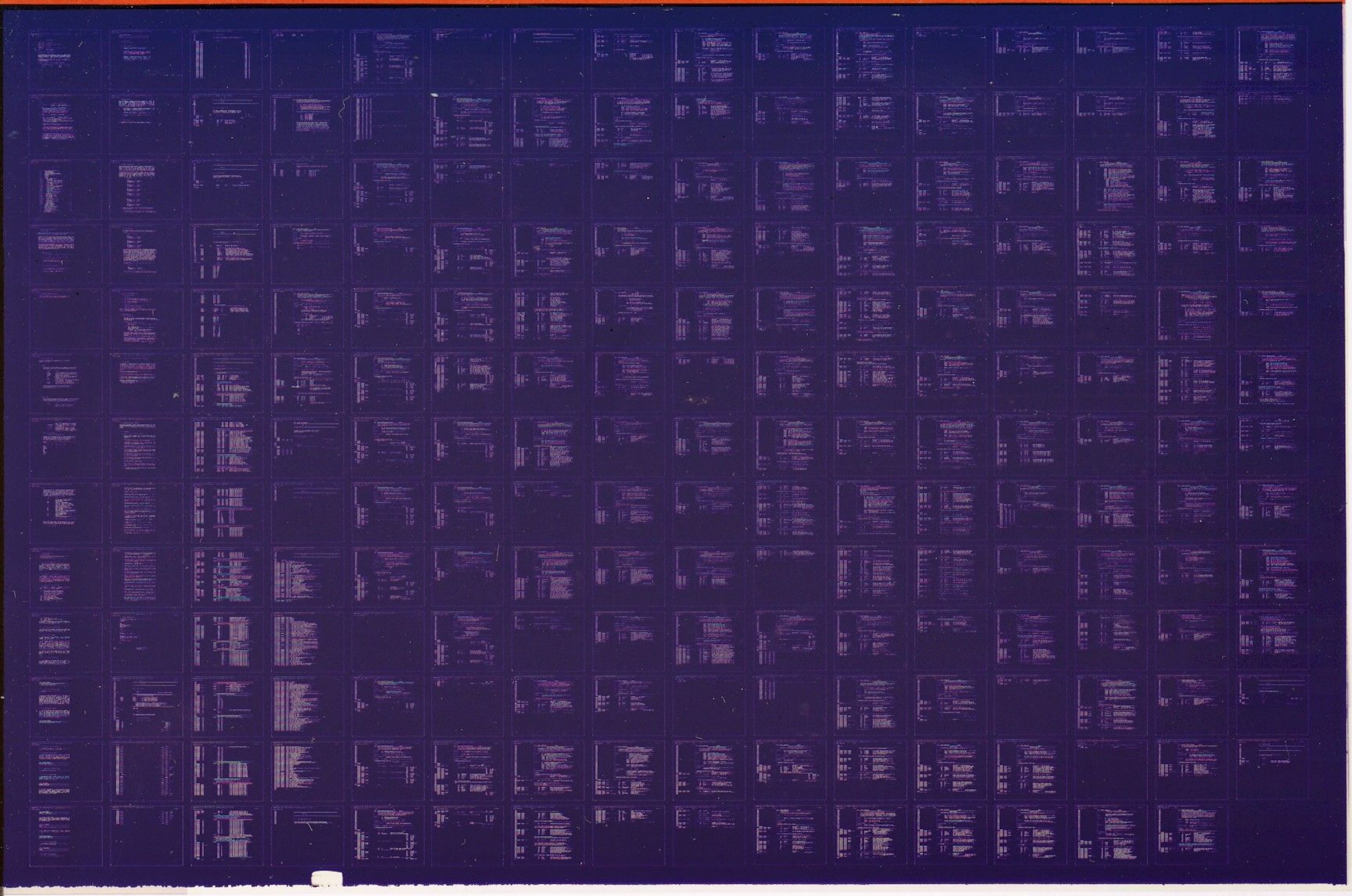
DHV11-M

DHV11-M TST ORION UFD
CVDHEB0

AH-T894B-MC
1 OF 2 OCT 1985

digital
MADE IN USA



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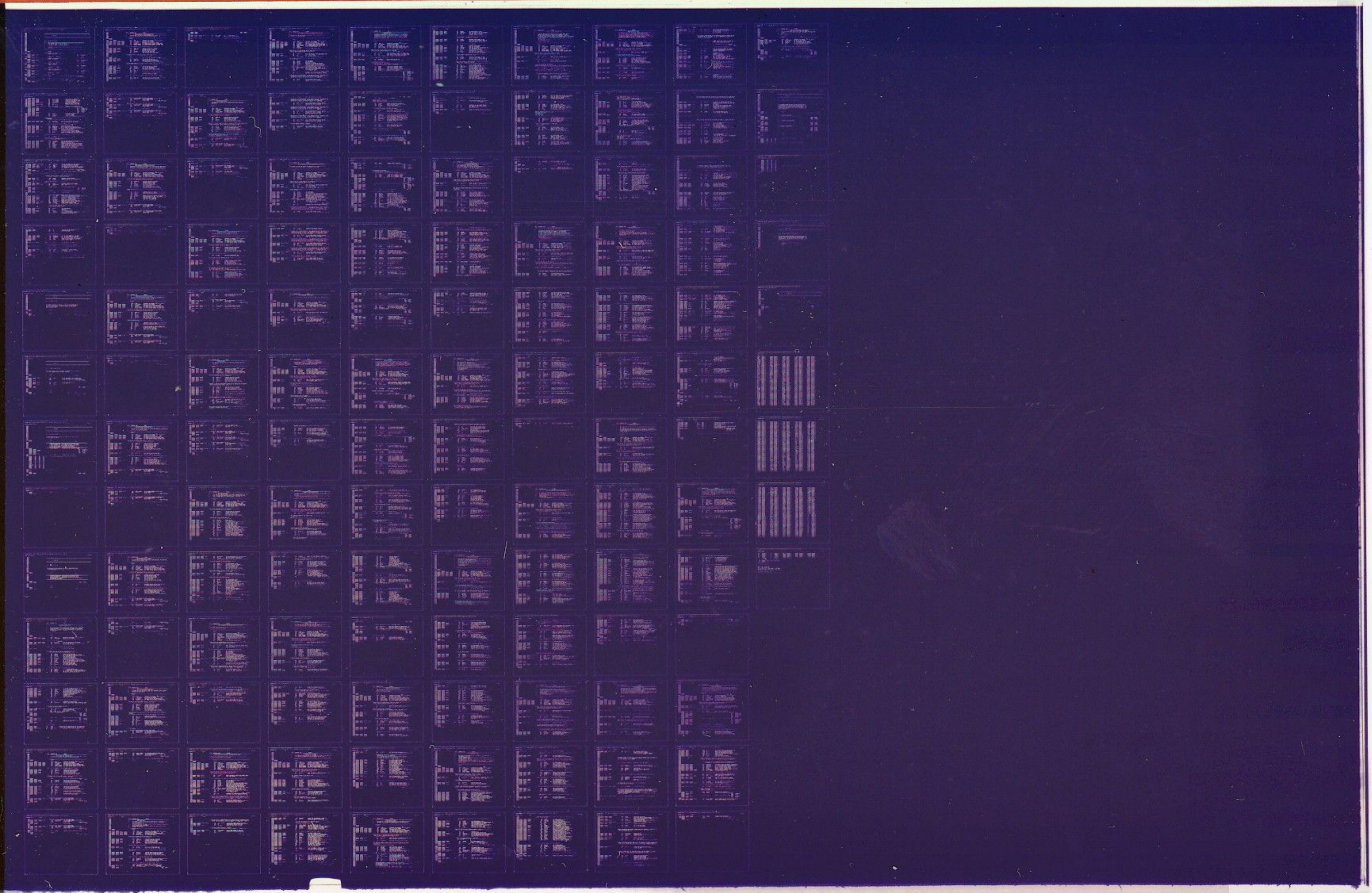

```
4 J2 =
A >;
1                                                                    SEQ 000
CVDHEBO DHV11 M TEST, ORION UFD MACRO Y05.02  Wednesday 08-May-85 10:16  Page 2
PROGRAM DOCUMENT

                .REM &


                        IDENTIFICATION
                        - -   --   -

                PRODUCT CODE:   AC T8938-MC

                PRODUCT NAME:   CVDHEBO DHV11-M TEST, ORION UFD

                PRODUCT DATE:   MAY 1985

                MAINTAINER:     Bruce Ribolini   MK D'agnostics Group

                AUTHOR:         Bert Kle'nschmidt
                                Tony Gr'mshaw

                MODIFIED BY:    Bert Kleinschm dt


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                        DEC             DECUS           DECTAPE
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***** MODIFICATION HISTORY *****

Original release: 06 Feb-84 Bert Kleinschmidt
Created from CVDHAB, CVDHBC, and CVDHCB.

Version B0 17 Jul-84 Bert Kleinschmidt
Fixed typographical errors discovered to date.
Modified control of processor priority and LTC throughout
the program to guarentees a less than 2 second
response to a Break request while running under APT.
Fixed bug in IAUTO Active test which caused an XON
character to arrive late on processors with cache.

Version B0 28-Sep-84 Peter ONeil
Modified VDHE.CUC to turn off clock if clock was enabled.

Version B0 6-May 85 Howerd L. Marshall
Found intermitent failure in IAUTO test because with faster
CPUs, last X-ON/X-OFF character does not get into the FIFO
buffer in time to be read by routine.
Changed test 29, IAUTO test, to provide pause when FIFO buffer
is 1/2 filled (128. characters) instead of when FIFI buffer is
3/4 filled (192. characters).

Changed test 38, DMA Addressing Test to use KPAR5 instead of
KPAR6, and as to not modify KPAR0, 6 + 7.

In addition, found test 40, DMA Transmission Test, to be a
failure under the Extended monitor because the DRS and XXDP+
services require more time to execute the SETPRI + GETPRI
macros. Substituted those macros with MTPS + MFPS respectively.

ATTENTION: /NO RESTORE (of DRS) IS ASSEMBLED INTO THIS DIAG. !!!

)
V

```
**************************************************************************
*  Found additional timing problems when running under the               *
* extended DRS monitor on a PDP 11/23+ in test #3, Master reset          *
* skip selftest test. The DRS calls are consuming too much time          *
* and adversly affecting the timing of the critical loops in test        *
* #3. Assembled in "/NORESTORE" into this source code by adding          *
* an argument (a 1) to the end of the HEADER macro.                      *
**************************************************************************
```

TABLE OF CONTENTS

1.C GENERAL PROGRAM CONSIDERATIONS

1.1 PROGRAM ABSTRACT

CVDHE is a Functional Verification Test (FVT) for the DHV11 M 8 line asynchronous multiplexer. This program has been created for inclusion within the Orion User Friendly Diagnostic (UFD) system.

The source file for Rev A of this program was created by merging the source files for CVDHAB, CVDHBC, and CVDHCB (The three parts of the DHV11 M FVT) and removing any code which required external loopback or other operator intervention. Special versions of the single character mode and DMA mode transmission and reception tests have been produced for this program to reduce the run time from that of the standard DHV FVT (at the same time, reducing the test coverage). This program requires less than 30 seconds per DHV11-M for an error free pass.

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 DHV11-M FVT:

- LSI-11 processor with at least 56 Kbytes of RAM.
- DHV11 boards installed on the Q-bus.
- Appropriate program load device supporting XXDP+ media or a down-line loading system.

1.3 RELATED DOCUMENTS AND STANDARDS

- DHV11-M Hardware Manual - This manual describes the functions and uses of the DHV11 M device.
- 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 th s 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 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 enccuntered.
LOE	Loop on error, causing the diagnostic to loop continuously within the smallest defined block of coding (segment, subtest, or test) containing the error.
IER	Inhibit error reporting.
IBE	Inhibit basic error reports.
IXE	Inhibit extended error reports.
PRI	Direct all messages to a line printer.
PNT	Print number of test being executed.
BOE	Bell on error.
UAM	Run in unattended mode, bypassing manual

intervention.
ISR Inhibit statistical reports.
IDU Inhibit dropping of units by diagnostic.
LOT Loop on test.

The flags named or equated to 1 are set, those equated to 0 are cleared. A flag not specified is cleared. If the flags switch is not given all flags are cleared. See example at end of "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 "0 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((ED)/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)/UN[illegible]:<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 DHV11-M can be placed (160460 Octal).

2. INTERRUPT VECTOR ADDRESS - This question requests the interrupt vector address of the specified DHV11.

3. BR Level - This questions requests the interrupt BR level of the DHV11.

2.6 SOFTWARE QUESTIONS

This program contains no software P table questions. Because of this no "CHANGE SW (L) ? prompt s issued during program execution.

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 (0) ?  8<CR>

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

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

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

UNIT 4
CSR ADDRESS (0) ?  160000<CR>
SUB-DEVICE # (0) ?  3<CR>
Q FACTOR (0) 0 ?  <CR>
        .
        .
        .
UNIT 7
CSR ADDRESS (0) ?  160000<CR>
SUB DEVICE # (0) ?  6<CR>
Q FACTOR (0) 0 ?  1<CR>

UNIT 8
CSR ADDRESS (0)  160000<CR>
SUB DEVICE # (0) ?  7<CR>
Q FACTOR (0) 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

WHEN YOU FOLLOW THIS PROCEDURE YOU WILL BE USING ONLY THE DEFAULTS FOR FLAGS. 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 DHV11-M 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:

```
CVDHE 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 DHV11-M 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:

```
CVDHE 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 CVDHE:

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. 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.

5. 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.

6. 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.

7. 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.

8. RX.LINE field test - Verifies that the RX.LINE fields are correct for the skip selftest codes.

9. 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.

10. 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.

11. 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.

12. Selftest run test Verifies that no errors are found by the execution of the selftest.

13. Selftest fail test - Verifies that the selftest will report errors correctly when it is forced to fail.

14. Word access read/write test - Verifies that the registers respond correctly to word read and write accesses.

15. Word access read/modify/write test - Verifies that the registers respond correctly to read/modify/write word accesses.

16. Byte access read/write test - Verifies that the registers respond correctly to byte read and write accesses.

17. Byte access read/modify/write test - Verifies that the registers respond correctly to read/modify/write byte accesses.

18. ID.BIT test - Verifies that the ID.BIT reads as a zero.

19. No TX.DATA.VALID/No TX.ACTION test - Verifies that if a data word is written without the TX.DATA.VALID bit set, no TX.ACTION is generated. This test does not require that characters are TXed.

20. TX.DATA.VALID / TX.ACTION test - Verifies that if a data word is written with the TX.DATA.VALID bit set, it generates a corresponding TX.ACTION. This test does not require that characters are TXed.

21. TX.ENABLE inactive test - Verifies that if the TX.ENABLE bit is clear no transmission occurs.

22. TX.ENABLE active test - Verifies that TX occurs if the TX.ENABLE is set.

23. Interrupts test - Verifies that the TX and RX interrupts are functioning correctly.

24. BR level test - Verifies that the UUT generates TX and RX interrupts at the correct BR level.

25. DIAG field (BMP) test - Verifies that a request for BMP code reporting is answered by the UUT within the specified time.

26. DMA.START test - Verifies that each DMA.START bit will initiate a DMA TX on a line.

27. DMA.ABORT test - Verifies that the DMA.ABORT bit on each line will stop a DMA transmission and return a TX.ACTION and that the DMA can then be restarted.

28. I.AUTO inactive test - Verifies that the UUT will not generate and TX XON or XOFF characters in response to the FIFO conditions if the I.AUTO bit is inactive.

29. I.AUTO active test - Verifies that the UUT will generate and TX XON and XOFF characters in response to the FIFO conditions if the I.AUTO bit is active.

30. FIFO data test - Verifies that the FIFO will hold 256 characters without corrupting data.

31. FIFO 3/4 level inactive test - Verifies that the FIFO 3/4 alarm does not become active until the FIFO becomes 3/4 full.

32. FIFO 3/4 level active test - Verifies that the FIFO 3/4 alarm becomes active, and remains active, when the FIFO is more than 3/4 full.

33. FIFO 3/4 level active/inactive test - Verifies that the FIFO 3/4 alarm, once activated, remains active until the FIFO level is reduced below 1/2.

34. FIFO 1/2 level test - Verifies that FIFO 1/2 level indicator becomes active and remains active as the FIFO level is reduced below the 1/2 full point.

35. BREAK test - Verifies that setting the BREAK bit on any line causes that line to go to a spacing state and that clearing the BREAK bit removes the line from the spacing state.

36. No OVERRUN.ERROR test - Verifies that the UUT will receive the maximum number of characters without causing an overrun error.

37. OVERRUN.ERROR test - Verifies that if more than the maximum number of characters are sent to the UUT overrun errors occur.

38. DMA Addressing test - Verifies that the UUT can access the full memory which is on the host machine via DMA accesses.

39. Short single character mode TX/RX test - Verifies that the UUT will TX and RX data correclty in single character mode.

40. Short DMA mode TX/RX test - Verifies that the UUT will TX and RX data correctly using DMA transmission.

41. 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 on two units using no optional flags or DRS options:

```
.R VDHEB0
VDHEB0.BIC

DRS
CVDHE-B-0
DHV11-M TEST, ORION UFD
UNIT IS DHV11-M
RESTART ADDR: 147670
DR>STA

CHANGE HW (L)  ? ^

# UNITS (D)  ? 2

UNIT 0
CSR ADDRESS:  (O)  160460 ? ^Z

UNIT 1
CSR ADDRESS:  (O)  160460 ? 160040
INTERRUPT VECTOR ADDRESS:  (O) 300 ? 320
INTERRUPT BR LEVEL:  (O)  4? <CR>

CVDHE EOP    1
    0 CUMULATIVE ERRORS

^C
DR> EXIT
.
```

```
                                    E
1085                                        .LIST SEQ,LOC,BIN,MEB
1086                                        .NLIST CND
1087 000000                                  .ENABLE AMA,ABS,LC ;$$$
```

```
                        ;******************************************************************************
                        ;
                        ;               VDHE.PHD
                        ;
                        ;******************************************************************************



                        .SBTTL  Program Header


                                .MCALL  SVC
000000                          SVC                                     ; INITIALIZE SUPERVISOR MACROS

                        ;*************************************************************************
                        ;       IF STRUCTURED MACROS ARE TO BE USED, ADD ".MCALL STRUCT" AND "STRUCT"
                        ;       TO INITIALIZE THE STRUCTURED 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

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

000000                  .ENABL  ABS
                        .ENABL  AMA
002000                  .       =       2000

002000                          BGNMOD

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

002000                          POINTER BGNSW,BGNDU,ERRTBL


002000                          HEADER  CVDHE,8,0,15,0,PRI07,1
002000
002000  103                                                             L$NAME::
002001  126                                                                     .ASCII /C/
002002  104                                                                     .ASCII /V/
002003  110                                                                     .ASCII /D/
002004  105                                                                     .ASCII /H/
002005  000                                                                     .ASCII /E/
002006  000                                                                     .BYTE   0
002007  000                                                                     .BYTE   0
002010                                                                          .BYTE   0
002010  102                                                             L$REV::
002011                                                                          .ASCII  /B/
                                                                        L$DEPO::
```

Program Header

SEQ 0025

```
002011     060
002012
002012  000000
002014
002014  000015
002016
002016  064364
002020
002020  000000
002022
002022  002250
002024
002024  002262
002026
002026  064570
002030
002030  000000
002032
002032  000000
002034
002034  000000
002036
002036  000000
002040
002040  002124
002042
002042  000340
002044
002044  000000
002046
002046  000000
002050
002050     004
002051     000
002052
002052  000000
002054  000000
002056
002056  000000
002060
002060  005534
002062
002062  000000
002064
002064  000000
002066
002066  000000
002070
002070  000000
002072
002072  042326
002074
002074  000000
002076
002076  005544
002100
002100  104035
```

```
        .ASCII  /0/
L$UNIT::
        .WORD   0
L$TIML::
        .WORD   15
L$HPCP::
        .WORD   L$HARD
L$SPCP::
        .WORD   0
L$HPTP::
        .WORD   L$HW
L$SPTP::
        .WORD   L$SW
L$LADP::
        .WORD   L$LAST
L$STA::
        .WORD   0
L$CO::
        .WORD   0
L$DTYP::
        .WORD   0
L$APT::
        .WORD   0
L$DTP::
        .WORD   L$DISPATCH
L$PRIO::
        .WORD   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$DVTYP
L$RFPP::
        .WORD   0
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
```

Program Header

SEQ 0026

```
                002102
                002102  005464
                002104
                002104  041474
                002106
                002106  042276
                002110
                002110  042274
                002112
                002112  041466
                002114
                002114  000001
                002116
                002116  000000
                002120
                002120  000000
   1150
```

```
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$TEST::
                .WORD   1
L$DLY::
                .WORD   0
L$HIME::
                .WORD   0
```

DISPATCH TABLE

```
1162                                    .SBTTL  DISPATCH TABLE
1163
1164                                    ;++
1165                                    ; THE DISPATCH TABLE CONTAINS THE STARTING ADDRESS OF EACH TEST.
1166                                    ; IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
1167                                    ;--
1168
1169 002122                                    DISPATCH 41
     002122  000051                                                    .WORD   41
     002124                                                     L$DISPATCH::
     002124  042444                                                    .WORD   T1
     002126  042734                                                    .WORD   T2
     002130  043150                                                    .WORD   T3
     002132  043400                                                    .WORD   T4
     002134  043562                                                    .WORD   T5
     002136  043740                                                    .WORD   T6
     002140  044142                                                    .WORD   T7
     002142  044334                                                    .WORD   T8
     002144  044526                                                    .WORD   T9
     002146  044700                                                    .WORD   T10
     002150  045100                                                    .WORD   T11
     002152  045312                                                    .WORD   T12
     002154  045560                                                    .WORD   T13
     002156  046122                                                    .WORD   T14
     002160  046332                                                    .WORD   T15
     002162  046546                                                    .WORD   T16
     002164  047012                                                    .WORD   T17
     002166  047262                                                    .WORD   T18
     002170  047370                                                    .WORD   T19
     002172  047600                                                    .WORD   T20
     002174  050034                                                    .WORD   T21
     002176  050334                                                    .WORD   T22
     002200  050672                                                    .WORD   T23
     002202  051704                                                    .WORD   T24
     002204  052556                                                    .WORD   T25
     002206  053034                                                    .WORD   T26
     002210  053422                                                    .WORD   T27
     002212  054042                                                    .WORD   T28
     002214  054436                                                    .WORD   T29
     002216  055060                                                    .WORD   T30
     002220  055350                                                    .WORD   T31
     002222  055652                                                    .WORD   T32
     002224  056344                                                    .WORD   T33
     002226  057034                                                    .WORD   T34
     002230  057500                                                    .WORD   T35
     002232  060124                                                    .WORD   T36
     002234  060624                                                    .WORD   T37
     002236  061552                                                    .WORD   T38
     002240  063350                                                    .WORD   T39
     002242  063732                                                    .WORD   T40
     002244  064302                                                    .WORD   T41
1170
```

```
                        ;*****************************************************************************
                        ;
                        ;               VDHE.DHT
                        ;
                        ;*****************************************************************************



                        .SBTTL  DEFAULT HARDWARE P TABLE

                        ;++
                        ; THE DEFAULT HARDWARE P TABLE CONTAINS DEFAULT VALUES OF
                        ; THE TEST-DEVICE PARAMETERS.  THE STRUCTURE OF THIS TABLE
                        ; IS IDENTICAL TO THE STRUCTURE OF THE HARDWARE P TABLES,
                        ; AND IS USED AS A "TEMPLATE  FOR BUILDING THE P TABLES.
                        ;--

002246                          BGNHW   DFPTBL
002246  000004                                                          .WORD   L10000-L$HW/2
002250                                                          L$HW::
002250                                                          DFPTBL::

002250  160460                  .WORD   160460  ;Default CSR Address
002252  000300                  .WORD   300     ;Default Vector Address
002254  000377                  .WORD   377     ;Default Act've lines bit map
002256     001                  .BYTE   1       ;Default Loopback mode
002257     004                  .BYTE   4       ;Default BR Level

002260                          ENDHW
002260                                                          L10000:
```

```
                        ;*****************************************************************************
                        ;
                        ;               VDHE.SWT
                        ;
                        ;*****************************************************************************


                        .SBTTL  SOFTWARE P TABLE

                        ;++
                        ; THE SOFTWARE TABLE CONTAINS VARIOUS DATA USED BY THE
                        ; PROGRAM AS OPERATIONAL PARAMETERS.  THESE PARAMETERS ARE
                        ; SET UP AT ASSEMBLY TIME AND MAY BE VARIED BY THE OPERATOR
                        ; AT RUN TIME.
                        ;--

002260                          BGNSW   SFPTBL
002260  000002                                                          .WORD   !10001 L$SW/2
002262                                                          L$SW::
002262                                                          SFPTBL::

002262  000000          OPTION::        .WORD   0       ;NO UNIT # OR DMA ADR WIDTH PRINTOUT.
002264  000000          NDERPT::        .WORD   0       ;DISABLE ERROR SUMMORY REPORTING.

002266                          ENDSW
002266                                                          L10001:
```

```
1231
1232                            ;**********************************************************************
*
1233                            ;
1234                            ;               VDHE.EQU
1235                            ;
1236                            ;**********************************************************************
1237
1238
1239                            .SBTTL  GLOBAL EQUATES SECTION
1240
1250
1251
1252
1253                            ;++
1254                            ; THE GLOBAL EQUATES SECTION CONTAINS PROGRAM EQUATES THAT
1255                            ; ARE USED IN MORE THAN ONE TEST.
1256                            ; -
1257
1258    000010                          NUMLNS==10      ;NUMBER OF LINES ON DHV11 IS 8.
1259    000377                          MAPLNS==377     ;BIT MAP OF LINES ON DHV11.
1260
1261                            ;****** DEVICE REGISTER OFFSETS FROM THE CSR'S ADDRESS ******
1262    000000                          CSR0==0         ;CSR REGISTER OFFSET FROM THE CSR ADDRESS
1263    000002                          RBUF0==2        ;RECEIVE REGISTER OFFSET FROM THE CSR ADDRESS
1264    000002                          TXCHR0==2       ;TRANSMIT REGISTER OFFSET FROM THE CSR ADDRESS
1265    000004                          LPR0==4         ;LINE PARAMETER REGISTER OFFSET FROM THE CSR ADDRESS
1266    000006                          STAT0==6        ;STATUS REGISTER OFFSET FROM THE CSR ADDRESS
1267    000010                          LNCTRO==10      ;LINE CONTROL REGISTER OFFSET FROM THE CSR ADDRESS
1268    000012                          TXAD10==12      ;TRANSMIT ADDRESS 1 REGISTER OFFSET FROM THE CSR ADDRESS
1269    000014                          TXAD20==14      ;TRANSMIT ADDRESS 2 REGISTER OFFSET FROM THE CSR ADDRESS
1270    000016                          TXBFC0==16      ;TRANSMIT COUNT REGISTER OFFSET FROM THE CSR ADDRESS
1271
1272                            ;****** EQUATES USED WITH RESPECT TO THE RX BUFFER ******
1273    000020                          RXBETX==16.     ;LEVEL OF RX BUFFER AT WHICH TO RE ENABLE TRANSMISSION.
1274    000030                          RXBDTX==24.     ;LEVEL OF RX BUFFER AT WHICH TO DISABLE TRANSMISSION.
1275    000100                          RXBFUL==64.     ;TOTAL CHARACTER CAPACITY OF THE RX BUFFER.
1276
1277
1292 002266                             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
```

GLOBAL EQUATES SECTION SEQ 0031

```
000001                  BIT00== 1
                        ;
001000                  BIT9==  BIT09
000400                  BIT8==  BIT08
000200                  BIT7==  BIT07
000100                  BIT6==  BIT06
000040                  BIT5==  BIT05
000020                  BIT4==  BIT04
000010                  BIT3==  BIT03
000004                  BIT2==  BIT02
000002                  BIT1==  BIT01
000001                  BIT0==  BIT00
                        ;
                        ; EVENT FLAG DEFINITIONS
                        ;   EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
                        ;
                                                        ;  BIT POSITION IN SECOND STATUS WORD
000040                  EF.START==      32.             ; (100000) START COMMAND WAS ISSUED
000037                  EF.RESTART==    31.             ; (040000) RESTART COMMAND WAS ISSUED
000036                  EF.CONTINUE==   30.             ; (020000) CONTINUE COMMAND WAS ISSUED
000035                  EF.NEW==        29.             ; (010000) A NEW PASS HAS BEEN STARTED
000034                  EF.PWR==        28.             ; (004000) A POWER-FAIL/POWER-UP OCCURRED
                        ;
                        ;
                        ; PRIORITY LEVEL DEFINITIONS
                        ;
000340                  PRI07== 340
000300                  PRI06== 300
000240                  PRI05== 240
000200                  PRI04== 200
000140                  PRI03== 140
000100                  PRI02== 100
000040                  PRI01== 40
000000                  PRI00== 0
                        ;
                        ;OPERATOR FLAG BITS
                        ;
000004                  EVL==       4
000010                  LOT==      10
000020                  ADR==      20
000040                  IDU==      40
000100                  ISR==     100
000200                  UAM==     200
000400                  BOE==     400
001000                  PNT==    1000
002000                  PRI==    2000
004000                  IXE==    4000
010000                  IBE==   10000
020000                  IER==   20000
040000                  LOE==   40000
100000                  HOE==  100000
1293
```

```
1295
1296                            ;*****************************************************************************
1297                            ;
1298                            ;               VDHE.GDT
1299                            ;
1300                            ;*****************************************************************************
1301
1302
1303
1304                            .SBTTL  GLOBAL DATA SECTION
1305
1306                            ;++
1307                            ; THE GLOBAL DATA SECTION CONTAINS DATA THAT ARE USED
1308                            ; IN MORE THAN ONE TEST.
1309                            ;--
1310
1311                            ;*****************************************************************************
1312                            ;       Unit Varible Area
1313                            ;*****************************************************************************
1314
1315 002266  000300                     RXVECA:: .WORD  300     ;RX VECTOR ADDRESS.
1316 002270  000304                     TXVECA:: .WORD  304     ;TX VECTOR ADDRESS.
1317 002272  000377                     ACTLNS:: .WORD  377     ;ACTIVE LINE BIT MAP.
1318 002274     000                     LOPBCK:: .BYTE  0       ;LOOPBACK MODE
1319 002275     004                     BRLEVL:: .BYTE  4       ;INTERRUPT BUS REQUEST LEVEL
1320 002276  000000                     UNITN:: .WORD   0       ;UNIT NUMBER.
1321
1322                            ;*****************************************************************************
1323                            ;       Device Register Address Table
1324                            ;*****************************************************************************
1325 002300                             DRADRT::
1326 002300  160000                     CSRA::  .WORD   160000  ;DHV11-M CSR ADDRESS
1327 002302  160002             TXCHA:: RBUFA:: .WORD   160002  ;DHV11-M RECEIVE/TRANSMIT BUFFER ADDRESS
1328 002304  160004                     LPRA::  .WORD   160004  ;DHV11-M LINE PARAMETER REGISTER ADDRESS
1329 002306  160006                     STATA:: .WORD   160006  ;DHV11-M STATUS REGISTER ADDRESS
1330 002310  160010                     LNCTRA:: .WORD  160010  ;DHV11-M LINE CONTROL REGISTER ADDRESS
1331 002312  160012                     TXAD1A:: .WORD  160012  ;DHV11-M TRANSMIT BUFFER 1 REGISTER ADDRESS
1332 002314  160014                     TXAD2A:: .WORD  160014  ;DHV11-M TRANSMIT BUFFER 2 REGISTER ADDRESS
1333 002316  160016                     TXBFCA:: .WORD  160016  ;DHV11-M TRANSMIT BUFFER COUNT REGISTER ADDRESS
1334
1335                            ;*****************************************************************************
1336                            ;       Bit mask table of un-used DHV11-M device register bits.
1337                            ;*****************************************************************************
1338 002320  137660                     UNBTTB::.WORD   137660  ;UNUSED BIT MASK FOR THE CSR
1339 002322  177777                             .WORD   177777  ;UNUSED BIT MASK FOR THE RBUF/TX REG
1340 002324  000007                             .WORD   7       ;UNUSED BIT MASK FOR THE LPR
1341 002326  177777                             .WORD   177777  ;UNUSED BIT MASK FOR THE STAT
1342 002330  166051                             .WORD   166051  ;UNUSED BIT MASK FOR THE LNCTRL
1343 002332  000000                             .WORD   0       ;UNUSED BIT MASK FOR THE TBUFFAD1
1344 002334  077700                             .WORD   77700   ;UNUSED BIT MASK FOR THE TBUFFAD2
1345 002336  000000                             .WORD   0       ;UNUSED BIT MASK FOR THE TBUFFCT
1346
1347                            ;*****************************************************************************
1348                            ;       Register Message Address Table
1349                            ;*****************************************************************************
1350 002340  010644                     RMATBB:: .WORD  DR00MG  ;ADDRESS OF "CSR" MESSAGE.
1351 002342  010650                             .WORD   DR02MG  ;ADDRESS OF "RBUF" MESSAGE.
```

```
1352 002344  010655                    .WORD   DR04MG  ;ADDRESS OF 'LPR" MESSAGE.
1353 002346  010661                    .WORD   DR06MG  ;ADDRESS OF "STAT" MESSAGE.
1354 002350  010666                    .WORD   DR10MG  ;ADDRESS OF "LNCTRL" MESSAGE.
1355 002352  010675                    .WORD   DR12MG  ;ADDRESS OF "TBUFFAD1" MESSAGE.
1356 002354  010706                    .WORD   DR14MG  ;ADDRESS OF "TBUFAD2" MESSAGE.
1357 002356  010717                    .WORD   DR16MG  ;ADDRESS OF "TBUFFCT" MESSAGE.
1358
1359                            ;*******************************************************************************
1360                            ;       Assorted global variables:
1361                            ;*******************************************************************************
1362 002360  000000                    BUFPTR:: .WORD  0       ;STORAGE FOR RECEIVE CHARACTER BUFFER POINTER.
1363 002362  000000                    CTRLCF:: .WORD  0       ;STORAGE FOR THE CONTROL-C FLAG.
1364 002364  000001                    TSTNUM:: .WORD  1       ;STORAGE FOR THE TEST NUMBER.
1365 002366  000000                    IBM::    .WORD  0       ;INACTIVE TX/RX BITS MASK.
1366 002370  031463                    LGRP1M:: .WORD  31463   ;BIT MAP OF LINES IN LINE GROUP I.
1367 002372  146314                    LGRP2M:: .WORD  146314  ;BIT MAP OF LINES IN LINE GROUP II.
1368 002374  000000                    IESTAT:: .WORD  0       ;STORAGE FOR STATES OF THE DUT INT ENABLE BITS.
1369 002376  000000                    PASCNT:: .WORD  0       ;STO'G FOR PASS COUNT USED IN ROM VERSION# TST.
1370 002400  000000                    WORD1::  .WORD  0       ;LOCATION FOR PASSING INDIRECT PARAMETERS.
1371 002402  000000                    RXTOUT:: .WORD  0       ;TIME-OUT VALUE FOR WAITING FOR LAST RX CHAR.
1372 002404  000000                    SAVTEN:: .WORD  0       ;STORAGE FOR TX.ENABLE STATES, (TXROFF, TXRON).
1373 002406  000000                    SAVPRI:: .WORD  0       ;STO'G FOR PROCESSOR PRIORITY, (TXROFF, TXRON).
1374 002410  000000                    TXENBM:: .WORD  0       ;STORAGE FOR TX.ENABLE STATES, (BUFFER MGM'NT).
1375 002412  000000                    RXINTC:: .WORD  0       ;STORAGE FOR RECEIVER INTERRUPT FLAGS.
1376 002414  000000                    RXINTF:: .WORD  0       ;STORAGE FOR RECEIVER INTERRUPT FLAGS.
1377 002416  000000                    TXINTC:: .WORD  0       ;STORAGE FOR TRANSMIT INTERRUPT COUNT.
1378 002420  000000                    TXINTF:: .WORD  0       ;STORAGE FOR TRANSMIT INTERRUPT FLAGS.
1379 002422  000000                    TP4VEC:: .WORD  0       ;STORAGE FOR THE NORMAL 004 TRAP VECTOR.
1380 002424  000000                    TP4FLG:: .WORD  0       ;FLAGS SET WHEN AN EXPECTED 004 TRAP OCCURS.
1381 002426  177777                    BITLNG:: .WORD  -1      ;NUMBER OF BITS HOST USES TO DEFINE A UNIQUE
1382                                                            ;ADDR. -1= 16 BITS, 0= 18 BITS, 1= 22 BITS.
1383 002430  000000                    FFREM::  .WORD  0       ;STO'G FOR ADR OF FIRST FREE WORD AFTER THE DIAG'TIC
1384 002432  000000                    DMTSTA:: .WORD  0       ;STO'G FOR DMA TEST ADDRESS (IN PAR FORM).
1385 002434  000000                    GMANWD:: .WORD  0       ;WORD FOR GMANxx CALL RETURN PARAMETERS.
1386 002436  000000                    PMSFLG:: .WORD  0       ;FLAG INDICATING WHETHER TO PRINT MODEM STATUS.
1387
1388                            ;*******************************************************************************
1389                            ;       Line Time Clock variables and storage.
1390                            ;*******************************************************************************
1391 002440  177546                    CLKCSR:: .WORD  177546  ;CSR ADDRESS OF THE LTC.
1392 002442  000300                    CLKBRL:: .WORD  PRI06   ;INTERRUPT PRIORITY LEVEL OF THE LTC.
1393 002444  000100                    CLKVEC:: .WORD  100     ;INTERRUPT VECTOR ADDRESS OF THE LTC.
1394 002446  000074                    CLKHRZ:: .WORD  60.     ;INTERRUPT FREQUENCY OF THE LTC.
1395 002450  000000                    TIMER1:: .WORD  0       ;HARDWARE CLOCK COUNTER #1.
1396 002452  000000                    TIMER2:: .WORD  0       ;HARDWARE CLOCK COUNTER #2.
1397 002454  000170                    TIMER3:: .WORD  120.    ;HARDWARE BREAK COUNTER LOCATION.
1398 002456  000170                    BCOUNT:: .WORD  120.    ;BREAK COUNT VALUE IN CLOCK TICKS.
1399 002460  000021                    MSTICK:: .WORD  17.     ;NUMBER OF MILLI-SECONDS PER LTC TICK.
1400 002462  000062                    MSLCNT:: .WORD  62      ;LOOP COUNT (USED BY MSLOOP) TO DELAY 1 MS.
1401
1402                            ;*******************************************************************************
1403                            ;       Memmory Management Variables and Flags.
1404                            ;*******************************************************************************
1405 002464  177572                    MMSR0:: .WORD   177572  ;ADDRESS OF MEM MGT STATUS REGISTER #0.
1406 002466  172516                    MMSR3:: .WORD   172516  ;ADDRESS OF MEM MGT STATUS REGISTER #3.
1407 002470  000000                    MMPRES:: .WORD  0       ;MEM MGT PRESENT FLAG (0 IF MM NOT PRESENT).
1408 002472  000000                    MMENAB:: .WORD  0       ;MEM MGT ENABLED FLAG (0 IF MM NOT ENABLED).
```

```
1409
1410 002474
1411 002474  172340          PARATB::                        ;BASE OF MEM MGT PAR ADDRESS TABLE.
1412 002476  172342                  PAR0A:: .WORD   172340  ;ADDRESS OF MEM MGT PAR #0.
1413 002500  172344                  PAR1A:: .WORD   172342  ;ADDRESS OF MEM MGT PAR #1.
1414 002502  172346                  PAR2A:: .WORD   172344  ;ADDRESS OF MEM MGT PAR #2.
1415 002504  172350                  PAR3A:: .WORD   172346  ;ADDRESS OF MEM MGT PAR #3.
1416 002506  172352                  PAR4A:: .WORD   172350  ;ADDRESS OF MEM MGT PAR #4.
1417 002510  172354                  PAR5A:: .WORD   172352  ;ADDRESS OF MEM MGT PAR #5.
1418 002512  172356                  PAR6A:: .WORD   172354  ;ADDRESS OF MEM MGT PAR #6.
1419 002514                          PAR7A:: .WORD   172356  ;ADDRESS OF MEM MGT PAR #7.
1420                  PARATE::                                ;END OF PAR ADDRESS TABLE.
1421 002514
1422 002514  172300          PDRATB::                        ;BASE OF MEM MGT PDR ADDRESS TABLE.
1423 002516  172302                  PDR0A:: .WORD   172300  ;ADDRESS OF MEM MGT PDR #0.
1424 002520  172304                  PDR1A:: .WORD   172302  ;ADDRESS OF MEM MGT PDR #1.
1425 002522  172306                  PDR2A:: .WORD   172304  ;ADDRESS OF MEM MGT PDR #2.
1426 002524  172310                  PDR3A:: .WORD   172306  ;ADDRESS OF MEM MGT PDR #3.
1427 002526  172312                  PDR4A:: .WORD   172310  ;ADDRESS OF MEM MGT PDR #4.
1428 002530  172314                  PDR5A:: .WORD   172312  ;ADDRESS OF MEM MGT PDR #5.
1429 002532  172316                  PDR6A:: .WORD   172314  ;ADDRESS OF MEM MGT PDR #6.
1430 002534                          PDR7A:: .WORD   172316  ;ADDRESS OF MEM MGT PDR #7.
1431                  PDRATE::                                ;END OF MEM MGT PDR ADDRESS TABLE.
1432
1433          ;*************************************************************************
1434          ;       Table of words with corresponding bit set for generation of bit maps.
1435 002534  000001  ;*************************************************************************
1436 002536  000002  BITTBL:: .WORD  1                       ;BIT 0 SET.
1437 002540  000004          .WORD   2                       ;BIT 1 SET.
1438 002542  000010          .WORD   4                       ;BIT 2 SET.
1439 002544  000020          .WORD   10                      ;BIT 3 SET.
1440 002546  000040          .WORD   20                      ;BIT 4 SET.
1441 002550  000100          .WORD   40                      ;BIT 5 SET.
1442 002552  000200          .WORD   100                     ;BIT 6 SET.
1443 002554  000400          .WORD   200                     ;BIT 7 SET.
1444 002556  001000          .WORD   400                     ;BIT 8 SET.
1445 002560  002000          .WORD   1000                    ;BIT 9 SET.
1446 002562  004000          .WORD   2000                    ;BIT 10 SET.
1447 002564  010000          .WORD   4000                    ;BIT 11 SET.
1448 002566  020000          .WORD   10000                   ;BIT 12 SET.
1449 002570  040000          .WORD   20000                   ;BIT 13 SET.
1450 002572  100000          .WORD   40000                   ;BIT 14 SET.
1451                         .WORD   100000                  ;BIT 15 SET.
1452
1453          ;*************************************************************************
1454          ;*      Table of DUT Baudrates
1455 002574  ;*************************************************************************
1456 002574  000062  BRTBLB::                                ;BASE OF DUT BAUD RATE TABLE.
1457 002576  000113          .WORD   50.                     ;BAUD RATE ENTRY FOR CODE 0.
1458 002600  000156          .WORD   75.                     ;BAUD RATE ENTRY FOR CODE 1.
1459 002602  000206          .WORD   110.                    ;BAUD RATE ENTRY FOR CODE 2.
1460 002604  000226          .WORD   134.                    ;BAUD RATE ENTRY FOR CODE 3.
1461 002606  000454          .WORD   150.                    ;BAUD RATE ENTRY FOR CODE 4.
1462 002610  001130          .WORD   300.                    ;BAUD RATE ENTRY FOR CODE 5.
1463 002612  002260          .WORD   600.                    ;BAUD RATE ENTRY FOR CODE 6.
1464 002614  003410          .WORD   1200.                   ;BAUD RATE ENTRY FOR CODE 7.
1465 002616  003720          .WORD   1800.                   ;BAUD RATE ENTRY FOR CODE 8.
                             .WORD   2000.                   ;BAUD RATE ENTRY FOR CODE 9.
```

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1466 002620  004540                .WORD   2400.           ;BAUD RATE ENTRY FOR CODE 10.
1467 002622  011300                .WORD   4800.           ;BAUD RATE ENTRY FOR CODE 11.
1468 002624  016040                .WORD   7200.           ;BAUD RATE ENTRY FOR CODE 12.
1469 002626  022600                .WORD   9600.           ;BAUD RATE ENTRY FOR CODE 13.
1470 002630  045400                .WORD   19200.          ;BAUD RATE ENTRY FOR CODE 14.
1471 002632  113000                .WORD   38400.          ;BAUD RATE ENTRY FOR CODE 15.
1472 002634                     BRTBLE::                   ;LABEL AFTER END OF DUT BAUDRATE TABLE.
1473                            ;*************************************************************************
1474                            ;*      GPR Save Areas Zero and One.
1475                            ;*************************************************************************
1476 002634                     GPRS0B::                   ;BASE OF GPR SAVE AREA NUMBER ZERO.
1477 002634  000000                .WORD   0               ;WORD 1, STORAGE FOR R1.
1478 002636  000000                .WORD   0               ;WORD 2, STORAGE FOR R2.
1479 002640  000000                .WORD   0               ;WORD 3, STORAGE FOR R3.
1480 002642  000000                .WORD   0               ;WORD 4, STORAGE FOR R4.
1481 002644  000000                .WORD   0               ;WORD 5, STORAGE FOR R5.
1482                            ;*************************************************************************
1483                            ;*      Transmission and Reception Variables, Pointers, and Flags.
1484                            ;*************************************************************************
1485 002646  000000             CHRTOT:: .WORD  0          ;TOTAL RECEIVED CHARACTER COUNTER.
1486 002650  000000             ERSMRF:: .WORD  0          ;"PRINT ERROR SUMMARY" FLAGS.
1487 002652  000000             TXDONF:: .WORD  0          ;TRANSMISSION DONE FLAGS.
1488 002654  000000             RXDONF:: .WORD  0          ;RECEPTION DONE FLAGS.
1489 002656  000000             TXDBLF:: .WORD  0          ;"TX HAS BEEN DISABLED" FLAG.
1490                            ;*************************************************************************
1491                            ;       Storage area for the BMP code queue.
1492                            ;*************************************************************************
1493 002660  000000             BMPCQP::        .WORD   0       ;POINTER USED TO ACCESS THE NEXT CELL IN QUE.
1494 002662                     BMPCQB::        .BLKW   64.     ;STORAGE FOR 32 CELLS, TEST# PLUS BMP CODE.
1495 003062                     BMPCQE::                        ;LAST ADDRESS PLUS 2 OF THE BMP CODE QUEUE.
1496                            ;*************************************************************************
1497                            ;*      Receive Buffer and Associated Variables.
1498                            ;*************************************************************************
1499 003062  000000             RXBOPT:: .WORD  0          ;RX BUFFER OUTPUT POINTER.
1500 003064  000000             RXBIPT:: .WORD  0          ;RX BUFFER INPUT POINTER.
1501 003066  000000             RXBCNT:: .WORD  0          ;COUNT OF NUMBER OF CHARS IN RX BUFFER.
1502 003070                     RXBSTA::                   ;LABEL AT BEGINNING OF THE RX BUFFER.
1503 003070                        .BLKW   RXBFUL          ;LEAVE ENOUGH ROOM FOR A FULL BUFFER.
1504 003270  000000             RXBEND:: .WORD  0          ;LABEL AFTER END OF RX BUFFER.
1505                            ;*************************************************************************
1506                            ;*      TX/RX Control Block.
1507                            ;*************************************************************************
1508 003272                     CBB::                      ;BASE OF TX/RX CONTROL BLOCK.
1509 003272  000000             CBLPRA:: .WORD  0          ;LINE PARAMETER REGISTER CONTENTS.
1510 003274  000000             CBLNCA:: .WORD  0          ;LINE CONTROL REGISTER CONTENTS.
1511 003276  000000             CBDPAA:: .WORD  0          ;START ADDRESS OF DATA PATTERN.
1512 003300  000000             CBDPLA:: .WORD  0          ;LENGTH OF DATA PATTERN.
1513 003302  000000             CBDPNA:: .WORD  0          ;NUMBER OF REPEAT TRANSMISSIONS OF THE DATA PATTERN.
1514 003304  000000             CBMAPA:: .WORD  0          ;BIT MAP OF LINES TO INITIALISE.
1515 003306  000000             CBLPBA:: .WORD  0          ;LOOPBACK MODE (AS IN LOPBCK).
1516 003310  000000             CBOFSA:: .WORD  0          ;AMOUNT OF OFFSET BETWEEN EACH TX START.
1517                            ;*************************************************************************
1518                            ;*      Transmission and Reception Tables of Pointers and Counters.
1519                            ;*************************************************************************
1520 003312                     DPENDB:: .BLKW  16.        ;TABLE OF END ADDRESSES OF DATA PATTERNS.
1521 003352                     DPLENB:: .BLKW  16.        ;TABLE OF LENGTH OF DATA PATTERNS FOR LINES.
1522 003412                     EXCNTB:: .BLKW  16.        ;EXTRA RECEIVED CHARACTER COUNTERS TABLE.
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GLOBAL DATA SECTION

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1523 003452                     ERCNTB:: .BLKW  16.             ;CHARACTER RECEIVE ERROR COUNTERS TABLE.
1524 003512                     TXPTRB:: .BLKW  16.             ;TRANSMISSION DATA POINTERS TABLE.
1525 003552                     RXPTRB:: .BLKW  16.             ;RECEPTION DATA POINTERS TABLE.
1526 003612                     CHCNTB:: .BLKW  16.             ;NUMBER OF CHARACTERS TO BE TXED AND RXED.
1527 003652                     TXCNTB:: .BLKW  16.             ;TRANSMISSION CHARACTER COUNTERS TABLE.
1528 003712                     RXCNTB:: .BLKW  16.             ;RECEPTION CHARACTER COUNTERS TABLE.
1529                             ;*****************************************************************************
1530                             ;       Storage area for the contents of the DUT STAT register states.
1531                             ;*****************************************************************************
1532 003752                     STSTB::                         ;BASE OF DUT STAT STORAGE TABLE.
1533 003752  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 0.
1534 003754  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 1.
1535 003756  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 2.
1536 003760  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 3.
1537 003762  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 4.
1538 003764  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 5.
1539 003766  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 6.
1540 003770  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 7.
1541 003772  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 8.
1542 003774  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 9.
1543 003776  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 10.
1544 004000  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 11.
1545 004002  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 12.
1546 004004  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 13.
1547 004006  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 14.
1548 004010  000000                     .WORD   0               ;STORAGE FOR STAT REGISTER FOR LINE 15.
1549 004012                     STSTE::                         ;END OF DUT STAT STORAGE TABLE.
1550                             ;*****************************************************************************
1551                             ;       General table and buffer area--513 words.
1552                             ;*****************************************************************************
1553 004012                     BUFBAS::                        ;BASE OF MEMORY BUFFER.
1554 004012                     ERLTBL::        .BLKW   128.    ;FIRST HALF OF GENERAL TABLE OR BUFFER.
1555 004412                     BUFMID::        .BLKW   64.     ;SECOND HALF OF GENERAL TABLE OR BUFFER.
1556 004612                     BUF3QT::        .BLKW   64.     ;LAST QUARTER OF THE BUFFER AREA.
1557 005012                     BUFEND::                        ;END OF GENERAL PURPOSE MEMORY BUFFER.
1558 005012                     ENDETB::        .BLKW   16.     ;BUFFER OVERFLOW SPACE.
1559                             ;*****************************************************************************
1560                             ;       Table of Data Pattern Resync Queues.
1561                             ;*****************************************************************************
1562 005052                     DPRSQB::                        ;DATA PATTERN RESYNC QUEUES TABLE BASE.
1563 005052                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 0.
1564 005062                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 1.
1565 005072                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 2.
1566 005102                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 3.
1567 005112                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 4.
1568 005122                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 5.
1569 005132                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 6.
1570 005142                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 7.
1571 005152                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 8.
1572 005162                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 9.
1573 005172                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 10.
1574 005202                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 11.
1575 005212                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 12.
1576 005222                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 13.
1577 005232                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 14.
1578 005242                             .BLKW   4               ;DATA PATTERN RESYNC QUEUE FOR LINE 15.
1579 005252                     DPRSQE::                        ;END OF DATA PATTERN RESYNC QUEUES TABLE.
```

```
                                ;*****************************************************************************
                                ;       Single Character Mode LPR Field Tables.
                                ;*****************************************************************************
005252                  SCBCTB::                ;BASE OF NUMBER OF BITS PER CHAR FIELDS TABLE.
005252  000030                  .WORD   30              ;8 BITS/CHAR LPR FIELD.
005254                  ;CBCTE::                ;END OF NUMBER OF BITS/CHAR FIELDS TABLE.
005254                  SCNSTB::                ;BASE OF NUMBER OF STOP BITS FIELDS TABLE.
005254  000000                  .WORD   0               ;1 STOP BIT LPR FIELD.
005256                  SCNSTE::                ;END OF BAUDRATE FIELDS TABLE.
005256                  SCTPTB::                ;BASE OF TYPE OF PARITY FIELDS TABLE.
005256  000040                  .WORD   40              ;ODD PARITY LPR FIELD.
005260                  SCTPTE::                ;END OF TYPE OF PARITY FIELDS TABLE.

                                ;*****************************************************************************
                                ;       SINGLE CHARACTER DATA PATTERN TABLE.
                                ;*****************************************************************************
005260      000         SDPBAS::.BYTE   0       ;START OF SINGLE CHARACTER DATA PATTERN TABLE.
005261      001                 .BYTE   1
005262      010                 .BYTE   10
005263      017                 .BYTE   17
005264      063                 .BYTE   63
005265      074                 .BYTE   74
005266      125                 .BYTE   125
005267      177                 .BYTE   177
005270      200                 .BYTE   200
005271      252                 .BYTE   252
005272      303                 .BYTE   303
005273      314                 .BYTE   314
005274      360                 .BYTE   360
005275      367                 .BYTE   367
005276      376                 .BYTE   376
005277      377                 .BYTE   377
005300                  SDPEND::                        ;END OF SINGLE CHARACTER DATA PATTERN TABLE.
005300      000                 .BYTE   0       ;START OF FIRST SHORT DATA PATTERN OVERFLOW AREA.
005301      001                 .BYTE   1
005302      010                 .BYTE   10
005303      017                 .BYTE   17

                                ;*****************************************************************************
                                ;       SINGLE CHARACTER DATA PATTERN TABLE NUMBER TWO.
                                ;*****************************************************************************
005304      125         SDP2B:: .BYTE   125     ;START OF SECOND SHORT DATA PATTERN.
005305      252                 .BYTE   252
005306      124                 .BYTE   124
005307      253                 .BYTE   253
005310      122                 .BYTE   122
005311      255                 .BYTE   255
005312      112                 .BYTE   112
005313      265                 .BYTE   265
005314      052                 .BYTE   52
005315      325                 .BYTE   325
005316      152                 .BYTE   152
005317      225                 .BYTE   225
005320      132                 .BYTE   132
005321      245                 .BYTE   245
005322      126                 .BYTE   126
005323      251                 .BYTE   251
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1637 005324
1638 005324     125                SDP2E::                         ;END OF SECOND SHORT DATA PATTERN.
1639 005325     252                        .BYTE   125     ;START OF SECOND SHORT DATA PATTERN OVERFLOW AREA.
1640 005326     124                        .BYTE   252
1641 005327     253                        .BYTE   124
1642 005330     122                        .BYTE   253
1643 005331     255                        .BYTE   122
1644 005332     112                        .BYTE   255
1645 005333     265                        .BYTE   112
1646 005334     052                        .BYTE   265
1647 005335     325                        .BYTE   52
1648 005336     152                        .BYTE   325
1649 005337     225                        .BYTE   152
1650 005340     132                        .BYTE   225
1651 005341     245                        .BYTE   132
1652 005342     126                        .BYTE   245
1653 005343     251                        .BYTE   126
1654                               ;*************************************************************************
1655                               ;       Single character safe proportional delay table.
1656                               ;*************************************************************************
1657 005344     372                PROTBL::.BYTE   250.            ;DELAY IN MILLI SECONDS AT 50 BAUD
1658 005345     252                        .BYTE   170.            ;DELAY IN MILLI SECONDS AT 75 BAUD
1659 005346     167                        .BYTE   119.            ;DELAY IN MILLI SECONDS AT 110 BAUD
1660 005347     143                        .BYTE   99.             ;DELAY IN MILLI SECONDS AT 134.5 BAUD
1661 005350     132                        .BYTE   90.             ;DELAY IN MILLI SECONDS AT 150 BAUD
1662 005351     062                        .BYTE   50.             ;DELAY IN MILLI SECONDS AT 300 BAUD
1663 005352     036                        .BYTE   30.             ;DELAY IN MILLI SECONDS AT 600 BAUD
1664 005353     024                        .BYTE   20.             ;DELAY IN MILLI SECONDS AT 1200 BAUD
1665 005354     021                        .BYTE   17.             ;DELAY IN MILLI SECONDS AT 1800 BAUD
1666 005355     020                        .BYTE   16.             ;DELAY IN MILLI SECONDS AT 2000 BAUD
1667 005356     017                        .BYTE   15.             ;DELAY IN MILLI SECONDS AT 2400 BAUD
1668 005357     015                        .BYTE   13.             ;DELAY IN MILLI SECONDS AT 4800 BAUD
1669 005360     014                        .BYTE   12.             ;DELAY IN MILLI SECONDS AT 7200 BAUD
1670 005361     014                        .BYTE   12.             ;DELAY IN MILLI SECONDS AT 9600 BAUD
1671 005362     013                        .BYTE   11.             ;DELAY IN MILLI SECONDS AT 19200 BAUD
1672 005363     012                        .BYTE   10.             ;DELAY IN MILLI SECONDS AT 38400 BAUD
1673                                       .EVEN
1674                               ;*************************************************************************
1675                               ;* Table for storage of RX/TX line number associations.
1676                               ;* The associations are stored as line number times 2 for use as offsets
1677                               ;*    when accessing a table of words.
1678                               ;*    NOTE: Do not write a non-zero value into the upper byte of any entry.
1679                               ;*************************************************************************
1680 005364                       TXRXLB::                        ;BASE OF TX/RX LINE NUMBER ASSOCIATION TABLE.
1681 005364     000000                     .WORD   0               ;TX/RX LINE OFFSET FOR RX/TX LINE 0.
1682 005366     000002                     .WORD   2.              ;TX/RX LINE OFFSET FOR RX/TX LINE 1.
1683 005370     000004                     .WORD   4.              ;TX/RX LINE OFFSET FOR RX/TX LINE 2.
1684 005372     000006                     .WORD   6.              ;TX/RX LINE OFFSET FOR RX/TX LINE 3.
1685 005374     000010                     .WORD   8.              ;TX/RX LINE OFFSET FOR RX/TX LINE 4.
1686 005376     000012                     .WORD   10.             ;TX/RX LINE OFFSET FOR RX/TX LINE 5.
1687 005400     000014                     .WORD   12.             ;TX/RX LINE OFFSET FOR RX/TX LINE 6.
1688 005402     000016                     .WORD   14.             ;TX/RX LINE OFFSET FOR RX/TX LINE 7.
1689 005404     000020                     .WORD   16.             ;TX/RX LINE OFFSET FOR RX/TX LINE 8.
1690 005406     000022                     .WORD   18.             ;TX/RX LINE OFFSET FOR RX/TX LINE 9.
1691 005410     000024                     .WORD   20.             ;TX/RX LINE OFFSET FOR RX/TX LINE 10.
1692 005412     000026                     .WORD   22.             ;TX/RX LINE OFFSET FOR RX/TX LINE 11.
1693 005414     000030                     .WORD   24.             ;TX/RX LINE OFFSET FOR RX/TX LINE 12.
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 1694 005416  000032                    .WORD   26.             ;TX/RX LINE OFFSET FOR RX/TX LINE 13.
 1695 005420  000034                    .WORD   28.             ;TX/RX LINE OFFSET FOR RX/TX LINE 14.
 1696 005422  000036                    .WORD   30.             ;TX/RX LINE OFFSET FOR RX/TX LINE 15.
 1697 005424                    TXRXLE::                        ;END OF TX/RX LINE NUMBER ASSOCIATION TABLE.
 1698                                   .EVEN                   ;GUARANTEE THAT NEXT TABLE IS ON WORD BOUNDARY.
 1699                           ;*************************************************************************
 1700                           ;* Table for storage of RX/TX line number associations.
 1701                           ;* The associations are stored as line numbers which can be used as such or
 1702                           ;*    as offsets when accessing a table of bytes.
 1703                           ;*************************************************************************
 1704 005424                    TXRLNB::                        ;BASE OF TX/RX LINE NUMBER ASSOCIATION TABLE.
 1705 005424       000                  .BYTE   0               ;TX/RX LINE FOR RX/TX LINE 0.
 1706 005425       001                  .BYTE   1.              ;TX/RX LINE FOR RX/TX LINE 1.
 1707 005426       002                  .BYTE   2               ;TX/RX LINE FOR RX/TX LINE 2.
 1708 005427       003                  .BYTE   3.              ;TX/RX LINE FOR RX/TX LINE 3.
 1709 005430       004                  .BYTE   4.              ;TX/RX LINE FOR RX/TX LINE 4.
 1710 005431       005                  .BYTE   5.              ;TX/RX LINE FOR RX/TX LINE 5.
 1711 005432       006                  .BYTE   6.              ;TX/RX LINE FOR RX/TX LINE 6.
 1712 005433       007                  .BYTE   7.              ;TX/RX LINE FOR RX/TX LINE 7.
 1713 005434       010                  .BYTE   8.              ;TX/RX LINE FOR RX/TX LINE 8.
 1714 005435       011                  .BYTE   9.              ;TX/RX LINE FOR RX/TX LINE 9.
 1715 005436       012                  .BYTE   10.             ;TX/RX LINE FOR RX/TX LINE 10.
 1716 005437       013                  .BYTE   11.             ;TX/RX LINE FOR RX/TX LINE 11.
 1717 005440       014                  .BYTE   12.             ;TX/RX LINE FOR RX/TX LINE 12.
 1718 005441       015                  .BYTE   13.             ;TX/RX LINE FOR RX/TX LINE 13.
 1719 005442       016                  .BYTE   14.             ;TX/RX LINE FOR RX/TX LINE 14.
 1720 005443       017                  .BYTE   15.             ;TX/RX LINE FOR RX/TX LINE 15.
 1721 005444                    TXRLNE::                        ;END OF TX/RX LINE NUMBER ASSOCIATION TABLE.
 1722                                   .EVEN                   ;GUARANTEE THAT NEXT TABLE IS ON WORD BOUNDARY.
 1723                           ;*************************************************************************
 1724                           ;* Table of TX/RX line number associations in staggered loopback.
 1725                           ;* The associations are stored as line number times 2 for use as offsets
 1726                           ;*    when accessing a table of words.
 1727                           ;* This is a table of data for reading only.  Use to load the above table.
 1728                           ;*    NOTE: Must convert from BYTEs to WORDs when loading above table.
 1729                           ;*************************************************************************
 1730 005444                    STGTRB::                        ;BASE OF STAGGERED TX/RX LINE NUMBER TABLE.
 1731 005444       004                  .BYTE   4.              ;TX/RX LINE OFFSET FOR RX/TX LINE 0.
 1732 005445       006                  .BYTE   6.              ;TX/RX LINE OFFSET FOR RX/TX LINE 1.
 1733 005446       000                  .BYTE   0               ;TX/RX LINE OFFSET FOR RX/TX LINE 2.
 1734 005447       002                  .BYTE   2.              ;TX/RX LINE OFFSET FOR RX/TX LINE 3.
 1735 005450       014                  .BYTE   12.             ;TX/RX LINE OFFSET FOR RX/TX LINE 4.
 1736 005451       016                  .BYTE   14.             ;TX/RX LINE OFFSET FOR RX/TX LINE 5.
 1737 005452       010                  .BYTE   8.              ;TX/RX LINE OFFSET FOR RX/TX LINE 6.
 1738 005453       012                  .BYTE   10.             ;TX/RX LINE OFFSET FOR RX/TX LINE 7.
 1739 005454       024                  .BYTE   20.             ;TX/RX LINE OFFSET FOR RX/TX LINE 8.
 1740 005455       026                  .BYTE   22.             ;TX/RX LINE OFFSET FOR RX/TX LINE 9.
 1741 005456       020                  .BYTE   16.             ;TX/RX LINE OFFSET FOR RX/TX LINE 10.
 1742 005457       022                  .BYTE   18.             ;TX/RX LINE OFFSET FOR RX/TX LINE 11.
 1743 005460       034                  .BYTE   28.             ;TX/RX LINE OFFSET FOR RX/TX LINE 12.
 1744 005461       036                  .BYTE   30.             ;TX/RX LINE OFFSET FOR RX/TX LINE 13.
 1745 005462       030                  .BYTE   24.             ;TX/RX LINE OFFSET FOR RX/TX LINE 14.
 1746 005463       032                  .BYTE   26.             ;TX/RX LINE OFFSET FOR RX/TX LINE 15.
 1747                                   .EVEN                   ;GUARANTEE THAT NEXT TABLE IS ON WORD BOUNDARY.
 1760 005464                           ERRTBL
      005464                                                   L$ERRTBL::
      005464  000000           ERRTYP::        .WORD   0
```

SEQ 0040

GLOBAL DATA SECTION

```
        005466  000000                  ERRNBR::        .WORD   0
        005470  000000                  ERRMSG::        .WORD   0
        005472  000000                  ERRBLK::        .WORD   0
   1761
   1762                                         .EVEN
```

```
1764                            .SBTTL  GPR HANDLING ROUTINES FOR SUBROUTINE CALLS.
1765                            ;******************************************************************************
1766                            ;*      There are 4 routines and macro definitions used for the handling of
1767                            ;*      GPR values during subroutine calls within this program.  The four
1768                            ;*      routines/macro calls have the following names:
1769                            ;*
1770                            ;*      SAVE    Macro definition used at the beginning of a subroutine to
1771                            ;*               save the GPR contents for later restoration.
1772                            ;*      PASS - Macro definition used at the end of a subroutine to restore
1773                            ;*               the previously saved GPR contents and to leave the contents
1774                            ;*               of the specified GPR(s) intact (NOT restored).
1775                            ;*      PREG05 - Subroutine which is called from the SAVE and PASS macro
1776                            ;*               expansions which actually performs the actions on the GPRs.
1777                            ;*
1778                            ;*      During a subroutine which uses these GPR save routines the values
1779                            ;*      of the GPRs are stored on the stack in the following stack frame:
1780                            ;*
1781                            ;*              SP     -> RET PC INTO PREG05 ROUTINE.
1782                            ;*              SP+2   -> GPR R0 CONTENTS.
1783                            ;*              SP+4   -> GPR R1 CONTENTS.
1784                            ;*              SP+6   -> GPR R2 CONTENTS.
1785                            ;*              SP+8   -> GPR R3 CONTENTS.
1786                            ;*              SP+10  -> GPR R4 CONTENTS.
1787                            ;*              SP+12  -> GPR R5 CONTENTS.
1788                            ;*              SP+14  -> RET PC INTO CALLER OF SUBROUTINE WHICH CALLED PREG05.
1789                            ;*
1790                            ;*      Each level of subroutine calling uses 8 words of stack overhead.
1791                            ;*      The SAVE and PASS macros can also be used in "straight line code"
1792                            ;*      to save and restore the GPR values.  In any case, after the
1793                            ;*      issuing of a PASS call the GPRs will be restored to the values
1794                            ;*      they had prior to the last SAVE call (except for the excepted,
1795                            ;*      or passed intact, GPRs specified as parameters to the PASS call)
1796                            ;*      and the SP will also be restored to its condition before the last
1797                            ;*      SAVE call.  The programmer must be sure that the SP has the same
1798                            ;*      value when the PASS macro is called as it had immediately after
1799                            ;*      the SAVE macro was called.
1800                            ;******************************************************************************
```

```
                        .SBTTL GPR FRAME ACCESS EQUATES
                        ;+++
                        ;Equates that allow access to the stack frame.  These are the
                        ;offsets into the stack for registers saved during the PREG05
                        ;routine.
                        ;  -

000036                  LPCSLT==        36      ;Offset for last return PC.
000016                  PCSLOT==        16      ;Offset for return PC.
000014                  R5SLOT==        14      ;Offset for R5.
000012                  R4SLOT==        12      ;Offset for R4.
000010                  R3SLOT==        10      ;Offset for R3.
000006                  R2SLOT==        6       ;Offset for R2.
000004                  R1SLOT==        4       ;Offset for R1.
000002                  R0SLOT==        2       ;Offset for R0.
```

```
1818                            .SBTTL  GLOBAL MACRO DEFINITION          - SAVE -
1819                            ;*************************************************************************
1820                            ;*      This macro is used at the beginning of a subroutine to save the
1821                            ;*      contents of the GPRs R0 thru R5.
1822                            ;*
1823                            ;* INPUTS:      SP - Unchanged since subroutine was entered
1824                            ;*              R5SLOT - Offset to stack slot for R5 (Equated to 14 Octal)
1825                            ;*
1826                            ;* OUTPUTS:     GPR save area on the stack is loaded with the contents of GPRs
1827                            ;*              TOP OF STACK - Loaded with the return address into PREG05
1828                            ;*
1829                            ;* CALLING SEQUENCE:    SAVE
1830                            ;*
1831                            ;* COMMENTS:    No arguments are allowed.
1832                            ;*              The PASS macro should be called to restore the GPR values.
1833                            ;*
1834                            ;* SUBORDINATE ROUTINES CALLED: PREG05.
1835                            ;*************************************************************************
1836
1837                                    .MACRO  SAVE
1838                                    .LIST
1839                                            JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
1840                                    .NLIST
1841                                    .ENDM   SAVE
```

```
1843                            .SBTTL  GLOBAL MACRO DEFINITION         - PASS -
1844                            ;*******************************************************************************
1845                            ;*      This macro is used in conjunction with the SAVE macro.  It is
1846                            ;*      called at end of a subroutine to pass parameters in GPRs back to the
1847                            ;*      calling routine by altering the GPR save area on the stack and then
1848                            ;*      returning to PREG05 to restore the GPRs to their saved values.
1849                            ;*
1850                            ;* INPUTS:      Only allowed ARGUMENTS are "R0" thru "R5".
1851                            ;*              R0SLOT thru R5SLOT must be equated to their respective GPR save
1852                            :*                      slot offsets before calling this macro.
1853                            ;*
1854                            ;* OUTPUTS:     The GPR values are put in their respective slots on the stack.
1855                            ;*
1856                            ;* CALLING SEQUENCE:    PASS    R0,R1,...
1857                            ;*
1858                            ;* COMMENTS:    Any combination of GPR arguments may be listed in any order.
1859                            ;*              For example, the following are legal:
1860                            ;*                      PASS    R1
1861                            ;*                      PASS    R4,R0,R2
1862                            ;*              The GPRs listed as arguments will be passed intact to the
1863                            ;*              calling routine, all other GPRs will be restored.
1864                            ;*              The SP must be at its original value when PASS is called.
1865                            ;*
1866                            ;*              The macro call
1867                            ;*                      PASS    R0,R3
1868                            ;*              expands into the following assembly code:
1869                            ;*                      MOV     R0,R0SLOT(SP)           ;PUT R0 IN STACK SLOT.
1870                            ;*                      MOV     R3,R3SLOT(SP)           ;PUT R3 IN STACK SLOT.
1871                            ;*                      JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
1872                            ;*              In this example GPRs R1, R2, R4, and R5 will be restored to
1873                            ;*              their values contained in the stack frame and R0 and R3
1874                            ;*              will be left at their values prior to this PASS call.
1875                            ;*
1876                            ;* SUBORDINATE ROUTINES CALLED: (PREGRT - Label within PREG05, value on stack.)
1877                            ;*******************************************************************************
1878
1879                                    .MACRO  PASS    A,B,C,D,E,F
1880                                    .IRP    X,<A,B,C,D,E,F>
1881                                    .IF     NB,X
1882                                    .LIST
1883                                            MOV     X,X'SLOT(SP)            ;PUT X IN STACK SLOT.
1884                                    .NLIST
1885                                    .ENDC
1886                                    .ENDM
1887                                    .LIST
1888                                            JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
1889                                    .NLIST
1890                                    .ENDM   PASS
```

```
                        .SBTTL GLOBAL SUBROUTINE                - PREGO5 -
                        ;*******************************************************************************
                        ;*      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,PREGO5".)
                        ;*
                        ;* OUTPUTS:     Registers R0 through R5 are saved on the stack.
                        ;*
                        ;*CALLING SEQUENCE:     SAVE            ;Macro expansion calls PREGO5.
                        ;*                      [Subroutine code]...
                        ;*                      PASS            ;Macro expansion recalls PREGO5.
                        ;*
                        ;*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.
                        ;*******************************************************************************

005474                  PREGO5:                 ;R5 HAS BEEN LOADED ON THE STACK BY THE SUBROUTINE CALL
005474  010446                  MOV     R4,-(SP)        ;SAVE R4
005476  010346                  MOV     R3,-(SP)        ;SAVE R3
005500  010246                  MOV     R2,-(SP)        ;SAVE R2
005502  010146                  MOV     R1,-(SP)        ;SAVE R1
005504  010046                  MOV     R0,-(SP)        ;SAVE R0
005506  010546                  MOV     R5,-(SP)        ;PUSH RETURN PC ON TOP OF STACK
005510  016605  000014          MOV     R5SLOT(SP),R5   ;RESTORE R5 TO VALUE IT HAD BEFORE CALLS
                        
005514  004736                  JSR     PC,@(SP)+       ;Call the subroutine at the return address
                                                        ;from the PREGO5 call, putting the present
                                                        ;PC on the stack as a return address into
                                                        ;this (PREGO5) routine.

                                ;+++
                                ;The following code is executed when the calling routine does a
                                ;"return" [JSR  PC,@(SP)+] using the PC deposited on the stack above.
                                ;---

005516  012605          PREGRT:: MOV    (SP)+,R5        ;Put return PC in R5.
005520  012600                  MOV     (SP)+,R0        ;Restore R0.
005522  012601                  MOV     (SP)+,R1        ;Restore R1.
005524  012602                  MOV     (SP)+,R2        ;Restore R2.
005526  012603                  MOV     (SP)+,R3        ;Restore R3.
005530  012604                  MOV     (SP)+,R4        ;Restore R4.

005532  000205                  RTS     R5              ;Return to the subroutine which called PREGO5.
                                                          ;restoring R5 in the process.
```

```
   1946                                 .SBTTL  GLOBAL TEXT SECTION
   1948                                 ;******************************************************************************
   1949                                 ;
   1950                                 ;               FVTSKL1.P11
   1951
   1952                                 ;******************************************************************************
   1954
   1955
   1956                                 ;++
   1957                                 ; THE GLOBAL TEXT SECTION CONTAINS FORMAT STATEMENTS,
   1958                                 ; MESSAGES, AND ASCII INFORMATION THAT ARE USED IN
   1959                                 ; MORE THAN ONE TEST.
   1960                                 ; -
   1961
   1962                                 ;
   1963                                 ; NAMES OF DEVICES SUPPORTED BY PROGRAM
   1964                                 ;
   1965 005534                                 DEVTYP  <DHV11-M>
        005534                                                                  L$DVTYP::
        005534  104     110     126                                                     .ASCIZ  %DHV11 M%
        005537  061     061     055
        005542  115     000

                                                                                        .EVEN
   1966
   1972
   1973                                 ; TEST DESCRIPTION
   1974                                 ;
   1975 005544                                 DESCRIPT        <DHV11 TEST, ORION UFD>
        005544                                                                  L$DESC::
        005544  104     110     126                                                     .ASCIZ  /DHV11 TEST, ORION U
FD/
        005547  061     061     040
        005552  124     105     123
        005555  124     054     040
        005560  117     122     111
        005563  117     116     040
        005566  125     106     104
        005571  000

                                                                                        .EVEN
   1976                                 .EVEN
   1977
   1984
```

GLOBAL TEXT SECTION SEQ 0047

```
1986
1987                    ;*****************************************************************************************
*
1988                    ;
1989                    ;               VDHE.FMT
1990                    ;
1991                    ;*****************************************************************************************
1992
1993
1994
1995                    ;
1996                    ; FORMAT STATEMENTS USED IN PRINT CALLS
1997                    ;
1998
2009
2010
```

```
                                        ;%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
                                        ;
                                        ;               VDHE.MSG
                                        ;
                                        ;%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%


               .NLIST BIN
               .SBTTL  GLOBAL MESSAGE AREA
                        ; ********* FORMAT STATEMENTS **********
       005572  MFUNIT:: .ASCIZ /%N%A TESTING UNIT :%D4%A(D)%N/
       005630  EF0503:: .ASCIZ /%T%N/
       005635  EF0505:: .ASCIZ /%A    %D5%A ILLEGAL INTERRUPTS RECEIVED.%N/
       005710  EF1401:: .ASCIZ /%N%A ROM VERSION NUMBERS: PROC_1 = %D2%A(D)   PROC_2 = %D2%A(D)%N/
       006012  EF1402:: .ASCIZ /%T%A ROM VERSION NUMBER %T%N/
       006047  EF1601:: .ASCIZ /%A  %T%A ABORTED %N/
       006073  EF1602:: .ASCIZ /%A    EXPECTED DATA: %06%A (O).%N/
       006135  EF1603:: .ASCIZ /%A    ACTUAL DATA:   %06%A (O).%N/
       006177  EF1604:: .ASCIZ /%A  BAD BIT(S) IN DEVICE %T%A REGISTER FOR LINE %D2%A (D).%N/
       006274  EF3001:: .ASCIZ /%A    EXPECTED OR CORRECT VALUE: %O3%N/
       006343  EF3002:: .ASCIZ /%A    ACTUAL OR MEASURED  VALUE: %O3%N/
       006412  EF4401:: .ASCII /%N%A DMA ADDRESS TEST SUCCESSFUL, BITS 0 TO %D2%A (D) TESTED/
       006506           .ASCIZ / (%D2%A BITS).%N/
       006527  EF6401:: .ASCIZ /%A                          %D2%A(D).%N/
       006604  EF7801:: .ASCIZ /%T%A ON LINE %D2%A DECIMAL.%N/
       006642  EF8401:: .ASCIZ /%A  %T%A FOR LINE %D2%A(D) AFFECTS OTHER MODEM SIGNALS.%N/
       006734  EF8402:: .ASCII /%A        CHANGING %T%A FOR LINE %D2%A(D) AFFECTED /
       007017            ASCIZ /%T%A FOR LINE %D2%A(D).%N/
       007051  EF9001:: .ASCIZ /%A  UNEXPECTED %T%A FOUND IN RECEIVE CHAR FIFO:%N/
       007133  EF9002:: .ASCIZ /%A    CODE IS ASSOCIATED WITH LINE: %D2%A(D)%N/
       007212  EF9003:: .ASCIZ /%A      CODE IS: %O3%A(O)%N/
       007246  EF9004:: .ASCIZ /%A    %T%A VALUE: %O3%A(O)%N/
       007303  EF9005:: .ASCIZ /%A    %T%A VALUE: NONE%N/
       007334  EF9006:: .ASCIZ /%A  %T%A %D2%A(D)%N/
       007360  EF9007:: .ASCIZ /%A  CHARACTER RECEIVED WITH ERROR FLAG(S) SET ON LINE %D2%N/
       007454  EF9008:: .ASCIZ /%A    CHARACTER READ AS: %O3%N/
       007513  EF9009:: .ASCIZ /%A      %T%A ERROR FLAG SET.%N/
       007552  EF9010:: .ASCIZ /%A    NUMBER OF ERRORS DETECTED ON LINE %D2%A(D) IS %D5%A(D)%N/
       007651  EF9012:: .ASCII /%A LINE%D2%A ONLY %T%D5%A BYTES OF%D5%A BYTE/
       007725           .ASCIZ / DATA PAT'N TX'D FROM LINE%D2%N/
       007765  EF9013:: .ASCIZ /%A  DATA PATTERN NOT COMPLETELY %T%N/
       010032  EF9016:: .ASCIZ /%A  UNEXPECTED %T%A FOR LINE %D2%A(D) IN FIFO AFTER RESET:%N/
       010127  EF9017:: .ASCIZ /%A    %T%A (WITH ERROR FLAGS) IS %06%A(O)%N/
       010203  EF9018:: .ASCII /%A  %T%A IN SELFTEST CODE FIFO SLOT FOR LINE %D2/
       010263           .ASCIZ /%A(D) AFTER RESET.%N/
       010310  EF9019:: .ASCIZ /%A  %T%A %06%A(O)%N/
       010334  EF9020:: .ASCIZ /%A    TOO FEW TX.ACTIONS GENERATED ON LINE %D2%N/
       010415  EF9101:: .ASCIZ /%N/
       010420  EF9103:: .ASCIZ /%A      ERROR CONDITION ON LINE %D2%N/
       010466  EF9301:: .ASCIZ /%A %T%D2%A(D),  BMP CODE REPORTED :%O3%A(O)%N/
       010544  EF9302:: .ASCIZ /%A  OVERFLOW OCCURRED (MORE THAN 31 BMP CODES FOUND IN QUEUE)%N/

                       ;************ MESSAGE AREA ************
       010644  DR00MG:: .ASCIZ /CSR/
       010650  DR02MG:: .ASCIZ /RBUF/
       010655  DR04MG:: .ASCIZ /LPR/
```

GLOBAL MESSAGE AREA SEQ 0049

```
2076 010661  DR06MG:: .ASCIZ /STAT/
2077 010666  DR10MG:: .ASCIZ /LNCTRL/
2078 010675  DR12MG:: .ASCIZ /TBUFFAD1/
2079 010706  DR14MG:: .ASCIZ /TBUFFAD2/
2080 010717  DR16MG:: .ASCIZ /TBUFFCT/
2081 010727  EM0103:: .ASCIZ /DEVICE REGISTER ACCESS ERRORS/
2082 010765  EM0201:: .ASCIZ /MASTER RESET (PERFORM SELFTEST) TEST /
2083 011033  EM0202:: .ASCIZ /  MASTER RESET BIT DID NOT CLEAR AFTER BOARD RESET./
2084 011117           .ASCIZ /    WAITED 5 SECONDS.  BIT DEFECTIVE OR FIRMWARE HUNG./
2085 011206  EM0203:: .ASCIZ /  MASTER RESET BIT CLEAR IMMEDIATELY AFTER BOARD RESET./
2086 011276           .ASCIZ /    BIT DEFECTIVE OR BOARD FIRMWARE ERROR./
2087 011351  EM0204:: .ASCIZ \  MR BIT WENT CLEAR WITHIN 1/2 SECOND OF BOARD RESET.\
2088 011437           .ASCIZ /    BIT DEFECTIVE OR SELFTEST WAS (INCORRECTLY) SKIPPED./
2089 011530  EM0301:: .ASCIZ /MASTER RESET (SKIP SELFTEST) TEST /
2090 011573  EM0302:: .ASCIZ /  MR BIT CLR WITHIN 10 MILISECOND AFTER BOARD RESET./
2091 011660           .ASCIZ /    BIT DEFECTIVE OR BOARD FIRMWARE ERROR./
2092 011733  EM0303:: .ASCIZ \  MR BIT WENT CLEAR 1/5 TO 5 SECONDS AFTER RESET.\
2093 012015           .ASCIZ /    SELFTEST DID NOT GET SKIPPED (SHOULD HAVE BEEN SKIPPED)./
2094 012112  EM0401:: .ASCIZ /RBUF REGISTER RX CHARACTER FIELD TEST /
2095 012161  EM0402:: .ASCIZ /  IMPROPER CODE FOUND IN RX FIFO AFTER DUT RESET./
2096 012243           .ASCIZ /    EXPECTED: SELFTEST CODE,   ACTUAL: IMPROPER CODE./
2097 012331  EM0501:: .ASCIZ /RBUF REGISTER ERROR FLAGS FIELD TEST /
2098 012377  EM0502:: .ASCIZ /  RX ERROR FLAG(S) FOUND CLEAR ON SELFTEST CODE./
2099 012460           .ASCIZ /    EXPECTED: ALL ERROR FLAGS SET,  ACTUAL: FLAG(S) CLEAR./
2100 012553  EM0509:: .ASCIZ /SET/
2101 012557  EM0525:: .ASCIZ /  RX INTERRUPT(S) RECEIVED WITH RX INTERRUPTS DISABLED./
2102 012647  EM0526:: .ASCIZ /  TX INTERRUPT(S) RECEIVED WITH TX INTERRUPTS DISABLED./
2103 012737  EM0601:: .ASCIZ /CSR RX.DATA.AVAIL BIT TEST /
2104 012773  EM0602:: .ASCIZ /  RX.DATA.AVAIL BIT FOUND CLEAR AFTER RESET COMPLETION./
2105 013063           .ASCIZ /    EXPECTED BIT TO BE SET FROM SELFTEST CODES IN FIFO./
2106 013153  EM0603:: .ASCIZ /  RX.DATA.AVAIL BIT COULD NOT BE CLEARED BY PURGING FIFO./
2107 013245           .ASCIZ /    600 CHARS READ FROM FIFO WITHOUT R.D.A BIT CLEARING./
2108 013336  EM0701:: .ASCIZ /RBUF RX.DATA.VALID BIT TEST /
2109 013373  EM0702:: .ASCIZ /  RX.DATA.VALID BIT FOUND CLEAR AFTER RESET COMPLETION./
2110 013463           .ASCIZ /    EXPECTED BIT TO BE SET FROM SELFTEST CODES IN FIFO./
2111 013553  EM0703:: .ASCIZ /  RX.DATA VALID BIT COULD NOT BE CLEARED BY PURGING FIFO./
2112 013645           .ASCIZ /    600 CHARS READ FROM FIFO WITHOUT R.D.V BIT CLEARING./
2113 013736  EM0801:: .ASCIZ /RBUF RX.LINE.NUMBER FIELD TEST /
2114 013776  EM0802:: .ASCIZ /  LINE NUMBER IS WRONG ON A SELFTEST CODE./
2115 014051  EM0901:: .ASCIZ /CHECK FOR BMP_CODES TEST/
2116 014102  EM0902:: .ASCIZ /UNEXPECTED BMP CODES FOUND./
2117 014136  EM1001:: .ASCIZ /DIAGNOSTIC FAIL (SKP SELFTEST) TEST/
2118 014202  EM1002:: .ASCIZ /  SKIP SELF-TEST TOOK TOO LONG TO COMPLETE, > 50 MS./
2119 014267  EM1003:: .ASCIZ /  SKIP SELF-TEST COMPLETED TOO SOON, < 10 MS./
2120 014345  EM1101:: .ASCIZ /SKIP SELF-TEST TEST/
2121 014371  EM1201:: .ASCIZ /SELF-TEST TEST/
2122 014410  EM1202:: .ASCIZ /  SELF-TEST TOOK TOO LONG TO COMPLETE, > 3 SECONDS./
2123 014474  EM1203:: .ASCIZ \  SELF-TEST COMPLETED TOO SOON, < 1/2 SECOND.\
2124 014552  EM1204:: .ASCIZ /  SELF-TEST DID NOT EXECUTE/
2125 014606  EM1205:: .ASCIZ /  DIAG_FAIL BIT BAD/
2126 014632  EM1301:: .ASCIZ /FAIL SELF-TEST TEST/
2127 014656  EM1302:: .ASCIZ / SELF-TEST ERROR REPORTING BAD/
2128 014715  EM1401:: .ASCIZ /ROM VERSION_NUMBER TEST/
2129 014745  EM1402:: .ASCIZ /  FIFO EMPTY, ONE OR MORE ROM VERSION NUMBERS MISSING/
2130 015033  EM1403:: .ASCIZ /  ROM VERSION_NUMBER FOUND OUT OF SEQUENCE/
2131 015106  EM1404:: .ASCIZ /  ONE OR MORE ROM VERSION_NUMBERS MISSING/
2132 015160  EM1405:: .ASCIZ /    PROC 1/
```

GLOBAL MESSAGE AREA SEQ 0050

```
2133 015173  EM1406:: .ASCIZ /    PROC_2/
2134 015206  EM1407:: .ASCIZ /NOT FOUND/
2135 015220  EM1408:: .ASCIZ /FOUND/
2136 015226  EM1601:: .ASCIZ /TIMEOUT OCCURRED WAITING FOR MASTER RESET TO CLEAR/
2137 015311  EM1604:: .ASCIZ \DEVICE REGISTER WORD READ/WRITE TEST \
2138 015357  EM1701:: .ASCIZ \DEVICE REGISTER WORD READ/MODIFY/WRITE TEST \
2139 015434  EM1801:: .ASCIZ \DEVICE REGISTER BYTE READ/WRITE TEST \
2140 015502  EM1901:: .ASCIZ \DEVICE REGISTER BYTE READ/MODIFY/WRITE TEST \
2141 015557  EM2001:: .ASCIZ /DEVICE STAT REGISTER ID BIT TEST /
2142 015621  EM2002:: .ASCIZ /ID BIT BAD.  EXPECTED: CLEAR, ACTUAL: SET./
2143 015674  EM2101:: .ASCIZ \NO TX_DATA_VALID/NO TX_ACTION TEST\
2144 015737  EM2102:: .ASCIZ /  TX_ACTION FOUND AFTER INVALID DATA WORD WRITTEN TO LINE: /
2145 016033  EM2201:: .ASCIZ \TX_DATA_VALID/TX_ACTION TEST\
2146 016070  EM2202:: .ASCIZ /  NO TX_ACTION FOUND AFTER VALID DATA WORD TX'D ON LINE: /
2147 016162  EM2203:: .ASCIZ /  INCORRECT LINE NUMBER FOUND WITH TX_ACT AFTER DATA TX'D ON LINE : /
2148 016267  EM2301:: .ASCIZ /TX_ENABLE (INACTIVE) BIT TEST/
2149 016325  EM2302:: .ASCIZ /  TX_ENABLE BIT BAD ON LINE: /
2150 016363  EM2401:: .ASCIZ /TX_ENABLE (ACTIVE) BIT TEST/
2151 016417  EM2601:: .ASCIZ /RECEIVE INTERRUPT TEST /
2152 016447  EM2602:: .ASCIZ /  NO RX INT GENERATED (DATA_VALID SET, RX INTS ENABLED)./
2153 016540  EM2603:: .ASCIZ /  NO RX INT GENERATED (NO CODES IN FIFO AFTER RESET)./
2154 016626  EM2604:: .ASCIZ /  NO RX INT GENERATED (RX_DATA_AVAIL CLR, RX INTS ENABLED)./
2155 016722  EM2605:: .ASCIZ /  RX INTERRUPT GENERATED WITH RX_DATA_AVAIL CLEAR./
2156 017005  EM2606:: .ASCIZ /TRANSMIT INTERRUPT TEST ERROR:/
2157 017044  EM2607:: .ASCIZ /  TX_ACTION SET REPEATEDLY AFTER BOARD RESET, NO DATA SENT./
2158 017140  EM2608:: .ASCIZ /  TX_ACTION STUCK SET AFTER BOARD RESET./
2159 017211  EM2609:: .ASCIZ /  TX INTERRUPT GENERATED WITH TX_ACTION CLEAR./
2160 017270  EM2610:: .ASCIZ /  NO TX INTERRUPT WITH TX_ACTION SET AND TX INTS ENABLED./
2161 017362  EM2611:: .ASCIZ /  TX_ACTION NOT SET AFTER CHARS SENT ON ALL LINES./
2162 017445  EM3001:: .ASCIZ /INTERRUPT BR LEVEL TEST /
2163 017476  EM3002:: .ASCIZ /  NO RX_DATA_AVAIL FROM SELFTEST CODES IN FIFO AFTER RESET./
2164 017572  EM3003:: .ASCIZ /  TX INTERRUPT GENERATED AT WRONG BR LEVEL:/
2165 017646  EM3004:: .ASCIZ /  RX INTERRUPT GENERATED AT WRONG BR LEVEL:/
2166 017722  EM3005:: .ASCIZ /  TX INTERRUPT GIVEN PRECEDENCE OVER SIMULTANEOUS RX INT./
2167 020014  EM3101:: .ASCIZ /DIAGNOSTIC FIELD (BMP) TEST/
2168 020050  EM3102:: .ASCIZ /  DIAGNOSTIC FIELD BAD ON LINE: /
2169 020111  EM4001:: .ASCIZ /DMA_START BIT TEST/
2170 020134  EM4002:: .ASCIZ /DMA_START BIT BAD ON LINE: /
2171 020170  EM4101:: .ASCIZ /DMA_ABORT BIT TEST/
2172 020213  EM4102:: .ASCIZ /DMA_ABORT BIT BAD ON LINE: /
2173 020247  EM4103:: .ASCIZ /DMA_START BIT FOUND SET AFTER DMA ABORTED ON LINE: /
2174 020333  EM4401:: .ASCIZ /DMA ADDRESS TEST /
2175 020355  EM4402:: .ASCIZ /NO SUITABLE ADDR FOUND,TEST ABANDONED/
2176 020423  EM4403:: .ASCIZ /**HOST FAILURE**;WRITE FAILED TO AN ADDR WHICH HAD BEEN READ/
2177 020520  EM4404:: .ASCIZ /NO ACTIVE LINES,TEST ABANDONED/
2178 020557  EM4405:: .ASCIZ /DMA_START BIT FOUND SET BEFORE DMA INITIATED,TEST ABANDONED/
2179 020653  EM4406:: .ASCIZ /TIME-OUT OCCCURED WAITING FOR DMA TO FINISH/
2180 020727  EM4407:: .ASCIZ /TOO FEW CHARACTERS FOUND IN THE RXFIFO,DMA FAILED/
2181 021011  EM4408:: .ASCIZ /TOO MANY BMP CODES FOUND IN RXFIFO/
2182 021054  EM4409:: .ASCIZ /BAD BITS BETWEEN BITS 0 AND /
2183 021111  EM4410:: .ASCIZ /RXFIFO FAILED TO PURGE/
2184 021140  EM4411:: .ASCIZ /**HOST FAILURE**WRITE ATTEMPT FAILED/
2185 021205  EM5101:: .ASCIZ /IAUTO (INACTIVE) TEST/
2186 021233  EM5102:: .ASCIZ /IAUTO BIT FOUND SET ON LINE: /
2187 021271  EM5103:: .ASCIZ /IAUTO BIT BAD ON LINE: /
2188 021321  EM5201:: .ASCIZ /IAUTO (ACTIVE) TEST/
2189 021345  EM5202:: .ASCIZ /IAUTO BIT FOUND CLR ON LINE: /
```

GLOBAL MESSAGE AREA SEQ 0051

```
2190 021403  EM5301:: .ASCIZ /FIFO VALID DATA TEST/
2191 021430  EM5302:: .ASCIZ /FIFO BAD DATA FIELD CORRUPTED, TEST USED LINE:/
2192 021507  EM5303:: .ASCIZ /BMP CODE FOUND IN FIFO, TEST INVAILDATED/
2193 021560  EM5401:: .ASCIZ \FIFO 3/4 ALARM (INACTIVE) TEST\
2194 021617  EM5402:: .ASCIZ /FIFO BAD, ALARM SIGNAL DEFECTIVE/
2195 021660  EM5501:: .ASCIZ \FIFO 3/4 ALARM (ACTIVE) TEST\
2196 021715  EM5601:: .ASCIZ \FIFO 3/4 ALARM (ACTIVE/INACTIVE) TEST\
2197 021763  EM5701:: .ASCIZ \FIFO 1/2 LEVEL (ACTIVE/INACTIVE) TEST\
2198 022031  EM6401:: .ASCIZ /BREAK GENERATION TEST /
2199 022060  EM6402:: .ASCIZ /  BREAK NOT RECEIVED ON LINE(S):/
2200 022121  EM6601:: .ASCIZ /NO OVERRUN ERROR TEST/
2201 022147  EM6602:: .ASCIZ /  OVERRUN ERROR REPORTED WHEN NONE FORCED/
2202 022221  EM6701:: .ASCIZ /OVERRUN ERROR TEST/
2203 022244  EM6702:: .ASCIZ /  NO OVERRURN ERROR REPORTED, OVERRUN FORCED/
2204 022321  EM9001:: .ASCIZ /SINGLE CHARACTER MODE TEST /
2205 022355  EM9003:: .ASCIZ /MODEM STATUS CODE/
2206 022377  EM9004:: .ASCIZ /SELFTEST CODE/
2207 022415  EM9006:: .ASCIZ /CHARACTER RECEIVED ON INACTIVE LINE, LINE:/
2208 022470  EM9007:: .ASCIZ /UNEXPECTED CHAR RECEIVED AFTER RX COMPLETE ON LINE/
2209 022553  EM9008:: .ASCIZ /RECEIVED CHAR MISCOMPARE AGAINST TX DATA ON LINE/
2210 022634  EM9009:: .ASCIZ /EXPECTED OR CORRECT/
2211 022660  EM9010:: .ASCIZ /ACTUAL OR MEASURED /
2212 022704  EM9011:: .ASCIZ /OVERRUN/
2213 022714  EM9012:: .ASCIZ /FRAMING/
2214 022724  EM9013:: .ASCIZ /PARITY/
2215 022733  EM9014:: .ASCIZ /SUMMARY REPORTS FOR LINES WITH EXCESSIVE NUMBERS OF ERRORS:/
2216 023027  EM9015:: .ASCIZ /TRANSMITTED/
2217 023043  EM9016:: .ASCIZ /RECV'D/
2218 023052  EM9017:: .ASCII /  FIFO WILL NOT PURGE (DATA.VALID STUCK SET),/
2219 023127           .ASCIZ / REMAINDER OF TEST SKIPPED./
2220 023163  EM9018:: .ASCIZ /NO CODE/
2221 023173  EM9019:: .ASCIZ /NON-SELFTEST/
2222 023210  EM9020:: .ASCIZ /SELFTEST ERROR CODE/
2223 023234  EM9022:: .ASCIZ /DATA CHARACTER/
2224 023253  EM9023:: .ASCIZ /MODEM STATUS CODE/
2225 023275  EM9024:. .ASCIZ /SELFTEST CODE/
2226 023313  EM9025:: .ASCIZ /MORE THAN TWICE THE EXPECTED NUMBER OF CHARACTERS RECEIVED./
2227 023407  EM9026:: .ASCIZ /     LPR CONTENTS: /
2228 023433  EM9027:: .ASCIZ /EXTRA CHAR RECEIVED WITHIN DATA PATTERN ON LINE/
2229 023513  EM9028:: .ASCIZ /SINGLE CHAR MISSING FROM RECEIVED DATA ON LINE/
2230 023572  EM9030:: .ASCIZ /#A  (NO TX COMPLETION INTERRUPTS RECEIVED)#N/
2231 023647  EM9101:: .ASCIZ /DMA TRANSMISSION MODE TEST /
2232 023703  EM9102:: .ASCIZ /DMA_START BIT SET AFTER RESET OR TX.ACTION ON LINE(S):/
2233 023772  EM9104:: .ASCIZ /  UNEXPECTED DATA FOUND IN FIFO FROM LINE: /
2234 024046  EM9301:: .ASCIZ /BMP CODE REPORT/
2235 024066  EM9302:: .ASCIZ /BMP CODE FOUND IN TEST /
2236 024116  EM9303:: .ASCIZ /THE LAST BMP CODE WAS FOUND IN TEST /
2237 024163  EM9304:: .ASCIZ /UNEXPECTED BMP CODES FOUND DURING THIS PASS/
2238
2239                 .EVEN
2240                                 .LIST BIN
```

```
2242
2243                    ;*****************************************************************************
2244                    ;
2245                    ;               FVTSKL2.P11
2246                    ;
2247                    ;*****************************************************************************
2248
2249
2250
2251                    .SBTTL  GLOBAL ERROR REPORT SECTION
2252
2253                    ;++
2254                    ; THE GLOBAL ERROR REPORT SECTION CONTAINS MESSAGE PRINTING AREAS
2255                    ; USED BY MORE THAN ONE TEST TO OUTPUT ADDITIONAL ERROR INFORMATION.  PRINTB
2256                    ; (BASIC) AND PRINTX (EXTENDED) CALLS ARE USED TO CALL PRINT SERVICES.
2257                    ;--
```

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER0101 -
                        ;*****************************************************************************
                        ;*      This is an error reporting subroutine which prints addit'onal 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 DHV11-M 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.
                        ;*****************************************************************************

                               BGNMSG  ER0101
                                                                                ER0101::
                               SAVE                             ;SAVE THE GPR CONTENTS.
024240  004537  005474                 JSR     R5,PREGO5        ;CALL REGISTER SAVE SUBRT.

