          1087#
L$REV   002010 G          1043#
L$RPT   017036 G          1088    4465#
L$SOFT  025702 G          1054    6495    6496#
L$SPC   002056 G          1083#
L$SPCP  002020 G          1053#
L$SPTP  002024 G          1057#
L$STA   002030 G          1061#
L$SW    002204 G          1058    1184    1185#
L$TEST  002114 G          1113#
L$TIML  002014 G          1049#
L$UNIT  002012 G          1047#   4624    4668
L10000  002202            1163    1171#
L10001  002210            1184    1192#
L10002  012300            2391#
L10003  012574            2470#
L10004  012620            2502#
L10005  012750            2568#
L10006  013046            2621#
L10007  013126            2669#
L10010  013230            2722#
L10011  013306            2767#
L10012  013370            2816#
L10013  013550            2893#
L10014  017042            4469    4474#
L10016  017644            4688#
L10017  017646            4707#
L10020  017664            4728    4734#
L10021  017774            4768    4773#
L10022  020002            4789    4795#
L10023  020272            4902#
L10024  020522            4982#
L10025  020766            5069#
L10026  021164            5138#
L10027  021356            5206#
L10030  021574            5285#
L10031  022002            5362#
L10032  022210            5435#
L10033  022376            5509#
L10034  022612            5588#
L10035  023040            5671#
L10036  023322            5767#
L10037  023622            5864#
L10040  024222            6000#
L10041  024440            6078#
L10042  024662            6157#
L10043  025134            6256#
L10044  025412            6356#
L10045  025526            6397#
L10046  025606            6434#
L10047  025634            6452    6470#
L10050  025730            6495    6520#
MAPLNS= 000377 G          1205#   6463    6465
MFUNIT  002772 G          1653#   4672
MMENAB  002342 G          1378#   4600*
```

```
MMPRES  002340 G          1377#   4599*   4604*
MMSR0   002336 G          1376#   4598
MSG1    012302 G          2369    2394#
MSG2    012360 G          2377    2402#
MSG3    012437 G          2383    2410#
MSLCNT  002334 G          1371#   2964    2983    3002*   3210
MSLGET  014166 G          3186#   3278    3689    3706    4268    4929    4939    4946    5009    5019    5028    5039    5100
                          5169    5237    5316    5392    5467    5540    5550    5618    5633    5644    5649    5700    5709
                          5799    5816    5896    5904
MSLOOP  014302 G          3140    3271#
MSTICK  002332 G          1370#   2996    4550*   4552*
NDERPT  002206 G          1189#   3105    3107
NEWPAS  017432            4526    4606    4611#   4625
NEWRES  017424            4520    4608#
NEWSTA  017116            4514    4534#
NUMLNS= 000010 G          1204#   3501    3873    4021    4383    4871    5408    5913
OOPS    014316 G          2975    3001    3142    3302#
OPTION  002204 G          1188#   4666    5971
O$APTS= 000000            1014#   1061
O$AU  = 000000            1014#   1093
O$BGNR= 000001            1014#   1031#   1087
O$BGNS= 000001            1014#   1031#   1053
O$DU  = 000001            1014#   1031#   1095
O$ERRT= 000001            1014#   1031#   1103
O$GNSW= 000001            1014#   1031#   1057
O$POIN= 000001            1014#   1031#   1119
O$SETU= 000000            1014#   1047    6560
PAR0A   002344 G          1379#
PASCNT  002300 G          1353#   4605*   4610*   4617*   4619*   5973
PCSLOT= 000016 G          1477#
PNT   = 001000 G          1286#
PREGRT  002716 G          1600#
PREG05  002674            1581#   2364    2445    2647    2841    2931    3037    3064    3096    3135    3187    3272    3303
                          3365    3437    3536    3634    3677    3752    3795    3980    4015    4111    4154    4257    4318
PRI   = 002000 G          1287#
PRI00 = 000000 G          1275#
PRI01 = 000040 G          1274#
PRI02 = 000100 G          1273#
PRI03 = 000140 G          1272#
PRI04 = 000200 G          1271#
PRI05 = 000240 G          1270#   4564    4917    4997    5082    5151    5219    5298    5375    5452    5524    5602    5684
                          5782    5880    6014    6092    6171    6270    6369
PRI06 = 000300 G          1269#   1363    4554
PRI07 = 000340 G          1072    1268#   4684    4978    5065    5134    5202    5281    5358    5431    5505    5584    5667
                          5763    5860    5996
PUFIFO  014544 G          3364#   5480
RBUFA   002216 G          1315#   3367    3802    3882    4647    5833    5919
RBUF0 = 000002 G          1209#
RDPDR   014626 G          3436#   3575    3583    3593
REGTST  015046 G          3535#   6060    6069    6139    6148    6219    6228    6238    6247    6319    6328    6338    6347
REPSMR  015256 G          3633#   6075    6154    6253    6353
RESETT  015304 G          3676#   6030    6108    6187    6286    6382
RMATBB  002254 G          1339#   2596
ROLDAP  015416 G          3491    3499    3599    3751#   4372    4380
RSTRPT  015450 G          3794#   5561    5734
RXBDTX= 000030 G          1220#
```

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CVDHAAO DHV-11 FUNC TST PART1   MACY11 30A(1052)  12-JUL-83  10:52  PAGE 167
CVDHAA.P11    12-JUL-83 00:42          CROSS REFERENCE TABLE -- USER SYMBOLS

RXBETX= 000020 G          1219#
RXBFUL= 000100 G          1221#
ROSLOT= 000002 G          1483#   3228*
R1SLOT= 000004 G          1482#   3229*   4224*
R2SLOT= 000006 G          1481#   3761*   4272*
R3SLOT= 000010 G          1480#   3467    4340    4344
R4SLOT= 000012 G          1479#   3555    3560    4349    4361
R5SLOT= 000014 G          1478#   1588
SAVBMP  016032 G          3384    3840    3925    3979#   5927
SFPTBL  002204 G          1186#
SKPSTS  016100 G          3698    4014#   4937    5017    5027    5099    5168    5236    5315    5391    5473    5549    5624
                          5902
STATA   002222 G          1317#   6387
STATO = 000006 G          1212#
SVCGRI = 000000           1014#   1017#   1034    1043    1045    1047    1049    1051    1053    1055    1057    1059    1061
                          1063    1065    1067    1069    1071    1073    1075    1077    1080    1083    1085    1087    1089
                          1091    1093    1095    1097    1099    1101    1103    1105    1107    1109    1111    1113    1115
                          1117    1129    1164    1165    1185    1186    1425    1622    1631    2362    2443    2491    2528
                          2594    2645    2693    2746    2789    2839    4465    4485    4508    4703    4719    4746    4786
                          6453    6496    6562#   6563
SVCINS= 000001            1014#   1035    1036    1037    1038    1039    1040    1041    1042    1044    1046    1048    1050
                          1052    1054    1056    1058    1060    1062    1064    1066    1068    1070    1072    1074    1076
                          1078    1079    1081    1082    1084    1086    1088    1090    1092    1094    1096    1098    1100
                          1102    1104    1106    1108    1110    1112    1114    1116    1118    1128    1130    1131    1132
                          1133    1134    1135    1136    1137    1138    1139    1140    1141    1142    1143    1144    1145
                          1146    1147    1148    1149    1163    1184    1623    1625    1632    1636    2369    2370    2371
                          2372    2373    2377    2378    2379    2380    2381    2383    2384    2385    2386    2387    2392
                          2452    2453    2454    2455    2456    2457    2459    2460    2461    2462    2463    2464    2471
                          2494    2495    2496    2497    2498    2499    2503    2531    2532    2533    2534    2535    2536
                          2559    2560    2561    2562    2563    2564    2565    2569    2599    2600    2601    2602    2603
                          2604    2605    2607    2608    2609    2610    2611    2612    2614    2615    2616    2617    2618
                          2619    2622    2650    2651    2652    2653    2654    2655    2659    2660    2661    2662    2663
                          2664    2670    2696    2697    2698    2699    2700    2701    2709    2710    2711    2712    2713
                          2714    2715    2723    2750    2751    2752    2753    2754    2755    2756    2758    2759    2760
                          2761    2762    2763    2764    2768    2799    2800    2801    2802    2803    2804    2805    2807
                          2808    2809    2810    2811    2812    2813    2817    2844    2845    2846    2847    2848    2849
                          2871    2872    2873    2874    2875    2880    2881    2882    2883    2884    2885    2886    2887
                          2894    3306    3307    3308    3309    3312    3313    3314    3315    3316    3318    3489    3646
                          3717    3815    3854    3868    3932    3950    4115    4423    4468    4469    4475    4511    4512
                          4514    4517    4518    4520    4523    4524    4526    4529    4530    4532    4536    4541    4542
                          4543    4554    4555    4556    4557    4558    4559    4564    4565    4609    4628    4629    4630
                          4632    4671    4672    4673    4674    4675    4676    4684    4685    4689    4708    4724    4727
                          4728    4735    4748    4749    4750    4751    4752    4753    4767    4768    4774    4788    4789
                          4796    4883    4884    4885    4886    4889    4890    4893    4903    4917    4918    4936    4961
                          4968    4975    4978    4979    4983    4997    4998    5016    5048    5055    5062    5065    5066
                          5070    5082    5083    5124    5131    5134    5135    5139    5151    5152    5192    5199    5202
                          5203    5207    5219    5220    5264    5271    5278    5281    5282    5286    5298    5299    5341
                          5348    5355    5358    5359    5363    5375    5376    5420    5428    5431    5432    5436    5452
                          5453    5495    5496    5497    5498    5505    5506    5510    5524    5525    5570    5577    5584
                          5585    5589    5602    5603    5660    5667    5668    5672    5684    5685    5727    5743    5750
                          5756    5763    5764    5768    5782    5783    5854    5860    5861    5865    5880    5881    5976