024244  032705  000001         BIT     #BIT0,R5         ;TEST FOR READ ERROR.
024250  001410                 BEQ     2$               ;SKIP READ ERROR MSG IF NO READ ERROR.
024252                         PRINTB  #MSG1            ;PRINT READ ERROR MESSAGE.
024252  012746  024344                                                    MOV     #MSG1, (SP)
024256  012746  000001                                                    MOV     #1,-(SP)
024262  010600                                                            MOV     SP,R0
024264  104414                                                            TRAP    C$PNTB
024266  062706  000004                                                    ADD     #4,SP
024272  032705  000002         2$:     BIT     #BIT1,R5         ;TEST FOR WRITE ERROR.
024276  001410                 BEQ     4$               ;SKIP WRITE ERROR MSG IF NO WRITE ERROR.
024300                         PRINTB  #MSG2            ;PRINT WRITE ERROR MESSAGE.
024300  012746  024422                                                    MOV     #MSG2,-(SP)
024304  012746  000001                                                    MOV     #1, (SP)
024310  010600                                                            MOV     SP,R0
024312  104414                                                            TRAP    C$PNTB
024314  062706  000004                                                    ADD     #4,SP
024320                         4$:     PRINTX  #MSG3            ;SUGGEST THAT DHV11-M MAY BE AT WRONG ADDRESS.
024320  012746  024501                                                    MOV     #MSG3,-(SP)
024324  012746  000001                                                    MOV     #1,-(SP)
024330  010600                                                            MOV     SP,R0
024332  104415                                                            TRAP    C$PNTX
024334  062706  000004                                                    ADD     #4,SP
024340                         PASS                             ;RESTORE THE GPR CONTENTS.
024340  004736                                 JSR     PC,@(SP)+        ;RETURN TO PREGO5 SUBRT.
024342                         ENDMSG
024342                                                          L10002:
024342  104423                                                            TRAP    C$MSG

024344     045     101     102  MSG1::  .ASCIZ  /%ABUS TIME-OUT TRAP CAUSED BY READ ATTEMPT.%N/
```

```
        024347  125  123  040
        024352  124  111  115
        024355  105  055  117
        024360  125  124  040
        024363  124  122  101
        024366  120  040  103
        024371  101  125  123
        024374  105  104  040
        024377  102  131  040
        024402  122  105  101
        024405  104  040  101
        024410  124  124  105
        024413  115  120  124
        024416  056  045  116
        024421  000
2296    024422  045  101  102  MSG2::  .ASCIZ  /%ABUS TIME OUT TRAP CAUSED BY WRITE ATTEMPT.%N/
        024425  125  123  040
        024430  124  111  115
        024433  105  055  117
        024436  125  124  040
        024441  124  122  101
        024444  120  040  103
        024447  101  125  123
        024452  105  104  040
        024455  102  131  040
        024460  127  122  111
        024463  124  105  040
        024466  101  124  124
        024471  105  115  120
        024474  124  056  045
        024477  116  000
2297    024501  045  101  104  MSG3::  .ASCIZ  /%ADHV11-M MAY BE AT THE WRONG Q-BUS ADDRESS.%N%N/
        024504  110  126  061
        024507  061  055  115
        024512  040  115  101
        024515  131  040  102
        024520  105  040  101
        024523  124  040  124
        024526  110  105  040
        024531  127  122  117
        024534  116  107  040
        024537  121  055  102
        024542  125  123  040
        024545  101  104  104
        024550  122  105  123
        024553  123  056  045
        024556  116  045  116
        024561  000
2298
2299                                .EVEN
```

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER0201
                        ;*****************************************************************************
                        ;*      This is an error reporting subroutine which prints 2 contiguous
                        ;*      ASCII error messages.  The address of the first message is passed
                        ;*      as an input parameter and the address of the second is found by
                        ;*      searching for the end of the first message.
                        ;*
                        ;* INPUTS:      R1   Address of the first message to print.
                        ;*
                        ;* OUTPUTS:     A messages is printed at the operator console.
                        ;*
                        ;* CALLING SEQUENCE:    Load the address of the first message in R1.
                        ;*                      Include the label "ER0201" as the message pointer
                        ;*                      parameter in the Diag Super error report macro call.
                        ;*
                        ;* COMMENTS:    The message is printed as Basic error information.
                        ;*              The second message should follow the first one in the program
                        ;*              memory.  Each message should be defined using .ASCIZ
                        ;*
                        ;* SUBORDINATE ROUTINES USED: None.
                        ;*****************************************************************************

                              BGNMSG  ER0201

024562                                                                ER0201::
024562
                              SAVE                      ;SAVE THE GPR CONTENTS.
024562  004537  005474              JSR     R5,PREG05         ;CALL REGISTER SAVE SUBRT.

024566  010102               MOV     R1,R2
024570  105722        2$:    TSTB    (R2)+             ;CHECK FOR A ZERO BYTE (END OF MESSAGE).
024572  001376               BNE     2$                ;LOOP UNTIL NEXT MESSAGE IS FOUND.

024574                        PRINTB  #EF0503,R1        ;PRINT THE FIRST MESSAGE.
024574  010146                                                          MOV     R1, (SP)
024576  012746  005630                                                  MOV     #EF0503, (SP)
024602  012746  000002                                                  MOV     #2, (SP)
024606  010600                                                          MOV     SP,R0
024610  104414                                                          TRAP    C$PNTB
024612  062706  000006                                                  ADD     #6,SP
024616                        PRINTB  #EF0503,R2        ;PRINT THE SECOND MESSAGE.
024616  010246                                                          MOV     R2,-(SP)
024620  012746  005630                                                  MOV     #EF0503, (SP)
024624  012746  000002                                                  MOV     #2,-(SP)
024630  010600                                                          MOV     SP,R0
024632  104414                                                          TRAP    C$PNTB
024634  062706  000006                                                  ADD     #6,SP

024640                        PASS                      ;RESTORE THE GPR CONTENTS.
024640  004736                       JSR     PC,@(SP)+                ;RETURN TO PREG05 SUBRT.

024642                        ENDMSG
024642                                                          L10003:
024642  104423                                                          TRAP    C$MSG
```

```
                                .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER0503 -
                                ;**************************************************************************
                                ;*      This is an error reporting subroutine which prints an additional error
                                ;*      message whose address is passed as an input parameter.
                                ;*
                                ;* INPUTS:      R1 - Address of the message to print.
                                ;*
                                ;* OUTPUTS:     A messages is printed at the operator console.
                                ;*
                                ;* CALLING SEQUENCE:    Load the address of the message in R1.
                                ;*                      Include the label "ER0503" 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.
                                ;**************************************************************************

024644                                  BGNMSG  ER0503
024644                                                                  ER0503::
                                
024644                                  PRINTB  #EF0503,R1      ;PRINT THE MESSAGE.
024644  010146                                                          MOV     R1,-(SP)
024646  012746  005630                                                  MOV     #EF0503,-(SP)
024652  012746  000002                                                  MOV     #2, (SP)
024656  010600                                                          MOV     SP,R0
024660  104414                                                          TRAP    C$PNTB
024662  062706  000006                                                  ADD     #6,SP

024666                                  ENDMSG
024666                                                                  L10004:
024666  104423                                                          TRAP    C$MSG
```

```
                                .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER0504 -
                                ;*************************************************************************
                                ;*      This is an error reporting subroutine which prints additional error
                                ;*      messages when illegal interrupts are received.
                                ;*
                                ;* INPUTS:      R1   Address of the message to print.
                                ;*              R2   Number of illegal interrupts received.
                                ;*
                                ;* OUTPUTS:     Messagess are printed at the operator console.
                                ;*
                                ;* CALLING SEQUENCE:    Load the address of the message in R1.
                                ;*                      Load the number of illegal ints in R2.
                                ;*                      Include the label "ER0504" as the message pointer
                                ;*                      parameter in the Diag Super error report macro call.
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;* SUBORDINATE ROUTINES USED: None.
                                ;*************************************************************************

024670                                  BGNMSG  ER0504
024670                                                                          ER0504::

024670                                  PRINTB  #EF0503,R1      ;PRINT THE FIRST LINE OF THE MESSAGE.
024670  010146                                                                          MOV     R1,-(SP)
024672  012746  005630                                                                  MOV     #EF0503,-(SP)
024676  012746  000002                                                                  MOV     #2,-(SP)
024702  010600                                                                          MOV     SP,R0
024704  104414                                                                          TRAP    C$PNTB
024706  062706  000006                                                                  ADD     #6,SP
024712                                  PRINTX  #EF0505,R2      ;PRINT THE NUMBER OF INTS RECEIVED.
024712  010246                                                                          MOV     R2, (SP)
024714  012746  005635                                                                  MOV     #EF0505,-(SP)
024720  012746  000002                                                                  MOV     #2,-(SP)
024724  010600                                                                          MOV     SP,R0
024726  104415                                                                          TRAP    C$PNTX
024730  062706  000006                                                                  ADD     #6,SP

024734                                  ENDMSG
024734                                                                  L10005:
024734  104423                                                                          TRAP    C$MSG
```

GLOBAL ERROR REPORTING ROUTINE - ER1601 - SEQ 0058

```
                        .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.
                        ;*      Th's 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
                        ;*************************************************************************
024736                          BGNMSG  ER1601
024736                                                                  ER1601::
024736  016304  002340                MOV     RMATBB(R3),R4   ;FETCH ADDRESS OF REGISTER NAME MESSAGE.
024742                          PRINTB  #EF1604,R4,R5   ;REPORT BASIC MESSAGE (REG NAME AND LINE #).
024742  010546                                                        MOV     R5,-(SP)
024744  010446                                                        MOV     R4,-(SP)
024746  012746  006177                                               MOV     #EF1604,-(SP)
024752  012746  000003                                               MOV     #3,-(SP)
024756  010600                                                        MOV     SP,R0
024760  104414                                                        TRAP    C$PNTB
024762  062706  000010                                               ADD     #10,SP
024766                          PRINTX  #EF1602,R2      ;PRINT THE EXPECTED DATA.
024766  010246                                                        MOV     R2,-(SP)
024770  012746  006073                                               MOV     #EF1602,-(SP)
024774  012746  000002                                               MOV     #2,-(SP)
025000  010600                                                        MOV     SP,R0
025002  104415                                                        TRAP    C$PNTX
025004  062706  000006                                               ADD     #6,SP
025010                          PRINTX  #EF1603,R1      ;PRINT THE ACTUAL DATA.
025010  010146                                                        MOV     R1,-(SP)
025012  012746  006135                                               MOV     #EF1603,-(SP)
025016  012746  000002                                               MOV     #2,-(SP)
025022  010600                                                        MOV     SP,R0
025024  104415                                                        TRAP    C$PNTX
025026  062706  000006                                               ADD     #6,SP
025032                          ENDMSG
025032                                                          L10006:
025032  104423                                                        TRAP    C$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 po'nter
                                ;*                      parameter in the DRS error report macro call.
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: None.
                                ;*************************************************************************
                                        BGNMSG  ER1603
025034                                                                  ER1603::
025034                                  SAVE
025034  004537  005474                                ;SAVE THE CONTENTS OF THE GPRS.
                                                JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.

                                 PRINTB #EF0503,R1      ;PRINT BASIC MESSAGE ON OPERATORS CONSOLE.
025040  010146                                                                 MOV     R1,-(SP)
025042  012746  005630                                                         MOV     #EF0503,-(SP)
025046  012746  000002                                                         MOV     #2,-(SP)
025052  010600                                                                 MOV     SP,R0
025054  104414                                                                 TRAP    C$PNTB
025056  062706  000006                                                         ADD     #6,SP

025062  013702  005470         MOV     ERRMSG,R2      ;GET THE "TEST MESSAGE".
025066                         PRINTB #EF1601,R2      ;PRINT "TEST ABORTED" MESSAGE.
025066  010246                                                                 MOV     R2,-(SP)
025070  012746  006047                                                         MOV     #EF1601,-(SP)
025074  012746  000002                                                         MOV     #2,-(SP)
025100  010600                                                                 MOV     SP,R0
025102  104414                                                                 TRAP    C$PNTB
025104  062706  000006                                                         ADD     #6,SP

025110                         PASS            ;RESTORE THE CONTENTS OF THE GPRS.
025110  004736                                 JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
025112                         ENDMSG
025112                                                                  L10007:
025112  104423                                                                 TRAP    C$MSG
```

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER3001 -
                        ;*************************************************************************
                        ;*      This is an error reporting subroutine which is intended for use in the
                        ;*      Interrupt BR Level Test.  It reports additional information when an
                        ;*      interrupt has occurred at the wrong BR level.
                        ;*
                        ;* INPUTS:      R1 - Address of message to print first.
                        ;*              R4 - BR level at which the int request occurred.
                        ;*              R5 - Expected or correct BR level for the DUT.
                        ;*
                        ;* OUTPUTS:     A messages is printed at the operator console.
                        ;*
                        ;* CALLING SEQUENCE:    Include the label "ER3001" 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.
                        ;*************************************************************************

                                BGNMSG  ER3001
                                                                        ER3001::

                                PRINTB  #EF0503,R1      ;PRINT THE FIRST LINE OF THE MESSAGE.
                                                                        MOV     R1,-(SP)
                                                                        MOV     #EF0503,-(SP)
                                                                        MOV     #2,-(SP)
                                                                        MOV     SP,R0
                                                                        TRAP    C$PNTB
                                                                        ADD     #6,SP
                                PRINTX  #EF3001,R5      ;REPORT EXPECTED BR LEVEL.
                                                                        MOV     R5,-(SP)
                                                                        MOV     #EF3001,-(SP)
                                                                        MOV     #2,-(SP)
                                                                        MOV     SP,R0
                                                                        TRAP    C$PNTX
                                                                        ADD     #6,SP
                                PRINTX  #EF3002,R4      ;REPORT ACTUAL BR LEVEL.
                                                                        MOV     R4,-(SP)
                                                                        MOV     #EF3002,-(SP)
                                                                        MOV     #2,-(SP)
                                                                        MOV     SP,R0
                                                                        TRAP    C$PNTX
                                                                        ADD     #6,SP

                                ENDMSG
                                                                L10010:
                                                                        TRAP    C$MSG
```

```
                                .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER6401 -
                                ;*******************************************************************************
                                ;*      This is an error reporting subroutine which prints additional error
                                ;*      information after the error message header.
                                ;*      This subroutine is passed a GPR containing flags which indicate
                                ;*      the line(s) for which the error condition should be reported.
                                ;*
                                ;* INPUTS:      R1   Address of the message to be printed by this routine.
                                ;*              R5 - Contains the error flags, (1 flag per line).
                                ;*
                                ;* OUTPUTS:     Messages are printed at the operator console.
                                ;*
                                ;* CALLING SEQUENCE:    Load the address of the message in R1.
                                ;*                      Include the label "ER6401" as the message pointer
                                ;*                      parameter in the Diag Super error report macro call.
                                ;*
                                ;* COMMENTS:    The output format of this message is:
                                ;*                       TEXT MESSAGE
                                ;*                            @nn
                                ;*                            @nn
                                ;*                             ...
                                ;*              Where each "@nn" is the number of a line with the error.
                                ;*
                                ;* SUBORDINATE ROUTINES USED: None.
                                ;*******************************************************************************

                                        BGNMSG  ER6401
                                        SAVE                                    ER6401::
025204  004537  005474                          JSR     R5,PREG05       ;SAVE THE CONTENTS OF THE GPRS.
                                                                        ;CALL REGISTER SAVE SUBRT.
025210  005002                          CLR     R2              ;CLEAR LINE NUMBER TO ZERO.
025212  012703  000010                  MOV     @NUMLNS,R3      ;SET UP MAX LINE COUNT.
025216                                  PRINTB  @EF0503,R1      ;PRINT MESSAGE.
025216  010146                                                          MOV     R1,-(SP)
025220  012746  005630                                                  MOV     @EF0503,-(SP)
025224  012746  000002                                                  MOV     @2,-(SP)
025230  010600                                                          MOV     SP,R0
025232  104414                                                          TRAP    C$PNTB
025234  062706  000006                                                  ADD     @6,SP
025240  000241                          CLC                     ;CLEAR CARRY.
025242  006205          2$:             ASR     R5              ;SHIFT FLAG OUT INTO CARRY BIT.
025244  103011                          BCC     4$              ;SKIP ERROR REPORT IF CLEAR.
025246                                  PRINTB  @EF6401,R2      ;PRINT MESSAGE.
025246  010246                                                          MOV     R2,-(SP)
025250  012746  006527                                                  MOV     @EF6401, (SP)
025254  012746  000002                                                  MOV     @2,-(SP)
025260  010600                                                          MOV     SP,R0
025262  104414                                                          TRAP    C$PNTB
025264  062706  000006                                                  ADD     @6,SP
025270  005202          4$:             INC     R2              ;INCREMENT LINE COUNT.
025272  020302                          CMP     R3,R2           ;CHECK IF MAX LINE COUNT EXCEEDED.
025274  001362                          BNE     2$              ;LOOP IF NOT DONE.
025276                  60$:            PASS                    ;RESTORE THE SAVED CONTENTS OF THE GPRS.
025276  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
025300                                  ENDMSG
                                                                        L10011:
```

GLOBAL ERROR REPORTING ROUTINE - ER6401 - SEQ 0062

025300 104423 TRAP C$MSG

GLOBAL ERROR REPORTING ROUTINE - ER7801 - SEQ 0063

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER7801 -
                        ;*******************************************************************************
                        ;*      This is an error reporting subroutine which prints an additional error
                        ;*      message whose address is passed as an input parameter.  A line number
                        ;*      is included at the end of the message.
                        ;*
                        ;* INPUTS:      R1 - Address of the message to print.
                        ;*              R3   Number of line on which error occurred.
                        ;*
                        ;* OUTPUTS:     A messages is printed at the operator console.
                        ;*
                        ;* CALLING SEQUENCE:    Load the address of the message in R1.
                        ;*                      Load the line number into R3.
                        ;*                      Include the label "ER7801" 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.
                        ;*******************************************************************************

025302                          BGNMSG  ER7801
025302                                                                  ER7801::

                                PRINTB  #EF7801,R1,R3   ;PRINT THE MESSAGE.
025302  010346                                                                  MOV     R3,-(SP)
025304  010146                                                                  MOV     R1,-(SP)
025306  012746  006604                                                          MOV     #EF7801,-(SP)
025312  012746  000003                                                          MOV     #3,-(SP)
025316  010600                                                                  MOV     SP,R0
025320  104414                                                                  TRAP    C$PNTB
025322  062706  000010                                                          ADD     #10,SP

025326                          ENDMSG
025326                                                                  L10012:
025326  104423                                                                  TRAP    C$MSG
```

GLOBAL ERROR REPORTING ROUTINE - ER9001 - SEQ 0064

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER9001 -
                        ;*******************************************************************************
                        ;*      This is an error reporting subroutine which reports an unexpected
                        ;*      code which has been found in the DUT CSR.  This code can be a BMP
                        ;*      code, a Self-test code, or a Modem Status code.
                        ;*
                        ;* INPUTS:      R1 - Address of message to print first.
                        ;*              R2 - Single byte code which has been read from the DUT.
                        ;*              R4 - Line number associated with the code.
                        ;*
                        ;* OUTPUTS:     A messages is printed at the operator console.
                        ;*
                        ;* CALLING SEQUENCE:    Include the label "ER9001" 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.
                        ;*******************************************************************************

025330                          BGNMSG  ER9001
025330                                                                  ER9001::
025330  010146                  PRINTB  #EF9001,R1      ;REPORT TYPE OF CODE FOUND.
025332  012746  007051                                                  MOV     R1,-(SP)
025336  012746  000002                                                  MOV     #EF9001,-(SP)
025342  010600                                                          MOV     #2,-(SP)
025344  104414                                                          MOV     SP,R0
025346  062706  000006                                                  TRAP    C$PNTB
025352                                                                  ADD     #6,SP
025352  010446                  PRINTX  #EF9002,R4      ;REPORT THE LINE NUMBER OF THE CODE.
025354  012746  007133                                                  MOV     R4,-(SP)
025360  012746  000002                                                  MOV     #EF9002,-(SP)
025364  010600                                                          MOV     #2,-(SP)
025366  104415                                                          MOV     SP,R0
025370  062706  000006                                                  TRAP    C$PNTX
025374                                                                  ADD     #6,SP
025374  010246                  PRINTX  #EF9003,R2      ;REPORT THE CODE WHICH WAS FOUND.
025376  012746  007212                                                  MOV     R2,-(SP)
025402  012746  000002                                                  MOV     #EF9003,-(SP)
025406  010600                                                          MOV     #2,-(SP)
025410  104415                                                          MOV     SP,R0
025412  062706  000006                                                  TRAP    C$PNTX
                                                                        ADD     #6,SP

025416                          ENDMSG
025416                                                          L10013:
025416  104423                                                          TRAP    C$MSG
```

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER9002 -
                        ;*************************************************************************
                        ;*      This is an error reporting subroutine which is intended for use in the
                        ;*      transmission and reception tests.  It reports the type of error which
                        ;*      has occurred when incorrect data is received from the DUT.  This
                        ;*      routine also reports the read and expected data values.
                        ;*
                        ;* INPUTS:      R1 - Address of message to print first.
                        ;*              R2 - Data byte read from the DUT.
                        ;*              R3 - Line number multiplied by 2.
                        ;*              R4 - Expected data byte, bit 15 set if "NONE".
                        ;*
                        ;* OUTPUTS:     A messages is printed at the operator console.
                        ;*
                        ;* CALLING SEQUENCE:    Include the label "ER9002" 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: PRTLPR.
                        ;*************************************************************************

025420                          BGNMSG  ER9002
025420                                                          ER9002::
025420  006203                   ASR    R3              ;CALCULATE THE LINE NUMBER.
025422  042702  177400           BIC    #177400,R2      ;MASK OUT ALL BUT DATA IN READ CHAR.
025426                          PRINTB  #EF9006,R1,R3   ;PRINT THE FIRST LINE OF THE MESSAGE.
025426  010346                                                  MOV     R3,-(SP)
025430  010146                                                  MOV     R1,-(SP)
025432  012746  007334                                          MOV     #EF9006,-(SP)
025436  012746  000003                                          MOV     #3,-(SP)
025442  010600                                                  MOV     SP,R0
025444  104414                                                  TRAP    C$PNTB
025446  062706  000010                                          ADD     #10,SP
025452                                  PRINTX  #EF9004,#EM9010,R2      ;PRINT ACTUAL DATA.
025452  010246                                                  MOV     R2,-(SP)
025454  012746  022660                                          MOV     #EM9010,-(SP)
025460  012746  007246                                          MOV     #EF9004,-(SP)
025464  012746  000003                                          MOV     #3,-(SP)
025470  010600                                                  MOV     SP,R0
025472  104415                                                  TRAP    C$PNTX
025474  062706  000010                                          ADD     #10,SP
025500  005704                   TST    R4              ;CHECK FOR "NONE" CODE SET IN EXPECTED DATA.
025502  100414                  BMI     2$              ;BRANCH TO PRINT "NONE" MESSAGE IF FLAG SET.
025504                          PRINTX  #EF9004,#EM9009,R4      ;PRINT EXPECTED DATA.
025504  010446                                                  MOV     R4,-(SP)
025506  012746  022634                                          MOV     #EM9009,-(SP)
025512  012746  007246                                          MOV     #EF9004,-(SP)
025516  012746  000003                                          MOV     #3,-(SP)
025522  010600                                                  MOV     SP,R0
025524  104415                                                  TRAP    C$PNTX
025526  062706  000010                                          ADD     #10,SP
025532  000412                  BR      60$             ;EXIT THIS ROUTINE.
025534                  2$:     PRINTX  #EF9005,#EM9009 ;PRINT MESSAGE INDICATING NO EXPECTED DATA.
025534  012746  022634                                          MOV     #EM9009,-(SP)
025540  012746  007303                                          MOV     #EF9005,-(SP)
```

GLOBAL ERROR REPORTING ROUTINE - ER9002 SEQ 0066

```
                025544  012746  000002                                          MOV     #2, (SP)
                025550  010600                                                  MOV     SP,R0
                025552  104415                                                  TRAP    C$PNTX
                025554  062706  000006                                          ADD     #6,SP
     2610       025560  004737  032640          60$:    JSR     PC,PRTLPR       ;PRINT CONTENTS OF THE LPR REGISTER.
     2611       025564                                  ENDMSG
                025564                                                  L10014:
                025564  104423                                                  TRAP    C$MSG
```

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER9003 -
                        ;*************************************************************************
                        ;*      This is an error reporting subroutine which is intended for use in the
                        ;*      tranms'ssion and reception tests.  It reports error information when
                        ;*      a character has been read from the DUT with an error flag or flags
                        ;*      set (ie. over-run, framing, or parity flag).
                        ;*
                        ;* INPUTS:      R2   Data byte read from the DUT, including error flags.
                        ;*              R3   L ne number multiplied by 2.
                        ;*
                        ;* OUTPUTS:     A messages is printed at the operator console.
                        ;*
                        ;* CALLING SEQUENCE:    Include the label "ER9003" 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 the Indi-ect address register field of the DUT
                        ;*              CSR may be altered.
                        ;*
                        ;* SUBORDINATE ROUTINES USED: None.
                        ;*************************************************************************

025566                          BGNMSG  ER9003
025566                                                                  ER9003::
025566  006203                   ASR    R3              ;CALCULATE THE LINE NUMBER.
025570                          PRINTB  #EF9007,R3      ;REPORT THE ERROR TYPE AND LINE NUMBER.
025570  010346                                                          MOV     R3,-(SP)
025572  012746  007360                                                  MOV     #EF9007,-(SP)
025576  012746  000002                                                  MOV     #2,-(SP)
025602  010600                                                          MOV     SP,R0
025604  104414                                                          TRAP    C$PNTB
025606  062706  000006                                                  ADD     #6,SP
025612  010201                           MOV    R2,R1           ;EXTRACT THE RECEIVED CHARACTER FROM THE
025614  042701  177400                   BIC    #177400,R1      ;  PASSED IN CHA' VALUE WITH FLAGS.
025620                                  PRINTX  #EF9008,R1      ;REPORT THE VALUE OF THE RECEIVED CHAR.
025620  010146                                                          MOV     R1,-(SP)
025622  012746  007454                                                  MOV     #EF9008,-(SP)
025626  012746  000002                                                  MOV     #2,-(SP)
025632  010600                                                          MOV     SP,R0
025634  104415                                                          TRAP    C$PNTX
025636  062706  000006                                                  ADD     #6,SP
                        ;*
                        ; Report OVERRUN flag set if necessary.
                        ;-
025642  012701  022704                   MOV    #EM9011,R1      ;SELECT THE OVERRUN ERROR MESSAGE.
025646  032702  040000                   BIT    #BIT14,R2       ;CHECK OVERRUN ERROR FLAG IN PASSED IN CHAR.
025652  001402                          BEQ    2$              ;SKIP ERROR IF OVERRUN ERROR FLAG WAS CLEAR.
025654  004737  025716                   JSR    PC,50$          ;REPORT THE OVERRUN ERROR FLAG WAS SET.
                        ;*
                        ; Report FRAMING flag set 'f necessary.
                        ;-
025660  012701  022714          2$:      MOV    #EM9012,R1      ;SELECT THE FRAMING ERROR MESSAGE.
025664  032702  020000                   BIT    #BIT13,R2       ;CHECK FRAMING ERROR FLAG IN PASSED IN CHAR.
025670  001402                          BEQ    4$              ;SKIP ERROR IF FRAMING ERROR FLAG WAS CLEAR.
025672  004737  025716                   JSR    PC,50$          ;REPORT THE FRAMING ERROR MESSAGE.
                        ;*
```

GLOBAL ERROR REPORTING ROUTINE - ER9003 - SEQ 0068

```
2657                                    ; Report PARITY flag set if necessary.
2658                                    ;-
2659 025676  012701  022724             4$:     MOV     @EM9013,R1      ;SELECT THE PARITY ERROR MESSAGE.
2660 025702  032702  010000                     BIT     @BIT12,R2       ;CHECK PARITY ERROR FLAG IN PASSED IN CHAR.
2661 025706  001415                             BEQ     60$             ;EXIT ROUTINE IF PARITY ERRO FLAG WAS CLEAR.
2662 025710  004737  025716                     JSR     PC,50$          ;REPORT THE PARITY ERROR MESSAGE.
2663 025714  000412                             BR      60$             ;EXIT THIS ROUTINE.
2664
2665                                    ;*
2666                                    ; Local subroutine to report an error flag status.
2667                                    ;-
2668 025716                             50$:    PRINTX  @EF9009,R1
     025716  010146                                                                     MOV     R1, (SP)
     025720  012746  007513                                                             MOV     @EF9009,-(SP)
     025724  012746  000002                                                             MOV     #2, (SP)
     025730  010600                                                                     MOV     SP,R0
     025732  104415                                                                     TRAP    C$PNTX
     025734  062706  000006                                                             ADD     #6,SP
2669 025740  000207                             RTS     PC
2670
2671 025742  004737  032640             60$:    JSR     PC,PRTLPR       ;REPORT THE LPR CONTENTS FOR THIS LINE.
2672 025746                                     ENDMSG
     025746                                                                     L10015:
     025746  104423                                                                     TRAP    C$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.
                        ;*****************************************************************************

                                BGNMSG  ER9004
                                                                                ER9004::
                                PRINTB  #EF0503,#EM9014 ;REPORT THE SECONDARY ERROR MESSAGE.
025750                                                                          MOV     #EM9014, (SP)
025750  012746  022733                                                         MOV     #EF0503,-(SP)
025754  012746  005630                                                         MOV     #2,-(SP)
025760  012746  000002                                                         MOV     SP,R0
025764  010600                                                                 TRAP    C$PNTB
025766  104414                                                                 ADD     #6,SP
025770  062706  000006
                        CLR     R2              ;CLEAR THE LINE COUNTER.
025774  005002
                        MOV     ERSMRF,R3       ;GET THE ERROR SUMMARY FLAGS.
025776  013703  002650
                        CLR     R4              ;CLEAR "LINE COUNTER TIMES 2" OFFSET.
026002  005004
                2$:     CLC                     ;CLEAR THE CARRY FOR THE FOLLOWING ROTATE.
026004  000241
                        ROR     R3              ;SHIFT ANOTHER ERROR SUMMARY FLAG INTO CARRY.
026006  006003
                        BCC     4$              ;SKIP PRINTING MESSAGE IF FLAG FOR LINE CLEAR.
026010  103013
                        PRINTX  #EF9010,R2,ERCNTB(R4)
026012                                                                          MOV     ERCNTB(R4),-(SP)
026012  016446  003452                                                         MOV     R2,-(SP)
026016  010246                                                                 MOV     #EF9010,-(SP)
026020  012746  007552                                                         MOV     #3,-(SP)
026024  012746  000003                                                         MOV     SP,R0
026030  010600                                                                 TRAP    C$PNTX
026032  104415                                                                 ADD     #10,SP
026034  062706  000010
                4$:     MOV     (R4)+,R5        ;INCREMENT THE LINE OFFSET BY 2.
026040  012405
                        INC     R2              ;INCREMT THE LINE COUNTER.
026042  005202
                        TST     R3              ;CHECK THE ERROR SUMMARY FLAGS.
026044  005703
                        BNE     2$              ;IF MORE FLAGS SET, LOOP TO DO OTHER LINES.
026046  001356

                        ENDMSG
026050                                                                  L10016:
026050                                                                          TRAP    C$MSG
026050  104423
```

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER9005
                        ;*************************************************************************
                        ;*      This is an error reporting subroutine which reports incomplete data
                        ;*      transmissions or receptions.
                        ;*
                        ;* INPUTS:      R1 - Either "TRANSMITTED" or "RECEIVED" to indicate TX or RX.
                        ;*              R2 - Bit map of lines which did not complete TX or RX.
                        ;*              R4   Address of base of the correct character counters table.
                        ;*              DPLEN8 - Label at base of data pattern length table.
                        ;*              EM9015 - Symbolic address of the "TRANSMITTED" message.
                        ;*
                        ;* OUTPUTS:     A message is printed at the operator console.
                        ;*
                        ;* CALLING SEQUENCE:    Include the label "ER9005" 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 the indirect address field in the DUT CSR may
                        ;*              be altered.
                        ;*
                        ;* SUBORDINATE ROUTINES USED: PRTLPR.
                        ;*************************************************************************

                              BGNMSG  ER9005

026052                                                                  ER9005::
                              SAVE                      ;SAVE THE CONTENTS OF THE GPR'S.
026052  004537  005474              JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.

                              PRINTB  #EF9013,R1        ;REPORT THE SECONDARY ERROR MESSAGE.
026056                                                                  MOV     R1,-(SP)
026056  010146                                                          MOV     #EF9013,-(SP)
026060  012746  007765                                                  MOV     #2,-(SP)
026064  012746  000002                                                  MOV     SP,R0
026070  010600                                                          TRAP    C$PNTB
026072  104414                                                          ADD     #6,SP
026074  062706  000006
026100  005003                CLR     R3              ;CLEAR THE LINE COUNTER.
026102  022701  023027        CMP     #EM9015,R1      ;CHECK IF ADDRESS CORRESPONDS TO TX MESSAGE.
026106  001032              BNE     6$              ;BRANCH IF RECEPTION MESSAGE TO BE PRINTED.

                        ;+
                        ; Perform TX incomplete error message reporting.
                        ;-
                              PRINTX  #EM9030           ;PRINT "NO TX COMPLETION INTERRUPTS RECEIVED"
026110                                                                  MOV     #EM9030,-(SP)
026110  012746  023572                                                  MOV     #1,-(SP)
026114  012746  000001                                                  MOV     SP,R0
026120  010600                                                          TRAP    C$PNTX
026122  104415                                                          ADD     #4,SP
026124  062706  000004
026130  000241        2$:     CLC                     ;CLEAR THE CARRY FOR THE FOLLOWING ROTATE.
026132  006002                ROR     R2              ;SHIFT "TX NOT DONE" FLAG INTO CARRY.
026134  103013              BCC     4$              ;SKIP PRINTING MESSAGE IF FLAG FOR LINE CLEAR.
026136                        PRINTX  #EF9020,R3      ;PRINT "TOO FEW TX.ACTIONS GENERATED" MSG.
026136  010346                                                          MOV     R3, (SP)
026140  012746  010334                                                  MOV     #EF9020,-(SP)
026144  012746  000002                                                  MOV     #2,-(SP)
026150  010600                                                          MOV     SP,R0
026152  104415                                                          TRAP    C$PNTX
```

GLOBAL ERROR REPORTING ROUTINE - ER9005 - SEQ 0071

```
        026154  062706  000006                                                          ADD     #6,SP
 2751   026160  004737  032640          JSR     PC,PRTLPR       ;REPORT CONTENTS OF LPR REGISTER FOR THIS LINE.
 2752   026164  005203          4$:      INC     R3              ;INCREMENT LINE COUNTER.
 2753   026166  005702                   TST     R2              ;CHECK THE "TX NOT DONE FLAGS".
 2754   026170  001357                  BNE     2$              ;IF MORE FLAGS SET, LOOP TO DO OTHER LINES.
 2755   026172  000440                  BR      10$             ;EXIT THIS ROUTINE.
 2756                                   ;+
 2757                                   ; Perform RX incomplete error message reporting.
 2758                                   ;
 2759   026174  000241          6$:      CLC                     ;CLEAR THE CARRY FOR THE FOLLOWING ROTATE.
 2760   026176  006002                   ROR     R2              ;SHIFT "RX NOT DONE" FLAG INTO CARRY.
 2761   026200  103031                  BCC     8$              ;SKIP PRINTING MESSAGE IF FLAG FOR LINE CLEAR.
 2762   026202  006303                   ASL     R3              ;SHIFT LINE # TO GIVE CORRECT TABLE OFFSET.
 2763   026204  016305  005364          MOV     TXRXLB(R3),R5   ;GET THE "ASSOCIATED" RECEIVE LINE OFFSET.
 2764   026210  010246                   MOV     R2, (SP)        ;SAVE THE "RX NOT DONE" FLAGS ON THE STACK.
 2765   026212  010502                   MOV     R5,R2           ;COPY THE ASSOCIATED TX LINE OFFSET.
 2766   026214  016505  003612          MOV     CHCNTB(R5),R5   ;GET THE TOTAL NUMBER OF EXPECTED CHARS.
 2767   026220  006202                   ASR     R2              ;SHIFT THE TABLE OFFSET TO GIVE A LINE NUMBER.
 2768   026222  006203                   ASR     R3              ;SHIFT TABLE OFFSET TO GIVE LINE NUMBER.
 2769   026224                          PRINTX  #EF9012,R3,R1,(R4),R5,R2  ;REPORT NUMBER OF CHARS ON LINE.
        026224  010246                                                          MOV     R2,-(SP)
        026226  010546                                                          MOV     R5, (SP)
        026230  011446                                                          MOV     (R4),-(SP)
        026232  010146                                                          MOV     R1, (SP)
        026234  010346                                                          MOV     R3,-(SP)
        026236  012746  007651                                                  MOV     #EF9012,-(SP)
        026242  012746  000006                                                  MOV     #6,-(SP)
        026246  010600                                                          MOV     SP,R0
        026250  104415                                                          TRAP    C$PNTX
        026252  062706  000016                                                  ADD     #16,SP
 2770   026256  012602                   MOV     (SP)+,R2        ;RESTORE THE "RX NOT DONE" FLAGS.
 2771   026260  004737  032640          JSR     PC,PRTLPR       ;REPORT CONTENTS OF LPR REGISTER FOR THIS LINE.
 2772   026264  005724          8$:      TST     (R4)+           ;INCREMENT THE CHARACTER COUNTER TABLE.
 2773   026266  005203                   INC     R3              ;INCREMENT THE LINE COUNTER.
 2774   026270  005702                   TST     R2              ;CHECK THE "RX NOT DONE FLAGS".
 2775   026272  001340                  BNE     6$              ;IF MORE FLAGS SET, LOOP TO DO OTHER LINES.
 2776   026274                  10$:     PASS                    ;RESTORE THE CONTENTS OF THE GPRS.
        026274  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREGOS SUBRT.
 2777   026276                          ENDMSG
        026276                                                  L10017:
        026276  104423                                                  TRAP    C$MSG
```

GLOBAL ERROR REPORTING ROUTINE - ER9007 -

```
                        .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 error report macro call.
                        ;*
                        ;* COMMENTS:    The message is printed as Basic and Extended error information.
                        ;*
                        ;* SUBORDINATE ROUTINES USED: None.
                        ;*************************************************************************

                              BGNMSG  ER9007
026300                                                          ER9007::
026300
                        
026300  042703  177760          BIC     #177760,R3      ;REMOVE ALL BUT LINE # BITS FROM LINE # WORD.
026304                        PRINTB  #EF9018,R1,R3   ;REPORT SECONDARY ERROR MESSAGE.
026304  010346                                                  MOV     R3,-(SP)
026306  010146                                                  MOV     R1,-(SP)
026310  012746  010203                                          MOV     #EF9018,-(SP)
026314  012746  000003                                          MOV     #3, (SP)
026320  010600                                                  MOV     SP,R0
026322  104414                                                  TRAP    C$PNTB
026324  062706  000010                                          ADD     #10,SP
026330                        PRINTX  #EF9017,R1,R2   ;REPORT THE ACTUAL INCORRECT CODE.
026330  010246                                                  MOV     R2,-(SP)
026332  010146                                                  MOV     R1,-(SP)
026334  012746  010127                                          MOV     #EF9017,-(SP)
026340  012746  000003                                          MOV     #3, (SP)
026344  010600                                                  MOV     SP,R0
026346  104415                                                  TRAP    C$PNTX
026350  062706  000010                                          ADD     #10,SP
                        
026354                        ENDMSG
026354                                                  L10020:
026354  104423                                                  TRAP    C$MSG
```

```
 2808                                .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER9008 -
 2809                                ;*************************************************************************
 2810                                ;*      This is an error reporting subroutine which is used to report that
 2811                                ;*      an unexpected code or character has been found in the DUT receive
 2812                                ;*      character FIFO.
 2813                                ;*
 2814                                ;* INPUTS:      R1 - Address of partial error message string.
 2815                                ;*              R2 - Incorrect code as read from the selftest code FIFO slot.
 2816                                ;*
 2817                                ;* OUTPUTS:     A message is printed at the operator console.
 2818                                ;*
 2819                                ;* CALLING SEQUENCE:    Include the label "ER9008" as the message pointer
 2820                                ;*                      parameter in the Diag Super error report macro call.
 2821                                ;*
 2822                                ;* COMMENTS:    The message is printed as Basic and Extended error information.
 2823                                ;*
 2824                                ;* SUBORDINATE ROUTINES USED: None.
 2825                                ;*************************************************************************
 2826
 2827 026356                            BGNMSG  ER9008
      026356                                                                ER9008::
 2828
 2829                                ;*
 2830                                ; Extract the line number from the incorrect code or character which was read
 2831                                ;    from the selftest code FIFO slot.
 2832                                ;
 2833 026356  010203                        MOV     R2,R3
 2834 026360  000303                        SWAB    R3
 2835 026362  042703  177760                BIC     #177760,R3      ;CALCULATE LINE NUMBER OF CODE.
 2836 026366                        PRINTB  #EF9016,R1,R3   ;REPORT TYPE OF INCORRECT CODE FOUND.
      026366  010346                                                            MOV     R3,-(SP)
      026370  010146                                                            MOV     R1,-(SP)
      026372  012746  010032                                                    MOV     #EF9016,-(SP)
      026376  012746  000003                                                    MOV     #3,-(SP)
      026402  010600                                                            MOV     SP,R0
      026404  104414                                                            TRAP    C$PNTB
      026406  062706  000010                                                    ADD     #10,SP
 2837 026412                        PRINTX  #EF9017,R1,R2   ;REPORT THE ACTUAL INCORRECT CODE.
      026412  010246                                                            MOV     R2,-(SP)
      026414  010146                                                            MOV     R1,-(SP)
      026416  012746  010127                                                    MOV     #EF9017, (SP)
      026422  012746  000003                                                    MOV     #3,-(SP)
      026426  010600                                                            MOV     SP,R0
      026430  104415                                                            TRAP    C$PNTX
      026432  062706  000010                                                    ADD     #10,SP
 2838
 2839 026436                        ENDMSG
      026436                                                        L10021:
      026436  104423                                                           TRAP    C$MSG
```

```
                                .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER9101 -
                                ;*************************************************************************
                                ;*      This is a general error reporting subroutine which reports a message
                                ;*      which takes a single, 2 digit decimal argument after the end of an
                                ;*      ASCII message.
                                ;*
                                ;* INPUTS:      R1 - Value to be printed after msg as 2 decimal digits.
                                ;*              R2 - Address of message to print first.
                                ;*
                                ;* OUTPUTS:     A messages is printed at the operator console.
                                ;*
                                ;* CALLING SEQUENCE:    Include the label "ER9101" 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.
                                ;*************************************************************************

                                        BGNMSG  ER9101
                                                                                ER9101::

                                        PRINTB  #EF9006,R2,R1   ;REPORT THE STRING FOLLOWED BY THE NUMBER.
                                                                                MOV     R1,-(SP)
                                                                                MOV     R2,-(SP)
                                                                                MOV     #EF9006,-(SP)
                                                                                MOV     #3,-(SP)
                                                                                MOV     SP,R0
                                                                                TRAP    C$PNTB
                                                                                ADD     #10,SP

                                        ENDMSG

                                                                        L10022:
                                                                                TRAP    C$MSG
```

```
                        .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER9102 -
                        ;*****************************************************************************
                        ;*      This is an error reporting subroutine which prints additional error
                        ;*      information after the error message header.
                        ;*      This routine is passed a bit map which specifies the lines for which
                        ;*      the error condition should be reported.
                        ;*
                        ;* INPUTS:      R1 - Address of the message to be printed by this routine.
                        ;*              R2   Bit map of lines for which to report errors.
                        ;*
                        ;* OUTPUTS:     Messages are printed at the operator console.
                        ;*
                        ;* CALLING SEQUENCE:    Load the address of the message in R1.
                        ;*                      Load the bit map of lines with errors in R2.
                        ;*                      Include the label "ER9102" as the message pointer
                        ;*                         (ERRBLK) in the Diag Super error report macro call.
                        ;*
                        ;* COMMENTS:    The output format of this message is:
                        ;*              "TEXT MESSAGE POINTED TO BY R1"
                        ;*                      "ERROR CONDITION ON LINE nn"
                        ;*                      "ERROR CONDITION ON LINE ..."
                        ;*              The top message, and the message for each line are printed
                        ;*              as basic error information.
                        ;*
                        ;* SUBORDINATE ROUTINES USED: None.
                        ;*****************************************************************************

026466                          BGNMSG  ER9102
026466                                                          ER9102::
026466                          SAVE                    ;SAVE THE CONTENTS OF THE GPRS.
026466  004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.

026472                          PRINTB  #EF0503,R1      ;PRINT THE FIRST LINE OF THE MESSAGE.
026472  010146                                                  MOV     R1,-(SP)
026474  012746  005630                                          MOV     #EF0503,-(SP)
026500  012746  000002                                          MOV     #2, (SP)
026504  010600                                                  MOV     SP,R0
026506  104414                                                  TRAP    C$PNTB
026510  062706  000006                                          ADD     #6,SP
026514  005003                  CLR     R3              ;CLEAR THE LINE NUMBER.
026516  000241          2$:     CLC                     ;PREPARE TO ROTATE NEXT BIT OUT OF MAP.
026520  006002                  ROR     R2              ;GET THE NEXT BIT OF THE BIT MAP.
026522  103011                  BCC     4$              ;SKIP PRINTING MESSAGE IF THE BIT IS CLEAR.
026524                          PRINTB  #EF9103,R3      ;REPORT THIS LINE HAD THE ERROR.
026524  010346                                                  MOV     R3,-(SP)
026526  012746  010420                                          MOV     #EF9103,-(SP)
026532  012746  000002                                          MOV     #2,-(SP)
026536  010600                                                  MOV     SP,R0
026540  104414                                                  TRAP    C$PNTB
026542  062706  000006                                          ADD     #6,SP
026546  005203          4$:     INC     R3              ;INCREMENT THE LINE COUNTER.
026550  005702                  TST     R2              ;CHECK THE BIT MAP.
026552  001361                  BNE     2$              ;LOOP IF NOT ALL SET BITS REMOVED FROM BIT MAP.
026554                          PRINTB  #EF9101         ;PRINT A BLANK LINE.
026554  012746  010415                                          MOV     #EF9101,-(SP)
026560  012746  000001                                          MOV     #1,-(SP)
026564  010600                                                  MOV     SP,R0
```

GLOBAL ERROR REPORTING ROUTINE - ER9102 SEQ 0076

```
        026566  104414                                                  TRAP    C$PNTB
        026570  062706  000004                                          ADD     #4,SP
  2906  026574                  60$:    PASS
        026574  004736                                  JSR     PC,@(SP)+       ;RESTORE THE SAVED CONTENTS OF THE GPRS.
  2907  026576                          ENDMSG                                  ;RETURN TO PREG05 SUBRT.
        026576                                                          L10023:
        026576  104423                                                  TRAP    C$MSG
```

```
 2909                                   .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER9301 -
 2910                                   ;*************************************************************************
 2911                                   ;*      This is an error reporting subroutine which prints any BMP codes
 2912                                   ;*      that are found in the BMP code queue, together with the the number of
 2913                                   ;*      the test that was executing at the time the BMP code was logged.
 2914                                   ;*
 2915                                   ;* INPUTS:      R1 - The address of the first message to be reported.
 2916                                   ;*              R2 - The address of the next empty cell in the queue.
 2917                                   ;*
 2918                                   ;* OUTPUTS:     The test number followed by the BMP code are printed at the
 2919                                   ;*              operator console.
 2920                                   ;*
 2921                                   ;* CALLING SEQUENCE:    Include the label "ER9301" as the message pointer
 2922                                   ;*                      parameter in the Diag Super error report macro call.
 2923                                   ;*
 2924                                   ;* COMMENTS:    The message is printed as Basic error information.
 2925                                   ;*
 2926                                   ;* SUBORDINATE ROUTINES USED: None.
 2927                                   ;*************************************************************************
 2928
 2929 026600                                   BGNMSG  ER9301
         026600
 2930 026600                                   SAVE                                    ER9301::
         026600  004537  005474                        JSR     R5,PREGO5       ;SAVE THE GPRS ON THE STACK.
 2931                                                                           ;CALL REGISTER SAVE SUBRT.
 2932 026604                                   PRINTB  #EF0503,R1      ;REPORT UNEXPECTED BMP CODES FOUND.
         026604  010146                                                                 MOV     R1,-(SP)
         026606  012746  005630                                                         MOV     #EF0503,-(SP)
         026612  012746  000002                                                         MOV     #2,-(SP)
         026616  010600                                                                 MOV     SP,R0
         026620  104414                                                                 TRAP    C$PNTB
         026622  062706  000006                                                         ADD     #6,SP
 2933 026626  012703  002662                    MOV     #BMPCQB,R3      ;GET THE START ADDRESS OF THE BMP CODE QUEUE.
 2934 026632  012705  024066                    MOV     #EM9302,R5      ;GET THE MESSAGE TO BE REPORTED.
 2935 026636  012301                    2$:     MOV     (R3)+,R1        ;GET THE NUMBER OF THE TEST THAT WAS EXECUTING.
 2936 026640  012304                            MOV     (R3)+,R4        ;GET BMP CODE THAT WAS REPORTED OFF THE QUEUE.
 2937 026642  004737  026724                    JSR     PC,50$          ;GO REPORT THE BMP CODE.
 2938 026646  020302                            CMP     R3,R2           ;CHECK IF ALL CODES HAVE BEEN REPORTED.
 2939 026650  103772                            BLO     2$              ;IF IT IS NOT THE LAST BMP CODE THEN LOOP.
 2940                                   ;+
 2941                                   ; Check if overflow has occurred.
 2942                                   ;  The conditions for overflow are: the pointer contains the address of the
 2943                                   ;  last cell in the queue, and a bmp code has already been written into that
 2944                                   ;  cell.
 2945                                   ;-
 2946 026652  020227  003056                    CMP     R2,#BMPCQE-4    ;CHECK IF THE POINTER IS AT THE LAST LOCATION.
 2947 026656  001036                            BNE     60$             ;EXIT IF NOT AT THE LAST LOCATION.
 2948 026660  005762  000002                    TST     2(R2)           ;CHECK FOR A BMP CODE IN THE LAST CELL
 2949 026664  001433                            BEQ     60$             ;EXIT IF NO OVERFLOW HAS OCCURED, CELL EMPTY.
 2950 026666  012301                            MOV     (R3)+,R1        ;GET THE TEST NUMBER OFF THE QUEUE.
 2951 026670  011304                            MOV     (R3),R4         ;GET THE BMP CODE OFF THE QUEUE.
 2952 026672  012705  024116                    MOV     #EM9303,R5      ;SELECT THE MESSAGE TO BE REPORTED.
 2953 026676                            PRINTX  #EF9302         ;REPORT OVERFLOW CONDITION.
         026676  012746  010544                                                         MOV     #EF9302,-(SP)
         026702  012746  000001                                                         MOV     #1,-(SP)
         026706  010600                                                                 MOV     SP,R0
         026710  104415                                                                 TRAP    C$PNTX
```

GLOBAL ERROR REPORTING ROUTINE - ER9301 - SEQ 0078

```
     026712  062706  000004                                                  ADD     #4,SP
2954 026716  004737  026724          JSR     PC,50$          ;REPORT THE LAST BMP CODE PLACED ON THE QUEUE.
2955 026722  000414                  BR      60$             ;EXIT.
2956
2957 026724                  50$:    PRINTX  #EF9301,R5,R1,R4  ;PRINT THE MESSAGE.
     026724  010446                                                          MOV     R4,-(SP)
     026726  010146                                                          MOV     R1,-(SP)
     026730  010546                                                          MOV     R5,-(SP)
     026732  012746  010466                                                  MOV     #EF9301,-(SP)
     026736  012746  000004                                                  MOV     #4,-(SP)
     026742  010600                                                          MOV     SP,R0
     026744  104415                                                          TRAP    C$PNTX
     026746  062706  000012                                                  ADD     #12,SP
2958 026752  000207                  RTS     PC              ;RETURN.
2959 026754                  60$:    PASS                    ;RESTORE THE GPR CONTENTS.
     026754  004736                          JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
2960
2961 026756                  ENDMSG
     026756                                                          L10024:
     026756  104423                                                          TRAP    C$MSG
```

```
2963                            .SBTTL  GLOBAL SUBROUTINES SECTION
2965                            ;**********************************************************************************************
2966                            ;
2967                            ;               FVTSKL3.P11
2968                            ;
2969                            ;**********************************************************************************************
2971
2972
2973                            ;++
2974                            ; THE GLOBAL SUBROUTINES SECTION CONTAINS THE SUBROUTINES
2975                            ; THAT ARE USED IN MORE THAN ONE TEST.
2976                            ; -
```

```
                                .SBTTL  GLOBAL SUBROUTINE                ALTFLD -
                                ;** ************************************************************************
                                ;*              Alter Device Register Fields Routine -
                                ;*      Th s subroutine alters the specified field of the specified device
                                ;*      reg ster for the specified lines.  This routine can be used to set
                                ;*      or clear bits within selected fields of selected registers.
                                ;*      Use examples:   Set RX.BAUD.RATE fields on lines 3 and 6.
                                ;*                      Clear TX.DMA bits on all lines.
                                ;*
                                ;* INPUTS:      R1   Address of the registers to alter.
                                ;*              R2 - Bit fields set to desired states.
                                ;*              R3 - B t map of lines for which to alter register.
                                ;*              R4   Mask of bits to alter (1 indicates change bit).
                                ;*              CSRA - Contains the address of the device CSR.
                                ;*              IESTAT   Saved states of the interrupt enable bits.
                                ;*
                                ;* OUTPUTS:     DEVICE REGISTERS - Specified register f elds altered.
                                ;*                  CSR IND.ADR.REG field - Destroyed.
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,ALTFLD
                                ;*
                                ;* COMMENTS:    This routine reads the specified reg sters for all lines
                                ;*              w th numbers lower than the highes specified l ne.
                                ;*              This routine does not read the CSR.
                                ;*
                                ;* SUBROUTINES CALLED: None.
                                ;-- ************************************************************************

026760                          ALTFLD:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
026760  004537  005474                         JSR     R5,PREGOS       ;CALL REGISTER SAVE SUBRT.

                                ;*
                                ; Set up to loop for each l ne:
                                ;    Prepare the word to be ORed into the register contents.
                                ;    Set up the word to wr te into the IND.ADR.REG field of the CSR.
                                ;
026764  010400                          MOV     R4,R0           ;CALCULATE THE NEW CONTENTS OF THE
026766  005100                          COM     R0              ;  REGISTER FIELDS WHICH ARE TO BE
026770  040002                          BIC     R0,R2           ;  ALTERRED BY THIS ROUTINE.
026772  013705  002374                  MOV     IESTAT,R5       ;SET UP TO WRITE IND.ADR.REG FIELD TO 0.
                                ;*
                                ; Loop once for each line, altering the specified field in the specified
                                ;    register if the line has been selected for altering.
                                ; Ex t the loop f no more l nes to alter, or f we have altered the max
                                ;    allowable number of l nes (as spec fied by NUMLNS).
                                ;
026776  000241                          CLC                     ;PREPARE FOR ROTATE, "TST R5" DOES THIS BELOW.
027000  006003                  2$:     ROR     R3              ;GET THE LINE SELECT BIT FOR THIS LINE.
027002  103006                          BCC     4$              ;SKIP SETUP IF LINE IS NOT SELECTED.
027004  010577  153270                  MOV     R5,@CSRA        ;SET OUT CSR IND.ADR.REG FIELD TO THIS LINE.
027010  011100                          MOV     (R1),R0         ;GET THE PRESENT CONTENTS OF THE REG TO ALTER.
027012  040400                          BIC     R4,R0           ;CLEAR THE BIT FIELDS WE ARE TO ALTER.
027014  050200                          BIS     R2,R0           ;OR IN THE NEW STATES OF THE FIELDS.
027016  010011                          MOV     R0,(R1)         ;WRITE THE NEW REGISTER CONTENTS TO THE REG.
027020  005205                  4$:     INC     R5              ;SET LINE NUMBER TO THE NEXT LINE.
027022  005703                          TST     R3              ;CHECK FOR UNHANDLED LINES, CLEAR CARRY FLAG.
027024  001365                          BNE     2$              ;LOOP IF SELECTED LINE(S) IS NOT HANDLED.
```

GLOBAL SUBROUTINE ALTFLD SEQ 0081

```
3034
3035 027026                    60$:   PASS
     027026  004736                          JSR     PC,@(SP)+       ;RETURN TO PREGOS SUBRT.
3036 027030  000207                    RTS     PC                      ;RETURN TO CALLING ROUTNE.
                                                    ;RESTORE GPRS.
```

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

027032                  CALMSL:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
027032  004537  005474                          JSR     R5,PREGOS       ;CALL REGISTER SAVE SUBRT.
027036  005037  027252          CLR     62$             ;CLEAR THE 2ND TIME FLAG.
                        ;+
                        ; Synchronize with the LTC.
                        ;-
027042  012705  000001  2$:     MOV     #1,R5           ;SET OUTER LOOP COUNTER TO 1 LOOP.
                                                ;INCREASE THE VALUE LOADED INTO THIS COUNTER IF THE <**
                                                ;FOLLOWING LOOP FAILS ON FUTURE, FASTER PROCESSORS. <**
027046  005000          CLR     R0              ;CLEAR THE WAIT FOR CLOCK INT COUNTER.
027050  012737  000001  002450  MOV     #1,TIMER1       ;SET UP COUNT OF 1 TO SYNCH WITH LTC.
027056  005737  002450  4$:     TST     TIMER1          ;CHECK FOR COUNTER HAVING GONE TO ZERO.
027062  001410          BEQ     6$              ;JUMP OUT OF LOOP IF LTC HAS INTERRUPTED.
027064  005200          INC     R0              ;COUNT THIS ITERATION OF THE INNER LOOP.
027066  001373          BNE     4$              ;LOOP IF COUNTER HAS NOT TURNED OVER.
027070  005305          DEC     R5              ;DECREMENT THE INNER LOOP COUNTER.
027072  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.
                        ;-
027074  005037  002446          CLR     CLKHRZ          ;CLEAR LTC FREQUENCY WORD TO INDICATE NO LTC.
027100  000241          CLC                             ;INDICATE FAILURE FOR RETURN.
027102  000461          BR      60$             ;BYPASS THE FOLLOWING CALIBRATION PROCEDURES.
                        ;+
                        ; We are now synchronized with the LTC.
                        ; Set up for the calibration loop.
                        ;-
027104  012704  002450  6$:     MOV     #TIMER1,R4      ;WILL TEST TIMER1 IN THE LOOP BELOW.
```

```
3094 027110  005001                    CLR     R1              ;CLEAR THE OUTER LOOP COUNTER.
3095 027112  005002                    CLR     R2              ;INDICATE TO CHECK ALL BITS OF TIMER1.
3096 027114  005003                    CLR     R3              ;INDICATE TO CHECK FOR TIMER1 CLEAR.
3097 027116  012714  000001            MOV     #1,(R4)         ;LOAD TIMER1 WITH COUNT OF 1.
3098
3099 027122  013705  002462    8$:     MOV     MSLCNT,R5       ;LOAD MS LOOP COUNT.
3100 027126  011400            10$:    MOV     (R4),R0         ;GET THE TIMER1 VALUE.
3101 027130  010037  027254            MOV     R0,64$          ;SAVE WORD (LIKE IN THE REAL LOOP).
3102 027134  040200                    BIC     R2,R0           ;LEAVE ALL THE BITS.
3103 027136  020003                    CMP     R0,R3           ;COMPARE AGAINST ZERO.
3104 027140  000261                    SEC                     ;SET CARRY IN CASE OF SUCCESS.
3105 027142  001406                    BEQ     12$             ;EXIT LOOP IF TIMER1 HAS CLEARED.
3106 027144  005305                    DEC     R5              ;COUNT DOWN THE INSIDE MS LOOP COUNT.
3107 027146  001367                    BNE     10$             ;LOOP IF MS NOT UP.
3108 027150  005301                    DEC     R1              ;DECREMENT THE MS TIME COUNT.
3109 027152  001363                    BNE     8$              ;KEEP LOOPING.
3110 027154  004737  032412            JSR     PC,OOPS         ;WE OVERFLOWED, SOMETHING IS WRONG, ABORT.
3111                            ;+
3112                            ; We have now have loop count information for one clock tick.
3113                            ; We have negative of number of outer loops in R1, each is MSLCNT inner loops.
3114                            ; We have the portion of the last outer loop not executed, in R5.
3115                            ; Now we calculate the total number of inner loops executed.
3116                            ;
3117 027160  005401    12$:     NEG     R1              ;GET NUMBER OF OUTER LOOPS.
3118 027162  013702  002462            MOV     MSLCNT,R2       ;GET THE NUMBER OF INNER LOOPS PER OUTER LOOP.
3119 027166  010203                    MOV     R2,R3           ;COPY NUMBER OF LOOPS FOR MULTIPLY.
3120 027170  160502                    SUB     R5,R2           ;CALC # OF INNER LOOPS DONE IN LAST OUTER LOOP
3121 027172  010204                    MOV     R2,R4           ;  AND ADD TO ACCUMULATOR LSWORD.
3122 027174  005005                    CLR     R5              ;CLEAR ACCUMULATOR MSWORD.
3123 027176  005301    14$:     DEC     R1              ;CHECK R1 FOR 0 CONDITION
3124 027200  100403                    BMI     16$             ; SKIP MULTIPLICATION IF ZERO
3125 027202  060304                    ADD     R3,R4           ;MULTIPLY NUMBER OF INNER
3126 027204  005505                    ADC     R5              ; LOOPS PER OUTER LOOP BY
3127 027206  000773                    BR      14$             ;NUMBER OF OUTER LOOPS PERFORMED.
3128                            ;+
3129                            ; Divide the total number of inner loops by the number of MS per LTC tick.
3130                            ;-
3131 027210  013701  002460    16$:     MOV     MSTICK,R1       ;# OF MS PER LTC TICK IS DIVISOR.
3132 027214  010403                    MOV     R4,R3           ;LSWORD OF LOOP COUNT IS LSWORD OF DIVIDEND.
3133 027216  010502                    MOV     R5,R2           ;MSWORD OF LOOP COUNT IS MSWORD OF DIVIDEND.
3134 027220  004737  037234            JSR     PC,UNSDIV       ;DIVIDE NUMBER OF LOOPS BY MS PER LTC TICK.
3135 027224  103402                    BCS     18$             ;BYPASS OOPS IF WE'RE OK.
3136 027226  004737  032412            JSR     PC,OOPS         ;CLOCK ROUTINES ARE NOT LONG ENOUGH, OR BUG.
3137 027232  010137  002462    18$:     MOV     R1,MSLCNT       ;SET NEW VALUE FOR MS LOOP COUNT.
3138 027236  005137  027252            COM     62$             ;SET THE 2ND ITERATION FLAGS IF 1ST ITERATION.
3139 027242  001277                    BNE     2$              ;BRANCH IF ONLY ONE ITERATION DONE.
3140 027244  000261                    SEC                     ;SET THE SUCCESS FLAG FOR EXIT.
3141
3142 027246            60$:     PASS                            ;RESTORE GPRS,
     027246  004736                            JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
3143 027250  000207                    RTS     PC              ; CARRY   SUCCESS FLAG. SET IF SUCCESS.
3144
3145 027252  000000    62$:     .WORD   0               ;2ND CALIBRATION ITERATION FLAGS.
3146 027254  000000    64$:     .WORD   0               ;DUMMY WORD FOR STORAGE OF THE READ WORD.
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - CHKBMP -
                        ;++ ************************************************************************
                        ;*                      - CHECK IF CHARACTER IS A BMP CODE -
                        ;*      This subroutine is used to check for BMP codes.
                        ;*      If a BMP code is detected, it will be saved on the queue to be reported
                        ;*      later.  The carry is used as a flag to indicate a code has been found.
                        ;*
                        ;* INPUTS:      R2 - Contains the data to be checked.
                        ;*
                        ;* OUTPUTS:     R1 - Contians the message to be reported.
                        ;*              ERRBLK - Contains the error reporting routine.
                        ;*              Carry bit is used to indicate a BMP code found, Carry set.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,CHKBMP
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: SAVBMP.
                        ;-  ************************************************************************

027256                  CHKBMP:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
027256  004537  005474                      JSR     R5,PREGO5       ;CALL REGISTER SAVE SUBRT.
027262  012700  170301          MOV     #170301,R0      ;SET UP THE FLAGS OF A BMP CODE.
027266  040200                  BIC     R2,R0           ;TRY TO CLEAR THE BMP CODE FLAGS.
027270  001011                 BNE     2$              ;IF NOT A BMP CODE, EXIT WITH FAILURE.
027272  004737  035624         JSR     PC,SAVBMP       ;SAVE THE BMP CODE ON THE QUEUE.
027276  012701  021507          MOV     #EM5303,R1      ;PASS THE MESSAGE TO BE REPORTED.
027302  012737  025034  005472  MOV     #ER1603,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
027310  000261                  SEC                     ;PASS FLAG TO INDICATE SUCCESS, BMP CODE FOUND.
027312  000401                 BR      60$             ;EXIT.
027314  000241          2$:     CLC                     ;PASS FLAG TO INDICATE FAILURE.
027316                  60$:    PASS    R1                      ;RESTORE GPRS, EXCEPT
027316  010166  000004                          MOV     R1,R1SLOT(SP)           ;PUT R1 IN STACK SLOT.
027322  004736                               JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.

                        ;R1 - CONTAINS THE ADDRESS OF ERROR MESSAGE.
                        ;CARRY BIT - SET INDICATES SUCCESS.

027324  000207                 RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - CHKEXT -
                        ;++ ******************************************************************************
                        ;*                        - Check For Extra Character Routine -
                        ;*      This subroutine checks for the condition which indicates that an extra
                        ;*      character has been received during the reception of a data pattern.
                        ;*      If this routine determines that it is likely that an extra character
                        ;*      has been received it indicates this in the status information returned
                        ;*      to the calling routine.
                        ;*
                        ;* INPUTS:      R3 - RX line number multiplied by 2 (offset into word tables).
                        ;*              R4 - Base address of resync que containing RX chars.
                        ;*              R5 - Mask of "inactive" (non-data) bits of RX and TX chars.
                        ;*              CHCNTB - Base of number of chars to TX on each line table.
                        ;*              RXCNTB - Base of the RX character counters table.
                        ;*              RXPTRB - Base of the RX character pointers table.
                        ;*              TXRXLB - Base of TX/RX line number association table.
                        ;*
                        ;* OUTPUTS:     CARRY - Set if extra character condition is verified.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,CHKEXT
                        ;*
                        ;* COMMENTS:  The following symbols are used in line comments:
                        ;*              CHR0 - Character at bottom of resync que (first received).
                        ;*              CHR1, CHR2 - 2 characters received after CHR0.
                        ;*              EXP0 - Character expected to be received next.
                        ;*              EXP1, EXP2 - Character expected to be received after EXP0, etc.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: None.
                        ;-- ******************************************************************************
027326                  CHKEXT:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
027326  004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
027332  016302  003552          MOV     RXPTRB(R3),R2   ;GET THE RX DATA POINTER.
027336  005724                  TST     (R4)+           ;INCREMENT R4 BY 2 TO POINT TO CHR1.
027340  012400                  MOV     (R4)+,R0        ;GET CHR1 FROM THE QUE, DATA.VALID INTO N FLAG.
027342  100026                 BPL     52$             ;EXIT WITH "FAILURE" IF CHR1 NOT VALID.
027344  040500                  BIC     R5,R0           ;REMOVE INACTIVE BITS FROM CHR1 VALUE.
027346  112201                  MOVB    (R2)+,R1        ;GET EXP0 FROM THE DATA PATTERN.
027350  040501                  BIC     R5,R1           ;REMOVE INACTIVE BITS FROM EXP0 VALUE.
027352  120100                  CMPB    R1,R0           ;COMPARE CHR1 AND EXP0.
027354  001021                 BNE     52$             ;EXIT WITH "FAILURE" IF CHR1 <> EXP0.
027356  016300  003712          MOV     RXCNTB(R3),R0   ;COMPARE THE PRESENT RX CHARACTER COUNT PLUS 1
027362  005200                  INC     R0              ;  WITH THE EXPECTED NUMBER OF CHARS TO RX ON
027364  016301  005364          MOV     TXRXLB(R3),R1   ;  LINE (NUMBER TRANSMITTED AND LOOPED BACK) TO
027370  020061  003612          CMP     R0,CHCNTB(R1)   ;  DETERMINE IF CHR1 IS LAST EXPECTED CHAR.
027374  001407                 BEQ     50$             ;EXIT WITH "SUCCESS" IF CHR1 IS LAST CHAR.
027376  011400                  MOV     (R4),R0         ;GET CHR2 FROM THE QUE, DATA.VALID INTO N FLAG.
027400  100005                 BPL     50$             ;EXIT WITH "SUCCESS" IF CHR1 WAS LAST IN QUE.
027402  040500                  BIC     R5,R0           ;REMOVE INACTIVE BITS FROM CHR2 VALUE.
027404  111201                  MOVB    (R2),R1         ;GET THE EXP1 VALUE.
027406  040501                  BIC     R5,R1           ;REMOVE INACTIVE BITS FROM EXP1 VALUE.
027410  020001                  CMP     R0,R1           ;COMPARE CHR2 AND EXP1.
027412  001002                 BNE     52$             ;EXIT WITH "FAILURE" IF CHR2 <> EXP1.

                        ;+
                        ; It is likely that we received an extra character within the data pattern.
                        ; Indicate "success" and exit.
                        ;-
```

GLOBAL SUBROUTINE - CHKEXT - SEQ 0086

```
3239 027414  000261                50$:    SEC                     ;SET THE SUCCESS FLAG.
3240 027416  000401                        BR      60$             ;EXIT THE ROUTINE.
3241
3242                               ;+
3243                               ; We didn't receive a single extra character at this point in the data pattern.
3244                               ; Indicate "failure" and exit.
3245                               ;
3246 027420  000241                52$:    CLC                     ;CLEAR THE SUCCESS FLAG.
3247
3248 027422                         60$:    PASS                    ;RESTORE GPRS.
     027422  004736                                JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
3249 027424  000207                        RTS     PC              ;CARRY - SET IF SUCCESS (EXTRA CHAR RXED).
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - CHKLOS -
                        ;** ************************************************************************
                        ;*                      - Check For Lost Character Routine -
                        ;*      This subroutine checks for the condition which indicates that a char
                        ;*      has been "lost" from the looped back data pattern during a transmission
                        ;*      and reception test.  If this routine determines that it is likely that
                        ;*      a character has been lost, it indicates this in the status information
                        ;*      returned to the calling routine.
                        ;*
                        ;* INPUTS:      R3 - RX line number multiplied by 2 (offset into word tables).
                        ;*              R4 - Base address of resync que containing RX chars.
                        ;*              R5 - Mask of "inactive" (non data) bits of RX and TX chars with
                        ;*                   all set bits in a single, left justified group.
                        ;*              CHCNTB   Base of number of chars to TX on each line table.
                        ;*              RXCNTB - Base of the RX character counters table.
                        ;*              RXPTRB   Base of the RX character pointers table.
                        ;*              TXRXLB - Base of TX/RX line number association table.
                        ;*
                        ;* OUTPUTS:     CARRY - Set if lost character condition is verified.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,CHKLOS
                        ;*
                        ;* COMMENTS:  The following symbols are used in line comments:
                        ;*              CHR0 - Character at bottom of resync que (first received).
                        ;*              CHR1, CHR2 - 2 characters received after CHR0.
                        ;*              EXP0 - Character expected to be received next.
                        ;*              EXP1, EXP2 - Character expected to be received after EXP0, etc.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: None.
                        ;-- ************************************************************************
027426                  CHKLOS:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
027426  004537  005474          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
027432  016301  003712          MOV     RXCNTB(R3),R1   ;COMPARE THE PRESENT RX CHARACTER COUNT PLUS 1
027436  005201                  INC     R1              ;  WITH THE EXPECTED NUMBER OF CHARS TO RX ON
027440  016300  005364          MOV     TXRXLB(R3),R0   ;  LINE (NUMBER TXED AND LOOPED BACK) TO
027444  016002  003612          MOV     CHCNTB(R0),R2   ;  DETERMINE IF THE POSSIBLE LOST CHAR
027450  020102                  CMP     R1,R2           ;  WOULD BE THE LAST EXPECTED RX CHAR.
027452  001423                  BEQ     52$             ;EXIT WITH "FAILURE" IF LOST CHR WOULD BE LAST.
027454  005201                  INC     R1              ;DETERMINE (AS ABOVE) IF CHR0 WOULD BE THE LAST
027456  160201                  SUB     R2,R1           ;  RX CHAR AND SAVE RESULT FOR LATER.
027460  016302  003552          MOV     RXPTRB(R3),R2   ;GET THE RX DATA POINTER.
027464  005202                  INC     R2              ;CALCULATE POINTER TO EXP1 LOCATION.
027466  112200                  MOVB    (R2)+,R0        ;GET EXP1 VALUE FROM DATA PATTERN.
027470  162400                  SUB     (R4)+,R0        ;COMPARE CHR0 AND EXP1 VALUES.
027472  040500                  BIC     R5,R0           ;REMOVE INACTIVE BITS FROM RESULT.  (NO ACTIVE
                                                        ;  BITS ALLOWED TO LEFT OF ANY INACTIVE BITS.)
027474  001012                  BNE     52$             ;EXIT WITH "FAILURE" IF CHR0 <> EXP1.
027476  005701                  TST     R1              ;CHECK CHR0 TEST RESULT SAVED ABOVE.
027500  001406                  BEQ     50$             ;EXIT WITH "SUCCESS" IF CHR0 IS LAST CHAR.
027502  011401                  MOV     (R4),R1         ;GET CHR1 FROM THE QUE, DATA.VALID INTO N FLAG.
027504  100004                  BPL     50$             ;EXIT WITH "SUCCESS" IF CHR0 WAS LAST QUE CHAR.
027506  111200                  MOVB    (R2),R0         ;GET THE EXP2 VALUE FROM THE DATA PATTERN.
027510  160001                  SUB     R0,R1           ;COMPARE THE EXP2 AND THE CHR1 VALUES.
027512  040501                  BIC     R5,R1           ;REMOVE INACTIVE BITS FROM RESULT OF COMPARE.
                                                        ;  (NO ACTIVE BITS LEFT OF INACTIVE BITS.)
027514  001002                  BNE     52$             ;EXIT WITH "FAILURE" IF CHR1 <> EXP2.
```

GLOBAL SUBROUTINE CHKLOS - SEQ 0088

```
                                ;+
                                ; It is likely that we lost a character from the data pattern.
                                ; Indicate "success" and exit.
                                ;-
027516  000261                  50$:    SEC                     ;SET THE SUCCESS FLAG.
027520  000401                          BR      60$             ;EXIT THE ROUTINE.

                                ;+
                                ; We didn't lose a single extra character at this point in the data pattern.
                                ; Indicate "failure" and exit.
                                ;-
027522  000241                  52$:    CLC                     ;CLEAR THE SUCCESS FLAG.