                          5977    5978    5979    5980    5981    5982    5989    5996    5997    6001    6014    6015    6049
                          6079    6092    6093    6128    6158    6171    6172    6207    6257    6270    6271    6307    6357
                          6369    6370    6394    6398    6425    6426    6427    6428    6435    6452    6457    6458    6459
                          6460    6463    6464    6465    6466    6467    6469    6495    6500    6501    6502    6505    6506
                          6507    6508    6509    6512    6513    6514    6519    6559    6560    6561
```

```
SVCSUB= 000001          1014# 1016#
SVCTAG= 000001          1014# 1018#  1171  1192  2391  2470  2502  2568  2621  2669  2722  2767  2816
                        2893  4474   4688  4707  4734  4773  4795  4902  4982  5069  5138  5206  5285
                        5362  5435   5509  5588  5671  5767  5864  6000  6078  6157  6256  6356  6397
                        6434  6470   6520
SVCTST= 000001          1014# 1015#  4813  4912  4992  5080  5149  5217  5296  5373  5450  5522  5600
                        5682  5780   5878  6012  6090  6169  6268  6367  6410
SWAP0   016156 G        3550  3563   3572  3576  4059#
SWPTQ1  025730          6501  6523#
SWPTQ2  026004          6506  6531#
SWPTQ3  026073          6513  6541#
S$LSYM= 010000          1014# 1172#  1193# 2392# 2471# 2503# 2569# 2622# 2670# 2723# 2768# 2817# 2894#
                        4475# 4689#  4708# 4735# 4774# 4796# 4903# 4983# 5070# 5139# 5207# 5286# 5363#
                        5436# 5510#  5589# 5672# 5768# 5865# 6001# 6079# 6158# 6257# 6357# 6398# 6435#
                        6471# 6521#
TIMER1  002322 G        1366# 2940*  2941  2958  4412  4414*
TIMER2  002324 G        1367# 4415   4417*
TIMER3  002326 G        1368# 4418*  4420*
TNUM  = 000024 G        4814# 4815   4913# 4914  4993# 4994  5084# 5085  5153# 5154  5221# 5222  5300#
                        5301  5377#  5378  5454# 5455  5526# 5527  5604# 5605  5686# 5687  5784# 5785
                        5882# 5883   6016# 6017  6094# 6095  6173# 6174  6272# 6273  6371# 6372  6411#
                        6412
TP4FLG  002304 G        1355# 3038*  3040  4453* 4576* 4595* 4833*
TP4RTN  017014 G        4450# 4572   4594  4821
TP4VEC  002302 G        1354# 4452   4571* 4581  4593* 4602  4820* 4878
TSABRT  016226 G        4110# 5502   5581  5664  5760  5857  5993
TSTNUM  002274 G        1351# 3982   4815* 4914* 4994* 5085* 5154* 5222* 5301* 5378* 5455* 5527* 5605*
                        5687* 5785*  5883* 6017* 6095* 6174* 6273* 6372* 6412*
TXAD1A  002226 G        1319#
TXAD1O= 000012 G        1214#
TXAD2A  002230 G        1320#
TXAD2O= 000014 G        1215#
TXBFCA  002232 G        1321# 4029   5808*
TXBFCO= 000016 G        1216# 3493   4374
TXCHA   002216 G        1315#
TXCHRO= 000002 G        1210#
T$ARGC= 000003          1035# 1036#  1037# 1038# 1039# 1040# 2369# 2373  2377# 2381  2383# 2387  2452#
                        2457  2459#  2464  2494# 2499  2531# 2536  2559# 2565  2599# 2605  2607# 2612
                        2614# 2619   2650# 2655  2659# 2664  2696# 2701  2709# 2715  2750# 2756  2758#
                        2764  2799#  2805  2807# 2813  2844# 2849  2871# 2875  2880# 2887  3312# 3316
                        4671# 4676   4748# 4753  5976# 5982
T$CODE= 000130          6457# 6463#  6500# 6505# 6512#
T$ERRN= 022125          1014# 3307#  4884# 5496# 6426#
T$EXCP= 000000          6457# 6461   4463# 6468  6505# 6510
T$FLAG= 000050          4468# 4470   4 27# 4767# 4769  4788# 4790
T$GMAN= 000000          1014#
T$HILI= 177777          6457# 6460   6463# 6467  6505# 6509
T$LAST= 000001          1014# 6560#
T$LOLI= 000000          6457# 6459   6463# 6466  6505# 6508
T$LSYM= 010000          1014# 1172   1193  2392  2471  2503  2569  2622  2670  2723  2768  2817  2894
                        4475  4689   4708  4735  4774  4796  4903  4983  5070  5139  5207  5286  5363
                        5436  5510   5589  5672  5768  5865  6001  6079  6158  6257  6357  6398  6435
                        6471  6521
T$LTNO= 000024          6563#
T$NEST= 177777          1014# 1024#  1163# 1171# 1184# 1192# 2362# 2391# 2443# 2470# 2491# 2502# 2528#
                        2568# 2594#  2621# 2645# 2669# 2693# 2722# 2746# 2767# 2789# 2816# 2839# 2893#
```

```
                    4465#  4474#  4485#  4492#  4508#  4688#  4703#  4707#  4719#  4734#  4746#  4773#  4786#
                    4795#  4814#  4902#  4913#  4982#  4993#  5069#  5081#  5138#  5150#  5206#  5218#  5285#
                    5297#  5362#  5374#  5435#  5451#  5509#  5523#  5588#  5601#  5671#  5683#  5767#  5781#
                    5864#  5879#  6000#  6013#  6078#  6091#  6157#  6170#  6256#  6269#  6356#  6368#  6397#
                    6411#  6434#  6452#  6469#  6495#  6519#  6564#
T$NS0 = 000000      1024#  6564
T$NS1 = 000005      1163#  1171   1184#  1192   2362#  2391   2443#  2470   2491#  2502   2528#  2568   2594#
                    2621   2645#  2669   2693#  2722   2746#  2767   2789#  2816   2839#  2893   4465#  4474
                    4485#  4492   4508#  4688   4703#  4707   4719#  4734   4746#  4773   4786#  4795   4814#
                    4902   4913#  4982   4993#  5069   5081#  5138   5150#  5206   5218#  5285   5297#  5362
                    5374#  5435   5451#  5509   5523#  5588   5601#  5671.  5683#  5767   5781#  5864   5879#
                    6000   6013#  6078   6091#  6157   6170#  6256   6269#  6356   6368#  6397   6411#  6434
                    6452#  6469   6495#  6519
T$PTNU= 000000      1014#
T$SAVL= 177777      1014#
T$SEGL= 177777      1014#
T$SUBN= 000000      1014#  4813#  4912#  4992#  5080#  5149#  5217#  5296#  5373#  5450#  5522#  5600#  5682#
                    5780#  5878#  6012#  6090#  6169#  6268#  6367#  6410#
T$TAGL= 177777      1014#
T$TAGN= 010051      1014#  1163#  1184#  2362#  2443#  2491#  2528#  2594#  2645#  2693#  2746#  2789#  2839#
                    4465#  4485#  4508#  4703#  4719#  4746#  4786#  4814#  4913#  4993#  5081#  5150#  5218#
                    5297#  5374#  5451#  5523#  5601#  5683#  5781#  5879#  6013#  6091#  6170#  6269#  6368#
                    6411#  6452#  6495#
T$TEMP= 000000      1130#  1131#  1132#  1133#  1134#  1135#  1136#  1137#  1138#  1139#  1140#  1141#  1142#
                    1143#  1144#  1145#  1146#  1147#  1148#  1149#  1150#  1171#  1192#  2391#  2470#  2502#
                    2568#  2621#  2669#  2722#  2767#  2816#  2893#  4468#  4469   4474#  4492#  4688#  4707#
                    4727#  4728   4734#  4767#  4768   4773#  4788#  4789   4795#  4902#  4982#  5069#  5138#
                    5206#  5285#  5362#  5435#  5509#  5588#  5671#  5767#  5864#  6000#  6078#  6157#  6256#
                    6356#  6397#  6434#  6457#  6463#  6469#  6500#  6505#  6512#  6519#  6564#
T$TEST= 000024      1014#  4813#  4912#  4992#  5080#  5149#  5217#  5296#  5373#  5450#  5522#  5600#  5682#
                    5780#  5878#  6012#  6090#  6169#  6268#  6367#  6410#  6563
T$TSTM= 177777      1014#  2372   2380   2386   2392   2456   2463   2471   2498   2503   2535   2564   2569
                    2604   2611   2618   2622   2654   2663   2670   2700   2714   2723   2755   2763   2768
                    2804   2812   2817   2848   2874   2886   2894   3306   3315   3318   3489   3646   3717
                    3815   3854   3868   3932   3950   4115   4423   4475   4512   4518   4524   4530   4536
                    4542   4558   4565   4609   4629   4675   4685   4689   4708   4724   4727   4735   4752
                    4774   4796   4883   4890   4893   4903   4918   4936   4961   4968   4975   4979   4983
                    4998   5016   5048   5055   5062   5066   5070   5083   5124   5131   5135   5139   5152
                    5192   5199   5203   5207   5220   5264   5271   5278   5282   5286   5299   5341   5348
                    5355   5359   5363   5376   5420   5428   5432   5436   5453   5495   5506   5510   5525
                    5570   5577   5585   5589   5603   5660   5668   5672   5685   5727   5743   5750   5756
                    5764   5768   5783   5854   5861   5865   5881   5981   5989   5997   6001   6015   6049
                    6079   6093   6128   6158   6172   6207   6257   6271   6307   6357   6370   6394   6398
                    6425   6435
T$TSTS= 000001      1014#  4814#  4913#  4993#  5081#  5150#  5218#  5297#  5374#  5451#  5523#  5601#  5683#
                    5781#  5879#  6013#  6091#  6170#  6269#  6368#  6411#
T$$AU  = 010022     4786#  4788   4795
T$$AUT= 010017      4703#  4707
T$$CLE= 010020      4719#  4727   4734
T$$DU  = 010021     4746#  4767   4773
T$$HAR= 010047      6452#  6470
T$$HW  = 010000     1163#  1171
T$$INI= 010016      4508#  4688
T$$MSG= 010013      2362#  2391   2443#  2470   2491#  2502   2528#  2568   2594#  2621   2645#  2669   2693#
                    2722   2746#  2767   2789#  2816   2839#  2893
T$$PRO= 010015      4485#
```

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CVDHAA.P11 12-JUL-83 00:42 CROSS REFERENCE TABLE -- USER SYMBOLS

```
T$$RPT= 010014            4465#   4468    4474
T$$SOF= 010050            6495#   6520
T$$SW = 010001            1184#   1192
T$$TES= 010046            4814#   4902    4913#   4982    4993#   5069    5081#   5138    5150#   5206    5218#   5285    5297#
                          5362    5374#   5435    5451#   5509    5523#   5588    5601#   5671    5683#   5767    5781#   5864
                          5879#   6000    6013#   6078    6091#   6157    6170#   6256    6269#   6356    6368#   6397    6411#
                          6434
T1        020004 G        1130    4813#
T10       022400 G        1139    5522#
T11       022614 G        1140    5600#
T12       023042 G        1141    5682#
T13       023324 G        1142    5780#
T14       023624 G        1143    5878#
T15       024224 G        1144    6012#
T16       024442 G        1145    6090#
T17       024664 G        1146    6169#
T18       025136 G        1147    6268#
T19       025414 G        1148    6367#
T2        020274 G        1131    4912#
T20       025530 G        1149    6410#
T3        020524 G        1132    4992#
T4        020770 G        1133    5080#
T5        021166 G        1134    5149#
T6        021360 G        1135    5217#
T7        021576 G        1136    5296#
T8        022004 G        1137    5373#