027524                          60$:    PASS                    ;RESTORE GPRS.
027524  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
027526  000207                          RTS     PC              ;CARRY - SET IF SUCCESS (LOST CHAR LIKELY).
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - CHRMSK -
                        ;** ************************************************************************
                        ;*              - Form a Bit Mask of Unused TX/RX Bits Routine -
                        ;*      This subroutine constructs a bit mask of character bits which are not
                        ;*      used during transmission and reception.  This mask can be used
                        ;*      to remove the flags, line number, DATA.VALID bits, and unused data bits
                        ;*      from a character word which has been read from the DUT FIFO.
                        ;*
                        ;* INPUTS:      R1 - DUT LPR contents used to determine character length.
                        ;*
                        ;* OUTPUTS:     IBM - Bit mask of unused TX/RX bits (including upper byte):
                        ;*                    Examples: 177400 returned for 8 bits/char.
                        ;*                              177700 returned for 6 bits/char.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,CHRMSK
                        ;*
                        ;* COMMENTS:    If this mask is to be used to just remove the inactive bits
                        ;*              within the data byte of a word read from the DUT FIFO, the
                        ;*              upper byte of the mask must be cleared.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: None.
                        ;-- ************************************************************************

027530                  CHRMSK:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
027530  004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
027534  052701  177740          BIS     #177740,R1              ;PREPARE TO COUNT BITS SHIFTED INTO MASK BY
                                                                ;  USING THE LPR BITS/CHAR FIELD CONTENTS.
027540  012703  177400          MOV     #177400,R3              ;CLEAR THE UNUSED BIT MAP LOWER BYTE.
027544  062701  000010  2$:     ADD     #10,R1                  ;DETERMINE IF ANOTHER BIT WOULD BE TOO MANY.
027550  103402                  BCS     4$                      ;EXIT THE SHIFT LOOP IF IT WOULD BE TOO MANY.
027552  006203                  ASR     R3                      ;SHIFT A BIT INTO THE UNUSED BIT MASK LOW BYTE.
027554  000773                  BR      2$                      ;LOOP TO CHECK FOR DONE.

027556  010337  002366  4$:     MOV     R3,IBM                  ;LOAD THE INACTIVE BITS MASK STORAGE IN MEMORY.

027562                  60$:    PASS                            ;RESTORE GPRS.
027562  004736                          JSR     PC,@(SP)+       ;RETURN TO PREG05 SUBRT.
027564  000207                  RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - CKCHR -
                        ;** ************************************************************************
                        ;*                       - Check Character For Errors Routine -
                        ;*      This subroutine checks the character at the bottom of the resync queue
                        ;*      to determine if it is correct.  Pointers and counters which are related
                        ;*      to the reception of the character are updated.  If the character is
                        ;*      incorrect, an analysis of the error is done and parameters are set up
                        ;*      for the reporting of the correct error.
                        ;*
                        ;* INPUTS:      R3 - Line offset for access of word tables of line variables.
                        ;*              R4 - Base address of the resync queue for this line.
                        ;*              R5 - Mask of the inactives bits in a TX or RX char byte.
                        ;*              BITTBL - Table of words with bits set for use in forming maps.
                        ;*              DPRSQ - Data Pattern Resync Que with valid char at bottom.
                        ;*              EXCNTB - Base of the extra character couters table.
                        ;*              RXDONF - Receive done flags.
                        ;*              RXPTRB - Base of the RX character pointers table.
                        ;*              Error Message Labels - EM9007,EM9008,EM9027,EM9028
                        ;*
                        ;* OUTPUTS:     R1 - Contains the address of the error message to be reported.
                        ;*              R2 - Contains the actual received data.
                        ;*              R4 - Contains the expected data.
                        ;*              CARRY - "Success" flag (set if no error is found).
                        ;*            Following variables updated for line on which char was received:
                        ;*              EXCNT - Count of the number of extra chars received on line.
                        ;*              RXCNT - Count of the number of characters received on line.
                        ;*              RXPTR - Updated to point to the next expected char on line.
                        ;*              ERRBLK - Contents destroyed.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,CKCHR
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: CHKEXT,CHKLOS,UPDCHR.
                        ;-- ************************************************************************
027566                  CKCHR:: SAVE                            ;SAVE CONTENTS OF GPRS R0 THRU R5.
027566  004537  005474                      JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                        ;+
                        ; Check for the RX of a char after RX should be complete on this line.
                        ;-
027572  036337  002534  002654               BIT     BITTBL(R3),RXDONF       ;TEST THE RX DONE FLAG FOR THIS LINE.
027600  001407                             BEQ     2$              ,SKIP ERROR REPORT IF RX NOT COMPLETE ON LINE.
                        ;+
                        ; We have received an extra character on this line.
                        ; Set up for error report and exit to report the error.
                        ; Count the extra character.
                        ; Exit to report "UNEXPECTED CHAR RECEIVED AFTER RX COMPLETE ON LINE nn"
                        ;-
027602  012701  022470                       MOV     #EM9007,R1      ;SELECT "EXTRA CHAR ON LINE" ERROR MESSAGE.
027606  011402                             MOV     (R4),R2         ;GET THE ACTUAL DATA FOR ERROR REPORT.
027610  040502                             BIC     R5,R2           ;REMOVE THE INACTIVE BITS.
027612  052704  100000                       BIS     #BIT15,R4       ;INDICATE "NONE" EXPECTED DATA FOR ERROR RPT.
027616  000452                            BR      12$             ;GO COUNT EXTRA CHAR AND EXIT WITH "FAILURE".
                        ;+
                        ; Get the pointer to the next expected receive data character.
                        ;-
027620  016302  003552  2$:               MOV     RXPTRB(R3),R2
```

```
                                        ;+
                                        ; Compare the actual data with the expected data.
                                        ;-
                                                MOV     (R4),R0         ;GET THE ACTUAL DATA.
                                                BIC     R5,R0           ;REMOVE THE INACTIVE BITS.
                                                MOVB    (R2),R1         ;GET THE EXPECTED DATA.
                                                BIC     R5,R1           ;REMOVE THE INACTIVE BITS.
                                                CMPB    R0,R1           ;COMPARE ACTUAL AND EXPECTED.
                                               BNE      4$              ;CHECK FURTHER IF DATA MISCOMPARE.
027640  004737  037370                          JSR     PC,UPDCHR       ;UPDATE PTRS AND COUNTERS FOR THE CHAR.
027644  000446                                 BR       50$             ;EXIT WITH "SUCCESS", NO ERROR FOUND.
                                        ;+
                                        ; Actual and expected data miscompare.
                                        ; Determine if it's likely we received an extra char within the data pattern.
                                        ;-
027646  004737  027326                  4$:     JSR     PC,CHKEXT       ;CHECK FOR EXTRA CHAR RX'ED IN PATTERN.
027652  103010                                 BCC     6$              ;GO CHECK FOR LOST CHAR IF NO EXTRA CHAR.
                                        ;+
                                        ; It is likely that we received an extra character within the data pattern.
                                        ; Count the char as an extra char, don't count as a standard char.
                                        ; Report "EXTRA CHAR RECEIVED WITHIN DATA PATTERN ON LINE nn"
                                        ;-
027654  012701  023433                          MOV     #EM9027,R1      ;SELECT "EXTRA CHAR ON LINE" ERROR MSG.
027660  111200                                 MOVB    (R2),R0         ;GET THE EXPECTED RECEIVE DATA.
027662  040500                                 BIC     R5,R0           ;REMOVE THE INACTIVE BITS FROM EXPECTED DATA.
027664  011402                                 MOV     (R4),R2         ;GET THE ACTUAL RECEIVE DATA.
027666  040502                                 BIC     R5,R2           ;REMOVE THE INACTIVE BITS FROM ACTUAL DATA.
027670  010004                                 MOV     R0,R4           ;PASS EXPECTED DATA TO ERROR REPORT ROUTINE.
027672  000424                                BR       12$             ;GO COUNT EXTRA CHAR AND EXIT WITH "FAILURE".
                                        ;+
                                        ; Actual and expected data miscompare.
                                        ; Not likely that we received an extra character within the data pattern.
                                        ; Determine if it's likely we lost a character from the data pattern.
                                        ;-
027674  004737  027426                  6$:     JSR     PC,CHKLOS       ;CHECK FOR A LOST CHAR CONDITION.
027700  103012                                 BCC     8$              ;GO REPORT BAD RX DATA IF NOT LOST CHAR.
                                        ;+
                                        ; It is likely that we lost a character from the data pattern.
                                        ; Count the char in the RX char count as if it had been received.
                                        ; Also, count CHR0 as a valid char, because we have verified it above.
                                        ; Report "SINGLE CHAR MISSING FROM RECEIVED DATA ON LINE nn"
                                        ;-
027702  012701  023513                          MOV     #EM9028,R1      ;SELECT "LOST CHAR ON LINE" ERROR MSG. +++++
027706  111200                                 MOVB    (R2),R0         ;GET THE EXPECTED RECEIVE DATA.
027710  040500                                 BIC     R5,R0           ;REMOVE THE INACTIVE BITS FROM EXPECTED DATA.
027712  011402                                 MOV     (R4),R2         ;GET THE ACTUAL RECEIVE DATA.
027714  040502                                 BIC     R5,R2           ;REMOVE THE INACTIVE BITS FROM ACTUAL DATA.
027716  010004                                 MOV     R0,R4           ;PASS EXPECTED DATA TO ERROR REPORT ROUTINE.
027720  004737  037370                        JSR     PC,UPDCHR       ;UPDATE PTRS AND COUNTERS FOR THE CHAR.
027724  000404                                BR       10$             ;GO EXIT WITH "FAILURE".
                                        ;+
                                        ; Did not lose or gain a single character from/to the data pattern.
                                        ; Report "RECEIVED CHAR MISCOMPARE AGAINST TX DATA ON LINE nn"
                                        ;-
027726  010002                          8$:     MOV     R0,R2           ;PASS ACTUAL DATUM TO ERROR REPORT ROUTINE.
027730  010104                                 MOV     R1,R4           ;PASS EXPECTED DATUM TO ERROR REPORT ROUTINE.
027732  012701  022553                        MOV     #EM9008,R1      ;SELECT THE "DATA MISCOMPARE" MESSAGE.
```

GLOBAL SUBROUTINE CKCHR -

```
3473                                    ;*
3474                                    ; Update the character counter and RX data pattern pointer for this line.
3475                                    ;
3476 027736  004737  037370            10$:    JSR     PC,UPDCHR       ;UPDATE RX PTR AND COUNTER FOR THIS LINE.
3477 027742  000405                            BR      14$             ;GO EXIT WITH "FAILURE".
3478                                    ;*
3479                                    ; Count the character as an extra character.
3480                                    ;
3481 027744  005263  003412            12$:     INC    EXCNTB(R3)      ;INCREMENT THE EXTRA CHAR COUNT FOR THIS LINE.
3482 027750  001002                            BNE     14$             ;EXIT WITH FAILURE IF NO OVERFLOW.
3483 027752  005363  003412                     DEC    EXCNTB(R3)      ;DECREMENT BACK TO -1 (MAX VALUE) IF OVERFLOW.
3484                                    ;*
3485                                    ; Indicate "failure' and exit.
3486                                    ;
3487 027756  000241                    14$:     CLC                    ;CLEAR THE "SUCCESS" FLAG.
3488 027760  000401                            BR      60$             ;EXIT THE ROUTINE.
3489
3490                                    ;*
3491                                    ; No error was found.
3492                                    ; Set "success" flag and exit.
3493                                    ;-
3494 027762  000261                    50$:     SEC                    ;SET THE "SUCCESS" FLAG.
3495
3496 027764                             60$:    PASS    R1,R2,R4        ;RESTORE GPRS, EXCEPT
     027764  010166  000004                                    MOV     R1,R1SLOT(SP)           ;PUT R1 IN STACK SLOT.
     027770  010266  000006                                    MOV     R2,R2SLOT(SP)           ;PUT R2 IN STACK SLOT.
     027774  010466  000012                                    MOV     R4,R4SLOT(SP)           ;PUT R4 IN STACK SLOT.
     030000  004736                                            JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
3497                                                                    ;R1 - CONTAINS THE ADDRESS OF THE ERROR REPORT.
3498                                                                    ;R2 - CONTAINS THE ACTUAL DATA RECEIVED
3499                                                                    ;R4 - CONTAINS THE EXPECTED DATA.
3500 030002  000207                            RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - CKINAC -
                        ;** ************************************************************************
                        ;*              - Check for New Character on Inactive Line Routine -
                        ;*      This subroutine checks a character to determine if the character
                        ;*      was received on an active line.  If the character was received on
                        ;*      an inactive line this routine records the fact that the character
                        ;*      was received on an inactive line, prepares an error message for
                        ;*      the calling routine, and returns a "failure" status.
                        ;*
                        ;* INPUTS:      R2 - The RX character including error flags and line number.
                        ;*              ACTLNS - Bit map of active DUT lines.
                        ;*              BITTBL - Table of words with bits set for forming bit maps.
                        ;*              EM9006 - Label at "RX ON INACTIVE LINE" error messge.
                        ;*              EXCNTB - Base of the extra character couters table.
                        ;*              TXRXLB - Base of TX/RX line number association table.
                        ;*
                        ;* OUTPUTS:     CARRY   "Success" flag (set if no error found).
                        ;*              R1 - If error found, address of error message.
                        ;*              R3   Line number offset of passed in character.
                        ;*              R4   If error found, expected data indication for error rpt.
                        ;*              EXCNT   Extra character count for line (Updated if error).
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,CKINAC
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                        ;-- ************************************************************************

030004                  CKINAC:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
030004  004537  005474                        JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                        ;*
                        ; Extract the line number from the passed in character and use the line
                        ;   number to form an offset for accessing tables of line var ables.
                        ;
030010  010203                  MOV     R2,R3           ;EXTRACT THE LINE NUMBER
030012  000303                  SWAB    R3              ;  FROM THE CHARACTER WE
030014  042703  177760          BIC     #177760,R3      ;  ARE COMPARING.
030020  006303                  ASL     R3              ;FORM OFFSET INTO WORD TABLE FROM LINE NUMBER.
                        ;*
                        ; If the character in question is not a valid character, exit with "success'.
                        ;-
030022  005702                  TST     R2              ;CHECK DATA.VALID BIT.
030024  100021                BPL     50$             ;EXIT WITH SUCCESS IF CHAR IS NOT VALID.
                        ;*
                        ; If the TX line which is associated with this RX line is an active line,
                        ;  exit the routine with "success".
                        ;
030026  016301  005364          MOV     TXRXLB(R3),R1   ;GET THE TX LINE # OFFSET FOR THIS RX LINE.
030032  036137  002534  002272  BIT     BITTBL(R1),ACTLNS  ;DETERMINE IF TX LINE IS AN ACTIVE LINE.
030040  001013                BNE     50$             ;EXIT ROUTINE WITH SUCCESS IF LINE IS ACTIVE.
                        ;*
                        ; The character in question was received on an inactive l ne.
                        ; Count this character as an extra char.
                        ; Set up error information.
                        ; Exit routine with "failure" indication.
                        ;-
```

GLOBAL SUBROUTINE CKINAC - SEQ 0094

```
 3558 030042  005263  003412                  INC     EXCNTB(R3)      ;INCREMENT THE EXTRA CHAR COUNT FOR THIS LINE.
 3559 030046  001002                         BNE     2$              ;SKIP SETTING TO MAX VALUE IF NO OVERFLOW.
 3560 030050  005363  003412                  DEC     EXCNTB(R3)      ;DECREMENT BACK TO -1 (MAX VALUE) IF OVERFLOW.
 3561 030054  012701  022415          2$:     MOV     #EM9006,R1      ;SET UP RX ON INACTIVE LINE MESSAGE.
 3562 030060  012704  100000                  MOV     #BIT15,R4       ;SET UP "NONE" EXPECTED DATA INDICATION.
 3563 030064  000241                          CLC                     ;CLEAR THE "SUCCESS" FLAG.
 3564 030066  000401                         BR      60$             ;GO REPORT RX CHAR ON INACTIVE LINE.
 3565
 3566                                 ;+
 3567                                 ; We have not found a "char on inactive line" error s'tuat'on.
 3568                                 ; Set the "success' flag and exit the rout'ne.
 3569                                 ;
 3570 030070  000261                  50$:     SEC                     ;SET THE "SUCCESS" FLAG.
 3571
 3572 030072                          60$:    PASS    R1,R3,R4        ;RESTORE GPRS, EXCEPT OUTPUT GPRS.
      030072  010166  000004                              MOV     R1,R1SLOT(SP)           ;PUT R1 IN STACK SLOT.
      030076  010366  000010                              MOV     R3,R3SLOT(SP)           ;PUT R3 IN STACK SLOT.
      030102  010466  000012                              MOV     R4,R4SLOT(SP)           ;PUT R4 IN STACK SLOT.
      030106  004736                                      JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
 3573 030110  000207                         RTS     PC              ;CARRY - SUCCESS FLAG (SET IF NO ERROR).
```

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

030112                          CKTRAP:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
030112  004537  005474                         JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
030116  005037  002424                 CLR     TP4FLG          ;CLEAR THE 004 TRAP FLAGS.
030122  011011                         MOV     (R0),(R1)       ;PERFORM THE MOVE IN QUESTION.
030124  005737  002424         ADRPTR:: TST    TP4FLG          ;CHECK FOR OCCURENCE OF TRAP.
030130  000261                         SEC                     ;INDICATE SUCCESS.
030132  001401                         BEQ     60$             ;EXIT WITH SUCCESS IF TRAP DID NOT OCCUR.
030134  000241                         CLC                     ;INDICATE FAILURE.
030136                          60$:    PASS                    ;RESTORE GPRS.
030136  004736                                 JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
030140  000207                         RTS     PC
```

```
                        .SBTTL  GOBAL SUBROUTINE                - CKTRPB -
                        ;*****************************************************************************
                        ;*                              CHECK FOR TRAP -
                        ;*      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 A 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) - WRITEN TO THE CONTENTS OF (R0)
                        ;*                      CARRY FLAG - SET ON RETURN IF NO 004 TRAP DETECTED
                        ;*                      TP4FLG - NONZERO IF TRAP OCCURED, CLEARED OTHERWISE.
                        ;*
                        ;*      CALLING SEQUENCE:       JSR     PC,CKTRPB
                        ;*
                        ;*      COMMENTS:       IF THIS SUBROUTINE CAUSES A TRAP, EITHER THE ADDRESS
                        ;*                      WHICH IS LABELED TRPAD2 WILL BE THE TRAP PC ADDRESS ON
                        ;*                      THE STACK OR SOME OTHER ADDRESS WHICH WAS PLACED ON
                        ;*                      THE STACK BY AN UNEXPECTED TRAP.
                        ;*                              THIS ROUTINE PERFORMS A BYTE MOV .
                        ;*
                        ;*      SUBORDINATE ROUTINES CALLED:    NONE.
                        ;*****************************************************************************

030142                  CKTRPB::        SAVE
030142  004537  005474                          JSR     R5,PREGO5       ;CALL REGISTER SAVE SUBRT.

030146  005037  002424          CLR     TP4FLG          ;CLEAR THE 004 TRAP FLAGS
030152  111011          MOVB    (R0),(R1)       ;PERFORM THE BYTE MOVE
030154  005737  002424  TRPAD2:: TST     TP4FLG          ;CHECK FOR OCCURENCE OF TRAP
030160  000261          SEC                     ;INDICATE SUCCESS
030162  001401          BEQ     60$             ;EXIT WITH SUCCESS IF TRAP DID NOT OCCUR
030164  000241          CLC                     :INDICATE FAILURE
030166                  60$:    PASS            ;
030166  004736                          JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
030170  000207          RTS     PC              ;RETURN
```

GLOBAL SUBROUTINE - CLNRST -

```
                        .SBTTL  GLOBAL SUBROUTINE               - CLNRST -
                        ;*******************************************************************************
                        ;*              Clean Reset of the Device Under Test -
                        ;*      This subroutine is used to reset the DUT to a known state.
                        ;*      The DUT's self-test is skipped,and the fifo is purged of any error
                        ;*      codes, etc.
                        ;*      If the reset does not succesfully complete, then the carry bit is
                        ;*      passed back to the calling routine (clear).
                        ;*
                        ;* INPUTS:      CSRA - Contains the address of the CSR
                        ;*              TXBFCA - Contains address of DUT DMA Buffer Count register.
                        ;*              ERRNBR   Error number for possible error report.
                        ;*              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,CLNRST
                        ;*
                        ;* COMMENTS:    This subroutine can report errors with numbers ERRNBR.
                        ;*              This routine does not destroy the value of ERRNBR.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: DELAY,MSLGET,PUFIFO,RESETT.
                        ;*******************************************************************************

030172                  CLNRST:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
030172  004537  005474                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                        ;+
                        ; Reset the DUT.
                        ;  This routine reports errors with numbers from ERRNBR thru ERRNBR+2.
                        ;-
030176  004737  034530          JSR     PC,RESETT       ;RESET THE DUT TO A KNOWN STATE.
030202  103002                  BCC     60$             ;EXIT ROUTINE WITH ABORT TEST INDICATOR.
                        ;+
                        ; Purge the FIFO of error codes, save any BMP codes found.
                        ;
030204  004737  032722          JSR     PC,PUFIFO       ;PURGE THE FIFO.

030210                  60$:                            ;EXIT THE TEST USING RESETT OR PUFIFO STATUS.
030210                          PASS                    ;RESTORE GPRS, PASS THE FOLLOWING INTACT:
030210  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                                        ;CARRY BIT:IF CLEAR, THEN ABORT THE TEST.
030212  000207                  RTS     PC
```

```
                                .SBTTL  GLOBAL SUBROUTINE               - CLR16W -
                                ;** ****************************************************************************
                                ;*                          - Clear Sixteen Words Routine -
                                ;*      This subroutine clears 16 words starting with the specified word.
                                ;*
                                ;* INPUTS:      R0 - Address of the first word to clear.
                                ;*
                                ;* OUTPUTS:     (R0) to (R0+15) - 16 words of memory are cleared to 0.
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,CLR16W
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: None.
                                ;-- ****************************************************************************

030214                          CLR16W:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
030214  004537  005474                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
030220  012701  000020                  MOV     #16.,R1         ;SET THE LOOP COUNTER TO 16.
030224  005020                  2$:     CLR     (R0)+           ;CLEAR A WORD OF MEMORY.
030226  005301                          DEC     R1              ;COUNT THIS LOOP.
030230  001375                        BNE     2$              ;LOOP IF NOT 16 WORD CLEARED.
030232                          60$:    PASS                    ;RESTORE GPRS.
030232  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
030234  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.
                                ; - ************************************************************************

3737 030236                     CNTERR:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
     030236  004537  005474                             JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
3738                            ;*
3739                            ; Count the error on the counter for the specified line.
3740                            ;-
3741 030242  006305                         ASL     R5              ;FORM WORD OFFSET FROM LINE NUMBER.
3742 030244  016501  003452                 MOV     ERCNTB(R5),R1   ;GET THE PRESENT ERROR COUNT FOR THIS LINE.
3743 030250  005201                         INC     R1              ;COUNT ERROR.
3744 030252  103402                        BCS     2$              ;OVERFLOW?  YES, DON'T UPDATE COUNTER IN TABLE.
3745 030254  010165  003452                 MOV     R1,ERCNTB(R5)   ;UPDATE ERROR COUNTER TABLE ENTRY.
3746 030260  005737  002264         2$:     TST     NDERPT
3747 030264  001411                        BEQ     60$             ;SUMMARYS DISABLED?  YES, EXIT WITH CARRY 0.
3748 030266  020137  002264                 CMP     R1,NDERPT       ;NO.  CHECK FOR ENOUGH ERRORS FOR SUMMARY USE.
3749 030272  101002                        BHI     4$              ;ENOUGH ERRORS TO USE SUMMARY?  YES, GO HANDLE.
3750 030274  000241                        CLC                     ;INDICATE NOT TO USE SUMMARY REPORT YET.
3751 030276  000404                        BR      60$             ;EXIT WITH CARRY 0.
3752 030300  056537  002534  002650  4$:     BIS     BITTBL(R5),ERSMRF       ;SET THE ERROR SUMMARY FLAG FOR LINE.
3753 030306  000261                        SEC                     ;INDICATE TO USE SUMMARY REPORT.
3754 030310                     60$:    PASS                        ;RESTORE GPRS.
     030310  004736                                     JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
3755 030312  000207                        RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - CONMAP -
                        ;** ************************************************************************
                        ;*                      - Convert Line bit map.
                        ;*      This subrouitne is used to convert a bit map passed to it , into
                        ;*      another l'ne bit map that is based upon the associated TX/RX line
                        ;*      number/offset table.
                        ;*
                        ;* INPUTS:      R5   Contains the line bit map to be transformed.
                        ;*              TXRXLB - Base address of associated TX/RX line number table.
                        ;*
                        ;* OUTPUTS:     R5   Contains an assosciated line bit map.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,CONMAP
                        ;*
                        ;* COMMENTS:    The TX/RX association table must be initialised before this
                        ;*              routine is called.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                        ;-  ************************************************************************

030314                  CONMAP::SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
030314  004537  005474                  JSR     R5,PREGOS       ;CALL REGISTER SAVE SUBRT.
030320  012702  005364          MOV     #TXRXLB,R2      ;GET THE BASE ADDRESS OF THE LINE ASSOC TABLE.
030324  010503                  MOV     R5,R3           ;COPY THE BIT MAP TO BE TRANSFORMED.
030326  012704  000010          MOV     #NUMLNS,R4      ;SET MAX LINE COUNTER.
030332  005005                  CLR     R5              ;CLEAR ASSOCIATED LINE BIT MAP.
030334  006203          2$:     ASR     R3              ;SHIFT ACTLNS BIT MAP INT BOOLEAN REGISTER.
030336  103005                  BCC     4$              ;SKIP SETTING ASSOCIATED LINE NUMBER BIT MAP.
030340  011201                  MOV     (R2),R1         ;GET ASSOCIATED LINE NUMBER OFFSET FROM TABLE.
030342  006201                  ASR     R1              ;SHIFT RIGHT TO GET LINE NUMB FROM OFFSET.
030344  004737  031646          JSR     PC,LINBIT       ;GENERATE AN SINGLE BIT MAP FOR THIS LINE.
030350  050005                  BIS     R0,R5           ;SET BIT FOR THIS LINE IN ASSOCIATED BIT MAP.
030352  005722          4$:     TST     (R2)+           ;INCREMENT ADDRESS FOR THE NEXT LINE NUMBER.
030354  005304                  DEC     R4              ;DECREMENT LINE COUNT.
030356  001366                  BNE     2$              ;LOOP IF NOT DONE.
030360                  60$:    PASS    R5              ;RESTORE GPRS, EXCEPT
030360  010566  000014                          MOV     R5,R5SLOT(SP)           ;PUT R5 IN STACK SLOT.
030364  004736                              JSR     PC,@(SP)+               ;RETURN TO PREGOS SUBRT.
                                                        ;R5   CONTAINS THE ASSOCIATED LINE BIT MAP.
030366  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.
                                        ;*****************************************************************************

030370                                  DELAY:: SAVE                            ;SAVE CONTENTS OF GPRS R0 THRU R5.
030370  004537  005474                                JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
030374  010401                                  MOV     R4,R1           ;PASS NUMBER OF MS DELAY AS TIME-OUT VALUE.
030376  012702  177777                          MOV     #-1,R2          ;TELL MSLOOP ROUTINE TO CHECK ALL BITS.
030402  005003                                  CLR     R3              ;TELL MSLOOP RTN TO CHECK FOR ALL BITS CLEAR.
030404  012704  030426                          MOV     #62$,R4         ;TELL MSLOOP TO CHECK DUMMY NON-ZERO WORD.
030410  004737  032042                        JSR     PC,MSLOOP       ;DELAY THE REQUESTED # OF MS.
030414  103002                                  BCC     60$             ;EXIT ROUTINE IF WE TIMED-OUT.]
030416  004737  032412                        JSR     PC,OOPS         ;IF NO TIME-OUT, BAD PROGRAM OR HOST MACHINE.
030422                                  60$:    PASS                            ;RESTORE GPRS.
030422  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
030424  000207                                  RTS     PC

030426  177777                          62$:    .WORD   -1              ;DUMMY, NON-ZERO WORD.
```

```
                        .SBTTL  GLOBAL SUBROUTINE       - DM16B -
                        ;** ************************************************************************
                        ;*                  CONVERT TO A 16 BIT PHYSICAL ADDRESS -
                        ;*      THIS ROUTINE CONVERTS FROM PAR FORM TO A 16-BIT PHYSICAL ADDRESS,
                        ;*      OF ALTERNATE 1'S AND 0'S.
                        ;*
                        ;*      INPUTS:         DMTSTA: - CONTAINS THE ADDRESS IN PAR FORM
                        ;*
                        ;*      OUTPUTS:        R0 - CONTAINS THE 16 BIT PHYSICAL ADDRESS
                        ;*
                        ;*      CALLING SEQUENCE:       JSR     PC,DM16B
                        ;*
                        ;*      COMMENTS:       USED IN THE DMA ADDRESS TEST
                        ;*
                        ;*      SUBROUTINES CALLED:     NONE.
                        ;-  ************************************************************************

030430                  DM16B:: SAVE
030430  004537  005474                        JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
030434  013700  002432          MOV     DMTSTA,R0       ;SHIFT THE DMA TEST ADDRESS
030440  012702  000006          MOV     #6,R2           ;SIX PLACES LEFT , TO
030444  006300          2$:     ASL     R0              ;CONVERT IT INTO A ,
030446  005302          DEC     R2              ;16-BIT PHYSICAL ADDRESS
030450  001375          BNE     2$              ;
                        
030452  012701  000052          MOV     #52,R1          ;SET UP THE 6 LSB'S
030456  032700  000100          BIT     #100,R0         ;IF BIT #6 OF THE PHYSICAL
030462  001402          BEQ     4$              ;ADDRESS IS CLEAR THEN BRANCH
030464  012701  000025          MOV     #25,R1          ;OTHERWISE CORRECT THE LSB'S
                        
030470  060100          4$:     ADD     R1,R0           ;MREGE THE LSB'S WITH THE PHY ADDR
                        
030472                  PASS    R0              ;RETURN WITH THE PHY ADDR.
030472  010066  000002                                MOV     R0,ROSLOT(SP)           ;PUT R0 IN STACK SLOT.
030476  004736                                JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
030500  000207          RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - DMRW -
                        ;** ************************************************************************
                        ;*                      - READ/WRITE DATA FROM/TO (DMTSTA) -
                        ;*      THIS ROUTINE READS DATA BYTES FROM OR WRITES DATA BYTES TO AN ADDR OF
                        ;*      ALTERNATE 1'S AND 0'S . BITS 21 TO 6 OF THE ADDR ARE CONTAINED AT
                        ;*      DMTSTA. THE ROUTINE APPENDS THE 6 LSB'S TO PRODUCE AN ADDR OF ALTERNATE
                        ;*      1'S AND 0'S. THIS ROUTINE IS CALLED FROM THE DMA ADDRESS TEST.
                        ;*
                        ;* INPUTS:              R0 - ADDRESS OF THE  DATA TO BE WRITTEN TO (DMTSTA),
                        ;*                           IF A WRITE IS SPECIFIED.
                        ;*                      R1 - ADDRESS OF THE AREA IN WHICH DATA FROM (DMTSTA),
                        ;*                           IS TO BE SAVED,IF A READ IS SPECIFIED.
                        ;*                      R3 - NUMBER OF DATA BYTES TO BE READ/WRITTEN
                        ;*                      R5 - CLEAR , SPECIFIES A READ FROM (DMTSTA)
                        ;*                           SET , SPECIFIES A WRITE TO (DMTSTA).
                        ;*                      DMTSTA - CONTAINS BITS 21 TO 6 OF THE ADDR.
                        ;*                      MMSR0 - ADDRESS OF MEM MGT STATUS REG #0
                        ;*                      MMPRES - BIT #0 SET, INDICATES MEM MGT PRESENT
                        ;*                      PAR6 - ADDRESS OF MEM MGT PAR #6
                        ;*                      TP4FLG - 004 TRAP FLAGS
                        ;*
                        ;* OUTPUTS:             DATA AT (DMTSTA) SAVED OR WRITTEN
                        ;*                      PAR #6 - CONTENTS SET TO CONTENTS OF DMTSTA
                        ;*                      TP4FLG - CLEAR IF READ/WRITE SUCCESSFUL
                        ;*                               SET IF FAIL.
                        ;*
                        ;* CALLING SEQUENCE:            JSR     PC,DMRW
                        ;*
                        ;* COMENTS:             IF MEM MGT IS PRESENT THE SUBROUTINE USES (DMTSTA)
                        ;*                      AS THE PAGE ADDRESS , PLACING IT IN PAR #6, AND CREATES
                        ;*                      A VIRTUAL ADDR IN THE RANGE OF PAR #6 WHICH CONTAINS
                        ;*                      THE SIX LSB'S.
                        ;*                      IF IT IS NOT PRESENT THE (DMTSTA) IS CONVERTED INTO
                        ;*                      THE EQUIVALENT 16 BIT  PHYSICAL ADDRESS.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: CKTRAP,DM16B.
                        ;-- ************************************************************************

030502                  DMRW::  SAVE
030502  004537  005474                        JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.

030506  010004                  MOV     R0,R4           ;SAVE THE SOURCE ADDR
030510  005737  002470          TST     MMPRES          ;IF MEM MGT IS PRESENT THEN
030514  001003                  BNE     6$              ;JUMP AND SET UP THE PAR #6
030516  004737  030430          JSR     PC,DM16B        ;OTHERWISE CONVERT DMTSTA INTO A 16-BIT
                                                        ;PHYSICAL ADDRESS, IN R0.
030522  000416                  BR      10$             ;JUMP TO PERFORM THE MOVE
030524  013777  002432  151756  6$:     MOV     DMTSTA,@PAR6A   ;SET PAR #6
030532  012700  140052          MOV     #140052,R0      ;SET THE SIX LSB'S AND CONVERT TO
                                                        ;A VIRTUAL ADDRESS WITHIN THE INFLUENCE
                                                        ;OF PAR #6.
030536  032737  000001  002432  BIT     #1,DMTSTA       ;IF BIT #0 OF DMTSTA IS CLEAR THEN
030544  001402                  BEQ     8$              ;AVOID CHANGING THE LSB'S
030546  012700  140025          MOV     #140025,R0      ;CHANGE THE LSB'S
030552  012777  000001  151704  8$:     MOV     #BIT0,@MMSR0    ;ENABLE MEM MGT.
030560  005705                  10$:    TST     R5              ;IF A READ IS SPECIFIED THEN
```

GLOBAL SUBROUTINE - DMRW - SEQ 0104

```
 3917 030562  001402                    BEQ     12$             ;AVOID SWAPING THE SOURCE AND DESTINATION.
 3918 030564  010001                     MOV     R0,R1           ;SWAP
 3919 030566  010400                     MOV     R4,R0           ;RESTORE THE ORIGINAL SOURCE FOR THE MOVE.
 3920 030570  004737  030142      12$:   JSR     PC,CKTRPB       ;PERFORM THE BYTE MOVE.
 3921 030574  103004                    BCC     14$             ;EXIT IF A TRAP OCCURED.
 3922 030576  005201                     INC     R1              ;INCREMENT THE DESTINATION ADDRESS
 3923 030600  005200                     INC     R0              ;INCREMENT THE SOURCE ADDR.
 3924 030602  005303                     DEC     R3              ;DECREMENT THE DATA
 3925 030604  001371                    BNE     12$             ;REPEAT UNTIL ALL DATA READ/WRITTEN
 3926 030606  005737  002470      14$:   TST     MMPRES          ;IF MEM MGT IS PRESENT THEN
 3927 030612  001402                    BEQ     16$             ;
 3928 030614  005077  151644             CLR     @MMSR0          ;DISABLE IT.
 3929 030620                     16$:   PASS
      030620  004736                                    JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
 3930 030622  000207                    RTS     PC
 3931
```

```
                        .SBTTL  GLOBAL SUBROUTINE                - DODMA -
                        ;** ************************************************************************
                        ;*                      - Initiate DMA Transmission Routine -
                        ;*      This routine writes the DMA parameter to the specified device and
                        ;*      initiates the DMA transmission.
                        ;*
                        ;* INPUTS:      R1 - Line number on which to initiate the DMA.
                        ;*              R2 - Start address of the DMA buffer (16 bit virtual).
                        ;*              R3 - Character count of the DMA buffer.
                        ;*              CSRA   Contains address of the DUT CSR.
                        ;*              IESTAT - Storage for states of the interrupt enable bits.
                        ;*              MMENAB - Memmory management flag (0 if MEM MGT not enabled).
                        ;*              HOST MEM MGT PAR REGISTERS - If MEM MGT is in use.
                        ;*              TXAD1A - Contains address of DMA TX buffer address reg #1.
                        ;*              TXAD2A - Contains address of DMA TX buffer address reg #2.
                        ;*              TXBFCA - Contains address of DMA character count register.
                        ;*
                        ;* OUTPUTS:     CARRY - Success flag (set if DMA_START found clear).
                        ;*              DUT TBUFFAD1 - LS 16 bits of DMA buffer address (initialized).
                        ;*              DUT TBUFFAD2 - MS 6 bits of DMA buffer address (initialized),
                        ;*                             DMA_START bit set.
                        ;*              DUT TBUFFCT - DMA buffer character count (initialized).
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,DODMA
                        ;*
                        ;* COMMENTS:    This routine determines if Memory Management is being used
                        ;*              and sets up the full 22 bit physical address if necessary.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: None.
                        ;  ************************************************************************

030624                  DODMA:: SAVE                            ;SAVE CONTENTS OF GPRS R0 THRU R5.
030624  004537  005474                      JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
030630  012704  000200          MOV     #200,R4         ;PREPARE TO CLEAR UPPER 6 BITS OF DMA BUFF ADR.
030634  005737  002472          TST     MMENAB          ;CHECK FOR MEMORY MANAGEMENT IN USE.
030640  001427                 BEQ     6$              ;GOTO SET UP DEVICE IF MEM MGT NOT IN USE.
                        ;+
                        ; Memmory management is in use.
                        ; Construct 22 bit physical address from the 16 bit virtual address.
                        ;-
030642  010205                  MOV     R2,R5           ;STRIP THE MOST SIGNIFICANT 3 BITS OF THE
030644  012700  000005          MOV     #5,R0           ;  DMA BUFFER VIRTUAL ADDRESS AND MULTIPLY
030650  006105          2$:     ROL     R5              ;  THEIR VALUE BY TWO TO GET AN OFFSET INTO
030652  005300                  DEC     R0              ;  THE TABLE OF MEMMORY MANAGEMENT PAGE
030654  001375                 BNE     2$              ;  ADDRESS REGISTERS (PAR).
030656  042705  177761          BIC     #177761,R5      ;
030662  063705  002474          ADD     PAR0A,R5        ;ADD IN THE BASE VALUE OF THE MM PAR REGISTERS.
030666  011505                  MOV     (R5),R5         ;GET THE 16 BIT PHYSICAL ADDRESS BLOCK COUNT.
030670  012700  000006          MOV     #6,R0           ;SHIFT UPPER 6 BITS OF THE PHYSICAL ADDRESS
030674  006305          4$:     ASL     R5              ;  BLOCK COUNT (GOTTEN FROM THE PROPER PAR)
030676  006104                  ROL     R4              ;  INTO THE LS 6 BITS OF THE WORD TO WRITE
030700  005300                  DEC     R0              ;  INTO THE DUT TBUFFAD2 REGISTER.
030702  001374                 BNE     4$              ;
030704  042702  160000          BIC     #160000,R2      ;ADD THE 13 BIT DISPLACEMENT FIELD FROM VIRTUAL
030710  060502                  ADD     R5,R2           ;  ADR TO THE SHIFTED BLOCK NUMBER FROM THE
030712  005504                  ADC     R4              ;  MEMMORY MANAGEMENT PAR.
030714  052704  000200          BIS     #200,R4         ;SET THE DMA START BIT IN WORD FOR TBUFFAD2.
```

GLOBAL SUBROUTINE DODMA - SEQ 0106

```
 3989                                   ;*
 3990                                   ; Write the DMA parameters out to the DUT DMA registers.
 3991                                   ;    Disable interrupts.
 3992                                   ;    Set up DUT CSR IND.ADR.REG field.
 3993                                   ;    Write the DMA transmit character count.
 3994                                   ;    Write the least significant 16 bits of the DMA buffer start address.
 3995                                   ;    Write the most significant 6 bits of the address,
 3996                                   ;      setting the DMA_START bit, and initiating the DMA transmission.
 3997                                   ;
 3998 030720  106705                   6$:     MFPS    R5              ;GET THE PRESENT PROCESSOR PRIORITY.
 3999 030722  106427  000340                    MTPS    @PRI07          ;DISABLE ALL HARDWARE INTERRUPTS.
 4000 030726  053701  002374                     BIS    IESTAT,R1       ;PREPARE FOR SETUP OF LINE NUMBER IN DUT CSR.
 4001 030732  010177  151342                     MOV    R1,@CSRA        ;SET UP THE DUT CSR IND.ADR.REG FIELD.
 4002 030736  105777  151352                     TSTB   @TXAD2A         ;TEST THE DUT DMA_START BIT.
 4003 030742  000241                             CLC                    ;INDICATE FAILURE IN CASE DMA.HO BIT IS SET.
 4004 030744  100410                            BMI     60$             ;EXIT WITH FAILURE IF DMA.HO BIT IS SET.
 4005 030746  010377  151344                     MOV    R3,@TXBFCA      ;WRITE THE DMA CHARACTER COUNT.
 4006 030752  010277  151334                     MOV    R2,@TXAD1A      ;WRITE THE LS 16 BITS OF BUFFER ADDRESS.
 4007 030756  110477  151332                     MOVB   R4,@TXAD2A      ;WRITE MS 6 BITS OF ADR AND START DMA TX.
 4008 030762  106405                            MTPS    R5              ;RESTORE THE PROCESSOR PRIORITY.
 4009 030764  000261                             SEC                    ;INDICATE SUCCESS.
 4010
 4011 030766                            60$:    PASS                    ;RESTORE GPRS.
      030766  004736                                         JSR     PC,@(SP)+       ;RETURN TO PREG05 SUBRT.
 4012 030770  000207                            RTS     PC              ;  CARRY - SUCCESS FLAG (SET IF SUCCESS).
```

```
                                .SBTTL  GLOBAL SUBROUTINE                FINACT -
                                ;** ************************************************************************
                                ;*                       - FIND FIRST ACTIVE LINE -
                                ;*      This subroutine calculates the number of the first active line that
                                ;*      is found in the active line bit map ACTLNS.
                                ;*
                                ;* INPUTS:      ACTLNS   Contains the act've line bit map.
                                ;*
                                ;* OUTPUTS:     R1 - Contains the number of the first active line.
                                ;*              R5 - Contains the bit map representation of the active line.
                                ;*              Carry set ind'cates success.
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,FINACT
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: NONE.
                                ;  ************************************************************************

030772                          FINACT:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
030772  004537  005474                         JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                                     ;*
                                     ; Find an active line on which to perform the test.
                                     ;-
030776  005001                           CLR     R1                     ;CLEAR THE LINE NUMBER COUNTER.
031000  012703  000010                   MOV     #NUMLNS,R3             ;GET MAX LINE NUMBER.
031004  013700  002272                   MOV     ACTLNS,R0              ;GET THE ACTIVE LINE BIT MAP.
031010  012705  000001                   MOV     #1,R5                  ;SET UP A LINE BIT MASK.
031014  030500                   2$:     BIT     R5,R0                  ;LOOK FOR AN ACTIVE LINE.
031016  001006                           BNE     4$                     ;BRANCH TO BEGIN TEST IF A LINE HAS BEEN FOUND.
031020  006305                           ASL     R5                     ;SHIFT THE BIT MASK FOR THE NEXT LINE.
031022  005201                           INC     R1                     ;INCREMENT THE LINE NUMBER COUNTER.
031024  020103                           CMP     R1,R3                  ;CHECK IF ALL LINES HAVE BEEN TRIED.
031026  002772                           BLT     2$                     ;LOOP TO TRY THE NEXT LINE.
031030  000241                           CLC                            ;CLEAR CARRY BIT, NO ACTIVE LINE FOUND.
031032  000401                           BR      60$                    ;EXIT WITH FAILURE.
031034  000261                   4$:     SEC                            ;SET CARRY, SUCCESS.

031036                           60$:    PASS    R1,R5                  ;RESTORE GPRS, EXCEPT
031036  010166  000004                                   MOV     R1,R1SLOT(SP)           ;PUT R1 IN STACK SLOT.
031042  010566  000014                                   MOV     R5,R5SLOT(SP)           ;PUT R5 IN STACK SLOT.
031046  004736                                           JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                                        ;R1   CONTAINS THE NUMBER OF FIRST ACTIVE LINE.
                                                        ;R5 - CONTAINS THE BIT MAP OF THE ACTIVE LINE.
                                                        ;CARRY - SET INDICATES SUCCESS.
031050  000207                           RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE                GETCHR -
                        ;++ ************************************************************************
                        ;*              - Get a Character From the RX Buffer Routine -
                        ;*      This subroutine gets a character from the RX buffer which is in the
                        ;*      host system memory.  If the buffer is empty upon entry of this routine
                        ;*      this routine returns a null character with DATA.VALID clear and a
                        ;*      buffer empty indication.
                        ;*
                        ;* INPUTS:      RXBCNT - RX buffer character count.
                        ;*              RXBEND - Label after end of the RX buffer area in memory.
                        ;*              RXBETX - Equated to RX buffer level at which to enable TX.
                        ;*              RXBOPT - Pointer to next available input slot of RX buffer.
                        ;*              RXBSTA - Label at start of RX buffer area in memory.
                        ;*
                        ;* OUTPUTS:     R2 - Character which is read from the buffer.
                        ;*              RXBOPT - Updated to point to next input slot of RX buffer.
                        ;*              RXBCNT - RX buffer character count (Updated).
                        ;*              CARRY   "Success" flag (Set if buffer is not empty on entry).
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,GETCHR
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: None.
                        ;-- ************************************************************************

031052                  GETCHR:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
031052  004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
031056  005000          CLR     R0      ;CLEAR THE "RE-ENABLE" TX FLAG (SUBRTN OUTPUT).
031060  005002          CLR     R2      ;GET NULL CHAR IN CASE BUFFER IS EMPTY.
031062  005737  003066  TST     RXBCNT  ;CHECK FOR RX BUFFER EMPTY, CLEAR CARRY.
031066  001416          BEQ     60$     ;EXIT THE ROUTINE IF BUFFER IS EMPTY.
031070  013704  003062  MOV     RXBOPT,R4       ;GET THE BUFFER OUTPUT POINTER.
031074  011402          MOV     (R4),R2 ;GET A CHARACTER FROM THE BUFFER.
031076  005024          CLR     (R4)+   ;DELETE THE READ CHARACTER FROM THE BUFFER.
031100  020427  003270  CMP     R4,#RXBEND      ;CHECK IF POINTER SHOULD WRAP AROUND.
031104  103402          BLO     2$      ;SKIP WRAPAROUND IF POINTER IS NOT AT END.
031106  012704  003070  MOV     #RXBSTA,R4      ;WRAP INPUT POINTER AROUND.
031112  010437  003062  2$:     MOV     R4,RXBOPT       ;UPDATE THE OUTPUT POINTER STORAGE.

031116  005337  003066  DEC     RXBCNT  ;REMOVE THIS CHAR FROM THE BUFFER COUNT.
031122  000261          SEC             ;SET SUCCESS FLAG, BUFFER WAS NOT EMPTY.

031124                  60$:    PASS    R2      ;RESTORE GPRS, EXCEPT
031124  010266  000006                  MOV     R2,R2SLOT(SP)           ;PUT R2 IN STACK SLOT.
031130  004736                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                        ;R2    CONTAINS THE CHARACTER READ FROM BUFFER.
                        ;CARRY "SUCCESS' FLAG, SET IF BUFFER NOT EMPTY.
031132  000207          RTS     PC
```

```
                                .SBTTL  GLOBAL SUBROUTINE               - GETLP2 -
                                ;** ************************************************************************
                                ;*              - Get Line Parameters Routine Number Two -
                                ;*      This routine is used to repeatedly get combinations of line parameter
                                ;*      contents for the Single Character Mode TX/RX Test (long data pattern).
                                ;*      Each time this routine is called it gets another combination of the
                                ;*      paramters in the paramter tables until all combinations have been
                                ;*      returned at which point it returns a "failure" indication.
                                ;*
                                ;* INPUTS:      Single character mode, short data pattern TX/RX tables:
                                ;*                      SCBCT - Number of bits per char table (4 entries).
                                ;*                      SCNST - Number of stop bits bits table (2 entries).
                                ;*                      SCTPT - Type of parity table (3 entries).
                                ;*              Each table has a base and end label consisting of the name of
                                ;*              the table with a "B" and "E" appended respectively.
                                ;*              R1 thru R3 - Pointers into SCBCT, SCNST, SCTPT tables
                                ;*                  R1 is clear if this is the first call of GETLP2.
                                ;*
                                ;* OUTPUTS:     R0   Composed LPR contents, clear if failure (Done),
                                ;*                  38.4K baudrate is selected.
                                ;*              R1 thru R3 - Table pointers (Updated).
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,GETLP2
                                ;*
                                ;* COMMENTS:    This routine should be used in congunction with a SWAPx
                                ;*              routine to avoid destroying the GPR contents.
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: None.
                                ;-  ************************************************************************

031134                          GETLP2:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
031134  004537  005474                         JSR     R5,PREGOS       ;CALL REGISTER SAVE SUBRT.
031140  005701                          TST     R1              ;TEST FOR THIS BEING FIRST CALL OF GETLP2.
031142  001006                         BNE     2$              ;SKIP ORIGINAL SET UP IF NOT FIRST CALL.
031144  012701  005252                 MOV     #SCBCTB,R1      ;INITIALIZE BITS PER CHAR TABLE POINTER.
031150  012702  005254                 MOV     #SCNSTB,R2      ;INITIALIZE # OF STOP BITS TABLE POINTER.
031154  012703  005256                 MOV     #SCTPTB,R3      ;INITIALIZE TYPE OF PARITY TABLE POINTER.

031160  020327  005260         2$:     CMP     R3,#SCTPTE      ;CHECK FOR POINTER AT END OF TABLE.
031164  103417                        BLO     4$              ;GO GET LPR CONTENTS IF NOT AT END OF TABLE.
031166  012703  005256                 MOV     #SCTPTB,R3      ;RESET POINTER TO BEGINNING OF TABLE.
031172  005722                         TST     (R2)+           ;INC THE # OF STOP BITS TABLE POINTER BY 2.
031174  020227  005256                 CMP     R2,#SCNSTE      ;CHECK FOR POINTER AT END OF TABLE.
031200  103411                        BLO     4$              ;GO GET LPR CONTENTS IF NOT AT END OF TABLE.
031202  012702  005254                 MOV     #SCNSTB,R2      ;RESET POINTER TO BEGINNING OF TABLE.
031206  005721                         TST     (R1)+           ;INC BAUD RATES TABLE POINTER BY 2.
031210  020127  005254                 CMP     R1,#SCBCTE      ;CHECK FOR POINTER AT END OF TABLE.
031214  103403                        BLO     4$              ;GO GET LPR CONTENTS IF NOT AT END OF TABLE.
031216  005000                         CLR     R0              ;PREPARE TO PASS OUT CLEAR LPR FIELDS.
031220  000241                         CLC                     ;INDICATE "FAILURE" FOR EXIT.
031222  000406                        BR      60$             ;EXIT WITH "FAILURE", WE'RE DONE.

031224  012700  177400         4$:     MOV     #177400,R0      ;SET BAUD RATE FIELDS FOR 38.4 K BAUD.
031230  051100                         BIS     (R1),R0         ;GET THE BITS/CHAR FIELD OF NEW LPR CONTENTS.
031232  051200                         BIS     (R2),R0         ;INCLUDE THE NUMBER OF STOP BITS FIELD.
031234  052300                         BIS     (R3)+,R0        ;INCLUDE THE TYPE OF PARITY FIELD.
```

GLOBAL SUBROUTINE - GETLP2 - SEQ 0110

```
4160 031236  000261                        SEC                     ;INDICATE "SUCCESS" FOR EXIT.
4161
4162 031240                          60$:   PASS    R0,R1,R2,R3     ;RESTORE GPRS R4 & R5, LEAVE FOLLOWING INTACT:
     031240  010066  000002                       MOV     R0,R0SLOT(SP)           ;PUT R0 IN STACK SLOT.
     031244  010166  000004                       MOV     R1,R1SLOT(SP)           ;PUT R1 IN STACK SLOT.
     031250  010266  000006                       MOV     R2,R2SLOT(SP)           ;PUT R2 IN STACK SLOT.
     031254  010366  000010                       MOV     R3,R3SLOT(SP)           ;PUT R3 IN STACK SLOT.
     031260  004736                               JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
4163 031262  000207                        RTS     PC              ;  R1 THRU R3 - POINTERS, R0 - NEW LPR FIELDS.
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - GETTIM -
                        ;++ ******************************************************************************
                        ;*              Get Time-out Value Based on Minimum Baudrate Routine -
                        ;*      This subroutine gets the necessary time-out value to verify that all
                        ;*      chars have been received at the completion of the TX/RX of a data
                        ;*      pattern.  This uses the slowest baudrate which is specified in the
                        ;*      passed in DUT LPR contents to calculate this time-out value.
                        ;*
                        ;* INPUTS:      R1 - DUT LPR contents.
                        ;*
                        ;* OUTPUTS:     RXTOUT - Time-out value for waiting for last RX char.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,GETTIM
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: None.
                        ;-- ******************************************************************************

031264                  GETTIM:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
031264  004537  005474                  JSR     R5,PREGOS       ;CALL REGISTER SAVE SUBRT.
031270  000301          SWAB    R1              ;PUT THE BAUD RATE FIELDS IN THE LOW BYTE.
031272  042701  177400  BIC     #177400,R1      ;CLEAR STOP,PARITY,AND CHAR FIELDS.
031276  010102          MOV     R1,R2           ;COPY BAUD RATE FIELDS.
031300  042701  000360  BIC     #360,R1         ;SELECT RX BAUD RATE FIELD ONLY.
031304  006202          ASR     R2              ;SHIFT TX BAUD RATE FIELD
031306  006202          ASR     R2              ; TO OCCUPY THE LOW FOUR BYTES.
031310  006202          ASR     R2              ;
031312  006202          ASR     R2              ;
031314  020102          CMP     R1,R2           ;CHECK IF SAME BAUD RATE IN EACH FIELD.
031316  101401          BLOS    2$              ;BRANCH IF RX BAUD RATE IS LOWER OR SAME.
031320  010201          MOV     R2,R1           ;TX BAUD RATE IS THE SLOWER OF THE TWO.
031322  116102  005344  2$:     MOVB    PROTBL(R1),R2   ;GET PROPORTIONAL DELAY FROM TABLE.
031326  042702  177400  BIC     #177400,R2      ;CLEAR UPPER BYTE BECAUSE OF SIGN EXTENSION.
031332  010237  002402  MOV     R2,RXTOUT       ;LOAD THE RX TIME-OUT VARIABLE.
                        
031336                  60$:    PASS                            ;RESTORE GPRS.
031336  004736                          JSR     PC,@(SP)+               ;RETURN TO PREGOS SUBRT.
031340  000207          RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE              - INDATP -
                        ;++ ************************************************************************
                        ;*                      - INITIALISE DATA PATTERN -
                        ;*      This subroutine is used to initialise an incremental byte data pattern
                        ;*      in the general buffer area.
                        ;*      The data pattern will be sequential from 0 to 255 (decimal).
                        ;*
                        ;* INPUTS:      BUFBAS - Address of the start of the general buffer area.
                        ;*              BUFMID - Address of the 255 th location.
                        ;*
                        ;* OUTPUTS:     The first 255 locations of the general buffer area contain data
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,INIDATP
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                        ;-  ************************************************************************

031342                  INDATP:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
031342  004537  005474                      JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.

031346  012702  004012          MOV     #BUFBAS,R2      ;INITIALIZE THE DATA PATTERN IN THE GENERAL
031352  005003                  CLR     R3              ;  DATA BUFFER TO A 256 BYTE PATTERN.
031354  110322          2$:     MOVB    R3,(R2)+        ;
031356  005203                  INC     R3              ;SELECT THE NEXT CHARACTER.
031360  020227  004412          CMP     R2,#BUFMID      ;CHECK IF WE HAVE 256 DATA PATTERNS.
031364  103773                 BLO     2$              ;

031366                  60$:    PASS                            ;RESTORE GPRS.
031366  004736                              JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
031370  000207                  RTS     PC
```

```
                                .SBTTL  GLOBAL SUBROUTINE               - INDTPX -
                                ;++ ******************************************************************************
                                ;*              - INITIALISE DATA PATTERN WITHOUT XON OR XOFF -
                                ;*      This subroutine is used to initialise an incremental byte data pattern
                                ;*      in the general buffer area.
                                ;*      The data pattern will be from 0 to 255, but will exclude the following
                                ;*      two characters; (ASCII DC1, DC3) XON AND XOFF.  This will cause the
                                ;*      last two data characters to be the same as the first two.
                                ;*
                                ;* INPUTS:      BUFBAS - Address of the start of the general buffer area.
                                ;*              BUFMID - Address of the 255 th location.
                                ;*
                                ;* OUTPUTS:     The first 255 locations of the general buffer area contain data
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,INDTPX
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: NONE.
                                ;-  ******************************************************************************

031372                          INDTPX:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
031372  004537  005474                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                                ;+
                                ; Initialize the 256 byte data pattern.
                                ;  Ensure the data pattern is free from XON's or XOFF's to prevent errors.
                                ;  Note: the first two characters and the last two characters will be the same.
                                ;
031376  012702  004012                  MOV     #BUFBAS,R2      ;INITIALIZE THE DATA PATTERN IN THE GENERAL
031402  005003                          CLR     R3              ;  DATA BUFFER TO A 256 BYTE PATTERN.
031404  110322                  2$:     MOVB    R3,(R2)+        ;
031406  105203                          INCB    R3              ;SELECT THE NEXT CHARACTER.
031410  122703  000021                  CMPB    #21,R3          ;CHECK FOR AN XON CHARACTER.
031414  001001                          BNE     4$              ;BRANCH IF CHAR NOT AN XON.
031416  105203                          INCB    R3              ;FORCE THE NEXT CHARACTER.
031420  122703  000023          4$:     CMPB    #23,R3          ;CHECK FOR AN XOFF CHARACTER.
031424  001001                          BNE     6$              ;BRANCH IF NOT AN XOFF CHARACTER.
031426  105203                          INCB    R3              ;FORCE THE NEXT CHARACTER.
031430  020227  004412          6$:     CMP     R2,#BUFMID      ;CHECK IF WE HAVE 256 DATA PATTERNS.
031434  103763                          BLO     2$              ;

031436                          60$:    PASS                    ;RESTORE GPRS.
031436  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
031440  000207                          RTS     PC
```

```
                                .SBTTL  GLOBAL SUBROUTINE                INICHR -
                                ;++ ************************************************************************
                                ;*                        - Send Initial Characters Routine -
                                ;*      This routine is used to initiate single character transmission.
                                ;*      This routine sends the initial characters to each active lines to
                                ;*      cause future TX interrupts which will continue the transmission if
                                ;*      more than one character is to be sent to each active line.
                                ;*
                                ;* INPUTS:      ACTLNS - Bit map of active DUT lines.
                                ;*              BITTBL - Label of table of words each with a bit set.
                                ;*              CSRA - Contains the address of the DUT CSR.
                                ;*              DPENDB - Base of the data pattern end table (entry per line).
                                ;*              DPLENB - Base of the data pattern length table.
                                ;*              IBM - Bit mask of inactive TX/RX bits.
                                ;*              IESTAT - States of DUT int enable bits (Other bits clear).
                                ;*              NUMLNS - Equated to the number of lines on the DUT.
                                ;*              TXCHRA - Contains the address of the DUT TXCHAR register.
                                ;*              TXCNTB - Lable at base of the TX character counter table.
                                ;*              TXPTRB - Label at base of the TX data pattern pointers table.
                                ;*
                                ;* OUTPUTS:     CSR - DUT CSR IND.ADR.REG field is destroyed.
                                ;*              TXCHAR - DUT TXCHAR has word written to it.
                                ;*              TXCNTx - Counters incremented for lines on which chars sent.
                                ;*              TXPTRB - Each pointer in table points to next TX char for line.
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,INICHR
                                ;*
                                ;* COMMENTS:    This routine assumes that at least one character should be
                                ;*              transmitted on each active line.
                                ;*              Interrupts must be disabled when calling this routine.
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: None.
                                ;-- ************************************************************************
031442                          INICHR:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
031442  004537  005474                         JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
031446  013701  002374                 MOV     IESTAT,R1               ;GET STATE OF TX.IE, RX.IE FOR USE IN SETTING
                                                                        ;  UP THE IND.ADR.REG FIELD OF THE DUT CSR.
031452  005002                         CLR     R2                      ;SET LINE NUMBER OFFSET TO LINE 0.
031454  036237  002534  002272  2$:    BIT     BITTBL(R2),ACTLNS       ;TEST THE ACTIVE LINES BIT FOR THIS LINE.
031462  001424                        BEQ     6$                      ;DON'T TX ON THIS LINE IF IT IS NOT ACTIVE.
031464  010177  150610                 MOV     R1,@CSRA                ;SET UP THE IND.ADR.REG FIELD OF THE CSR.
031470  016205  003512                 MOV     TXPTRB(R2),R5           ;GET THE TX DATA PATTERN POINTER FOR THIS LINE.
031474  112504                         MOVB    (R5)+,R4                ;GET THE CHAR TO TX ON THIS LINE, INC POINTER.
031476  020562  003312                 CMP     R5,DPENDB(R2)           ;COMPARE POINTER WITH DATA PATTERN END ADR.
031502  103402                        BLO     4$                      ;SKIP POINTER WRAPAROUND IF NOT AT PATTERN END.
031504  166205  003352                 SUB     DPLENB(R2),R5           ;WRAP TX POINTER AROUND TO BEGINNING OF PAT'N.
031510  010562  003512          4$:    MOV     R5,TXPTRB(R2)           ;UPDATE THE TX POINTER STORAGE TABLE FOR LINE.
031514  043704  002366                 BIC     IBM,R4                  ;CLEAR INACTIVE BITS OF TX CHARACTER WORD.
031520  052704  100000                 BIS     #BIT15,R4               ;SET THE TX.DATA.VALID BIT IN THE WORD.
031524  010477  150552                 MOV     R4,@TXCHA               ;TX THE FIRST CHARACTER FOR THIS LINE.
031530  005262  003652                 INC     TXCNTB(R2)              ;INCREMENT TX CHARACTER COUNTER FOR THIS LINE.
031534  005201                  6$:    INC     R1                      ;INCREMENT WORD FOR IND.ADR.REG FIELD SET UP.
031536  062702  000002                 ADD     #2,R2                   ;SET LINE NUMBER OFFSET TO NEXT LINE.
031542  020227  000020                 CMP     R2,#NUMLNS*2            ;COMPARE LINE OFFSET WITH TWICE THE # OF LINES.
031546  002742                        BLT     2$                      ;LOOP TO SEND CHAR TO ANOTHER LINE IF NOT DONE.

031550                          60$:    PASS                            ;RESTORE GPRS.
```

GLOBAL SUBROUTINE INICHR - SEQ 0115

```
        031550  004736                          JSR     PC,@(SP)+       ;RETURN TO PREGO5 SUBRT.
4333    031552  000207                  RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - INIDMA -
                        ;++ ************************************************************************
                        ;*                      - Initiate DMA Transmissions Routine -
                        ;*      This routine is used to initiate DMA mode transmission.  It sends
                        ;*      the initial DMA buffer on each active line to cause future TX
                        ;*      interrupts which will continue the transmission if more than one
                        ;*      buffer is to be sent.
                        ;*
                        ;* INPUTS:      ACTLNS - Active lines bit map.
                        ;*              BITTBL - Label of table of words each with a bit set.
                        ;*              CSRA - Contains the address of the DUT CSR.
                        ;*              DPENDB - Base of the data pattern end table (entry per line).
                        ;*              DPLENB - Base of the data pattern length table.
                        ;*              IESTAT - Preserved states of the DUT interrupt enable bits.
                        ;*              NUMLNS - Equated to number of lines on a DUT.
                        ;*              TXCNTB - Lable at base of the TX character counter table.
                        ;*              TXPTRB - Label at base of the TX data pattern pointers table.
                        ;*
                        ;* OUTPUTS:     CSR - DUT CSR IND.ADR.REG field is destroyed.
                        ;*              <<<<<<<<<<<<<<<<< ADD COMMENTS <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
                        ;*              TXCNTx - Counters incremented for lines on which chars sent.
                        ;*              TXINTF - TX int flags (bit set if DMA.HO found set on line).
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,INIDMA
                        ;*
                        ;* COMMENTS:    This routine assumes that at least one data pattern should be
                        ;*              transmitted on each active line.
                        ;*              Interrupts must be disabled when calling this routine.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: DODMA.
                        ;-- ************************************************************************
4366 031554             INIDMA:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
     031554  004537  005474                     JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
4367 031560  013705  002272             MOV     ACTLNS,R5       ;GET THE ACTIVE LINES BIT MAP.
4368                    ;+
4369                    ; Set up loop which handles one line per iteration.
4370                    ;-
4371 031564  005001             CLR     R1              ;CLEAR THE LINE NUMBER COUNTER.
4372                        ;+
4373                        ; Get a bit map of the selected line.
4374                        ; If the line is inactive skip to select the next line.
4375                        ;-
4376 031566  010104     2$:     MOV     R1,R4           ;CALCULATE AN OFFSET TO THE PROPER LINE
4377 031570  006304             ASL     R4              ;  ENTRY IN A WORD TABLE (LINE # TIMES 2).
4378 031572  016402  002534     MOV     BITTBL(R4),R2   ;GET A BIT MAP FOR THIS LINE.
4379 031576  030205             BIT     R2,R5           ;TEST THE ACTIVE LINES BIT FOR THIS LINE.
4380 031600  001414            BEQ     10$             ;DON'T TX ON THIS LINE IF IT IS NOT ACTIVE.
4381                    ;+
4382                    ; Line is active.
4383                    ; Initiate DMA on this line.
4384                    ;    Get the data pattern length for this line.
4385                    ;-
4386 031602  016403  003352             MOV     DPLENB(R4),R3   ;GET DATA PATTERN LENGTH FOR THIS LINE.
4387 031606  016402  003512             MOV     TXPTRB(R4),R2   ;PREPARE TO PASS DATA PATTERN ADR TO DODMA RTN.
4388                        ;+
4389                        ; Write DMA parameters to the DUT.
4390                        ;-
```

GLOBAL SUBROUTINE - INIDMA - SEQ 0117

```
 4391 031612  004737  030624                JSR     PC,DODMA
 4392 031616  103403                        BCS     6$              ;SKIP ERROR IF DODMA WAS SUCCESSFUL.
 4393                                    ;+
 4394                                    ; Set the proper bit of the TX interrupt flags to indicate the line error.
 4395                                    ;-
 4396 031620  050537  002420                BIS     R5,TXINTF       ;INDICATE THE ERROR.
 4397 031624  000402                        BR      10$             ;SKIP UPDATING POINTERS AND COUNTERS.
 4398                                    ;+
 4399                                    ; Update the TX character count for this line.
 4400                                    ;-
 4401 031626  060364  003652        6$:     ADD     R3,TXCNTB(R4)   ;ADD THE DATA PATTERN LENGTH TO TX CHAR COUNT.
 4402                                    ;+
 4403                                    ; Increment line counter,goto next line if not done.
 4404                                    ;-
 4405 031632  005201                10$:     INC     R1              ;INCREMENT THE LINE COUNTER.
 4406 031634  020127  000010                CMP     R1,#NUMLNS      ;COMPARE THE LINE COUNTER WITH NUMBER OF LINES.
 4407 031640  002752                        BLT     2$              ;LOOP TO SEND CHAR TO ANOTHER LINE IF NOT DONE.
 4408
 4409 031642                        60$:    PASS                    ;RESTORE GPRS.
      031642  004736                                JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
 4410 031644  000207                        RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE                       LINBIT -
                        ;** ************************************************************************
                        ;*                  Line Number to Bit Map conversion subroutine -
                        ;*      This subroutine is used to generate a bit map (one bit of 16 set)
                        ;*      based on a line number (range: 1 to 16).  Only the LS 4 bits of the
                        ;*      line number word are used, the others are masked out (so unmasked
                        ;*      MSBytes of DUT CSRs can be passed to this routine without error).
                        ;*
                        ;* INPUTS:      R1 - Line number (only LS 4 bits used, others disregarded).
                        ;*              BITTBL - Base label of a 16 word b't table.
                        ;*
                        ;* OUTPUTS:     R0 - Bit map, bit corresponding to line number 's set:
                        ;*                      If l'ne number is 3, then bit3 is set, etc.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,LINBIT
                        ;*
                        ;* COMMENTS:    No checking is performed to verify that the line number is
                        ;*              a legal line number for the DUT ('e - less than NUMLNS).
                        ;*              NOTE: The line number is not destroyed of altered, so this
                        ;*                      routine can be used easily 'n loops.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: None.
                        ;-  ************************************************************************

4436 031646             LINBIT:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
     031646  004537  005474             JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
4437 031652  042701  177760     BIC     #177760,R1              ;MASK OUT ALL BUT 4 LSBITS OF THE LINE #.
4438 031656  006301             ASL     R1                      ;MULTIPLY LINE # BY 2 TO GET WORD TABLE OFFSET.
4439 031660  016100  002534     MOV     BITTBL(R1),R0           ;GET THE SINGLE BIT BIT MAP.
4440 031664             60$:    PASS    R0                      ;RESTORE GPRS, EXCEPT THE FOLLOWING,
     031664  010066  000002             MOV     R0,ROSLOT(SP)           ;PUT R0 IN STACK SLOT.
     031670  004736                     JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
4441 031672  000207             RTS     PC                        ;R0 - BIT MAP WITH LINE # BIT SET.
```

```
 4443                                   .SBTTL  GLOBAL SUBROUTINE                  MAPCNT -
 4444                                   ;** ************************************************************************
 4445                                   ;*                        - Count Bits in Bit Map Routine
 4446                                   ;*      This subroutine counts the number of bits which are set in a bit map.
 4447                                   ;*
 4448                                   ;* INPUTS:      R2 - The bit map for which to count the bits.
 4449                                   ;*
 4450                                   ;* OUTPUTS:     R2 - Count of the number of b'ts that were set.
 4451                                   ;*
 4452                                   ;* CALLING SEQUENCE:    JSR     PC,MAPCNT
 4453                                   ;*
 4454                                   ;* COMMENTS:
 4455                                   ;*
 4456                                   ;* SUBORDINATE ROUTINES CALLED: None.
 4457                                   ;  ************************************************************************
 4458
 4459 031674                           MAPCNT:: SAVE                      ;SAVE CONTENTS OF GPRS R0 THRU R5.
      031674  004537  005474                            JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
 4460 031700  010201                            MOV     R2,R1
 4461 031702  001405                           BEQ     60$                 ;EXIT WITH ZERO IF NO BITS ARE SET IN MAP.
 4462
 4463 031704  005002                            CLR     R2                  ;CLEAR THE BIT COUNT.
 4464 031706  000261                            SEC                         ;COUNT THE LAST BIT TO BE SHIFTED OUT.
 4465
 4466 031710  005502                   2$:      ADC     R2                  ;COUNT THE BIT IF IT WAS SET.
 4467 031712  006301                            ASL     R1                  ;SHIFT ANOTHER BIT OUT OF THE MAP.
 4468 031714  001375                           BNE     2$                  ;LOOP IF ALL BITS NOT SHIFTED OUT OF MAP.
 4469
 4470 031716                           60$:     PASS    R2                  ;RESTORE GPRS, EXCEPT THE FOLLOWING:
      031716  010266  000006                                    MOV     R2,R2SLOT(SP)           ;PUT R2 IN STACK SLOT.
      031722  004736                                    JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
 4471 031724  000207                           RTS     PC                  ;   R2   COUNT OF BITS SET IN BIT MAP.
```

```
                        .SBTTL  GLOBAL SUBROUTINE                MSLGET
                        ;******************************************************************************
                        ;*      - Milli Seconds Loop which returns read word and remain'ng 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
                        ;*      rout'ne and then once each milli-second there after.
                        ;*      Upon return, the last word which was read to check for the condition
                        ;*      's 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.
                        ;******************************************************************************

 031726                 MSLGET:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
 031726  004537  005474                       JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                        ;*
                        ; Set up mask for removing unused bits in the test word, and clear unused
                        ; bits 'n the des'red state word to allow direct compar'son.
                        ;
 031732  005102                 COM     R2              ;GET MASK OF UNUSED BITS.
 031734  040203                 BIC     R2,R3           ;MASK OUT UNUSED BITS IN DESIRED STATE WORD.
                        ;*
                        ; Handle the test and ex't if we have a 0 time-out value.
                        ;
 031736  005701                 TST     R1              ;TEST THE TIME OUT VALUE FOR ZERO.
 031740  001011                 BNE     2$              ;IF NON ZERO TIME-OUT, GO LOOP AND TEST.
 031742  011400                 MOV     (R4),R0         ;GET THE WORD TO TEST BEFORE EXITING.
 031744  010037  032040         MOV     R0,62$          ;SAVE VALUE SO WE CAN RETURN IT.
 031750  040200                 BIC     R2,R0           ;MASK OUT UNTESTED BITS OF WORD.
 031752  020003                 CMP     R0,R3           ;COMPARE AGAINST DESIRED STATE WORD.
 031754  000261                 SEC                     ;INDICATE SUCCESS IN CASE WORDS ARE EQUAL.
 031756  001420                 BEQ     6$              ;EXIT WITH SUCCESS IF WORDS ARE EQUAL.
```

GLOBAL SUBROUTINE - MSLGET SEQ 0121

```
4529 031760  000241                    CLC                     ;INDICATE FAILURE (TIME-OUT).
4530 031762  000416                    BR      6$              ;EXIT WITH FAILURE, WORDS AREN'T EQUAL.
4531                                ;+
4532                                ; Non-zero t me out value.  Loop, waiting for condition or time-out.
4533                                ;-
4534 031764  013705  002462      2$:   MOV     MSLCNT,R5       ;LOAD MS LOOP COUNT.
4535 031770  011400              4$:   MOV     (R4),R0         ;GET THE WORD TO TEST.
4536 031772  010037  032040            MOV     R0,62$          ;SAVE WORD IN CASE THIS IS THE LAST.
4537 031776  040200                    BIC     R2,R0           ;MASK OUT UNTESTED BITS OF WORD.
4538 032000  020003                    CMP     R0,R3           ;COMPARE AGAINST DESIRED STATE WORD.
4539 032002  000261                    SEC                     ;SET CARRY IN CASE OF SUCCESS.
4540 032004  001405                    BEQ     6$              ;EXIT WITH SUCCESS IF WORDS ARE EQUAL.
4541 032006  005305                    DEC     R5              ;COUNT DOWN THE INSIDE MS LOOP COUNT.
4542 032010  001367                    BNE     4$              ;LOOP IF MS NOT UP.
4543 032012  005301                    DEC     R1              ;DECREMENT THE MS TIME COUNT.
4544 032014  001363                    BNE     2$              ;IF TIME NOT UP, LOOP TO COUNT ANOTHER MS.
4545 032016  000241                    CLC                     ;CLEAR CARRY, WE TIMED-OUT.
4546                                ;+
4547                                ; Have either found condit'on, or timed out (possibly from 0 t'me-out value).
4548                                ; Restore the last contents read from the test word.  Exit routine.
4549                                ;-
4550 032020  013700  032040      6$:   MOV     62$,R0          ;PASS OUT THE LAST READ WORD.
4551 032024                      60$:  PASS    R0,R1           ;RESTORE GPRS, EXCEPT THE FOLLOWING:
     032024  010066  000002                          MOV     R0,R0SLOT(SP)       ;PUT R0 IN STACK SLOT.
     032030  010166  000004                          MOV     R1,R1SLOT(SP)       ;PU' R1 IN STACK SLOT.
     032034  004736                                  JSR     PC,@(SP)+           ;RETURN TO PREG05 SUBRT.
4552                                                 ;R0 - LAST READ WORD CHECKED FOR CONDITION.
4553                                                 ;R1 - REMAINING TIME (0 IF TIME OUT OCCURED).
4554 032036  000207                    RTS     PC              ;CARRY - SET IF SUCCESS, CLEAR IF 'IME OUT.
4555                                ;+
4556                                ; Local storage.
4557                                ;
4558 032040  000000              62$:  .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.
                        ;*************************************************************************

032042                  MSLOOP:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
032042  004537  005474                  JSR     R5,PREGO5       ;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.
                        ;-
032046  004737  031726          JSR     PC,MSLGET               ;CALL THE MULTI-PURPOSE MS LOOP AND SEARCH RTN.

032052                  60$:    PASS                            ;RESTORE GPRS,
032052  004736                          JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
032054  000207          RTS     PC                      ;CARRY - SET IF SUCCESS, CLEAR IF TIME OUT.
```

```
                        .SBTTL  GLOBAL SUBROUTINE              - MUL16U -
                        ;++ ************************************************************************
                        ;*                      - 16 Bit Unsigned Multiply Routine -
                        ;*      This routine multiplies 2 16 bit unsigned numbers and returns a 16 bit
                        ;*      unsigned result.  The multiplication is performed by iterative
                        ;*      addition of one number to a sum while decrementing the other number
                        ;*      to zero.  If overflow occurrs (177777 to 0) the product is invalid.
                        ;*
                        ;* INPUTS:      R1   Multiplicand (16 bit unsigned).
                        ;*              R2 - Multiplier (16 bit unsigned).
                        ;*
                        ;* OUTPUTS:     R1 - Product (16 bit unsigned), -1 if overflow.
                        ;*              CARRY - Set if success (no overflow), clear otherwise.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,MUL16U
                        ;*
                        ;* COMMENTS:    Note: For minimum execution time R2 should contain the
                        ;*                    smaller of the 2 arguments.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: None.
                        ;-  ************************************************************************

032056                  MUL16U:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
032056  004537  005474                 JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
032062  005003                  CLR     R3              ;CLEAR THE PRODUCT.
032064  005702                  TST     R2              ;CHECK THE MULTIPLIER.
032066  001003                 BNE     2$              ;GO TO DO MULTIPLICATION IF NOT ZERO.
032070  005001                  CLR     R1              ;RETURN A PRODUCT OF ZERO.
032072  000261                  SEC                     ;INDICATE SUCCESS.
032074  000412                 BR      60$             ;EXIT THE ROUTINE.

032076  060103          2$:     ADD     R1,R3           ;ADD THE MULTIPLICAND TO THE PRODUCT.
032100  103405                 BCS     50$             ;EXIT WITH OVERFLOW IF ONE OCCURRED.
032102  005302                  DEC     R2              ;DECREMENT THE MULTIPLIER.
032104  001374                 BNE     2$              ;LOOP IF MULTIPLIER NOT ZERO.
032106  010301                  MOV     R3,R1           ;PREPARE TO PASS OUT THE PRODUCT.
032110  000261                  SEC                     ;INDICATE SUCCESS.
032112  000403                 BR      60$             ;EXIT WITH SUCCESS.

032114  012701  177777  50$:    MOV     #-1,R1          ;FORCE PRODUCT TO MAX VALUE, WE OVERLFOWED.
032120  000241                  CLC                     ;INDICATE FAILURE.

032122                  60$:    PASS    R1              ;RESTORE GPRS, EXCEPT THE FOLLOWING:
032122  010166  000004                         MOV     R1,R1SLOT(SP)           ;PUT R1 IN STACK SLOT.
032126  004736                                 JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.

032130  000207                 RTS     PC              ;  R1 - PRODUCT (16 BIT UNSIGNED),
                                                        ;  CARRY - SET IF SUCCESS (NO OVERFLOW).
```

```
                        .SBTTL  GLOBAL SUBROUTINE                NEWCHR -
                        ;** ************************************************************************
                        ;*                      - New Character Handling Routine -
                        ;*      This subroutine handles a new character which has been read from
                        ;*      the DUT.   he counters and pointers which are involved with the
                        ;*      character are updated.  The character is checked for errors and
                        ;*      any errors which are found are reported.
                        ;*
                        ;* INPUTS:      R2 - The read character including error flags and line number.
                        ;*              R3 - Mask of the inactives bits in a TX or RX char byte.
                        ;*              ACTLNS  - Bit map of active DUT lines.
                        ;*              DPRSQB - Label at data pattern resync queues table base.
                        ;*              TXRXLB - Base of TX/RX line number association table.
                        ;*              BITTBL - Table of words with bits set for use in forming maps.
                        ;*              ERSMRF - "Print error summary for line" flags.
                        ;*              ERRTBL   Error information (ERRNBR, ERRMSG, ERRTYP).
                        ;*              ERCNTB - Base of the RX character error counters table.
                        ;*              NDERPT - Contains number of char errors to report on a line.
                        ;* INPUTS TO SUBROUTINES:       CHCNTB, DPENDB, DPLEN, DPRSQE, EXCNTB, RXCNTB,
                        ;*                              RXPTRB, ERRNBR, ERMSG, ERRTYP.
                        ;*
                        ;* OUTPUTS:     ERRBLK - Contents destroyed.
                        ;*            Following variables updated for line on which char was received:
                        ;*              DPRSQ   Data pattern resync que of received characters.
                        ;*              ERCNT - Count of the number of character errors on line.
                        ;*              ERSMRF - Updated "print error summary for line" flags.
                        ;*              EXCNT - Count of the number of extra chars received on line.
                        ;*              RXCNT - Count of the number of characters received on line.
                        ;*              RXPTR - Updated to point to the next expected char on line.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,NEWCHR
                        ;*
                        ;* COMMENTS:    This routine can report errors with numbers Initial ERRNBR
                        ;*              and Initial ERRNBR + 1.  ERRNBR is restored to its initial
                        ;*              value before this routine returns.
                        ;*
                        ;* SUBROUTINES CALLED:  CKCHR,CKINAC,TXROFF,TXRON.
                        ;* INDIRECT SUBROUTINES:  CHKEXT,CHKLOS,ER9002,ER9003,UPDCHR.
                        ;-  ************************************************************************

032132                  NEWCHR:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
032132  004537  005474                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
032136  010305                  MOV     R3,R5           ;GET THE BIT MAP OF INACTIVE DATA BYTE BITS.
032140  052705  177400          BIS     #177400,R5      ;ALL UPPER BITS OF EXPECTED DATA ARE INACTIVE.
032144  005037  032410          CLR     70$             ;CLEAR THE "ERROR FOUND" FLAG.
                        ;*
                        ; If the new character is valid on an inactive line, go report error.
                        ; Routine used also extracts line number from the new character.
                        ;-
032150  004737  030004          JSR     PC,CKINAC       ;CHECK FOR CHAR ON INACTIVE LINE.
032154  103043                  BCC     4$              ;GO REPORT ERROR IF ON INACTIVE LINE.
                        ;*
                        ; Push the new character on the resync que for this line.
                        ;
032156  010304                  MOV     R3,R4           ;CALCULATE BASE ADDRESS OF THE
032160  006304                  ASL     R4              ;  DATA PATTERN RESYNCH QUEUE
032162  006304                  ASL     R4              ;  (QUEUE IS 4 WORDS LONG) FOR
```

GLOBAL SUBROUTINE - NEWCHR - SEQ 0125

```
 4705 032164  062704  005052                ADD     #DPRSQB,R4      ;  THIS LINE.
 4706 032170  010401                        MOV     R4,R1           ;GET THE BASE OF THE QUEUE.
 4707 032172  016121  000002                MOV     2(R1),(R1)+     ;MOVE FROM CHR1 SLOT TO CHR0 SLOT.
 4708 032176  016121  000002                MOV     2(R1),(R1)+     ;MOVE FROM CHR2 SLOT TO CHR1 SLOT.
 4709 032202  010211                        MOV     R2,(R1)         ;PUT NEW CHAR INTO CHR2 SLOT.
 4710                                ;+
 4711                                ; Check the DATA.VALID for the character at the botton of the queue.
 4712                                ; If DATA.VALID is clear, exit the routine--nothing to analyze.
 4713                                ;-
 4714 032204  011402                        MOV     (R4),R2         ;GET CHR0 VALUE, SET FLAGS.
 4715 032206  100076                        BPL     60$             ;EXIT ROUTINE IF DATA.VALID IS CLEAR.
 4716                                ;+
 4717                                ; Test for any of the error bits set in CHR0.
 4718                                ;-
 4719 032210  032702  070000                BIT     #70000,R2       ;TEST FOR ANY CHR0 ERROR BITS SET.
 4720 032214  001420                        BEQ     2$              ;SKIP THIS ERROR IF NO ERROR BITS SET.
 4721                                ;+
 4722                                ; We have at least one error flag set on the received char.
 4723                                ; Report data error flag error if not in summary mode.
 4724                                ;-
 4725 032216  005337  032410                DEC     70$             ;SET THE "ERROR FOUND" FLAG.
 4726 032222  016300  005364                MOV     TXRXLB(R3),R0   ;GET THE TX LINE OFFSET FOR THIS RX LINE.
 4727 032226  036037  002534  002650        BIT     BITTBL(R0),ERSMRF  ;CHECK THE ERROR SUMMARY FLAG FOR TX LINE.
 4728 032234  001010                        BNE     2$              ;IF ERROR SUMMARY FLAG SET, SKIP NEXT REPORT.
 4729 032236  012737  025566  005472        MOV     #ER9003,ERRBLK  ;SELECT THE ER9003 ERROR REPORT ROUTINE.
 4730 032244  004737  037074                JSR     PC,TXROFF       ;TURN OFF TX AND RX DURING ERROR REPORTING.
 4731 032250                                ERROR                   ;               >>>>> ERROR <<<<<.
      032250  104460                                                                          TRAP    C$ERROR
 4732 032252  004737  037130                JSR     PC,TXRON        ;TURN TX AND RX BACK ON.
 4733                                ;+
 4734                                ; Check the character at the bottom of the resync que for data errors.
 4735                                ;
 4736 032256  004737  027566        2$:     JSR     PC,CKCHR        ;CHECK THE CHR0 CHAR FOR ERRORS.
 4737 032262  103424                        BCS     6$              ;SKIP ERROR REPORT IF CHR0 IS CORRECT.
 4738                                ;+
 4739                                ; We have some sort of data error so report it (unless in summary report moue).
 4740                                ;-
 4741 032264  005337  032410        4$:     DEC     70$             ;SET THE "ERROR FOUND" FLAG.
 4742 032270  016300  005364                MOV     TXRXLB(R3),R0   ;GET THE TX LINE OFFSET FOR THIS RX LINE.
 4743 032274  036037  002534  002650        BIT     BITTBL(R0),ERSMRF  ;CHECK THE ERROR SUMMARY FLAG FOR THIS LINE.
 4744 032302  001014                        BNE     6$              ;SKIP ERROR REPORT IF ERROR SUMMARY FLAG SET.
 4745 032304  012737  025420  005472        MOV     #ER9002,ERRBLK  ;SELECT THE ER9002 ERROR REPORT ROUTINE.
 4746 032312  005237  005466                INC     ERRNBR          ;SELECT INITIAL ERRNBR + 1.
 4747 032316  004737  037074                JSR     PC,TXROFF       ;TURN OFF TX AND RX DURING ERROR REPORTING.
 4748 032322                                ERROR                   ;               >>>>> ERROR <<<<<.
      032322  104460                                                                          TRAP    C$ERROR
 4749 032324  004737  037130                JSR     PC,TXRON        ;TURN TX AND RX BACK ON.
 4750 032330  005337  005466                DEC     ERRNBR          ;RESTORE INITIAL ERRNBR.
 4751                                ;+
 4752                                ; Count a character error if one occurred.
 4753                                ; Update the "report error summary" flag for line based on error count.
 4754                                ;-
 4755 032334  005737  032410        6$:     TST     70$             ;CHECK THE "ERROR FOUND" FLAG.
 4756 032340  001421                        BEQ     60$             ;SKIP COUNTING AN ERROR IF FLAG IS CLEAR.
 4757 032342  005263  003452                INC     ERCNTB(R3)      ;INCREMENT THE ERROR COUNTER FOR THIS LINE.
 4758 032346  001002                        BNE     8$              ;SKIP SETTING COUNTER TO MAX IF NO OVERFLOW.
 4759 032350  005363  003452                DEC     ERCNTB(R3)      ;RESET THE ERROR COUNTER TO -1 (MAX VALUE).
```