T9        022212 G        1138    5450#
UAM     = 000200 G        1284#
UNBTTB    002234 G        1327#   3465    3482    4338
UNITN     002212 G        1308#   4612*   4623*   4624    4628    4671    4889
UNSDIV    016340 G        2999    4153#
WAIBIS    016474 G        4256#
WDPDR     016550 G        3573    3581    4317#
WORD1     002306 G        1356#   4577*   4578    4596*   4597
X$ALWA= 000000            1014#
X$FALS= 000040            1014#
X$OFFS= 000400            1014#
X$TRUE= 000020            1014#
$PATCH    026144 G        6551#
.       = 026220          1021#   1415#   1421#   1625#   2326#   4469    4728    4754#   4768    4789    6031    6109    6188
                          6287    6552#
```

```
BCOMPL      1#   1014#  4513  4519  4525  4631
BERROR      1#   1014#
BGNAU       1#   1014#  4785
BGNAUT      1#   1014#  4702
BGNCLN      1#   1014#  4718
BGNDU       1#   1014#  4745
BGNHRD      1#   1014#  6451
BGNHW       1#   1014#  1162
BGNINI      1#   1014#  4507
BGNMOD      1#   1014#  1023
BGNMSG      1#   1014#  2361  2442  2490  2527  2593  2644  2692  2745  2788  2838
BGNPRO      1#   1014#  4484
BGNPTA      1#   1014#
BGNRPT      1#   1014#  4464
BGNSEG      1#   1014#
BGNSET      1#   1014#
BGNSFT      1#   1014#  6494
BGNSRV      1#   1014#
BGNSUB      1#   1014#
BGNSW       1#   1014#  1183
BGNTST      1#   1014#  4812  4911  4991  5079  5148  5216  5295  5372  5449  5521  5599  5681  5779
         5877    6011   6089  6168  6267  6366  6409
BNCOMP      1#   1014#  4531
BNERRO      1#   1014#
BREAK       1#   1014#  3317  4422
BRESET      1#   1014#  4535  4608  4723  4935  5015
CKLOOP      1#   1014#
CLOCK       1#   1014#  4540
CLOSE       1#   1014#
CLRVEC      1#   1014#
COMMEN      1#   1014#
DELAY       1#   1014#
DESCRI      1#   1014#  1630
DEVTYP      1#   1014#  1621
DISPAT      1#   1014#  1127
DISPLA      1#   1014#
DOCLN       1#   1014#  4892
DODU        1#   1014#  4888
DORPT       1#   1014#
ENDAU       1#   1014#  4794
ENDAUT      1#   1014#  4706
ENDCLN      1#   1014#  4733
ENDCOM      1#   1014#
ENDDU       1#   1014#  4772
ENDHRD      1#   1014#  6468
ENDHW       1#   1014#  1170
ENDINI      1#   1014#  4687
ENDMOD      1#   1014#  6563
ENDMSG      1#   1014#  2390  2469  2501  2567  2620  2668  2721  2766  2815  2892
ENDPRO      1#   1014#  4491
ENDPTA      1#   1014#
ENDRPT      1#   1014#  4473
ENDSEG      1#   1014#
ENDSET      1#   1014#
ENDSFT      1#   1014#  6518
ENDSRV      1#   1014#
```

```
ENDSUB      1#   1014#
ENDSW       1#   1014#   1191
ENDTST      1#   1014#   4901   4981   5068   5137   5205   5284   5361   5434   5508   5587   5670   5766   5863
         5999    6077    6156   6255   6355   6396   6433
EQUALS      1#   1014#   1224
ERRDF       1#   1014#   4882   5494   6424
ERRHRD      1#   1014#
ERROR       1#   1014#   3488   3645   3716   3814   3853   3867   3931   3949   4114   4960   4967   4974   5047
         5054    5061    5123   5130   5191   5198   5263   5270   5277   5340   5347   5354   5419   5427   5569
         5576    5659    5726   5742   5749   5755   5853   5988   6048   6127   6206   6306   6393
ERRSF       1#   1014#   3305
ERRSOF      1#   1014#
ERRTBL      1#   1014#   1424
ESCAPE      1#   1014#
EXIT        1#   1014#   4467   4726   4766   4787
FEQUAL      1#   1014#
GETBYT      1#   1014#
GETPRI      1#   1014#
GETWOR      1#   1014#
GMANIA      1#   1014#
GMANID      1#   1014#
GMANIL      1#   1014#
GPHARD      1#   1014#   4627
GPRMA       1#   1014#   6456
GPRMD       1#   1014#   6462   6504
GPRML       1#   1014#   6499   6511
HEADER      1#   1014#   1033
INLOOP      1#   1014#
IOSETU      1#   1014#
IOSTAR      1#   1014#
KT11        1#   1014#
LASTAD      1#   1014#   6558
MANUAL      1#   1014#
MEMORY      1#   1014#
MSBYTE      1#   1014#   1034#  1040   1041   1042
MSCHEC      1#   1014#   4468#  4727#  4767#  4788#
MSCNTO      1#   1014#   6457#  6463#  6500#  6505#  6512#
MSCOUN      1#   1014#   2369#  2377#  2383#  2452#  2459#  2494#  2531#  2559#  2599#  2607#  2614#  2650#  2659#
         2696#   2709#   2750#  2758#  2799#  2907#  2844#  2871#  2880#  3312#  4671#  4748#  5976#
MSDATA      1#   1014#   1034#  1043   1045   1047   1049   1051   1053   1055   1057   1059   1061   1063   1065
         1067    1069    1071   1073#  1075   1077   1080   1083   1085   1087   1089   1091   1093   1095   1097
         1099    1101    1103   1105   1107   1109   1111   1113   1115   1117   1622#  1631#
MSDECR      1#   1014#   1171#  1192#  2391#  2470#  2502#  2568#  2621#  2669#  2722#  2767#  2816#  2893#  4474#
         4492#   4688#   4707#  4734#  4773#  4795#  4902#  4982#  5069#  5138#  5206#  5285#  5362#  5435#  5509#
         5588#   5671#   5767#  5864#  6000#  6078#  6157#  6256#  6356#  6397#  6434#  6469#  6519#  6564#
MSDEFA      1#   1014#   6457#  6463#  6500#  6505#  6512#
MSENDE      1#   1014#   1171#  1192#  2391#  2470#  2502#  2568#  2621#  2669#  2722#  2767#  2816#  2893#  4474#
         4688#   4707#   4734#  4773#  4795#  4902#  4982#  5069#  5138#  5206#  5285#  5362#  5435#  5509#  5588#
         5671#   5767#   5864#  6000#  6078#  6157#  6256#  6356#  6397#  6434#  6469#  6519#  6564#
MSERRI      1#   1014#   3306#  4883#  5495#  6425#
MSESCA      1#   1014#
MSESCS      1#   1014#
MSEXCP      1#   1014#   6457#  6463#  6505#
MSEXIT      1#   1014#   4468#  4727#  4728   4767#  4788#
MSEXSE      1#   1014#   4468#  4727#  4767#  4788#
MSEXTJ      1#   1014#   4468#  4469   4727#  4767#  4768   4788#  4789
```

M$GEN	1#	1014#	1034#	1043#	1045#	1047#	1049#	1051#	1053#	1055#	1057#	1059#	1061#	1063#	1065#
	1067#	1069#	1071#	1073#	1075#	1077#	1080#	1083#	1085#	1087#	1089#	1091#	1093#	1095#	1097#
	1099#	1101#	1103#	1105#	1107#	1109#	1111#	1113#	1115#	1117#	1129#	1164#	1165#	1171#	1185#
	1186#	1192#	1425#	1622#	1631#	2362#	2391#	2443#	2470#	2491#	2502#	2528#	2568#	2594#	2621#
	2645#	2669#	2693#	2722#	2746#	2767#	2789#	2816#	2839#	2893#	4465#	4474#	4485#	4508#	4688#
	4703#	4707#	4719#	4734#	4746#	4773#	4786#	4795#	4813#	4902#	4912#	4982#	4992#	5069#	5080#
	5138#	5149#	5206#	5217#	5285#	5296#	5362#	5373#	5435#	5450#	5509#	5522#	5588#	5600#	5671#
	5682#	5767#	5780#	5864#	5878#	6000#	6012#	6078#	6090#	6157#	6169#	6256#	6268#	6356#	6367#
	6397#	6410#	6434#	6453#	6470#	6496#	6520#	6562#							
M$GENB	1#	1014#													
M$GETS	1#	1014#	1171#	1192#	2391#	2470#	2502#	2568#	2621#	2669#	2722#	2767#	2816#	2893#	4474#
	4492#	4688#	4707#	4734#	4773#	4795#	4902#	4982#	5069#	5138#	5206#	5285#	5362#	5435#	5509#
	5588#	5671#	5767#	5864#	6000#	6078#	6157#	6256#	6356#	6397#	6434#	6469#	6519#	6564#	
M$GETT	1#	1014#	4468#	4727#	4767#	4788#									
M$GNGB	1#	1014#	1024#	1034#	1043#	1045#	1047#	1049#	1051#	1053#	1055#	1057#	1059#	1061#	1063#
	1065#	1067#	1069#	1071#	1073#	1075#	1077#	1080#	1083#	1085#	1087#	1089#	1091#	1093#	1095#
	1097#	1099#	1101#	1103#	1105#	1107#	1109#	1111#	1113#	1115#	1117#	1128#	1129	1163#	1164
	1165	1184#	1185	1186	1425#	1622#	1631#	2362#	2443#	2491#	2528#	2594#	2645#	2693#	2746#
	2789#	2839#	4465#	4485#	4508#	4703#	4719#	4746#	4786#	6452#	6453	6495#	6496	6559#	6562
M$GNIN	1#	1014#	1034#	1035	1036	1037	1038	1039	1040#	1041#	1042#	1043#	1044	1045#	1046
	1047#	1048	1049#	1050	1051#	1052	1053#	1054	1055#	1056	1057#	1058	1059#	1060	1061#
	1062	1063#	1064	1065#	1066	1067#	1068	1069#	1070	1071#	1072	1073#	1074	1075#	1076
	1077#	1078	1079	1080#	1081	1082#	1083#	1084	1085#	1086	1087#	1088	1089#	1090	1091#
	1092	1093#	1094	1095#	1096	1097#	1098	1099#	1100	1101#	1102	1103#	1104	1105#	1106
	1107#	1108	1109#	1110	1111#	1112	1113#	1114	1115#	1116	1117#	1118	1128#	1130#	1131#
	1132#	1133#	1134#	1135#	1136#	1137#	1138#	1139#	1140#	1141#	1142#	1143#	1144#	1145#	1146#
	1147#	1148#	1149#	1163#	1184#	1622#	1623	1625	1631#	1632	1636	2369#	2370#	2371	2372#
	2373	2377#	2378#	2379	2380#	2381	2383#	2384#	2385	2386#	2387	2392#	2452#	2453#	2454#
	2455	2456#	2457	2459#	2460#	2461#	2462	2463#	2464	2471#	2494#	2495#	2496#	2497	2498#
	2499	2503#	2531#	2532#	2533#	2534	2535#	2536	2559#	2560#	2561#	2562#	2563	2564#	2565
	2569#	2599#	2600#	2601#	2602#	2603	2604#	2605	2607#	2608#	2609#	2610	2611#	2612	2614#
	2615#	2616#	2617	2618#	2619	2622#	2650#	2651#	2652#	2653	2654#	2655	2659#	2660#	2661#
	2662	2663#	2664	2670#	2696#	2697#	2698#	2699	2700#	2701	2709#	2710#	2711#	2712#	2713
	2714#	2715	2723#	2750#	2751#	2752#	2753#	2754	2755#	2756	2758#	2759#	2760#	2761#	2762
	2763#	2764	2768#	2799#	2800#	2801#	2802#	2803	2804#	2805	2807#	2808#	2809#	2810#	2811
	2812#	2813	2817#	2844#	2845#	2846#	2847	2848#	2849	2871#	2872#	2873	2874#	2875	2880#
	2881#	2882#	2883#	2884#	2885	2886#	2887	2894#	3306#	3307#	3308#	3309#	3312#	3313#	3314
	3315#	3316	3318#	3489#	3646#	3717#	3815#	3854#	3868#	3932#	3950#	4115#	4423#	4468#	4469#
	4475#	4511#	4512#	4514#	4517#	4518#	4520#	4523#	4524#	4526#	4529#	4530#	4532#	4536#	4541#
	4542#	4543#	4554#	4555#	4556#	4557#	4558#	4559	4564#	4565#	4609#	4628#	4629#	4630#	4632#
	4671#	4672#	4673#	4674	4675#	4676	4684#	4685#	4689#	4708#	4724#	4727#	4728#	4735#	4748#
	4749#	4750#	4751	4752#	4753	4767#	4768#	4774#	4788#	4789#	4796#	4883#	4884#	4885#	4886#
	4889#	4890#	4893#	4903#	4917#	4918#	4936#	4961#	4968#	4975#	4978#	4979#	4983#	4997#	4998#
	5016#	5048#	5055#	5062#	5065#	5066#	5070#	5082#	5083#	5124#	5131#	5134#	5135#	5139#	5151#
	5152#	5192#	5199#	5202#	5203#	5207#	5219#	5220#	5264#	5271#	5278#	5281#	5282#	5286#	5298#
	5299#	5341#	5348#	5355#	5358#	5359#	5363#	5375#	5376#	5420#	5428#	5431#	5432#	5436#	5452#
	5453#	5495#	5496#	5497#	5498#	5505#	5506#	5510#	5524#	5525#	5570#	5577#	5584#	5585#	5589#
	5602#	5603#	5660#	5667#	5668#	5672#	5684#	5685#	5727#	5743#	5750#	5756#	5763#	5764#	5768#
	5782#	5783#	5854#	5860#	5861#	5865#	5880#	5881#	5976#	5977#	5978#	5979#	5980	5981#	5982
	5989#	5996#	5997#	6001#	6014#	6015#	6049#	6079#	6092#	6093#	6128#	6158#	6171#	6172#	6207#
	6257#	6270#	6271#	6307#	6357#	6369#	6370#	6394#	6398#	6425#	6426#	6427#	6428#	6435#	6452#
	6457#	6458	6459	6460	6463#	6464	6465	6466	6467	6469#	6495#	6500#	6501	6502	6505#
	6506	6507	6508	6509	6512#	6513	6514	6519#	6559#	6560#	6561#				
M$GNLS	1#	1014#													
M$GNSU	1#	1014#													
M$GNTA	1#	1014#	1171#	1192#	2391#	2470#	2502#	2568#	2621#	2669#	2722#	2767#	2816#	2893#	4474#

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CVDHAA.P11 12-JUL-83 00:42 CROSS REFERENCE TABLE -- MACRO NAMES

```
                4688#  4707#  4734#  4773#  4795#  4902#  4982#  5069#  5138#  5206#  5285#  5362#  5435#  5509#  5588#