GLOBAL SUBROUTINE - NEWCHR - SEQ 0126

```
4760 032354  005737  002264          8$:    TST     NDERPT           ;DISABLE ERROR SUMMARY FUNCTION IF
4761 032360  001411                         BEQ     60$              ; NUMBER OF DATA ERRORS TO REPORT IS 0.
4762 032362  026337  003452  002264         CMP     ERCNTB(R3),NDERPT  ;COMPARE ERROR COUNT WITH # OF ERR'S TO RPT.
4763 032370  103405                         BLO     60$              ;SKIP SETTING OF SUMMARY FLAG IF NOT TOO MANY.
4764 032372  016300  005364                 MOV     TXRXLB(R3),R0    ;GET THE TX LINE OFFSET FOR THIS RX LINE.
4765 032376  056037  002534  002650         BIS     BITTBL(R0),ERSMRF  ;SET "PRINT ERROR SUMMARY" FLAG FOR LINE.
4766
4767 032404                         60$:    PASS                     ;RESTORE GPRS.
     032404  004736                                 JSR     PC,@(SP)+          ;RETURN TO PREGO5 SUBRT.
4768 032406  000207                         RTS     PC
4769
4770 032410  000000                 70$:    .WORD   0                ;LOCAL STORAGE FOR ERROR OCCURRED FLAG.
```

```
                        .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 informat'on 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.
                        ;   ************************************************************************

032412                  OOPS::  SAVE                            ;SAVE CONTENTS OF GPRS R0 THRU R5.
032412  004537  005474                      JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                            ; REPORT "HOST COMPUTER HARDWARE OR SOFTWARE BUG ENCOUNTERED." ERROR.
                              ERRSF   101,EM0101
                                                                      TRAP    C$ERSF
                                                                      .WORD   101
032416  104454                                                        .WORD   EM0101
032420  000145                                                        .WORD   0
032422  032456
032424  000000
                            ; REPORT "PROGRAM HUNG, WAITING FOR A CONTROL-C."
                              PRINTF  #EM0102
032426  012746  032542                                               MOV     #EM0102,-(SP)
032432  012746  000001                                               MOV     #1,-(SP)
032436  010600                                                       MOV     SP,R0
032440  104417                                                       TRAP    C$PNTF
032442  062706  000004                                               ADD     #4,SP
032446                  2$:     BREAK                           ;LOOK FOR OPERATOR CONTROL-C INPUT.
032446  104422                                                       TRAP    C$BRK
032450  000776                  BR      2$                      ;INFINITE LOOP.
032452                  60$:    PASS                            ;DON'T NEED THIS, BUT SOMEBODY MAY CHANGE THIS
032452  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
032454  000207                  RTS     PC                      ; ROUTINE IN THE FUTURE, SO BE CONSISTANT.

032456    110   117   123     EM0101:: .ASCIZ /HOST COMPUTER HARDWARE OR SOFTWARE BUG ENCOUNTERED./
032461    124   040   103
032464    117   115   120
032467    125   124   105
032472    122   040   110
032475    101   122   104
032500    127   101   122
032503    105   040   117
032506    122   040   123
032511    117   106   124
032514    127   101   122
032517    105   040   102
032522    125   107   040
032525    105   116   103
032530    117   125   116
032533    124   105   122
```

GLOBAL SUBROUTINE - OOPS - SEQ 0128

```
        032536  105  104  056
        032541  000
4802    032542  045  116  045  EM0102:: .ASCIZ /%N%APROGRAM HUNG, WAITING FOR A CONTROL-C. <**************%N%N/
        032545  101  120  122
        032550  117  107  122
        032553  101  115  040
        032556  110  125  116
        032561  107  054  040
        032564  127  101  111
        032567  124  111  116
        032572  107  040  106
        032575  117  122  040
        032600  101  040  103
        032603  117  116  124
        032606  122  117  114
        032611  055  103  056
        032614  040  074  052
        032617  052  052  052
        032622  052  052  052
        032625  052  052  052
        032630  052  052  052
        032633  045  116  045
        032636  116  000
4803                                .EVEN
```

```
                        .SBTTL  GLOBAL SUBROUTINE                - PRTLPR -
                        ;++ ************************************************************************
                        ;*                      -Print the contents of the LPR.
                        ;*      This routine is used to print out extended information on the
                        ;*      contents of the Line Parameter Register (LPR).
                        ;*
                        ;* INPUTS:      R3 - Contains the number of the line you wish to examine.
                        ;*              CSRA - Contains the address of the DUT's CSR.
                        ;*              IESTAT - Contains the current status of the TX and RX interrupt
                        ;*                       enable bits in the DUT's CSR.
                        ;*              LPRA - Contains the address of the DUT's LPR register.
                        ;*
                        ;* OUTPUTS:     An extended information message is printed on the operators
                        ;*              console.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,PRTLPR
                        ;*
                        ;* COMMENTS:    This routine changes the indirect address field of the device
                        ;*              under test's CSR.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                        ;-- ************************************************************************

032640                  PRTLPR::SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
013701  002300          MOV     CSRA,R1                 ;GET THE CSR ADDRESS.
013702  002304          MOV     LPRA,R2                 ;GET THE LPR ADDRESS.
042703  177760          BIC     #177760,R3              ;CLEAR ANY UNWANTED BITS.
053703  002374          BIS     IESTAT,R3               ;SET STATE OF TX AND RX INTERRUPT ENABLE BITS.
010311                  MOV     R3,(R1)                 ;SELECT LINE.
011204                  MOV     (R2),R4                 ;GET CONTENTS OF THE LPR.
                        ;PRINT MESSAGE"CONTENTS OF THE LPR:nnnnnn"
032670                  PRINTX #EF9019,#EM9026,R4;PRINT OUT MESSAGE ON OPERATORS CONSOLE.
010446                                                          MOV     R4,-(SP)
012746  023407                                                  MOV     #EM9026,-(SP)
012746  010310                                                  MOV     #EF9019,-(SP)
012746  000003                                                  MOV     #3,-(SP)
010600                                                          MOV     SP,R0
104415                                                          TRAP    C$PNTX
062706  000010                                                  ADD     #10,SP
032716                  60$:    PASS                    ;RESTORE GPRS.
004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
000207                  RTS     PC
```

```
 4840                                   .SBTTL  GLOBAL SUBROUTINE               - PUFIFO -
 4841                                   ;*************************************************************************
 4842                                   ;*      - PURGE THE FIFO
 4843                                   ;*      This routine tries to remove all the characters from the FIFO.
 4844                                   ;*      Any BMP codes that are found are saved on the BMP code queue.
 4845                                   ;*
 4846                                   ;* INPUTS:      RBUFA- Contains the  address of the Receiver.
 4847                                   ;*
 4848                                   ;*
 4849                                   ;* OUTPUTS:     Carry bit - Indicates the state of the fifo, set:= purged.
 4850                                   ;*              BMPCQ - The contents of the BMP code queue may be updated.
 4851                                   ;*
 4852                                   ;* CALLING SEQUENCE:    JSR     PC,PUFIFO
 4853                                   ;*
 4854                                   ;* COMMENTS:
 4855                                   ;*
 4856                                   ;* SUBORDINATE ROUTINES CALLED: SAVBMP.
 4857                                   ;*************************************************************************
 4858
 4859 032722                           PUFIFO::SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
      032722  004537  005474                        JSR     R5,PREGO5       ;CALL REGISTER SAVE SUBRT.
 4860 032726  012701  001000            MOV     #512.,R1        ;SET MAXIMUM TRY COUNT OF 512.
 4861 032732  013704  002302            MOV     RBUFA,R4        ;GET ADDRESS OF THE RECEIVER BUFFER REGISTER.
 4862
 4863 032736  011402                    2$:     MOV     (R4),R2         ;GET THE CONTENTS OF THE RECEIVER BUFFER REG.
 4864 032740  100016                    BPL     6$              ;EXIT IF THE FIFO IS EMPTY, DATA_VALID CLR.
 4865                                   ;+
 4866                                   ; Check if the read character is actually a BMP code.
 4867                                   ;  If it is, then save it on the BMP code queue to be reported later.
 4868                                   ;-
 4869 032742  012700  070000            MOV     #70000,R0       ;GENERATE A BIT MAP OF CHAR ERROR BITS
 4870 032746  040200                    BIC     R2,R0           ; WHICH ARE NOT SET FOR CHAR.
 4871 032750  001006                    BNE     4$              ;THROW CHAR AWAY IF NOT BMP OR SELFTEST CODE.
 4872                                   ;+
 4873                                   ; Check if the read data is modem status , BMP or Selftest?.
 4874                                   ;-
 4875 032752  012700  000300            MOV     #300,R0         ; CHECK IF BMP OR SELFTEST?.
 4876 032756  040200                    BIC     R2,R0           ;TRY TO CLEAR BMP FLAGS IN THE READ DATA.
 4877 032760  001002                    BNE     4$              ;IF IT IS MODEM OR SELFTEST CODE THROW IT AWAY.
 4878 032762  004737  035624            JSR     PC,SAVBMP       ;SAVE BMP CODE ON THE QUEUE.
 4879
 4880 032766  005301                    4$:     DEC     R1              ;DECREMENT THE TRY COUNT.
 4881 032770  001362                    BNE     2$              ;LOOP TO TRY AGAIN.
 4882 032772  000241                    CLC                     ;CLEAR CARRY,TO INDICATE FIFO NOT PURGED.
 4883 032774  000401                    BR      60$             ;EXIT WITH CARRY CLEAR.
 4884 032776  000261                    6$:     SEC             ;SET CARRY, TO INDICATE FIFO PURGED.
 4885
 4886 033000                            60$:    PASS                    ;RESTORE GPRS.
      033000  004736                                    JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
 4887                                                                   ;CARRY BIT, SET INDICATES FIFO PURGED.
 4888 033002  000207                    RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE                PUFIFR -
                        ;*************************************************************************
                        ;*      - Purge FIFO report any errors found.
                        ;*      This routine removes all data from the FIFO.  Any BMP codes that are
                        ;*        and are save on the queue to be reported later in the BMP report test.
                        ;*         unxepected data (ie any non-status inforamtion) that are found,
                        ;*         reported as an error.
                        ;*      1. the FIFO will not purge after 512 attempts, then the current test
                        ;*      that called this routine receives a failure flag that should be used
                        ;*      to abort the test.
                        ;*
                        ;* INPUTS:      ERRTBL - ERRTYPE, ERRMSG, ERRNBR are set up correctly.
                        ;*              RBUFA- Contains the  address of the Receiver.
                        ;*
                        ;* OUTPUTS:     Carry bit - Abort test flag, Clr = ABORT TEST, Set = OK.
                        ;*              ERRBLK - Value will be destroyed.
                        ;*              BMPCQP - The BMP code queue pointer may be updated.
                        ;*              The contents of the BMP code queue may be updated.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,PUFIFR
                        ;*
                        ;* COMMENTS:    This routine reports errors with numbers initial ERRNBR
                        ;*              thru to ERRNBR+2.
                        ;*              The ERRNBR is restored to its INITIAL value before returning.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: ER1603,ER9001,ER9002,SAVBMP.
                        ;*************************************************************************

033004                  PUFIFR::SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
033004  004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
033010  013746  005466          MOV     ERRNBR, (SP)    ;SAVE THE CONTENTS OF THE ERROR NUMBER.
033014  012705  001000          MOV     #512.,R5        ;SET MAXIMUM READ COUNTER TO 2*FIFO SIZE.
                        ;+
                        ; Read data from the FIFO until DATA VALID is clear of read counter is zero.
                        ;  Report any BMP or Unexpected data as errors.
                        ;-
033020  017702  147256  2$:      MOV     @RBUFA,R2       ;GET THE CONTENTS OF THE RECEIVER BUFFER REG.
033024  100057                 BPL     8$              ;EXIT IF DATA VALID CLEAR, ie. FIFO PURGED.
                         ;+
                         ; Check if read data is status or unexpected character.
                         ;
033026  012700  070000          MOV     #70000,R0       ;GENERATE A BIT MAP OF CHAR ERROR BITS
033032  040200                  BIC     R2,R0           ; WHICH ARE NOT SET FOR CHAR.
033034  001012                 BNE     4$              ;SKIP BMP CHECK IF IT IS UNEXPECTED DATA.
                         ;+
                         ; Check if the read data is modem status , BMP or Selftest?.
                         ;  If it is a BMP code then save it on the queue.
                         ;-
033036  012737  025330  005472          MOV     #ER9001,ERRBLK  ;SET UP THE CORRECT ERROR REPORTING ROUTINE.
033044  012700  000300          MOV     #300,R0         ; CHECK IF BMP OR SELFTEST?.
033050  040200                  BIC     R2,R0           ;TRY TO CLEAR BMP FLAGS IN THE READ DATA.
033052  001003                 BNE     4$              ;SKIP BMP ERROR REPORT IF MODEM OR SELFTEST?.
033054  004737  035624          JSR     PC,SAVBMP       ;SAVE THE BMP CODE ON THE QUEUE.
033060  000424                 BR      6$              ;BRANCH TO CHECK READ COUNT.
                         ;+
                         ; Check if the read data is Modem, Selftest or Unexpected data.
                         ;
```

```
 4946 033062  032702  000001          4$:     BIT     #BIT0,R2        ;TEST THE MODEM STATUS INDICATION BIT.
 4947 033066  001421                          BEQ     6$              ;DO NOT REPORT ANY ERROR IF MODEM STATUS.
 4948 033070  012701  023772                   MOV     #EM9104,R1      ;PASS THE CORRECT ERROR MESSAGE TO REPORT.
 4949 033074  010203                          MOV     R2,R3           ;EXTRACT THE LINE NUMBER FROM
 4950 033076  000303                          SWAB    R3              ; THE READ DATA.
 4951 033100  042703  177760                  BIC     #177760,R3      ;
 4952 033104  006303                          ASL     R3              ;FORM LINE NUMBER TIMES 2 FOR ER9002 ROUTINE.
 4953 033106  052704  100000                  BIS     #BIT15,R4       ;SET THE "NONE" EXPECTED MAESSAGE FLAG.
 4954 033112  005237  005466                  INC     ERRNBR          ;SET ERROR NUMBER TO INTIAL ERRBR+1.
 4955 033116  012737  025420  005472          MOV     #ER9002,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
 4956                                         ;REPORT ERROR "UNEXPECTED DATA FOUND IN FIFO".
 4957 033124                                  ERROR                   ;               >>>>> ERROR <<<<<.
      033124  104460                                                                    TRAP    C$ERROR
 4958 033126  005337  005466                  DEC     ERRNBR          ;RESTORE ERROR NUMBER TO INTIAL ERRNBR.
 4959
 4960 033132  005305                  6$:     DEC     R5              ;DECREMENT READ COUNTER.
 4961 033134  001331                          BNE     2$              ;LOOP TO READ NEXT CHAR FROM FIFO IF COUNT > 0.
 4962                                         ;+
 4963                                         ; The FIFO will not clear, report the error and indicate that the test is to
 4964                                         ; be ABORTED.
 4965                                         ;
 4966 033136  062737  000002  005466          ADD     #2,ERRNBR       ;SET ERROR NUMBER TO INTIAL ERRNBR+2.
 4967 033144  012737  025034  005472          MOV     #ER1603,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
 4968 033152  012701  023052                  MOV     #EM9017,R1      ;PASS THE MESSAGE TO BE REPORTED.
 4969                                         ;REPORT THE ERROR "FIFO WILL NOT PURGE, (DATA VALID STUCK SET)"
 4970                                         ;                       "?????? TEST ABORTED".
 4971 033156                                  ERROR                   ;               >>>>> ERROR <<<<<.
      033156  104460                                                                    TRAP    C$ERROR
 4972 033160  000241                          CLC                     ;INDICATE THE TEST IS TO BE ABORTED.
 4973 033162  000401                          BR      10$             ;EXIT THIS ROUTINE AND ABORT THE CURRENT TEST.
 4974
 4975 033164  000261                  8$:     SEC                     ;SET THE CARRY, DO NOT ABORT THE TEST.
 4976
 4977 033166  012637  005466          10$:    MOV     (SP)+,ERRNBR    ;RESTORE INITIAL ERROR NUMBER.
 4978 033172                          60$:    PASS                    ;RESTORE GPRS,
      033172  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
 4979                                         ;CARRY BIT, SET INDICATES FIFO PURGED, DO NOT
 4980                                         ; ABORT THE TEST.
 4981 033174  000207                          RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE                PURRXB -
                        ;** ************************************************************************
                        ;*                      - Purge the RX Buffer in Memory Routine -
                        ;*      This subroutine is used before the beginning of a TX/RX of data
                        ;*      patterns to clear out the RX buffer and to initialize the various
                        ;*      counters and pointers related to that buffer.
                        ;*
                        ;* INPUTS:      RXBSTA - Label at the beginning of the RX buffer.
                        ;*
                        ;* OUTPUTS:     RXBCNT - Count of # of chars in RX buffer (Cleared).
                        ;*              RXBIPT - Input pointer to RX buffer (Initialized).
                        ;*              RXBOPT - Output pointer to RX buffer (Initialized).
                        ;*              The contents of the RX BUFFER are cleared.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,PURRXB
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: None.
                        ;- ************************************************************************

033176                  PURRXB:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
033176  004537  005474                 JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.

033202  012701  003062          MOV     @RXBOPT,R1      ;GET THE ADDRESS OF THE RX OUTPUT POINTER.
033206  012721  003070          MOV     @RXBSTA,(R1)+   ;INITIALIZE THE RX BUFFER OUTPUT POINTER.
033212  012721  003070          MOV     @RXBSTA,(R1)+   ;INITIALIZE THE RX BUFFER INPUT POINTER.
033216  005021          2$:     CLR     (R1)+           ;CLEAR CHAR COUNT AND THE BUFFER AREA.
033220  020127  003270          CMP     R1,@RXBEND      ;CHECK IF LAST LOCATION HAS BEEN CLEARED.
033224  101774                  BLOS    2$              ;LOOP IF NOT DONE.

033226                  60$:    PASS                            ;RESTORE GPRS.
033226  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
033230  000207                  RTS     PC
```

```
5016                                    .SBTTL  GLOBAL SUBROUTINE               - RDCHRS -
5017                                    ;** ****************************************************************************
5018                                    ;*              - Read and Compare Input Characters Routine -
5019                                    ;*      This subroutine reads the characters from the RX buffer in memory.
5020                                    ;*      If characters stop appearing in the buffer with DATA.VALID set
5021                                    ;*      or if more than the allowable number of characters has been read from
5022                                    ;*      the buffer this routine exits with an RX complete indication.
5023                                    ;*      Each read char is analyzed and any necessary errors are reported.
5024                                    ;*
5025                                    ;* INPUTS:      ACTLNS - Bit map of the active DUT lines.
5026                                    ;*              ERRNBR - Set to error number of first error in this routine.
5027                                    ;*              IBM - Mask of the inactive bits in a TX or RX char byte.
5028                                    ;*              OSTEND - Address of the end of the output storage fifo buffer.
5029                                    ;*              OSTPTR - Pointer to the next byte to read from OSTORE.
5030                                    ;*              RXBOPT - Pointer into the RX char buffer in memory.
5031                                    ;*              RXTOUT - Time-out value for RX of last char.
5032                                    ;*
5033                                    ;* OUTPUTS:     Error messages may be printed at the operator's console.
5034                                    ;*              TXDBLF - TX/RX disabled flag (Cleared).
5035                                    ;*              TXENBM - TX.ENABLE state mask (Destroyed).
5036                                    ;*              SAVPRI - Storage for processor priority (Destroyed).
5037                                    ;*              SAVTEN - Storage for TX.ENABLE states (Destroyed).
5038                                    ;*
5039                                    ;* CALLING SEQUENCE:    JSR     PC,RDCHRS
5040                                    ;*
5041                                    ;*  COMMENTS:   This routine reports errors with numbers Initial ERRNBR
5042                                    ;*              thru Initial ERRNBR + 4.
5043                                    ;*              ERRNBR is restored before this routine returns.
5044                                    ;*
5045                                    ;* SUBROUTINES CALLED:  CKCHR,NEWCHR,REPCOD,RXIE0,RXIE1,TXENBL,TXIE0,TXIE1,
5046                                    ;*                      WAIBIS.
5047                                    ;- ****************************************************************************
5048
5049 033232                           RDCHRS:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
     033232  004537  005474                            JSR     R5,PREGO5       ;CALL REGISTER SAVE SUBRT.
5050 033236  013704  005466                    MOV     ERRNBR,R4       ;PRESERVE THE INITIAL ERROR NUMBER.
5051 033242  013703  002366                    MOV     IBM,R3          ;GET THE INACTIVE BIT MASK.
5052 033246  005037  002656                    CLR     TXDBLF          ;CLEAR THE TX DISABLED FLAG.
5053 033252  004737  035600                    JSR     PC,RXIE1        ;TURN ON DUT RECEPTION INTERRUPTS.
5054 033256  004737  036574                    JSR     PC,TXIE1        ;TURN ON DUT TRANSMISSION INTERRUPTS.
5055
5056                                    ;+
5057                                    ; Clear all resync queues for all lines.
5058                                    ;
5059 033262  012701  005052                    MOV     #DPRSQB,R1      ;GET BASE ADDRESS OF RESYNC QUEUES TABLE.
5060 033266  012702  005252                    MOV     #DPRSQE,R2      ;GET END ADDRESS OF RESYNC QUEUES TABLE.
5061 033272  005021                    2$:     CLR     (R1)+           ;CLEAR A WORD OF THE TABLE.
5062 033274  020102                            CMP     R1,R2           ;CHECK IF POINTER AT END OF TABLE.
5063 033276  103775                            BLO     2$              ;LOOP UNTIL TABLE IS CLEAR.
5064
5065                                    ;+
5066                                    ; Wait for a character to appear in the FIFO.
5067                                    ; If no character appears within time-out period: exit routine, we're done.
5068                                    ;-
5068 033300  013701  002402            4$:     MOV     RXTOUT,R1       ;GET TIME OUT FOR SLOWEST BAUD RATE IN USE.
5069 033304  023737  002652  002272            CMP     TXDONF,ACTLNS   ;CHECK FOR TRANSMISSION DONE ON ACTIVE LINES.
5070 033312  001402                            BEQ     6$              ;SKIP ADDING 50 MS DELAY IF TX DONE ALL LINES.
5071 033314  062701  000062                    ADD     #50.,R1         ;ADD 50 MILLI SEC TO DELAY IF NOT LAST CHAR.
```

```
5072 033320  052701  170000          6$:     BIS     #170000,R1      ;INDICATE TO TEST DATA.VALID BIT.
5073 033324  013702  003062                  MOV     RXBOPT,R2       ;INDICATE TO CHECK MEMORY RECEIVE BUFFER.
5074 033330  004737  037740                  JSR     PC,WAIBIS       ;WAIT FOR RECEIVED CHAR OR TIME-OUT.
5075 033334  103073                          BCC     18$             ;EXIT ROUTINE IF TIME-OUT, WE'RE DONE.
5076
5077 033336  004737  031052                  JSR     PC,GETCHR       ;READ A CHARACTER FROM THE MEMORY BUFFER.
5078                                  ;+
5079                                  ; Check if the TX ISR is disabled.
5080                                  ; Re enable RX ISR if the space for new chars is low enough.
5081                                  ;  If the buffer can accomodate more chars then re-enable transmiss'on.
5082                                  ;-
5083 033342  005737  002656          8$:     TST     TXDBLF          ;CHECK IF TX IS DISABLED.
5084 033346  100024                          BPL     10$             ;SKIP RX/TX CHECK IF TX NOT DISABLED.
5085 033350  023727  003066  000020          CMP     RXBCNT,#RXBETX  ;COMPARE BUFFER COUNT WITH LEVEL TO ENABLE RX.
5086 033356  101020                          BHI     10$             ;SKIP ENABLE RX IF BUFFER TOO FULL.
5087 033360  004737  035600                  JSR     PC,RXIE1        ;ENABLE RECEPTION INTERRUPTS.
5088 033364  013705  002410                  MOV     TXENBM,R5       ;GET THE PRESERVED TX.ENABLE STATES.
5089 033370  023727  003066  000020          CMP     RXBCNT,#RXBETX  ;COMPARE BUFFER COUNT WITH LEVEL TO ENABLE TX.
5090 033376  101010                          BHI     10$             ;SKIP ENABLING TX IF BUFFER TOO FULL.
5091 033400  106701                          MFPS    R1              ;SAVE THE CURRENT PROCESSOR PRIORITY.
5092 033402  106427  000340                  MTPS    #PRI07          ;DISABLE INTERRUPTS.
5093 033406  004737  036446                  JSR     PC,TXENBL       ;ENABLE TRANSMISSION.
5094 033412  005037  002656                  CLR     TXDBLF          ;CLEAR THE TX DISABLE FLAG.
5095 033416  106401                          MTPS    R1              ;RE-ENABLE INTERUPTS.
5096 033420                          10$:
5097
5098 033420  005337  002646                  DEC     CHRTOT          ;DECREMENT THE TOTAL CHAR COUNTER.
5099 033424  001011                          BNE     12$             ;SKIP ERROR IF NOT TOO MANY RECEIVED.
5100 033426  010437  005466                  MOV     R4,ERRNBR       ;SET ERROR NUMBER TO INITIAL ERRNBR.
5101 033432  012701  023313                  MOV     #EM9025,R1      ;SELECT THE PROPER ERROR MESSAGE.
5102 033436  012737  024644  005472          MOV     #ER0503,ERRBLK  ;SELECT THE PROPER ERROR REPORT ROUTINE.
5103                                  ;+
5104                                  ; Report error at Initial ERRNBR.
5105                                  ; "MORE THAN TWICE THE EXPECTED NUMBER OF CHARACTERS RECEIVED."
5106                                  ;-
5107 033444                              ERROR                   ;               >>>>> ERROR <<<<<.
     033444  104460                                                                          TRAP    C$ERROR
5108 033446  000452                      BR      60$             ;EXIT THE ROUTINE, WE'RE GIVING UP.
5109                                  ;+
5110                                  ; Determine if the character is data or a status code.
5111                                  ;-
5112 033450  012700  070000          12$:    MOV     #70000,R0       ;GENERATE A BIT MAP OF CHARACTER ERROR BITS
5113 033454  040200                          BIC     R2,R0           ;  WHICH ARE NOT SET FOR THE CHARACTER.
5114 033456  001007                          BNE     14$             ;SKIP REPORTING OF ERROR CODE IF WE HAVE CHAR.
5115                                  ;+
5116                                  ; The data is either a BMP code or a Modem Status code.
5117                                  ; Report that the code was found.
5118                                  ; Errors reported with error numbers >>>>> ERRNBR+1 and ERRNBR+2 <<<<<.
5119                                  ;-
5120 033460  010437  005466                  MOV     R4,ERRNBR       ;GET THE ERROR NUMBER PASSED INTO THIS ROUTINE.
5121 033464  005237  005466                  INC     ERRNBR          ;SET ERROR NUMBER TO INITIAL ERRNBR+1.
5122 033470  004737  034350                  JSR     PC,REPCOD       ;REPORT THE BMP OR MODEM STATUS CHANGE CODE.
5123 033474  000407                          BR      16$             ;BRANCH TO GET THE NEXT CHARACTER.
5124                                  ;+
5125                                  ; The data is a valid character:
5126                                  ;    Compare the read data with the expected data.
5127                                  ;    Update expected data pointer.
```

```
                                        ;    Errors reported with error numbers >>>>> ERRNBR+3 and ERRNBR+4 <<<<<.
                                        ;-
033476  010437  005466          14$:     MOV     R4,ERRNBR       ;CALCULATE THE STARTING ERROR NUMBER FOR THE
033502  062737  000003  005466           ADD     #3,ERRNBR       ;  NEXT ROUTINE CALL (INITIAL ERRNBR+3).
033510  004737  032132                   JSR     PC,NEWCHR       ;HANDLE THE NEW DATA CHARACTER.
                                        ;+
                                        ; Done processing this character.
                                        ; Read another char from the DUT FIFO.
                                        ; If DATA.VALID is set, loop to check the received character.
                                        ; If DATA.VALID is clear loop to wait for it set or time-out.
                                        ;-
033514  004737  031052          16$:     JSR     PC,GETCHR       ;READ A CHARACTER FROM THE RX BUFFER.
033520  103710                           BCS     8$              ;IF DATA.VALID SET, GO TO CHECK THE RX CHAR.
033522  000666                           BR      4$              ;LOOP TO WAIT CHAR OR TIME-OUT IF BUFFER EMPTY.
                                        ;+
                                        ; Use dummy characters to force analysis of characters in resync queues.
                                        ;-
033524  004737  035546          18$:     JSR     PC,RXIE0        ;TURN OFF DUT RX INTERRUPTS.
033530  004737  036242                   JSR     PC,TXDONE       ;CHECK IF TX DONE, TURN OFF DUT TX INTERRUPTS.
033534  005002                           CLR     R2              ;CLEAR THE DUMMY CHARACTER.
033536  005001                           CLR     R1              ;CLEAR THE LOOP COUNTER.
033540  004737  032132          20$:     JSR     PC,NEWCHR       ;FORCE ONE RESYNC QUE CHAR TO BE ANALYZED.
033544  062702  000400                   ADD     #400,R2         ;INCREMENT THE LINE NUMBER IN THE DUMMY CHAR.
033550  005201                           INC     R1              ;INCREMENT THE LOOP COUNTER.
033552  120127  000010                   CMPB    R1,#NUMLNS      ;TEST FOR LOOP COUNTER EQUAL TO # OF DUT LINES.
033556  002770                           BLT     20$             ;LOOP IF LOOP COUNT IS NOT ALL LINES DONE.
033560  005701                           TST     R1              ;CHECK FOR SECOND TIME AROUND OUTER LOOP.
033562  100404                           BMI     60$             ;EXIT IF OUTER LOOP DONE TWICE.
033564  005002                           CLR     R2              ;CLEAR THE DUMMY CHAR FOR 2ND TIME AROUND LOOP.
033566  012701  100000                   MOV     #100000,R1      ;CLEAR LOOP COUNT, SET OUTER LOOP FLAG.
033572  000762                           BR      20$             ;LOOP THE SECOND TIME AROUND OUTER LOOP.

033574  010437  005466          60$:     MOV     R4,ERRNBR       ;RESTORE THE ERROR NUMBER TO ITS INITIAL VALUE.
033600                                   PASS                    ;RESTORE GPRS.
033600  004736                                   JSR     PC,@(SP)+       ;RETURN TO PREG05 SUBRT.
033602  000207                           RTS     PC
```

```
                                        .SBTTL  GLOBAL SUBROUTINE                       RDMAST -
                                        ;** ************************************************************************
                                        ;*              - Report DMA_START Bit Errors Routine -
                                        ;*      This subroutine checks for lines which have DMA_START bit errors
                                        ;*      during the just completed DMA transmission.  If any are found,
                                        ;*      they are reported.
                                        ;*
                                        ;* INPUTS:      ERRMSG - Address of primary error message for this routine.
                                        ;*              ERRNBR - Error number of error reported in this routine.
                                        ;*              TXINTF - Contains bit map of lines with DMA_START bit errors.
                                        ;*
                                        ;* OUTPUTS:     ERRBLK - Address of the error reporting routine (Destroyed).
                                        ;*              Messages may be printed at the operator console.
                                        ;*
                                        ;* CALLING SEQUENCE:    JSR     PC,RDMAST
                                        ;*
                                        ;* COMMENTS:    If no lines have DMA_START bit errors, no messages are printed.
                                        ;*
                                        ;* SUBORDINATE ROUTINES CALLED: ER9102.
                                        ;  ************************************************************************

033604                                  RDMAST:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
033604  004537  005474                                JSR     R5,PREGO5       ;CALL REGISTER SAVE SUBRT.
033610  013702  002420                          MOV     TXINTF,R2       ;GET COPY OF THE DMA_START ERRORS BIT MAP.
033614  001406                              BEQ     60$             ;EXIT IF NO DMA_START ERROR BITS ARE SET.
                                        ;+
                                        ; We have some DMA_START bit errors to report.
                                        ;-
033616  012737  026466  005472                  MOV     #ER9102,ERRBLK  ;SELECT THE ERROR REPORTING ROUTINE.
033624  012701  023703                          MOV     #EM9102,R1      ;INDICATE THAT WE HAVE DMA_START BIT ERROR.
                                            ;+
                                            ; Report "DMA_START BIT SET AFTER RESET OR TX.ACTION ... ON LINES(S):"
                                            ;
033630                                          ERROR                   ;               >>>>> ERROR <<<<<.
033630  104460                                                                                  TRAP    C$ERROR

033632                                  60$:    PASS                    ;RESTORE GPRS.
033632  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
033634  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.
                        ;*              LPR0 - 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.
                        ;*              TXBFC0 - 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.
                        ;-- *************************************************************************

033636                  RDPDR:: SAVE                            ;SAVE CONTENTS OF GPRS R0 THRU R5.
033636  004537  005474                      JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
033642  012737  024736  005472              MOV     #ER1601,ERRBLK  ;SET UP THE ADDRESS OF THE ERROR REPORT RTN.
                        ;+
                        ; Determine whether register data should be inverted from data pattern.
                        ;
033650  005704                      TST     R4              ;CHECK THE OPERAND TYPE INDICATOR.
033652  100001                     BPL     2$              ;BIC WRITE PERFORMED?  NO, USE STANDARD DATA.
033654  005102                      COM     R2              ;YES, INVERT THE DATA PATTERN.
                        ;+
                        ; Set up outer loop.
                        ;
033656  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.
                        ;-
```

GLOBAL SUBROUTINE RDPDR - SEQ 0139

```
5257 033660  010237  034054          4$:     MOV     R2,70$          ;SAVE THE OUTER LOOP DATA PATTERN.
5258 033664  010577  146410                  MOV     R5,@CSRA        ;SET CSR IND.ADP.REG FIELD TO THIS LINE.
5259 033670  010500                          MOV     R5,R0
5260 033672  006300                          ASL     R0
5261 033674  036037  002534  002272          BIT     BITTBL(R0),ACTLNS
5262 033702  001452                        BEQ     16$             ;IS THE LINE ACTIVE?  NO, SKIP THE LINE.
5263 033704  012703  000004                  MOV     #LPR0,R3        ;YES, INITIALIZE REGISTER OFFSET FOR LPR.
5264                                  ;+
5265                                  ;       The inner loop follows.  Each pass through this loops reads and compares
5266                                  ;       data from a device register.
5267                                  ;-
5268 033710  010204                  6$:     MOV     R2,R4           ;SAVE THE INNER LOOP DATA PATTERN.
5269 033712  046302  002320                  BIC     UNBTTB(R3),R2   ;REMOVE UNUSED BITS FROM EXPECTED DATA.
5270 033716  016300  002300                  MOV     DRADRT(R3),R0
5271 033722  005766  000010                  TST     R3SLOT(SP)      ;CHECK THE ACCESS TYPE INDICATOR.
5272 033726  001002                        BNE     8$              ;BYTE ACCESS?  YES, GO PERFORM BYTE READ.
5273 033730  011001                         MOV     (R0),R1         ;NO, PERFORM WORD READ OF DEVICE REGISTER.
5274 033732  000416                        BR      12$
5275 033734  100410                  8$:     BMI     10$             ;LOW BYTE ACCESS?  YES, GO DO LOW BYTE READ.
5276 033736  005200                         INC     R0              ;HIGH BYTE ACCESS.  FORM HIGH BYTE ADDRESS.
5277 033740  111001                         MOVB    (R0),R1         ;READ THE HI BYTE OF THE DUT REGISTER.
5278 033742  000301                         SWAB    R1              ;PUT HI BYTE BACK INTO THE HI BYTE.
5279 033744  042701  000377                 BIC     #377,R1         ;REMOVE THE UNUSED BYTE IN ACTUAL DATA.
5280 033750  042702  000377                 BIC     #377,R2         ;REMOVE THE UNUSED BYTE IN EXPECTED DATA.
5281 033754  000405                        BR      12$
5282 033756  111001                  10$:    MOVB    (R0),R1         ;READ THE LOW BYTE OF THE DUT REGISTER.
5283 033760  042701  177400                 BIC     #177400,R1      ;REMOVE THE UNUSED BYTE.
5284 033764  042702  177400                 BIC     #177400,R2      ;FORM EXPECTED LOW BYTE FOR COMAPARISON.
5285
5286 033770  046301  002320          12$:    BIC     UNBTTB(R3),R1   ;REMOVE UNUSED BITS FROM ACTUAL DATA.
5287 033774  020102                         CMP     R1,R2           ;COMPARE ACTUAL AND EXPECTED DATA.
5288 033776  001404                        BEQ     14$             ;ACTUAL = EXPECTED?  YES, SKIP ERROR.
5289 034000  004737  030236                 JSR     PC,CNTERR       ;NO, COUNT THE ERROR, CHECK FOR ERROR SUMMARY.
5290 034004  103401                        BCS     14$             ;USE ERROR SUMMARY?  YES, SKIP ERROR.
5291                                  ;No, report "BAD BIT(S) IN DEVICE xxxxx REGISTER FOR LINE nn (D)."
5292 034006                             ERROR
     034006  104460                                                                  TRAP    C$ERROR
5293 034010  010402                  14$:    MOV     R4,R2           ;RESTORE THE INNER LOOP DATA PATTERN.
5294 034012  004737  034642                 JSR     PC,ROLDAP       ;ROTATE DATA PATTERN LEFT, NOT THROUGH CARRY.
5295 034016  062703  000002                 ADD     #2,R3           ;SET REGISTER OFFSET TO THE NEXT REGISTER.
5296 034022  020327  000016                 CMP     R3,#TXBFC0      ;COMPARE REG OFFSET WITH OFFSET OF LAST REG.
5297 034026  003730                         BLE     6$              ;LOOP IF NOT ALL REG DONE FOR THIS LINE.
5298                                  ;+
5299                                  ; Back into the outer loop.  Now set up for next line.  Loop if not done.
5300                                  ;-
5301 034030  013702  034054          16$:    MOV     70$,R2          ;SET UP TO ROTATE THE DATA PATTERN.
5302 034034  004737  034642                 JSR     PC,ROLDAP       ;ROTATE THE DATA PATTERN.
5303 034040  005205                         INC     R5              ;COUNT THIS LINE
5304 034042  020527  000010                 CMP     R5,#NUMLNS      ;COMPARE LINE COUNT WITH NUMBER OF LINES.
5305 034046  002704                         BLT     4$              ;LOOP IF SOME LINES NOT DONE.
5306
5307 034050                          60$:    PASS                    ;RESTORE GPRS.
     034050  004736                                      JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
5308 034052  000207                        RTS     PC
5309
5310 034054  000000                  70$:    .WORD   0               ;STORAGE FOR DATA PATTERN OUTSIDE INNER LOOP.
```

GLOBAL SUBROUTINE - READBX - SEQ 0140

```
 5312                                   .SBTTL  GLOBAL SUBROUTINE                - READBX -
 5313                                   ;** ************************************************************************
 5314                                   ;*      - READ CHARACTERS FROM THE FIFO AND CHECKS FOR BMPS AND XONS-
 5315                                   ;*      This subroutine is used in the FIHAVL.TST.
 5316                                   ;*      It reads the specified number of characters from the fifo and checks
 5317                                   ;*      for BMP codes and XON characters.
 5318                                   ;*
 5319                                   ;* INPUTS:      R0 - Contains the number of chars to read from the fifo.
 5320                                   ;*
 5321                                   ;* OUTPUTS:     R1 - Contains address of error message to be reported
 5322                                   ;*                   Clear if no error found.
 5323                                   ;*              Carry used to indicate if fifo was found empty, carry clear.
 5324                                   ;*
 5325                                   ;* CALLING SEQUENCE:    JSR     PC,READ
 5326                                   ;*
 5327                                   ;* COMMENTS:
 5328                                   ;*
 5329                                   ;* SUBORDINATE ROUTINES CALLED: CHKBMP.
 5330                                   ;-  ************************************************************************
 5331
 5332 034056                           READBX:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
          034056  004537  005474                          JSR     R5,PREGOS       ;CALL REGISTER SAVE SUBRT.
 5333 034062  005001                            CLR     R1              ;CLEAR GPR THAT HOLDS THE ADDRESS OF ERRMSG.
 5334 034064  013703  002302                    MOV     RBUFA,R3        ;GET THE ADDRESS OF THE RECEIVER BUFFER REG.
 5335 034070  011302                    2$:     MOV     (R3),R2         ;READ A CHARACTER FROM THE FIFO.
 5336 034072  100015                           BPL     8$              ;BRANCH IF FIFO IS EMPTY.
 5337                                     ;+
 5338                                     ; Check if the read character is a BMP code.
 5339                                     ;  If it is a BMP code save it on the queue to be reported later, and
 5340                                     ;  abort the test.
 5341                                     ;
 5342 034074  004737  027256                    JSR     PC,CHKBMP       ;CHECK IF CHARACTER IS A BMP CODE.
 5343 034100  103410                            BCS     6$              ;BRANCH IF A BMP CODE WAS FOUND.
 5344 034102  120227  000021                    CMPB    R2,#21          ;CHECK IF IT IS AN XON.
 5345 034106  001003                            BNE     4$              ;BRANCH IF NOT AN XON.
 5346 034110  012701  021617                    MOV     #EM5402,R1      ;PASS THE MESSAGE TO BE REPORTED.
 5347 034114  000402                            BR      6$              ;GO EXIT TEST.
 5348 034116  005300                    4$:     DEC     R0              ;DECREMENT THE READ COUNT.
 5349 034120  001363                            BNE     2$
 5350 034122  000261                    6$:     SEC                     ;SET CARRY TO INDICATE SUCCESS.
 5351 034124  000401                            BR      60$             ;EXIT
 5352 034126  000241                    8$:     CLC                     ;CLEAR CARRY BIT TO INDICATE FAILURE.
 5353
 5354 034130                            60$:    PASS    R1              ;RESTORE GPRS,
          034130  010166  000004                                  MOV     R1,R1SLOT(SP)           ;PUT R1 IN STACK SLOT.
          034134  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREGOS SUBRT.
 5355 034136  000207                            RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - REGTST -
                        ;++ ******************************************************************************
                        ;*                              - Registers Test Subroutine -
                        ;*      Subroutine to test the Device Under Test (DUT) registers.  The used
                        ;*      bits of the registers are either all cleared or all set and then the
                        ;*      data pattern is written and verified using either word or byte
                        ;*      accesses in read/write or read/modify/write mode.
                        ;*
                        ;* INPUTS:      R3 - Byte indicator (- => low, + => high, 0 => both bytes).
                        ;*              R4 - Access mode (-1 => set then BIC, 1 => clear then BIS,
                        ;*                   (-2 => set them MOV, +2 clear then MOV).
                        ;*              ERRNBR - Set up with initial error number.
                        ;*
                        ;* OUTPUTS:     GPRS0 - GPR save area 0 is destroyed.
                        ;*              Device Under Test registers are written.
                        ;*              Error messages may be printed at the operators console.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,REGTST
                        ;*
                        ;* COMMENTS:    This routine loop 16 times writing the same data pattern
                        ;*              rotated left once each iteration.
                        ;*              This routine can report errors INITIAL ERRNBR thru INITIAL+2.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: RDPDR,ROLDAP,SWAP0,WDPDR
                        ;-- ******************************************************************************
034140                  REGTST:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
034140  004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                        ;+
                        ; Set up the GPRs for the writting of the data pattern.
                        ;-
034144  012705  000020          MOV     #16.,R5         ;SET UP LOOP COUNTER TO COUNT 16 ITERATIONS.
034150  012702  167410          MOV     #167410,R2      ;INITIALIZE THE DATA PATTERN.
034154  032704  000001          BIT     #BIT0,R4        ;TEST FOR R/W ACCESS.
034160  001001                  BNE     2$              ;R/M/W ACCESS?  YES, R4 IS ALL SET UP.
034162  005004                  CLR     R4              ;NO, INDICATE R/W ACCESS.
034164                  2$:
                        ;+
                        ; Set up the GPRs for the clearing or setting of all the used bits.
                        ;-
034164  010400          MOV     R4,R0           ;PASS OPERATION TYPE INDICATOR AROUND SWAP0.
034166  004737  036036  JSR     PC,SWAP0        ;GET ALTERNATE GPR SET IN R1 THRU R5.
034172  013701  005466  MOV     ERRNBR,R1       ;SAVE THE INITIAL ERROR NUMBER.
034176  010004          MOV     R0,R4
034200  005404          NEG     R4              ;SET UP OP TYPE FOR CLEARING OR SETTING.
034202  005002          CLR     R2              ;SET UP CLEAR WRITE PATTERN.
034204  026627  000012  000002  CMP     R4SLOT(SP),#2   ;TEST FOR CLEAR THEN MOV TEST SEQUENCE.
034212  001401          BEQ     4$              ;CLEAR THEN MOV?  YES, LEAVE WRITE PAT CLEAR.
034214  005102          COM     R2              ;NO, SET ALL BITS OF WRITE PATTERN.
034216  005003  4$:     CLR     R3              ;INDICATE THAT WORD ACCESSES SHOULD BE USED.
034220  005000          CLR     R0              ;SET ALTERNATE BYTE EXPECTED DATA PAT TO CLEAR.
034222  026627  000012  177776  CMP     R4SLOT(SP),#-2  ;TEST FOR SET THEN MOV TEST SEQUENCE.
034230  001001          BNE     6$              ;SET THEN MOV?  YES, LEAVE ALT BYTE PAT CLEAR.
034232  005100          COM     R0              ;NO, SET ALT BYTE EXPECTED DATA PAT TO ALL 1'S.
034234  004737  036036  6$:     JSR     PC,SWAP0        ;RESTORE SWAPPED GPR VALUES TO R1 THRU R5.
                        ;+
                        ; Start of data pattern loop.
```

GLOBAL SUBROUTINE - REGTST - SEQ 0142

```
                                        ;-
034240                                  8$:
                                            ;+
                                            ; Set or clear all the used bits of the device registers for all lines.
                                            ; Verify that all the bits were set or cleared correctly.
                                            ;-
034240  004737  036036                          JSR     PC,SWAPO        ;GET ALTERNATE GPRS FOR SETTING INTIAL STATES.
034244  004737  040054                          JSR     PC,WDPDR        ;GO CLEAR ALL USED REGISTER BITS, ALL LINES.
034250  010137  005466                           MOV    R1,ERRNBR       ;SET UP ERROR NUMBER TO INITIAL ERRNBR.
034254  004737  033636                          JSR     PC,RDPDR        ;VERIFY ALL USED REGISTER BITS, ALL LINES.
034260  004737  036036                          JSR     PC,SWAPO        ;RESTORE MAIN GPRS CONTENTS.
                                            ;+
                                            ; Write data patterns, all lower byte used bits, all registers, all lines.
                                            ; Verify that the data pattern was written correctly.
                                            ;-
034264  004737  040054                          JSR     PC,WDPDR        ;WRITE DATA PATTERN TO DEVICE REGISTERS.
034270  005237  005466                           INC    ERRNBR          ;SET ERROR NUMBER TO INITIAL+1.
034274  004737  033636                          JSR     PC,RDPDR        ;VERIFY DATA PATTERN IN ALTERRED BYTE(S).
034300  005703                                   TST    R3              ;CHECK THE BYTE INDICATOR.
034302  001411                                  BEQ     10$             ;WORD ACCESS?  YES, SKIP SECOND BYTE CHECK.
                                            ;+
                                            ; Check that the alternate (unmodified) byte is clear or set as expected.
                                            ;-
034304  010201                                   MOV    R2,R1           ;SAVE THE DATA PATTERN.
034306  010002                                   MOV    R0,R2           ;GET THE ALTERNATE BYTE EXPECTED DATA.
034310  005403                                   NEG    R3              ;INDICATE THAT OTHER BYTE IS TO BE CHECKED.
034312  005237  005466                           INC    ERRNBR          ;SET ERROR NUMBER TO INITIAL+2.
034316  004737  033636                          JSR     PC,RDPDR        ;VERIFY DATA PATS IN OTHER BYTES OF REGISTERS.
034322  005403                                   NEG    R3              ;RESTORE BYTE INDICATOR.
034324  010102                                   MOV    R1,R2           ;RESTORE DATA PATTERN.
                                            ;+
                                            ; Pepare the next data pattern and loop if not done.
                                            ;-
034326  004737  034642          10$:            JSR     PC,ROLDAP       ;ROTATE DATA PATTERN LEFT, NOT THROUGH CARRY.
034332  005305                                   DEC    R5              ;COUNT THIS ITERATION OF THE LOOP.
034334  003341                                  BGT     8$              ;ALL PATTERNS DONE?  NO, LOOP.
                                                                        ;YES. RESTORE ERROR NUMBER AND EXIT.
034336  013737  002634  005466  60$:            MOV     GPRS08,ERRNBR   ;GET THE ERROR NUMBR FROM GPR SWAP STORAGE.
034344                                          PASS                    ;RESTORE GPRS.
        034344  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
034346  000207                                  RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE                - REPCOD -
                        ;++ ************************************************************************
                        ;*              - Routine to Report Error Code From DUT -
                        ;*      This routine reports an error code which has been read from the DUT
                        ;*      FIFO.  The code is checked to determine whether it is a Selftest code
                        ;*      an Modem Status Change code or a BMP code.  This routine assumes that
                        ;*      the code indicates an error.  If a BMP code is found it is not reported
                        ;*      immediately, but is saved on the BMP code queue to be reported later.
                        ;*
                        ;* INPUTS:      R2 - Contains the error code complete with flags and line #.
                        ;*              ERRTBL - ERRTYP,ERRNBR,and ERRMSG set up correctly.
                        ;*
                        ;* OUTPUTS:     ERRBLK - Value may be destroyed.
                        ;*              BMPCQP - Maybe updated if a BMP code is added to the queue.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,REPCOD
                        ;*
                        ;* COMMENTS:    ERRNBR is restored to its entering value by this routine.
                        ;*              This routine reports errors with numbers ERRNBR thru ERRNBR+1.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: ER9001,SAVBMP.
                        ;-- ************************************************************************
034350                  REPCOD:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
034350  004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
034354  012737  025330  005472          MOV     #ER9001,ERRBLK  ;SELECT THE ERROR REPORTING ROUTINE.
034362  013703  005466                  MOV     ERRNBR,R3       ;PRESERVE THE ERROR NUMBER.
034366  010204                          MOV     R2,R4           ;EXTRACT THE LINE NUMBER FIELD
034370  000304                          SWAB    R4              ;  FROM THE ERROR CODE WHICH WAS
034372  042704  177760                  BIC     #177760,R4      ;  PASSED INTO THIS ROUTINE.
                        ;+
                        ; Determine the type of code which is to be reported.
                        ;-
0343 6  012701  022355                  MOV     #EM9003,R1      ;SELECT MODEM STATUS CODE MESSAGE.
034402  032702  000001                  BIT     #BIT0,R2        ;TEST THE MODEM STATUS INDICATION BIT.
034406  001422                          BEQ     4$              ;GOTO REPORT ERROR IF MODEM STATUS CODE.
034410  005237  005466                  INC     ERRNBR          ;SELECT THE SELFTEST CODE ERROR NUMBER.
034414  012701  022377                  MOV     #EM9004,R1      ;SELECT SELFTEST CODE MESSAGE.
034420  012700  000300                  MOV     #300,R0         ;CHECK IF SELF-TEST OR BMP CODE.
034424  040200                          BIC     R2,R0           ;TRY TO CLEAR BMP BITS.
034426  001003                          BNE     2$              ;GO CHECK FOR SELFTEST CODE IF NOT BMP.
034430  004737  035624                  JSR     PC,SAVBMP       ;SAVE THE BMP CODE ON THE QUEUE.
034434  000420                          BR      60$             ;EXIT THIS ROUTINE.
034436  122702  000201          2$:     CMPB    #201,R2         ;CHECK FOR SELF TEST NULL CODE.
034442  001413                          BEQ     6$              ;EXIT ROUTINE IF NULL CODE FOUND.
034444  122702  000203                  CMPB    #203,R2         ;CHECK FOR SKIP SELF TEST CODE.
034450  001410                          BEQ     6$              ;EXIT ROUTINE IF SKIP SELF TEST CODE FOUND.
034452  000400                          BR      4$              ;GO REPORT SELF TEST ERROR.
                        ;+
                        ; Report "UNEXPECTED xxxxx CODE FOUND IN RECEIVE CHAR FIFO."
                        ;-
034454  042702  177400          4$:     BIC     #177400,R2      ;REMOVE UPPER BYTE OF CODE TO BE REPORTED.
034460  004737  037074                  JSR     PC,TXROFF       ;TURN OFF TX AND RX DURING ERROR REPORTING.
034464                                  ERROR                   ;               >>>>> ERROR <<<<<.
034464  104460                                                                          TRAP    C$ERROR
034466  004737  037130                  JSR     PC,TXRON        ;TURN TX AND RX BACK ON.
                        ;+
                        ; Restore the initial error number.
```

GLOBAL SUBROUTINE - REPCOD - SEQ 0144

```
5509                                        ;-
5510 034472  010337  005466                60$:    MOV     R3,ERRNBR
5511
5512 034476                                60$:    PASS                    ;RESTORE GPRS.
     034476  004736                                JSR     PC,@(SP)+       ;RETURN TO PREGO5 SUBRT.
5513 034500  000207                                RTS     PC
```

```
                                .SBTTL  GLOBAL SUBROUTINE                REPSMR -
                                ;** ************************************************************************
                                ;*                      - Report Error Summary Routine -
                                ;*      This subroutine reports an error summary for those lines which have
                                ;*      exceeded the number of individual errors to report for a single line
                                ;*      in a single test.  This parameter can be specified by the operator if
                                ;*      he/she answers the Software Parameter Questions.
                                ;*
                                ;* INPUTS:      ERCNTB - Label at base of line error counters table.
                                ;*              ERRMSG - Address of primary error message.
                                ;*              ERRNBR - Error number of errors in this routine.
                                ;*              ERSMRF - "Report error summary for line" flags.
                                ;*
                                ;* OUTPUTS:     ERRBLK - Address of error reporting routine (Destroyed).
                                ;*              Summary messages may be printed at the operator console.
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,REPSMR
                                ;*
                                ;* COMMENTS:    If no lines have exceeded the maximum number of individual
                                ;*              errors to report, no messages are printed by this routine.
                                ;*              Error summaries in this routine are reported as errors.
                                ;*              The contents of ERRBLK are destroyed.
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED:
                                ;   ************************************************************************

034502                          REPSMR:: SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
034502  004537  005474                          JSR     R5,PREGOS       ;CALL REGISTER SAVE SUBRT.
034506  005737  002650                  TST     ERSMRF          ;CHECK THE "PRINT LINE ERROR SUMMARY" FLAGS.
034512  001404                          BEQ     60$             ;EXIT WITHOUT ACTION IF NO SUMMARY FLAGS SET.
                                ;*
                                ; We have some error summaries to report.
                                ;-
034514  012737  025750  005472          MOV     #ER9004,ERRBLK  ;SELECT ERROR REPORTING ROUTINE.
                                ;*
                                ; Report
                                ;    "ERROR SUMMARY REPORT FOR LINES WITH EXCESSIVE NUMBERS OF ERRORS:"
                                ;
034522                              ERROR
034522  104460                                                                TRAP    C$ERROR

034524                          60$:    PASS                     ;RESTORE GPRS.
034524  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREGOS SUBRT.
034526  000207                          RTS     PC
```

GLOBAL SUBROUTINE - RESETT - SEQ 0146

```
5557                                    .SBTTL  GLOBAL SUBROUTINE                RESETT -
5558                                    ;*****************************************************************************
5559                                    ;*              - Reset Device Under Test -
5560                                    ;*      This subroutine is used to reset the DUT to a known state.
5561                                    ;*      If reset does not succesfully complete, ie. time-out occurs, then
5562                                    ;*      an abort test error message is reported.
5563                                    ;*
5564                                    ;* INPUTS:      CSRA   Contains the address of the CSR
5565                                    ;*              TXBFCA - Contains address of DUT DMA Buffer Count register.
5566                                    ;*              ERRTBL  ERRTYP,ERNBR,and ERRMSG set up correctly.
5567                                    ;*
5568                                    ;* OUTPUTS:     The DUT performs its reset function into a known state.
5569                                    ;*              CARRY - Clear indicates the test is to be aborted.
5570                                    ;*              ERRBLK - value may be destroyed.
5571                                    ;*              IESTAT - TX and RX interrupt flags are cleared.
5572                                    ;*              TX and RX interrupt enable bits in the DUT's CSR are cleared.
5573                                    ;*
5574                                    ;* CALLING SEQUENCE:    JSR     PC,RESETT
5575                                    ;*
5576                                    ;* COMMENTS:    This subroutine can report errors with numbers initial ERRNBR
5577                                    ;*              This routine does not destroy the value of ERRNBR.
5578                                    ;*
5579                                    ;* SUBORDINATE ROUTINES CALLED: DELAY,MSLGET.
5580                                    ;*****************************************************************************
5581
5582 034530                            RESETT:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
     034530  004537  005474                            JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
5583 034534  012702  000040                    MOV     #BIT05,R2               ;SET BIT MASK OF MASTER RESET BIT.
5584                                    ;+
5585                                    ; Test the state of the master reset bit in the CSR.
5586                                    ;  If MR is set then wait for self-test to complete.
5587                                    ;   If time out occurs, report the error and pass-out abort test indicator.
5588                                    ;-
5589 034540  013704  002300                    MOV     CSRA,R4                 ;GET THE ADDRESS OF THE DUT'S CSR.
5590 034544  030214                            BIT     R2,(R4)                 ;CHECK STATE OF MASTER RESET BIT.
5591 034546  001406                            BEQ     2$                      ;DON'T DELAY IF MR IS ALREADY CLEAR.
5592 034550  005003                            CLR     R3                      ;SET UP DESIRED STATE OF MASTER RESET BIT.
5593 034552  012701  004704                    MOV     #2500.,R1               ;PASS TIME OUT VALUE OF 2.5 SECONDS.
5594 034556  004737  031726                    JSR     PC,MSLGET               ;WAIT FOR SELF-TEST TO COMPLETE, MR CLEAR.
5595 034562  103012                            BCC     4$                      ;GO REPORT ERROR IF TIMEOUT OCCURRED.
5596
5597                                    ;+
5598                                    ; Set Master Reset bit in CSR.  Clear TX and RX enable bits, etc.
5599                                    ;  Skip the selftest.
5600                                    ;  Time-out of 2.5 secs, just in case the self-test executes.
5601                                    ;-
5602 034564  010277  145510            2$:     MOV     R2,@CSRA                ;SET MASTER RESET BIT, DISABLE TX AND RX INTS.
5603 034570  004737  035740                    JSR     PC,SKPSTS               ;TRY TO SKIP THE SELFTEST.
5604                                      ;+
5605                                      ;   Set Self-test time-out of 2.5 seconds, and wait for M.R to clear.
5606                                      ;   If Time out occurs, then report the fatal error and pass-out the abort
5607                                      ;   test indicator.
5608                                      ;-
5609 034574  005003                            CLR     R3                      ;SET UP DESIRED STATE OF MASTER RESET BIT.
5610 034576  012701  004704                    MOV     #2500.,R1               ;PASS TIME-OUT VALUE OF 2.5 SECONDS.
5611 034602  004737  031726                    JSR     PC,MSLGET               ;WAIT FOR SELF-TEST TO COMPLETE, MR CLEAR.
5612 034606  103410                            BCS     6$                      ;SKIP ERROR REPORT IF MR CLEARED IN TIME
```

GLOBAL SUBROUTINE - RESETT SEQ 0147

```
                                        ;+
                                        ; Set up error message to report 'fatal error found during reset,test aborted .
                                        ; Indicate test is to be aborted by clearing the carry bit.
                                        ;-
034610  012701  015226          4$:     MOV     #EM1601,R1      ;PASS ERROR MESSAGE TO REPORT.
034614  012737  025034  005472          MOV     #ER1603,ERRBLK ;PASS ADDRESS OF ERROR HANDLING ROUTINE.
                                        ;REPORT ERROR "TIME-OUT OCCURRED WAITING FOR MASTER RESET TO CLEAR"
                                        ; "TEST ABORTED"
034622                                  ERROR                   ;               >>>>> ERROR <<<<<
034622  104460                                                                          TRAP    C$ERROR
034624  000241                          CLC                     ;INDICATE TEST IS TO BE ABORTED.
034626  000403                          BR      60$             ;EXIT THIS SUBROUTINE, ABORT TEST INDICATOR.
                                        ;+
                                        ; Clear TX and RX Interrupt enable status flags in IESTAT.
                                        ; Exit with continue test indicator set (ie,carry set).
                                        ;-
034630  005037  002374          6$:      CLR    IESTAT          ;CLEAR TX AND RX INTERRUPT STATUS FLAGS.
034634  000261                           SEC                    ;INDICATE SUCCESS, CONTINUE TEST.

034636                          60$:    PASS                    ;RESTORE GPRS, PASS THE FOLLOWING INTACT:
034636  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
                                                                ;CARRY BIT:IF CLEAR,INDICATES ABORT TEST.
034640  000207                          RT      PC
```

```
                                .SBTTL  GLOBAL SUBROUTINE                - ROLDAP -
                                ;*************************************************************************
                                ;*      - ROtate Left DAta Pattern
                                ;*      This routine rotates the passed input data pattern left,without going
                                ;*      through the carry.The carry is initially set or cleared depending
                                ;*      upon the state of the MSB of the data pattern,before a ROL instruction
                                ;*      is executed.
                                ;*
                                ;* INPUTS:      R2 - Contains the data pattern to be rotated
                                ;*
                                ;* OUTPUTS:     R2   Contains the rotated data pattern
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,ROLDAP
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: NONE
                                ;*************************************************************************

034642                          ROLDAP::SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
034642  004537  005474                        JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
034646  010202                  MOV     R2,R2           ;SET PROCESSOR STATUS CODES
034650  005702                  TST     R2              ;CHECK MSB
034652  100402                  BMI     2$              ;BRANCH IF SET
034654  000241                  CLC                     ;CLEAR CARRY BIT IF MSB CLEAR
034656  000401                  BR      4$              ;
034660  000261          2$:     SEC                     ;SET CARRY IF MSB SET
034662  006102          4$:     ROL     R2              ;ROTATE DATA PATTERN LEFT
034664                  60$:    PASS    R2              ;RESTORE GPRS,EXCEPT
034664  010266  000006                        MOV     R2,R2SLOT(SP)           ;PUT R2 IN STACK SLOT.
034670  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                         ;R2 - CONTAINS THE ROTATED DATA PATTERN
034672  000207                  RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE                       RRXNDN -
                        ;** ************************************************************************
                        ;*                  Report Reception Not Completed Routine -
                        ;*      This subroutine checks for lines which did not receive the complete
                        ;*      data pattern.  If any are found, they are reported.
                        ;*
                        ;* INPUTS:      R5 - Local active lines bit map.
                        ;*              DPLENB - Base of table of data pattern lengths.
                        ;*              ERRMSG - Address of primary error message for this routine.
                        ;*              ERRNBR - Error number of error reported in this routine.
                        ;*              RXCNTB - Label at base of the RX character counters table.
                        ;*              RXDONF - Reception done flags.
                        ;*
                        ;* OUTPUTS:     ERRBLK - Address of the error reporting routine (Destroyed).
                        ;*              Messages may be printed at the operator console.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,RRXNDN
                        ;*
                        ;* COMMENTS:    If no lines failed to complete their reception, no messages
                        ;*              are printed.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: ER9005.
                        ;-  ************************************************************************

034674                  RRXNDN:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
034674  004537  005474                 JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
034700  010502          MOV     R5,R2           ;GET COPY OF THE LOCAL ACTIVE LINES BIT MAP.
034702  043702  002654  BIC     RXDONF,R2       ;GET MAP OF ACTIVE LINES WITH RX DONE FLAG CLR.
034706  001410          BEQ     60$             ;EXIT IF NO ACTIVE LINES HAVE RX DONE FLAG CLR.
                        ;+
                        ; We have some "RX not completed" errors to report.
                        ;-
034710  012737  026052  005472          MOV     #ER9005,ERRBLK  ;SELECT THE ERROR REPORTING ROUTINE.
034716  012701  023043          MOV     #EM9016,R1      ;INDICATE THAT WE ARE DEALING WITH RECEPTION.
034722  012704  003712          MOV     #RXCNTB,R4      ;PASS BASE OF RX CHAR COUNTERS TABLE TO ER9005.
                            ;+
                            ; Report "SINGLE CHARACTER MODE TEST ERROR:"
                            ;     "DATA PATTERN NOT COMPLETELY RECEIVED ON ALL LINES:"
                            ;       ...
                            ;-
034726                          ERROR
034726  104460                                                                    TRAP    C$ERROR

034730                  60$:    PASS                            ;RESTORE GPRS.
034730  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
034732  000207          RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - RSTRPT -
                        ;** ************************************************************************
                        ;*                      - Report any Reset Errors Routine
                        ;*      This routine determines if any error codes are among the diagnostic
                        ;*      codes reported placed in the DUT received character FIFO by the
                        ;*      Self-test.  If any non BMP error codes are found, or if other errors
                        ;*      are encountered, appropriate errors are reported.  Any BMP codes that
                        ;*      are found, are placed on the BMP code queue to be reported later.
                        ;*      This routine also purges the DUT FIFO looking for any characters
                        ;*      or modem status codes.  If any are found, errors are reported.
                        ;*
                        ;* INPUTS:      ERRMSG - Address of the primary error message.
                        ;*              ERRNBR - Error number of first error reported by this rouitne.
                        ;*              NUMLNS - Equated to the number of line on the DUT.
                        ;*              RBUFA - Contains address of the DUT receiver FIFO.
                        ;*
                        ;* OUTPUTS:     CARRY - Success flag (set if FIFO cleared successfully).
                        ;*              ERRBLK - Address of the error report routine (Destroyed).
                        ;*              Error messages can be printed at the operators console.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,RSTRPT
                        ;*
                        ;* COMMENTS:    This subroutine can report errors with numbers Initial ERRNBR
                        ;*              thru Initial ERRNBR+4.
                        ;*              This routine does not destroy the value of ERRNBR.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: ER0503,ER9007,ER9008,SAVBMP.
                        ;-- ************************************************************************

034734                  RSTRPT:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
034734  004537  005474                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                        ;+
                        ; Read correct number (number of line on DUT) of chars from the FIFO.
                        ; Verify that each char is a selftest success code.
                        ;-
034740  005003                  CLR     R3              ;CLEAR THE CODE COUNTER.
034742  013705  005466          MOV     ERRNBR,R5       ;SAVE ERRNBR FOR RESTORATION LATER.
034746  017702  145330  2$:     MOV     @RBUFA,R2       ;READ A CHAR FROM THE DUT FIFO.
034752  100412                  BMI     4$              ;SKIP ERROR IF DATA.VALID SET FOR CHAR.
                            ;+
                            ; We expect a selftest code, but this FIFO slot is empty.
                            ;-
034754  010537  005466              MOV     R5,ERRNBR       ;RESTORE ERROR NUMBER TO INTITIAL VALUE.
034760  012701  023163              MOV     #EM9018,R1      ;PASS ERROR MESSAGE INFO TO ER9007 ROUTINE.
034764  012737  026300  005472      MOV     #ER9007,ERRBLK  ;SELECT PROPER ERROR REPORT ROUTINE.
                            ;+
                            ; Report error with number Initial ERRNRB.
                            ;    "NO SELFTEST CODE IN SELFTEST CODE FIFO SLOT FOR LINE nn AFTER RESET."
                            ;-
034772                          ERROR                   ;               >>>>> ERROR <<<<<.
034772  104460                                                                  TRAP    C$ERROR
                            ;+
                            ; Inidicate "success" (because FIFO is purged), and exit this routine.
                            ;-
034774  000261                  SEC                     ;SET SUCCESS FLAG.
034776  000545                  BR      60$             ;EXIT ROUTINE.
                            ;+
```

```
 5767                                   ; Determine if this is not a selftest code.
 5768                                   ;
 5769 035000  012700  070001      4$:      MOV     #70001,R0       ;GENERATE BIT MAP OF ANY CLEAR ERROR BITS OR
 5770 035004  040200                       BIC     R2,R0           ;  BIT 0 WHICH ARE CLEAR.
 5771 035006  001033                      BNE     8$              ;GO TO REPORT ERROR IF THIS IS NOT A TEST CODE.
 5772                                   ;+
 5773                                   ; We have a test code (either BMP or selftest code).
 5774                                   ; Determine what type of code we have.
 5775                                   ;
 5776 035010  032702  000200               BIT     #BIT7,R2        ;TEST ROM VERSION CODE INDICATOR BIT.
 5777 035014  001443                      BEQ     10$             ;SKIP ERRORS IF SELFTEST ROM VERSION CODE.
 5778 035016  120227  000203               CMPB    R2,#203         ;CHECK IF SKIP SELF TEST CODE.
 5779 035022  001440                      BEQ     10$             ;SKIP ERROR REPORT IF SKIP SELF TEST CODE FOUND
 5780 035024  120227  000201               CMPB    R2,#201         ;CHECK IF NULL CODE PRESENT.
 5781 035030  001435                      BEQ     10$             ;SKIP ERROR REPORT IF SELF TEST NULL CODE.
 5782 035032  012700  000300               MOV     #300,R0         ;TEST CODE TYPE BITS FOR BOTH CODE
 5783 035036  040200                       BIC     R2,R0           ;  TYPE BITS SET (INDICATING BMP CODE).
 5784 035040  001003                      BNE     6$              ;IF IT IS NOT A BMP CODE GO REPORT ERROR.
 5785 035042  004737  035624               JSR     PC,SAVBMP       ;SAVE THE BMP CODE ON THE QUEUE.
 5786 035046  000426                      BR      10$             ;GO GET THE NEXT CHARACTER FROM THE FIFO.
 5787                                   ;+
 5788                                   ; We have a selftest error code.
 5789                                   ;-
 5790 035050  010537  005466      6$:      MOV     R5,ERRNBR       ;RESTORE ERROR NUMBER TO INITIAL VALUE.
 5791 035054  005237  005466               INC     ERRNBR          ;CALCULATE INITIAL ERROR NUMBER PLUS 1.
 5792 035060  012701  023210               MOV     #EM9020,R1      ;PASS ERROR MESSAGE INFO TO ER9008 ROUTINE.
 5793 035064  012737  026356  005472       MOV     #ER9008,ERRBLK  ;SELECT PROPER ERROR REPORT ROUTINE.
 5794                                   ;+
 5795                                   ; Report error with number Initial ERRNRB + 1.
 5796                                   ;    "UNEXPECTED SELFTEST ERROR CODE FOR LINE nn IN FIFO AFTER RESET:"
 5797                                   ;-
 5798 035072                               ERROR                   ;               >>>>> ERROR <<<<<.
      035072  104460                                                                   TRAP    C$ERROR
 5799 035074  000413                      BR      10$             ;GO TO END OF LOOP.
 5800                                   ;+
 5801                                   ; We have a non-selftest code (either BMP code or data char).
 5802                                   ;
 5803 035076  010537  005466      8$:      MOV     R5,ERRNBR       ;RESTORE ERROR NUMBER TO INTITIAL VALUE.
 5804 035102  062737  000002  005466       ADD     #2,ERRNBR       ;CALCULATE INITIAL ERROR NUMBER PLUS 2.
 5805 035110  012701  023173               MOV     #EM9019,R1      ;PASS ERROR MESSAGE INFO TO ER9007 ROUTINE.
 5806 035114  012737  026300  005472       MOV     #ER9007,ERRBLK  ;SELECT PROPER ERROR REPORT ROUTINE.
 5807                                   ;+
 5808                                   ; Report error with number Initial ERRNRB + 2.
 5809                                   ;    "NON-SELFTEST CODE IN SELFTEST CODE FIFO SLOT FOR LINE nn AFTER RESET."
 5810                                   ;
 5811 035122                               ERROR                   ;               >>>>> ERROR <<<<<.
      035122  104460                                                                   TRAP    C$ERROR
 5812                                   ;+
 5813                                   ; End of loop, loop if not all chars have been read from the FIFO.
 5814                                   ;
 5815 035124  005203      10$:     INC     R3              ;SET CODE COUNTER FOR NEXT ITERATION OF LOOP.
 5816 035126  020327  000010               CMP     R3,#NUMLNS      ;TEST FOR ALL CODES READ.
 5817 035132  002705                      BLT     2$              ;LOOP IF NOT CHARS READ FROM FIFO.
 5818                                   ;+
 5819                                   ; Purge the FIFO until DATA.VALID is clear or until too many chars are read.
 5820                                   ;-
 5821 035134  012704  000022               MOV     #18.,R4         ;INITIALIZE THE CHARACTER COUNTER.
```

GLOBAL SUBROUTINE - RSTRPT - SEQ 0152

```
 5822 035140  010537  005466                    MOV     R5,ERRNBR       ;GET INITIAL VALUE OF THE ERROR NUMBER.
 5823 035144  062737  000003  005466            ADD     #3,ERRNBR       ;CALCULATE ERROR NUMBER OF NEXT ERROR.
 5824 035152  012737  026356  005472            MOV     #ER9008,ERRBLK  ;SELECT PROPER ERROR REPORT ROUTINE.
 5825 035160  017702  145116          12$:      MOV     @RBUFA,R2       ;READ A CHARACTER FROM THE DUT FIFO.
 5826 035164  000261                            SEC                     ;INDICATE SUCCESS IN CASE DATA.VALID IS CLEAR.
 5827 035166  100051                          BPL     60$               ;EXIT ROUTINE WITH SUCCESS IF DATA.VALID CLEAR.
 5828                                    ;+
 5829                                    ; We have a character.
 5830                                    ; Determine if character is a data character.
 5831                                    ;-
 5832 035170  012700  070000                    MOV     #70000,R0       ;TEST BITS 12 THRU 14 OF THE
 5833 035174  040200                            BIC     R2,R0           ;  CODE READ FROM THE DUT FIFO.
 5834 035176  001403                          BEQ     14$               ;SKIP THIS ERROR IF CODE IS NOT A DATA CHAR.
 5835                                    ;+
 5836                                    ; We have an unexpected data character: set up and go to report error.
 5837                                    ;
 5838 035200  012701  023234                    MOV     #EM9022,R1      ;SELECT ERROR MSG INFO FOR ER0808 ROUTINE.
 5839 035204  000423                          BR      22$               ;GO TO REPORT THIS ERROR.
 5840                                    ;+
 5841                                    ; We have an unexpected code.
 5842                                    ; Determine if the code is a modem status code.
 5843                                    ;-
 5844 035206  032702  000001          14$:      BIT     #BIT0,R2        ;TEST MODEM STATUS INDICATOR BIT OF CODE.
 5845 035212  001003                          BNE     16$               ;SKIP THIS ERROR IF NOT MODEM STATUS CODE.
 5846                                    ;+
 5847                                    ; We have a modem status code: set up and go to report error.
 5848                                    ;-
 5849 035214  012701  023253                    MOV     #EM9023,R1      ;SELECT ERROR MSG INFO FOR ER0808 ROUTINE.
 5850 035220  000415                          BR      22$               ;GO TO REPORT THIS ERROR.
 5851                                    ;+
 5852                                    ; We have an onboard test code.
 5853                                    ; Determine if this code is a BMP code.
 5854                                    ;
 5855 035222  032702  000200          16$:      BIT     #BIT7,R2        ;TEST THE ROM VERSION BIT OF THE CODE.
 5856 035226  001404                          BEQ     18$               ;GOTO SET UP FOR SELFTEST CODE IF ROM VERSION.
 5857 035230  012700  000300                    MOV     #300,R0
 5858 035234  040200                            BIC     R2,R0           ;TEST THE ERROR TYPE BITS OF THE CODE.
 5859 035236  001403                          BEQ     20$               ;SKIP THIS ERROR IF BMP CODE.
 5860                                    ;+
 5861                                    ; We have a selftest code: set up and go to report error.
 5862                                    ;-
 5863 035240  012701  023275          18$:      MOV     #EM9024,R1      ;SELECT ERROR MSG INFO FOR ER0808 ROUTINE.
 5864 035244  000403                          BR      22$               ;GO TO REPORT THIS ERROR.
 5865                                    ;+
 5866                                    ; We have a BMP code: save it on the queue.
 5867                                    ;-
 5868 035246  004737  035624          20$:    JSR     PC,SAVBMP         ;SAVE THE BMP CODE ON THE QUEUE.
 5869 035252  000401                          BR      24$               ;
 5870                                    ;+
 5871                                    ; Report the error with error number of Initial ERRNBR + 3.
 5872                                    ;    "UNEXPECTED xxx xxxx FOR LINE nn IN FIFO AFTER RESET:"
 5873                                    ;-
 5874 035254                          22$:    ERROR                   ;               >>>>> ERROR <<<<<.
      035254  104460                                                                      TRAP    C$ERROR
 5875                                    ;+
 5876                                    ; End of loop.
 5877                                    ; Count the character we just received, and check for too many received.
```

GLOBAL SUBROUTINE - RSTRPT - SEQ 0153

```
                                        ;
                                24$:    DEC     R4              ;COUNT THIS CHARACTER.
                                        BNE     12$             ;LOOP IF NOT TOO MANY CHARACTERS PURGED.
                                ;+
                                ; We read too many valid characters while trying to purge the FIFO.
                                ; Report error and exit without success.
                                ;    "FIFO WILL NOT PURGE (DATA.VALID STUCK SET), REMAINDER OF TEST SKIPPED."
                                ;-
                                        MOV     #EM9017,R1      ;SELECT PROPER ERROR MESSAGE.
                                        MOV     R5,ERRNBR       ;GET INITIAL ERROR NUMBER.
                                        ADD     #4,ERRNBR       ;CALCULATE INITIAL ERRNBR + 4.
                                        MOV     #ER0503,ERRBLK  ;SELECT PROPER ERROR REPORT ROUTINE.
                                       ;PRINT ERROR REPORT.
                                       ERROR                    ;               >>>>> ERROR <<<<<.
035306  104460                                                                    TRAP    C$ERROR
                                        CLC                     ;CLEAR THE SUCCESS FLAG.

                                60$:    PASS                    ;RESTORE GPRS,
035312  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                        RTS     PC              ; CARRY - SUCCESS FLAG (SET IF FIFO IS PURGED).
```

```
                        .SBTTL  GLOBAL SUBROUTINE                RTXNDN -
                        ;++ ************************************************************************
                        ;*              - Report Transmission Not Completed Routine -
                        ;*      This subroutine checks for lines which did not transmit the complete
                        ;*      data pattern.  If any are found, they are reported.
                        ;*
                        ;* INPUTS:      R5 - Local active lines bit map.
                        ;*              DPLENB - Label at base of data pattern length table.
                        ;*              ERRMSG - Address of primary error message for this routine.
                        ;*              ERRNBR - Error number of error reported in this routine.
                        ;*              TXCNTB - Label at base of the TX character counters table.
                        ;*              TXDONF - Transmission done flags.
                        ;*
                        ;* OUTPUTS:     ERRBLK - Address of the error reporting routine (Destroyed).
                        ;*              Messages may be printed at the operator console.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,RTXNDN
                        ;*
                        ;* COMMENTS:    If no lines failed to complete their transmission, no messages
                        ;*              are printed.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: ER9005.
                        ;-- ************************************************************************

035316                  RTXNDN:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
035316  004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
035322  010502                  MOV     R5,R2                   ;GET COPY OF THE LOCAL ACTIVE LINES BIT MAP.
035324  043702  002652          BIC     TXDONF,R2               ;GET MAP OF ACTIVE LINES WITH TX DONE FLAG CLR.
035330  001410                  BEQ     60$                     ;EXIT IF NO ACTIVE LINES HAVE TX DONE FLAG CLR.
                        ;+
                        ; We have some "TX not completed" errors to report.
                        ;-
035332  012737  026052  005472          MOV     #ER9005,ERRBLK  ;SELECT THE ERROR REPORTING ROUTINE.
035340  012701  023027                  MOV     #EM9015,R1      ;INDICATE WE ARE DEALING WITH TRANSMISSION.
035344  012704  003652                  MOV     #TXCNTB,R4      ;PASS BASE OF TX CHAR COUNTERS TO TABLE ER0805.

                            ;+
                            ; Report "SINGLE CHARACTER MODE TEST ERROR:"
                            ;    "DATA PATTERN NOT COMPLETELY TRANSMITTED ON ALL LINES:"
                            ;      ...
                            ;-
035350                          ERROR                   ;               >>>>> ERROR <<<<<.
035350  104460                                                                  TRAP    C$ERROR

035352                  60$:    PASS                    ;RESTORE GPRS.
035352  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
035354  000207                  RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - RXDSBL -
                        ;** ************************************************************************
                        ;*                      - Disable Receivers -
                        ;*      This subroutine is used to disable reception on selected lines by,
                        ;*      clearing the associated RX_ENABLE bit on the DUT.
                        ;*
                        ;* INPUTS:      R5 - Bit's set correspond to lines on which to clear RX_ENABLE.
                        ;*              CSRA - Contains the address of the DUT CSR.
                        ;*              IESTAT - Contains the state of TXIE and RXIE bits in the CSR.
                        ;*              NUMLNS - Equated to be the maximum number of lines available.
                        ;*              LNCTRA - Contains the address of the LNCTRL register.
                        ;*
                        ;* OUTPUTS:     R5 - Bit's set indicate initial states of all RX_ENBLE bits.
                        ;*              LNCTRA - The state of the RX_ENBLE bit may be altered.
                        ;*              The contents of the IND_ADD_REG field in the CSR are destroyed.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,RXDSBL
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                        ;-- ************************************************************************

035356                  RXDSBL:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
035356  004537  005474                  JSR     R5,PREGOS       ;CALL REGISTER SAVE SUBRT.
035362  010500          MOV     R5,R0           ;COPY BIT MAP OF LINES TO DISABLE RECEPTION.
035364  012701  000001  MOV     #BIT0,R1        ;INITIALIZE THE SELECTED LINE BIT MASK.
035370  013702  002310  MOV     LNCTRA,R2       ;GET THE ADDRESS OF THE LNCTRL REGISTER.
035374  012703  000010  MOV     #NUMLNS,R3      ;GET MAXIMUM LINE NUMBER PLUS ONE.
035400  013704  002374  MOV     IESTAT,R4       ;GET THE STATES OF THE INT ENABLE BITS.
035404  005005          CLR     R5              ;LOG POSSIBLE RX DISABLED ON ALL LINES.
                        ;+
                        ; Select every line in turn, and log the state of each RX_ENABLE bit.
                        ;-
035406  010477  144666  2$:     MOV     R4,@CSRA        ;WRITE TO DUT CSR TO SELECT LINE REGISTERS.
035412  032712  000004          BIT     #BIT2,(R2)      ;CHECK STATE OF RX_ENABLE BIT ON SELECTED LINE.
035416  001401          BEQ     4$              ;SKIP NEXT INSTRUCTION IF RX_ENABLE CLEAR.
035420  050105          BIS     R1,R5           ;LOG RX ENABLE BIT SET FOR SELECTED LINE.
                        ;+
                        ;  Clear RX_ENBLE on lines that have a corresponding bit set in the rx disable
                        ;  line bit map.
                        ;-
035422  030100          4$:     BIT     R1,R0           ;CHECK STATE OF DISABLE LINE BIT MAP.
035424  001402          BEQ     6$              ;BRANCH IF THIS LINE TO REMAIN UNALTERED.
035426  042712  000004          BIC     #BIT2,(R2)      ;CLEAR RX_ENABLE BIT ON SELECTED LINE.
035432  005204          6$:     INC     R4              ;PREPARE TO SELECT REGISTERS FOR NEXT LINE.
035434  006301          ASL     R1              ;SHIFT BIT MAP FOR NEXT LINE.
035436  005303          DEC     R3              ;DECREMENT LINE NUMBER.
035440  001362          BNE     2$              ;LOOP TO CHECK NEXT LINE.

035442                  60$:    PASS    R5                      ;RESTORE GPRS,EXCEPT
035442  010566  000014                          MOV     R5,R5SLOT(SP)           ;PUT R5 IN STACK SLOT.
035446  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREGOS SUBRT.
                                                                ;R5 - PREVIOUS STATES OF ALL RX_ENABLE BITS.
035450  000207          RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - RXENBL -
                        ;** ************************************************************************
                        ;*                      - Enable Receiver -
                        ;*      This subroutine is used to enable reception on selected lines by
                        ;*      setting the associated RX.ENABLE bit on the DUT.
                        ;*
                        ;* INPUTS:      R5 - Bit's set correspond to lines on which to set RX.ENABLE.
                        ;*              CSRA - Contains the address of the DUT CSR.
                        ;*              IESTAT - Contains the state of TXIE and RXIE bits in the CSR.
                        ;*              NUMLNS - Equated to be the maximum number of lines available.
                        ;*              LNCTRA - Contains the address of the LNCTRL register.
                        ;*
                        ;* OUTPUTS:     R5 - Bit's set indicate previously disabled lines.
                        ;*              LNCTRA - The state of the RX.ENABLE bit may be altered.
                        ;*              The contents of the IND.ADD.REG field in the CSR are destroyed.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,RXENBL
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                        ;-- ************************************************************************

035452                  RXENBL:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
035452  004537  005474                 JSR     R5,PREGOS       ;CALL REGISTER SAVE SUBRT.
035456  010500          MOV     R5,R0           ;COPY BIT MAP OF LINES TO ENABLE.
035460  012701  000001  MOV     #BIT0,R1        ;INITIALIZE THE SELECTED LINE BIT MASK.
035464  013702  002310  MOV     LNCTRA,R2       ;GET THE ADDRESS OF THE LNCTRL REGISTER.
035470  012703  000010  MOV     #NUMLNS,R3      ;GET MAXIMUM LINE NUMBER.
035474  013704  002374  MOV     IESTAT,R4       ;GET THE STATES OF THE INT ENABLE BITS.
035500  005005          CLR     R5              ;CLEAR RX.ENABLE BIT LOG OF DISABLED LINES.
                        ;*
                        ; Select every line in turn,and log any RX.ENBLE bit that is clear.
                        ;-
035502  010477  144572  2$:     MOV     R4,@CSRA        ;WRITE TO DUT CSR TO SELECT LINE REGISTERS.
035506  032712  000004          BIT     #BIT2,(R2)      ;CHECK STATE OF RX.ENABLE BIT ON SELECTED LINE.
035512  001001          BNE     4$              ;SKIP NEXT INSTRUCTION IF RX.ENABLE SET.
035514  050105          BIS     R1,R5           ;LOG RX ENABLE BIT CLEAR FOR SELECTED LINE.
                        ;*
                        ;  Set RX.ENBLE on lines that have a corresponding bit set in the rx enable
                        ;  line bit map.
                        ;-
035516  030100          4$:     BIT     R1,R0           ;CHECK STATE OF RX.ENABLE LINE BIT MAP.
035520  001402          BEQ     6$              ;BRANCH IF THIS LINE TO REMAIN UNALTERED.
035522  052712  000004          BIS     #BIT2,(R2)      ;ENABLE RECEPTIONON SELECTED LINE.
035526  005204          6$:     INC     R4              ;PREPARE TO SELECT REGISTERS FOR NEXT LINE.
035530  006301          ASL     R1              ;SHIFT BIT MAP FOR NEXT LINE.
035532  005303          DEC     R3              ;DECREMENT LINE NUMBER.
035534  001362          BNE     2$              ;LOOP TO CHECK NEXT LINE.

035536                  60$:    PASS    R5                      ;RESTORE GPRS,EXCEPT
035536  010566  000014                          MOV     R5,R5SLOT(SP)           ;PUT R5 IN STACK SLOT.
035542  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREGOS SUBRT.
                                                ;R5 - LINE BIT MAP CORRESPONDING TO THE
                                                ; PREVIOUS LINES THAT WERE DISABLED.
035544  000207          RTS     PC
```

```
 6050                                        .SBTTL  GLOBAL SUBROUTINE                    RXIE0
 6051                                        ;** ************************************************************************
 6052                                        ;*                        - RECEIVER INTERRUPT DISABLE -
 6053                                        ;*      This routine is used to disable receiver interrupts in the DHV11.
 6054                                        ;*
 6055                                        ;* INPUTS:       NONE.
 6056                                        ;*
 6057                                        ;* OUTPUTS:      The RX.INT.ENBL bit is cleared in the DUT CSR.
 6058                                        ;*               IESTST -contains the updated status of the TX and RX interrupt
 6059                                        ;*               enable bits.
 6060                                        ;*
 6061                                        ;* CALLING SEQUENCE:    JSR     PC,RXIE0
 6062                                        ;*
 6063                                        ;* COMMENTS:     The contents of the indirect address register field in
 6064                                        ;*               the DUT CSR are destroyed.
 6065                                        ;*
 6066                                        ;* SUBORDINATE ROUTINES CALLED: NONE.
 6067                                        ;-- ************************************************************************
 6068 035546  010046                        RXIE0::  MOV     R0,-(SP)          ;SAVE CONTENTS OF R0 ON THE STACK.
 6069 035550  106746                                 MFPS    -(SP)             ;SAVE PROCESSOR PRIORITY ON STACK.
 6070 035552  106427  000340                         MTPS    @PRI07            ;IGNORE ANY INTERRUPT THAT MAY BE GENERATED.
 6071 035556  042737  137777  002374                BIC     @137777,IESTAT    ;CLEAR RX.INT.ENBL BIT IN IESTAT.
 6072 035564  013777  002374  144506                MOV     IESTAT,@CSRA      ;DISABLE RX INTERRUPTS.
 6073 035572  106426                                 MTPS    (SP)+             ;ENABLE INTERRUPTS TO THE PROCESSOR AGAIN.
 6074 035574  012600                                 MOV     (SP)+,R0          ;RESTORE R0.
 6075 035576  000207                                RTS     PC
```

```
 6077                                   .SBTTL  GLOBAL SUBROUTINE                - RXIE1 -
 6078                                   ;** ************************************************************************
 6079                                   ;*                          RECEIVER INTERRUPT ENABLE -
 6080                                   ;*      This routine is used to enable receiver interrupts in the DHV11.
 6081                                   ;*
 6082                                   ;* INPUTS:       NONE.
 6083                                   ;*
 6084                                   ;* OUTPUTS:      The RX.INT.ENBL bit is set in the DUT CSR.
 6085                                   ;*               IESTST -contains the updated status of the TX and RX interrupt
 6086                                   ;*               enable bits.
 6087                                   ;*
 6088                                   ;* CALLING SEQUENCE:    JSR     PC,RXIE1
 6089                                   ;*
 6090                                   ;* COMMENTS:     The contents of the indirect address register field in
 6091                                   ;*               the DUT CSR are destroyed.
 6092                                   ;*
 6093                                   ;* SUBORDINATE ROUTINES CALLED: NONE.
 6094                                   ;-- ************************************************************************
 6095
 6096 035600  052737  000100  002374  RXIE1::  BIS     #BIT06,IESTAT   ;SET RX.INT.ENBL BIT IN IESTAT.
 6097 035606  042737  137677  002374          BIC     #137677,IESTAT  ;CLEAR ALL OTHER BITS, EXCEPT TX AND RX I.E.
 6098 035614  013777  002374  144456          MOV     IESTAT,@CSRA    ;ENABLE RX INTERRUPTS.
 6099 035622  000207                         RTS     PC
```

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

6124 035624             SAVBMP:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
     035624  004537  005474                     JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
6125 035630  013704  002660             MOV     BMPCQP,R4       ;GET THE POINTER TO THE NEXT LOCATION IN QUEUE.
6126 035634  113724  002364             MOVB    TSTNUM,(R4)+    ;SAVE THE CURRENT TEST NUMBER ON THE QUEUE.
6127 035640  005204                     INC     R4              ;INCREMENT THE POINTER TO GIVE AN EVEN ADDRESS.
6128 035642  042702  177400             BIC     #177400,R2      ;CLEAR THE UNWANTED BITS FROM THE BMP CODE.
6129 035646  010224                     MOV     R2,(R4)+        ;SAVE THE BMP CODE ON THE QUEUE.
6130 035650  020427  003062             CMP     R4,#BMPCQE      ;CHECK IF OVERFLOW WILL OCCUR THE NEXT TIME.
6131 035654  103402                    BLO     2$              ;GO SAVE THE POINTER IF WE WILL NOT OVERFLOW.
6132 035656  162704  000004             SUB     #4,R4           ;RESET THE POINTER TO THE LAST LOCATION IN QUE.
6133 035662  010437  002660     2$:     MOV     R4,BMPCQP       ;SAVE THE POINTER.
6134
6135 035666             60$:    PASS                            ;RESTORE GPRS.
     035666  004736                             JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
6136 035670  000207                     RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE                - SETPAR -
                        ;** ************************************************************************
                        ;*                        SET TX AND CONTROL PARAMETERS -
                        ;*      This suroutine is used in the FIHAVL.TST.
                        ;*      It initialises the selected line to the following state:
                        ;*      Internal loopback, IAUTO enabled, LPR:38.4k, 8 bits/char, 2 stop,
                        ;*      odd par'ty.
                        ;*
                        ;* _NPUTS:      R1 - Contains number of the l'ne to be initialised.
                        ;*
                        ;* OUTPUTS:     LNCTRL and LPR registers for the selected line are destroyed.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,SETPAR
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: DELAY,WTWLNC,WTWLPR.
                        ;   ************************************************************************

6157 035672             SETPAR:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
     035672  004537  005474                     JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
6158 035676  004737  031646            JSR     PC,LINBIT       ;GET A BIT MAP FOR THIS LINE.
6159 035702  010005                     MOV     R0,R5           ;COPY THE LINE BIT MAP.
6160 035704  012700  000206            MOV     #206,R0         ;PASS INTERNAL LOPBCK, ENABLE RX AND IAUTO.
6161 035710  004737  040250            JSR     PC,WTWLNC       ;INITILAISE THE LINE CONTROL REGISTER.
6162 035714  012700  177670            MOV     #177670,R0      ;PASS THE LPR CONTENTS.
6163 035720  004737  040324            JSR     PC,WTWLPR       ;SET THE LPR CONTENTS TO 38.4K BAUD.
6164 035724  012704  000012            MOV     #10.,R4         ;PASS DELAY TIME OF 10 MILLI SECONDS.
6165 035730  004737  030370            JSR     PC,DELAY        ;WAIT FOR LNCTRL AND LPR REGS TO BE UPDATED.
6166
6167 035734             60$:    PASS                    ;RESTORE GPRS.
     035734  004736                             JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
6168 035736  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.
                        ;   ************************************************************************

035740                  SKPSTS:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
035740  004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
035744  012704  000012          MOV     #10.,R4         ;PASS DELAY VALUE OF 10 MILLI-SECONDS.
035750  004737  030370         JSR     PC,DELAY        ;DELAY FOR 10 MILLI-SECONDS.
                        ;+
                        ; Write skip self-test code (52525) to all the indexed DUT Registers.
                        ;-
035754  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 DHV11-M.
035760  012703  052525          MOV     #52525,R3       ;INITIALISE THE SKIP SELF-TEST CODE.
035764  005301          4$:     DEC     R1              ;SELECT THE NEXT SET OF DEVICE REGISTERS.
035766  013704  002300          MOV     CSRA,R4         ;GET THE ADDRESS OF THE CSR OF THE DUT.
035772  010124          MOV     R1,(R4)+        ;SELECT A BANK OF DUT REGISTERS.
035774  010324          6$:     MOV     R3,(R4)+        ;WRITE THE CODE TO A DUT REGISTER.
035776  020437  002316          CMP     R4,TXBFCA       ;COMPARE POINTER WITH LAST REGISTER ADDRESS.
036002  103774         BLO     6$              ;LOOP IF NOT ALL REGS DONE IN THIS BANK.
036004  032701  000017          BIT     #17,R1          ;TEST FOR IND.ADR.REG FIELD DECREMENTED TO 0.
036010  001365         BNE     4$              ;LOOP UNTIL ALL REGISTERS CONTAIN THE CODE.