                5671#  5767#  5864#  6000#  6078#  6157#  6256#  6356#  6397#  6434#  6469#  6470   6519#  6520
MSGNTE             1#  1014#  4813#  4912#  4992#  5080#  5149#  5217#  5296#  5373#  5450#  5522#  5600#  5682#  5780#
                5878#  6012#  6090#  6169#  6268#  6367#  6410#
MSHAPT             1#  1014#  1034#
MSHNAP             1#  1014#  1034#  1073
MSINCR             1#  1014#  1024#  1163#  1184#  2362#  2372#  2380#  2386#  2392#  2443#  2456#  2463#  2471#  2491#
                2498#  2503#  2528#  2535#  2564#  2569#  2594#  2604#  2611#  2618#  2622#  2645#  2654#  2663#  2670#
                2693#  2700#  2714#  2723#  2746#  2755#  2763#  2768#  2789#  2804#  2812#  2817#  2839#  2848#  2874#
                2886#  2894#  3306#  3315#  3318#  3489#  3646#  3717#  3815#  3854#  3868#  3932#  3950#  4115#  4423#
                4465#  4475#  4485#  4508#  4512#  4518#  4524#  4530#  4536#  4542#  4558#  4565#  4609#  4629#  4675#
                4685#  4689#  4703#  4708#  4719#  4724#  4727#  4735#  4746#  4752#  4774#  4786#  4796#  4813#  4814#
                4883#  4890#  4893#  4903#  4912#  4913#  4918#  4936#  4961#  4968#  4975#  4979#  4983#  4992#  4993#
                4998#  5016#  5048#  5055#  5062#  5066#  5070#  5080#  5081#  5083#  5124#  5131#  5135#  5139#  5149#
                5150#  5152#  5192#  5199#  5203#  5207#  5217#  5218#  5220#  5264#  5271#  5278#  5282#  5286#  5296#
                5297#  5299#  5341#  5348#  5355#  5359#  5363#  5373#  5374#  5376#  5420#  5428#  5432#  5436#  5450#
                5451#  5453#  5495#  5506#  5510#  5522#  5523#  5525#  5570#  5577#  5585#  5589#  5600#  5601#  5603#
                5660#  5668#  5672#  5682#  5683#  5685#  5727#  5743#  5750#  5756#  5764#  5768#  5780#  5781#  5783#
                5854#  5861#  5865#  5878#  5879#  5881#  5981#  5989#  5997#  6001#  6012#  6013#  6015#  6049#  6079#
                6090#  6091#  6093#  6128#  6158#  6169#  6170#  6172#  6207#  6257#  6268#  6269#  6271#  6307#  6357#
                6367#  6368#  6370#  6394#  6398#  6410#  6411#  6425#  6435#  6452#  6495#
MSIOSE             1#  1014#
MSLDRO             1#  1014#  4511#  4517#  4523#  4529#  4541#  4564#  4628#  4684#  4889#  4917#  4978#  4997#  5065#
                5082#  5134#  5151#  5202#  5219#  5281#  5298#  5358#  5375#  5431#  5452#  5505#  5524#  5584#  5602#
                5667#  5684#  5763#  5782#  5860#  5880#  5996#  6014#  6092#  6171#  6270#  6369#
MSMASK             1#  1014#
MSMCHI             1#  1014#
MSMCLO             1#  1014#
MSMSK1             1#  1014#
MSPOP              1#  1014#  1171#  1192#  2391#  2470#  2502#  2568#  2621#  2669#  2722#  2767#  2816#  2893#  4474#
             4492#  4688#  4707#  4734#  4773#  4795#  4902#  4982#  5069#  5138#  5206#  5285#  5362#  5435#  5509#
             5588#  5671#  5767#  5864#  6000#  6078#  6157#  6256#  6356#  6397#  6434#  6469#  6519#  6564#
MSPRIN             1#  1014#  2369#  2377#  2383#  2452#  2459#  2494#  2531#  2559#  2599#  2607#  2614#  2650#  2659#
             2696#  2709#  2750#  2758#  2799#  2807#  2844#  2871#  2880#  3312#  4671#  4748#  5976#
MSPUSH             1#  1014#  1024#  1163#  1184#  2362#  2443#  2491#  2528#  2594#  2645#  2693#  2746#  2789#  2839#
             4465#  4485#  4508#  4703#  4719#  4746#  4786#  4813#  4814   4912#  4913   4992#  4993   5080#  5081
             5149#  5150   5217#  5218   5296#  5297   5373#  5374   5450#  5451   5522#  5523   5600#  5601   5682#
             5683   5780#  5781   5878#  5879   6012#  6013   6090#  6091   6169#  6170   6268#  6269   6367#  6368
             6410#  6411   6452#  6495#
MSPUT              1#  1014#  2369#  2377#  2383#  2452#  2459#  2494#  2531#  2559#  2599#  2607#  2614#  2650#  2659#
             2696#  2709#  2750#  2758#  2799#  2807#  2844#  2871#  2880#  3312#  4554#  4671#  4748#  5976#
MSPUT1             1#  1014#  2369#  2370   2377#  2378   2383#  2384   2452#  2453   2454   2459#  2460   2461   2494#
             2495   2496   2531#  2532   2533   2559#  2560   2561   2562   2599#  2600   2601   2602   2607#  2608
             2609   2614#  2615   2616   2650#  2651   2652   2659#  2660   2661   2696#  2697   2698   2709#  2710
             2711   2712   2750#  2751   2752   2753   2758#  2759   2760   2761   2799#  2800   2801   2802   2807#
             2808   2809   2810   2844#  2845   2846   2871#  2872   2880#  2881   2882   2883   2884   3312#  3313
             4554#  4555   4556   4557   4671#  4672   4673   4748#  4749   4750   5976#  5977   5978   5979
MSRADI             1#  1014#  6457#  6463#  6500#  6505#  6512#
MSRBRO             1#  1014#
MSRNRO             1#  1014#  4541#  4543   4628#  4630
MSSETS             1#  1014#  1024#  1163#  1184#  2362#  2443#  2491#  2528#  2594#  2645#  2693#  2746#  2789#  2839#
             4465#  4485#  4508#  4703#  4719#  4746#  4786#  4814#  4913#  4993#  5081#  5150#  5218#  5297#  5374#
             5451#  5523#  5601#  5683#  5781#  5879#  6013#  6091#  6170#  6269#  6368#  6411#  6452#  6495#
MSSTAR             1#  1014#
MSSVC              1#  1014#  2369#  2372   2377#  2380   2383#  2386   2391#  2392   2452#  2456   2459#  2463   2470#