036012                  60$:    PASS                    ;RESTORE GPRS.
036012  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
036014  000207         RTS     PC
```

```
 6212                                   .SBTTL  GLOBAL SUBROUTINE       - STPSW -
 6213                                   ;++ ************************************************************************
 6214                                   ;*                      - SET PROCESSOR STATUS WORD -
 6215                                   ;*              THIS ROUTINE SETS THE PSW TO THE CONTENTS OF R1.
 6216                                   ;*
 6217                                   ;*      INPUTS:         R1 - CONTAINS THE NEW PSW SETTINGS
 6218                                   ;*
 6219                                   ;*      OUTPUTS:        PSW - SET TO THE CONTENTS OF R1
 6220                                   ;*
 6221                                   ;*      CALLING SEQUENCE:       JSR     PC,STPSW
 6222                                   ;*
 6223                                   ;*      COMMENTS:       USED IN THE DMA ADDRESS TEST TO SET THE PROCESSOR
 6224                                   ;*                      PRIORITY WITHOUT MAKING A CALL TO THE DRS.
 6225                                   ;*
 6226                                   ;*      SUBROUTINES CALLED:     NONE.
 6227                                   ;************************************************************************
 6228
 6229 036016                           STPSW:: SAVE
      036016  004537  005474                           JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
 6230 036022  010146                            MOV     R1,-(SP)        ;PUSH THE NEW PSW CONTENTS ONTO THE STACK
 6231 036024  012746  036032                    MOV     @ADDR, (SP)     ;PUSH THE NEW PC VALUE ONTO THE STACK
 6232 036030  000002                           RTI                     ;LOAD THE NEW PC AND PSW
 6233 036032                           ADDR:   PASS                    ;
      036032  004736                           JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
 6234 036034  000207                           RTS     PC              ;RETURN
 6235
 6236
 6237
 6238
```

```
                                .SBTTL  GLOBAL SUBROUTINE                - SWAPO -
                                ;++ ************************************************************************************
                                ;*                        - 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,SWAPO
                                ;*
                                ;* COMMENTS:    The state of the CARRY flag is not alterred by this routine.
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: None.
                                ;-- ************************************************************************************

036036  010046                  SWAPO::  MOV     R0,-(SP)        ;SAVE THE CONTENTS OF R0.
                                ;+
                                ; Load the stack from the GPRs.
                                ;-
036040  010146                          MOV     R1,-(SP)        ;SAVE THE CONTENTS OF R1.
036042  010246                          MOV     R2,-(SP)        ;SAVE THE CONTENTS OF R2.
036044  010346                          MOV     R3,-(SP)        ;SAVE THE CONTENTS OF R3.
036046  010446                          MOV     R4,-(SP)        ;SAVE THE CONTENTS OF R4.
036050  010546                          MOV     R5,-(SP)        ;SAVE THE CONTENTS OF R5.
                                ;+
                                ; Load the GPRs from the GPR save area 0.
                                ;-
036052  012700  002634                  MOV     #GPRS0B,R0      ;GET THE BASE ADDRESS OF GPR SAVE AREA 0.
036056  012001                          MOV     (R0)+,R1        ;LOAD R1 WITH GPR SAVE AREA 0 WORD 1.
036060  012002                          MOV     (R0)+,R2        ;LOAD R1 WITH GPR SAVE AREA 0 WORD 2.
036062  012003                          MOV     (R0)+,R3        ;LOAD R1 WITH GPR SAVE AREA 0 WORD 3.
036064  012004                          MOV     (R0)+,R4        ;LOAD R1 WITH GPR SAVE AREA 0 WORD 4.
036066  012005                          MOV     (R0)+,R5        ;LOAD R1 WITH GPR SAVE AREA 0 WORD 5.
                                ;+
                                ; Load the GPR save area 0 from the stack.
                                ;-
036070  012640                          MOV     (SP)+,-(R0)     ;LOAD GPR SAVE AREA 0 WORD 5 WITH SAVED R5.
036072  012640                          MOV     (SP)+,-(R0)     ;LOAD GPR SAVE AREA 0 WORD 4 WITH SAVED R4.
036074  012640                          MOV     (SP)+,-(R0)     ;LOAD GPR SAVE AREA 0 WORD 3 WITH SAVED R3.
036076  012640                          MOV     (SP)+,-(R0)     ;LOAD GPR SAVE AREA 0 WORD 2 WITH SAVED R2.
036100  012640                          MOV     (SP)+,-(R0)     ;LOAD GPR SAVE AREA 0 WORD 1 WITH SAVED R1.

036102  012600                          MOV     (SP)+,R0        ;RESTORE THE INITIAL VALUE OF R0.

036104  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 's 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.
                                ;-- ************************************************************************

036106                          TSABRT:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
036106  004537  005474                         JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
036112  012701  036130                 MOV     #2$,R1                  ;PASS ADDRESS OF FIRST MESSAGE TO BE REPORTED.
036116  012737  025034  005472         MOV     #ER1603,ERRBLK          ;SET-UP THE ERROR REPORTING ROUTINE.
036124                                ERROR                           ;               >>>>> ERROR <<<<<.
036124  104460                                                                            TRAP    C$ERROR
036126  000432                        BR      60$                     ;
036130    040     116     117   2$:   .ASCIZ / NON-RELATED TEST ERROR FOUND DURING TEST EXECUTION/
036133    116     055     122
036136    105     114     101
036141    124     105     104
036144    040     124     105
036147    123     124     040
036152    105     122     122
036155    117     122     040
036160    106     117     125
036163    116     104     040
036166    104     125     122
036171    111     116     107
036174    040     124     105
036177    123     124     040
036202    105     130     105
036205    103     125     124
036210    111     117     116
036213    000

                                .EVEN
036214                  60$:    PASS                    ;RESTORE GPRS.
036214  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
036216  000207                  RTS     PC
```

```
 6325                                   .SBTTL  GLOBAL SUBROUTINE               - TXDATP -
 6326                                   ;++ ************************************************************************
 6327                                   ;*                        - TRANSMIT DATA PATTERN -
 6328                                   ;*      This subroutine is used in the FIHAVL.TST.
 6329                                   ;*      It transmits a specified number of data bytes on the specified line.
 6330                                   ;*
 6331                                   ;* INPUTS:      R0 - Contains the number of data bytes to TX.
 6332                                   ;*              R1 - Contains line numb on which transmission is to take place.
 6333                                   ;*              BUFBAS to BUFMID contains a 256 byte data pattern.
 6334                                   ;*
 6335                                   ;* OUTPUTS:     Data is sent out on the specified line.
 6336                                   ;*              Carry set = TX successful.
 6337                                   ;*
 6338                                   ;* CALLING SEQUENCE:    TXDATP
 6339                                   ;*
 6340                                   ;* COMMENTS:
 6341                                   ;*
 6342                                   ;* SUBORDINATE ROUTINES CALLED: DODMA.
 6343                                   ;-- ************************************************************************
 6344
 6345 036220                           TXDATP:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
          036220  004537  005474                      JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
 6346 036224  010003                           MOV     R0,R3           ;PASS THE NUMBER OF CHARS TO TX.
 6347 036226  012702  004012               MOV     @BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
 6348 036232  004737  030624               JSR     PC,DODMA        ;TRANSMIT THE DATA PATTERN.
 6349 036236                           60$:    PASS                    ;RESTORE GPRS.
          036236  004736                      JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
 6350 036240  000207                           RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - TXDONE -
                        ;++ ******************************************************************************
                        ;*                      - TRANSMISSION DONE -
                        ;*      This subroutine is used in the transmission/reception tests to allow
                        ;*      time for transmission to complete on outstanding lines.
                        ;*
                        ;* INPUTS:      ACTLNS - Contains bit map of all active lines.
                        ;*              TXDONF - TX done flags, set for lines that have sent all chars.
                        ;*              CHCNT - Table contaning the number of chars to be TX'd.
                        ;*
                        ;*
                        ;* OUTPUTS:     Transmission interrupts are disabled.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,TXDONE
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: MSLOOP,MUL16U.
                        ;-- ******************************************************************************

036242                  TXDONE:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
036242  004537  005474          JSR     R5,PREGOS       ;CALL REGISTER SAVE SUBRT.
                        ;+
                        ; Check if all active lines have completed transmission.
                        ;  If any have not yet completed, determine the tx char count for a
                        ;  line that has outstanding characters to transmit.  Using this value,
                        ;  calculate the time-out value needed at the currently selected baud rate.
                        ;-
036246  013703  002272          MOV     ACTLNS,R3       ;GET THE ACTIVE LINE BIT MAP.
036252  013702  002652          MOV     TXDONF,R2       ;GET THE BIT MAP OF LINES THAT HAVE COMPLETED.
036256  040203                  BIC     R2,R3           ;GENERATE A BIT MAP OF LINES THAT ARE STILL TX.
036260  005703                  TST     R3              ;CHECK IF ALL LINES HAVE COMPLETED TX.
036262  001427                  BEQ     6$              ;GO DISABLE TX INTERRUPTS IF ALL DONE.
                        ;+
                        ; Find a line that has not completed transmission.
                        ; Obtain the expected character count for that line (which is the same for
                        ; all other lines with outstanding tx's).
                        ; Calculate time-out value.
                        ;-
036264  005004                  CLR     R4              ;CLEAR LINE NUMBER COUNTER.
036266  012702  000001          MOV     #1,R2           ;SELECT BIT MAP FOR THE FIRST LINE.
036272  030203          2$:     BIT     R2,R3           ;SEE IF THIS LINE HAS COMPLETED.
036274  001003                  BNE     4$              ;BRANCH IF THIS LINE HAS NOT COMPLETED TX.
036276  006102                  ROL     R2              ;SHIFT THE LINE BIT MAP FOR THE NEXT LINE.
036300  005204                  INC     R4              ;INCREMENT THE LINE NUMBER COUNTER.
036302  000773                  BR      2$              ;LOOP TO CHECK THE NEXT LINE.
036304  006304          4$:     ASL     R4              ;LINE NUMBER X 2 TO OBTAIN OFFSET INTO TABLE.
036306  016401  003612          MOV     CHCNTB(R4),R1   ;GET THE EXPECTED NUMBER OF CHARS TO BE TX'D.
036312  013702  002402          MOV     RXTOUT,R2       ;GET THE CURRENT TIME-OUT VALUE FOR ONE CHAR.
036316  004737  032056          JSR     PC,MUL16U       ;(NUMBER OF CHARS TO TX) X (TIME-OUT OF 1 CHAR)
036322  006301                  ASL     R1              ;MULTIPLY DELAY TIME BY 2 TO GIVE A SAFE VALUE.
                        ;+
                        ; Wait for all oustanding transmissions to complete or time out.
                        ; Disable all transmission interrupts.
                        ;-
036324  013702  002272          MOV     ACTLNS,R2       ;PASS A BIT MAP OF THE BITS TO TEST.
036330  010203                  MOV     R2,R3           ;PASS THE EXPECTED STATE OF THE TXDONF.
```

GLOBAL SUBROUTINE - TXDONE - SEQ 0167

```
6408 036332  012704  002652                MOV     #TXDONF,R4      ;PASS THE ADDRESS OF THE WORD TO TEST.
6409 036336  004737  032042                JSR     PC,MSLOOP       ;WAIT FOR TIME-OUT OF TX COMPLETION.
6410 036342  004737  036542        6$:     JSR     PC,TXIE0        ;DISABLE ALL TX INTERRUPTS.
6411
6412 036346                        60$:    PASS                    ;RESTORE GPRS.
     036346  004736                                JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
6413 036350  000207                RTS     PC
```

GLOBAL SUBROUTINE - TXDONE -

```
                        .SBTTL  GLOBAL SUBROUTINE               - TXDSBL -
                        ;++ ************************************************************************
                        ;*                      - Transmitter Disable -
                        ;*      This subroutine is used to disable transmission on selected lines by,
                        ;*      clearing the associated TX.ENABLE bit on the DUT.
                        ;*
                        ;* INPUTS:      R5 - Bit's set correspond to lines on which to clear TX.ENABLE.
                        ;*              CSRA - Contains the address of the DUT CSR.
                        ;*              IESTAT - Contains the state of TXIE and RXIE bits in the CSR.
                        ;*              NUMLNS - Equated to be the maximum number of lines available.
                        ;*              TXAD2A - Contains the address of the TBUFFAD2 register.
                        ;*
                        ;* OUTPUTS:     R5 - Bit's set indicate the initial states of all TX.ENBLE bits.
                        ;*              TBUFFAD2 - The state of the TX.ENBLE bit may be altered.
                        ;*              The contents of the IND.ADD.REG field in the CSR are destroyed.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,TXDSBL
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                        ;-- ************************************************************************

036352                  TXDSBL:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
036352  004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
036356  010500          MOV     R5,R0           ;COPY BIT MAP OF LINES TO DISABLE TRANSMISSION.
036360  012701  000001  MOV     #BIT0,R1        ;INITIALIZE THE SELECTED LINE BIT MASK.
036364  013702  002314  MOV     TXAD2A,R2       ;GET THE ADDRESS OF THE TBUFFAD2 REGISTER.
036370  005202          INC     R2              ;GET THE ADDRESS OF THE MSBYTE OF TBUFFAD2 REG.
036372  012703  000010  MOV     #NUMLNS,R3      ;GET MAXIMUM LINE NUMBER PLUS ONE.
036376  013704  002374  MOV     IESTAT,R4       ;GET THE STATES OF THE INT ENABLE BITS.
036402  005005          CLR     R5              ;LOG POSSIBLE TX DISABLED ON ALL LINES.
                        ;+
                        ; Select every line in turn, and log the state of each TX.ENABLE bit.
                        ;-
036404  010477  143670  2$:     MOV     R4,@CSRA        ;WRITE TO DUT CSR TO SELECT LINE REGISTERS.
036410  105712          TSTB    (R2)            ;CHECK STATE OF TX.ENABLE BIT ON SELECTED LINE.
036412  100001          BPL     4$              ;SKIP NEXT INSTRUCTION IF TX.ENABLE CLEAR.
036414  050105          BIS     R1,R5           ;LOG TX ENABLE BIT SET FOR SELECTED LINE.
                        ;+
                        ;  Clear TX.ENBLE on lines that have a corresponding bit set in the tx disable
                        ;  line bit map.
                        ;-
036416  030100          4$:     BIT     R1,R0           ;CHECK STATE OF DISABLE LINE BIT MAP.
036420  001402          BEQ     6$              ;BRANCH IF THIS LINE TO REMAIN UNALTERED.
036422  142712  000200  BICB    #BIT7,(R2)      ;CLEAR TX.ENABLE BIT ON SELECTED LINE.
036426  005204          6$:     INC     R4              ;PREPARE TO SELECT REGISTERS FOR NEXT LINE.
036430  006301          ASL     R1              ;SHIFT BIT MAP FOR NEXT LINE.
036432  005303          DEC     R3              ;DECREMENT LINE NUMBER.
036434  001363          BNE     2$              ;LOOP TO CHECK NEXT LINE.

036436                  60$:    PASS    R5              ;RESTORE GPRS,EXCEPT
036436  010566  000014                          MOV     R5,R5SLOT(SP)           ;PUT R5 IN STACK
036442  004736                              JSR     PC,@(SP)+               ;RETURN TO PREGC
                                                        ;R5 - PREVIOUS STATES OF ALL TX.ENABLE BITS.
036444  000207          RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE                - TXENBL -
                        ;++ ************************************************************************
                        ;*                        - Transmitter Enable -
                        ;*      This subroutine is used to enable transmission on selected lines by
                        ;*      setting the associated TX.ENABLE bit on the DUT.
                        ;*
                        ;* INPUTS:      R5 - Bit's set correspond to lines on which to set TX.ENABLE.
                        ;*              CSRA - Contains the address of the DUT CSR.
                        ;*              IESTAT - Contains the state of TXIE and RXIE bits in the CSR.
                        ;*              NUMLNS - Equated to be the maximum number of lines available.
                        ;*              TXAD2A - Contains the address of the TBUFFAD2 register.
                        ;*
                        ;* OUTPUTS:     R5 - Bit's set indicate previously disabled lines.
                        ;*              TBUFFAD2 - The state of the TX.ENBLE bit may be altered.
                        ;*              The contents of the IND.ADD.REG field in the CSR are destroyed.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,TXENBL
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                        ;-- ************************************************************************

036446                  TXENBL:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
036446  004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
036452  010500          MOV     R5,R0           ;COPY BIT MAP OF LINES TO ENABLE.
036454  012701  000001  MOV     #BIT0,R1        ;INITIALIZE THE SELECTED LINE BIT MASK.
036460  013702  002314  MOV     TXAD2A,R2       ;GET THE ADDRESS OF THE TBUFFAD2 REGISTER.
036464  005202          INC     R2              ;GET THE ADDRESS OF THE MSBYTE OF TBUFFAD2 REG.
036466  012703  000010  MOV     #NUMLNS,R3      ;GET MAXIMUM LINE NUMBER.
036472  013704  002374  MOV     IESTAT,R4       ;GET THE STATES OF THE INT ENABLE BITS.
036476  005005          CLR     R5              ;CLEAR TX.ENABLE BIT LOG OF DISABLED LINES.
                        ;+
                        ; Select every line in turn,and log any TX.ENBLE bit that is clear.
                        ;-
036500  010477  143574  2$:     MOV     R4,@CSRA        ;WRITE TO DUT CSR TO SELECT LINE REGISTERS.
036504  105712          TSTB    (R2)            ;CHECK STATE OF TX.ENABLE BIT ON SELECTED LINE.
036506  100401          BMI     4$              ;SKIP NEXT INSTRUCTION IF TX.ENABLE SET.
036510  050105          BIS     R1,R5           ;LOG TX ENABLE BIT CLEAR FOR SELECTED LINE.
                        ;+
                        ;  Set TX.ENBLE on lines that have a corresponding bit set in the tx enable
                        ;  line bit map.
                        ;-
036512  030100          4$:     BIT     R1,R0           ;CHECK STATE OF TX.ENABLE LINE BIT MAP.
036514  001402          BEQ     6$              ;BRANCH IF THIS LINE TO REMAIN UNALTERED.
036516  152712  000200  BISB    #BIT7,(R2)      ;ENABLE TRANSMISSION ON SELECTED LINE.
036522  005204          6$:     INC     R4              ;PREPARE TO SELECT REGISTERS FOR NEXT LINE.
036524  006301          ASL     R1              ;SHIFT BIT MAP FOR NEXT LINE.
036526  005303          DEC     R3              ;DECREMENT LINE NUMBER.
036530  001363          BNE     2$              ;LOOP TO CHECK NEXT LINE.

036532                  60$:    PASS    R5              ;RESTORE GPRS,EXCEPT
036532  010566  000014                          MOV     R5,R5SLOT(SP)           ;PUT R5 IN STACK SLOT.
036536  004736                              JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                                        ;R5 - LINE BIT MAP CORRESPONDING TO THE
                                                        ; PREVIOUS LINES THAT WERE DISABLED.
036540  000207          RTS     PC
```

```
                                        .SBTTL  GLOBAL SUBROUTINE               - TXIE0 -
                                        ;** ************************************************************************
                                        ;*                        - TRANSMITTER INTERRUPT DISABLE -
                                        ;*      This routine is used to disable transmitter interrupts in the DHV11.
                                        ;*
                                        ;* INPUTS:      NONE.
                                        ;*
                                        ;* OUTPUTS:     The TX.INT.ENBL bit is cleared in the DUT CSR.
                                        ;*              IESTST -contains the updated status of the TX and RX interrupt
                                        ;*              enable bits.
                                        ;*
                                        ;* CALLING SEQUENCE:    JSR     PC,TXIE0
                                        ;*
                                        ;* COMMENTS:    The contents of the indirect address register field in
                                        ;*              the DUT CSR are destroyed.
                                        ;*
                                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                                        ;-- ************************************************************************
036542  010046                  TXIE0:: MOV     R0,-(SP)        ;SAVE CONTENTS OF R0 ON THE STACK.
036544  106746                          MFPS    -(SP)           ;SAVE CURRENT PROCESSOR PRIORITY ON THE STACK.
036546  106427  000340                  MTPS    #PRI07          ;IGNORE ANY INTERRUPTS THAT MAY BE GENERATED.
036552  042737  177677  002374          BIC     #177677,IESTAT  ;CLEAR TX.INT.ENBL BIT IN IESTAT.
036560  013777  002374  143512          MOV     IESTAT,@CSRA    ;DISABLE TX INTERRUPTS.
036566  106426                          MTPS    (SP)+           ;ENABLE INTERRUPTS TO THE PROCESSOR AGAIN.
036570  012600                          MOV     (SP)+,R0        ;RESTORE R0.
036572  000207                          RTS     PC
```

```
                                .SBTTL  GLOBAL SUBROUTINE               - TXIE1 -
                                ;** ************************************************************************
                                ;*                      - TRANSMITTER INTERRUPT ENABLE -
                                ;*      This routine is used to enable transmitter interrupts in the DHV11.
                                ;*
                                ;* INPUTS:      NONE.
                                ;*
                                ;* OUTPUTS:     The TX.INT.ENBL bit is set in the DUT CSR.
                                ;*              IESTST -contains the updated status of the TX and RX interrupt
                                ;*              enable bits.
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,TXIE1
                                ;*
                                ;* COMMENTS:    The contents of the indirect address register field in
                                ;*              the DUT CSR are destroyed.
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: NONE.
                                ;-- ************************************************************************

036574  052737  040000  002374  TXIE1::  BIS     #BIT14,IESTAT   ;SET TX.INT.ENBL BIT IN IESTAT.
036602  042737  137677  002374           BIC     #137677,IESTAT  ;CLEAR ALL BITS EXCEPT TX RX I.E BITS.
036610  013777  002374  143462           MOV     IESTAT,@CSRA    ;DISAB_E TX INTERRUPTS.
036616  000207                          RTS     PC
```

```
6576                    .SBTTL  GLOBAL SUBROUTINE               - TXRINI -
6577                    ;** ************************************************************************
6578                    ;*              - Transmit and Receive Initialization Routine -
6579                    ;*      This subroutine performs the initialization of the various pointers,
6580                    ;*      counters, and flags which are used during the transmission and
6581                    ;*      reception portion of a test.  This initialization is performed on
6582                    ;*      the specified lines only, other line variables remain unchanged.
6583                    ;*
6584                    ;* INPUTS:      CHCNTB - Label at base of line character count table.
6585                    ;*              CHRTOT - Max # of chars to RX on lines already initialized.
6586                    ;*              DPENDB - Label at base of line data pattern end table.
6587                    ;*              DPLENB - Label at base of line data pattern length table.
6588                    ;*              EXCNTB - Label at base address of extra char counters table.
6589                    ;*              IESTAT - Present state of the RX.IE and TX.IE bits.
6590                    ;*              NUMLNS - Equated to number of lines on the DUT.
6591                    ;*              RXCNTB - Label at base address of RX character counters table.
6592                    ;*              RXPTRB - Lable at base adr of "next RX char" pointers table.
6593                    ;*              TXCNTB - Label at base address of TX character counters table.
6594                    ;*              TXPTRB - Label at base adr of "next TX char" pointers table.
6595                    ;*              CBB - Label at base of TX/RX control block.
6596                    ;*              CB Contents   TX/RX control block contains the following:
6597                    ;*                  CBLPRA - DUT LPR contents.
6598                    ;*                  CBLNCA - DUT LNCTRL contents.
6599                    ;*                  CBDPAA - Address of beginning of data pattern.
6600                    ;*                  CBDPLA - Length in bytes of data pattern.
6601                    ;*                  CBDPNA - Number of data patterns to transmit.
6602                    ;*                  CBMAPA - Bit map of lines to be initialized.
6603                    ;*                  CBLPBA - Type of loopback to be used for test.
6604                    ;*                  CBOFSA - Amount to offset each TX start in the data pat.
6605                    ;*              TXRXLB - Label at base of TX/RX line association table.
6606                    ;*
6607                    ;* OUTPUTS:     CHCNT - Table of number of line TX characters (Initialized).
6608                    ;*              CHRTOT   Maximum number of chars to receive (2 * pat length).
6609                    ;*              DPEND - Table of data pattern ends (Initialized).
6610                    ;*              DPLEN - Table of data pattern lengths (Initialized).
6611                    ;*              DUT LNCTRL - Line control registers (Initialized).
6612                    ;*              DUT LPR - Line parameter registers (Initialized).
6613                    ;*              EXCNT - Table of extra RX char counts (Clred, selected lines).
6614                    ;*              RXCNT - Table of RX character counts (Clred, selected lines)
6615                    ;*              RXDONF - "Reception Done" flags (Cleared for selected lines).
6616                    ;*              RXPTR - Table of receive pointers (Initialized).
6617                    ;*              TXCNT - Table of TX character counters (Clred, selected lines).
6618                    ;*              TXDONF - "Transmission Done" flags (Clred for selected lines).
6619                    ;*              TXPTR - Table of transmit pointers (Initialized).
6620                    ;*              TXRXL - TX/RX line association table (Initialized).
6621                    ;*
6622                    ;* CALLING SEQUENCE:    JSR     PC,TXRINI
6623                    ;*
6624                    ;* COMMENTS:    If the calculation of the CHRTOT value (2 times the data
6625                    ;*              pattern length) results in a number greater than 64K then
6626                    ;*              CHRTOT is initialized to 64K - 1.
6627                    ;*              This routine will not force internal loopback based on the
6628                    ;*              loopback type in CBLPBA.  The user must set up CBLNCA correctly
6629                    ;*              to get internal loopback.
6630                    ;*
6631                    ;* SUBORDINATE ROUTINES CALLED: WTWLNC,WTWLPR,
6632                    ;-- ************************************************************************
```

```
 6633 036620                            TXRINI:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
      036620  004537  005474                      JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
 6634                                   ;+
 6635                                   ; Set up the LPR and LNCTRL registers as specified in the TX/RX Control Block.
 6636                                   ;-
 6637 036624  013705  003304                    MOV     CBMAPA,R5       ;GET THE BIT MAP OF SELECTED LINES.
 6638 036630  013700  003274                    MOV     CBLNCA,R0       ;GET THE NEW LNCTRL CONTENTS.
 6639 036634  023727  003306  000001            CMP     CBLPBA,#1       ;CHECK IF INTERNAL LOOPBACK HAS BEEN SELECTED.
 6640 036642  001002                           BNE     2$              ;SKIP SETTING INT. LOPBCK IN MAINTENANCE FIELD.
 6641 036644  052700  000200                    BIS     #200,R0         ;SET INTERNAL LOOPBACK IN MAINTENANCE FIELD.
 6642 036650  004737  040250            2$:     JSR     PC,WTWLNC       ;SET UP THE LNCTRL REGS FOR SELECTED LINES.
 6643 036654  013700  003272                    MOV     CBLPRA,R0       ;GET THE NEW LPR CONTENTS.
 6644 036660  004737  040324                    JSR     PC,WTWLPR       ;SET UP THE LPR REGISTERS FOR SELECTED LINES.
 6645 036664  004737  036446                    JSR     PC,TXENBL       ;ENABLE TX FOR ALL SELECTED LINES.
 6646                                   ;+
 6647                                   ; Set up and begin loop which handles one line per iteration.
 6648                                   ;-
 6649 036670  005004                            CLR     R4              ;CLEAR THE LINE OFFSET.
 6650 036672  013705  003276                    MOV     CBDPAA,R5       ;INITIALIZE THE TX START ADDRESS VALUE.
 6651 036676  013703  003300                    MOV     CBDPLA,R3       ;GET THE LENGTH OF THE DATA PATTERN.
 6652 036702  060503                            ADD     R5,R3           ;CALCULATE END ADDRESS OF THE DATA PATTERN.
 6653 036704  036437  002534  003304    4$:     BIT     BITTBL(R4),CBMAPA  ;CHECK IF THIS LINE IS SELECTED FOR INIT.
 6654 036712  001452                           BEQ     12$             ;SKIP SET UP IF LINE IS NOT SELECTED.
 6655                                   ;+
 6656                                   ; This line is selected for initialization.
 6657                                   ;    Set up proper entry in number of chars to TX and RX table.
 6658                                   ;    Include char count on this line in max allowable char total for all lines.
 6659                                   ;-
 6660 036714  013701  003300                    MOV     CBDPLA,R1       ;GET THE LENGTH OF THIS LINE'S DATA PATTERN.
 6661 036720  013702  003302                    MOV     CBDPNA,R2       ;GET THE NUMBER OF PATTERNS TO TX AND RX.
 6662 036724  004737  032056                    JSR     PC,MUL16U       ;CALCULATE THE TOTAL NUMBER OF CHARS TO TX/RX.
 6663 036730  010164  003612                    MOV     R1,CHCNTB(R4)   ;SET UP THE NUMBER OF TX/RX CHARS FOR LINE.
 6664 036734  060137  002646                    ADD     R1,CHRTOT       ;ADD TWICE THE NUMBER OF CHARACTERS TO TX/RX
 6665 036740  103403                           BCS     6$              ;  ON THIS LINE TO THE TOTAL NUMBER OF CHARS
 6666 036742  060137  002646                    ADD     R1,CHRTOT       ;  WHICH WE WILL ALLOW TO BE RECEIVED ON
 6667 036746  103003                           BCC     8$              ;  ALL LINES.
 6668 036750  012737  177777  002646    6$:     MOV     #-1,CHRTOT      ;  SET MAX CHAR TOTAL TO -1 IF OVERFLOW.
 6669 036756                            8$:
 6670                                   ;+
 6671                                   ; Set up the data pattern end and length for this line.
 6672                                   ;-
 6673 036756  013764  003300  003352            MOV     CBDPLA,DPLENB(R4)  ;SET UP TX DATA PATTERN LENGTH FOR THIS LINE.
 6674 036764  010364  003312                    MOV     R3,DPENDB(R4)   ;SET UP TX DATA PAT END ADDRESS FOR THIS LINE.
 6675                                   ;+
 6676                                   ; Set up the TX counter and character pointer for this line.
 6677                                   ;-
 6678 036770  005064  003652                    CLR     TXCNTB(R4)      ;CLEAR THE TX COUNTER FOR THIS LINE.
 6679 036774  010564  003512                    MOV     R5,TXPTRB(R4)   ;SET UP THE TX CHAR POINTER FOR THIS LINE.
 6680                                   ;+
 6681                                   ; Set up the TX/RX line association offset table entry for this line.
 6682                                   ;-
 6683 037000  010402                            MOV     R4,R2           ;SELECT LINE OFFSET FOR NON-STAGGERED LPBK.
 6684 037002  023727  003306  000002            CMP     CBLPBA,#2       ;TEST FOR STAGGERED LOOPBACK.
 6685 037010  001003                           BNE     10$             ;SKIP SETTING STAGGERED LPBK IF NOT.
 6686 037012  006202                            ASR     R2              ;FORM BYTE OFFSET INTO TABLE FROM TX LINE #.
 6687 037014  116202  005444                    MOVB    STGTRB(R2),R2   ;GET THE RX LINE CORRESPONDING WITH TX LINE.
 6688 037020  010264  005364            10$:    MOV     R2,TXRXLB(R4)   ;LOAD TX TABLE ENTRY WITH RX LINE OFFSET.
```

GLOBAL SUBROUTINE - TXRINI - SEQ 0174

```
 6689                                   ;+
 6690                                   ; Set up the RX counters and character pointer for the RX line which
 6691                                   ;   is associated with this TX line.
 6692                                   ;-
 6693 037024  005062  003712                CLR     RXCNTB(R2)      ;CLEAR THE RX COUNTER FOR THIS RX LINE.
 6694 037030  005062  003412                CLR     EXCNTB(R2)      ;CLEAR THE EXTRA CHAR COUNTER FOR THIS RX LINE.
 6695 037034  010562  003552                MOV     R5,RXPTRB(R2)   ;SET UP THE RX CHAR POINTER FOR THIS RX LINE.
 6696                                   ;+
 6697                                   ; Update the TX start pointer in preparation for the next line.
 6698                                   ;-
 6699 037040  063705  003310        12$:    ADD     CBOFSA,R5       ;ADD THE TX OFFSET TO THE TX START POINTER.
 6700 037044  020503                14$:    CMP     R5,R3           ;COMPARE TX START WITH END OF DATA PATTERN.
 6701 037046  103403                       BLO     16$             ;SKIP WRAPAROUND IF START IS BEFORE PAT END.
 6702 037050  163705  003300                SUB     CBDPLA,R5       ;SUBTRACT DATA PATTERN LENGTH FROM START.
 6703 037054  000773                       BR      14$             ;LOOP UNTIL START IS WITHIN DATA PATTERN.
 6704                                   ;+
 6705                                   ; Update the TX line number offset to the next line.
 6706                                   ;-
 6707 037056  005204                16$:    INC     R4
 6708 037060  005204                        INC     R4
 6709                                   ;+
 6710                                   ; Test for done handling all possible lines on the device.
 6711                                   ;-
 6712 037062  020427  000020                CMP     R4,@NUMLNS*2    ;COMPARE OFFSET WITH 2 TIMES MAX # OF LINES.
 6713 037066  002706                       BLT     4$              ;LOOP IF NOT ALL LINES DONE.
 6714
 6715 037070                        60$:    PASS                    ;RESTORE GPRS.
      037070  004736                                JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
 6716 037072  000207                        RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - TXROFF -
                        ;++ ******************************************************************************
                        ;*                          - Turn TX and RX off Routine -
                        ;*      This subroutine is used to turn off DUT transmission and reception.
                        ;*      This routine achieves this by boosting processor priority to 5 to
                        ;*      avoid RX interrupts and by clearing all the DUT TX.ENABLE bits to
                        ;*      halt TX (either DMA or single character TX).  The states of the
                        ;*      TX.ENABLE bits and the processor priority are saved for restoration
                        ;*      when TX and RX are re-enabled.
                        ;*
                        ;* INPUTS:      MAPLNS - Bit map of all possible lines on the DUT.
                        ;*
                        ;* OUTPUTS:     SAVPRI - Saved processor priority.
                        ;*              SAVTEN - Bit map of TX.ENBL bits (Bit setif TX.ENBL was set).
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,TXROFF
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: TXDSBL.
                        ;-- ******************************************************************************

037074                  TXROFF:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
037074  004537  005474          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
037100  106737  002406          MFPS    SAVPRI          ;GET THE PRESENT PROCESSOR PRIORITY.
037104  106427  000240          MTPS    #PRI05          ;DISABLE DUT INTERRUPTS.
037110  012705  000377           MOV    #MAPLNS,R5      ;PREPARE TO DISABLE TX ON ALL DUT LINES.
037114  004737  036352          JSR     PC,TXDSBL       ;CLEAR ALL DUT TX.ENABLE BITS.
037120  010537  002404           MOV    R5,SAVTEN       ;PRESERVE THE PREVIOUS TX.ENABLE BIT STATES.
037124                  60$:    PASS                    ;RESTORE GPRS.
037124  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
037126  000207          RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE                - TXRON -
                        ;++ ************************************************************************
                        ;*                        - Turn TX and RX on Routine -
                        ;*      This subroutine is used to turn on DUT transmission and reception.
                        ;*      This routine restores the DUT TX.ENABLE bits and the processor priority
                        ;*      to the states saved by the TXROFF routine.
                        ;*
                        ;* INPUTS:      SAVPRI - Saved processor priority.
                        ;*              SAVTEN - Bit map of TX.ENBL bits (Bit setif TX.ENBL was set).
                        ;*
                        ;* OUTPUTS:     DUT TX.ENABLE bits - Set to specified states.
                        ;*              PROCESSOR PRIORITY - Set to specified priority.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,TXRON
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: TXENBL.
                        ;-  ************************************************************************

037130                  TXRON:: SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
037130  004537  005474                JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
037134  013705  002404        MOV     SAVTEN,R5       ;GET THE SAVED STATES OF THE TX.ENABLE BITS.
037140  004737  036446        JSR     PC,TXENBL       ;SET THE SPECIFIED TX.ENABLE BITS.
037144  106437  002406        MTPS    SAVPRI          ;RESTORE THE PROCESSOR PRIORITY.
037150                  60$:    PASS                    ;RESTORE GPRS.
037150  004736                        JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
037152  000207          RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE                - TXRREP -
                        ;++ ******************************************************************************
                        ;*                      - Report Final TX/RX Errors Routine -
                        ;*      This subroutine reports errors which are found after the completion
                        ;*      of the TX, RX, and verification of data patterns.  It reports errors
                        ;*      dealing with incomplete TX or RX and with DMA_START bits.
                        ;*
                        ;* INPUTS:       ACTLNS - Bit map of active DUT lines.
                        ;*               DPLENB - Label at base of the data pattern lengths table.
                        ;*               ERRMSG - Address of primary error message for this routine.
                        ;*               ERRNBR - Error number of error reported in this routine.
                        ;*               RXCNTB - Label at base of the RX character counters table.
                        ;*               RXDONF - Reception done flags.
                        ;*               TXCNTB - Label at base of the TX character counters table.
                        ;*               TXDONF - Transmission done flags.
                        ;*               TXINTF - Contains bit map of lines with DMA_START bit errors.
                        ;*
                        ;* OUTPUTS:      CARRY FLAG - Restored to its entering value.
                        ;*               ERRBLK - Address of the error reporting routine (Destroyed).
                        ;*               Messages may be printed at the operator console.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,TXRREP
                        ;*
                        ;* COMMENTS:     This routine reports errors at Initial ERRNBR thru
                        ;*               Initial ERRMBR+2.
                        ;*               If no lines failed to complete their reception or failed to
                        ;*               complete their transmission or had DMA_START bit errors
                        ;*               then no messages are printed.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: CONMAP,ER9005,ER9102,RDMAST,RRXNDN,RTXNDN.
                        ;-- ******************************************************************************

037154                  TXRREP:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
037154  004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
037160  006003            ROR     R3      ;ROTATE CARRY INTO GPR TO SAVE CARRY STATE.
037162  013704  005466    MOV     ERRNBR,R4       ;SAVE THE INITIAL ERROR NUMBER VALUE.
037166  013705  002272    MOV     ACTLNS,R5       ;GET THE ACTIVE LINES BIT MAP.
037172  004737  033604    JSR     PC,RDMAST       ;REPORT ANY DMA_START BIT ERRORS.
037176  005237  005466    INC     ERRNBR          ;SELECT INTIAL ERROR NUMBER + 1.
037202  004737  035316    JSR     PC,RTXNDN       ;REPORT TX NOT COMPLETE IF NECESSARY.
037206  005237  005466    INC     ERRNBR          ;SELECT INITIAL ERROR NUMBER + 2.
037212  004737  030314    JSR     PC,CONMAP       ;GENERATE AN ASSOCIATED LINE BIT MAP.
037216  004737  034674    JSR     PC,RRXNDN       ;REPORT RX NOT COMPLETE IF NECESSARY.
037222  010437  005466    MOV     R4,ERRNBR       ;RESTORE THE INITIAL ERROR NUMBER VALUE.

037226  006103            ROL     R3              ;ROTATE SAVED CARRY STATE BACK INTO CARRY.
037230                  60$:    PASS                            ;RESTORE GPRS, THIS ROUTINE PRESERVES THE
037230  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
037232  000207            RTS     PC              ;  INITIAL CARRY STATE.
```

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

037234                  UNSDIV:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
037234  004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                        ;+
                        ; Check for quotient greater than 16 bits condition.
                        ;-
037240  010204                  MOV     R2,R4           ;GET MSW OF DIVIDEND FOR SUBTRACT.
037242  160104                  SUB     R1,R4           ;SUBTRACT DIVISOR FROM MSW OF DIVIDEND.
037244  103403                  BCS     2$              ;IF IT DIDN'T GO, WE HAVE QUOTIENT < 16 BITS.
037246  012701  177777          MOV     #-1,R1          ;SET QUOTIENT TO ALL ONES (177777),
037252  000442                  BR      60$             ;EXIT WITH CARRY CLEAR.
                        ;+
                        ; Set up counters and various working GPRs.
                        ;
037254  005004          2$:     CLR     R4              ;CLEAR THE LSW OF THE DIVISOR.
037256  000241                  CLC                     ;CLEAR CARRY FOR THE SHIFT OF THE DIVISOR.
037260  006001                  ROR     R1              ; DIVISOR BY
037262  006004                  ROR     R4              ; 2(UNSIGNED)
037264  012700  000020          MOV     #16.,R0         ;SET UP INITIAL SHIFT COUNT TO 16.
                        ;+
                        ; The subtract and shift loop.
                        ;
037270  010246          4$:     MOV     R2,-(SP)        ;SAVE MSWORD OF DIVIDEND.
037272  010346                  MOV     R3,-(SP)        ;SAVE LSWORD OF DIVIDEND.
037274  160403                  SUB     R4,R3           ;LSWORD DIVIDEND - LSWORD OF DIVISOR.
037276  005602                  SBC     R2              ;MSWORD DIVIDEND - BORROW .
037300  103402                  BCS     6$              ;IF BORROW FROM BORROW SUBTRACT, IT DIDN'T GO.
037302  160102                  SUB     R1,R2           ;MSWORD DIVIDEND - MSWORD OF DIVISOR.
037304  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.
                            ;
037306  012603          6$:     MOV     (SP)+,R3        ;RESTORE LSWORD OF DIVIDEND.
037310  012602                  MOV     (SP)+,R2        ;RESTORE MSWORD OF DIVIDEND.
```

```
 6880 037312  000401                    BR      10$             ;GOTO SHIFT 1 INTO THE QUOTIENT.
 6881                                ;+
 6882                                ; It went, so we restore the stack and shift a 0 into quotient (will be
 6883                                ; complemented later).   Carry is clear.
 6884                                ;-
 6885 037314  012626                8$:  MOV     (SP)+,(SP)+     ;POP THE SAVED DIVIDEND OFF OF THE STACK.
 6886                                ;+
 6887                                ; Shift the result of the subtract attempt into the quotient shift reg.
 6888                                ;-
 6889 037316  006105                10$: ROL     R5              ;SHIFT NEXT BIT INTO THE INVERTED QUOTIENT.
 6890 037320  000241                     CLC                     ;DIVIDE THE
 6891 037322  006001                     ROR     R1              ;  DEVISOR BY
 6892 037324  006004                     ROR     R4              ;  2 (UNSIGNED).
 6893 037326  005300                     DEC     R0              ;COUNT THIS SHIFT AND SUBTRACT.
 6894 037330  001357                     BNE     4$              ;LOOP FOR ANOTHER SHIFT & SUB IF NOT DONE.
 6895 037332  005105                     COM     R5              ;GET QUOTIENT FROM INVERTED QUOTIENT.
 6896                                ;+
 6897                                ; Now we either round up or leave quotient alone.
 6898                                ;-
 6899 037334  000241                     CLC                     ;CLEAR THE CARRY FOR THE SHIFT OF THE DIVIDEND.
 6900 037336  006103                     ROL     R3              ;MULTIPLY LSWORD OF DIVIDEND BY 2, MSWORD IS 0.
 6901 037340  103402                     BCS     12$             ;IF CARRY FROM SHIFT, ROUND UP.
 6902 037342  160403                     SUB     R4,R3           ;SUBTRACT DIVISOR FROM DIVIDEND.
 6903 037344  103403                     BCS     14$             ;IF BORROW, DON'T ROUND UP.
 6904                                ;+
 6905                                ; Round up, extra subtract went.
 6906                                ;-
 6907 037346  005205                12$: INC     R5              ;INCREMENT THE QUOTIENT BY ONE.
 6908 037350  001001                     BNE     14$             ;IF NO OVERFLOW, WE LEAVE THE ROUND UP.
 6909 037352  005305                     DEC     R5              ;DON'T LET ROUNDING CAUSE OVERFLOW.
 6910                                ;+
 6911                                ; All done, pass quotient and exit.
 6912                                ;-
 6913 037354  010501                14$: MOV     R5,R1           ;PASS QUOTIENT BACK IN R1.
 6914 037356  000261                     SEC                     ;INDICATE NO OVERFLOW.
 6915
 6916 037360                        60$: PASS    R1              ;RESTORE GPRS, LEAVE THE FOLLOWING INTACT:
      037360  010166  000004                          MOV     R1,R1SLOT(SP)           ;PUT R1 IN STACK SLOT.
      037364  004736                          JSR     PC,@(SP)+               ;RETURN TO PREGOS SUBRT.
 6917                                                                         ;R1 - 16 BIT, UNSIGNED QUOTIENT,
 6918 037366  000207                     RTS     PC              ;CARRY - SET INDICATES NO OVERFLOW (SUCCESS).
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - UPDCHR -
                        ;++ ************************************************************************
                        ;*              - Update Character Pointers and Counters Routine -
                        ;*      This subroutine updates the pointers and counters associated with
                        ;*      the reception of a character on a specified line.  The receive char
                        ;*      pointer is set to the next expected character, the receive char count
                        ;*      is incremented, and the count is checked to determine if the reception
                        ;*      is complete.  If the reception is complete the Reception Done Flag
                        ;*      is set for the specified line.
                        ;*
                        ;* INPUTS:      R3 - Line number times 2 of line on which char was received.
                        ;*              BITTBL - Label of table of words used to form single bit maps.
                        ;*              CHCNTB - Base of number of chars to TX on each line table.
                        ;*              DPENDB - Base of data pattern end addresses table.
                        ;*              DPLENB - Base of data pattern lengths table.
                        ;*              RXCNTB - Base of the RX character counters table.
                        ;*              RXPTRB - Base of the RX character pointers table.
                        ;*              TXRXLB - Base of TX/RX line number association table.
                        ;*
                        ;* OUTPUTS:   Following variables updated for line on which char was received:
                        ;*              RXCNT - Count of the number of characters received on line.
                        ;*              RXDONF - RX done flags with BIT0 for line 0 ... (Updated).
                        ;*              RXPTR - Updated to point to the next expected char on line.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,UPDCHR
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: None.
                        ;- ************************************************************************
037370                  UPDCHR:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
037370  004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
037374  016302  005364          MOV     TXRXLB(R3),R2   ;GET TX LINE NUMBER OFFSET FOR THIS RX LINE.
                        ;+
                        ; Update the RX data pointer with wraparound at the end of the data pattern.
                        ;-
037400  016301  003552          MOV     RXPTRB(R3),R1   ;GET THE RX DATA POINTER FROM THE RX PTR TABLE.
037404  005201                  INC     R1              ;INCREMENT THE RX POINTER VALUE BY 1.
037406  020162  003312          CMP     R1,DPENDB(R2)   ;CMP RX PTR VALUE WITH ADR OF END OF DATA PAT.
037412  103402                 BLO     2$              ;SKIP WRAPPING RX PTR AROUND IF NOT AT END.
037414  166201  003352          SUB     DPLENB(R2),R1   ;WRAP RX PTR AROUND TO START OF DATA PATTERN.
037420  010163  003552  2$:     MOV     R1,RXPTRB(R3)   ;UPDATE THE RX POINTER WITH THE NEW VALUE.
                        ;+
                        ; Update the RX character count with overflow detection.
                        ;-
037424  016301  003712          MOV     RXCNTB(R3),R1   ;GET THE RX CHARACTER COUNT.
037430  005201                  INC     R1              ;INCREMENT THE RX CHAR COUNT VALUE BY 1.
037432  001002                 BNE     4$              ;SKIP SETTING COUNT TO MAX IF NO OVERFLOW.
037434  012701  177777          MOV     #-1,R1          ;SET RX CHAR COUNT VALUE TO MAX VALUE.
037440  010163  003712  4$:     MOV     R1,RXCNTB(R3)   ;UPDATE THE RX CHAR COUNT WITH NEW VALUE.
                        ;+
                        ; Check for RX completion on this line.
                        ; If RX is complete on this line, set the correct RX done flag.
                        ;
037444  016204  003612          MOV     CHCNTB(R2),R4   ;GET THE NUMBER OF TX CHARS IN COMPLETE TX.
037450  020104                  CMP     R1,R4           ;COMPARE RX CHAR COUNT WITH NUMBER OF TX CHARS.
037452  103403                 BLO     60$             ;EXIT ROUTINE IF NOT ALL CHARS RECEIVED.
```

GLOBAL SUBROUTINE - UPDCHR - SEQ 0181

```
o976 037454  056337  002534  002654          BIS     BITTBL(R3),RXDONF       ;SET THE RX DONE FLAG FOR THIS LINE.
6977
6978 037462                          60$:     PASS                            ;RESTORE GPR'S.
     037462  004736                                   JSR     PC,@(SP)+               ;RETURN TO PREGOS SUBRT.
6979 037464  000207                          RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE              - VANSUP -
                        ;++ ************************************************************************
                        ;*              - TRANSMISSION / RECEPTION SET-UP ROUTINE -
                        ;*
                        ;*              This routine is used to initialise both the DUT and the
                        ;*              transmission/reception control parameters to the correct
                        ;*              state, prior to a Single character or DMA transmission,
                        ;*              reception test.
                        ;*
                        ;* INPUTS:      R1 - TX, RX LPR contents.
                        ;*              R2 - Start address of data pattern to transmit.
                        ;*              R3 - Length of data pattern.
                        ;*              R4 - Number of patterns to transmit.
                        ;*              ACTLNS - Contains a bit map of all currently active lines.
                        ;*              LOPBCK - Contains the type of loopback mode selected.
                        ;*              CBB - Label at base of TX/RX control block.
                        ;*
                        ;* OUTPUTS:     The contents of the TX/RX control block (CCB) are destroyed.
                        ;*              The indirect address field of the DUT CSR may be destroyed.
                        ;*              The DUT's LPR's and LNC's may be modified.
                        ;*              The following pointers and counters are initialised;
                        ;*              CHCNT,CHRTOT,DPEND,DPLEN,EXCNT,RXCNT,RXPTR,TXCNT,
                        ;*              TXPTR,TXRXL.
                        ;*              CHRTOT, RXDONF, TXDONF and TXINTF are cleared.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,VANSUP
                        ;*
                        ;* COMMENTS:    Modem loopback mode is inhibited if it has been selected
                        ;*              via Hardware P-table questions, and internal loopback mode
                        ;*              is forced to take place.
                        ;*
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: CONMAP,RXENBL,TXRINI.
                        ;-- ************************************************************************

037466                  VANSUP:: SAVE                           ;SAVE CONTENTS OF THE GPR'S R0 THRU R5.
037466  004537  005474                 JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
037472  005037  002646         CLR     CHRTOT                  ;CLEAR TOTAL RECEIVED CHAR COUNTER.
037476  005037  002420         CLR     TXINTF                  ;CLEAR FLAGS USED TO LOG DMA H.OVER ERRORS.
037502  005037  002652         CLR     TXDONF                  ;CLEAR THE TX DONE FLAGS.
037506  005037  002654         CLR     RXDONF                  ;CLEAR THE RX DONE FLAGS.
                        ;*
                        ;  Set up the Transmission/Reception Control block to the desired state.
                        ;-
037512  010137  003272         MOV     R1,CBB                  ;SET CONTENTS OF LPR PARAMS IN TX/RX C.BLK.
037516  012701  003272         MOV     #CBB,R1                 ;GET BASE ADDRESS OF CONTROL BLOCK.
037522  005201                 INC     R1                      ;INCREMENT ADDRESS FOR NEXT WORD
037524  005201                 INC     R1                      ;INITIALISE THE FOLLOWING IN THE CNTRL.BLK:
037526  012721  000004         MOV     #4,(R1)+                ; LNCTRL PARAMETER, ENABLE RECEIVERS.
037532  010221                 MOV     R2,(R1)+                ; START ADDRESS OF DATA PATTERN.
037534  010321                 MOV     R3,(R1)+                ; DATA PATTERN LENGTH.
037536  010421                 MOV     R4,(R1)+                ; NUMBER OF DATA PATTERNS TO TRANSMIT.
037540  013721  002272         MOV     ACTLNS,(R1)+            ; BIT MAP OF LINES TO INITIALISE.
037544  032737  000004  002274 BIT     #BIT2,LOPBCK            ;TEST IF MODEM LOOPBACK MODE HAS BEEN SELECTED.
037552  001404                 BEQ     2$                      ;DONT SELECT INTERNL LOPBCK IF STAGRD OR LOCAL.
037554  012702  000001         MOV     #1,R2                   ;FORCE INTERNAL LOOPBACK MODE TO BE SELECTED.
037560  110221                 MOVB    R2,(R1)+                ;INITIALISE LOOPBACK MODE IN CONTROL BLOCK.
```

```
 7037 037562  000402                    BR      4$                ;SKIP NEXT INSTRUCTION IF IN MODEM LOOPBACK.
 7038 037564  113721  002274      2$:    MOVB    LOPBCK,(R1)+      ;SET LOOPBACK MODE.
 7039 037570  005201              4$:    INC     R1                ;INCREMENT ADDRESS FOR THE NEXT WORD.
 7040 037572  012711  000002             MOV     #2,(R1)           ;SET AMOUNT OF OFFSET EACH TX STARTS AT TO 2.
 7041                                    ;+
 7042                                    ; Initialise the DUT and the associated pointers and counters, to the state
 7043                                    ; dictated by the contents of the TX/RX control block.
 7044                                    ;-
 7045 037576  004737  036620                    JSR     PC,TXRINI         ;INITIALISE DUT.
 7046                                    ;+
 7047                                    ; Initialise pointers and counters for inactive lines to zero.
 7048                                    ;
 7049 037602  012701  000377                    MOV     #MAPLNS,R1        ;GET THE LINE BIT MAP FOR ALL LINES.
 7050 037606  013702  002272                    MOV     ACTLNS,R2         ;GET THE ACTIVE LINE BIT MAP.
 7051 037612  005101                            COM     R1                ;
 7052 037614  005102                            COM     R2                ;
 7053 037616  040102                            BIC     R1,R2             ;GENERATE AN IN-ACTIVE LINE BIT MAP.
 7054 037620  010237  003304                    MOV     R2,CBMAPA         ;MOVE BIT MAP TO THE CONTROL BLOCK.
 7055 037624  005037  003302                    CLR     CBDPNA            ;CLEAR THE REPEAT TX COUNT IN CNTRL BLCK.
 7056 037630  004737  036620                    JSR     PC,TXRINI         ;SET UP PARAMETERS FOR INACTIVE LINES.
 7057                                    ;+
 7058                                    ; Disable Receivers on all lines to ensure correct initialisation of only the
 7059                                    ; lines that are selected.
 7060                                    ;-
 7061 037634  012705  000377                    MOV     #MAPLNS,R5        ;SET UP BIT MAP FOR ALL LINES.
 7062 037640  004737  035356                    JSR     PC,RXDSBL         ;DISABLE RX ON ALL LINES.
 7063                                    ;+
 7064                                    ; Enable receivers on associated (RX) lines.
 7065                                    ;-
 7066 037644  013705  002272                    MOV     ACTLNS,R5         ;GET THE ACTIVE LINE BIT MAP.
 7067 037650  004737  030314                    JSR     PC,CONMAP         ;GENERATE AN ASSOCIATED LINE BIT MAP.
 7068 037654  004737  035452                    JSR     PC,RXENBL         ;ENABLE RECEIVERS ON ASSOCIATED LINES
 7069 037660                      60$:  PASS                              ;RESTORE GPR'S.
      037660  004736                                  JSR     PC,@(SP)+         ;RETURN TO PREG05 SUBRT.
 7070 037662  000207                            RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - WAIBIC -
                        ;** ************************************************************************
                        ;*                      - Wait For Bit Clear Routine -
                        ;*      This subroutine waits for the specified bit to become clear.  If the
                        ;*      specified bit goes to a clear 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 clr 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,WAIBIC       ;WAIT 32 MS FOR BIT 11 TO CLR.
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: MSLGET.
                        ;  ************************************************************************

037664                  WAIBIC:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
037664  004537  005474                 JSR     R5,PREGO5       ;CALL REGISTER SAVE SUBRT.
037670  010204          MOV     R2,R4           ;SET UP THE ADDRESS PARAMETER FOR MSLGET.
037672  010102          MOV     R1,R2
037674  042701  170000  BIC     @170000,R1      ;SEPERATE DELAY COUNT OUT OF PASSED PARAMETER.
037700  042702  007777  BIC     @7777,R2        ;SEPERATE LINE NUMBER FIELD OF PASSED PARAM.
037704  000302          SWAB    R2              ;PUT LINE NUMBER FIELD IN LSBYTE.
037706  006202          ASR     R2              ;SHIFT THE LINE NUMBER FIELD INTO THE PROPER
037710  006202          ASR     R2              ;  POSITION TO USE IT AS A WORD TABLE OFFSET
037712  006202          ASR     R2              ;  FOR THE TABLE LOOKUP OF THE LINE BIT MAP.
037714  016202  002534  MOV     BITTBL(R2),R2   ;GET BIT MAP OF L. .E TO TEST FROM TABLE.
037720  005003          CLR     R3              ;INDICATE THAT THE BIT SHOULD BE CLR.
037722  004737  031726  JSR     PC,MSLGET       ;WAIT FOR THE BIT TO BE CLR WITHIN TIME-OUT.
                                                ;  CARRY IS CORRECT UPON MSLGET RETURN.
037726  010002          MOV     R0,R2           ;PASS LAST VALUE READ AS OUTPUT PARAMETER.
037730                  60$:    PASS    R2      ;RESTORE GPRS, EXCEPT THE FOLLOWING:
037730  010266  000006                  MOV     R2,R2SLOT(SP)           ;PUT R2 IN STACK SLOT.
037734  004736                          JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
                                                ;  R2 - LAST VALUE READ LOOKING FOR CONDITION.
037736  000207          RTS     PC              ;  CARRY - SUCCESS FLAG (SET IF BIT FOUND CLR).
```

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

037740                          WAIBIS:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
037740  004537  005474                           JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT
037744  010204                  MOV     R2,R4                   ;SET UP THE ADDRESS PARAMETER FOR MSLGET.
037746  010102                  MOV     R1,R2
037750  042701  170000          BIC     #170000,R1              ;SEPERATE DELAY COUNT OUT OF PASSED PARAMETER.
037754  042702  007777          BIC     #^777,R2                ;SEPERATE LINE NUMBER FIELD OF PASSED PARAM.
037760  000302                  SWAB    R2                      ;PUT LINE NUMBER FIELD IN LSBYTE.
037762  006202                  ASR     R2                      ;SHIFT THE LINE NUMBER FIELD INTO THE PROPER
037764  006202                  ASR     R2                      ;  POSITION TO USE IT AS A WORD TABLE OFFSET
037766  006202                  ASR     R2                      ;  FOR THE TABLE LOOKUP OF THE LINE BIT MAP.
037770  016202  002534          MOV     BITTBL(R2),R2           ;GET BIT MAP OF LINE TO TEST FROM TABLE.
037774  010203                  MOV     R2,R3                   ;INDICATE THAT THE BIT SHOULD BE SET.
037776  004737  031726          JSR     PC,MSLGET               ;WAIT FOR THE BIT TO BE SET WITHIN TIME-OUT.
                                                                ;  CARRY IS CORRECT UPON MSLGET RETURN.
040002  010002                  MOV     R0,R2                   ;PASS LAST VALUE READ AS OUTPUT PARAMETER.
040004                  60$:    PASS    R2                      ;RESTORE GPRS, EXCEPT THE FOLLOWING:
040004  010266  000006                          MOV     R2,R2SLOT(SP)           ;PUT R2 IN STACK SLOT.
040010  004736                              JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                                                ;  R2 - LAST VALUE READ LOOKING FOR CONDITION.
040012  000207                  RTS     PC                      ;  CARRY - SUCCESS FLAG (SET IF BIT FOUND SET).
```

```
                                .SBTTL  GLOBAL SUBROUTINE                WAITTX -
                                ;++ ************************************************************************************
                                ;*                          - WAIT FOR TX TO FINISH -
                                ;*       This subroutine is used in the FIHAVL.TST.
                                ;*      It waits for transmission to complete ie TX_ACTION. Then delays
                                ;*      for 5 milliseconds to allow time for the last character to get into
                                ;*      the fifo.
                                ;*
                                ;* INPUTS:      CSRA - Contains the address of the CSR.
                                ;*
                                ;* OUTPUTS:     Carry - Set indicates success.
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,WAITTX
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: DELAY,WAIBIS.
                                ;-- ************************************************************************************

7183 040014                     WAITTX:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
     040014  004537  005474                      JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
7184 040020  012701  170536             MOV     #170536,R1      ;PASS TIME-OUT VALUE OF 350 MILLI SECS.
7185 040024  013702  002300             MOV     CSRA,R2         ;PASS THE ADDRESS OF THE CSR.
7186 040030  004737  037740            JSR     PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE, TX_ACTION SET.
7187 040034  103005                    BCC     60$             ;BRANCH IF FIFO EMPTY, ABORT THE TEST.
7188 040036  012704  000005             MOV     #5,R4           ;PASS DELAY OF 5 MILLI SECS.
7189 040042  004737  030370            JSR     PC,DELAY        ;WAIT FOR LAST CHAR TO ARRIVE IN THE FIFO.
7190 040046  000261                     SEC                     ;SET CARRY TO I8NDICATE SUCCESS.
7191
7192 040050                     60$:    PASS                            ;RESTORE GPRS.
     040050  004736                             JSR     PC,@(SP)+       ;RETURN TO PREG05 SUBRT.
7193                                                                     ;PASS THE CARRY BIT, SET INDICATES SUCCESS.
7194 040052  000207                     RTS     PC
```

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

040054                  WDPDR:: SAVE                            ;SAVE CONTENTS OF GPRS R0 THRU R5.
040054  004537  005474                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                        ;+
                        ; Set up outer loop which writes the data pattern to each line's registers
                        ;
040060  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.
                        ;-
040062  010204          2$:     MOV     R2,R4           ;SAVE THE OUTER LOOP DATA PATTERN.
040064  010577  142210          MOV     R5,@CSRA        ;SET CSR IND.ADR.REG FIELD TO THIS LINE.
040070  006305                  ASL     R5              ;TURN LINE NUMBER INTO A WORD OFFSET.
040072  036537  002534  002272  BIT     BITTBL(R5),ACTLNS
040100  001451                 BEQ     20$             ;LINE ACTIVE?  NO, SKIP THIS LINE.
040102  012701  000004          MOV     #LPRO,R1        ;YES, INITIALIZE THE REGISTER OFFSET.
```

```
                                        ;+
                                        ;       The inner loop follows.  Each pass through this loop writes data to a
                                        ;       device register.
                                        ;
040106  010200                  4$:     MOV     R2,R0
040110  046100  002320                  BIC     UNBTTB(R1),R0   ;CLEAR BIT FIELDS FOR UNUSED REGISTER BITS.
040114  016103  002300                  MOV     DRADRT(R1),R3   ;GET THE ADDRESS OF THE DEVICE REGISTER.
040120  005766  000010                  TST     R3SLOT(SP)      ;CHECK THE OPERAND TYPE INDICATOR.
040124  003402                          BLE     6$              ;HIGH BYTE?  NO, SKIP HIGH BYTE ADDRESS SET UP.
040126  005203                          INC     R3              ;YES, SET THE REG ADDRESS TO THE HIGH BYTE.
040130  000300                          SWAB    R0              ;MOVE HIGH BYTE DATA INTO THE LOW BYTE.
040132  005766  000010          6$:     TST     R3SLOT(SP)      ;CHECK THE OPERAND TYPE INDICATOR.
040136  001412                          BEQ     12$             ;WORD ACCESS?  YES, GO PERFORM WORD ACCESS.
                                    ;+
                                    ;Perform byte access to the specified byte of the specified register.
                                    ;-
040140  005766  000012                      TST     R4SLOT(SP)      ;NO, CHECK THE ACCESS TYPE INDICATOR.
040144  100403                          BMI     8$              ;USE BIC?  YES, GO PERFORM BICB INSTRUCTION.
040146  001404                          BEQ     10$             ;USE MOV?  YES, GO PERFORM MOVB INSTRUCTION.
040150  150013                          BISB    R0,(R3)         ;NEITHER.  PERFORM BISB ACCESS TO REGISTER.
040152  000415                          BR      18$
040154  140013                  8$:     BICB    R0,(R3)         ;PERFORM BICB ACCESS TO REGISTER.
040156  000413                          BR      18$
040160  110013                  10$:    MOVB    R0,(R3)         ;PERFORM MOVB ACCESS TO REGISTER.
040162  000411                          BR      18$
                                    ;+
                                    ;Perform word access to the specified register.
                                    ;-
040164  005766  000012          12$:    TST     R4SLOT(SP)      ;CHECK THE ACCESS TYPE INDICATOR.
040170  100403                          BMI     14$             ;USE BIC?  YES, GO PERFORM BIC INSTRUCTION.
040172  001404                          BEQ     16$             ;USE MOV?  YES, GO PERFORM MOV INSTRUCTION.
040174  050013                          BIS     R0,(R3)         ;NEITHER.  PERFORM BIS ACCESS TO REGISTER.
040176  000403                          BR      18$
040200  040013                  14$:    BIC     R0,(R3)         ;PERFORM BIC ACCESS TO REGISTER.
040202  000401                          BR      18$
040204  010013                  16$:    MOV     R0,(R3)         ;PERFORM MOV ACCESS TO REGISTER.
                                    ;+
                                    ; Prepare the data pattern and offset for the next register on this line.
                                    ;-
040206  004737  034642          18$:    JSR     PC,ROLDAP       ;ROTATE DATA PATTERN LEFT, NOT THROUGH CARRY.
040212  062701  000002                  ADD     #2,R1           ;INCREMENT OFFSET FOR NEXT REGISTER.
040216  020127  000016                  CMP     R1,#TXBFC0      ;COMPARE REG OFFSET WITH OFFSET OF LAST REG.
040222  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.
                                    ;-
040224  010402                  20$:    MOV     R4,R2           ;SET UP TO ROTATE THE DATA PATTERN.
040226  004737  034642                  JSR     PC,ROLDAP       ;ROTATE THE DATA PATTERN.
040232  006205                          ASR     R5              ;CONVERT BACK TO LINE NUMBER FROM WORD OFFSET.
040234  005205                          INC     R5              ;COUNT THIS LINE.
040236  020527  000010                  CMP     R5,#NUMLNS      ;COMPARE LINE COUNT WITH NUMBER OF LINES.
040242  002707                          BLT     2$              ;LOOP IF SOME LINES NOT DONE.

040244                          60$:    PASS                    ;RESTORE GPRS.
040244  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
040246  000207                          RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE                - WTWLNC -
                        ;** ************************************************************************
                        ;*                      - Line Control Register Setup Routine -
                        ;*      This subroutine is used to set the Device Under Test (DUT) Line
                        ;*      Control Registers (LNCTRL) to the specified state.  Only the LNCTRLS
                        ;*      for the specified lines are altered.
                        ;*
                        ;* INPUTS:      R0 - New line parameters.
                        ;*              R5 - Bit map of lines to be altered.
                        ;*              CSRA - Contains address of the DUT CSR.
                        ;*              IESTAT - Contains the current state of the TX and RX interrupt
                        ;*               enable bits in the CSR.
                        ;*              LNCTRA - Contains address of the DUT LNCTRL registers.
                        ;*
                        ;* OUTPUTS:     LNCTRL - Specified DUT Line Control Registers are altered.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,WTWLNC
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: ALTFLD.
                        ;-- ************************************************************************

040250                  WTWLNC:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
040250  004537  005474                 JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                        ;+
                        ; Set up the parameters for the call to ALTFLD.
                        ;-
040254  013701  002310          MOV     LNCTRA,R1       ;SET UP THE REGISTER ADDRESS PARAMETER.
040260  010002                  MOV     R0,R2           ;SET UP THE DESIRED REGISTER CONTENTS.
040262  010503                  MOV     R5,R3           ;SET UP THE BIT MAP OF LINES TO ALTER.
040264  012704  177777          MOV     #-1,R4          ;SELECT ALL REGISTER BITS TO BE ALTERED.
                        ;+
                        ; Call the subroutine which alters the register contents.
                        ;-
040270  004737  026760          JSR     PC,ALTFLD       ;ALTER THE REGISTER CONTENTS.

040274                  60$:    PASS                    ;RESTORE GPRS.
040274  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
040276  000207          RTS     PC
```

```
                        .SBTTL  GLOBAL SUBROUTINE               - WTWLNS -
                        ;*******************************************************************************
                        ;*                      - Write Word to all Lines routine -
                        ;*      This subroutine writes a specified word to the specified DHV11-M device
                        ;*      register for each of the DHV11-M lines.  It could be used to clear all
                        ;*      of the LNCTRL registers or to initialize all of the LPR registers to
                        ;*      the same parameters.
                        ;*
                        ;* INPUTS:      R1 - Address of the specified registers.
                        ;*              R2 - Word to write into the specified registers.
                        ;*              IESTAT - Saved states of the TX.IE and RX.IE bits.
                        ;*              MAPLNS - Equated to bit map of lines on device (8 for DHV11).
                        ;*                CSRA.
                        ;*
                        ;* OUTPUTS:     DEVICE REGISTERS - Specified registers given new value.
                        ;*              CSR IND.ADR.REG field   Destroyed.
                        ;*              CSR Interrupt Enable bits - Set to states in IES AT.
                        ;*
                        ;* CALLING SEQUENCE:    JSR     PC,WTWLNS
                        ;*
                        ;* COMMENTS:    Note that the specified registers for all lines are altered
                        ;*              by this routine.  This routine should NOT be used to alter
                        ;*              the states of partial register fields or to alter a register
                        ;*              for fewer than all of the lines.
                        ;*              The specified registers are read before being written.
                        ;*
                        ;* SUBROUTINES CALLED: ALTFLD.
                        ;*******************************************************************************

040300                  WTWLNS:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
040300  004537  005474                      JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                        ;+
                        ; Set up the bit map of lines to change and mask of bits to alter parameters.
                        ;-
040304  012703  000377          MOV     @MAPLNS,R3      ;GET THE BIT MAP OF LINES TO CHANGE.
040310  012704  177777          MOV     @-1,R4          ;INDICATE ALL 16 BITS TO BE CHANGED.
                        ;+
                        ; Call the subroutine to write the specified registers.
                        ;-
040314  004737  026760          JSR     PC,ALTFLD       ;CHANGE THE REGISTERS.

040320                  60$:    PASS                            ;RESTORE GPRS.
040320  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
040322  000207                  RTS     PC
```

```
                                .SBTTL  GLOBAL SUBROUTINE                - WTWLPR -
                                ;++ ************************************************************************
                                ;*                      - Line Parameter Register Setup Routine -
                                ;*      This subroutine is used to set the Device Under Test (DUT) Line
                                ;*      Parameter Registers (LPR) to the specified state.  Only the LPRs for
                                ;*      the specified lines are altered.
                                ;*
                                ;* INPUTS:      R0 - New line parameters.
                                ;*              R5 - Bit map of lines to be altered.
                                ;*              CSRA - Contains address of the DUT CSR.
                                ;*              IESTAT - Contains the current state of the TX and RX interrupt
                                ;*               enable bits in the CSR.
                                ;*              LPRA - Contains address of the DUT LPR.
                                ;*
                                ;* OUTPUTS:     LPR - Specified DUT Line Paramter Registers are altered.
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,WTWLPR
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: ALTFLD.
                                ;-- ************************************************************************

040324                          WTWLPR:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
040324  004537  005474                         JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                                ;+
                                ; Set up the parameters for the call to ALTFLD.
                                ;-
040330  013701  002304                  MOV     LPRA,R1         ;SET UP THE REGISTER ADDRESS PARAMETER.
040334  010002                          MOV     R0,R2           ;SET UP THE DESIRED REGISTER CONTENTS.
040336  010503                          MOV     R5,R3           ;SET UP THE BIT MAP OF LINES TO ALTER.
040340  012704  177777                  MOV     #-1,R4          ;SELECT ALL REGISTER BITS TO BE ALTERED.
                                ;+
                                ; Call the subroutine which alters the register contents.
                                ;-
040344  004737  026760                  JSR     PC,ALTFLD       ;ALTER THE REGISTER CONTENTS.

040350                          60$:    PASS                            ;RESTORE GPRS.
040350  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
040352  000207                          RTS     PC
```

```
                                .SBTTL  INTERRUPT SERVICE ROUTINE       - CACHRX -
                                ;** ************************************************************************
                                ;*      - Catch Receiver interrupt.
                                ;*      This routine is used in several tests,to log a count of the
                                ;*      number of receiver interupts that occur.
                                ;*
                                ;* INPUTS:      CSRA - Contains the address of the CSR.
                                ;*              RXINTC - Holds the count of the number of RX interrupts
                                ;*                       that occurred.
                                ;*
                                ;* OUTPUTS:     RXINTC - Contains the updated interrupt count.
                                ;*
                                ;*
                                ;* CALLING SEQUENCE:    Put the address of the label CACHRX in the vector
                                ;*                      location.
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: none
                                ; - ************************************************************************

040354                          CACHRX::SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
040354  004537  005474                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
040360  013701  002412                  MOV     RXINTC,R1       ;GET THE RECEIVER INTERRUPT COUNT
040364  005201                          INC     R1              ;INCREMENT THE COUNT
040366  102001                          BVC     2$              ;BRANCH IF NO OVERFLOW OCCURRED
040370  005301                          DEC     R1              ;RESET THE COUNT TO 177777
040372  010137  002412          2$:     MOV     R1,RXINTC       ;SAVE NEW COUNT VALUE
040376                          60$:    PASS                    ;RESTORE GPRS.
040376  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
040400  000002                          RTI
```

```
                        .SBTTL  INTERRUPT SERVICE ROUTINE       - CACHTX -
                        ;** ************************************************************************
                        ;*      - Catch Transmiter interrupt.
                        ;*      This routine is used in several tests,to log a count of the
                        ;*      number of transmission interrupts that occur.
                        ;*
                        ;* INPUTS:      CSRA - Contains the address of the CSR.
                        ;*              TXINTC - Holds the count of the number of TX interrupts
                        ;*                       that occurred.
                        ;*
                        ;* OUTPUTS:     TXINTC - Contains the updated interrupt count.
                        ;*
                        ;*
                        ;* CALLING SEQUENCE:    Put the address of the label CACHTX in the vector
                        ;*                      location.
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: none
                        ;-- ************************************************************************

040402                  CACHTX::SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
040402  004537  005474                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
040406  013701  002416          MOV     TXINTC,R1       ;GET THE TRANSMISSION INTERRUPT COUNT
040412  005201                  INC     R1              ;INCREMENT THE COUNT
040414  102001                  BVC     2$              ;BRANCH IF NO OVERFLOW OCCURRED
040416  005301                  DEC     R1              ;RESET THE COUNT TO 177777
040420  010137  002416  2$:     MOV     R1,TXINTC       ;SAVE NEW COUNT VALUE
040424                  60$:    PASS                    ;RESTORE GPRS.
040424  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
040426  000002          RTI
```

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

040430  005737  002450        CLKINT:: TST     TIMER1          ;CHECK FOR TIMER1 AT ZERO.
040434  001402                         BEQ     2$              ;BRANCH TO LEAVE IT AT ZERO IF IT IS ZERO.
040436  005337  002450                 DEC     TIMER1          ;DECREMENT TIME COUNT.
040442  005737  002452        2$:      TST     TIMER2          ;CHECK FOR TIMER2 AT ZERO.
040446  001402                         BEQ     4$              ;BRANCH TO LEAVE IT ALONE IF IT'S ALREADY ZERO.
040450  005337  002452                 DEC     TIMER2          ;DECREMENT TIME COUNT.
040454  005337  002454        4$:      DEC     TIMER3          ;DECREMENT THE BREAK COUNT.
040460  001006                         BNE     60$             ;EXIT IF NOT TIME TO CALL BREAK.
040462  013737  002456  002454        MOV     BCOUNT,TIMER3   ;SET UP TIME TILL NEXT BREAK.
040470  010046                         MOV     R0,-(SP)        ;SAVE CONTENTS OF R0 FROM BREAK MACRO.
040472                                 BREAK                   ;CHECK FOR OPERATOR CONTROL/C.
040472  104422                                                         TRAP    C$BRK
040474  012600                         MOV     (SP)+,R0        ;RESTORE CONTENTS OF R0.
040476  000002                 60$:    RTI
```

```
                                .SBTTL  INTERUPT SERVICE ROUTINE        - RXBRRT -
                                ;++ ******************************************************************************
                                ;*      - BR Level Test Receive Interrupt Service Routine -
                                ;*      This service routine handles Receive Interrupts during the Interrupt
                                ;*      BR Level Test.  This routine counts the interrupt and sets a flag
                                ;*      to indicate that the interrupt has occurred.  It also checks the
                                ;*      flag which indicates that a TX interrupt has occurred.  If the TX
                                ;*      interrupt flag is set, this routine sets an interrupt order error
                                ;*      flag indicating that a transmit interrupt was serviced before a
                                ;*      simultaneous receive interrupt.
                                ;*
                                ;* INPUTS:      RXINTC - Holds the count of the number of RX interupts.
                                ;*              RXINTF - RX Interrupt flags.
                                ;*
                                ;* OUTPUTS:     RXINTC - Contains the updated interupt count.
                                ;*              RXINTF - RX Int flags:
                                ;*                       (Bit 0 set, bit 14 set if TXINTF bit 0 is set.)
                                ;*
                                ;* CALLING SEQUENCE:    Put the address of the label RXBRRT in the vector
                                ;*                      location.
                                ;*
                                ;* COMMENTS:    NOTE: The FIFO is purged by this routine.
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: None.
                                ;-- ******************************************************************************

040500                          RXBRRT:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
040500  004537  005474                         JSR     R5,PREGOS       ;CALL REGISTER SAVE SUBRT.
040504  017700  141572                 MOV     @RBUFA,R0       ;READ THE CHAR OUT OF THE FIFO.
040510  013701  002412                 MOV     RXINTC,R1       ;GET THE INTERUPT COUNT.
040514  005201                         INC     R1              ;INCREMENT THE COUNT.
040516  001402                        BEQ     2$              ;BYPASS UPDATING COUNT IF OVERFLOW OCCURRED.
040520  010137  002412                 MOV     R1,RXINTC       ;SAVE NEW COUNT VALUE.
040524  013701  002414        2$:      MOV     RXINTF,R1       ;GET THE RX INTERRUPT FLAGS.
040530  052701  000001                 BIS     #BIT0,R1        ;SET THE RX INTERRUPT HAS OCCURRED FLAG.
040534  032737  000001  002420         BIT     #BIT0,TXINTF    ;TEST THE "TX INT HAS OCCURRED" FLAG.
040542  001402                        BEQ     4$              ;SKIP SETTING ERROR FLAG IF NO TX INT.
040544  052701  040000                 BIS     #BIT14,R1       ;SET THE INTERRUPT ORDER ERROR FLAG.
                                ;+
                                ; 8 FIFO codes will cause 8 interrupts, after these 8 codes we don't want
                                ;  to check the interrupt order, because perhaps a BMP code has come in
                                ;  between the servicing of the 8 FIFO code interrupts and the servicing
                                ;  of one of the TX interrupts.
                                ;-
040550  023737  002412  000010  4$:      CMP     RXINTC,NUMLNS   ;TEST FOR ALL SELFTEST CODE INTS DONE.
040556  003002                        BGT     60$             ;SKIP UPDATING RX INT FLAGS IF EXTRA RX INTS.
040560  010137  002414                 MOV     R1,RXINTF       ;UPDATE THE RX INTERRUPT FLAGS.
040564                          60$:    PASS                    ;RESTORE GPRS.
040564  004736                                 JSR     PC,@(SP)+               ;RETURN TO PREGOS SUBRT.
040566  000002                         RTI
```

```
                        .SBTTL  INTERRUPT SERVICE ROUTINE       - RXCHRS -
                        ;** ************************************************************************
                        ;*              - DMA RECEIVE Interrupt Service Routine -
                        ;*      This routine executes in response to an interrupt caused by the DUT
                        ;*      RX.DATA.AVAIL bit becoming active.  This routine reads characters from
                        ;*      the DUT receive character FIFO and deposits them into the receive
                        ;*      buffer in memory.  If the number of characters in the receive buffer
                        ;*      exceeds a specified threshold, transmission is halted (by clearing all
                        ;*      DUT TX.ENABLE bits) and if the receive buffer is full reception is
                        ;*      halted (by disabling RX interrupts).  The routine exits if the receive
                        ;*      buffer becomes full or if a character is read from the FIFO with the
                        ;*      DATA.VALID bit clear.
                        ;*
                        ;* INPUTS:      RBUFA - Contains address of the DUT RX character FIFO.
                        ;*              RXBCNT - RX buffer character count.
                        ;*              RXBDTX - Equated to RX buffer level at which to disable TX.
                        ;*              RXBEND - Label after end of the RX buffer area in memory.
                        ;*              RXBFUL - Equated to the capacity of the RX buffer.
                        ;*              RXBIPT - Pointer to next available input slot of RX buffer.
                        ;*              RXBSTA - Label at start of RX buffer area in memory.
                        ;*
                        ;* OUTPUTS:     RXBIPT - Updated to point to next input slot of RX buffer.
                        ;*              RXBCNT - RX buffer character count (Incremented).
                        ;*              TXENBM - Map of previous DUT TX.ENABLE states.
                        ;*              CARRY - "Success" flag (Set if buffer is not full).
                        ;*
                        ;* CALLING SEQUENCE:    Put the address of the label RXCHRS in the vector
                        ;*                      location.
                        ;*
                        ;* COMMENTS:    If the RX buffer is full upon entry, this routine aborts the
                        ;*              program.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: RXIEO,TXDSBL.
                        ;-- ************************************************************************

                        RXCHRS::        MOV     R2,-(SP)        ;SAVE CONTENTS OF GPR R2.
040572 017702 141504    2$:     MOV     @RBUFA,R2       ;READ A CHARACTER FROM THE DUT RX FIFO.
040576 100054                   BPL     60$             ;EXIT THE ROUTINE IF THE DATA.VALID BIT IS CLR.