             2471   2494#  2498   2502#  2503   2531#  2535   2559#  2564   2568#  2569   2599#  2604   2607#  2611
```

	2614#	2618	2621#	2622	2650#	2654	2659#	2663	2669#	2670	2696#	2700	2709#	2714	2722#
	2723	2750#	2755	2758#	2763	2767#	2768	2799#	2804	2807#	2812	2816#	2817	2844#	2848
	2871#	2874	2880#	2886	2893#	2894	3306	3312#	3315	3318#	3489#	3646#	3717#	3815#	3854#
	3868#	3932#	3950#	4115#	4423#	4468#	4474#	4475	4511#	4512	4517#	4518	4523#	4524	4529#
	4530	4536#	4541#	4542	4554#	4558	4564#	4565	4609#	4628#	4629	4671#	4675	4684#	4685
	4688#	4689	4707#	4708	4724#	4727#	4734#	4735	4748#	4752	4767#	4773#	4774	4788#	4795#
	4796	4883	4889#	4890	4893#	4902#	4903	4917#	4918	4936#	4961#	4968#	4975#	4978#	4979
	4982#	4983	4997#	4998	5016#	5048#	5055#	5062#	5065#	5066	5069#	5070	5082#	5083	5124#
	5131#	5134#	5135	5138#	5139	5151#	5152	5192#	5199#	5202#	5203	5206#	5207	5219#	5220
	5264#	5271#	5278#	5281#	5282	5285#	5286	5298#	5299	5341#	5348#	5355#	5358#	5359	5362#
	5363	5375#	5376	5420#	5428#	5431#	5432	5435#	5436	5452#	5453	5495	5505#	5506	5509#
	5510	5524#	5525	5570#	5577#	5584#	5585	5588#	5589	5602#	5603	5660#	5667#	5668	5671#
	5672	5684#	5685	5727#	5743#	5750#	5756#	5763#	5764	5767#	5768	5782#	5783	5854#	5860#
	5861	5864#	5865	5880#	5881	5976#	5981	5989#	5996#	5997	6000#	6001	6014#	6015	6049#
	6078#	6079	6092#	6093	6128#	6157#	6158	6171#	6172	6207#	6256#	6257	6270#	6271	6307#
	6356#	6357	6369#	6370	6394#	6397#	6398	6425	6434#	6435					
MSTLAB	1#	1014#	2372#	2380#	2386#	2392#	2456#	2463#	2471#	2498#	2503#	2535#	2564#	2569#	2604#
	2611#	2618#	2622#	2654#	2663#	2670#	2700#	2714#	2723#	2755#	2763#	2768#	2804#	2812#	2817#
	2848#	2874#	2886#	2894#	3306#	3315#	3318#	3489#	3646#	3717#	3815#	3854#	3868#	3932#	3950#
	4115#	4423#	4475#	4512#	4518#	4524#	4530#	4536#	4542#	4558#	4565#	4609#	4629#	4675#	4685#
	4689#	4708#	4724#	4727#	4735#	4752#	4774#	4796#	4883#	4890#	4893#	4903#	4918#	4936#	4961#
	4968#	4975#	4979#	4983#	4998#	5016#	5048#	5055#	5062#	5066#	5070#	5083#	5124#	5131#	5135#
	5139#	5152#	5192#	5199#	5203#	5207#	5220#	5264#	5271#	5278#	5282#	5286#	5299#	5341#	5348#
	5355#	5359#	5363#	5376#	5420#	5428#	5432#	5436#	5453#	5495#	5506#	5510#	5525#	5570#	5577#
	5585#	5589#	5603#	5660#	5668#	5672#	5685#	5727#	5743#	5750#	5756#	5764#	5768#	5783#	5854#
	5861#	5865#	5881#	5981#	5989#	5997#	6001#	6015#	6049#	6079#	6093#	6128#	6158#	6172#	6207#
	6257#	6271#	6307#	6357#	6370#	6394#	6398#	6425#	6435#						
MSTSTL	1#	1014#	2372#	2380#	2386#	2392#	2456#	2463#	2471#	2498#	2503#	2535#	2564#	2569#	2604#
	2611#	2618#	2622#	2654#	2663#	2670#	2700#	2714#	2723#	2755#	2763#	2768#	2804#	2812#	2817#
	2848#	2874#	2886#	2894#	3306#	3315#	3318#	3489#	3646#	3717#	3815#	3854#	3868#	3932#	3950#
	4115#	4423#	4475#	4512#	4518#	4524#	4530#	4536#	4542#	4558#	4565#	4609#	4629#	4675#	4685#
	4689#	4708#	4724#	4727#	4735#	4752#	4774#	4796#	4883#	4890#	4893#	4903#	4918#	4936#	4961#
	4968#	4975#	4979#	4983#	4998#	5016#	5048#	5055#	5062#	5066#	5070#	5083#	5124#	5131#	5135#
	5139#	5152#	5192#	5199#	5203#	5207#	5220#	5264#	5271#	5278#	5282#	5286#	5299#	5341#	5348#
	5355#	5359#	5363#	5376#	5420#	5428#	5432#	5436#	5453#	5495#	5506#	5510#	5525#	5570#	5577#
	5585#	5589#	5603#	5660#	5668#	5672#	5685#	5727#	5743#	5750#	5756#	5764#	5768#	5783#	5854#
	5861#	5865#	5881#	5981#	5989#	5997#	6001#	6015#	6049#	6079#	6093#	6128#	6158#	6172#	6207#
	6257#	6271#	6307#	6357#	6370#	6394#	6398#	6425#	6435#						
MSWORD	1#	1014#	1073#	1082	1128#	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139
	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	3306#	3307	3308	3309	4468#
	4727#	4767#	4788#	4883#	4884	4885	4886	5495#	5496	5497	5498	6425#	6426	6427	6428
	6457#	6463#	6500#	6505#	6512#	6560	6561								
MSXFER	1#	1014#													
OPEN	1#	1014#													
PASS	1544#	2388	2466	2666	2889	3007	3044	3069	3113	3143	3227	3280	3320	3392	3504
	3604	3648	3727	3760	3953	3991	4034	4127	4223	4271	4386				
POINTE	1#	1014#	1030												
PRINTB	1#	1014#	2368	2376	2451	2458	2493	2530	2598	2649	2658	2695	2749	2798	2843
	5975														
PRINTF	1#	1014#	3311	4670	4747										
PRINTS	1#	1014#													
PRINTX	1#	1014#	2382	2558	2606	2613	2708	2757	2806	2870	2879				
READBU	1#	1014#													
READEF	1#	1014#	4510	4516	4522	4528									
RFLAGS	1#	1014#													
SAVE	1503#	2363	2444	2646	2840	2930	3036	3063	3095	3134	3186	3271	3302	3364	3436

```
CVDHAA0 DHV-11 FUNC TST PART1   MACY11 30A(1052)  12-JUL-83  10:52  PAGE 177
CVDHAA.P11    12-JUL-83 00:42          CROSS REFERENCE TABLE -- MACRO NAMES

          3535    3633    3676    3751    3794    3979    4014    4110    4153    4256    4317
SETPRI      1#   1014#   4563    4683    4916    4977    4996    5064    5081    5133    5150    5201    5218    5280    5297
          5357    5374    5430    5451    5504    5523    5583    5601    5666    5683    5762    5781    5859    5879    5995
          6013    6091    6170    6269    6368
SETVEC      1#   1014#   4553
SLASH       1#   1014#
STARS       1#   1014#
SVC         1#   1012#   1013
XFER        1#   1014#   4468#   4727#   4767#   4788#
XFERF       1#   1014#
XFERT       1#   1014#


. ABS.  026220     000


 ERRORS DETECTED:  0

 CVDHAA.BIC,CVDHAA.LST/CRF/NL:TOC/SOL=SVC34R.MLB,CVDHAA.P11
 RUN-TIME: 18 25 2 SECONDS
 RUN-TIME RATIO: 335/46=7.1
 CORE USED:  16K  (31 PAGES)
```