040600 023727 003066 000100             CMP     RXBCNT,#RXBFUL  ;COMPARE BUFFER COUNT WITH BUFFER CAPACITY.
040606 103402                   BLO     4$              ;SKIP ABORT IF BUFFER IS NOT FULL.
040610 004737 032412            JSR     PC,OOPS         ;ABORT, MUST BE A PROGRAM BUG.
040614 010277 142244    4$:     MOV     R2,@RXBIPT      ;PUT THE CHAR IN THE BUFFER.
040620 062737 000002 003064             ADD     #2,RXBIPT       ;UPDATE POINTER TO THE NEXT BUFFER SLOT.
040626 023727 003064 003270             CMP     RXBIPT,#RXBEND  ;CHECK IF POINTER SHOULD WRAP AROUND.
040634 103403                   BLO     6$              ;SKIP WRAPAROUND IF POINTER IS NOT AT END.
040636 012737 003070 003064             MOV     #RXBSTA,RXBIPT  ;WRAP INPUT POINTER AROUND.

040644 005237 003066    6$:     INC     RXBCNT          ;COUNT THIS CHARACTER AS BEING IN THE BUFFER.
040650 023727 003066 000030             CMP     RXBCNT,#RXBDTX  ;CHECK FOR BUFFER AT DISABLE TX LEVEL.
040656 001016                   BNE     8$              ;SKIP DISABLING TX IF BUFFER LEVEL NOT CORRECT.
040660 005737 002656            TST     TXDBLF          ;CHECK STATE OF TX DISABLE FLAG.
040664 100413                   BMI     8$              ;BRANCH IF TRANSMISSION ALREADY DISABLED.
040666 010546                   MOV     R5,-(SP)        ;SAVE THE VALUE OF GPR R5.
040670 012705 000377            MOV     #MAPLNS,R5      ;SPECIFY THAT ALL LINES SHOULD BE AFFECTED.
040674 004737 036352            JSR     PC,TXDSBL       ;CLEAR THE TX ENABLE'S FOR ALL LINES.
040700 010537 002410            MOV     R5,TXENBM       ;SAVE PREVIOUS TX ENABLE STATES IN STORAGE.
```

INTERRUPT SERVICE ROUTINE - RXCHRS SEQ 0197

```
7632 040704  012605                          MOV    (SP)+,R5          ;RESTORE GPR R5.
7633 040706  012737  100000  002656          MOV    #BIT15,TXDBLF     ;PREVENT TX FROM BEING DISABLED AGAIN.
7634
7635 040714  023727  003066  000100  8$:     CMP    RXBCNT,#RXBFUL    ;CHECK FOR BUFFER FULL CONDITION.
7636 040722  103723                          BLO    2$                ;LOOP TO READ ANOTHER CHAR IF BUFFER NOT FULL.
7637
7638 040724  004737  035546                  JSR    PC,RXIE0          ;BUFFER IS FULL. DISABLE RX INTERRUPTS.
7639
7640 040730  012602                  60$:     MOV    (SP)+,R2          ;RESTORE R2 TO ITS SAVED VALUE.
7641 040732  000002                          RTI
```

```
                        .SBTTL  INTERUPT SERVICE ROUTINE        - RXINPT -
                        ;** ************************************************************************
                        ;*      - Receive Character Input Interrupt Service Routine -
                        ;*      This service routine inputs a character from the DUT and loads the
                        ;*      char (complete with status flags) into a receive char buffer in
                        ;*      memory.  The interrupt is also counted.  The receive char buffer is
                        ;*      monitored to ensure that it does not overflow.
                        ;*
                        ;* INPUTS:      BUFEND - Labels the end of the host memory buffer.
                        ;*              BUFPTR - Contains address of next free buffer location.
                        ;*              CSRA - Contains the address of the DUT CSR.
                        ;*              RBUFA - Contains the address of the RBUF DUT register.
                        ;*              RXINTC - Holds the count of the number of RX interupts.
                        ;*              RXINTF - RX Interrupt flags.
                        ;*
                        ;* OUTPUTS:     BUFPTR - Contains updated address of next free buffer location.
                        ;*              RXINTC - Contains the updated interupt count.
                        ;*              RXINTF - RX Int flags (bit 15 set if RX.DATA.AVAIL is clear).
                        ;*
                        ;* CALLING SEQUENCE:    Put the address of the label RXINPT in the vector
                        ;*                      location.
                        ;*
                        ;* COMMENTS:    In case of overflow of the memory buffer, BUFPTR will be
                        ;*              maintained equal to BUFEND and the word at BURFPTR will be
                        ;*              the last word read from the DUT FIFO.
                        ;*              NOTE: This routine can destroy TX.ACTIONS by reading the CSR.
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: None.
                        ;-- ************************************************************************

040734                  RXINPT:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
040734  004537  005474                  JSR     R5,PREGO5       ;CALL REGISTER SAVE SUBRT.
040740  032777  000200  141332          BIT     #BIT7,@CSRA     ;TEST RX.DATA.AVAIL BIT OF THE CSR (READS CSR).
040746  001003                          BNE     2$              ;BRANCH AROUND SETTING FLAG IF BIT IS SET.
040750  052737  100000  002414          BIS     #BIT15,RXINTF   ;SET THE RX.DATA.AVAIL CLEAR FLAG.
040756  013701  002412          2$:     MOV     RXINTC,R1       ;GET THE INTERUPT COUNT.
040762  005201                          INC     R1              ;INCREMENT THE COUNT.
040764  001402                          BEQ     4$              ;BYPASS UPDATING COUNT IF OVERFLOW OCCURRED.
040766  010137  002412                  MOV     R1,RXINTC       ;SAVE NEW COUNT VALUE.
040772  013702  002360          4$:     MOV     BUFPTR,R2       ;GET THE POINTER TO NEXT FREE BUFFER WORD.
040776  017722  141300                  MOV     @RBUFA,(R2)+    ;READ A CHAR FROM THE FIFO INTO BUFFER.
041002  020237  005012                  CMP     R2,BUF ND       ;TEST FOR POINTER BEYOND END OF BUFFER.
041006  103002                          BHIS    60$             ;SKIP THE PTR UPDATE IF PTR OUT OF BOUNDS.
041010  010237  002360                  MOV     R2,BUFPTR       ;UPDATE THE BUFFER POINTER.
041014                  60$:    PASS                    ;RESTORE GPRS.
041014  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
041016  000002                          RTI
```

```
                                .SBTTL  TRAP SERVICE ROUTINE          - TP4BRT -
                                ;*************************************************************************
                                ;*      Bus Time-out Trap (004 trap) Service Routine -
                                ;*      This routine is used during the DMA ADDRESS TEST.
                                ;*      It determines if the 004 trap was caused by an "expected" error or
                                ;*      not by examining the return PC value on the stack.  If the trap is
                                ;*      unexpected, this routine jumps to the normal Diagnostic Supervisor
                                ;*      004 trap handling routine.
                                ;*
                                ;* INPUTS:      SP - Points to the PC where the trap occured.
                                ;*              TRPAD2 - Label at the address where "expected" traps occur.
                                ;*              TP4FLG - 004 trap flags.
                                ;*
                                ;* OUTPUTS:     TP4FLG - Bit 15 is set if "expected" trap occured.
                                ;*
                                .* CALLING SEQUENCE:    Put address pointed to by TP4BRT in 004 vector.
                                .*                      Occurence of 004 trap vectors to this routine.
                                ;*
                                ;* COMMENTS:    Any 004 trap which occurs at an address other than that labeled
                                ;*              TRPAD2 will be handled by the normal 004 trap service routine.
                                ;*               This routine is used in conjunction with CKTRPB subroutine.
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: None.
                                ;*************************************************************************

041020  021627  030154          TP4BRT:: CMP    (SP),@TRPAD2    ;COMPARE EXPECTED ADDR WITH TRAP RET PC.
041024  001402                         BEQ    2$              ;IF THEY MATCH, CONTINUE THIS ROUTINE.
041026  000177  141370                 JMP    @TP4VEC         ;IF NOT, JUMP TO NORMAL 004 TRAP SERVICE RTN.
041032  052737  100000  002424  2$:     BIS    #BIT15,TP4FLG   ;SET THE 004 TRAP OCCURED FLAG.
041040  000002                         RTI                    ;ALL DONE, GO BACK TO THE TEST.
```

```
                                .SBTTL  GLOBAL TRAP SERVICE ROUTINE     - TP4RTN -
                                ;*************************************************************************
                                ;*      Bus Time-out Trap (004 trap) Service Routine -
                                ;*      This routine is used during the Device Register Address Access Test.
                                ;*      It determines if the 004 trap was caused by an "expected" error or
                                ;*      not by examining the return PC value on the stack.  If the trap is
                                ;*      unexpected, this routine jumps to the normal Diagnostic Supervisor
                                ;*      004 trap handling routine.
                                ;*
                                ;* INPUTS:      SP - Points to the PC where the trap occured.
                                ;*              ADRPTR - Label at the address where "expected" traps occur.
                                ;*              TP4FLG - 004 trap flags.
                                ;*
                                ;* OUTPUTS:     TP4FLG - Bit 15 is set if "expected" trap occured.
                                ;*
                                ;* CALLING SEQUENCE:    Put address pointed to by TP4RTN in 004 vector.
                                ;*                      Occurence of 004 trap vectors to this routine.
                                ;*
                                ;* COMMENTS:    Any 004 trap which occurs at an address other than that labeled
                                ;*              ADRPTR will be handled by the normal 004 trap service routine.
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: None.
                                ;*************************************************************************

041042  021627  030124          TP4RTN:: CMP     (SP),@ADRPTR    ;COMPARE EXPECTED ADR AGAINST TRAP RET PC.
041046  001402                           BEQ     2$              ;IF THEY MATCH, CONTINUE THIS ROUTINE.
041050  000177  141346                   JMP     @TP4VEC         ;IF NOT,JUMP TO NORMAL 004 TRAP SERVICE RTN.
041054  052737  100000  002424  2$:      BIS     #BIT15,TP4FLG   ;SET THE 004 TRAP OCCURED FLAG.
041062  000002                           RTI                     ;ALL DONE, GO BACK TO THE TEST.
```

```
                                .SBTTL  INTERRUPT SERVICE ROUTINE       - TXDMA -
                                ;++ ******************************************************************************
                                ;*              - DMA Transmit Interrupt Service Routine -
                                ;*      This routine executes in response to an interrupt caused by the DUT
                                ;*      TX.ACTION bit becoming active.  This routine initiates the TX of a
                                ;*      new DMA buffer of characters or sets the TX Done Flag for the correct
                                ;*      line if TX is complete on that line.
                                ;*
                                ;* INPUTS:      BITTBL - Label of table of words each with a bit set.
                                ;*              CNCNTB - Base of # of chars to TX/RX table.
                                ;*              CSRA - Contains the address of the DUT CSR.
                                ;*              DPENDB   Base of the data pattern end table (entry per line).
                                ;*              DPLENB   Base of the data pattern length table.
                                ;*              IESTAT - Preserved states of the DUT interrupt enable bits.
                                ;*              TXCNTB - Lable at base of the TX character counter table.
                                ;*              TXPTRB - Label at base of the TX data pattern pointers table.
                                ;*
                                ;* OUTPUTS:     TXCNTx   Counters incremented for lines on which chars sent.
                                ;*              TXDONF - TX done flags set for lines which have sent all chars.
                                ;*              TXINTF - TX int flags (bit set if DMA.HO found set on line).
                                ;*
                                ;* CALLING SEQUENCE:    Put the address of the label TXDMA in the vector
                                ;*                      location.
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: DODMA.
                                ;-- ******************************************************************************

7779 041064                     TXDMA:: SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
     041064  004537  005474                     JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
7780 041070  017701  141204             MOV     @CSRA,R1        ;READ THE CONTENTS OF THE DUT CSR.
7781 041074  010100                     MOV     R1,R0           ;SAVE INITIAL CONTENTS OF IND.ADR.REG FIELD.
7782 041076  000402                    BR      4$              ;BRANCH TO SKIP DOUBL READING OF DUT CSR.
7783                            ;+
7784                            ; Read the contents of the DUT CSR.  This will clear the TX.ACTION CSR bit.
7785                            ; If TX.ACTION is not set, exit this routine.
7786                            ; Determine the line for which the TX.ACTION was set.
7787                            ; Calculate an offset for use in accessing tables (2 times the line number).
7788                            ; Get the bit map of this line.
7789                            ;-
7790 041100  017701  141174     2$:     MOV     @CSRA,R1        ;READ THE CONTENTS OF THE DUT CSR.
7791 041104  100033             4$:    BPL     60$             ;EXIT ROUTINF IF TX.ACTION IS CLEAR.
7792 041106  000301                     SWAB    R1              ;CALCULATE THE LINE NUMBER OF THE LINE WHICH IS
7793 041110  042701  177760             BIC     #177760,R1      ;  ASSOCIATED WITH THE TX.ACTION.
7794 041114  010104                     MOV     R1,R4           ;CALCULATE AN OFFSET FOR USE IN ACCESSING
7795 041116  006304                     ASL     R4              ;  LINE COUNTER AND POINTER IN TABLES.
7796 041120  016405  002534             MOV     BITTBL(R4),R5   ;GET THE BIT MAP OF THIS LINE.
7797                            ;+
7798                            ; Get the TX character counter for this line.
7799                            ; If all the characters have been sent for this line:
7800                            ;    Set the TX done flag for this line.
7801                            ;    Don't send a char to the line (no more TX.ACTIONS on this line).
7802                            ;    Loop to check the TX.ACTION for another line.
7803                            ;-
7804 041124  026464  003652  003612             CMP     TXCNTB(R4),CHCNTB(R4) ;COMPARE # CHARS SENT AND TX COUNT.
7805 041132  103403                    BLO     6$              ;GO TO SEND A CHAR IF NOT ALL CHARS SENT.
```

```
 7806 041134  050537  002652                  BIS     R5,TXDONF       ;SET THIS LINE'S TX DONE FLAG.
 7807 041140  000757                          BR      2$              ;LOOP TO CHECK TX.ACTION AGAIN.
 7808                                 ;+
 7809                                 ; Start the DMA of the next buffer (data pattern) on this line.
 7810                                 ;    Get the data pattern length for this line.
 7811                                 ;    Get the start address of the data pattern.
 7812                                 ;-
 7813 041142  016403  003352          6$:     MOV     DPLENB(R4),R3   ;PASS DATA PATTERN LENGTH FOR LINE TO DODMA.
 7814 041146  016402  003512                  MOV     TXPTRB(R4),R2   ;PASS THE TX START ADR TO DODMA.
 7815                                     ;+
 7816                                     ; Write DMA parameters to the DUT.
 7817                                     ;-
 7818 041152  004737  030624                  JSR     PC,DODMA
 7819 041156  103403                          BCS     8$              ;SKIP ERROR IF DODMA WAS SUCCESSFUL.
 7820                                     ;+
 7821                                     ; Set the proper bit of the TX interrupt flags to indicate the line error.
 7822                                     ;-
 7823 041160  050537  002420                  BIS     R5,TXINTF       ;INDICATE THE ERROR.
 7824 041164  000402                          BR      10$             ;SKIP UPDATING POINTERS AND COUNTERS.
 7825                                     ;+
 7826                                     ; Update the TX character for this line.
 7827                                     ; Update the TX buffer pointer for this line.
 7828                                     ;-
 7829 041166  060364  003652          8$:     ADD     R3,TXCNTB(R4)   ;ADD THE DATA PAT LENGTH TO THE TX COUNT.
 7830                                 ;+
 7831                                 ; Loop to check the TX.ACTION bit for another line.
 7832                                 ;-
 7833 041172  000742                  10$:    BR      2$              ;LOOP BACK TO CHECK TX.ACTION BIT AGAIN.
 7834
 7835 041174  013701  002374          60$:    MOV     IESTAT,R1       ;GET THE PRESENT STATES OF TX.IE & RX.IE BITS.
 7836 041200  042700  177760                  BIC     #177760,R0      ;GET SAVED IND.ADR.REG FIELD BITS.
 7837 041204  050001                          BIS     R0,R1           ;COMBINE IND.ADR.REG FIELD BITS WITH IE BITS.
 7838 041206  010177  141066                  MOV     R1,@CSRA        ;RESTORE THE DUT CSR IND.ADR.REG FIELD.
 7839 041212                                  PASS                    ;RESTORE GPRS.
      041212  004736                                      JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
 7840 041214  000002                          RTI
```

```
                        .SBTTL  INTERUPT SERVICE ROUTINE        - TXINTR -
                        ;++ ******************************************************************************
                        ;*      - Transmit Interrupt Service Routine -
                        ;*      This routine handles a transmit interrupt from the Device Under Test
                        ;*      (DUT) by counting the interrupt and reading the DUT CSR to clear the
                        ;*      interrupt request.  This routine also sets a flag to indicate that
                        ;*      a TX interrupt has occurred and sets a flag if the TX.ACTION bit is
                        ;*      not set in the read contents of the DUT CSR.
                        ;*
                        ;* INPUTS:      CSRA - Contains the address of the CSR.
                        ;*              TXINTC - Holds the count of the number of TX interupts.
                        ;*              TXINTF - TX Interrupt flags.
                        ;*
                        ;* OUTPUTS:     TXINTC - Contains the updated TX interupt count.
                        ;*              TXINTF - TX Int flags (bit 0 set, bit 15 set if TX.ACTION clr).
                        ;*
                        ;* CALLING SEQUENCE:    Put the address of the label TXINTR in the vector
                        ;*                      location.
                        ;*
                        ;* COMMENTS:
                        ;*
                        ;* SUBORDINATE ROUTINES CALLED: none
                        ;-- ******************************************************************************

041216                  TXINTR:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
041216  004537  005474                 JSR     R5,PREGO5       ;CALL REGISTER SAVE SUBRT.
041222  013701  002416          MOV     TXINTC,R1       ;GET THE TX INTERUPT COUNT.
041226  005201                  INC     R1              ;INCREMENT THE COUNT.
041230  102001                BVC     2$              ;BRANCH IF NO OVERFLOW OCCURRED.
041232  005301                  DEC     R1              ;RESET THE COUNT TO 177777.
041234  010137  002416  2$:     MOV     R1,TXINTC       ;SAVE NEW COUNT VALUE.
041240  013703  002420          MOV     TXINTF,R3       ;GET THE TX INTERRUPT FLAGS.
041244  017702  141030          MOV     @CSRA,R2        ;READ THE CSR.
041250  100402                BMI     4$              ;SKIP SETTING OF FLAG IF TX.ACTION IS SET.
041252  052703  100000          BIS     #BIT15,R3       ;SET THE TX.ACTION CLEAR FLAG.
041256  052703  000001  4$:     BIS     #BIT0,R3        ;SET THE TX INT HAS OCCURRED FLAG.
041262  010337  002420          MOV     R3,TXINTF       ;UPDATE THE TX INTERRUPT FLAGS.
041266                  60$:    PASS                    ;RESTORE GPRS.
041266  004736                          JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
041270  000002                RTI
```

```
                                .SBTTL  INTERRUPT SERVICE ROUTINE       - TXSCHR -
                                ;** ****************************************************************************
                                ;*      - Single Character Mode Transmit Interrupt Service Routine -
                                ;*      This routine executes in response to an iterrupt caused by the DUT
                                ;*      TX.ACTION bit becoming active.  This routine sends the next TX char
                                ;*      or sets the TX Done Flag for the correct line if TX is complete on
                                ;*      that line.
                                ;*
                                ;* INPUTS:      ACTLNS - Bit map of active DUT lines.
                                ;*              BITTBL - Label of table of words each with a bit set.
                                ;*              CHCNTB - Base of # of chars to TX/RX table.
                                ;*              CSRA - Contains the address of the CSR.
                                ;*              DPENDB - Base of the data pattern end table (entry per line).
                                ;*              DPLENB - Base of the data pattern length table.
                                ;*              IACBIT - Bit mask of inactive TX/RX bits.
                                ;*              IBM - Inactive bits mask (reflecting bits per char).
                                ;*              TXCHRA - Contains the address of the DUT TXCHAR register.
                                ;*              TXCNTB - Label at base of TX character counters table.
                                ;*              TXPTRB - Label at the base address of the TX pointers table.
                                ;*
                                ;* OUTPUTS:     CSR - DUT CSR IND.ADR.REG field is destroyed.
                                ;*              TXCHAR - DUT TXCHARs have words written to them.
                                ;*              TXCNTx - Counters incremented for lines on which chars sent.
                                ;*              TXDONF - TX done flags set for lines which have sent all chars.
                                ;*              TXPTRB - Each pointer in table points to next TX char for line.
                                ;*
                                ;* CALLING SEQUENCE:    Put the address of the label TXSCHR in the vector
                                ;*                      location.
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: None.
                                ;-- ****************************************************************************

041272                          TXSCHR:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
041272  004537  005474                         JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
041276  017701  140776                 MOV     @CSRA,R1        ;READ THE CONTENTS OF THE DUT CSR.
041302  010105                         MOV     R1,R5           ;SAVE THE CONTENTS OF THE DUT IND.ADR.REG
041304  042705  137660                 BIC     #137660,R5      ;  FIELD FOR RESTORATION BEFORE RETURN.
041310  010546                         MOV     R5,-(SP)        ;SAVE THE DUT IN.ADD FIELD ON THE STACK.
041312  005005                         CLR     R5              ;CLEAR CHARACTER TRANSMISSION COUNTER.
041314  005701                         TST     R1              ;SET FLAG FOR TEST AFTER THE FOLLOWING BRANCH.
041316  000402                        BR      4$              ;GO HANDLE THE LINE THAT GOT THE TX.ACTION.
                                ;+
                                ; Read the contents of the DUT CSR.  This will clear the TX.ACTION CSR bit.
                                ; If TX.ACTION is not set, exit this routine.
                                ; Determine the line for which the TX.ACTION was set.
                                ; Calculate an offset for use in accessing tables (2 times the line number).
                                ; Determine the states of the DUT CSR interrupt enable bits.
                                ;-
041320  017701  140754          2$:     MOV     @CSRA,R1        ;READ THE CONTENTS OF THE DUT CSR.
041324  100051                 4$:    BPL     60$             ;EXIT ROUTINE IF TX.ACTION IS CLEAR.
041326  010102                         MOV     R1,R2           ;CALCULATE THE LINE NUMBER
041330  000302                         SWAB    R2              ;  OF THE LINE WHICH IS
041332  042702  177760                 BIC     #177760,R2      ;  ASSOCIATED WITH THE TX.ACTION.
041336  010203                         MOV     R2,R3           ;CALCULATE AN OFFSET FOR USE IN ACCESSING
041340  006303                         ASL     R3              ;  LINE COUNTER AND POINTER IN TABLES.
```

```
7937 041342  042701  137677                BIC    #137677,R1      ;GET BIT MASK OF INTERRUPT ENABLE STATES.
7938                                    ;+
7939                                    ; Get the TX character counter for this line.
7940                                    ; If all the characters have been sent for this line:
7941                                    ;    Set the TX done flag for this line.
7942                                    ;    Don't send a char to the line (no more TX.ACTIONS on this line).
7943                                    ;    Loop to check the TX.ACTION for another line.
7944                                    ;-
7945 041346  026363  003652  003612          CMP    TXCNTB(R3),CHCNTB(R3)  ;COMPARE TX CHAR COUNT AND # TO TX.
7946 041354  103404                       BLO    6$              ;GO TO SEND A CHAR IF NOT ALL CHARS SENT.
7947 041356  056337  002534  002652        BIS    BITTBL(R3),TXDONF       ;SET THIS LINE'S TX DONE FLAG.
7948 041364  000757                       BR     4$              ;LOOP TO CHECK TX.ACTION AGAIN.
7949                                    ;+
7950                                    ; Send the next char to the specified line.
7951                                    ;    Set up the IND.ADR.REG field of the DUT CSR using the previously read
7952                                    ;       states of the interrupt enable bits.
7953                                    ;    Fetch the correct character from the data pattern.
7954                                    ;    Update the data pattern pointer for this line using wraparound.
7955                                    ;    Mask out inactive data bits and send the character.
7956                                    ;    Count the character on the TX char counter for the line.
7957                                    ;    Decrement the FIFO slack count to reserve room for this char in the FIFO.
7958                                    ;    Exit if a maximum of 8 characters have been transmitted, ie.give reception
7959                                    ;    a chance to remove characters from the FIFO.
7960                                    ;-
7961 041366  050201                    6$:    BIS    R2,R1           ;SET UP THE IND.ADR.REG FIELD OF THE DUT CSR
7962 041370  010177  140704                   MOV    R1,@CSRA        ;  WITHOUT AFFECTING THE INTERRUPT ENABLES.
7963 041374  016304  003512                   MOV    TXPTRB(R3),R4   ;FETCH THE TX POINTER FOR THIS LINE.
7964 041400  112400                          MOVB   (R4)+,R0        ;GET THE NEXT CHAR FOR THIS LINE.
7965 041402  020463  003312                   CMP    R4,DPENDB(R3)   ;COMPARE POINTER WITH END OF DATA PATTERN.
7966 041406  103402                          BLO    8$              ;SKIP RESETTING OF POINTER IF NOT PAST END.
7967 041410  166304  003352                   SUB    DPLENB(R3),R4   ;WRAP POINTER AROUND TO BEGINNING OF PATTERN.
7968 041414  010463  003512             8$:   MOV    R4,TXPTRB(R3)   ;UPDATE THE TX POINTER FOR THIS LINE.
7969 041420  043700  002366                   BIC    IBM,R0          ;CLEAR UNUSED BITS OF THE TX CHAR WORD.
7970 041424  052700  100000                   BIS    #BIT15,R0       ;SET THE TX.DATA.VALID BIT OF TX CHAR WORD.
7971 041430  010077  140646                   MOV    R0,@TXCHA       ;SEND THE CHAR TO THE DUT.
7972 041434  005205                          INC    R5              ;INCREMENT TX CHAR COUNT.
7973 041436  005263  003652                   INC    TXCNTB(R3)      ;INCREMENT THE TX CHAR COUNT FOR THIS LINE.
7974                                    ;+
7975                                    ; Loop to check the TX.ACTION bit for another line.
7976                                    ;-
7977 041442  020527  000010                   CMP    R5,#NUMLNS      ;CHECK IF MAX NUMBER OF CHAR HAVE BEEN TX'D.
7978 041446  103724                          BLO    2$              ;LOOP BACK TO CHECK TX.ACTION BIT AGAIN.
7979 041450  012677  140624             60$:  MOV    (SP)+,@CSRA     ;RESTORE THE IND.ADR.REG FIELD OF THE DUT CSR.
7980 041454                                 POPS                   ;RESTORE GPRS.
     041454  004736                                JSR    PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
7981 041456  000002                       RTI
```

INTERRUPT SERVICE ROUTINE - TXSCHR -

```
                                ;*****************************************************************************
                                ;
                                ;               VDHE.RPT
                                ;
                                ;*****************************************************************************


                                .SBTTL  REPORT CODING SECTION

                                ;++
                                ; THE REPORT CODING SECTION CONTAINS THE
                                ; "PRINTS" CALLS THAT GENERATE STATISTICAL REPORTS.
                                ;--

041460                                  BGNRPT
041460                                                                  L$RPT::
041460                                  EXIT    RPT
041460  000167                                                                  .WORD   J$JMP
041462  000000                                                                  .WORD   L10025-2-.

                                        .EVEN

041464                                  ENDRPT
041464                                                                  L10025:
041464  104425                                                                  TRAP    C$RPT
```

PROTECTION TABLE

```
                                .SBTTL  PROTECTION TABLE
                                ;*************************************************************************
                                ;
                                ;               FVTSKL4.P11
                                ;
                                ;*************************************************************************



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

041466                                  BGNPROT
041466                                                                  L$PROT::

041466  177777                          -1              ;OFFSET INTO P-TABLE FOR CSR ADDRESS
041470  177777                          -1              ;OFFSET INTO P-TABLE FOR MASSBUS ADDRESS
041472  177777                          -1              ;OFFSET INTO P-TABLE FOR DRIVE NUMBER

041474                                  ENDPROT
```

```
                        ;*****************************************************************************
                        ;
                        ;               VDME.INI
                        ;
                        ;*****************************************************************************



                        .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.
                        ;*
                        ;*****************************************************************************
                        ;--
041474                          BGNINIT
041474                                                                  L$INIT::
                        ;SEE IF PROGRAM JUST STARTED, BR IF YES
041474                          READEF  @EF.START
041474  012700  000040                                                  MOV     @EF.START,R0
041500  104447                                                          TRAP    C$REFG
041502                          BCOMPLETE       NEWSTA
041502  103416                                                          BCS     NEWSTA
                        ;SEE IF PROGRAM JUST RESTARTED, BR IF YES
041504                          READEF  @EF.RESTART
041504  012700  000037                                                  MOV     @EF.RESTART,R0
041510  104447                                                          TRAP    C$REFG
041512                          BCOMPLETE       NEWRES
041512  103555                                                          BCS     NEWRES
                        ;SEE IF THIS IS A NEW PASS, BR IF YES
041514                          READEF  @EF.NEW
041514  012700  000035                                                  MOV     @EF.NEW,R0
041520  104447                                                          TRAP    C$REFG
041522                          BCOMPLETE       NEWPAS
041522  103554                                                          BCS     NEWPAS
                        ;SEE IF PROGRAM WAS JUST CONTINUED
041524                          READEF  @EF.CONTINUE
041524  012700  000036                                                  MOV     @EF.CONTINUE,R0
041530  104447                                                          TRAP    C$REFG
041532                          BNCOMPLETE      GETPRM
041532  103160                                                          BCC     GETPRM
041534  000137  042246          JMP     ENDIT
041540                  NEWSTA:
041540                          BRESET                  ;RESET THE BUS TO PREVENT ILLEGAL INTERRUPTS.
041540  104433                                                          TRAP    C$RESET
                        ;+
                        ; Set up for Line Time Clock interrupts.
                        ;-
041542                          CLOCK   L,R1            ;GET THE CLOCK PARAMETERS.
041542  012700  000114                                                  MOV     #'L,R0
041546  104462                                                          TRAP    C$CLCK
```

INITIALIZE SECTION

```
                041550  010001                                                          MOV     R0,R1
8085            041552  012137  002440                  MOV     (R1)+,CLKCSR            ;STORE CLOCK CSR ADDRESS.
8086            041556  012137  002442                  MOV     (R1)+,CLKBRL            ;STORE CLOCK BUS REQ INT LEVEL.
8087            041562  012137  002444                  MOV     (R1)+,CLKVEC            ;STORE CLOCK INTERRUPT VECTOR.
8088            041566  012137  002446                  MOV     (R1)+,CLKHRZ            ;STORE CLOCK FREQUENCY.
8089            041572  023727  002446  000062          CMP     CLKHRZ,#50.             ;TEST FOR 50HZ LINE FREQUENCY.
8090            041600  001004                          BNE     2$                      ;BRANCH IF CLOCK IS NOT 50HZ.
8091            041602  012737  000024  002460          MOV     #20.,MSTICK             ;INDICATE 20MS PER CLOCK TICK.
8092            041610  000403                          BR      4$
8093            041612  012737  000021  002460  2$:     MOV     #17.,MSTICK             ;INDICATE 17 MS PER CLOCK TICK.
8094            041620                          4$:     SETVEC  CLKVEC,#CLKINT,#PRI06   ;INITIALIZE CLOCK INTERRUPT VECTOR.
                041620  012746  000300                                                  MOV     #PRI06,-(SP)
                041624  012746  040430                                                  MOV     #CLKINT,-(SP)
                041630  013746  002444                                                  MOV     CLKVEC, (SP)
                041634  012746  000003                                                  MOV     #3, (SP)
                041640  104437                                                          TRAP    C$SVEC
                041642  062706  000010                                                  ADD     #10,SP
8095            041646  013700  002446                  MOV     CLKHRZ,R0               ;INITIALIZE THE BREAK COUNT
8096            041652  006200                          ASR     R0                      ; TO CAUSE A BREAK
8097            041654  010037  002456                  MOV     R0,BCOUNT               ; EVERY 1/2 SECOND.
8098            041660  106427  000240                  MTPS    #PRI05                  ;ALLOW CLOCK INTERRUPTS DISABLE OTHERS.
8099                                            ;+
8100                                            ; Enable the Line Time Clock (LTC) checking to make sure that the CSR
8101                                            ; is accessable.
8102                                            ;    First set up to catch any 004 traps which occur:
8103                                            ;-
8104            041664  013737  000004  002422          MOV     @#4,TP4VEC      ;SAVE THE EXISTING 004 TRAP VECTOR.
8105            041672  012737  041042  000004          MOV     #TP4RTN,@#4     ;SET 004 TRAP VECTOR TO OUR SERVICE RTN ADR.
8106                                            ;+
8107                                            ;    Enable LTC checking for 004 trap in case CSR is not there.
8108                                            ;-
8109            041700  005037  002424                  CLR     TP4FLG          ;CLEAR THE 004 TRAP FLAG.
8110            041704  012737  000100  002400          MOV     #BIT6,WORD1     ;SET UP TO SET BIT6 OF THE LTC CSR.
8111            041712  012700  002400                  MOV     #WORD1,R0       ;SET UP WORD1 AS THE CKTRAP MOVE SOURCE.
8112            041716  013701  002440                  MOV     CLKCSR,R1       ;SET UP LTC CSR AS DESTINATION FOR CKTRAP MOVE.
8113            041722  004737  030112                  JSR     PC,CKTRAP       ;MOVE AND CHECK FOR TRAP.
8114            041726  013737  002422  000004          MOV     TP4VEC,@#4      ;RESTORE THE NORMAL 004 TRAP VECTOR.
8115            041734  103403                          BCS     6$              ;IF NO TRAP, LTC IS THERE SO CONTINUE.
8116            041736  005037  002446                  CLR     CLKHRZ          ;CLEAR LTC FREQUENCY WORD TO INDICATE NO LTC.
8117            041742  000402                          BR      8$              ;BYPASS THE FOLLOWING CALIBRATION PROCEDURES.
8118                                            ;+
8119                                            ; Calibrate the DELAY routine milli second delay count value.
8120                                            ;-
8121            041744  004737  027032          6$:     JSR     PC,CALMSL
8122                                            ;+
8123                                            ; Check for Memmory Management present on th's machine.
8124                                            ; If MEM MGT is present, disable it.
8125                                            ;-
8126            041750  013737  000004  002422  8$:     MOV     @#4,TP4VEC      ;SAVE THE EXISTING 004 TRAP VECTOR.
8127            041756  012737  041042  000004          MOV     #TP4RTN,@#4     ;SET 004 TRAP VECTOR TO OUR SERVICE RTN ADR.
8128            041764  005037  002424                  CLR     TP4FLG          ;CLEAR THE 004 TRAP FLAG.
8129            041770  005037  002400                  CLR     WORD1           ;PREPARE TO CLEAR THE MEM MGT SR0 REGISTER.
8130            041774  012700  002400                  MOV     #WORD1,R0       ;SELECT CLEARED WORD AS CKTRAP RTN SOURCE.
8131            042000  013701  002464                  MOV     MMSR0,R1        ;SELECT MEM MGT SR0 REGISTER AS DESTINATION.
8132            042004  005037  002470                  CLR     MMPRES          ;INDICATE NO MEM MGT PRESENT IN CASE IT ISN'T.
8133            042010  005037  002472                  CLR     MMENAB          ;INDICATE MEM MGT IS NOT ENABLED.
8134            042014  004737  030112                  JSR     PC,CKTRAP       ;CLEAR THE MEM MCT SR0 REG AND CHECK FOR TRAP.
```

INITIALIZE SECTION

```
 8135 042020  013737  002422  000004          MOV     TP4VEC,#04      ;RESTORE THE NORMAL 004 TRAP VECTOR.
 8136 042026  103003                          BCC     10$             ;SKIP INDICATING MEM MGT PRESENT IF IT ISN'T.
 8137 042030  012737  000001  002470          MOV     #1,MMPRES       ;INDICATE THAT MEM MGT IS PRESENT.
 8138 042036  005037  002376          10$:    CLR     PASCNT          ;CLR COUNTER USED IN REPORTING ROM VERSION #.
 8139 042042  000137  042054          NEWPAS  JMP     NEWPAS          ;SKIP AROUND THE BUS RESET, IT'S BEEN DONE.
 8140
 8141 042046                          NEWRES: BRESET                  ;RESET THE BUS TO PREVENT ILLEGAL INTERRUPTS.
      042046  104433                                                          TRAP    C$RESET
 8142 042050  005037  002376                  CLR     PASCNT          ;CLR COUNTER USED IN REPORTING ROM VERSION #.
 8143
 8144 042054                          NEWPAS:
 8145 042054  012737  177777  002276          MOV     #-1,UNITN       ;RESET LOGICAL DEVICE TO -1
 8146                                 ;+
 8147                                 ; Increment the pass counter, correct for any overflow.
 8148                                 ;  This counter is used in the Rom version test.
 8149                                 ;-
 8150 042062  005237  002376                  INC     PASCNT          ;INCREMENT THE PASS COUNTER.
 8151 042066  001002                          BNE     GETPRM          ;BRANCH IF WE HAVE NOT YET! OVERFLOWED.
 8152 042070  005337  002376                  DEC     PASCNT          ;SET PASS COUNT TO 177777 OCTAL.
 8153
 8154                                 ; GET THE HARDWARE PARAMETERS FOR THIS UNIT.
 8155 042074                          GETPRM:
 8156 042074  005237  002276                  INC     UNITN           ;INCREMENT LOGICAL DEVICE NUMBER
 8157 042100  023737  002276  002012          CMP     UNITN,L$UNIT    ;SEE IF MAXIMUM UNIT NO. EXCEEDED
 8158 042106  002362                          BGE     NEWPAS          ;BR IF YES
 8159
 8160 042110                                  GPHARD  UNITN,R1        ;GET P-TABLE POINTER INTO R1
      042110  013700  002276                                                  MOV     UNITN,R0
      042114  104442                                                          TRAP    C$GPHRD
      042116  010001                                                          MOV     R0,R1
 8161 042120                                  BCOMPLETE       30$     ;BR IF DEVICE AVAILABLE
      042120  103401                                                          BCS     30$
 8162 042122  000764                          BR      GETPRM          ;SKIP THIS DEVICE
 8163
 8164
 8165                                 ;************ HARDWARE PARAMETER MOVING CODE ****************
 8166 042124  012137  002300          30$:    MOV     (R1)+,CSRA      ;STORE DHV11-M CSR ADDRESS IN DEV.REG.ADDRESS TABLE
 8167 042130  012102                          MOV     (R1)+,R2        ;GET THE RX INTERRUPT VECTOR ADDRESS.
 8168 042132  010237  002266                  MOV     R2,RXVECA       ;STORE RX INT VECTOR ADDRESS.
 8169 042136  062702  000004                  ADD     #4,R2           ;CALCULATE TX INTERRUPT VECTOR ADDRESS.
 8170 042142  010237  002270                  MOV     R2,TXVECA       ;STORE TX INT VECTOR ADDRESS.
 8171 042146  012102                          MOV     (R1)+,R2        ;REMOVE DATA FROM EMPTY P-TABLE SLOT.
 8172 042150  012737  000377  002272          MOV     #MAPLNS,ACTLNS  ;INDICATE THAT ALL POSSIBLE LINES ARE ACTIVE.
 8173 042156  112102                          MOVB    (R1)+,R2        ;REMOBE DATA FROM EMPTY P-TABLE SLOT.
 8174 042160  112737  000001  002274          MOVB    #1,LOPBCK       ;FORCE INTERNAL LOOPBACK MODE
 8175 042166  112137  002275                  MOVB    (R1)+,BRLEVL    ;STORE DHV11-M INTERUPT BUS REQUEST LEVEL
 8176                                 ;+
 8177                                 ;       CALCULTATE DEVICE REGISTER ADDRESSES,AND PUT THEM IN THE
 8178                                 ;       DEVICE REGISTER ADDRESS TABLE.
 8179                                 ;
 8180 042172  013701  002300                  MOV     CSRA,R1         ;COPY CSR ADDRESS
 8181 042176  005201                          INC     R1              ;INCREMENT CSR ADDRESS
 8182 042200  005201                          INC     R1              ; COPY BY 2.
 8183 042202  012703  000007                  MOV     #7,R3           ;SET UP REGISTER COUNT
 8184 042206  012702  002302                  MOV     #RBUFA,R2       ;GET LOCATION WHERE RBUF ADDRESS GOES IN TABLE
 8185 042212  010122                  12$:    MOV     R1,(R2)+        ;STORE REGISTER ADDRESS IN TABLE
 8186 042214  005201                          INC     R1              ;INCREMENT REGISTER ADDRESS
```

INITIALIZE SECTION SEQ 0211

```
8187 042216  005201                        INC     R1              ; BY 2,FOR THE NEXT DEVICE REGISTER.
8188 042220  005303                        DEC     R3              ;DECREMENT REGISTER COUNT
8189 042222  001373                        BNE     12$             ;LOOP IF NOT DONE
8190
8191                                ;+
8192                                ; Initialise the BMP code queue.
8193                                ;-
8194 042224  012700  002662                 MOV     #BMPCQB,R0      ;GET THE START ADDRESS OF THE QUEUE.
8195 042230  012701  003062                 MOV     #BMPCQE,R1      ;GET THE END ADDRESS OF THE QUEUE.
8196 042234  010037  002660                 MOV     R0,BMPCQP       ;SET THE POINTER TO THE START OF THE QUEUE.
8197 042240  005020                 14$:    CLR     (R0)+           ;CLEAR OUT THE CONTENTS OF THE QUEUE.
8198 042242  020001                         CMP     R0,R1           ;CHECK IF END OF QUEUE HAS BEEN REACHED.
8199 042244  103775                        BLO     14$             ;LOOP IF NOT ALL DONE.
8200 042246                         16$:
8201
8202 042246  005037  002362        ENDIT:  CLR     CTRLCF          ;CLR THE CTRL-C TEST ABORT FLAG.
8203                                ;+
8204                                ; Set the processor priority to disable all but LTC interrupts.
8205                                ;-
8206 042252  106427  000240                 MTPS    #PRIO5                  ;SET PROCESSOR PRIORITY TO 5.
8207                                ;+
8208                                ;    Enable Line Time Clock if one is available.
8209                                ;-
8210 042256  005737  002446                 TST     CLKHRZ          ;CHECK FOR A LTC BEING PRESENT.
8211 042262  001403                        BEQ     18$             ;LTC PRESENT?  NO, SKIP LTC ENABLE.
8212 042264  012777  000100  140146         MOV     #BIT6,@CLKCSR   ;YES, ENABLE THE LTC.
8213 042272                         18$:
8214
8215 042272                                ENDINIT
     042272
     042272  104411                                                    L10027:
                                                                               TRAP    C$INIT
8216
8217         000000                        TNUM == 0               ;INITIALIZE THE ASSEMBLER TEST NUMBER VARIABLE.
```

INITIALIZE SECTION SEQ 0212

```
 8220                           ;*****************************************************************************************************
 8221                           ;
 8222                           ;               VDHE.ATD
 8223                           ;
 8224                           ;*****************************************************************************************************
 8226
 8227
 8228                           .SBTTL  AUTODROP SECTION
 8229
 8230
 8231                           ;++
 8232                           ; THIS CODE IS EXECUTED IMMEDIATELY AFTER THE INITIALIZE CODE IF
 8233                           ; THE "ADR" FLAG WAS SET.  THE UNIT(S) UNDER TEST ARE CHECKED TO
 8234                           ; SEE IF THEY WILL RESPOND.  THOSE THAT DON'T ARE IMMEDIATELY
 8235                           ; DROPPED FROM TESTING.
 8236                           ;--
 8237
 8238 042274                           BGNAUTO
      042274                                                          L$AUTO::
 8239
 8246
 8247 042274                           ENDAUTO
      042274                                                          L10030:
      042274  104461                                                         TRAP    C$AUTO
```

```
                        ;*****************************************************************************
                        ;
                        ;               VDHE.CUC
                        ;
                        ;*****************************************************************************


                        .SBTTL  CLEANUP CODING SECTION

                        ;++
                        ; THE CLEANUP CODING SECTION CONTAINS THE CODING THAT IS PERFORMED
                        ; AFTER THE HARDWARE TESTS HAVE BEEN PERFORMED.
                        ;--

042276                          BGNCLN
042276                                                                  L$CLEAN::

042276  005737  002362          TST     CTRLCF          ;DID WE GET HERE BY CTRL-C FROM TEST?
042302  001401                  BEQ     2$              ;CTRL-C FROM TEST?  NO, SKIP BUS RESET.
042304                          BRESET                  ;YES, CLR ANY DMAS OR OUTSTANDING INTERRUPTS.
042304  104433                                                          TRAP    C$RESET
042306                  2$:
042306  005737  002446          TST     CLKHRZ          ;SEE IF CLOCK WAS ENABLED
042312  001402                  BEQ     3$              ;IF NOT BRANCH
042314  005077  140120          CLR     @CLKCSR
042320                  3$:
042320                          EXIT    CLN
042320  104432                                                          TRAP    C$EXIT
042322  000002                                                          .WORD   L10031-.

                        .EVEN

042324                          ENDCLN
042324                                                          L10031:
042324  104412                                                          TRAP    C$CLEAN
```

CLEANUP CODING SECTION

```
8302
8303                                    ;*****************************************************************************************
8304                                    ;
8305                                    ;               VDHE.DRP
8306                                    ;
8307                                    ;*****************************************************************************************
8308
8309
8310
8311                                    .SBTTL  DROP UNIT SECTION
8312
8313                                    ;++
8314                                    ; THE DROP-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
8315                                    ; TO NO LONGER BE TESTED.
8316                                    ;--
8317
8318 042326                                     BGNDU
     042326                                                                     L$DU::
8319
8320                                    ;*****************************************************************************************
8321                                    ;       INSERT DROP CODE HERE.  THIS CODE WILL BE EXECUTED AFTER
8322                                    ;       A "DROP" COMMAND OR A "DODU" MACRO EXECUTION.  THE PURPOSE
8323                                    ;       OF THIS CODE IS TO DO ANY NECESSARY HOUSEKEEPING AFTER A
8324                                    ;       UNIT HAS BEEN DROPPED.  THIS SECTION IS OPTIONAL.
8325                                    ;*****************************************************************************************
8326 042326                                      PRINTF @DROP,R0        ;REPORT UNIT THAT HAS BEEN DROPPED.
     042326  010046                                                                MOV     R0,-(SP)
     042330  012746  042352                                                        MOV     @DROP,-(SP)
     042334  012746  000002                                                        MOV     #2,-(SP)
     042340  010600                                                                MOV     SP,R0
     042342  104417                                                                TRAP    C$PNTF
     042344  062706  000006                                                        ADD     #6,SP
8327 042350  000427                            BR      EDROP           ;BRANCH AROUND THE MESSAGE.
8328
8329 042352      045     101     040  DROP:    .ASCIZ/%A UNIT%D6%A DROPPED FROM FURTHER TESTING.%N/
     042355      125     116     111
     042360      124     045     104
     042363      066     045     101
     042366      040     104     122
     042371      117     120     120
     042374      105     104     040
     042377      106     122     117
     042402      115     040     106
     042405      125     122     124
     042410      110     105     122
     042413      040     124     105
     042416      123     124     111
     042421      116     107     056
     042424      045     116     000
8330                                    .EVEN
8331 042430                        EDROP:
8332
8333 042430                             EXIT    DU
     042430  000167                                                           .WORD   J$JMP
     042432  000000                                                           .WORD   L10032-2-.
8334
8335
```

SEQ 0215

DROP UNIT SECTION

```
 8336 042434                                ENDDU
      042434                                                    L10032:
      042434  104453                                                      TRAP    C$DU
```

```
 8338
 8339                           ;*****************************************************************************************************
 8340                           ;
 8341                           ;               VDHE.ADD
 8342                           ;
 8343                           ;*****************************************************************************************************
 8344
 8345
 8346
 8347                           .SBTTL  ADD UNIT SECTION
 8348
 8349                           ;++
 8350                           ; THE ADD-UNIT SECTION CONTAINS ANY CODE THE PROGRAMMER WISHES
 8351                           ;  TO BE EXECUTED IN CONJUNCTION WITH THE ADDING OF A UNIT BACK
 8352                           ;  TO THE TEST CYCLE.
 8353                           ;
 8354
 8355 042436                           BGNAU
      042436                                                                  L$AU::
 8356
 8357                           ;*****************************************************************************************************
 8358                           ;       INSERT ADD CODE HERE.  THIS CODE WILL BE EXECUTED AFTER
 8359                           ;       AN "ADD" COMMAND.  THE PURPOSE OF THIS CODE IS TO DO ANY
 8360                           ;       HOUSEKEEPING THAT MAY BE NECESSARY AFTER A UNIT HAS BEEN ADDED.
 8361                           ;       THIS SECTION IS OPTIONAL.
 8362                           ;*****************************************************************************************************
 8363
 8364 042436                           EXIT    AU
      042436  000167                                                          .WORD   J$JMP
      042440  000000                                                          .WORD   L10033-2-.
 8365
 8366
 8367                           .EVEN
 8368
 8369 042442                           ENDAU
      042442                                                          L10033:
      042442  104452                                                          TRAP    C$AU
 8370
```

```
 8372                                   .SBTTL  HARDWARE TEST           - ADRA -
 8373                                   ;++
 8374                                   ;*****************************************************************************
 8375                                   ;*                        - REGISTER ADDRESS TEST -
 8376                                   ;*
 8377                                   ;*      This test verifies that the Q-bus can read and write to the DHV11
 8378                                   ;*      device registers.  If the DHV11 does not respond to the access
 8379                                   ;*      attempts (If the DHV11 is at the wrong address, for example) the
 8380                                   ;*      004 bus time-out trap is detected by this routine and an error
 8381                                   ;*       's reported.
 8382                                   ;*
 8383                                   ;*****************************************************************************
 8384                                   ;--
 8385
 8386 042444                                       BGNTST
      042444                                                                          T1::
 8387           000001                             TNUM == TNUM + 1          ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 8388 042444   012737  000001  002364               MOV     @TNUM,TSTNUM      ;SET UP THE TEST NUMBER.          (1)
 8389 042452   012737  177777  002362               MOV     @-1,CTRLCF        ;INDICATE THAT WE ARE IN A TEST.
 8390                                   ;+
 8391                                   ; Set up to catch any 004 traps which occur:
 8392                                   ;-
 8393 042460   013737  000004  002422               MOV     @#4,TP4VEC        ;SAVE THE EXISTING 004 TRAP VECTOR.
 8394 042466   012737  041042  000004               MOV     @TP4RTN,@#4       ;SET 004 TRAP VECTOR TO OUR SERVICE RTN ADR.
 8395 042474   005005                              CLR     R5                ;CLEAR THE ERROR FLAGS.
 8396
 8397                                   ;+
 8398                                   ; Set up for the initial iteration of the test loop:
 8399                                   ;-
 8400 042476   005004                              CLR     R4                ;CLEAR THE LINE COUNTER.
 8401
 8402                                   ;+
 8403                                   ; Here begins the loop to test the registers for a line.
 8404                                   ;    First test the CSR and set the IND.ADR.REG (I.A.R) field.
 8405                                   ;-
 8406 042500   005037  002424          2$:       CLR     TP4FLG            ;CLEAR THE 004 TRAP FLAG.
 8407 042504   013700  002300                     MOV     CSRA,R0           ;SET UP CSR AS THE CKTRAP MOVE SOURCE.
 8408 042510   012701  042724                     MOV     @52$,R1           ;SET UP DESTINATION LOCATION FOR CKTRAP MOVE.
 8409 042514   004737  030112                    JSR     PC,CKTRAP         ;MOVE AND CHECK FOR TRAP.
 8410 042520   103402                           BCS     4$                ;IF NO TRAP, BYPASS ERROR.
 8411 042522   052705  100001                     BIS     @100001,R5        ;SET FATAL READ ERROR FLAGS.
 8412 042526   042737  000017  042724  4$:       BIC     @17,52$           ;CLEAR THE I.A.R FIELD OF THE CSR DATA.
 8413 042534   050437  042724                     BIS     R4,52$            ;OR IN THE LINE COUNTER TO THE I.A.R FIELD.
 8414 042540   010100                           MOV     R1,R0             ;USE OLD DESTINATION FOR SOURCE OF CKTRAP MOVE.
 8415 042542   013701  002300                     MOV     CSRA,R1           ;SET UP CSR AS THE CKTRAP MOVE DESTINATION.
 8416 042546   004737  030112                    JSR     PC,CKTRAP         ;MOVE AND CHECK FOR TRAP.
 8417 042552   103403                           BCS     6$                ;IF NO TRAP, BYPASS ERROR.
 8418 042554   052705  100002                     BIS     @100002,R5        ;SET FATAL WRITE ERROR FLAGS.
 8419 042560   000440                           BR      40$               ;EXIT AND REPORT FATAL ERROR.
 8420                                   ;+
 8421                                   ;    Now, we test each register for this line.
 8422                                   ;-
 8423 042562   012702  000010          6$:       MOV     @10,R2            ;INIT REGISTER COUNTER TO 8.
 8424 042566   013737  002300  042722               MOV     CSRA,50$                  ;INITIALIZE THE REGISTER POINTER.
 8425 042574   012700  042722          8$:       MOV     @50$,R0           ;SET UP REGISTER AS THE SOURCE FOR CKTRAP MOVE.
 8426 042600   012701  042724                     MOV     @52$,R1           ;SET UP LOCAL STORAGE AS THE DES FOR CKTRAP.
 8427 042604   004737  030112                    JSR     PC,CKTRAP         ;PERFORM THE MOVE, CHECK FOR TRAP.
```

```
 8428 042610  103402                    BCS     10$             ;IF NO TRAP, BYPASS THE SETTING OF ERROR FLAGS.
 8429 042612  052705  100001             BIS     #100001,R5      ;SET FATAL READ ERROR FLAGS.
 8430 042616  010100               10$:  MOV     R1,R0           ;USE OLD DEST AS SRC FOR CKTRAP MOVE.
 8431 042620  012701  042722             MOV     #50$,R1         ;SET UP REGISTER AS THE DEST FOR CKTRAP MOVE.
 8432 042624  004737  030112             JSR     PC,CKTRAP       ;PERFORM THE MOVE, CHECK FOR TRAP.
 8433 042630  103402                    BCS     12$             ;IF NO TRAP, BYPASS THE SETTING OF ERROR FLAGS.
 8434 042632  052705  100002             BIS     #100002,R5      ;SET FATAL WRITE ERROR FLAGS.
 8435 042636  005237  042722       12$:  INC     50$             ;INCREMENT THE REGISTER
 8436 042642  005237  042722             INC     50$             ; POINTER BY 2.
 8437 042646  005302                    DEC     R2              ;COUNT THE REGISTER.
 8438 042650  001351                    BNE     8$              ;LOOP TO TEST THE NEXT REGISTER ADDRESS.
 8439
 8440                               ;+
 8441                               ; Now we set up to test the next line, or to exit if we are done.
 8442                               ;-
 8443 042652  005204                    INC     R4              ;INCREMENT THE LINE COUNTER.
 8444 042654  020427  000010             CMP     R4,#NUMLNS      ;COMPARE LINE COUNTER AGAINST NUMBER OF LINES.
 8445 042660  002707                    BLT     2$              ;LOOP TO TEST THE NEXT LINE IF WE'RE NOT DONE.
 8446
 8447                               ;+
 8448                               ; Done checking device register addresses.
 8449                               ;    Report any errors and exit.
 8450                               ;-
 8451 042662  013737  002422  000004 40$:  MOV     TP4VEC,@#4     ;RESTORE THE NORMAL 004 TRAP VECTOR.
 8452 042670  005705                    TST     R5              ;CHECK THE ERROR FLAGS.
 8453 042672  100015                    BPL     60$             ;EXIT ROUTINE IF NO ERRORS.
 8454                                ; REPORT "DEVICE REGISTER ACCESS ERRORS"
 8455 042674                            ERRDF   101,EM0103,ER0101;              >>>>> ERROR #101 <<<<<.
      042674  104455                                                              TRAP    C$ERDF
      042676  000145                                                              .WORD   101
      042700  010727                                                              .WORD   EM0103
      042702  024240                                                              .WORD   ER0101
 8456
 8457 042704                            DODU    UNITN           ;DROP THIS UNIT FROM FUTHER TESTING.
      042704  013700  002276                                                      MOV     UNITN,R0
      042710  104451                                                              TRAP    C$DODU
 8458 042712  005037  002362             CLR     CTRLCF          ;INDICATE NO CTRL-C ABORT FROM TEST.
 8459 042716                            DOCLN                   ;ABORT THIS SUB PASS.
      042716  104444                                                              TRAP    C$DCLN
 8460 042720  000402                    BR      60$             ;
 8461                               ;+
 8462                               ; Local storage.
 8463                               ;-
 8464 042722  000000               50$:  .WORD   0       ;STORAGE FOR THE SOURCE OR DEST OF THE CKTRAP MOVE.
 8465 042724  000000               52$:  .WORD   0       ;STORAGE FOR THE SOURCE OR DEST OF THE CKTRAP MOVE.
 8466 042726  005037  002362       60$:  CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
 8467 042732                            ENDTST
      042732                                                            L10034:
      042732  104401                                                              TRAP    C$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.
                                ;*
                                ;-- ******************************************************************************
042734                                  BGNTST
042734                                                                  T2::
        000002                          TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
042734  012737  000002  002364           MOV    #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (2)
042742  012737  177777  002362           MOV    #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
042750  012737  000001  005464           MOV    #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
042756  012737  010765  005470           MOV    #EM0201,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
042764  012737  024562  005472           MOV    #ER0201,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                ;+
                                ; Wait up to 5 seconds for the DUT Master Reset bit to clear.
                                ;-
042772  012701  011610                   MOV    #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
042776  012702  000040                   MOV    #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
043002  005003                           CLR    R3              ;WAITING FOR BIT TO CLEAR.
043004  013704  002300                   MOV    CSRA,R4         ;BIT IS IN THE DUT'S CSR.
043010  004737  031726                   JSR    PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
043014  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.
                                ;-
043016                                  BRESET                  ;NO, TRY TO JOG DEVICE WITH BUS RESET.
043016  104433                                                          TRAP    C$RESET
043020  004737  035740                   JSR    PC,SKPSTS       ;TRY TO SKIP THE SELFTEST.
043024  012701  011610                   MOV    #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
043030  004737  031726                   JSR    PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
043034  103016                           BCC    4$              ;GO REPORT ERROR IF MR BIT DID NOT CLEAR.
                                ;+
                                ; Set the Master Reset bit and verify that it clears within the proper time.
                                ;-
043036  012701  011610          2$:      MOV    #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
043042  010214                           MOV    R2,(R4)         ;SET THE DUT MASTER RESET BIT.
043044  004737  031726                   JSR    PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
043050  103010                           BCC    4$              ;GO REPORT ERROR IF MR BIT DID NOT CLEAR.
043052  012702  011610                   MOV    #5000.,R2
043056  160102                           SUB    R1,R2           ;CALCULATE # OF MS FOR MR TO CLEAR.
043060  001413                           BEQ    6$              ;GO REPORT ERROR IF MR CLEAR IMMEDIATELY.
043062  020227  000764                   CMP    R2,#500.
043066  002417                           BLT    8$              ;GO REPORT ERROR IF MR CLEAR IN < 1/2 SECOND.
043070  000424                           BR     60$             ;EXIT THE TEST WITHOUT ERROR.
                                ;+
                                ; Error reports:
                                ;-
                                    ;Report MR bit would not clear after a DUT reset.
005466  043072  012737  000311  4$:      MOV    #201.,ERRNBR    ;SET THE ERROR NUMBER IN ERROR TABLE.
043100  012701  011033                   MOV    #EM0202,R1      ;SELECT ERROR MESSAGE.
043104                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #201 <<<<<
043104  104460                                                          TRAP    C$ERROR
043106  000415                           BR     60$             ;EXIT THE TEST.
```

HARDWARE TEST - MRSTA - SEQ 0220

```
 8523                                          ;Report MR bit clear immediately after DUT reset.
 8524 043110  012737  000312  005466  6$:      MOV     #202.,ERRNBR    ;SET THE ERROR NUMBER IN ERROR TABLE.
 8525 043116  012701  011206                   MOV     #EM0203,R1      ;SELECT ERROR MESSAGE.
 8526 043122                                   ERROR                   ;REPORT ERROR.          >>>>> ERROR #202 <<<<<
      043122  104460                                                                             TRAP    C$ERROR
 8527 043124  000406                           BR      60$             ;EXIT THE TEST.
 8528
 8529                                          ;Report MR clear within 1/2 second of DUT reset.
 8530 043126  012737  000313  005466  8$:      MOV     #203.,ERRNBR    ;SET THE ERROR NUMBER IN ERROR TABLE.
 8531 043134  012701  011351                   MOV     #EM0204,R1      ;SELECT ERROR MESSAGE.
 8532 043140                                   ERROR                   ;REPORT ERROR.          >>>>> ERROR #203 <<<<<
      043140  104460                                                                             TRAP    C$ERROR
 8533
 8534 043142  005037  002362          60$:     CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 8535
 8536 043146                                   ENDTST
      043146                                                           L10035:
      043146  104401                                                                             TRAP    C$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.
                                ;*
                                ;-- ************************************************************************
043150                                  BGNTST
043150                                                                          T3::
                000003                  TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
043150  012737  000003  002364           MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (3)
043156  012737  177777  002362           MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
043164  012737  000001  005464           MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
043172  012737  011530  005470           MOV     #EM0301,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
043200  012737  024562  005472           MOV     #ER0201,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                ;+
                                ; Wait up to 5 seconds for the DUT Master Reset bit to clear.
                                ;-
043206  012701  011610                   MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
043212  012702  000040                   MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
043216  005003                           CLR     R3              ;WAITING FOR BIT TO CLEAR.
043220  013704  002300                   MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
043224  004737  031726                   JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
043230  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.
                                ;-
043232                                  BRESET                  ;NO, TRY TO JOG DEVICE WITH BUS RESET.
043232  104433                                                                  TRAP    C$RESET
043234  004737  035740                   JSR     PC,SKPSTS       ;TRY TO SKIP THE SELFTEST.
043240  012701  011610                   MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
043244  004737  031726                   JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
043250  103024                           BCC     6$              ;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.
                                ;-
043252  012701  000310          2$:      MOV     #200.,R1        ;TIME-OUT VALUE IS 1/5 SECOND.
043256  010214                           MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
043260  004737  035740                   JSR     PC,SKPSTS       ;TRY TO SKIP THE SELFTEST.
043264  004737  031726                   JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
043270  103007                           BCC     4$              ;GO FIND OUT WHAT IS WRONG IF MR NOT CLEAR.
043272  012702  000310                   MOV     #200.,R2
043276  160102                           SUB     R1,R2           ;CALCULATE # OF MS FOR MR TO CLEAR.
043300  020227  000012                   CMP     R2,#10.
043304  002415                          BLT     8$              ;GO REPORT ERROR IF MR CLEAR IN < 10 MS.
043306  000431                           BR      60$             ;EXIT THE TEST WITHOUT ERROR.
                                ;+
                                ; MR did not clear within 1/5 second, see if it clears within 5 seconds.
                                ;-
043310  012701  011300          4$:      MOV     #4800.,R1       ;TIME-OUT VALUE IS 5 SECONDS MINUS 1/5 SECOND.
043314  004737  031726                  JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
043320  103416                           BCS     10$             ;GO REPORT ERROR IF MR CLEARED FINALLY.
                                ;+
                                ; Error reports:
                                ;
```

HARDWARE TEST - MRSSTA -

```
 8593                                          ;Report MR bit would not clear after a DUT reset.
 8594 043322  012737  000455  005466  6$:      MOV     #0301.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
 8595 043330  012701  011033                   MOV     #EM0202,R1      ;SELECT ERROR MESSAGE.
 8596 043334                                   ERROR                   ;REPORT ERROR.          >>>>> ERROR #0301 <<<<<
      043334  104460                                                                            TRAP    C$ERROR
 8597 043336  000415                           BR      60$             ;EXIT THE TEST.
 8598
 8599                                          ;Report MR bit clear within 10 ms after DUT reset.
 8600 043340  012737  000456  005466  8$:      MOV     #0302.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
 8601 043346  012701  011573                   MOV     #EM0302,R1      ;SELECT ERROR MESSAGE.
 8602 043352                                   ERROR                   ;REPORT ERROR.          >>>>> ERROR #0302 <<<<<
      043352  104460                                                                            TRAP    C$ERROR
 8603 043354  000406                           BR      60$             ;EXIT THE TEST.
 8604
 8605                                          ;Report MR cleared between 1/5 second and 5 seconds of DUT reset.
 8606 043356  012737  000457  005466  10$:     MOV     #0303.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
 8607 043364  012701  011733                   MOV     #EM0303,R1      ;SELECT ERROR MESSAGE.
 8608 043370                                   ERROR                   ;REPORT ERROR.          >>>>> ERROR #0303 <<<<<
      043370  104460                                                                            TRAP    C$ERROR
 8609
 8610 043372  005037  002362          60$:     CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 8611
 8612 043376                                   ENDTST
      043376                                                                    L10036:
      043376  104401                                                                            TRAP    C$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.
                                ;*
                                ;-- ******************************************************************************
                                        BGNTST
                                                                                        T4::
                                         TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
043400  012737  000004  002364         MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (4)
043406  012737  177777  002362         MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
043414  012737  000001  005464         MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
043422  012737  012112  005470         MOV     #EM0401,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
043430  012737  024562  005472         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.
                                ;-
043436  012701  011610                  MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
043442  012702  000040                  MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
043446  005003                          CLR     R3              ;WAITING FOR BIT TO CLEAR.
043450  013704  002300                  MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
043454  010214                          MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
043456  004737  035740                  JSR     PC,SKPSTS       ;SKIP THE SELFTEST.
043462  004737  031726                  JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
043466  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.
                                ;-
043470  012400                          MOV     (R4)+,R0        ;INCREMENT POINTER TO POINT TO DUT RBUF REGSTR.
043472  012701  000006                  MOV     #6,R1           ;INITIALIZE THE LOOP COUNTER.
043476  011402                  2$:     MOV     (R4),R2         ;READ A CHARACTER FROM THE DUT RBUF REGISTER.
043500  010200                          MOV     R2,R0
043502  042700  177476                  BIC     #177476,R0      ;REMOVE ALL BUT BITS SPECIFIC TO SELFTEST CODE.
043506  020027  000201                  CMP     R0,#201         ;CHECK THAT BITS 0,6, AND 7 ARE CORRECT.
043512  001012                          BNE     6$              ;GO REPORT ERROR IF CODE IS NOT SELFTEST CODE.
043514  005301                          DEC     R1              ;COUNT THIS LOOP ITERATION.
043516  001367                          BNE     2$              ;LOOP IF NOT ALL LINES DONE.
043520  000415                          BR      60$             ;EXIT TEST, NO ERROR FOUND.

                                ;+
                                ; Error reports:
                                ;-
                                    ;Report MR bit would not clear after a DUT reset.
043522  012737  000621  005466  4$:      MOV     #0401.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
043530  012701  011033                  MOV     #EM0202,R1      ;SELECT ERROR MESSAGE.
043534                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0401 <<<<<
043534  104460                                                                                  TRAP    C$ERROR
043536  000406                          BR      60$             ;EXIT THE TEST.

                                    ;Report improper code found in DUT RBUF after reset (skip selftest).
043540  012737  000622  005466  6$:      MOV     #0402.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
043546  012701  012161                  MOV     #EM0402,R1      ;SELECT ERROR MESSAGE.
043552                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0402 <<<<<
```

HARDWARE TEST - RXCHRA -

```
        043552  104460                                                                  TRAP    C$ERROR
 8669
 8670 043554  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 8671
 8672 043560                                  ENDTST
      043560                                                          L10037:
      043560  104401                                                  TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - RXFFDA -
                                ;++ ************************************************************************
                                ;*              - RBUF Register RX Flag Field Test -
                                ;*      This test verifies that the Field of 3 flag bits in the RBUF reads
                                ;*      as all ones when the Selftest codes are being read from the DUT
                                ;*      after a board reset and skip selftest sequence.
                                ;*
                                ;-- ************************************************************************
                                        BGNTST
                                                                                                T5::
                                         TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
043562  012737  000005  002364          MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (5)
043570  012737  177777  002362          MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
043576  012737  000001  005464          MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
043604  012737  012331  005470          MOV     #EM0501,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
043612  012737  024562  005472          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.
                                ;-
043620  012701  011610                  MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
043624  012702  000040                  MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
043630  005003                          CLR     R3              ;WAITING FOR BIT TO CLEAR.
043632  013704  002300                  MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
043636  010214                          MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
043640  004737  035740                  JSR     PC,SKPSTS       ;SKIP THE SELFTEST.
043644  004737  031726                  JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
043650  103013                          BCC     4$              ;GO REPORT ERROR IF MR DID NOT CLEAR.
                                ;+
                                ; Read 8 characters from the DUT and verify that all 3 RX error flags are
                                ;  set for each characters.
                                ;-
043652  012400                  MOV     (R4)+,R0        ;INCREMENT POINTER TO POINT TO DUT RBUF REGSTR.
043654  012701  000010          MOV     #8.,R1          ;INITIALIZE THE LOOP COUNTER.
043660  011402          2$:     MOV     (R4),R2         ;READ A CHARACTER FROM THE DUT RBUF REGISTER.
043662  012700  070000          MOV     #70000,R0
043666  040200                  BIC     R2,R0           ;CALCULATE BIT MAP OF CLEAR RX ERROR FLAGS.
043670  001012                  BNE     6$              ;GO REPORT ERROR IF NOT ALL RX ERROR FLAGS SET.
043672  005301                  DEC     R1              ;COUNT THIS LOOP ITERATION.
043674  001371                  BNE     2$              ;LOOP IF NOT ALL LINES DONE.
043676  000415                  BR      60$             ;EXIT TEST, NO ERROR FOUND.

                                ;+
                                ; Error reports:
                                ;-
                                    ;Report MR bit would not clear after a DUT reset.
043700  012737  000765  005466  4$:      MOV     #0501.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
043706  012701  011033                  MOV     #EM0202,R1      ;SELECT ERROR MESSAGE.
043712                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0501 <<<<<
043712  104460                                                                                  TRAP    C$ERROR
043714  000406                          BR      60$             ;EXIT THE TEST.

                                    ;Report one or more RX error flags found set with selftest code.
043716  012737  000766  005466  6$:      MOV     #0502.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
043724  012701  012377                  MOV     #EM0502,R1      ;SELECT ERROR MESSAGE.
043730                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0502 <<<<<
043730  104460                                                                                  TRAP    C$ERROR
```

HARDWARE TEST RXFFDA - SEQ 0226

```
8728
8729 043732  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
8730
8731 043736                                  ENDTST
     043736                                                                  L10040:
     043736  104401                                                                  TRAP    C$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.
                                ;*
                                ;-- ******************************************************************************
                                        BGNTST
                                                                                        T6::
                                         TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
043740  012737  000006  002364          MOV    #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (6)
043746  012737  177777  002362          MOV    #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
043754  012737  000001  005464          MOV    #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
043762  012737  012737  005470          MOV    #EM0601,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
043770  012737  024562  005472          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.
                                ;-
043776  012701  011610                  MOV    #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
044002  012702  000040                  MOV    #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
044006  005003                          CLR    R3              ;WAITING FOR BIT TO CLEAR.
044010  013704  002300                  MOV    CSRA,R4         ;BIT IS IN THE DUT'S CSR.
044014  010214                          MOV    R2,(R4)         ;SET THE DUT MASTER RESET BIT.
044016  004737  035740                 JSR    PC,SKPSTS       ;SKIP THE SELFTEST.
044022  004737  031726                 JSR    PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
044026  103016                         BCC    4$              ;GO REPORT ERROR IF MR DID NOT CLEAR.
                                ;+
                                ; Check that the RX Data Available bit is set.
                                ;-
044030  032714  000200                  BIT    #BIT7,(R4)      ;TEST THE DUT RX.DATA.AVAIL BIT.
044034  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.
                                ;-
044036  012705  001130                  MOV    #600.,R5        ;ALLOW READING 600 CHARS BEFORE ERROR.
044042  010403                          MOV    R4,R3
044044  012300                          MOV    (R3)+,R0        ;CALCULATE THE RBUF ADDRESS.
044046  011300                 2$:      MOV    (R3),R0         ;READ A CHARACTER FROM THE RX FIFO.
044050  032714  000200                  BIT    #BIT7,(R4)      ;TEST THE DUT RX.DATA.AVAIL BIT.
044054  001427                         BEQ    60$             ;EXIT TEST WITHOUT ERROR IF RX.DATA.AVAIL CLR.
044056  005305                          DEC    R5              ;COUNT THE CHARACTER JUST READ.
044060  001372                         BNE    2$              ;LOOP IF NOT TOO MANY CHARS READ FROM FIFO.
044062  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.
044064  012737  001131  005466  4$:      MOV    #0601.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
044072  012701  011033                  MOV    #EM0202,R1      ;SELECT ERROR MESSAGE.
044076                                  ERROR                  ;REPORT ERROR.          >>>>> ERROR #0601 <<<<<
044076  104460                                                                                  TRAP    C$ERROR
044100  000415                          BR     60$             ;EXIT THE TEST.

                                    ;Report that RX.DATA.AVAIL bit was not set after a reset completion.
```

HARDWARE TEST - RDAA - SEQ 0228

```
 8788 044102  012737  001132  005466  6$:     MOV     #0602.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
 8789 044110  012701  012773                 MOV     #EM0602,R1      ;SELECT ERROR MESSAGE.
 8790 044114                                 ERROR                   ;REPORT ERROR.          >>>>> ERROR #0602 <<<<<
      044114  104460                                                                              TRAP    C$ERROR
 8791 044116  000406                         BR      60$             ;EXIT THE TEST.
 8792
 8793                                ;Report that RX.DATA.AVAIL bit could not be cleared by purging FIFO.
 8794 044120  012737  001133  005466  8$:     MOV     #0603.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
 8795 044126  012701  013153                 MOV     #EM0603,R1      ;SELECT ERROR MESSAGE.
 8796 044132                                 ERROR                   ;REPORT ERROR.          >>>>> ERROR #0603 <<<<<
      044132  104460                                                                              TRAP    C$ERROR
 8797
 8798 044134  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 8799
 8800 044140                                 ENDTST
      044140                                                                     L10041:
      044140  104401                                                                          TRAP    C$ETST
```

```
 8802                                   .SBTTL  HARDWARE TEST           - RDVA -
 8803                                   ;++ ******************************************************************************
 8804                                   ;*              - RBUF RX Data Valid Bit Test -
 8805                                   ;*      This test verifies that the DUT RBUF RX Data Valid Bit is set by the
 8806                                   ;*      inclusion of the selftest codes in the DUT FIFO and that the bit clears
 8807                                   ;*      after the FIFO has been emptied.
 8808                                   ;*
 8809                                   ;-- ******************************************************************************
 8810 044142                                    BGNTST
      044142                                                                                    T7::
 8811           000007                           TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 8812 044142   012737   000007  002364          MOV     @TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (7)
 8813 044150   012737   177777  002362          MOV     @-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
 8814 044156   012737   000001  005464          MOV     @1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
 8815 044164   012737   013336  005470          MOV     @EM0701,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
 8816 044172   012737   024562  005472          MOV     @ER0201,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
 8817                                   ;+
 8818                                   ; Set the DUT CSR Master Reset (MR) bit, perform the skip selftest sequence,
 8819                                   ;  and wait up to 5 seconds for the MR bit to clear.
 8820                                   ;-
 8821 044200   012701   011610                   MOV     @5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
 8822 044204   012702   000040                   MOV     @BIT05,R2       ;WAITING FOR MASTER RESET BIT.
 8823 044210   005003                            CLR     R3              ;WAITING FOR BIT TO CLEAR.
 8824 044212   013704   002300                   MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
 8825 044216   010214                            MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
 8826 044220   004737   035740                  JSR     PC,SKPSTS       ;SKIP THE SELFTEST.
 8827 044224   004737   031726                  JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
 8828 044230   103012                           BCC     4$              ;GO REPORT ERROR IF MR DID NOT CLEAR.
 8829                                   ;+
 8830                                   ; Check that the RX Data Valid bit is set.
 8831                                   ;-
 8832 044232   012400                            MOV     (R4)+,R0        ;INCREMENT POINTER TO PNT TO DUT RBUF REG.
 8833 044234   005714                            TST     (R4)            ;TEST THE DUT RX.DATA.VALID BIT.
 8834 044236   100016                           BPL     6$              ;GO REPORT ERROR IF BIT IS NOT SET.
 8835                                   ;+
 8836                                   ; Read characters from the DUT RX FIFO and wait for RX.DATA.VALID to go clear.
 8837                                   ;-
 8838 044240   012705   001130                   MOV     @600.,R5        ;ALLOW READING 600 CHARS BEFORE ERROR.
 8839 044244   011400                   2$:     MOV     (R4),R0         ;READ A CHARACTER FROM THE RX FIFO.
 8840 044246   100027                           BPL     60$             ;EXIT TEST WITHOUT ERROR IF BIT IS CLEAR.
 8841 044250   005305                            DEC     R5              ;COUNT THE CHARACTER JUST READ.
 8842 044252   001374                           BNE     2$              ;LOOP IF NOT TOO MANY CHARS READ FROM FIFO.
 8843 044254   000416                            BR      8$              ;GO REPORT ERROR IF RX.DATA.VALID WOULDN'T CLR.
 8844
 8845                                   ;+
 8846                                   ; Error reports:
 8847                                   ;-
 8848                                       ;Report MR bit would not clear after a DUT reset.
 8849 044256   012737   001275  005466  4$:      MOV     @0701.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
 8850 044264   012701   011033                   MOV     @EM0202,R1      ;SELECT ERROR MESSAGE.
 8851 044270                                     ERROR                   ;REPORT ERROR.          >>>>> ERROR @0701 <<<<<
      044270   104460                                                                                  TRAP    C$ERROR
 8852 044272   000415                           BR      60$             ;EXIT THE TEST.
 8853
 8854                                       ;Report that RX.DATA.VALID bit was not set after a reset completion.
 8855 044274   012737   001276  005466  6$:      MOV     @0702.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
 8856 044302   012701   013373                   MOV     @EM0702,R1      ;SELECT ERROR MESSAGE.
```

HARDWARE TEST - RDVA - SEQ 0230

```
8857 044306                                ERROR                ;REPORT ERROR.          >>>>> ERROR #0702 <<<<<
     044306  104460                                                                              TRAP    C$ERROR
8858 044310  000406                        BR       60$         ;EXIT THE TEST.
8859
8860                                  ;Report that RX.DATA.VALID bit could not be cleared by purging FIFO.
8861 044312  012737  001277  005466  8$:   MOV      #0703.,ERRNBR  ;SET THE ERROR NUMBER IN ERROR TABLE.
8862 044320  012701  013553              MOV      #EM0703,R1     ;SELECT ERROR MESSAGE.
8863 044324                                ERROR                ;REPORT ERROR.          >>>>> ERROR #0703 <<<<<
     044324  104460                                                                              TRAP    C$ERROR
8864
8865 044326  005037  002362          60$:  CLR      CTRLCF       ;INDICATE THAT WE COMPLETED THE TEST.
8866
8867 044332                                ENDTST
     044332                                                                    L10042:
     044332  104401                                                                              TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - RLNA -
                                ;++ ******************************************************************************
                                ;*              - RBUF RX Line Number Field Test -
                                ;*      This test verifies that the DUT RBUF RX Line Number field is working
                                ;*      correctly by utilizing the selftest codes which are put in the RX
                                ;*      FIFO after a board reset.
                                ;*
                                ;-- ******************************************************************************
                                        BGNTST
                                                                                        T8::
                                         TNUM == TNUM + 1       :INCREMENT THE ASSEMBLY TIME TEST COUNTER.
044334  012737  000010  002364         MOV     @TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (8)
044342  012737  177777  002362         MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
044350  012737  000001  005464         MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
044356  012737  013736  005470         MOV     #EM0801,ERRMSG  ;SET ERROR MESSAGE 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.
                                ;-
044364  012701  011610                  MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
044370  012702  000040                  MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
044374  005003                         CLR     R3              ;WAITING FOR BIT TO CLEAR.
044376  013704  002300                  MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
044402  010214                         MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
044404  004737  035740                 JSR     PC,SKPSTS       ;SKIP THE SELFTEST.
044410  004737  031726                 JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
044414  103016                         BCC     4$              ;GO REPORT ERROR IF MR DID NOT CLEAR.
                                ;+
                                ; Read characters from the DUT RX FIFO and verify that the line numbers are
                                ;  correct.
                                ; One character is read from the FIFO for each possible line on the DUT.
                                ;-
044416  005001                         CLR     R1              ;CLEAR THE LINE COUNTER.
044420  012400                         MOV     (R4)+,R0        ;INCREMENT POINTER TO PNT TO THE DUT RBUF REG.
044422  011402                 2$:     MOV     (R4),R2         ;READ A CHARACTER FROM THE DUT RX FIFO.
044424  010203                         MOV     R2,R3
044426  000303                         SWAB    R3
044430  042703  177760                 BIC     #177760,R3      ;REMOVE ALL BUT LINE NUMBER BITS.
044434  020301                         CMP     R3,R1           ;COMPARE WITH EXPECTED LINE NUMBER.
044436  001017                        BNE     6$              ;GO REPORT ERROR IF LINE NUMBERS DON'T MATCH.
044440  005201                         INC     R1              ;INCREMENT THE EXPECTED LINE NUMBER.
044442  020127  000010                 CMP     R1,#NUMLNS      ;COMPARE WITH NUMBER OF LINES ON DUT.
044446  001365                        BNE     2$              ;LOOP UNTIL CODES FOR ALL LINES ARE READ.
044450  000423                         BR      60$             ;EXIT TEST WITHOUT ERROR.

                                ;+
                                ; Error reports:
                                ;-
                                    ;Report MR bit would not clear after a DUT reset.
044452  012737  001441  005466 4$:       MOV     #0801.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
044460  012737  024644  005472          MOV     #ER0503,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
044466  012701  011033                  MOV     #EM0202,R1      ;SELECT ERROR MESSAGE.
044472                                 ERROR                   ;REPORT ERROR.          >>>>> ERROR #0801 <<<<<
044472  104460                                                                                  TRAP    C$ERROR
044474  000411                         BR      60$             ;EXIT THC TEST.

                                    ;Report that RX Line Number field is wrong for selftest code.
```

HARDWARE TEST - RLNA - SEQ 0232

```
 8924 044476  012737  001442  005466  6$:     MOV     #0802.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
 8925 044504  012737  024562  005472          MOV     #ER0201,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
 8926 044512  012701  01377E                  MOV     #EM0802,R1      ;SELECT ERROR MESSAGE.
 8927 044516                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0802 <<<<<
      044516  104460                                                                              TRAP    C$ERROR
 8928
 8929 044520  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 8930
 8931 044524                                  ENDTST
      044524                                                                      L10043:
      044524  104401                                                                          TRAP    C$ETST
```

```
 8933                                   .SBTTL  HARDWARE TEST           - BMPCHK -
 8934                                   ;++ ************************************************************************
 8935                                   ;*              - BMP check Test -
 8936                                   ;*      This test is used to verify that the DUT does not immediately fail
 8937                                   ;*      the on-board background-monitor program, and hence invalidate
 8938                                   ;*      succeeding tests.
 8939                                   ;*      This test looks for BMP codes in the fifo for a set period immediately
 8940                                   ;*      after the self-test is skipped.
 8941                                   ;*      Any BMP codes that are found are saved on the queue and are also
 8942                                   ;*      reported in this test.
 8943                                   ;*
 8944                                   ;-- ************************************************************************
 8945 044526                                   BGNTST
      044526                                                                                   T9::
 8946            000011                         TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 8947 044526    012737  000011  002364          MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (9)
 8948 044534    012737  177777  002362          MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
 8949 044542    012737  000001  005464          MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
 8950 044550    012737  001605  005466          MOV     #0901.,ERRNBR   ;SET THE ERROR NUMBER.
 8951                                   ;+
 8952                                   ; Wait up to 3 seconds for the DUT Master Reset bit to clear.
 8953                                   ;  If time-out occurs, then exit this test.
 8954                                   ;-
 8955 044556    012701  005670                  MOV     #3000.,R1       ;TIME-OUT VALUE IS 3.0 SECONDS.
 8956 044562    012702  000040                  MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
 8957 044566    005003                          CLR     R3              ;WAITING FOR BIT TO CLEAR.
 8958 044570    013704  002300                  MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
 8959 044574    004737  031726                 JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
 8960 044600    103027                          BCC     50$             ;ABORT THE TEST IF MR DID NOT CLEAR.
 8961                                   ;+
 8962                                   ; Reset the DUT, skip the self-test.
 8963                                   ;-
 8964 044602    010214                          MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
 8965 044604    004737  035740                 JSR     PC,SKPSTS       ;WRITE THE SKIP SELFTEST CODES TO THE DUT.
 8966                                   ;+
 8967                                   ; Wait for Master reset to clear. Delay for 500 milli-secs before purging
 8968                                   ; the fifo.
 8969                                   ;-
 8970 044610    012704  000764                  MOV     #500.,R4        ;TIME-OUT VALUE IS 500 MILLI-SECONDS.
 8971 044614    004737  030370                 JSR     PC,DELAY        ;WAIT FOR BMP TO BEGIN EXECUTION.
 8972 044620    004737  032722                 JSR     PC,PUFIFO       ;PURGE THE FIFO, SAVING ANY BMP CODES.
 8973 044624    103015                          BCC     50$             ;ABORT THE TEST IF THE FIFO DID NOT CLEAR.
 8974                                   ;+
 8975                                   ; Report the error if any BMP codes were found.
 8976                                   ;-
 8977 044626    013702  002660                  MOV     BMPCQP,R2       ;GET THE CONTENTS OF THE POINTER TO THE BMP Q.
 8978 044632    012703  002662                  MOV     #BMPCQB,R3      ;GET THE START ADDRESS OF THE QUEUE.
 8979 044636    020203                          CMP     R2,R3           ;SEE IF THE POINTER HAS MOVED FROM THE BASE.
 8980 044640    001414                         BEQ     60$             ;EXIT NO CODES IN THE QUEUE.
 8981                                   ;+
 8982                                   ; There is at least one BMP code in the queue. Report the error.
 8983                                   ;-
 8984                                           ;Report error BMP CODE FOUND IN TEST nn, BMP CODE:nnnnnn"
 8985 044642    012701  014102                  MOV     #EM0902,R1      ;PASS THE MESSAGE TO BE REPORTED.
 8986 044646                                   ERRDF   0901,EM0901,ER9301 ;            >>>>> ERROR #0901 <<<<<.
      044646    104455                                                                          TRAP    C$ERDF
      044650    001605                                                                          .WORD   901
```

SEQ 0234

HARDWARE TEST - BMPCHK -

```
                044652  014051                                                                  .WORD   EM0901
                044654  026600                                                                  .WORD   ER9301
     8987       044656  000405                          BR      60$
     8988
     8989       044660  012737  001606  005466  50$:    MOV     #902.,ERRNBR    ;SET >>>>> ERROR #0902 <<<<<.
     8990       044666  004737  036106                  JSR     PC,TSABRT       ;REPORT NON-TEST RELATED ERROR.
     8991
     8992       044672  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
     8993
     8994       044676                          ENDTST
                044676                                                          L10044:
                044676  104401                                                          TRAP    C$ETST
```

```
                                .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.
                                ;*
                                ;-- ************************************************************************
044700                                  BGNTST
044700                                                                          T10::
        000012                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
044700  012737  000012  002364   MOV     @TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (10)
044706  012737  177777  002362   MOV     @-1,CTRLCF     ;INDICATE THAT WE ARE WITHIN A TEST.
044714  012737  000001  005464   MOV     @1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
044722  012737  014136  005470   MOV     @EM1001,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
044730  012737  024644  005472   MOV     @ER0503,ERRBLK ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                ;+
                                ; Wait up to 3 seconds for the DUT Master Reset bit to clear.
                                ;  If t'me out occurs, then exit this test.
                                ;-
044736  012701  005670           MOV     @3000.,R..     ;TIME-OUT VALUE IS 3.0 SECONDS.
044742  012702  000040           MOV     @BIT05,R2      ;WAITING FOR MASTER RESET BIT.
044746  005003                   CLR     R3             ;WAITING FOR BIT TO CLEAR.
044750  013704  002300           MOV     CSRA,R4        ;BIT IS IN THE DUT'S CSR.
044754  004737  031726           JSR     PC,MSLGET      ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
044760  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.
                                ;
044762  012701  000062           MOV     @50.,R1        ;TIME-OUT VALUE IS 50 MILLI-SECONDS.
044766  010214                   MOV     R2,(R4)        ;SET THE DUT MASTER RESET BIT.
044770  004737  035740           JSR     PC,SKPSTS      ;WRITE THE SKIP SELFTEST CODES TO THE DUT.
044774  004737  031726           JSR     PC,MSLGET      ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
045000  103011                   BCC     2$             ;GO REPORT ERR IF SKIPPING STEST TOOK TOO LONG.
045002  020127  000050           CMP     R1,@40.
045006  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 <<<<<.
                                ;-
045010  012737  001753  005466   MOV     @1003.,ERRNBR  ;SET ERROR NUMBER TO 1003.
045016  004737  034734           JSR     PC,RSTRPT      ;CHECK SELF TEST CODES IN THE FIFO.
045022  000423                   BR      60$            ;EXIT TEST.
                                ;+
                                ; Error reports:
                                ;-
                                    ;Report Skip Self test took too long.
045024  012737  001751  005466  2$:  MOV     @1001.,ERRNBR  ;SET THE ERROR NUMBER IN THE ERROR TABLE.
045032  012701  014202           MOV     @EM1002,R1     ;SELECT ERROR MESSAGE.
045036                           ERROR                  ;REPORT ERROR.          >>>>> ERROR @1001 <<<<<
045036  104460                                                                          TRAP    C$ERROR
```

```
 9051 045040  000414                          BR      60$             ;EXIT THE TEST.
 9052
 9053                                      ;Report Skip Self-test completed too soon.
 9054 045042  012737  001752  005466  4$:     MOV     #1002.,ERRNBR   ;SET THE ERROR NUMBER IN THE ERROR TABLE.
 9055 045050  012701  014267                  MOV     #EM1003,R1      ;SELECT ERROR MESSAGE.
 9056 045054                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #1002 <<<<<
      045054  104460                                                                              TRAP    C$ERROR
 9057 045056  000405                          BR      60$             ;EXIT THE TEST.
 9058
 9059 045060  012737  001753  005466  50$:    MOV     #1003.,ERRNBR   ;SET ERROR NUMBER.
 9060 045066  004737  036106                  JSR     PC,TSABRT       ;REPORT NON-TEST RELATED ERROR.
 9061
 9062 045072  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 9063
 9064 045076                                  ENDTST
      045076                                                                          L10045:
      045076  104401                                                                          TRAP    C$ETST
```

```
 9066
 9067
 9068                                   .SBTTL  HARDWARE TEST           - DFSKST -
 9069                                   ;++ ************************************************************************
 9070                                   ;*              - Diagnostic fail bit, skip self-test test -
 9071                                   ;*      This test verifies that the diagnostic fail bit of the DUT, correctly
 9072                                   ;*      changes state as the on-boared selftest is skipped.
 9073                                   ;*
 9074                                   ;-- ************************************************************************
 9075 045100                                   BGNTST
      045100                                                                                    T11::
 9076           000013                          TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 9077 045100   012737   000013   002364        MOV     @TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (11)
 9078 045106   012737   177777   002362        MOV     @-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
 9079 045114   012737   000001   005464        MOV     @1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
 9080 045122   012737   014345   005470        MOV     @EM1101,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
 9081 045130   012737   024644   005472        MOV     @ER0503,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
 9082                                   ;+
 9083                                   ; Wait up to 3 seconds for the DUT Master Reset bit to clear.
 9084                                   ;  If time-out occurs, then exit this test.
 9085                                   ;-
 9086 045136   012701   005670                MOV     @3000.,R1       ;TIME-OUT VALUE IS 3.0 SECONDS.
 9087 045142   012702   000040                MOV     @BIT05,R2       ;WAITING FOR MASTER RESET BIT.
 9088 045146   005003                        CLR     R3              ;WAITING FOR BIT TO CLEAR.
 9089 045150   013704   002300                MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
 9090 045154   004737   031726               JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
 9091 045160   103044                        BCC     50$             ;ABORT THE TEST IF MR DID NOT CLEAR.
 9092                                   ;+
 9093                                   ; Reset the DUT, skip the self-test.
 9094                                   ;-
 9095 045162   010214                        MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
 9096 045164   004737   035740               JSR     PC,SKPSTS       ;WRITE THE SKIP SELFTEST CODES TO THE DUT.
 9097                                   ;+
 9098                                   ; Set time out of 5 milli seconds, wait for Diag_fail bit to set.
 9099                                   ;  If time-out occurs go report the error.
 9100                                   ;-
 9101 045170   012701   000005                MOV     @5,R1           ;TIME-OUT VALUE IS 5 MILLI SECONDS.
 9102 045174   012702   020000                MOV     @BIT13,R2       ;WAITING FOR DIAGNOSTIC FAIL BIT.
 9103 045200   010203                        MOV     R2,R3           ;WAITING FOR BIT TO SET.
 9104 045202   013704   002300                MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
 9105 045206   004737   031726               JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_DF BIT TO CLEAR.
 9106 045212   103020                        BCC     4$              ;IF DIAG_FAIL DID NOT SET, GO REPORT ERROR.
 9107
 9108                                   ;+
 9109                                   ; Set time-out of 15 milli secs, wait for Diag_Fail to clear.
 9110                                   ;  If time-out occurs go report the error.
 9111                                   ;  Verify the Diag_fail bit is in a stable state before continuing.  Loop
 9112                                   ;  back if the state was transitory, using the remainder of the 15 ms time-out.
 9113                                   ;-
 9114 045214   012701   000017                MOV     @15.,R1         ;TIME-OUT VALUE IS 15 MILLI-SECONDS.
 9115 045220   005003                2$:     CLR     R3              ;WAITING FOR BIT TO CLEAR.
 9116 045222   004737   031726               JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_DF BIT TO CLEAR.
 9117 045226   103012                        BCC     4$              ;IF DIAG_FAIL DID NOT CLEAR, GO REPORT ERROR.
 9118 045230   010105                        MOV     R1,R5           ;SAVE THE REMAINING TIME-OUT VALUE.
 9119 045232   012701   000001                MOV     @1,R1           ;SET TIME-OUT OF 1 MILLI-SECOND.
 9120 045236   052703   020000                BIS     @BIT13,R3       ;WAIT FOR BIT TO SET.
 9121 045242   004737   031726               JSR     PC,MSLGET       ;DOUBLE CHECK TO ELIMINATE NOISE PROBLEMS.
```

HARDWARE TEST - DFSKST -

```
 9122 045246  103016                          BCC     60$             ;EXIT IF DIAG_FAIL BIT STILL CLEAR.
 9123 045250  010501                           MOV     R5,R1           ;PASS THE REMAINING TIME-OUT VALUE.
 9124 045252  000762                          BR      2$              ;LOOP TO CHECK AGAIN.
 9125                                 ;*
 9126                                 ; Error reports:
 9127                                 ;-
 9128                                     ;Report Diagnostic fail bit bad.
 9129 045254  012737  002115  005466  4$:      MOV     #1101.,ERRNBR   ;SET THE ERROR NUMBER IN THE ERROR TABLE.
 9130 045262  012701  014606                   MOV     #EM1205,R1      ;SELECT ERROR MESSAGE.
 9131 045266                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #1101 <<<<<
      045266  104460                                                                                  TRAP    C$ERROR
 9132 045270  000405                          BR      60$             ;EXIT THE TEST.
 9133
 9134 045272  012737  002116  005466  50$:     MOV     #1102.,ERRNBR   ;SET THE ERROR NUMBER FOR TSABRT RTN.
 9135 045300  004737  036106                   JSR     PC,TSABRT       ;REPORT NON-TEST RELATED ERROR.
 9136
 9137 045304  005037  002362          60$:     CLR     CTRLCF          ;INDICATE THAT WE COMPLETED A TEST.
 9138
 9139 045310                                  ENDTST
      045310                                                                          L10046:
      045310  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.
                                ;*
                                ;-- ************************************************************************
                                        BGNTST
                                                                                        T12::
                                         TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
045312  012737  000014  002364         MOV     @TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (12)
045320  012737  177777  002362         MOV     @-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
045326  012737  000001  005464         MOV     @1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
045334  012737  014371  005470         MOV     @EM1201,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
045342  012737  024644  005472         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.
                                ;-
045350  012701  005670                 MOV     @3000.,R1       ;TIME-OUT VALUE IS 3.0 SECONDS.
045354  012702  000040                 MOV     @BIT05,R2       ;WAITING FOR MASTER RESET BIT.
045360  005003                         CLR     R3              ;WAITING FOR BIT TO CLEAR.
045362  013704  002300                 MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
045366  004737  031726                JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
045372  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.
                                ;-
045374  012701  005670                 MOV     @3000.,R1       ;TIME-OUT VALUE IS 3.0 SECONDS.
045400  010214                         MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
045402  004737  031726                JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
045406  103030                        BCC     4$              ;GO REPORT ERROR SELFTEST TOOK TOO LONG.
045410  012702  005670                 MOV     @3000.,R2
045414  160102                         SUB     R1,R2           ;CALCULATE # OF MS SELFTEST TO COMPLETE.
045416  020227  000062                 CMP     R2,@50.
045422  002431                        BLT     6$              ;SELFTEST SKIPPED?  YES, GO REPORT ERROR.
045424  020227  000764                 CMP     R2,@500.
045430  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.
                                ;-
045432  032714  020000                 BIT     @BIT13,(R4)     ;DETERMINE IF THE DIAG_FAIL BIT IS CLEAR.
045436  001406                        BEQ     2$              ;SKIP ERROR REPORT IF BIT IS CLEAR.
                                    ;Report Diagnostic fail bit bad.
045440  012737  002264  005466          MOV     @1204.,ERRNBR   ;SET ERROR NUMBER TO IN ERROR TABLE.
045446  012701  014606                 MOV     @EM1205,R1      ;SELECT THE ERROR MESSAGE.
045452                                 ERROR                   ;               >>>>> ERROR @1204 <<<<<
045452  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 subrout ne reports errors with numbers >>>>> 1205 thru 1209 <<<<<.
                                ;-
```

```
 9196 045454  012737  002265  005466  2$:     MOV     #1205.,ERRNBR   ;SET ERROR NUMBER TO 1205.
 9197 045462  004737  034734                  JSR     PC,RSTRPT       ;CHECK SELF-TEST CODES IN THE FIFO.
 9198 045466  000431                          BR      60$             ;EXIT TEST.
 9199                                 ;+
 9200                                 ; Error reports:
 9201                                 ;-
 9202                                     ;Report Self-test took too long to complete.
 9203 045470  012737  002261  005466  4$:     MOV     #1201.,ERRNBR   ;SET THE ERROR NUMBER IN THE ERROR TABLE.
 9204 045476  012701  014410                  MOV     #EM1202,R1      ;SELECT ERROR MESSAGE.
 9205 045502                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #1201 <<<<<
      045502  104460                                                                              TRAP    C$ERROR
 9206 045504  000422                          BR      60$             ;EXIT THE TEST.
 9207
 9208                                     ;Report Self-test did not execute after DUT reset.
 9209 045506  012737  002262  005466  6$:     MOV     #1202.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
 9210 045514  012701  014552                  MOV     #EM1204,R1      ;SELECT ERROR MESSAGE.
 9211 045520                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #1202 <<<<<
      045520  104460                                                                              TRAP    C$ERROR
 9212
 9213                                     ;Report Self-test competed too soon.
 9214 045522  012737  002263  005466  8$:     MOV     #1203.,ERRNBR   ;SET THE ERROR NUMBER IN THE ERROR TABLE.
 9215 045530  012701  014474                  MOV     #EM1203,R1      ;SELECT ERROR MESSAGE.
 9216 045534                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #1203 <<<<<
      045534  104460                                                                              TRAP    C$ERROR
 9217 045536  000405                          BR      60$             ;EXIT THE TEST.
 9218
 9219 045540  012737  002272  005466  50$:    MOV     #1210.,ERRNBR   ;SET THE ERROR NUMBER FOR TSABRT RTN.
 9220 045546  004737  036106                  JSR     PC,TSABRT       ;REPORT NON-TEST RELATED ERROR.
 9221
 9222 045552  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 9223
 9224 045556                                  ENDTST
      045556                                                      L10047:
      045556  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.
                                        ;*
                                        ;-- ************************************************************************
045560                                          BGNTST
045560                                                                                  T13::
        000015                           TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
045560  012737  000015  002364          MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (13)
045566  012737  177777  002362          MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE WITHIN A TEST.
045574  012737  000001  005464          MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
045602  012737  014632  005470          MOV     #EM1301,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
045610  012737  024644  005472          MOV     #ER0503,ERRBLK ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
045616  012737  002425  005466          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.
                                        ;-
045624  012701  005670                  MOV     #3000.,R1      ;TIME-OUT VALUE IS 3.0 SECONDS.
045630  012702  000040                  MOV     #BIT05,R2      ;WAITING FOR MASTER RESET BIT.
045634  005003                          CLR     R3             ;WAITING FOR BIT TO CLEAR.
045636  013704  002300                  MOV     CSRA,R4        ;BIT IS IN THE DUT'S CSR.
045642  004737  031726                  JSR     PC,MSLGET      ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
045646  103120                          BCC     50$            ;GO REPORT ERROR IF MR DID NOT CLEAR.
                                        ;+
                                        ; Reset the DUT, check for rom version 0.
                                        ;  If Version 0 is found then exit this test.
                                        ;-
045650  010214                          MOV     R2,(R4)        ;RESET THE DUT.
045652  004737  035740                  JSR     PC,SKPSTS      ;SKIP THE SELFTEST.
045656  012701  000764                  MOV     #500.,R1       ;PASS TIME-OUT VALUE OF 500 MILLISECS.
045662  004737  031726                  JSR     PC,MSLGET      ;WAIT FOR MR BIT TO CLEAR.
045666  103110                          BCC     50$            ;GO REPORT ERROR IF TIME-OUT OCCURRED.
045670  005237  005466                  INC     ERRNBR         ;SET ERROR NUMBER TO 1302.
045674  012700  000010                  MOV     #8.,R0         ;SET MAXIMUM READ COUNT.
045700  005003                          CLR     R3             ;CLEAR THE ROM VERSION 0 FLAG.
045702  013704  002302                  MOV     RBUFA,R4       ;GET ADDRESS OF THE RECEIVER BUFFER REGISTER.
045706  011402                  2$:     MOV     (R4),R2        ;READ A CODE FROM THE FIFO.
045710  100077                          BPL     50$            ;GO REPORT ERROR IF THE FIFO IS EMPTY.
045712  042702  007402                  BIC     #7402,R2       ;REMOVE THE LINE NUMBER AND PROC INDICATOR.
045716  020227  170001                  CMP     R2,#170001     ;COMPARE WITH ROM VERSION #0 CODE.
045722  001002                          BNE     4$             ;ROM VERSION #0?  NO, SKIP SETTING FLAG.
045724  012703  177777                  MOV     #-1,R3         ;YES, SET THE ROM VERSION #0 FLAGS.
045730  005300                  4$:     DEC     R0             ;DECREMENT MAX READ COUNTER.
045732  001365                          BNE     2$             ;LOOP IF 8 CODES HAVE NOT BEEN READ.
045734  005703                          TST     R3             ;CHECK THE ROM VERSION #1 INDICATOR.
045736  100466                          BMI     60$            ;ROM VERSION 0 IN EITHER PROCESSOR?  YES, EXIT.

                                        ;+
                                        ; Reset the DUT, delay for 25 milli-seconds before writing the Fail_self_test
                                        ; code to TBUFFCT register on channel 0.
                                        ;-
```

```
 9282 045740  012777  000040  134332          MOV     @BIT05,@CSRA    ;SET DUT MASTER RESET BIT, SELECT CHANNEL 0.
 9283 045746  012704  000031                  MOV     @25.,R4         ;PASS DELAY PERIOD OF 25 MILLI SECS.
 9284 045752  004737  030370                  JSR     PC,DELAY        ;WAIT FOR SELFTEST TO INITIALISE.
 9285 045756  012777  146314  134332          MOV     @146314,@TXBFCA ;WRITE THE FAIL SELF-TEST CODE TO TBUFFCT REG.
 9286                                  ;+
 9287                                  ; Wait up to 2 seconds for the self-test to complete.
 9288                                  ;  If time-out occurs, then exit this test.
 9289                                  ;-
 9290 045764  005237  005466                  INC     ERRNBR          ;SET ERROR NUMBER TO 1303.
 9291 045770  012701  003720                  MOV     @2000.,R1       ;TIME-OUT VALUE IS 2.0 SECONDS.
 9292 045774  012702  000040                  MOV     @BIT05,R2       ;PASS THE BIT MAP OF THE BIT TO TEST.
 9293 046000  005003                          CLR     R3              ;SET UP THE EXPECTED STATE.
 9294 046002  013704  002300                  MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
 9295 046006  004737  031726                  JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
 9296 046012  103036                          BCC     50$             ;GO REPORT ERROR IF MR DID NOT CLEAR.
 9297                                  ;+
 9298                                  ; Verify the diagnostic fail bit is set, indicating the error.
 9299                                  ; Report error if diagnostic fail bit is clear.
 9300                                  ;-
 9301 046014  005237  005466                  INC     ERRNBR          ;SET ERROR NUMBER TO 1304.
 9302 046020  032714  020000                  BIT     @BIT13,(R4)     ;CHECK THE STATE OF THE DIAG_FAIL BIT.
 9303 046024  001425                          BEQ     10$             ;GO REPORT ERROR IF DIAG_FAIL BIT CLEAR.
 9304                                  ;+
 9305                                  ; Remove the 8 self-test codes form the fifo, and verify that at least
 9306                                  ; one is a Proc1 to ram error code (231).
 9307                                  ;-
 9308 046026  005237  005466                  INC     ERRNBR          ;SET ERROR NUMBER TO 1305.
 9309 046032  012700  000010                  MOV     @8.,R0          ;SET MAXIMUM READ COUNT.
 9310 046036  005001                          CLR     R1              ;CLEAR THE CORRECT CODE COUNTER.
 9311 046040  013704  002302                  MOV     RBUFA,R4        ;GET ADDRESS OF THE RECEIVER BUFFER REGISTER.
 9312 046044  011402                  6$:     MOV     (R4),R2         ;READ A CODE FROM THE FIFO.
 9313 046046  100020                          BPL     50$             ;GO REPORT ERROR IF THE FIFO IS EMPTY.
 9314 046050  042702  007400                  BIC     @7400,R2        ;REMOVE THE LINE NUMBER FROM THE CODE.
 9315 046054  120227  170231                  CMPB    R2,@170231      ;IS IT THE CORRECT ERROR CODE?.
 9316 046060  001001                          BNE     8$              ;SKIP NEXT INSTRUCTION, IF NOT A 231 CODE.
 9317 046062  005201                          INC     R1              ;INCREMENT COUNTER.
 9318 046064  005300                  8$:     DEC     R0              ;DECREMENT MAX READ COUNTER.
 9319 046066  001366                          BNE     6$              ;LOOP IF 8 CODES HAVE NOT BEEN READ.
 9320 046070  005701                          TST     R1              ;WERE ANY 231 CODES FOUND?.
 9321 046072  001010                          BNE     60$             ;YES, THEN EXIT.
 9322 046074  005237  005466                  INC     ERRNBR          ;NO, SET ERROR NUMBER TO 1306 AND REPORT ERROR.
 9323                                  ;Report Self-test error reporting bad.
 9324 046100  012701  014656          10$:    MOV     @EM1302,R1      ;SELECT ERROR MESSAGE.
 9325 046104                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR <<<<<
      046104  104460                                                                              TRAP    C$ERROR
 9326 046106  000402                          BR      60$             ;EXIT THE TEST.
 9327
 9328 046110  004737  036106          50$:    JSR     PC,TSABRT       ;REPORT NON-RELATED TEST ERROR.
 9329
 9330 046114  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 9331
 9332 046120                                  ENDTST
      046120                                                                          L10050:
      046120  104401                                                                          TRAP    C$ETST
```

```
 9334
 9335
 9336                                   .SBTTL  HARDWARE TEST           - REGWRW -
 9337                                   ;++ ******************************************************************************
 9338                                   ;*              - Device Register Word Access Read and Write Test -
 9339                                   ;*
 9340                                   ;* This test verifies that the device registers can be read and written
 9341                                   ;* correctly using word accesses.
 9342                                   ;*
 9343                                   ;-- ******************************************************************************
 9344
 9345 046122                                       BGNTST
          046122                                                                    T14::
 9346            000016                          TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 9347 046122    012737  000016  002364           MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (16)
 9348 046130    012737  177777  002362           MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
 9349 046136    012737  000001  005464           MOV     #1,ERRTYP       ;SET UP DEVICE FATAL INDICATOR IN ERROR TYPE.
 9350 046144    012737  003101  005466           MOV     #1601.,ERRNBR   ;SET UP ERROR NUMBER IN THE ERROR TABLE.
 9351 046152    012737  015311  005470           MOV     #EM1604,ERRMSG  ;SET UP ERROR MESSAGE FOR TEST IN ERROR TABLE.
 9352 046160    005037  002650                   CLR     ERSMRF          ;CLEAR THE ERROR SUMMARY FLAGS.
 9353 046164    012700  003452                   MOV     #ERCNTB,R0
 9354 046170    004737  030214                  JSR     PC,CLR16W       ;CLEAR THE ERROR COUNTER TABLE.
 9355                                   ;+
 9356                                   ; Reset the DUT to a known state, do not remove the status codes from the fifo.
 9357                                   ;  Clear TX and RX interrupt enable bits in the CSR.
 9358                                   ; This subroutine reports errors >>>>> 1601 <<<<<.
 9359                                   ;-
 9360 046174    004737  034530                  JSR     PC,RESETT       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
 9361 046200    103402                          BCS     .+6             ;FATAL RESET ERROR?  NO, CONTINUE WITH TEST.
 9362 046202    000137  046324                  JMP     60$             ;YES,  EXIT THE TEST.
 9363                                   ;+
 9364                                   ; Verify read/write capability to indirect address field of CSR
 9365                                   ;-
 9366 046206    005237  005466                   INC     ERRNBR          ;SET THE ERROR REPORT NUMBER TO 1602.
 9367 046212    012702  000017                   MOV     #17,R2          ;SET LOOP COUNT.
 9368 046216    013704  002300                   MOV     CSRA,R4         ;GET CSR ADDRESS.
 9369 046222    010214                  2$:      MOV     R2,(R4)         ;WRITE COUNT TO CSR.
 9370 046224    011401                           MOV     (R4),R1         ;READ BACK THE CONTENTS OF THE CSR
 9371 046226    042701  177760                   BIC     #177760,R1      ;MASK OUT ALL BUT THE IND.ADR.REG FIELD.
 9372 046232    020102                           CMP     R1,R2           ;CHECK FOR CORRECT DATA WRITTEN/READ.
 9373 046234    001406                          BEQ     4$              ;IS EXPECTED DATA BAD?  NO, SKIP ERROR REPORT.
 9374                                       ;Report "BAD BIT(S) IN DEVICE CSR REGISTER FOR LINE  0 (D)."
 9375 046236    012737  024736  005472           MOV     #ER1601,ERRBLK  ;SELECT THE PROPER ERROR REPORT ROUTINE.
 9376 046244    005003                           CLR     R3              ;SET OFFSET TO 0 TO CAUSE REPORT OF CSR REG.
 9377 046246    005005                           CLR     R5              ;CAUSE REPORT OF LINE 0.
 9378 046250                                     ERROR                   ;  >>>>> ERROR # 1602 <<<<<
          046250    104460                                                                  TRAP    C$ERROR
 9379 046252    005302                  4$:      DEC     R2              ;DECREMENT LOOP COUNT/IND.ADD.REG ADDRESS.
 9380 046254    002362                          BGE     2$              ;LOOP BACK TO TEST NEXT ADDRESS IF NOT DONE.
 9381                                   ;+
 9382                                   ; Write and verify 16 data patterns in all used bits of all registers on all
 9383                                   ;   active lines.  Before writing each pattern, clear all the bits.
 9384                                   ;    REGTST routine reports errors with numbers  >>>>> ERROR 1603 - 1605 <<<<<.
 9385                                   ;-
 9386 046256    005237  005466                   INC     ERRNBR          ;SET THE ERROR NUMBER TO 1603.
 9387 046262    005003                           CLR     R3              ;INDICATE THAT WORD ACCESSES ARE TO BE USED.
 9388 046264    012704  000002                   MOV     #2,R4           ;INDICATE R/W ACCESS, CLEAR FIRST.
```

HARDWARE TEST - REGWRW -

```
 9389 046270  004737  034140                JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
 9390                                    ;+
 9391                                    ; Write and verify 16 data patterns in all used bits of all registers on all
 9392                                    ;   active lines.  Before writing each pattern, set all the bits.
 9393                                    ;    REGTST routine reports errors with numbers  >>>>> ERROR 1606 - 1608 <<<<<.
 9394                                    ;-
 9395 046274  012737  003106  005466           MOV     #1606.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
 9396 046302  005003                           CLR     R3              ;INDICATE THAT WORD ACCESSES ARE TO BE USED.
 9397 046304  005404                           NEG     R4              ;INDICATE R/W ACCESS, SET FIRST.
 9398 046306  004737  034140                JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
 9399                                    ;+
 9400                                    ; Print error summary reports if necessary.
 9401                                    ;   The following routine reports errors with number >>>>> ERROR # 1609 <<<<<
 9402                                    ;-
 9403 046312  012737  003111  005466           MOV     #1609.,ERRNBR   ;SET UP ERROR NUMBER FOR NEXT RTN.
 9404 046320  004737  034502                JSR     PC,REPSMR       ;REPORT ERROR SUMMARY IF NECESSARY.
 9405 046324  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 9406 046330                                ENDTST
      046330                                                                     L10051:
      046330  104401                                                                 TRAP    C$ETST
```

```
 9408                                   .SBTTL  HARDWARE TEST           - REGWRM -
 9409                                   ;++ ************************************************************************
 9410                                   ;*      - Device Register Word Access Read/Modify/Write Test -
 9411                                   ;*
 9412                                   ;* This test verifies that the device registers can be written correctly
 9413                                   ;* using word read/modify/write accesses.
 9414                                   ;*
 9415                                   ;-- ************************************************************************
 9416
 9417 046332                                    BGNTST
      046332                                                                                    T15::
 9418           000017
 9419 046332   012737   000017   002364          TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 9420 046340   012737   177777   002362          MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (17)
 9421 046346   012737   000001   005464          MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
 9422 046354   012737   003245   005466          MOV     #1,ERRTYP       ;SET UP DEVICE FATAL INDICATOR IN ERROR TYPE.
 9423 046362   012737   015357   005470          MOV     #1701.,ERRNBR   ;SET UP ERROR NUMBER IN THE ERROR TABLE.
 9424 046370   005037   002650                  MOV     #EM1701,ERRMSG  ;SET UP ERROR MESSAGE FOR TEST IN ERROR TABLE.
 9425 046374   012700   003452                  CLR     ERSMRF          ;CLEAR THE ERROR SUMMARY FLAGS.
 9426 046400   004737   030214                  MOV     #ERCNTB,R0
                                               JSR     PC,CLR16W       ;CLEAR THE ERROR COUNTER TABLE.
 9427                                   ;+
 9428                                   ; Reset the DUT to a known state, do not remove the status codes from the fifo.
 9429                                   ;  Clear TX and RX interrupt enable bits in the CSR.
 9430                                   ; This subroutine reports errors >>>>> 1701 <<<<<.
 9431                                   ;-
 9432 046404   004737   034530                  JSR     PC,RESETT       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
 9433 046410   103402                          BCS     .+6             ;FATAL RESET ERROR?  NO, CONTINUE WITH TEST.
 9434 046412   000137   046540                  JMP     60$             ;YES,  EXIT THE TEST.
 9435                                   ;+
 9436                                   ; Verify read/modify/write capability to indirect address field of CSR
 9437                                   ;-
 9438 046416   005237   005466                  INC     ERRNBR          ;SET THE ERROR REPORT NUMBER TO 1702.
 9439 046422   012702   000017                  MOV     #17,R2          ;SET LOOP COUNT.
 9440 046426   013704   002300                  MOV     CSRA,R4         ;GET CSR ADDRESS.
 9441 046432   042714   000017          2$:     BIC     #17,(R4)        ;CLEAR THE DUT CSR USING READ/MODIFY/WRITE.
 9442 046436   050214                          BIS     R2,(R4)         ;WRITE COUNT TO CSR USING READ/MODIFY/WRITE.
 9443 046440   011401                          MOV     (R4),R1         ;READ BACK THE CONTENTS OF THE CSR
 9444 046442   042701   177760                  BIC     #177760,R1      ;MASK OUT ALL BUT THE IND.ADR.REG FIELD.
 9445 046446   020102                          CMP     R1,R2           ;CHECK FOR CORRECT DATA WRITTEN/READ.
 9446 046450   001406                          BEQ     4$              ;IS EXPECTED DATA BAD?  NO, SKIP ERROR REPORT.
 9447                                      ;Report "BAD BIT(S) IN DEVICE CSR REGISTER FOR LINE  0 (D)."
 9448 046452   012737   024736   005472          MOV     #ER1601,ERRBLK  ;SELECT THE PROPER ERROR REPORT ROUTINE.
 9449 046460   005003                          CLR     R3              ;SET OFFSET TO 0 TO CAUSE REPORT OF CSR REG.
 9450 046462   005005                          CLR     R5              ;CAUSE REPORT OF LINE 0.
 9451 046464                                    ERROR                   ;  >>>>> ERROR # 1702 <<<<<
      046464   104460                                                                        TRAP    C$ERROR
 9452 046466   005302                  4$:     DEC     R2              ;DECREMENT LOOP COUNT/IND.ADD.REG ADDRESS.
 9453 046470   002360                          BGE     2$              ;LOOP BACK TO TEST NEXT ADDRESS IF NOT DONE.
 9454                                   ;+
 9455                                   ; Write and verify 16 data patterns in all used bits of all registers on all
 9456                                   ;   active lines using R/M/W.  Before writing each pattern, clear all the bits.
 9457                                   ;    REGTST routine reports errors with numbers  >>>>> ERROR 1703 - 1705 <<<<<.
 9458                                   ;-
 9459 046472   005237   005466                  INC     ERRNBR          ;SET THE ERROR NUMBER TO 1703.
 9460 046476   005003                          CLR     R3              ;INDICATE THAT WORD ACCESSES ARE TO BE USED.
 9461 046500   012704   000001                  MOV     #1,R4           ;INDICATE R/M/W ACCESS, CLEAR FIRST.
 9462 046504   004737   034140                  JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
```

```
 9463                                   ;+
 9464                                   ; Write and verify 16 data patterns in all used bits of all registers on all
 9465                                   ;   active lines using R/M/W.  Before writing each pattern, set all the bits.
 9466                                   ;    REGTST routine reports errors with numbers  >>>>> ERROR 1706 - 1708 <<<<<.
 9467                                   ;-
 9468 046510  012737  003252  005466          MOV     #1706.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
 9469 046516  005003                          CLR     R3              ;INDICATE THAT WORD ACCESSES ARE TO BE USED.
 9470 046520  005404                          NEG     R4              ;INDICATE R/M/W ACCESS, SET FIRST.
 9471 046522  004737  034140                 JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
 9472                                   ;+
 9473                                   ; Print error summary reports if necessary.
 9474                                   ;   The following routine reports errors with number >>>>> ERROR # 1709 <<<<<
 9475                                   ;-
 9476 046526  012737  003255  005466          MOV     #1709.,ERRNBR   ;SET UP ERROR NUMBER FOR NEXT RTN.
 9477 046534  004737  034502                 JSR     PC,REPSMR       ;REPORT ERROR SUMMARY IF NECESSARY.
 9478 046540  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 9479 046544                                 ENDTST
      046544                                                                     L10052:
      046544  104401                                                                 TRAP    C$ETST
```

```
 9481                                   .SBTTL  HARDWARE TEST           - REGBRW -
 9482                                   ;** ************************************************************************
 9483                                   ;*              - Device Register Byte Access Read and Write Test -
 9484                                   ;*
 9485                                   ;* This test verifies that the device registers can be read and written
 9486                                   ;* correctly using byte accesses.
 9487                                   ;*
 9488                                   ;-- ************************************************************************
 9489
 9490 046546                                   BGNTST
      046546                                                                                    T16::
 9491           000020                          TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 9492 046546   012737   000020   002364         MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (18)
 9493 046554   012737   177777   002362         MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
 9494 046562   012737   000001   005464         MOV     #1,ERRTYP       ;SET UP DEVICE FATAL INDICATOR IN ERROR TYPE.
 9495 046570   012737   003411   005466         MOV     #1801.,ERRNBR   ;SET UP ERROR NUMBER IN THE ERROR TABLE.
 9496 046576   012737   015434   005470         MOV     #EM1801,ERRMSG  ;SET UP ERROR MESSAGE FOR TEST IN ERROR TABLE.
 9497 046604   005037   002650                 CLR     ERSMRF          ;CLEAR THE ERROR SUMMARY FLAGS.
 9498 046610   012700   003452                 MOV     #ERCNTB,R0
 9499 046614   004737   030214                JSR     PC,CLR16W       ;CLEAR THE ERROR COUNTER TABLE.
 9500                                   ;*
 9501                                   ; Reset the DUT to a known state, do not remove the status codes from the fifo.
 9502                                   ;  Clear TX and RX interrupt enable bits in the CSR.
 9503                                   ; This subroutine reports errors >>>>> 1801 <<<<<.
 9504                                   ;-
 9505 046620   004737   034530                 JSR     PC,RESETT       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
 9506 046624   103402                         BCS     .+6             ;FATAL RESET ERROR?  NO, CONTINUE WITH TEST.
 9507 046626   000137   047004                 JMP     60$             ;YES,  EXIT THE TEST.
 9508 046632   012737   003412   005466         MOV     #1802.,ERRNBR   ;SET THE ERROR REPORT NUMBER TO 1802.
 9509                                   ;*
 9510                                   ; Verify read/write capability to indirect address field of CSR.
 9511                                   ; Use byte accesses.
 9512                                   ;-
 9513 046640   012702   000017                 MOV     #17,R2          ;SET LOOP COUNT.
 9514 046644   013704   002300                 MOV     CSRA,R4         ;GET CSR ADDRESS.
 9515 046650   110214                 2$:     MOVB    R2,(R4)         ;WRITE COUNT TO CSR.
 9516 046652   111401                         MOVB    (R4),R1         ;READ BACK THE CONTENTS OF THE CSR
 9517 046654   042701   177760                 BIC     #177760,R1      ;MASK OUT ALL BUT THE IND.ADR.REG FIELD.
 9518 046660   020102                         CMP     R1,R2           ;CHECK FOR CORRECT DATA WRITTEN/READ.
 9519 046662   001406                        BEQ     4$              ;IS EXPECTED DATA BAD?  NO, SKIP ERROR REPORT.
 9520                                       ;Report "BAD BIT(S) IN DEVICE CSR REGISTER FOR LINE  0 (D)."
 9521 046664   012737   024736   005472         MOV     #ER1601,ERRBLK  ;SELECT THE PROPER ERROR REPORT ROUTINE.
 9522 046672   005003                         CLR     R3              ;SET OFFSET TO 0 TO CAUSE REPORT OF CSR REG.
 9523 046674   005005                         CLR     R5              ;CAUSE REPORT OF LINE 0.
 9524 046676                                  ERROR                   ;  >>>>> ERROR # 1802 <<<<<
      046676   104460                                                                        TRAP    C$ERROR
 9525 046700   005302                 4$:     DEC     R2              ;DECREMENT LOOP COUNT/IND.ADD.REG ADDRESS.
 9526 046702   002362                        BGE     2$              ;LOOP BACK TO TEST NEXT ADDRESS IF NOT DONE.
 9527                                   ;*
 9528                                   ; Write and verify 16 data patterns in all used bits of all lower bytes of all
 9529                                   ;   registers on all active lines.  Use READ/WRITE accesses.  Before writing
 9530                                   ;   each pattern, clear all the used bits of all active registers.
 9531                                   ;    REGTST routine reports errors with numbers  >>>>> ERROR 1803 - 1805 <<<<<.
 9532                                   ;-
 9533 046704   005237   005466                 INC     ERRNBR          ;SET THE ERROR NUMBER TO 1803.
 9534 046710   012703   177777                 MOV     #-1  3          ;INDICATE THAT LO BYTE ACCESSES ARE TO BE USED.
 9535 046714   012704   000002                 MOV     #2,R4           ;INDICATE R/W ACCESS, CLEAR FIRST.
```

```
 9536 046720  004737  034140                    JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
 9537                                    ;*
 9538                                    ; Write and verify 16 data patterns in all used bits of all high bytes of all
 9539                                    ;   registers on all active lines.  Use READ/WRITE accesses.  Before writing
 9540                                    ;   each pattern, clear all the used bits of all active registers.
 9541                                    ;    REGTST routine reports errors with numbers  >>>>> ERROR 1806 - 1808 <<<<<.
 9542                                    ;-
 9543 046724  012737  003416  005466             MOV     #1806.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
 9544 046732  005403                            NEG     R3              ;INDICATE THAT HI BYTE ACCESSES ARE TO BE USED.
 9545 046734  004737  034140                    JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
 9546                                    ;*
 9547                                    ; Write and verify 16 data patterns in all used bits of all lower bytes of all
 9548                                    ;   registers on all active lines.  Use READ/WRITE accesses.  Before writing
 9549                                    ;   each pattern, set all the used bits of all active registers.
 9550                                    ;    REGTST routine reports errors with numbers  >>>>> ERROR 1809   1811 <<<<<.
 9551                                    ;-
 9552 046740  012737  003421  005466             MOV     #1809.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
 9553 046746  005403                            NEG     R3              ;INDICATE THAT LO BYTE ACCESSES ARE TO BE USED.
 9554 046750  005404                            NEG     R4              ;INDICATE R/W ACCESS, SET FIRST.
 9555 046752  004737  034140                    JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
 9556                                    ;*
 9557                                    ; Write and verify 16 data patterns in all used bits of all high bytes of all
 9558                                    ;   registers on all active lines.  Use READ/WRITE accesses.  Before writing
 9559                                    ;   each pattern, set all the used bits of all active registers.
 9560                                    ;    REGTST routine reports errors with numbers  >>>>> ERROR 1812 - 1814 <<<<<.
 9561                                    ;
 9562 046756  012737  003424  005466             MOV     #1812.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
 9563 046764  005403                            NEG     R3              ;INDICATE THAT HI BYTE ACCESSES ARE TO BE USED.
 9564 046766  004737  034140                    JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
 9565                                    ;*
 9566                                    ; Print error summary reports if necessary.
 9567                                    ;   The following routine reports errors with number >>>>> ERROR # 1815 <<<<<
 9568                                    ;-
 9569 046772  012737  003427  005466             MOV     #1815.,ERRNBR   ;SET UP ERROR NUMBER FOR NEXT RTN.
 9570 047000  004737  034502                    JSR     PC,REPSMR       ;REPORT ERROR SUMMARY IF NECESSARY.
 9571 047004  005037  002362            60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 9572 047010                                    ENDTST
      047010                                                                    L10053:
      047010  104401                                                                TRAP    C$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
                                                                                                        T17::
                                                 TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
047012  012737  000021  002364           MOV     @TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (19)
047020  012737  177777  002362           MOV     @-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
047026  012737  000001  005464           MOV     @1,ERRTYP       ;SET UP DEVICE FATAL INDICATOR IN ERROR TYPE.
047034  012737  003555  005466           MOV     @1901.,ERRNBR   ;SET UP ERROR NUMBER IN THE ERROR TABLE.
047042  012737  015502  005470           MOV     @EM1901,ERRMSG  ;SET UP ERROR MESSAGE FOR TEST IN ERROR TABLE.
047050  005037  002650                   CLR     ERSMRF          ;CLEAR THE ERROR SUMMARY FLAGS.
047054  012700  003452                   MOV     @ERCNTB,R0
047060  004737  030214                  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 <<<<<.
                                        ;-
047064  004737  034530                  JSR     PC,RESETT       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
047070  103402                          BCS     .+6             ;FATAL RESET ERROR?  NO, CONTINUE WITH TEST.
047072  000137  047254                  JMP     60$             ;YES,  EXIT THE TEST.
047076  012737  003556  005466           MOV     @1902.,ERRNBR   ;SET THE ERROR REPORT NUMBER TO 1902.
                                        ;*
                                        ; Verify read/write capab'lity to indirect address field of CSR.
                                        ; Use byte accesses.
                                        ;-
047104  012702  000017                          MOV     @17,R2          ;SET LOOP COUNT.
047110  013704  002300                          MOV     CSRA,R4         ;GET CSR ADDRESS.
047114  142714  000017                  2$:     BICB    @17,(R4)        ;CLEAR THE DUT CSR USING READ/MODIFY/WRITE.
047120  150214                                  BISB    R2,(R4)         ;WRITE COUNT TO CSR USING READ/MODIFY/WRITE.
047122  111401                                  MOVB    (R4),R1         ;READ BACK THE CONTENTS OF THE CSR
047124  042701  177760                        BIC     @177760,R1      ;MASK OUT ALL BUT THE IND.ADR.REG FIELD.
047130  020102                                CMP     R1,R2           ;CHECK FOR CORRECT DATA WRITTEN/READ.
047132  001406                               BEQ     4$              ;IS EXPECTED DATA BAD?  NO, SKIP ERROR REPORT.
                                            ;Report "BAD BIT(S) IN DEVICE CSR REGISTER FOR LINE  0 (D)."
047134  012737  024736  005472                MOV     @ER1601,ERRBLK  ;SELECT THE PROPER ERROR REPORT ROUTINE.
047142  005003                                CLR     R3              ;SET OFFSET TO 0 TO CAUSE REPORT OF CSR REG.
047144  005005                                CLR     R5              ;CAUSE REPORT OF LINE 0.
047146                                       ERROR                   ;  >>>>> ERROR @ 1902 <<<<<
047146  104460                                                                        TRAP    C$ERROR
047150  005302                  4$:     DEC     R2              ;DECREMENT LOOP COUNT/IND.ADD.REG ADDRESS.
047152  002360                          BGE     2$              ;LOOP BACK TO TEST NEXT ADDRESS IF NOT DONE.
                                        ;*
                                        ; Wr'te 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.
                                        ;    REGTST routine reports errors w'th numbers  >>>>> ERROR 1903 - 1905 <<<<<.
                                        ;-
047154  005237  005466                          INC     ERRNBR          ;SET THE ERROR NUMBER TO 1903.
047160  012703  177777                          MOV     @-1,R3          ;INDICATE THAT LO BYTE ACCESSES ARE TO BE USED.
```

```
 9629 047164  012704  000001                MOV     #1,R4           ;INDICATE R/M/W ACCESS, CLEAR FIRST.
 9630 047170  004737  034140                JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
 9631                                    ;+
 9632                                    ; Write and verify 16 data patterns in all used bits of all high bytes of all
 9633                                    ;   registers on all active lines.  Use READ/MODIFY/WRITE accesses.  Before
 9634                                    ;   writing each pattern, clear all the used bits of all active registers.
 9635                                    ;    REGTST routine reports errors with numbers  >>>>> ERROR 1906 - 1908 <<<<<.
 9636                                    ;-
 9637 047174  012737  003562  005466          MOV     #1906.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
 9638 047202  005403                        NEG     R3              ;INDICATE THAT HI BYTE ACCESSES ARE TO BE USED.
 9639 047204  004737  034140                JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
 9640                                    ;+
 9641                                    ; Write and verify 16 data patterns in all used bits of all lower bytes of all
 9642                                    ;   registers on all active lines.  Use READ/MODIFY/WRITE accesses.  Before
 9643                                    ;   writing each pattern, set all the used bits of all active registers.
 9644                                    ;    REGTST routine reports errors with numbers  >>>>> ERROR 1909 - 1911 < <<<.
 9645                                    ;-
 9646 047210  012737  003565  005466          MOV     #1909.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
 9647 047216  005403                        NEG     R3              ;INDICATE THAT LO BYTE ACCESSES ARE TO BE USED.
 9648 047220  005404                        NEG     R4              ;INDICATE R/M/W ACCESS, SET FIRST.
 9649 047222  004737  034140                JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
 9650                                    ;+
 9651                                    ; Write and verify 16 data patterns in all used bits of all high bytes of all
 9652                                    ;   registers on all active lines.  Use READ/MODIFY/WRITE accesses.  Before
 9653                                    ;   writing each pattern, set all the used bits of all active registers.
 9654                                    ;    REGTST routine reports errors with numbers  >>>>> ERROR 1912 - 1914 <<<<<.
 9655                                    ;-
 9656 047226  012737  003570  005466          MOV     #1912.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
 9657 047234  005403                        NEG     R3              ;INDICATE THAT HI BYTE ACCESSES ARE TO BE USED.
 9658 047236  004737  034140                JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
 9659                                    ;+
 9660                                    ; Print error summary reports if necessary.
 9661                                    ;   The following routine reports errors with number >>>>> ERROR # 1915 <<<<<
 9662                                    ;-
 9663 047242  012737  003573  005466          MOV     #1915.,ERRNBR   ;SET UP ERROR NUMBER FOR NEXT RTN.
 9664 047250  004737  034502                JSR     PC,REPSMR       ;REPORT ERROR SUMMARY IF NECESSARY.
 9665 047254  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 9666 047260                                ENDTST
      047260                                                                  L10054:
      047260  104401                                                                  TRAP    C$ETST
```

```
 9668                                   .SBTTL  HARDWARE TEST           - IDBIT -
 9669                                   ;++ ******************************************************************************
 9670                                   ;*              - Device Register ID Bit Test -
 9671                                   ;*
 9672                                   ;*      This test verifies that the DUT STAT register ID bit reads as clear.
 9673                                   ;*
 9674                                   ;-- ******************************************************************************
 9675
 9676 047262                                   BGNTST
      047262                                                                                    T18::
 9677           000022                          TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 9678 047262   012737   000022   002364         MOV     @TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (20)
 9679 047270   012737   177777   002362         MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
 9680 047276   012737   000001   005464         MOV     #1,ERRTYP       ;SET UP DEVICE FATAL INDICATOR IN ERROR TYPE.
 9681 047304   012737   003721   005466         MOV     #2001.,ERRNBR   ;SET UP ERROR NUMBER IN THE ERROR TABLE.
 9682 047312   012737   015557   005470         MOV     #EM2001,ERRMSG  ;SET UP ERROR MESSAGE FOR TEST IN ERROR TABLE.
 9683                                   ;+
 9684                                   ; Reset the DUT to a known state, do not remove the status codes from the fifo.
 9685                                   ;  Clear TX and RX interrupt enable bits in the CSR.
 9686                                   ; This subroutine reports errors >>>>> 2001 <<<<<.
 9687                                   ;-
 9688 047320   004737   034530                 JSR     PC,RESETT       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
 9689 047324   103016                         BCC     60$             ;FATAL RESET ERROR?  YES,  EXIT THE TEST.
 9690                                   ;+
 9691                                   ; Read the STAT register ID bit and verify that it is clear.
 9692                                   ;-
 9693 047326   017701   132754                 MOV     @STATA,R1       ;READ THE STAT REGISTER CONTENTS.
 9694 047332   032701   000400                 BIT     #BIT8,R1        ;CHECK THE ID BIT.
 9695 047336   001411                         BEQ     60$             ;ID BIT CLEAR?  YES, EXIT THE TEST.
 9696 047340   012737   003722   005466         MOV     #2002.,ERRNBR   ;NO,  SET THE ERROR REPORT NUMBER TO 2002.
 9697 047346   012701   015621                 MOV     #EM2002,R1      ;GET THE PROPER ERROR MESSAGE.
 9698 047352   012737   024644   005472         MOV     #ER0503,ERRBLK  ;SELECT THE PROPER ERROR REPORT ROUTINE.
 9699 047360                                   ERROR                   ;ERROR NUMBER >>>>> 2002 <<<<<
      047360   104460                                                                            TRAP    C$ERROR
 9700 047362   005037   002362         60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 9701 047366                                   ENDTST
      047366                                                                            L10055:
      047366   104401                                                                           TRAP    C$ETST
```

```
 9703                                   .SBTTL  HARDWARE TEST           - NOTXDV -
 9704                                   ;++ ******************************************************************************
 9705                                   ;*                      - No TX_DATA_VALID/No TX_ACTION Test -
 9706                                   ;*      This test verifies that if a data word is written without the
 9707                                   ;*      TX_DATA_VALID bit set, no TX_ACTION will be generated.
 9708                                   ;*      To ensure data is not accidentally transmitted, the test is performed
 9709                                   ;*      in internal loopback, and on all active lines.
 9710                                   ;*
 9711                                   ;-- ******************************************************************************
 9712 047370                                   BGNTST
      047370                                                                                   T19::
 9713           000023                          TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 9714 047370   012737   000023   002364          MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (21)
 9715 047376   012737   177777   002362          MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
 9716 047404   012737   000001   005464          MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
 9717 047412   012737   004065   005466          MOV     #2101.,ERRNBR   ;SET THE FIRST ERROR NUMBER IN ERROR TABLE.
 9718 047420   012737   015674   005470          MOV     #EM2101,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERRTBL.
 9719 047426   012737   026440   005472          MOV     #ER9101,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
 9720                                   ;+
 9721                                   ; Reset the DUT to a known state, remove the status codes from the fifo.
 9722                                   ;  Clear TX and RX interrupt enable bits in the CSR.
 9723                                   ; This subroutine reports error >>>>> 2101 <<<<<.
 9724                                   ;-
 9725 047434   004737   030172                  JSR     PC,CLNRST       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
 9726 047440   103054                          BCC     60$             ;RESET FAILURE?, ABORT THIS TEST.
 9727 047442   005237   005466                  INC     ERRNBR          ;SET THE ERROR NUMBER TO 2102.
 9728                                   ;+
 9729                                   ; Set internal loopback on all active lines.
 9730                                   ; Set LPR on all lines to 38.4k baud, 8 bits per character, odd parity,
 9731                                   ; 2 stop bits.
 9732                                   ; Disable transmitters on all active lines.
 9733                                   ;-
 9734 047446   013705   002272                  MOV     ACTLNS,R5       ;PASS THE ACTIVE LINE BIT MAP.
 9735 047452   012700   000200                  MOV     #200,R0         ;PASS THE LNCTRL CONTENTS.
 9736 047456   004737   040250                  JSR     PC,WTWLNC       ;INITIALISE THE LNCTRL REGISTERS.
 9737 047462   012700   177670                  MOV     #177670,R0      ;PASS THE LPR CONTENTS.
 9738 047466   004737   040324                  JSR     PC,WTWLPR       ;INITIALSE THE LPR REGISTERS ON ALL LINES.
 9739 047472   012704   000012                  MOV     #10.,R4         ;PASS DELAY TIME OF 10 MILLI SECS.
 9740 047476   004737   030370                  JSR     PC,DELAY        ;WAIT FOR LNCTRL AND LPR REGS TO BE UPDATED.
 9741 047502   004737   036352                  JSR     PC,TXDSBL       ;DISABLE TRANSMITTERS ON ALL ACTIVE LINES.
 9742                                   ;+
 9743                                   ; Test all active lines individually.
 9744                                   ; Write a data word to the TXCHAR register with TX_DATA_VALID clear.
 9745                                   ; Verify no TX_ACTION is generated.
 9746                                   ;-
 9747 047506   013705   002272                  MOV     ACTLNS,R5       ;GET THE ACTIVE LINE BIT MAP.
 9748 047512   005004                          CLR     R4              ;CLEAR THE LINE NUMBER COUNTER.
 9749 047514   000241                  2$:     CLC                     ;CLEAR THE CARRY BIT PRIOR TO SHIFTING BIT MAP.
 9750 047516   006005                          ROR     R5              ;SHIFT THE BIT MAP INTO THE CARRY BIT.
 9751 047520   103020                          BCC     4$              ;DO NOT TEST THE LINE IF IT IS INACTIVE.
 9752                                   ;+
 9753                                   ; Select the line under test.
 9754                                   ;  Write data word (ASCII <LF>) to TXCHR register with the most significant
 9755                                   ;  bit (TX_DATA_VALID) clear.
 9756                                   ;-
 9757 047522   010477   132552                  MOV     R4,@CSRA        ;SELECT THE LINE CURRENTLY UNDER TEST.
 9758 047526   012777   000012   132546         MOV     #12,@TXCHA      ;WRITE THE DATA WORD TO THE DUT'S TXCHAR REG.
```

HARDWARE TEST - NOTXDV -

```
 9759                                   ;+
 9760                                   ; Wait for a TX_ACTION to be returned, report error if TX_ACTION found
 9761                                   ; before time-out occurs.
 9762                                   ;-
 9763 047534  012701  170002             MOV    #170002,R1      ;TEST BIT 15, TIMEOUT OF 2 MILLI SECS.
 9764 047540  013702  002300             MOV    CSR4,R2         ;PASS THE ADDRESS OF THE REGISTER TO TEST.
 9765 047544  004737  037740            JSR     PC,WAIBIS       ;WAIT FOR TX_ACTION TO COME BACK.
 9766 047550  103004                    BCC     4$              ;SKIP ERROR REPORT IF TX-ACTION NOT FOUND.
 9767
 9768 047552  010401                     MOV    R4,R1           ;PASS THE NUMBER OF CURRENT LINE UNDER TEST.
 9769 047554  012702  015737             MOV    #EM2102,R2      ;PASS THE ERROR MESSAGE TO BE REPORTED.
 9770                                                           ;"TX_ACT FOUND AFTER INVALID DATA WORD WRITTEN"
 9771 047560                            ERROR                   ;               >>>>> ERROR #4102 <<<<<.
      047560  104460                                                                    TRAP    C$ERROR
 9772                                ;+
 9773                                ; Verify all active lines have been tested.
 9774                                ;-
 9775 047562  005204                4$:      INC    R4              ;INCREMENT THE LINE NUMBER COUNTER.
 9776 047564  005705                         TST    R5              ;ARE THERE ANY MORE ACTIVE LINES TO TEST?.
 9777 047566  001352                        BNE     2$              ;YES; BRANCH TO TEST THE NEXT LINE.
 9778 047570  000400                        BR      60$             ;NO; EXIT THIS TEST.
 9779
 9780 047572  005037  002362          60$:     CLR    CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
 9781 047576                            ENDTST
      047576                                                                  L10056:
      047576  104401                                                             TRAP    C$ETST
```

```
 9783                                   .SBTTL  HARDWARE TEST           - TXDVAL-
 9784                                   ;++ ************************************************************************
 9785                                   ;*                      - TX_DATA_VALID/TX_ACTION Test -
 9786                                   ;*      This test verifies that if a data word is written to the TXCHAR register
 9787                                   ;*      with the TX_DATA_VALID bit set, a corresponding TX_ACTION will be
 9788                                   ;*      generated.
 9789                                   ;*      To ensure data is not accidentally transmitted, the test is performed
 9790                                   ;*      in internal loopback, and on all active lines.
 9791                                   ;*
 9792                                   ;-- ************************************************************************
 9793
 9794 047600                                       BGNTST
      047600
 9795           000024                                                          T20::
 9796 047600   012737   000024   002364           MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (22)
 9797 047606   012737   177777   002362           MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
 9798 047614   012737   000001   005464           MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
 9799 047622   012737   004231   005466           MOV     #2201.,ERRNBR   ;SET THE FIRST ERROR NUMBER IN ERROR TABLE.
 9800 047630   012737   016033   005470           MOV     #EM2201,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERRTBL.
 9801 047636   012737   026440   005472           MOV     #ER9101,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
 9802                                   ;+
 9803                                   ; Reset the DUT to a known state, remove the status codes from the fifo.
 9804                                   ;  Clear TX and RX interrupt enable bits in the CSR.
 9805                                   ; This subroutine reports error >>>>> 2201 <<<<<.
 9806                                   ;-
 9807 047644   004737   030172                   JSR     PC,CLNRST       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
 9808 047650   103066                   BCC     60$             ;RESET FAILURE?, ABORT THIS TEST.
 9809                                   ;+
 9810                                   ; Set internal loopback on all active lines.
 9811                                   ; Set LPR on all lines to 38.4k baud, 8 bits per character, odd parity,
 9812                                   ; 2 stop bits.
 9813                                   ; Disable transmitters on all active lines.
 9814                                   ;-
 9815 047652   013705   002272                   MOV     ACTLNS,R5       ;PASS THE ACTIVE LINE BIT MAP.
 9816 047656   012700   000200                   MOV     #200,R0         ;PASS THE LNCTRL CONTENTS.
 9817 047662   004737   040250                   JSR     PC,WTWLNC       ;INITIALISE THE LNCTRL REGISTERS.
 9818 047666   012700   177670                   MOV     #177670,R0      ;PASS THE LPR CONTENTS.
 9819 047672   004737   040324                   JSR     PC,WTWLPR       ;INITIALSE THE LPR REGISTERS ON ALL LINES.
 9820 047676   012704   000012                   MOV     #10.,R4         ;PASS DELAY TIME OF 10 MILLI-SECONDS.
 9821 047702   004737   030370                   JSR     PC,DELAY        ;WAIT FOR LNCTR AND LPR REGS TO BE UPDATED.
 9822 047706   004737   036352                   JSR     PC,TXDSBL       ;DISABLE TRANSMITTERS ON ALL ACTIVE LINES.
 9823                                   ;+
 9824                                   ; Test all active lines individually.
 9825                                   ; Write a data word to the TXCHAR register with TX DATA_VALID set.
 9826                                   ; Verify that a corresponding TX_ACTION is generated.
 9827                                   ;-
 9828 047712   013705   002272                   MOV     ACTLNS,R5       ;GET THE ACTIVE LINE BIT MAP.
 9829 047716   005004                           CLR     R4              ;CLEAR THE LINE NUMBER COUNTER.
 9830 047720   012737   004232   005466  2$:     MOV     #2202.,ERRNBR   ;SET THE ERROR NUMBER TO 2202.
 9831 047726   000241                           CLC                     ;CLEAR THE CARRY BIT PRIOR TO SHIFTING BIT MAP.
 9832 047730   006005                           ROR     R5              ;SHIFT THE BIT MAP INTO THE CARRY BIT.
 9833 047732   103032                   BCC     8$              ;DO NOT TEST THE LINE IF IT IS INACTIVE.
 9834                                   ;+
 9835                                   ; Select the line under test.
 9836                                   ;  Write data word (ASCII <LF>) to TXCHR register with the most significant
 9837                                   ;  bit (TX_DATA_VALID) set.
 9838                                   ;-
```

HARDWARE TEST - TXDVAL- SEQ 0255

```
 9839 047734  010477  132340                    MOV     R4,@CSRA        ;SELECT THE LINE CURRENTLY UNDER TEST.
 9840 047740  012777  100012  132334            MOV     #100012,@TXCHA  ;WRITE THE DATA WORD TO THE DUT'S TXCHAR REG.
 9841                                          ;+
 9842                                          ; Wait for a TX_ACTION to be returned, report error if no TX_ACTION
 9843                                          ; found before time-out occurs.
 9844                                          ;-
 9845 047746  012701  170002                    MOV     #170002,R1      ;TEST BIT 15, TIMEOUT OF 2 MILLI SECS.
 9846 047752  013702  002300                    MOV     CSRA,R2         ;PASS THE ADDRESS OF THE REGISTER TO TEST.
 9847 047756  004737  037740                   JSR     PC,WAIBIS       ;WAIT FOR TX_ACTION TO COME BACK.
 9848 047762  103403                           BCS     4$              ;SKIP ERROR REPORT IF TX-ACTION FOUND.
 9849 047764  012702  016070                    MOV     #EM2202,R2      ;PASS THE ERROR MESSAGE TO BE REPORTED.
 9850                                                                  ;"NO TX_ACT FOUND AFTER VALID DATA WORD TX'D".
 9851 047770  000411                           BR      6$              ;GO REPORT THE ERROR.
 9852                                          ;+
 9853                                          ; Verify TX_ACTION returned from correct line.
 9854                                          ;-
 9855 047772  005237  005466          4$:       INC     ERRNBR          ;INCREMENT ERROR NUMBER TO 2103.
 9856 047776  000302                            SWAB    R2              ;GET THE LINE NUMBER IN THE LOW BYTE.
 9857 050000  042702  177760                    BIC     #177760,R2      ;CLEAR THE UNWANTED BITS.
 9858 050004  020204                            CMP     R2,R4           ;IS IT THE CORRECT LINE NUMBER?.
 9859 050006  001404                           BEQ     8$              ;YES; SKIP THE ERROR REPORT.
 9860 050010  012702  016162                    MOV     #EM2203,R2      ;PASS THE ERROR MESSAGE TO BE REPORTED.
 9861                                                                  ; "INCORRECT LINE # RETURNED WITH TX_ACT"
 9862 050014  010401                  6$:       MOV     R4,R1           ;PASS THE NUMBER OF CURRENT LINE UNDER TEST.
 9863 050016                                    ERROR                   ;               >>>>> ERROR <<<<<.
      050016  104460                                                                      TRAP    C$ERROR
 9864
 9865                                          ;+
 9866                                          ; Verify all active lines have been tested.
 9867                                          ;-
 9868 050020  005204                  8$:       INC     R4              ;INCREMENT THE LINE NUMBER COUNTER.
 9869 050022  005705                            TST     R5              ;ARE THERE ANY MORE ACTIVE LINES TO TEST?.
 9870 050024  001335                           BNE     2$              ;YES; BRANCH TO TEST THE NEXT LINE.
 9871
 9872 050026  005037  002362          60$:      CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
 9873 050032                                    ENDTST
      050032                                                          L10057:
      050032  104401                                                          TRAP    C$ETST
```

```
                                        .SBTTL  HARDWARE TEST           - TXENBI-
                                        ;++ ******************************************************************************
                                        ;*                      - TX_ENABLE (Inactive) Test -
                                        ;*      This test verifies that when the line under test's TX_ENABLE bit is
                                        ;*      clear, transmission will not take place on that line.
                                        ;*      This test is performed in internal loopback, and on all active lines.
                                        ;*
                                        ;-- ******************************************************************************

050034                                          BGNTST
050034                                                                                  T21::
        000025                                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
050034  012737  000025  002364                   MOV     @TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (23)
050042  012737  177777  002362                   MOV     @-1,CTRLCF     ;INDICATE THAT WE ARE IN A TEST.
050050  012737  000001  005464                   MOV     @1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
050056  012737  004375  005466                   MOV     @2301.,ERRNBR  ;SET THE FIRST ERROR NUMBER IN ERROR TABLE.
050064  012737  016267  005470                   MOV     @EM2301,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERRTBL.
050072  012737  026440  005472                   MOV     @ER9101,ERRBLK ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
                                        ;+
                                        ; Reset the DUT to a known state, remove the status codes from the fifo.
                                        ;  Clear TX and RX interrupt enable bits in the CSR.
                                        ; This subroutine reports error >>>>> 2301 <<<<<.
                                        ;-
050100  004737  030172                          JSR     PC,CLNRST      ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
050104  103110                                 BCC     60$            ;RESET FAILURE?, ABORT THIS TEST.
                                        ;+
                                        ; Set internal loopback on all active lines.
                                        ; Set LPR on all lines to 38.4k baud, 8 bits per character, odd parity,
                                        ; 2 stop bits.
                                        ; Enable transmitters on all lines.
                                        ;-
050106  013705  002272                           MOV     ACTLNS,R5      ;PASS THE ACTIVE LINE BIT MAP.
050112  012700  000200                           MOV     @200,R0        ;PASS THE LNCTRL CONTENTS.
050116  004737  040250                          JSR     PC,WTWLNC       ;INITIALISE THE LNCTRL REGISTERS.
050122  012700  177670                           MOV     @177670,R0     ;PASS THE LPR CONTENTS.
050126  004737  040324                          JSR     PC,WTWLPR       ;INITIALSE THE LPR REGISTERS ON ALL LINES.
050132  012704  000012                           MOV     @10.,R4        ;PASS DELAY TIME OF 10 MILLI-SECONDS.
050136  004737  030370                          JSR     PC,DELAY        ;WAIT FOR LNCTR AND LPR REGS TO BE UPDATED.
050142  012705  000377                           MOV     @MAPLNS,R5     ;PASS THE BIT MAP CORRESPONDING TO ALL LINES.
050146  004737  036446                          JSR     PC,TXENBL       ;ENABLE TRANSMITTERS ON ALL LINES.
                                        ;+
                                        ; Test all active lines individually.
                                        ; Disable transmission on each active line.
                                        ;-
050152  012703  000001                           MOV     @1,R3          ;SET UP THE LINE BIT MAP FOR CHANNEL 0.
050156  005004                                   CLR     R4             ;CLEAR THE LINE NUMBER COUNTER.
050160  012737  004376  005466  2$:              MOV     @2302.,ERRNBR  ;SET THE ERROR NUMBER TO 2302.
050166  030337  002272                           BIT     R3,ACTLNS      ;CHECK IF THE LINE IS ACTIVE.
050172  001447                                  BEQ     6$             ;SKIP TESTING THIS LINE IF IT IS INACTIVE.
                                            ;+
                                            ; Clear the TX_ENABLE bit in TBUFFAD2 register.
                                            ; Select the line under test.
                                            ;   Verify it is clear, report error if set.
                                            ;-
050174  010305                                   MOV     R3,R5          ;PASS THE BIT MAP OF THE LINE UNDER TEST.
050176  004737  036352                          JSR     PC,TXDSBL       ;DISABLE TRANSMISSION ON THE LINE UNDER TEST.
050202  010477  132072                           MOV     R4,@CSRA       ;SELECT THE LINE CURRENTLY UNDER TEST.
```

HARDWARE TEST - TXENBI- SEQ 0257

```
 9931 050206  005777  132102                  TST     @TXAD2A         ;VERIFY THE TX_ENABLE BIT IS SET.
 9932 050212  100433                          BMI     4$              ;GO REPORT ERROR IF TX_ENABLE BIT SET.
 9933                                        ;+
 9934                                        ; Write data word (ASCII <LF>) to TXCHR register.
 9935                                        ; Wait for a TX_ACTION to be returned, report error if a TX_ACTION
 9936                                        ; is found before time-out occurs.
 9937                                        ;-
 9938 050214  012737  004377  005466          MOV     #2303.,ERRNBR   ;SET ERROR NUMBER TO 2303.
 9939 050222  012777  100012  132052          MOV     #100012,@TXCHA  ;WRITE THE DATA WORD TO THE DUT'S TXCHAR REG.
 9940 050230  012701  170002                  MOV     #170002,R1      ;TEST BIT 15, TIMEOUT OF 2 MILLI SECS.
 9941 050234  013702  002300                  MOV     CSRA,R2         ;PASS THE ADDRESS OF THE REGISTER TO TEST.
 9942 050240  004737  037740                  JSR     PC,WAIBIS       ;WAIT FOR TX_ACTION TO COME BACK.
 9943 050244  103016                          BCC     4$              ;GO REPORT ERROR IF NO TX-ACTION FOUND.
 9944                                        ;+
 9945                                        ; Wait for the data to appear in the fifo, report error if data found.
 9946                                        ;-
 9947 050246  005237  005466                  INC     ERRNBR          ;SET ERROR NUMBER TO 2304.
 9948 050252  012701  070012                  MOV     #70012,R1       ;TEST BIT 7, TIMEOUT OF 10 MILLI SECS.
 9949 050256  013702  002300                  MOV     CSRA,R2         ;PASS THE ADDRESS OF THE REGISTER TO TEST.
 9950 050262  004737  037740                  JSR     PC,WAIBIS       ;WAIT FOR RX_DATA_AVAILABLE TO SET.
 9951 050266  103405                          BCS     4$              ;REPORT ERROR IF DATA RECEIVED IN THE FIFO.
 9952 050270  005237  005466                  INC     ERRNBR          ;SET ERROR NUMBER TO 2305.
 9953 050274  017702  132002                  MOV     @RBUFA,R2       ;READ THE DATA FROM THE FIFO.
 9954 050300  100004                          BPL     6$              ;SKIP ERROR REPORT IF DATA IS THERE.
 9955
 9956 050302  010401                  4$:     MOV     R4,R1           ;PASS THE NUMBER OF CURRENT LINE UNDER TEST.
 9957 050304  012702  016325                  MOV     #EM2302,R2      ;PASS THE MESSAGE TO BE REPORTED.
 9958                                                                 ;"TX_ENABLE BIT BAD ON LINE: nn".
 9959 050310                                  ERROR                   ;               >>>>> ERROR <<<<<.
      050310  104460                                                                     TRAP    C$ERROR
 9960                                        ;+
 9961                                        ; Verify all active lines have been tested.
 9962                                        ;-
 9963 050312  000241                  6$:     CLC                     ;CLEAR THE CARRY BIT PRIOR TO ROTATION.
 9964 050314  006103                          ROL     R3              ;SHIFT THE BIT MAP FOR THE NEXT LINE.
 9965 050316  005204                          INC     R4              ;INCREMENT THE LINE NUMBER COUNTER.
 9966 050320  020427  000010                  CMP     R4,#NUMLNS      ;HAVE ALL THE LINES BEEN TESTED?.
 9967 050324  002715                          BLT     2$              ;NO; BRANCH TO TEST THE NEXT LINE.
 9968
 9969 050326  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
 9970 050332                                  ENDTST
      050332                                                                 L10060:
      050332  104401                                                                 TRAP    C$ETST
```

```
 9972                                   .SBTTL  HARDWARE TEST           - TXENBA-
 9973                                   ;++ ************************************************************************
 9974                                   ;*                      - TX_ENABLE (Active) Test -
 9975                                   ;*      This test verifies that when the TX_ENABLE bit is set in the approriate
 9976                                   ;*      line register, transmission will take place on that line.
 9977                                   ;*      This test is performed in internal loopback, and on all active lines.
 9978                                   ;*
 9979                                   ;-- ************************************************************************
 9980
 9981 050334                                    BGNTST
      050334
 9982           000026                                                          T22::
 9983 050334   012737   000026   002364          TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 9984 050342   012737   177777   002362          MOV     @TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (24)
 9985 050350   012737   000001   005464          MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
 9986 050356   012737   004541   005466          MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
 9987 050364   012737   016363   005470          MOV     #2401.,ERRNBR   ;SET THE FIRST ERROR NUMBER IN ERROR TABLE.
 9988 050372   012737   026440   005472          MOV     #EM2401,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERRTBL.
 9989                                           MOV     #ER9101,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
 9990                                   ;+
 9991                                   ; Reset the DUT to a known state, remove the status codes from the fifo.
 9992                                   ;  Clear TX and RX interrupt enable bits in the CSR.
 9993                                   ; This subroutine reports error >>>>> 2401 <<<<<.
 9994 050400   004737   030172          ;-
 9995 050404   103127                           JSR     PC,CLNRST       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
 9996                                           BCC     60$             ;RESET FAILURE?, ABORT THIS TEST.
 9997                                   ;+
 9998                                   ; Set internal loopback on all active lines.
 9999                                   ; Set LPR on all lines to 38.4k baud, 8 bits per character, odd parity,
10000                                   ; 2 stop bits.
10001                                   ; Disable transmitters on all lines.
10002 050406   013705   002272          ;-
10003 050412   012700   000200                   MOV     ACTLNS,R5       ;PASS THE ACTIVE LINE BIT MAP.
10004 050416   004737   040250                   MOV     #200,R0         ;PASS THE LNCTRL CONTENTS.
10005 050422   012700   177670                  JSR     PC,WTWLNC       ;INITIALISE THE LNCTRL REGISTERS.
10006 050426   004737   040324                   MOV     #177670,R0      ;PASS THE LPR CONTENTS.
10007 050432   012704   000012                  JSR     PC,WTWLPR       ;INITIALSE THE LPR REGISTERS ON ALL LINES.
10008 050436   004737   030370                   MOV     #10.,R4         ;PASS DELAY TIME OF 10 MILLI-SECONDS.
10009 050442   012705   000377                  JSR     PC,DELAY        ;WAIT FOR LNCTR AND LPR REGS TO BE UPDATED.
10010 050446   004737   036352                   MOV     #MAPLNS,R5      ;PASS THE BIT MAP CORRESPONDING TO ALL LINES.
10011                                          JSR     PC,TXDSBL       ;DISABLE TRANSMITTERS ON ALL LINES.
10012                                  ;+
10013                                  ; Test all active lines individually.
10014                                  ; Enable transmission on each active line.
10015 050452   012703   000001          ;-
10016 050456   005004                           MOV     #1,R3           ;SET UP THE LINE BIT MAP FOR CHANNEL 0.
10017 050460   012737   004542   005466          CLR     R4              ;CLEAR THE LINE NUMBER COUNTER.
10018 050466   030337   002272          2$:     MOV     #2402.,ERRNBR   ;SET THE ERROR NUMBER TO 2402.
10019 050472   001463                          BIT     R3,ACTLNS       ;CHECK IF THE LINE IS ACTIVE.
10020                                          BEQ     8$              ;SKIP TESTING THIS LINE IF IT IS INACTIVE.
10021                                  ;+
10022                                  ; Select the line under test.
10023                                  ;  Set the TX_ENABLE bit in TBUFFAD2 register.
10024                                  ;   Verify it is set, report error if clear.
10025 050474   010305                  ;-
10026 050476   004737   036446                   MOV     R3,R5           ;PASS THE BIT MAP OF THE LINE UNDER TEST.
10027 050502   012705   000012                  JSR     PC,TXENBL       ;ENABLE TRANSMISSION ON THE LINE UNDER TEST.
                                               MOV     #10.,R5         ;SET TXCHAR/LOOP COUNT TO 10.
```

HARDWARE TEST - TXENBA- SEQ 0259

```
 10028 050506  010477  131566                    MOV     R4,@CSRA        ;SELECT THE LINE CURRENTLY UNDER TEST.
 10029 050512  005777  131576                    TST     @TXAD2A         ;VERIFY THE TX_ENABLE BIT IS SET.
 10030 050516  100045                           BPL     6$              ;GO REPORT ERROR IF TX_ENABLE BIT CLEAR.
 10031                                         ;+
 10032                                         ; Write data word (ASCII <LF>) to TXCHR register.
 10033                                         ; Wait for a TX_ACTION to be returned, report error if no TX_ACTION
 10034                                         ; found before time-out occurs.
 10035                                         ;-
 10036 050520  012737  004543  005466  4$:      MOV     #2403.,ERRNBR   ;SET ERROR NUMBER TO 2403.
 10037 050526  012777  100012  131546           MOV     #100012,@TXCHA  ;WRITE THE DATA WORD TO THE DUT'S TXCHAR REG.
 10038 050534  012701  170002                    MOV     #170002,R1      ;TEST BIT 15, TIMEOUT OF 2 MILLI SECS.
 10039 050540  013702  002300                    MOV     CSRA,R2         ;PASS THE ADDRESS OF THE REGISTER TO TEST.
 10040 050544  004737  037740                   JSR     PC,WAIBIS       ;WAIT FOR TX_ACTION TO COME BACK.
 10041 050550  103030                           BCC     6$              ;GO REPORT ERROR IF NO TX-ACTION FOUND.
 10042                                         ;+
 10043                                         ; Wait for the data to appear in the fifo, report error if time-out.
 10044                                         ;-
 10045 050552  005237  005466                    INC     ERRNBR          ;SET ERROR NUMBER TO 2404.
 10046 050556  012701  070012                    MOV     #70012,R1       ;TEST BIT 7, TIMEOUT OF 10 MILLI SECS.
 10047 050562  013702  002300                    MOV     CSRA,R2         ;PASS THE ADDRESS OF THE REGISTER TO TEST.
 10048 050566  004737  037740                   JSR     PC,WAIBIS       ;WAIT FOR RX_DATA_AVAILABLE TO SET.
 10049 050572  103017                           BCC     6$              ;REPORT ERROR IF NO DATA RECEIVED IN THE FIFO.
 10050 050574  005237  005466                    INC     ERRNBR          ;SET ERROR NUMBER TO 2405.
 10051 050600  017702  131476                    MOV     @RBUFA,R2       ;READ THE DATA FROM THE FIFO.
 10052 050604  100012                           BPL     6$              ;GO REPORT ERROR IF THER IS'NT ANY DATA THERE.
 10053 050606  005237  005466                    INC     ERRNBR          ;SET ERROR NUMBER TO 2406.
 10054 050612  000302                           SWAB    R2              ;PUT THE LINE NUMBER IN THE LOW BYTE.
 10055 050614  042702  177760                    BIC     #177760,R2      ;CLEAR THE UNWANTED BITS.
 10056 050620  020204                           CMP     R2,R4           ;DID THE DATA COMF FROM THE CORRECT LINE?.
 10057 050622  001003                           BNE     6$              ;NO; GO REPORT THE ERROR.
 10058 050624  005305                           DEC     R5              ;DECREMENT THE TXCHAR/LOOP COUNTER.
 10059 050626  001334                           BNE     4$              ;LOOP TO TX THE NEXT CHAR.
 10060 050630  000404                           BR      8$              ;GO TEST THE NEXT LINE.
 10061
 10062 050632  010401                  6$:      MOV     R4,R1           ;PASS THE NUMBER OF CURRENT LINE UNDER TEST.
 10063 050634  012702  016325                    MOV     #EM2302,R2      ;PASS THE MESSAGE TO BE REPORTED.
 10064                                                                  ;"TX_ENABLE BIT BAD ON LINE: nn".
 10065 050640                                   ERROR                   ;               >>>>> ERROR <<<<<.
       050640  104460                                                                    TRAP    C$ERROR
 10066                                         ;+
 10067                                         ; Verify all active lines have been tested.
 10068                                         ;-
 10069 050642  010305                  8$:      MOV     R3,R5           ;PASS THE BIT MAP OF THE LINE UNDER TEST.
 10070 050644  004737  036352                   JSR     PC,TXDSBL       ;CLEAR THE TX_ENABLE BIT ON THIS LINE.
 10071 050650  000241                           CLC                     ;CLEAR THE CARRY BIT PRIOR TO ROTATION.
 10072 050652  006103                           ROL     R3              ;SHIFT THE BIT MAP FOR THE NEXT LINE.
 10073 050654  005204                           INC     R4              ;INCREMENT THE LINE NUMBER COUNTER.
 10074 050656  020427  000010                   CMP     R4,@NUMLNS      ;HAVE ALL THE LINES BEEN TESTED?.
 10075 050662  002676                           BLT     2$              ;NO; BRANCH TO TEST THE NEXT LINE.
 10076
 10077 050664  005037  002362          60$:     CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
 10078 050670                                   ENDTST
       050670                                                                   L10061:
       050670  104401                                                                    TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - INTA -
                                ;++ ******************************************************************************
                                ;*                      - Interrupt Test -
                                ;*      This test verifies that the Device Under Test (DUT) will generate
                                ;*      reception and transmission interrupts correctly.  This test does
                                ;*      not depend on the use of the serial line transmission or reception
                                ;*      capabilities of the DUT.  The lines are put in internal loopback
                                ;*      to minimize any external effects that could be caused on devices
                                ;*      attached to the serial lines.
                                ;*
                                ;-- ******************************************************************************

050672                                  BGNTST
050672                                                                          T23::
          000027                         TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
050672    012737  000027  002364         MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (26)
050700    012737  177777  002362         MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
050706    012737  000001  005464         MOV     #1,ERRTYP       ;SET ERROR FATAL ERROR TYPE IN ERROR TABLE.
050714    012737  003101  005466         MOV     #1601.,ERRNBR   ;SET FIRST ERROR REPORT NUMBER IN ERROR TABLE.
050722    012737  016417  005470         MOV     #EM2601.,ERRMSG ;SET TEST ERROR MESSAGE 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 from >>>>> 2601 thru 2602 <<<<<.
                                ;-
050730    004737  034530                JSR     PC,RESETT       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
050734    103402                        BCS     2$              ;SKIP AROUND ABORTING TEST IF NO ERROR FOUND.
050736    000137  051676                JMP     60$             ;ABORT TEST IF FATAL ERROR FOUND DURING RESET.
050742    012737  005053  005466  2$:    MOV     #2603.,ERRNBR   ;SET THE ERROR REPORT NUMBER TO 2603.
                                ;+
                                ; Enable transmitters on all lines.
                                ;-
050750    012705  000377        4$:     MOV     #MAPLNS,R5      ;PASS ACTIVE LINE BIT MAP.
050754    004737  036446                JSR     PC,TXENBL       ;ENABLE TRANSMISSION ON ALL LINES.
                                ;+
                                ; Test reception interrupts.
                                ;    Set up for RX and TX interrupts:
                                ;    RX interrupt service routine inputs a char and counts the interrupt.
                                ;    TX interrupt service routine counts TX interrupts.
                                ;-
050760    005037  002412                CLR     RXINTC          ;CLEAR THE RX INTERRUPT COUNTER.
050764    005037  002414                CLR     RXINTF          ;CLEAR THE RX INTERRUPT FLAGS.
050770    005037  002416                CLR     TXINTC          ;CLEAR THE TX INTERRUPT COUNTER.
050774    012737  004012  002360        MOV     #BUFBAS,BUFPTR  ;LOAD THE BUFFER PTR WITH THE BUFFER BASE ADR.
051002    106427  000240                MTPS    #PRIO5          ;DISABLE DEVICE I   RRUPTS.
051006                                  SETVEC  RXVECA,#RXINPT,#PRIO5 ;SET UP INTERRUPT VECTOR TO CATCH RX INT.
051006    012746  000240                                                  MOV     #PRIO5, (SP)
051012    012746  040734                                                  MOV     #RXINPT,-(SP)
051016    013746  002266                                                  MOV     RXVECA,-(SP)
051022    012746  000003                                                  MOV     #3, (SP)
051026    104437                                                          TRAP    C$SVEC
051030    062706  000010                                                  ADD     #10,SP
051034                                  SETVEC  TXVECA,#CACHTX,#PRIO5 ;SET UP INTERRUPT VECTOR TO CATCH TX INT.
051034    012746  000240                                                  MOV     #PRIO5,-(SP)
051040    012746  040402                                                  MOV     #CACHTX,-(SP)
051044    013746  002270                                                  MOV     TXVECA, (SP)
051050    012746  000003                                                  MOV     #3, (SP)
```

HARDWARE TEST - INTA -

```
                051054  104437                                                          TRAP    C$SVEC
                051056  062706  000010                                                  ADD     #10,SP
 10126          051062  106427  000000                  MTPS    #PRI00          ;ALLOW INTERRUPTS.
 10127                                                  ;+
 10128                                                  ;Enable reception interrupts.
 10129                                                  ;Delay 4 ms to allow time for the interrupts to take place.
 10130                                                  ;Disable reception interrupts.
 10131                                                  ;-
 10132          051066  004737  035600                  JSR     PC,RXIE1        ;ENABLE THE RECEPTIO. INTERRUPTS.
 10133          051072  012704  000004                   MOV    #4,R4           ;PASS 4 MS COUNT TO THE DELAY ROUTINE.
 10134          051076  004737  030370                  JSR     PC,DELAY        ;DELAY 4 MILLI-SECONDS.
 10135          051102  004737  035546                  JSR     PC,RXIE0        ;DISABLE RECEPTION INTERRUPTS.
 10136                                                  ;+
 10137                                                  ; Verify that the correct interrupts took place.
 10138                                                  ;    Test the int counter to verify that interrupts took place.
 10139                                                  ;-
 10140          051106  005737  002412                   TST    RXINTC          ;CHECK THE RX INTERRUPT COUNT.
 10141          051112  001017                          BNE     6$              ;SKIP THE FOLLOWING ERRORS IF COUNT <> 0.
 10142                                                  ;+
 10143                                                  ; Determine reason for no RX interrupts and print proper error message.
 10144                                                  ;-
 10145          051114  012701  016626                   MOV    #EM2604,R1      ;SET UP MSG IN CASE "RX.DATA.AVAIL IS CLR".
 10146          051120  032777  000200  131152           BIT    #BIT7,@CSRA     ;TEST THE RX.DATA.AVAIL BIT OF THE CSR.
 10147          051126  001416                          BEQ     8$              ;GO REPORT ERROR IF RX.DATA.AVAIL IS CLR.
 10148          051130  012701  016540                   MOV    #EM2603,R1      ;SET UP MSG IN CASE "DATA.VALID IS CLEAR".
 10149          051134  032777  100000  131140           BIT    #BIT15,@RBUFA   ;TEST THE DATA.VALID BIT OF THE FIFO.
 10150          051142  001410                          BEQ     8$              ;GO REPORT ERROR IF DATA.VALID IS CLEAR.
 10151          051144  012701  016447                   MOV    #EM2602,R1      ;SET UP MSG,"DATA VALID IS SET".
 10152          051150  000405                          BR      8$              ;GO REPORT THE ERROR.
 10153                                                  ;+
 10154                                                  ; If RX ints occurred with RX.DATA.AVAIL clear, report the error.
 10155                                                  ;-
 10156          051152  005737  002414          6$:      TST    RXINTF          ;CHECK THE RX INTERRUPT FLAGS.
 10157          051156  100006                          BPL     10$             ;SKIP THE ERROR IF FLAG IS CLEAR.
 10158          051160  012701  016722                   MOV    #EM2605,R1      ;SET UP THE PROPER MESSAGE.
 10159                                                  ;+
 10160                                                  ; Report the error which has been found.
 10161                                                  ;-
 10162          051164                          8$:     ERRDF   2603,EM2601,ER0503;             >>>>> ERROR #2603 <<<<<.
                051164  104455                                                                  TRAP    C$ERDF
                051166  005053                                                                  .WORD   2603
                051170  016417                                                                  .WORD   EM2601
                051172  024644                                                                  .WORD   ER0503
 10163                                                  ;+
 10164                                                  ; Verify that no TX interrupts have been generated so far in this test.
 10165                                                  ;
 10166          051174  013702  002416          10$:     MOV    TXINTC,R2       ;LOAD # OF TX INTERRUPTS FOR ER0504 RTN.
 10167          051200  001406                          BEQ     12$             ;SKIP ERROR IF NO TX INTERRUPTS.
 10168                                                 ;REPORT "TX INTERRUPTS(S) RECEIVED WITH TX INTERRUPTS DISABLED."
 10169          051202  012701  012647                   MOV    #EM0526,R1      ;SET UP MESSAGE ADR FOR INDIRECT PRINT.
 10170          051206                                  ERRDF   2604,EM2601,ER0504;             >>>>> ERROR #2604 <<<<<.
                051206  104455                                                                  TRAP    C$ERDF
                051210  005054                                                                  .WORD   2604
                051212  016417                                                                  .WORD   EM2601
                051214  024670                                                                  .WORD   ER0504
 10171                                                  ;+
 10172                                                  ; Clean out the interrupt vectors used in this test.
```

HARDWARE TEST INTA -

```
10173
10174 051216  106427  000240          ;-
                      12$:    MTPS    #PRI05          ;DISABLE DEVICE INTERRUPTS.
10175 051222                          CLRVEC  RXVECA          ;RETURN RX INT VECTOR TO UNUSED POOL.
      051222  013700  002266                                                    MOV     RXVECA,R0
      051226  104436                                                            TRAP    C$CVEC
10176 051230                          CLRVEC  TXVECA          ;RETURN TX INT VECTOR TO UNUSED POOL.
      051230  013700  002270                                                    MOV     TXVECA,R0
      051234  104436                                                            TRAP    C$CVEC
10177                                 ;+
10178                                 ; Test transmission interrupts.
10179                                 ;    Set up for RX and TX interrupts:
10180                                 ;    RX interrupt service routine counts RX interrupts.
10181                                 ;    TX interrupt service routine counts the interrupt and sets flags.
10182                                 ;
10183 051236  005037  002412                CLR     RXINTC          ;CLEAR THE RX INTERRUPT COUNTER.
10184 051242  005037  002416                CLR     TXINTC          ;CLEAR THE TX INTERRUPT COUNTER.
10185 051246  005037  002420                CLR     TXINTF          ;CLEAR THE RX INTERRUPT FLAGS.
10186 051252                               SETVEC  RXVECA,#CACHRX,#PRI05 ;SET UP INTERRUPT VECTOR TO CATCH RX INT.
      051252  012746  000240                                                    MOV     #PRI05,-(SP)
      051256  012746  040354                                                    MOV     #CACHRX,-(SP)
      051262  013746  002266                                                    MOV     RXVECA,-(SP)
      051266  012746  000003                                                    MOV     #3,-(SP)
      051272  104437                                                            TRAP    C$SVEC
      051274  062706  000010                                                    ADD     #10,SP
10187 051300                               SETVEC  TXVECA,#TXINTR,#PRI05 ;SET UP INT VECTOR TO TX INT ROUTINE.
      051300  012746  000240                                                    MOV     #PRI05, (SP)
      051304  012746  041216                                                    MOV     #TXINTR,-(SP)
      051310  013746  002270                                                    MOV     TXVECA, (SP)
      051314  012746  000003                                                    MOV     #3, (SP)
      051320  104437                                                            TRAP    C$SVEC
      051322  062706  000010                                                    ADD     #10,SP
10188 051326  106427  000000                    MTPS    #PRI00          ;ALLOW INTERRUPTS.
10189                                     ;+
10190                                     ; Verify that the TX_ACTION bit is clear.
10191                                     ;-
10192 051332  012705  000022                      MOV     #18.,R5         ;INITIALIZE THE LOOP COUNTER.
10193 051336  012701  000144                      MOV     #100.,R1        ;SET 100 MS TIME-OUT.
10194 051342  012702  100000                      MOV     #BIT15,R2       ;SELECT TX_ACTION BIT TO TEST.
10195 051346  013704  002300                      MOV     CSRA,R4         ;PASS DUT CSR AS THE WORD TO TEST.
10196 051352  012703  100000          14$:        MOV     #BIT15,R3       ;WAIT FOR TX_ACTION TO BE SET.
10197 051356  004737  032042                    JSR     PC,MSLOOP       ;WAIT UP TO 100 MS FOR TX_ACTION SET.
10198 051362  103020                            BCC     20$             ;IF TIME-OUT, CONSIDER TX_ACTION CLEAR.
10199 051364  005003                             CLR     R3              ;NOW, WAIT FOR TX_ACTION CLEAR.
10200 051366  004737  032042                    JSR     PC,MSLOOP       ;WAIT UP TO 100 MS FOR TX_ACTION CLEAR.
10201 051372  103005                            BCC     16$             ;IF TIME-OUT, REPORT TX ACTION WON'T CLEAR.
10202 051374  005305                             DEC     R5              ;DECREMENT THE TX_ACTION SET COUNTER.
10203 051376  001365                            BNE     14$             ;LOOP IF NOT TOO MANY TX_ACTIONS FOUND.
10204                                     ;REPORT "TX_ACTION SET REPEATEDLY AFTER RESET, NO DATA SENT."
10205 051400  012701  017044                      MOV     #EM2607,R1      ;SELECT ERROR MESSAGE.
10206 051404  000402                            BR      18$             ;GO TO REPORT THE ERROR.
10207 051406  012701  017140          16$:        MOV     #EM2608,R1      ;SELECT TX_ACTION STUCK SET MSG.
10208 051412                          18$:    ERRDF   2605,EM2606,ER0503;             >>>>> ERROR #2605 <<<<<.
      051412  104455                                                            TRAP    C$ERDF
      051414  005055                                                            .WORD   2605
      051416  017005                                                            .WORD   EM2606
      051420  024644                                                            .WORD   ER0503
10209 051422  000424                            BR      24$             ;GO TO TEST WITH TX_ACTION SET.
```

```
10210                                   ;+
10211                                   ; Verify that no interrupts occur with TX_ACTION clear.
10212                                   ;-
10213 051424  004737  036574    20$:    JSR     PC,TXIE1        ;ENABLE TX_INTERRUPTS.
10214 051430  012704  000062            MOV     #50.,R4         ;PASS 50 MS TIME TO THE DELAY ROUTINE.
10215 051434  004737  030370            JSR     PC,DELAY        ;DELAY 50 MILLI-SECONDS TO ALLOW INTS TO OCCUR.
10216 051440  005737  002416            TST     TXINTC          ;TEST THE TX INTERRUPT COUNT.
10217 051444  001413                    BEQ     24$             ;SKIP THE ERROR IF NO TX INTERRUPTS.
10218 051446  012701  017044            MOV     #EM2607,R1      ;SELECT MESSAGE IN CASE TX INT FLAG CLEAR.
10219 051452  005737  002420            TST     TXINTF          ;TEST THE TX INTERRUPT FLAGS.
10220 051456  100002                    BPL     22$             ;GO REPORT ERROR IF TX FLAG IS CLEAR.
10221 051460  012701  017211            MOV     #EM2609,R1      ;TX FLAG IS SET, SELECT PROPER ERROR MESSAGE.
10222                                   ;REPORT "TRANSMIT INTERRUPT TEST ERROR:..."
10223 051464                    22$:    ERRDF   2606,EM2606,ER0503;             >>>>> ERROR #2606 <<<<<
      051464  104455                                                                  TRAP    C$ERDF
      051466  005056                                                                  .WORD   2606
      051470  017005                                                                  .WORD   EM2606
      051472  024644                                                                  .WORD   ER0503
10224                                   ;+
10225                                   ; Prepare TX interrupt counter and flags.
10226                                   ;-
10227 051474  005037  002416    24$:    CLR     TXINTC          ;CLEAR THE TX INTERRUPT COUNT.
10228 051500  005037  002420            CLR     TXINTF          ;CLEAR THE TX INTERRUPT FLAGS.
10229                                   ;+
10230                                   ; Set up line parameters for transmission.
10231                                   ;-
10232 051504  012705  000377            MOV     #MAPLNS,R5      ;PASS ACTIVE LINES BIT MAP.
10233 051510  012700  000200            MOV     #200,R0         ;PASS INERT STATE, INTERNAL LOOPBACK.
10234 051514  004737  040250            JSR     PC,WTWLNC       ;DISABLE RECPTION AND DMA, ETC. ON DUT.
10235 051520  012700  156430            MOV     #156430,R0      ;SPECIFY 9600BPS,1STOP,NO PARITY,8BITS/CHAR.
10236 051524  004737  040324            JSR     PC,WTWLPR       ;WRITE TO ALL LPR REGISTERS.
10237                                   ;+
10238                                   ; Send a null char to each line.
10239                                   ;-
10240 051530  013701  002302            MOV     TXCHA,R1        ;SET UP TXCHAR REGISTER ADDRESS.
10241 051534  012702  100000            MOV     #100000,R2      ;SET CHARACTER TO BE TRANSMITTED = NULL.
10242 051540  004737  040300            JSR     PC,WTWLNS       ;SEND NULL CHAR TO EACH LINE.
10243                                   ;+
10244                                   ; Delay 250 milli-seconds to allow interrupts to occur.
10245                                   ;-
10246 051544  012704  000372            MOV     #250.,R4        ;SET UP FOR 250 MS DELAY.
10247 051550  004737  030370            JSR     PC,DELAY        ;WAIT 250 MS.
10248                                   ;+
10249                                   ; Verify that TX interrupts occurred.
10250                                   ;-
10251 051554  005737  002416            TST     TXINTC          ;CHECK THE TX INTERRUPT COUNTER.
10252 051560  001007                    BNE     26$             ;SKIP THE FOLLOWING ERROR IF WE GOT TX INTS.
10253                                   ;+
10254                                   ; Determine the reason that we received no interrupts.
10255                                   ;-
10256 051562  012701  017270            MOV     #EM2610,R1      ;SET UP MSG IN CASE "TX_ACTION IS SET".
10257 051566  005777  130506            TST     @CSRA           ;CHECK THE DUT CSR.
10258 051572  100407                    BMI     28$             ;GO TO REPORT ERROR IF TX_ACTION IS SET.
10259 051574  012701  017362            MOV     #EM2611,R1      ;SET UP "TX_ACTION NOT SET" MESSAGE.
10260                                   ;+
10261                                   ; Check to verify that TX_ACTION was set for each interrupt.
10262                                   ;-
```

HARDWARE TEST - INTA -

```
10263 051600  005737  002420          26$:     TST     TXINTF          ;CHECK THE TX INTERRUPT FLAGS.
10264 051604  100006                           BPL     30$             ;SKIP ERROR IF TX_ACTION CLR FLAG IS CLEAR.
10265 051606  012701  017211                    MOV     #EM2609,R1      ;SET UP TX INT WITH "TX_ACTION CLR" MSG.
10266                                        ;+
10267                                        ; Report "TRANSMIT INTERRUPT TEST ERROR:...."
10268                                        ;-
10269 051612                                 28$:    ERRDF   2607,EM2606,ER0503;             >>>>> ERROR #2607 <<<<<.
      051612  104455                                                                              TRAP    C$ERDF
      051614  005057                                                                              .WORD   2607
      051616  017005                                                                              .WORD   EM2606
      051620  024644                                                                              .WORD   ER0503
10270                                        ;+
10271                                        ; Verify that no TX interrupts have been generated so far in this test.
10272                                        ;-
10273 051622  013702  002412          30$:     MOV     RXINTC,R2       ;LOAD # OF RX INTERRUPTS FOR ER0504 RTN.
10274 051626  001406                           BEQ     32$             ;SKIP ERROR IF NO RX INTERRUPTS.
10275 051630  012701  012557                    MOV     #EM0525,R1      ;SET UP MESSAGE ADR FOR INDIRECT PRINT.
10276                                       ;REPORT "RX INTERRUPTS(S) RECEIVED WITH RX INTERRUPTS DISABLED."
10277 051634                                    ERRDF   2608,EM2606,ER0504;             >>>>> ERROR #2608 <<<<<.
      051634  104455                                                                              TRAP    C$ERDF
      051636  005040                                                                              .WORD   2608
      051640  017005                                                                              .WORD   EM2606
      051642  024670                                                                              .WORD   ER0504
10278                                        ;+
10279                                        ; Disable interrupts and clean out the interrupt vectors used in this test.
10280                                        ;-
10281 051644  005001                         32$:     CLR     R1              ;CLEAR BOTH TRANSMITTER
10282 051646  004737  036542                    JSR     PC,TXIE0        ; INTERRUPT ENABLE AND RECEIVER
10283 051652  004737  035546                    JSR     PC,RXIE0        ; INTERRUPT ENABLE BITS IN THE DUT CSR.
10284 051656  106427  000240                    MTPS    #PRI05          ;DISABLE DEVICE INTERRUPTS.
10285 051662                                    CLRVEC  RXVECA          ;RETURN RX INT VECTOR TO UNUSED POOL.
      051662  013700  002266                                                                      MOV     RXVECA,R0
      051666  104436                                                                              TRAP    C$CVEC
10286 051670                                    CLRVEC  TXVECA          ;RETURN TX INT VECTOR TO UNUSED POOL.
      051670  013700  002270                                                                      MOV     TXVECA,R0
      051674  104436                                                                              TRAP    C$CVEC
10287
10288 051676  005037  002362          60$:     CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
10289
10290 051702                                    ENDTST
      051702                                                                            L10062:
      051702  104401                                                                              TRAP    C$ETST
10291
```

HARDWARE TEST - BRLEVA -

```
10293                                   .SBTTL  HARDWARE TEST           - BRLEVA -
10294                                   ;++ ******************************************************************************
10295                                   ;*                      - BR Level Test B -
10296                                   ;*      This test verifies that the Device Under Test (DUT) will generate
10297                                   ;*      reception and transmission interrupts at the correct BR level.
10298                                   ;*      This test does not depend on the use of the serial line transmission
10299                                   ;*      or reception capabilities of the DUT.  The lines are put in internal
10300                                   ;*      loopback to minimize any external effects that could be caused on
10301                                   ;*      devices attached to the serial lines.
10302                                   ;*
10303                                   ;-- ******************************************************************************
10304
10305 051704                                   BGNTST
       051704                                                                                   T24::
10306           000030                           TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
10307 051704   012737  000030  002364           MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (30)
10308 051712   012737  177777  002362           MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
10309 051720   012737  000001  005464           MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
10310 051726   012737  005671  005466           MOV     #3001.,ERRNBR   ;SET THE FIRST ERROR NUMBER IN ERROR TABLE.
10311 051734   012737  017445  005470           MOV     #EM3001,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERRTBL.
10312 051742   005037  002650                   CLR     ERSMRF          ;INITIALIZE THE "REPORT ERROR SUMMARY" FLAGS.
10313                                   ;+
10314                                   ; Reset the DUT to a known state, do not remove the status codes from the fifo.
10315                                   ;  Clear TX and RX interrupt enable bits in the CSR.
10316                                   ; This subroutine reports errors from >>>>> 3001 thru 3002 <<<<<.
10317                                   ;-
10318 051746   004737  034530                   JSR     PC,RESETT       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
10319 051752   103402                           BCS     2$              ;SKIP AROUND ABORTING TEST IF NO ERROR FOUND.
10320 051754   000137  052544                   JMP     60$             ;ABORT TEST IF FATAL ERROR FOUND DURING RESET.
10321 051760   012737  005673  005466   2$:     MOV     #3003.,ERRNBR   ;SET THE ERROR REPORT NUMBER TO 3003.
10322                                   ;+
10323                                   ; Enable transmitters on all lines.
10324                                   ;-
10325 051766   012705  000377           4$:     MOV     #MAPLNS,R5      ;PASS ACTIVE LINE BIT MAP.
10326 051772   004737  036446                   JSR     PC,TXENBL       ;ENABLE TRANSMISSION ON ALL LINES.
10327                                   ;+
10328                                   ; Generate a transmission interrupt request.
10329                                   ; Processor priority should be at 7 disabling ints.
10330                                   ;-
10331 051776   106427  000340                   MTPS    #PRIO7          ;DISABLE ALL INTERRUPTS.
10332 052002                                    SETVEC  TXVECA,#TXINTR,#PRIO7 ;SET UP INTERRUPT VECTOR TO CATCH TX INT.
       052002   012746  000340                                                                    MOV     #PRIO7,-(SP)
       052006   012746  041216                                                                    MOV     #TXINTR,-(SP)
       052012   013746  002270                                                                    MOV     TXVECA,-(SP)
       052016   012746  000003                                                                    MOV     #3,-(SP)
       052022   104437                                                                           TRAP    C$SVEC
       052024   062706  000010                                                                    ADD     #10,SP
10333                                   ;+
10334                                   ; Set up DUT for transmission interrupts:
10335                                   ;  Set up internal loopback.
10336                                   ;  Set up line parameters for transmission.
10337                                   ;-
10338 052030   012705  000377                    MOV     #MAPLNS,R5      ;PASS ACTIVE LINES BIT MASK.
10339 052034   012700  000200                    MOV     #200,R0         ;PASS INERT STATE, INTERNAL LOOPBACK.
10340 052040   004737  040250                   JSR     PC,WTWLNC       ;DISABLE RECPTION AND DMA, ETC. ON DUT.
10341 052044   012700  156430                    MOV     #156430,R0      ;SPECIFY 9600BPS,1STOP,NO PARITY,8BITS/CHAR.
10342 052050   004737  040324                   JSR     PC,WTWLPR       ;WRITE INTO ALL LPR REGISTERS.
```

```
10343                                   ;+
10344                                   ; Send a null char to each line.
10345                                   ;-
10346 052054  013701  002302                MOV     TXCHA,R1        ;SET UP TXCHAR REGISTER ADDRESS.
10347 052060  012702  100000                MOV     #100000,R2      ;SET CHARACTER TO BE TRANSMITTED = NULL.
10348 052064  004737  040300               JSR     PC,WTWLNS       ;SEND NULL CHAR TO EACH LINE.
10349                                   ;+
10350                                   ; Delay 50 ms to allow time for the interrupt to be generated.
10351                                   ;-
10352 052070  012704  000062                MOV     #50.,R4         ;PASS 50 MS TIME TO THE DELAY ROUTINE.
10353 052074  004737  030370               JSR     PC,DELAY        ;DELAY 50 MILLI-SECONDS.
10354                                 ;+
10355                                 ; Generate a reception interrupt request.
10356                                 ;-
10357 052100                                SETVEC  RXVECA,#RXBRRT,#PRIO7 ;SET UP INTERRUPT VECTOR TO CATCH RX INT.
       052100  012746  000340                                                  MOV     #PRIO7,-(SP)
       052104  012746  040500                                                  MOV     #RXBRRT,-(SP)
       052110  013746  002266                                                  MOV     RXVECA,-(SP)
       052114  012746  000003                                                  MOV     #3,-(SP)
       052120  104437                                                         TRAP    C$SVEC
       052122  062706  000010                                                  ADD     #10,SP
10358                                 ;+
10359                                 ; Set up for the loop which tests the interrupt BR levels.
10360                                 ;-
10361 052126  012705  000340                MOV     #340,R5         ;SET UP THE PRIORITY LEVEL TO 7.
10362 052132  005003                        CLR     R3              ;CLEAR THE RX PRIORITY STORE AND FLAGS.
10363 052134  005002                        CLR     R2              ;CLEAR THE TX PRIORITY STORE AND FLAGS.
10364                                   ;+
10365                                   ; Enable TX and RX interrupts.
10366                                   ; Processor priority should be at 7 disabling the interrupts.
10367                                   ;-
10368 052136  004737  035600                JSR     PC,RXIE1        ;ENABLE RECEIVER INTERRUPTS.
10369 052142  004737  036574                JSR     PC,TXIE1        ;ENABLE TRANSMITTER INTERRUPTS.
10370                                 ;+
10371                                 ; Loop, lowering the processor priority until the DUT interrupts on RX and TX.
10372                                 ;-
10373 052146  005037  002416          6$:       CLR     TXINTC          ;CLEAR THE TX INTERRUPT COUNTER.
10374 052152  005037  002420                    CLR     TXINTF          ;CLEAR THE TX INTERRUPT FLAGS.
10375 052156  005037  002412                    CLR     RXINTC          ;CLEAR THE RX INTERRUPT COUNTER.
10376 052162  005037  002414                    CLR     RXINTF          ;CLEAR THE RX INTERRUPT FLAGS.
10377 052166  106405                          MTPS    R5              ;SET PROCESSOR PRIORITY TO THE SELECTED VALUE.
10378 052170  012704  000001                    MOV     #1,R4           ;PASS 1 MS COUNT TO THE DELAY ROUTINE.
10379 052174  004737  030370                   JSR     PC,DELAY        ;DELAY 1 MS TO ALLOW INTERRUPTS TO OCCUR.
10380                                     ;+
10381                                     ; Determine if any RX DUT interrupts occurred.
10382                                     ; Log the processor priority for the RX interrupt if first RX int.
10383                                     ;-
10384 052200  005737  002412                    TST     RXINTC          ;CHECK THE RECEIVE INTERRUPT COUNTER.
10385 052204  001412                         BEQ     8$              ;SKIP THE PRIORITY LOG IF NO RX INT OCCURRED.
10386                                        ;+
10387                                        ; If this is the first RX interrupt, log the priority.
10388                                        ;-
10389 052206  005703                         TST     R3              ;CHECK THE RX PRIORITY STORE AND FLAGS.
10390 052210  001010                         BNE     8$              ;GOTO TEST FOR TX INTS IF NOT THE FIRST RX INT.
10391 052212  010503                          MOV     R5,R3           ;LOG THE PRESENT PRIORITY IN THE RX PRIO STORE.
10392 052214  052703  100000                  BIS     #BIT15,R3       ;SET THE RX INT HAS OCCURRED FLAG.
10393 052220  013700  002414                  MOV     RXINTF,R0       ;GET THE RX INTERRUPT ROUTINE FLAGS.
```

```
10394 052224  042700  137777              BIC     #137777,R0      ;CLEAR ALL BUT THE TX INT ERROR FLAG.
10395 052230  050003                      BIS     R0,R3           ;IF TX INT ERROR, SET BIT 14 OF THE PRIO FLAGS.
10396                                   ;+
10397                                   ; Determine if any TX DUT interrupts have occurred.
10398                                   ; Log the present processor priority if this is the first TX interrupt.
10399                                   ;-
10400 052232  005737  002416          8$:     TST     TXINTC          ;CHECK THE TRANSMIT INTERRUPT COUNTER.
10401 052236  001405                      BEQ     10$             ;SKIP THE PRIORITY LOG IF NO TX INT OCCURRED.
10402                                       ;+
10403                                       ; If this is the first TX interrupt, log the priority.
10404                                       ;-
10405 052240  005702                       TST     R2              ;CHECK THE TX PRIORITY STORE AND FLAGS.
10406 052242  100403                      BMI     10$             ;SKIP THE LOGGING IF NOT FIRST TX INTERRUPT.
10407 052244  010502                       MOV     R5,R2           ;LOG THE PRESENT PRIORITY IN THE TX PRIO STORE.
10408 052246  052702  100000               BIS     #BIT15,R2       ;SET THE TX INT HAS OCCURRED FLAG.
10409                                   ;+
10410                                   ; Select next processor priority.
10411                                   ; Test for both RX and TX interrupts having occurred, loop if not.
10412                                   ;-
10413 052252  162705  000040          10$:     SUB     #40,R5          ;DECREMENT PRIORITY LEVEL BY ONE.
10414 052256  002402                      BLT     12$             ;GOTO CHECK FOR ERRORS IF BELOW PRIORITY ZERO.
10415 052260  030203                       BIT     R2,R3           ;AND PRIO FLAGS TOGETHER, ALTER NONE OF THEM.
10416 052262  100331                      BPL     6$              ;LOOP IF RX AND TX INTS HAVEN'T BOTH OCCURRED.
10417                                   ;+
10418                                   ; Disable interrupts and clear interrupt vectors.
10419                                   ;-
10420 052264  106427  000340          12$:     MTPS    #PRI07          ;DISABLE ALL INTERRUPTS.
10421 052270                              CLRVEC  RXVECA          ;RETURN RX INT VECTOR TO UNUSED POOL.
       052270  013700  002266                                                  MOV     RXVECA,R0
       052274  104436                                                          TRAP    C$CVEC
10422 052276                              CLRVEC  TXVECA          ;RETURN TX INT VECTOR TO UNUSED POOL.
       052276  013700  002270                                                  MOV     TXVECA,R0
       052302  104436                                                          TRAP    C$CVEC
10423                                   ;+
10424                                   ; Verify that RX and TX interrupts occurred,
10425                                   ; at the proper BR level, and
10426                                   ; in the proper order.
10427                                   ;    Determine if TX interrupt occurred.
10428                                   ;-
10429 052304  005702                        TST     R2              ;DETERMINE WHETHER TX INT OCCURRED OR NOT.
10430 052306  100414                      BMI     16$             ;SKIP THESE ERRORS IF TX INT OCCURRED.
10431                                       ;+
10432                                       ; Determine reason that no TX int occurred.
10433                                       ;-
10434 052310  012701  017270                MOV     #EM2610,R1      ;SELECT "NO TX INT FROM TX.ACTION" MESSAGE.
10435 052314  005777  127760                TST     @CSRA           ;CHECK THE TX.ACTION BIT OF THE DUT CSR.
10436 052320  100402                      BMI     14$             ;SKIP TX.ACTION CLR MSG SELECTION IF IT IS SET.
10437 052322  012701  017362                MOV     #EM2611,R1      ;SELECT "TX.ACTION CLEAR AFTER CHARS SENT" MSG.
10438                                   ;REPORT "INTERRUPT BR LEVEL TEST ERROR:"
10439 052326                          14$:     ERRDF   3003,EM3001,ER0503;             >>>>> ERROR #3003 <<<<<.
       052326  104455                                                          TRAP    C$ERDF
       052330  005673                                                          .WORD   3003
       052332  017445                                                          .WORD   EM3001
       052334  024644                                                          .WORD   ER0503
10440 052336  000423                      BR      18$             ;SKIP THE BR LEVEL CHECK, NO TX INT OCCURRED.
10441                                   ;+
10442                                   ; Verify that the TX interrupt was at the proper BR level.
```

```
10443                                           ;-
10444 052340  010204                    16$:    MOV     R2,R4           ;CALCULATE THE BR LEVEL
10445 052342  042704  177400                    BIC     #177400,R4      ; THAT THE TRANMSIT
10446 052346  006204                            ASR     R4              ; INTERRUPT WAS
10447 052350  006204                            ASR     R4              ; REQUESTED AT, WHICH
10448 052352  006204                            ASR     R4              ; IS ONE GREATER THAN
10449 052354  006204                            ASR     R4              ; THE PROCESSOR PRIORITY
10450 052356  006204                            ASR     R4              ; LEVEL AT WHICH THE
10451 052360  005204                            INC     R4              ; TRANSMIT INTERRUPT OCCURRED.
10452 052362  113705  002275                    MOVB    BRLEVL,R5       ;GET THE EXPECTED INTERRUPT BR LEVEL.
10453 052366  120405                            CMPB    R4,R5           ;COMARE THE INTERRUPT BR LEVEL WITH EXPECTED.
10454 052370  001406                          BEQ     18$             ;SKIP THE ERROR IF BR LEVEL IS CORRECT.
10455                                       ;REPORT "TX INTERRUPT GENERATED AT WRONG BR LEVEL: ..."
10456 052372  012701  017572                    MOV     #EM3003,R1      ;SELECT THE ERROR MESSAGE FOR THE ERROR CALL.
10457 052376                                  ERRDF   3004,EM3001,ER3001;             >>>>> ERROR #3004 <<<<<.
      052376  104435                                                                          TRAP    C$ERDF
      052400  005674                                                                          .WORD   3004
      052402  017445                                                                          .WORD   EM3001
      052404  025114                                                                          .WORD   ER3001
10458                                           ;+
10459                                           ; Determine if RX interrupt occurred.
10460                                           ;-
10461 052406  005703                    18$:    TST     R3              ;CHECK THE RX INT OCCURRED FLAG.
10462 052410  100415                          BMI     22$             ;SKIP THESE ERRORS IF RX INT OCCURRED.
10463                                           ;+
10464                                           ; Determine reason that no RX int occurred.
10465                                           ;-
10466 052412  012701  016447                    MOV     #EM2602,R1      ;SELECT "NO RX INT FROM TX.ACTION" MSG.
10467 052416  032777  000200  127654            BIT     #BIT7,@CSRA     ;CHECK THE RX.DATA.AVAIL BIT OF THE DUT CSR.
10468 052424  001002                          BNE     20$             ;SKIP RX.DATA.AVAIL CLR MSG IF BIT IS SET.
10469 052426  012701  017476                    MOV     #EM3002,R1      ;SELECT "NO RX.DATA.AVAIL AFTER RESET" MSG.
10470                                       ;REPORT "INTERRUPT BR LEVEL TEST ERROR:"
10471 052432                            20$:    ERRDF   3005,EM3001,ER0503;             >>>>> ERROR #3005 <<<<<.
      052432  104455                                                                          TRAP    C$ERDF
      052434  005675                                                                          .WORD   3005
      052436  017445                                                                          .WORD   EM3001
      052440  024644                                                                          .WORD   ER0503
10472 052442  000423                          BR      24$             ;SKIP THE BR CHECK IF NO RX INT OCCURRED.
10473                                           ;+
10474                                           ; Verify that the RX interrupt was at the proper BR level.
10475                                           ;-
10476 052444  010304                    22$:    MOV     R3,R4           ;CALCULATE THE BR LEVEL
10477 052446  042704  177400                    BIC     #177400,R4      ; THAT THE RECEIVE
10478 052452  006204                            ASR     R4              ; INTERRUPT WAS
10479 052454  006204                            ASR     R4              ; REQUESTED AT, WHICH
10480 052456  006204                            ASR     R4              ; IS ONE GREATER THAN
10481 052460  006204                            ASR     R4              ; THE PROCESSOR PRIORITY
10482 052462  006204                            ASR     R4              ; LEVEL AT WHICH THE
10483 052464  005204                            INC     R4              ; RECEIVE INTERRUPT OCCURRED.
10484 052466  113705  002275                    MOVB    BRLEVL,R5       ;GET THE EXPECTED INTERRUPT BR LEVEL.
10485 052472  120405                            CMPB    R4,R5           ;COMARE THE INTERRUPT BR LEVEL WITH EXPECTED.
10486 052474  001406                          BEQ     24$             ;SKIP THE ERROR IF BR LEVEL IS CORRECT.
10487                                       ;REPORT "RX INTERRUPT GENERATED AT WRONG BR LEVEL: ..."
10488 052476  012701  017646                    MOV     #EM3004,R1      ;SELECT ERROR MESSAGE FOR THE ERROR CALL.
10489 052502                                  ERRDF   3006,EM3001,ER3001;             >>>>> ERROR #3006 <<<<<.
      052502  104455                                                                          TRAP    C$ERDF
      052504  005676                                                                          .WORD   3006
```

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        052506  017445                                                          .WORD   EM3001
        052510  025114                                                          .WORD   ER3001
 10490
 10491                                  ;+
 10492                                  ; Test for interrupts occuring in the proper order.
 10493                                  ;-
 10494 052512  032703  040000   24$:     BIT     #BIT14,R3       ;CHECK THE IMPROPER INT ORDER ERROR FLAG.
 10495 052516  001406                   BEQ     26$             ;SKIP ERROR REPORT IF ERROR DID NOT OCCUR.
 10496                                  ;REPORT "TX INTERRUPT GIVEN PRECEDENCE OVER SIMULTANEOUS RX INT."
 10497 052520  012701  017722           MOV     #EM3005,R1      ;SELECT THE ERROR MESSAGE FOR INDIRECT PRINT.
 10498 052524                           ERRDF   3007,EM3001,ER0503;             >>>>> ERROR #3007 <<<<<.
        052524  104455                                                          TRAP    C$ERDF
        052526  005677                                                          .WORD   3007
        052530  017445                                                          .WORD   EM3001
        052532  024644                                                          .WORD   ER0503
 10499                                  ;+
 10500                                  ; Clean up, exit the test.
 10501                                  ;-
 10502 052534  004737  036542   26$:     JSR     PC,TXIE0        ;CLEAR TRANSMITTER INTERRUPTS.
 10503 052540  004737  035546           JSR     PC,RXIE0        ;CLEAR RECEIVER INTERRUPTS.
 10504 052544  005037  002362   60$:     CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
 10505 052550  106427  000240           MTPS    #PRI05          ;DISABLE ALL BUT LTC INTERRUPTS.
 10506 052554                           ENDTST
        052554                                                                  L10063:
        052554  104401                                                                  TRAP    C$ETST
 10507
```

```
10509                                   .SBTTL  HARDWARE TEST           - DIABMP -
10510                                   ;++ ******************************************************************************
10511                                   ;*                      - Diagnostic field (BMP) Test -
10512                                   ;*      This test verifies that a request to the DUT to report BMP status
10513                                   ;*      codes is complied with, within the specified time.
10514                                   ;*      All active lines are tested.
10515                                   ;-- ******************************************************************************
10516
10517 052556                                   BGNTST
      052556                                                                    T25::
10518           000031                           TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
10519 052556   012737  000031  002364           MOV     @TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (31)
10520 052564   012737  177777  002362           MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE IN A TEST.
10521 052572   012737  000001  005464           MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
10522 052600   012737  006035  005466           MOV     #3101.,ERRNBR  ;SET THE FIRST ERROR NUMBER IN ERROR TABLE.
10523 052606   012737  020014  005470           MOV     #EM3101,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERRTBL.
10524 052614   012737  026440  005472           MOV     #ER9101,ERRBLK ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
10525                                   ;+
10526                                   ; Reset the DUT to a known state, remove the status codes from the fifo.
10527                                   ;  Clear TX and RX interrupt enable bits in the CSR.
10528                                   ; This subroutine reports error >>>>> 3101 <<<<<.
10529                                   ;-
10530 052622   004737  030172                   JSR     PC,CLNRST      ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
10531 052626   103077                           BCC     60$            ;RESET FAILURE?, ABORT THIS TEST.
10532                                   ;+
10533                                   ; Test all active lines individually.
10534                                   ; Write the request code to the diagnostic field in the LPR register.
10535                                   ; Verify that a BMP code is returned within the correct time.
10536                                   ;-
10537 052630   013705  002272                   MOV     ACTLNS,R5      ;GET THE ACTIVE LINE BIT MAP.
10538 052634   005004                           CLR     R4             ;CLEAR THE LINE NUMBER COUNTER.
10539 052636   013703  002300                   MOV     CSRA,R3        ;GET THE ADDRESS OF THE DUT'S CSR.
10540 052642   000241                   2$:     CLC                    ;CLEAR THE CARRY BIT PRIOR TO SHIFTING BIT MAP.
10541 052644   006005                           ROR     R5             ;SHIFT THE BIT MAP INTO THE CARRY BIT.
10542 052646   103064                          BCC     8$             ;DO NOT TEST THE LINE IF IT IS INACTIVE.
10543                                   ;+
10544                                   ; Select the line under test.
10545                                   ;  Write the BMP request code to the DIAG field in the LPR register.
10546                                   ;-
10547 052650   012737  006036  005466           MOV     #3102.,ERRNBR  ;SET THE ERROR NUMBER TO 3102.
10548 052656   010413                           MOV     R4,(R3)        ;SELECT THE LINE CURRENTLY UNDER TEST.
10549 052660   052777  000002  127416           BIS     #2,@LPRA       ;WRITE THE BMP REQUEST CODE TO THE LPR.
10550                                   ;+
10551                                   ; Wait for BMP request code to be cleared, report error if time-out
10552                                   ; occurs.
10553                                   ;-
10554 052666   012701  010764                   MOV     #10764,R1      ;TEST BIT 1, TIMEOUT OF 500 MILLI SECS.
10555 052672   013702  002304                   MOV     LPRA,R2        ;PASS THE ADDRESS OF THE REGISTER TO TEST.
10556 052676   004737  037664                  JSR     PC,WAIBIC      ;WAIT FOR REQUEST CODE TO CLEAR.
10557 052702   103042                          BCC     6$             ;GO REPORT ERROR IF CODE DID NOT CLEAR IN TIME.
10558                                   ;+
10559                                   ; Wait for BMP code to appear in the fifo, report error if time-out
10560                                   ; occurs.
10561                                   ;-
10562 052704   005237  005466                   INC     ERRNBR         ;SET ERROR NUMBER TO 3103.
10563 052710   012701  070012                   MOV     #70012,R1      ;TEST BIT 7, TIMEOUT OF 10 MILLI SECS.
10564 052714   013702  002300                   MOV     CSRA,R2        ;PASS THE ADDRESS OF THE REGISTER TO TEST.
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10565 052720  004737  037740                JSR     PC,WAIBIS       ;WAIT FOR RX_DATA_AVAILABLE TO SET.
10566 052724  103031                        BCC     6$              ;GO REPORT ERROR IF CODE DID NOT CLEAR IN TIME.
10567                                       ;+
10568                                       ; Read the BMP code (if it is there) from the RBUF register.
10569                                       ; Determine if it is a valid BMP code.
10570                                       ; Verify the BMP code was received from the correct channel.
10571                                       ; If the BMP code does not indicate DUT running ok, then save it on
10572                                       ; the queue to be reported in a later test.
10573                                       ;-
10574 052726  005237  005466                 INC     ERRNBR          ;SET ERROR NUMBER TO 3104.
10575 052732  017702  127344                 MOV     @RBUFA,R2       ;GET THE BMP CODE FROM THE FIFO.
10576 052736  100024                        BPL     6$              ;GO REPORT ERROR IF NO BMP CODE FOUND.
10577 052740  005237  005466                 INC     ERRNBR          ;SET ERROR NUMBER TO 3105.
10578 052744  012700  170301                 MOV     #170301,R0      ;SET-UP A BMP CODE MASK.
10579 052750  040200                         BIC     R2,R0           ;TRY TO CLEAR THE BMP MASK.
10580 052752  001016                        BNE     6$              ;GO REPORT ERROR IF IT IS NOT A VALID BMP CODE.
10581 052754  005237  005466                 INC     ERRNBR          ;SET THE ERROR NUMBER TO 3106.
10582 052760  010200                         MOV     R2,R0           ;COPY THE BMP CODE.
10583 052762  000300                         SWAB    R0              ;PUT THE LINE NUMBER IN THE LOW BYTE.
10584 052764  042700  177760                 BIC     #177760,R0      ;CLEAR THE UNWANTED BITS.
10585 052770  120400                         CMPB    R4,R0           ;DID THE BMP CODE COME FROM THE CORRECT LINE?.
10586 052772  001006                        BNE     6$              ;NO; GO REPORT ERROR.
10587 052774  120227  000305                 CMPB    R2,#305         ;IS THE BMP CODE A "GOOD ONE"?.
10588 053000  001407                        BEQ     8$              ;YES; SKIP SAVING THE BMP CODE ON THE QUEUE.
10589 053002  004737  035624                JSR     PC,SAVBMP       ;SAVE THE BMP CODE ON THE QUEUE.
10590 053006  000404                        BR      8$              ;GO SEE IF THERE ARE ANY MORE LINE TO TEST.
10591
10592 053010  010401                 6$:     MOV     R4,R1           ;PASS THE LINE NUMBER TO BE REPORTED.
10593 053012  012702  020050                 MOV     #EM3102,R2      ;PASS THE ERROR MESSAGE TO BE REPORTED.
10594                                                                ;"BMP REQUEST BIT BAD ON LINE:"
10595 053016                                ERROR                   ;               >>>>> ERROR <<<<<.
      053016  104460                                                                    TRAP    C$ERROR
10596                                       ;+
10597                                       ; Verify all active lines have been tested.
10598                                       ;-
10599 053020  005204                 8$:     INC     R4              ;INCREMENT THE LINE NUMBER COUNTER.
10600 053022  005705                         TST     R5              ;ARE THERE ANY MORE ACTIVE LINES TO TEST?.
10601 053024  001306                        BNE     2$              ;YES; BRANCH TO TEST THE NEXT LINE.
10602 053026  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
10603 053032                                ENDTST
      053032                                                                L10064:
      053032  104401                                                            TRAP    C$ETST
```

```
10605
10606                                   .SBTTL  HARDWARE TEST           - DMASTA -
10607                                   ;++ ***************************************************************************
10608                                   ;*                      - DMA Start Bit Test -
10609                                   ;*      This test verifies that the DMA_START bit in the DUT's Line control
10610                                   ;*      registers will initiate DMA transmission on the selected line.
10611                                   ;*      This test is performed in internal loopback, on all active lines.
10612                                   ;*
10613                                   ;-- ***************************************************************************
10614 053034                                   BGNTST
      053034
10615           000032                                                          T26::
10616 053034   012737   000032  002364          TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
10617 053042   012737   177777  002362          MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (40)
10618 053050   012737   000001  005464          MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
10619 053056   012737   007641  005466          MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
10620 053064   012737   020111  005470          MOV     #4001.,ERRNBR   ;SET THE FIRST ERROR NUMBER IN ERROR TABLE.
10621 053072   012737   026440  005472          MOV     #EM4001,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERRTBL.
10622                                           MOV     #ER9101,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
10623                                   ;+
10624                                   ; Reset the DUT to a known state, remove the status codes from the fifo.
10625                                   ;  Clear TX and RX interrupt enable bits in the CSR.
10626                                   ; This subroutine reports error >>>>> 4001 <<<<<.
10627 053100   004737   030172         ;-
10628 053104   103141                          JSR     PC,CLNRST       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
10629                                           BCC     50$             ;RESET FAILURE?, ABORT THIS TEST.
10630 053106   004737   031342
10631                                           JSR     PC,INDATP       ;INITIALSE THE 256 BYTE DATA PATTERN.
10632                                   ;+
10633                                   ; Set internal loopback,enable receiver functions on all active lines.
10634                                   ; Set LPR on all lines to 38.4k baud, 8 bits per character, odd parity,
10635                                   ; 2 stop bits.
10636                                   ; Enable transmitters on all active lines.
10637 053112   013705   002272         ;-
10638 053116   012700   000204                  MOV     ACTLNS,R5       ;PASS THE ACTIVE LINE BIT MAP.
10639 053122   004737   040250                  MOV     #204,R0         ;PASS THE LNCTRL CONTENTS.
10640 053126   012700   177670                 JSR     PC,WTWLNC       ;INITIALISE THE LNCTRL REGISTERS.
10641 053132   004737   040324                  MOV     #177670,R0      ;PASS THE LPR CONTENTS.
10642 053136   004737   036446                 JSR     PC,WTWLPR       ;INITIALSE THE LPR REGISTERS ON ALL LINES.
10643                                          JSR     PC,TXENBL       ;ENABLE TRANSMITTERS ON ALL LINES.
10644                                   ;+
10645                                   ; Set-up outer loop to test the DMA_START bit on all active lines.
10646 053142   013705   002272         ;-
10647 053146   005001                          MOV     ACTLNS,R5       ;GET THE ACTIVE LINE BIT MAP.
10648 053150   012737   007642  005466 2$:      CLR     R1              ;CLEAR THE LINE NUMBER COUNTER.
10649 053156   000241                          MOV     #4002.,ERRNBR   ;SET THE ERROR NUMBER TO 4002.
10650 053160   006005                          CLC                     ;CLEAR THE CARRY BIT PRIOR TO SHIFTING BIT MAP.
10651 053162   103106                          ROR     R5              ;SHIFT THE BIT MAP INTO THE CARRY BIT.
10652 053164   004737   032722                 BCC     14$             ;DO NOT TEST THE LINE IF IT IS INACTIVE.
10653 053170   103107                         JSR     PC,PUFIFO       ;PURGE THE FIFO.
10654                                          BCC     50$             ;GO REPORT ERROR IF FIFO WILL NOT CLEAR.
10655                                   ;+
10656                                   ; Perform DMA_START bit testing on each line individually.
10657                                   ; Test each DMA_START bit before TX'ing data pattern, report error if set
10658                                   ; Set DMA_START bit on LUT, verify it is set, report error if clear.
10659                                   ; Wait for DMA to complete.
10660                                   ; Verify DMA_START bit is clear, report error if set.
                                        ; Verify correct number of chars were received, report error if < expected.
```

```
10661                                           ;-
10662 053172  005237  005466                        INC     ERRNBR          ;SET ERROR NUMBER TO 4003.
10663 053176  012702  004012                        MOV     #BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
10664 053202  012703  000144                        MOV     #100.,R3        ;PASS THE LENGTH OF THE DATA PATTERN.
10665 053206  004737  030624                       JSR     PC,DODMA        ;TRANSMIT THE DATA PATTERN.
10666 053212  103067                                BCC     12$             ;GO REPORT ERROR IF DMA_START BIT SET.
10667                                           ;+
10668                                           ; Test the state of the DMA_START bit on the line under test.
10669                                           ;  Report error if DMA_START bit is clear.
10670                                           ;-
10671 053214  005237  005466                        INC     ERRNBR          ;INCREMENT ERROR NUMBER TO 4004.
10672 053220  010177  127054                        MOV     R1,@CSRA        ;SELECT THE LINE CURRENTLY UNDER TEST.
10673 053224  105777  127064                        TSTB    @TXAD2A         ;TEST THE STATE OF THE DMA_START BIT.
10674 053230  100060                               BPL     12$             ;GO REPORT ERROR IF BIT IS CLEAR.
10675                                           ;+
10676                                           ; Wait for DMA transmission to complete.
10677                                           ;-
10678 053232  005237  005466          4$:           INC     ERRNBR          ;INCREMENT ERROR NUMBER TO 4005.
10679 053236  010103                                MOV     R1,R3           ;SAVE THE LINE NUMBER.
10680 053240  012701  170226                        MOV     #170226,R1      ;TEST BIT 15, TIMEOUT OF 150 MILLI SECS.
10681 053244  013702  002300                        MOV     CSRA,R2         ;PASS THE ADDRESS OF THE REGISTER TO TEST.
10682 053250  004737  037740                       JSR     PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE.
10683 053254  103045                               BCC     10$             ;GO REPORT ERROR IF TIMEOUT OCCURRED.
10684 053256  012704  000005                        MOV     #5,R4           ;PASS DELAY OF 5 MILLI SECS.
10685 053262  004737  030370                       JSR     PC,DELAY        ;WAIT FOR CHAR TO BE RECEIVED AND PROCESSED.
10686 053266  010301                                MOV     R3,R1           ;RESTORE THE CURRENT LINE NUMBER.
10687                                           ;+
10688                                           ; Test the state of the DMA_START bit on the line under test.
10689                                           ;  Report error if DMA_START bit is set.
10690                                           ;-
10691 053270  005237  005466                        INC     ERRNBR          ;INCREMENT ERROR NUMBER TO 4006.
10692 053274  010177  127000                        MOV     R1,@CSRA        ;SELECT THE LINE CURRENTLY UNDER TEST.
10693 053300  105777  127010                        TSTB    @TXAD2A         ;TEST THE STATE OF THE DMA_START BIT.
10694 053304  100432                               BMI     12$             ;GO REPORT ERROR IF BIT IS STILL SET.
10695                                           ;+
10696                                           ; Verify the number of chars received = number of chars expected.
10697                                           ; Report error if count is incorrect.
10698                                           ; If more than 128 BMP codes are found then report error and exit test.
10699                                           ;-
10700 053306  005003                                CLR     R3              ;CLEAR THE READ COUNTER.
10701 053310  012704  000200                        MOV     #128.,R4        ;SET UP MAX BMP CODE READ COUNT.
10702 053314  012737  007647  005466    6$:           MOV     #4007.,ERRNBR   ;SET ERROR NUMBER TO 4007.
10703 053322  017702  126754                        MOV     @RBUFA,R2       ;READ THE CHARACTER FROM THE FIFO.
10704 053326  100021                               BPL     12$             ;GO REPORT ERROR IF FIFO EMPTY TOO SOON.
10705 053330  012700  170301                        MOV     #170301,R0      ;SET-UP BIT MASK OF A BMP CODE.
10706 053334  040200                               BIC     R2,R0           ;TRY TO CLEAR THE BMP CODE MASK.
10707 053336  001007                               BNE     8$              ;BRANCH IF NOT A BMP CODE.
10708 053340  005237  005466                        INC     ERRNBR          ;INCREMENT ERROR NUMBER TO 4008.
10709 053344  004737  035624                       JSR     PC,SAVBMP       ;SAVE THE BMP CODE ON THE QUEUE.
10710 053350  005304                               DEC     R4              ;DECREMENT MAX BMP CODE READ COUNT.
10711 053352  001416                               BEQ     50$             ;GO REPORT ERROR IF TOO MANY BMP CODES FOUND.
10712 053354  000757                               BR      6$              ;DO NOT COUNT THE BMP CODE AS A VALID CHAR.
10713 053356  005203                         8$:           INC     R3              ;COUNT THIS CHARACTER.
10714 053360  020327  000144                        CMP     R3,#100.        ;HAVE WE RECIEVED 100 CHARACTERS?.
10715 053364  002753                               BLT     6$              ;LOOP UNTIL 100 (NON-BMP) CHARS ARE READ.
10716 053366  000404                               BR      14$             ;SKIP AROUND THE ERROR REPORT.
10717
```

HARDWARE TEST - DMASTA -

```
10718                                          ;+
10719                                          ; Report error, skip further testing on this line.
10720                                          ;-
10721 053370  010301              10$:    MOV     R3,R1           ;RESTORE THE CURRENT LINE NUMBER.
10722
10723 053372  012702  020134      12$:    MOV     #EM4002,R2      ;PASS THE ERROR MESSAGE TO BE REPORTED.
10724                                          ; "DMA_START BIT BAD ON LINE nn".
10725 053376                              ERROR                   ;               >>>>> ERROR <<<<<.
      053376  104460                                                                  TRAP    C$ERROR
10726
10727 053400  005201              14$:    INC     R1              ;INCREMENT THE LINE NUMBER COUNTER.
10728 053402  005705                      TST     R5              ;ARE THERE ANY MORE ACTIVE LINES TO TEST?.
10729 053404  001261                      BNE     2$              ;YES; BRANCH TO TEST THE NEXT LINE.
10730 053406  000402                      BR      60$             ;NO; EXIT THIS TEST.
10731
10732 053410  004737  036106      50$:    JSR     PC,TSABRT       ;REPORT TEST ABORTED. NON-TEST RELATED ERROR.
10733 053414  005037  002362      60$:    CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
10734
10735 053420                              ENDTST
      053420                                                                L10065:
      053420  104401                                                              TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - DMABRT -
                                ;** ************************************************************************
                                ;*                      - DMA Abort/Restart Test -
                                ;*      This test verifies that each DMA_ABORT bit will correctly halt
                                ;*      a DMA transmission, and return a TX_ACTION.
                                ;*      It will also verify that the aborted DMA transmission can be resummed,
                                ;*      and that a TX_ACTION is returned upon completion.
                                ;*      This test is performed in internal loopback, on all active lines.
                                ;*
                                ;-- ************************************************************************
053422                                  BGNTST
053422                                                                          T27::
        000033                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
053422  012737  000033  002364          MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (41)
053430  012737  177777  002362          MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
053436  012737  000001  005464          MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
053444  012737  010005  005466          MOV     #4101.,ERRNBR   ;SET THE FIRST ERROR NUMBER IN ERROR TABLE.
053452  012737  020170  005470          MOV     #EM4101,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERRTBL.
053460  012737  026440  005472          MOV     #ER9101,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
                                ;*
                                ; Reset the DUT to a known state, remove the status codes from the fifo.
                                ;  Clear TX and RX interrupt enable bits in the CSR.
                                ; This subroutine reports error >>>>> 4101 <<<<<.
                                ;-
053466  004737  030172                  JSR     PC,CLNRST       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
053472  103160                          BCC     60$             ;RESET FAILURE?, ABORT THIS TEST.
                                
053474  004737  031342                  JSR     PC,INDATP       ;INITIALISE 256 BYTE DATA PATTERN.
                                ;*
                                ; Set internal loopback,enable receiver functions on all active lines.
                                ; Set LPR on all lines to 38.4k baud, 8 bits per character, odd parity,
                                ; 2 stop bits.
                                ; Enable transmitters on all active lines.
                                ;-
053500  013705  002272                   MOV     ACTLNS,R5       ;PASS THE ACTIVE LINE BIT MAP.
053504  012700  000204                   MOV     #204,R0         ;PASS THE LNCTRL CONTENTS.
053510  004737  040250                  JSR     PC,WTWLNC       ;INITIALISE THE LNCTRL REGISTERS.
053514  012700  177670                   MOV     #177670,R0      ;PASS THE LPR CONTENTS.
053520  004737  040324                  JSR     PC,WTWLPR       ;INITIALSE THE LPR REGISTERS ON ALL LINES.
053524  004737  036446                  JSR     PC,TXENBL       ;ENABLE TRANSMITTERS ON ALL LINES.
                                ;*
                                ; Perform DMA_ABORT bit testing on each individual (active) line.
                                ;-
053530  013705  002272                   MOV     ACTLNS,R5       ;GET THE ACTIVE LINE BIT MAP.
053534  005001                           CLR     R1              ;CLEAR THE LINE NUMBER COUNTER.
053536  012737  010006  005466  2$:      MOV     #4102.,ERRNBR   ;SET THE ERROR NUMBER TO 4102.
053544  000241                           CLC                     ;CLEAR THE CARRY BIT PRIOR TO SHIFTING BIT MAP.
053546  006005                           ROR     R5              ;SHIFT THE BIT MAP INTO THE CARRY BIT.
053550  103123                          BCC     10$             ;DO NOT TEST THE LINE IF IT IS INACTIVE.
053552  004737  032722                  JSR     PC,PUFIFO       ;PURGE THE FIFO.
053556  103124                          BCC     50$             ;GO REPORT ERROR IF FIFO WILL NOT CLEAR.
                                    ;*
                                    ;  Check the DMA_ABORT bit before enabling DMA, report error if set.
                                    ;-
                                         INC     ERRNBR          ;INCREMENT ERROR NUMBER TO 4103.
                                         MOV     R1,@CSRA        ;SELECT THE LINE CURRENTLY UNDER TEST.
                                         BIT     #BIT0,@LNCTRA   ;TEST THE STATE OF THE DMA ABORT BIT.
```

```
10793 053576  001105                          BNE     6$              ;GO REPORT ERROR IF BIT IS SET.
10794                                       ;+
10795                                       ; Enable DMA TX on selected line, wait for DMA to TX approx 1/4 of data.
10796                                       ;  Abort the DMA transmission. Wait for TX_ACTION to be returned.
10797                                       ;-
10798 053600  005237  005466                    INC     ERRNBR          ;SET ERROR NUMBER TO 4104.
10799 053604  012702  004012                    MOV     #BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
10800 053610  012703  000400                    MOV     #256.,R3        ;PASS THE LENGTH OF THE DATA PATTERN.
10801 053614  004737  030624                    JSR     PC,DODMA        ;TRANSMIT THE DATA PATTERN.
10802 053620  103103                            BCC     50$             ;GO REPORT ERROR IF THERE ARE TX PROBLEMS.
10803                                       ;+
10804                                       ; Wait for DMA to transmit 1/4 of the data before aborting.
10805                                       ;-
10806 053622  010177  126452                    MOV     R1,@CSRA        ;SELECT THE LINE CURRENTLY UNDER TEST.
10807 053626  012704  000062                    MOV     #50.,R4         ;PASS THE DELAY TIME OF 40 MILLI SECONDS.
10808 053632  004737  030370                    JSR     PC,DELAY        ;WAIT FOR APPROX 1/4 OF DATA TO BE TX'D.
10809 053636  052777  000001  126444            BIS     #BIT0,@LNCTRA   ;ABORT THE DMA TRANSMISSION.
10810                                       ;+
10811                                       ; Wait for TX_ACTION to be returned, report error if time-out occurs.
10812                                       ;-
10813 053644  005237  005466                    INC     ERRNBR          ;INCREMENT ERROR NUMBER TO 4105.
10814 053650  010103                            MOV     R1,R3           ;SAVE THE LINE NUMBER.
10815 053652  012701  170012                    MOV     #170012,R1      ;TEST BIT 15, TIMEOUT OF 10 MILLI SECS.
10816 053656  013702  002300                    MOV     CSRA,R2         ;PASS THE ADDRESS OF THE REGISTER TO TEST.
10817 053662  004737  037740                    JSR     PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE.
10818 053666  103050                            BCC     4$              ;GO REPORT ERROR IF TIMEOUT OCCURRED.
10819 053670  010301                            MOV     R3,R1           ;RESTORE THE CURRENT LINE NUMBER.
10820                                       ;+
10821                                       ; Verify DMA_START bit clear, report error if set.
10822                                       ;-
10823 053672  005237  005466                    INC     ERRNBR          ;INCREMENT ERROR NUMBER TO 4106.
10824 053676  012702  020247                    MOV     #EM4103,R2      ;SELECT MESSAGE TO BE REPORTED.
10825                                                                   ; "DMA_START BIT FOUND SET AFTER DMA ABORTED".
10826 053702  010177  126372                    MOV     R1,@CSRA        ;SELECT THE LINE CURRENTLY UNDER TEST.
10827 053706  105777  126402                    TSTB    @TXAD2A         ;TEST THE STATE OF THE DMA_START BIT.
10828 053712  100441                            BMI     8$              ;GO REPORT ERROR IF IT IS SET.
10829                                       ;+
10830                                       ; Resume DMA transmission by clearing DMA_ABORT and setting DMA_START.
10831                                       ;-
10832 053714  042777  000001  126366            BIC     #BIT0,@LNCTRA   ;CLEAR THE DMA_ABORT BIT.
10833 053722  052777  000200  126364            BIS     #BIT7,@TXAD2A   ;SET THE DMA_START BIT.
10834                                       ;+
10835                                       ; Wait for DMA transmission to complete.
10836                                       ;-
10837 053730  005237  005466                    INC     ERRNBR          ;INCREMENT ERROR NUMBER TO 4107.
10838 053734  010103                            MOV     R1,R3           ;SAVE THE LINE NUMBER.
10839 053736  012701  170536                    MOV     #170536,R1      ;TEST BIT 15, TIMEOUT OF 350 MILLI SECS.
10840 053742  013702  002300                    MOV     CSRA,R2         ;PASS THE ADDRESS OF THE REGISTER TO TEST.
10841 053746  004737  037740                    JSR     PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE.
10842 053752  103016                            BCC     4$              ;GO REPORT ERROR IF TIMEOUT OCCURRED.
10843 053754  012704  000002                    MOV     #2,R4           ;PASS TIME-OUT OF 2 MILLI SECS.
10844 053760  004737  030370                    JSR     PC,DELAY        ;WAIT FOR CHAR TO BE RECEIVED AND PROCESSED.
10845 053764  010301                            MOV     R3,R1           ;RESTORE THE CURRENT LINE NUMBER.
10846                                       ;+
10847                                       ; Test the state of the DMA_ABORT bit on the line under test.
10848                                       ;  Report error if DMA_ABORT bit is set.
10849                                       ;-
```

HARDWARE TEST - DMABRT - SEQ 0277

```
10850 053766  005237  005466                    INC     ERRNBR          ;INCREMENT ERROR NUMBER TO 4108.
10851 053772  010177  126302                    MOV     R1,@CSRA        ;SELECT THE LINE CURRENTLY UNDER TEST.
10852 053776  032777  000001  126304            BIT     #BIT0,@LNCTRA   ;TEST THE STATE OF THE DMA_ABORT BIT.
10853 054004  001002                           BNE     6$              ;GO REPORT ERROR IF BIT IS SET.
10854 054006  000404                           BR      10$             ;BRANCH TO CHECK FOR ANY MORE LINES TO TEST.
10855                                          ;+
10856                                          ; Report error, skip further testing on this line.
10857                                          ;-
10858 054010  010301                  4$:      MOV     R3,R1           ;RESTORE THE CURRENT LINE NUMBER.
10859
10860 054012  012702  020213          6$:      MOV     #EM4102,R2      ;PASS THE ERROR MESSAGE TO BE REPORTED.
10861                                                                  ; "DMA_ABORT BIT BAD ON LINE nn".
10862 054016                          8$:      ERROR                   ;               >>>>> ERROR <<<<<.
      054016  104460                                                                    TRAP    C$ERROR
10863                                          ;+
10864                                          ; Verify all active lines have been tested.
10865                                          ;-
10866 054020  005201                  10$:     INC     R1              ;INCREMENT THE LINE NUMBER COUNTER.
10867 054022  005705                           TST     R5              ;ARE THERE ANY MORE ACTIVE LINES TO TEST?.
10868 054024  001244                          BNE     2$              ;YES; BRANCH TO TEST THE NEXT LINE.
10869 054026  000402                          BR      60$             ;NO; EXIT THIS TEST.
10870
10871 054030  004737  036106          50$:     JSR     PC,TSABRT       ;REPORT TEST ABORTED. NON-TEST RELATED ERROR.
10872 054034  005037  002362          60$:     CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
10873
10874 054040                                   ENDTST
      054040                                                                    L10066:
      054040  104401                                                                    TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - IAUTOI -
                                ;+*****************************************************************************
                                ;*                      - IAUTO BIT INACTIVE TEST -
                                ;*
                                ;*      This test verifies that the DUT's IAUTO function behaves correctly
                                ;*      when inactive, ie. IAUTO bit clear.
                                ;*      All active lines are tested individually by filling the FIFO
                                ;*      then reading the received data checking for the presence of
                                ;*      XOFF(ASCII DC3) or XON (ASCII DC1) characters.
                                ;*      If any are found then appropriate errors are reported.
                                ;*      Any BMP codes that are found will be placed on the BMP code queue,
                                ;*      to be reported later.
                                ;*      The characters are transmitted on all active lines, in internal
                                ;*      loopback mode.
                                ;*
                                ;--*****************************************************************************

                                        BGNTST
                                                                                T28::
                                         TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
054042  012737  000034  002364         MOV     @TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (51)
054050  012737  177777  002362         MOV     @-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
054056  012737  000001  005464         MOV     @1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
054064  012737  011755  005466         MOV     @5101.,ERRNBR   ;SET ERROR NUMBER TO 5101.
054072  012737  021205  005470         MOV     @EM5101,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
054100  012737  026440  005472         MOV     @ER9101,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
                                ;+
                                ; Reset the DUT to a known state, remove the status codes from the fifo.
                                ;  Clear TX and RX interrupt enable bits in the CSR.
                                ; This subroutine reports error >>>>> 5101 <<<<<.
                                ;-
054106  004737  030172                 JSR     PC,CLNRST       ;RESET THE DHV11 M, REPORT ANY ERRORS FOUND.
054112  103146                         BCC     60$             ;EXIT TEST IF FATAL ERROR FOUND.

                                ;+
                                ; Initialize the 256 byte data pattern.
                                ;  Ensure the data pattern is free from XON's or XOFF's to prevent errors.
                                ;  Note: the first two characters and the last two characters will be the same.
                                ;-
054114  004737  031372                 JSR     PC,INDTPX       ;INITIALISE DATA PATTERN.
                                ;+
                                ; Set internal loopback, disable IAUTO, enable receiver on the selected line.
                                ; Set LPR to 38.4k baud, 8 bits per character, odd parity, 2 stop bits.
                                ;-
054120  013705  002272                  MOV     ACTLNS,R5       ;PASS THE ACTIVE LINE BIT MAP.
054124  012700  000204                  MOV     @204,R0         ;PASS INT'L LOPBCK, ENABLE RX, DISABLE IAUTO.
054130  004737  040250                 JSR     PC,WTWLNC       ;INITIALISE THE LINE CONTROL REGISTER.
054134  012700  177670                  MOV     @177670,R0      ;PASS THE LPR CONTENTS.
054140  004737  040324                 JSR     PC,WTWLPR       ; _T THE LPR CONTENTS TO 38.4K BAUD.
054144  012704  000012                  MOV     @10.,R4         ;PASS DELAY TIME OF 10 MILLI SECONDS.
054150  004737  030370                 JSR     PC,DELAY        ;WAIT FOR LNCTRL AND LPR REGS TO BE UPDATED.

                                ;+
                                ; Set up loop for all active lines.
                                ; Test the state of the IAUTO bit prior to transmitting the data pattern.
                                ;  If the bit is set, then report the error and skip transmitting
                                ;  the data pattern on the selected line.
```

```
10932                                   ; Transmit a 256 character data pattern using DMA, on a single channel
10933                                   ; Empty the fifo, and verify no XOFF or XON chars were found.
10934                                   ;-
10935 054154  005001                            CLR     R1              ;CLEAR THE LINE NUMBER COUNTER.
10936 054156  005037  054426                     CLR     55$             ;CLEAR STORAGE FOR LINE NUMBER.
10937 054162  012737  011756  005466  2$:       MOV     #5102.,ERRNBR   ;SET THE ERROR NUMBER TO 5102.
10938 054170  004737  032722                    JSR     PC,PUFIFO       ;PURGE THE FIFO.
10939 054174  103111                           BCC     50$             ;GO REPORT ERROR IF FIFO DID NOT PURGE.
10940 054176  000241                            CLC                     ;CLEAR CARRY PRIOR TO ROTATING BIT MAP.
10941 054200  006005                            ROR     R5              ;ROTATE THE BIT MAP INTO THE CARRY BIT.
10942 054202  103077                           BCC     12$             ;BRANCH IF LINE IS INACTIVE.
10943                                   ;+
10944                                   ; Test the IAUTO bit on the selected active line.
10945                                   ; Report error if it is set.
10946                                   ;  Do not transmit the data pattern on the selected line.
10947                                   ;-
10948 054204  005237  005466                     INC     ERRNBR          ;SET ERROR NUMBER TO 5103.
10949 054210  010177  126064                     MOV     R1,@CSRA        ;SELECT LINE TO TEST.
10950 054214  032777  000002  126066             BIT     #BIT1,@LNCTRA   ;TEST THE STATE OF THE IAUTO BIT ON THIS LINE.
10951 054222  001404                            BEQ     4$              ;SKIP ERROR IF IAUTO BIT CLEAR.
10952 054224  012702  021233                     MOV     #EM5102,R2      ;PASS THE CORRECT ERROR MESSAGE.
10953 054230                                    ERROR                   ;               >>>>> ERROR <<<<<.
      054230  104460                                                                            TRAP    C$ERROR
10954 054232  000463                           BR      12$             ;SKIP TRANSMITTING DATA PATTERN.
10955
10956                                   ;+
10957                                   ; Transmit data pattern of 256 chars.
10958                                   ;-
10959 054234  005237  005466            4$:     INC     ERRNBR          ;SET ERROR NUMBER TO 5104.
10960 054240  012702  004012                    MOV     #BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
10961 054244  012703  000400                    MOV     #256.,R3        ;PASS THE LENGTH OF THE DATA PATTERN.
10962 054250  004737  030624                    JSR     PC,DODMA        ;TRANSMIT THE DATA PATTERN.
10963 054254  103061                           BCC     50$             ;ABORT THE TEST IF ERROR FOUND DURING DMA TX.
10964
10965                                   ;+
10966                                   ; Wait for DMA to complete, then wait for the last character plus XOFF
10967                                   ; to arrive in the fifo.
10968                                   ;-
10969 054256  005237  005466                     INC     ERRNBR          ;SET ERROR NUMBER TO 5105.
10970 054262  012701  170536                     MOV     #170536,R1      ;PASS TIME-OUT VALUE OF 350 MILLI SECS.
10971 054266  013702  002300                     MOV     CSRA,R2         ;PASS THE ADDRESS OF THE CSR.
10972 054272  004737  037740                    JSR     PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE, TX_ACTION SET.
10973 054276  103050                           BCC     50$             ;IF NO TX_ACTION WAS RECEIVED, ABORT THE TEST.
10974 054300  012704  000012                     MOV     #10.,R4         ;PASS DELAY OF 10 MILLI SECS.
10975 054304  004737  030370                    JSR     PC,DELAY        ;WAIT FOR LAST CHAR TO ARRIVE IN THE FIFO.
10976
10977                                   ;+
10978                                   ; Read 256 chars from the fifo.  Report error if any XOFF's or XON's
10979                                   ; are found.
10980                                   ;-
10981 054310  005237  005466                     INC     ERRNBR          ;INCREMENT ERROR NUMBER TO 5106.
10982 054314  012701  000400                     MOV     #256.,R1        ;INITIALISE THE READ COUNTER.
10983 054320  017702  125756            6$:     MOV     @RBUFA,R2       ;READ CHAR FROM THE FIFO.
10984 054324  100035                           BPL     50$             ;GO REPORT ERROR IF FIFO EMPTY.
10985                                   ;+
10986                                   ; Check for BMP code in the fifo.  Save any found on the queue.
10987                                   ;-
```

HARDWARE TEST - IAUTOI -

```
10988 054326  012700  170301          MOV     #170301,R0      ;SET UP BMP BIT MASK.
10989 054332  040200                  BIC     R2,R0           ;TRY TO CLEAR ALL THE BMP BITS.
10990 054334  001002                  BNE     8$              ;SKIP BMPSAV IF NOT A BMP CODE.
10991 054336  004737  035624          JSR     PC,SAVBMP       ;SAVE THE BMP CODE ON THE QUEUE.
10992                                 ;+
10993                                 ; Check for XOFF and XON characters.
10994                                 ;-
10995 054342  120227  000023  8$:     CMPB    R2,#23          ;IS IT AN XOFF CHARACTER?.
10996 054346  001406                  BEQ     10$             ;YES; GO REPORT ERROR.
10997 054350  120227  000021          CMPB    R2,#21          ;NO; IS IT AN XON CHARACTER?.
10998 054354  001403                  BEQ     10$             ;YES; GO REPORT ERROR.
10999 054356  005301                  DEC     R1              ;DECREMENT THE READ COUNT.
11000 054360  001357                  BNE     6$              ;LOOP TO READ THE NEXT CHAR.
11001 054362  000407                  BR      12$             ;GO CHECK FOR ANY UNTESTED ACTIVE LINES.
11002
11003 054364  005237  005466  10$:     INC     ERRNBR          ;SET ERROR NUMBER TO 5107.
11004 054370  013701  054426          MOV     55$,R1          ;PASS THE LINE NUMBER TO BE REPORTED.
11005 054374  012702  021271          MOV     #EM5103,R2      ;PASS THE ERROR MESSAGE TO BE REPORTED.
11006 054400                          ERROR                   ;               >>>>> ERROR <<<<<.
      054400  104460                                                          TRAP    C$ERROR
11007                                 ;+
11008                                 ; Check if all active lines have been tested.
11009                                 ;-
11010 054402  005237  054426  12$:     INC     55$             ;INCREMENT LINE NUMBER.
11011 054406  013701  054426          MOV     55$,R1          ;GET NUMBER OF THE NEXT LINE TO TEST.
11012 054412  005705                  TST     R5              ;ARE THERE ANY MORE ACTIVE LINES TO TEST?.
11013 054414  001262                  BNE     2$              ;LOOP TO CHECK NEXT LINE.
11014 054416  000404                  BR      60$             ;EXIT TEST.
11015
11016 054420  004737  036106  50$:     JSR     PC,TSABRT       ;REPORT TEST ABORTED. NON-TEST RELATED ERROR.
11017 054424  000401                  BR      60$             ;EXIT THIS TEST.
11018 054426  000000  55$:     .WORD   0               ;STORAGE FOR LINE NUMBER.
11019 054430  005037  002362  60$:     CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
11020
11021 054434                          ENDTST
      054434                                                  L10067:
      054434  104401                                                  TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - IAUTOA -
                                ;+*****************************************************************************
                                ;*                      - IAUTO BIT ACTIVE TEST -
                                ;*
                                ;*      This test verifies that the DUT's IAUTO function behaves correctly
                                ;*      when active, ie IAUTO asserted high.
                                ;*      All active lines are tested individually by filling the FIFO, and
                                ;*      checking for the presence of at least one XOFF(ASCII DC3) character
                                ;*      and one XON (ASCII DC1) character.
                                ;*      Any BMP codes that are found will be placed on the BMP code queue,
                                ;*      to be reported later.
                                ;*      The characters are transmitted on all active lines, in internal
                                ;*      loopback mode.
                                ;*
                                ;--*****************************************************************************

054436                                  BGNTST
054436                                                                  T29::
000035                                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
054436  012737  000035  002364           MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (52)
054444  012737  177777  002362           MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE IN A TEST.
054452  012737  000001  005464           MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
054460  012737  012121  005466           MOV     #5201.,ERRNBR  ;SET ERROR NUMBER TO 5201.
054466  012737  021321  005470           MOV     #EM5201,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
054474  012737  026440  005472           MOV     #ER9101,ERRBLK ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
                                ;+
                                ; Reset the DUT to a known state, remove the status codes from the fifo.
                                ;  Clear TX and RX interrupt enable bits in the CSR.
                                ; This subroutine reports error >>>>> 5201 <<<<<.
                                ;-
054502  004737  030172                  JSR     PC,CLNRST      ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
054506  103161                          BCC     60$            ;EXIT TEST IF FATAL ERROR FOUND.

                                ;+
                                ; Initialize the 256 byte data pattern.
                                ;  Ensure the data pattern is free from XON's or XOFF's to prevent errors.
                                ;  Note: the first two characters and the last two characters will be the same.
                                ;-
054510  004737  031372                  JSR     PC,INDTPX      ;INITIALISE DATA PATTERN.
                                ;+
                                ; Set internal loopback, enable IAUTO and receiver on the selected line.
                                ; Set LPR to 38.4k baud, 8 bits per character, odd parity, 2 stop bits.
                                ;-
054514  013705  002272                   MOV     ACTLNS,R5      ;PASS THE ACTIVE LINE BIT MAP.
054520  012700  000206                   MOV     #206,R0        ;PASS INTERNAL LOPBCK, ENABLE RX AND IAUTO.
054524  004737  040250                  JSR     PC,WTWLNC      ;INITIALISE THE LINE CONTROL REGISTER.
054530  012700  177670                   MOV     #177670,R0     ;PASS THE LPR CONTENTS.
054534  004737  040324                  JSR     PC,WTWLPR      ;SET THE LPR CONTENTS TO 38.4K BAUD.
054540  012704  000012                   MOV     #10.,R4        ;PASS DELAY TIME OF 10 MILLI SECONDS.
054544  004737  030370                  JSR     PC,DELAY       ;WAIT FOR LNCTRL AND LPR REGS TO BE UPDATED.

                                ;+
                                ; Set up loop for all active lines.
                                ; Test the state of the OAUTO bit prior to transmitting the data pattern.
                                ;  If the bit is clear, then report the error and skip transmitting
                                ;  the data pattern on the selected line.
                                ; Transmit a 224 character data pattern using DMA, on a single channel
```

```
11079                                   ; Empty the fifo, and count the XOFF and an XON chars found.
11080                                   ;-
11081 054550  005001                            CLR     R1              ;CLEAR THE LINE NUMBER COUNTER.
11082 054552  005037  055050                     CLR     55$             ;CLEAR STORAGE FOR LINE NUMBER.
11083 054556  012737  012122  005466  2$:       MOV     #5202.,ERRNBR   ;SET THE ERROR NUMBER TO 5202.
11084 054564  004737  032722                    JSR     PC,PUFIFO       ;PURGE THE FIFO.
11085 054570  103124                           BCC     50$             ;GO REPORT ERROR IF FIFO DID NOT PURGE.
11086 054572  000241                            CLC                     ;CLEAR CARRY PRIOR TO ROTATING BIT MAP.
11087 054574  006005                            ROR     R5              ;ROTATE THE BIT MAP INTO THE CARRY BIT.
11088 054576  103112                           BCC     16$             ;BRANCH IF LINE IS INACTIVE.
11089                                       ;+
11090                                       ; Test the IAUTO bit on the selected active line.
11091                                       ; Report error if it is clear.
11092                                       ;  Do not transmit the data pattern on the selected line.
11093                                       ;-
11094 054600  005237  005466                     INC     ERRNBR          ;SET ERROR NUMBER TO 5203.
11095 054604  010177  125470                     MOV     R1,@CSRA        ;SELECT LINE TO TEST.
11096 054610  032777  000002  125472             BIT     #BIT1,@LNCTRA   ;TEST THE STATE OF THE IAUTO BIT ON THIS LINE.
11097 054616  001004                            BNE     4$              ;SKIP ERROR IF IAUTO BIT SET.
11098 054620  012702  021345                     MOV     #EM5202,R2      ;PASS THE CORRECT ERROR MESSAGE.
11099                                                                   ; "IAUTO BIT FOUND CLEAR ON LINE nn"
11100 054624                                    ERROR                   ;               >>>>> ERROR <<<<<.
      054624  104460                                                                            TRAP    C$ERROR
11101 054626  000476                           BR      16$             ;SKIP TRANSMITTING DATA PATTERN.
11102
11103                                       ;+
11104                                       ; Transmit data pattern to fill the fifo, 223 chars + 32 xoff's + xon.
11105                                       ;-
11106 054630  005237  005466          4$:       INC     ERRNBR          ;SET ERROR NUMBER TO 5204.
11107 054634  012702  004012                    MOV     #BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
11108 054640  012703  000337                    MOV     #223.,R3        ;PASS THE LENGTH OF THE DATA PATTERN.
11109 054644  004737  030624                   JSR     PC,DODMA        ;TRANSMIT THE DATA PATTERN.
11110 054650  103074                           BCC     50$             ;ABORT THE TEST IF ERROR FOUND DURING DMA TX.
11111
11112                                     ;+
11113                                     ; Wait for DMA to complete, then wait for the last character plus XOFF
11114                                     ; to arrive in the fifo.
11115                                     ;-
11116 054652  005237  005466                    INC     ERRNBR          ;SET ERROR NUMBER TO 5205.
11117 054656  012701  170536                    MOV     #170536,R1      ;PASS TIME-OUT VALUE OF 350 MILLI SECS.
11118 054662  013702  002300                    MOV     CSRA,R2         ;PASS THE ADDRESS OF THE CSR.
11119 054666  004737  037740                   JSR     PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE, TX_ACTION SET.
11120 054672  103063                           BCC     50$             ;IF NO TX_ACTION WAS RECEIVED, ABORT THE TEST.
11121
11122                                     ;+
11123                                     ; Read 256 chars from the fifo, count any XOFF or XON chars found.
11124                                     ;-
11125 054674  005003                            CLR     R3              ;CLEAR XOFF AND XON INDICATOR.
11126 054676  005237  005466                    INC     ERRNBR          ;INCREMENT ERROR NUMBER TO 5206.
11127 054702  012701  000400                    MOV     #256.,R1        ;INITIALISE THE READ COUNTER.
11128 054706  017702  125370          6$:       MOV     @RBUFA,R2       ;READ CHAR FROM THE FIFO.
11129 054712  100053                           BPL     50$             ;GO REPORT ERROR IF FIFO EMPTY.
11130                                       ;+
11131                                       ; Check for BMP code in the fifo.  Save any found on the queue.
11132                                       ;
11133 054714  012700  170301                    MOV     #170301,R0      ;SET UP BMP BIT MASK.
11134 054720  040200                            BIC     R2,R0           ;TRY TO CLEAR ALL THE BMP BITS.
```

```
11135 054722  001002                    BNE     8$              ;SKIP BMPSAV IF NOT A BMP CODE.
11136 054724  004737  035624            JSR     PC,SAVBMP       ;SAVE THE BMP CODE ON THE QUEUE.
11137                                   ;+
11138                                   ; Check for XOFF and XON characters.
11139                                   ;-
11140 054730  120227  000023    8$:      CMPB    R2,#23          ;IS IT AN XOFF CHARACTER?.
11141 054734  001002                    BNE     10$             ;NO, BRANCH TO SEE IF IT IS AN XON.
11142 054736  052703  000001            BIS     #BIT0,R3        ;INDICATE THE XOFF CHAR.
11143 054742  120227  000021    10$:     CMPB    R2,#21          ;IS IT AN XON CHARACTER?.
11144 054746  001002                    BNE     12$             ;NO, SKIP THE NEXT INSTRUCTION.
11145 054750  052703  000002            BIS     #BIT1,R3        ;INDICATE THE XON CHAR.
11146 054754  005301    12$:     DEC     R1              ;DECREMENT THE READ COUNT.  256 READ?
11147 054756  001410                    BEQ     14$             ;YES, EXIT THE LOOP.
11148 054760  020127  000200            CMP     R1,#128.        ;NO.  HAVE WE READ EXACTLY 128 CHARS? $$$
11149 054764  001350                    BNE     6$              ;NO, LOOP TO READ MORE.
11150 054766  012704  000012            MOV     #10.,R4         ;YES.  DELAY 10MS TO WAIT FOR THE XON CHAR
11151 054772  004737  030370            JSR     PC,DELAY        ;  (WHICH IS LAST CHAR) TO GET INTO FIFO.
11152 054776  000743                    BR      6$              ;LOOP TO READ MORE CHARS.
11153                                   ;+
11154                                   ; Verify than at least 1 XOFF and 1 XON was found in the fifo.
11155                                   ; Report error if none were found.
11156                                   ;-
11157 055000  020327  000003    14$:     CMP     R3,#3           ;DID WE GET AT LEAST 1 XON AND 1 XOFF?
11158 055004  001407                    BEQ     16$             ;YES, SKIP ERROR REPORT.
11159 055006  005237  005466            INC     ERRNBR          ;NO, SET ERROR NUMBER TO 5207.
11160 055012  013701  055050            MOV     55$,R1          ;PASS THE LINE NUMBER TO BE REPORTED.
11161 055016  012702  021271            MOV     #EM5103,R2      ;PASS THE ERROR MESSAGE TO BE REPORTED.
11162                                                           ; "IAUTO BIT BAD ON LINE nn".
11163 055022                            ERROR                   ;               >>>>> ERROR <<<<<.
      055022  104460                                                                    TRAP    C$ERROR
11164                                   ;+
11165                                   ; Check if all active lines have been tested.
11166                                   ;-
11167 055024  005237  055050    16$:     INC     55$             ;INCREMENT LINE NUMBER.
11168 055030  013701  055050            MOV     55$,R1          ;GET NUMBER OF THE NEXT LINE TO TEST.
11169 055034  005705                    TST     R5              ;ARE THERE ANY MORE ACTIVE LINES TO TEST?.
11170 055036  001247                    BNE     2$              ;LOOP TO CHECK NEXT LINE.
11171 055040  000404                    BR      60$             ;EXIT TEST.
11172
11173 055042  004737  036106    50$:     JSR     PC,TSABRT       ;REPORT TEST ABORTED. NON-TEST RELATED ERROR.
11174 055046  000401                    BR      60$             ;EXIT THIS TEST.
11175 055050  000000    55$:     .WORD   0               ;STORAGE FOR LINE NUMBER.
11176 055052  005037  002362    60$:     CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
11177
11178 055056                            ENDTST
      055056                                                    L10070:
      055056  104401                                                      TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - FIFDAT -
                                ;+*************************************************************************
                                ;*                      - FIFO VALID DATA TEST -
                                ;*
                                ;*      This test verifies that the DUT is capable of holding 256 valid
                                ;*      characters in its fifo.
                                ;*      The characters are transmitted on the first available active line, in
                                ;*      internal loopback mode.
                                ;*      The data found in the fifo is compared with the expected data, and any
                                ;*      discrepancies are reported.
                                ;*      Any BMP code found will invalidate the test and cause it to be aborted.
                                ;*      However the BMP code will be placed on the BMP code queue, to be
                                ;*      reported later.
                                ;*
                                ;--*************************************************************************

055060                                  BGNTST
055060                                                                  T30::
                  000036                 TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
055060  012737  000036  002364           MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (53)
055066  012737  177777  002362           MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
055074  012737  000001  005464           MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
055102  012737  012265  005466           MOV     #5301.,ERRNBR   ;SET ERROR NUMBER TO 5301.
055110  012737  021403  005470           MOV     #EM5301,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
                                ;+
                                ; Reset the DUT to a known state, remove the status codes from the fifo.
                                ;  Clear TX and RX interrupt enable bits in the CSR.
                                ; This subroutine reports error >>>>> 5301 <<<<<.
                                ;-
055116  004737  030172                   JSR     PC,CLNRST       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
055122  103107                           BCC     60$             ;EXIT TEST IF FATAL ERROR FOUND.
                                ;+
                                ; Find an active line on which to perform the test.
                                ; Initialise 256 byte data pattern.
                                ;-
055124  004737  030772                   JSR     PC,FINACT       ;FIND AN ACTIVE LINE.
055130  103104                           BCC     60$             ;EXIT IF NO ACTIVE LINES FOUND.
055132  004737  031342                   JSR     PC,INDATP       ;INITIALISE THE DATA PATTERN.
                                ;+
                                ; Transmit a 265 character data pattern using DMA, on a single channel
                                ; at 38.4k baud, 8 bits per character, odd parity, 2 stop bits.
                                ;-
                                     ;+
                                     ; Set internal loopback on the selected line.
                                     ; Transmit the data pattern on the first available active line.
                                     ;-
055136  012700  000204                   MOV     #204,R0         ;PASS PARAMETER FOR INTERNAL LOPBCK,ENABLE RX.
055142  004737  040250                   JSR     PC,WTWLNC       ;INITILAISE THE LINE CONTROL REGISTER.
055146  012700  177670                   MOV     #177670,R0      ;PASS THE LPR CONTENTS.
055152  004737  040324                   JSR     PC,WTWLPR       ;SET THE LPR CONTENTS TO 38.4K BAUD.
055156  012704  000012                   MOV     #10.,R4         ;PASS DELAY TIME OF 10 MILLI SECONDS.
055162  004737  030370                   JSR     PC,DELAY        ;WAIT FOR LNCTRL AND LPR REGS TO BE UPDATED.
055166  012702  004032                   MOV     #BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
055172  012703  000400                   MOV     #BUFMID-BUFBAS,R3 ;PASS THE LENGTH OF THE DATA PATTERN.
055176  005237  005466                   INC     ERRNBR          ;SET ERROR NUMBER TO 5302.
055202  004737  030624                   JSR     PC,DODMA        ;TRANSMIT THE DATA PATTERN.
055206  103053                           BCC     50$             ;ABORT TEST IF ERROR FOUND DURING DMA TX.
```

```
11236                                   ;+
11237                                   ; Wait for DMA to complete, then wait for the last character to arrive in
11238                                   ; the fifo.
11239                                   ;-
11240 055210  005237  005466                  INC     ERRNBR          ;SET ERROR NUMBER TO 5303.
11241 055214  010103                          MOV     R1,R3           ;SAVE THE NUMBER OF THE SELECTED ACTIVE LINE.
11242 055216  012701  170536                  MOV     #170536,R1      ;PASS TIME-OUT VALUE OF 350 MILLI SECS.
11243 055222  013702  002300                  MOV     CSRA,R2         ;PASS THE ADDRESS OF THE CSR.
11244 055226  004737  037740                  JSR     PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE, TX_ACTION SET.
11245 055232  103041                          BCC     50$             ;BRANCH IF FIFO EMPTY, ABORT THE TEST.
11246 055234  012704  000005                  MOV     #5,R4           ;PASS DELAY OF 5 MILLI SECS.
11247 055240  004737  030370                  JSR     PC,DELAY        ;WAIT FOR LAST CHAR TO ARRIVE IN THE FIFO.
11248                                   ;+
11249                                   ; Read the FIFO checking for data corruption, report any errors found.
11250                                   ; Abort the test if a BMP code was found in the fifo.
11251                                   ;-
11252 055244  006303                          ASL     R3              ;MULTIPLY BY 2.
11253 055246  005004                          CLR     R4              ;INITIALISE THE EXPECTED DATA.
11254 055250  013705  002302                  MOV     RBUFA,R5        ;GET THE ADDRESS OF THE RECEIVER BUFFER REG.
11255 055254  012737  012270  005466  2$:     MOV     #5304.,ERRNBR   ;SET UP ERROR NUMBER EACH TIME AROUND LOOP.
11256 055262  011502                          MOV     (R5),R2         ;GET THE ACTUAL DATA FROM THE FIFO.
11257 055264  100024                          BPL     50$             ;ABORT THE TEST IF THE FIFO IS EMPTY.
11258                                   ;+
11259                                   ; Check if the read character is a BMP code.
11260                                   ;  If it is a BMP code save it on the queue to be reported later, and
11261                                   ;  abort the test.
11262                                   ;-
11263 055266  005237  005466                  INC     ERRNBR          ;SET ERROR NUMBER TO 5305.
11264 055272  004737  027256                  JSR     PC,CHKBMP       ;CHECK IF CHARACTER IS A BMP CODE.
11265 055276  103002                          BCC     4$              ;BRANCH IF NOT A BMP CODE.
11266 055300                                  ERROR                   ;                >>>>> ERROR 5305 <<<<<.
      055300  104460                                                                          TRAP    C$ERROR
11267 055302  000417                          BR      60$             ;ABORT THIS TEST.
11268
11269 055304  005237  005466          4$:     INC     ERRNBR          ;SET ERROR NUMBER TO 5306.
11270 055310  120402                          CMPB    R4,R2           ;COMPARE THE EXPECTED WITH THE ACTUAL DATA.
11271 055312  001406                          BEQ     8$              ;SKIP ERROR REPORT IF DATA IS OK.
11272 055314  012737  025420  005472          MOV     #ER9002,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
11273 055322  012701  021430                  MOV     #EM5302,R1      ;PASS THE MESSAGE TO BE REPORTED.
11274                                         ;REPORT THE ERROR "FIFO BAD, DATA FIELD CORRUPTED"
11275 055326                          6$:     ERROR                   ;                >>>>> ERROR 5306 <<<<<.
      055326  104460                                                                          TRAP    C$ERROR
11276 055330  105204                  8$:     INCB    R4              ;INCREMENT THE EXPECTED DATA.
11277 055332  001350                          BNE     2$              ;LOOP IF NOT DONE.
11278 055334  000402                          BR      60$             ;EXIT
11279
11280 055336  004737  036106          50$:    JSR     PC,TSABRT       ;ABORT THE TEST, REASON SHOWN BY ERROR NUMBER.
11281 055342  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
11282
11283 055346                                  ENDTST
      055346                                                                        L10071:
      055346  104401                                                                          TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - FI3QLI -
                                ;+*****************************************************************************
                                ;*                      - FIFO 3/4 LEVEL INACTIVE TEST -
                                ;*
                                ;*      This test verifies that the DUT's fifo 3/4 level alarm system
                                ;*      remains inactive while it contains 191 characters or less.
                                ;*      The test looks for an XOFF (ASCII DC3) character in the fifo.
                                ;*      If any XOFF's are found an error will be reported and the test aborted.
                                ;*      Any BMP code found will invalidate the test and cause it to be aborted.
                                ;*      However the BMP code will be placed on the BMP code queue, to be
                                ;*      reported later.
                                ;*      The characters are transmitted on the first available active line, in
                                ;*      internal loopback mode.
                                ;*
                                ;--*****************************************************************************

                                        BGNTST
                                                                                T31::
                                 TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
055350  012737  000037  002364    MOV     @TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (54)
055356  012737  177777  002362    MOV     @-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
055364  012737  000001  005464    MOV     @1,ERRTYP       ;SET FATAL ERROR TYPE IN ERROR TABLE.
055372  012737  012431  005466    MOV     @5401.,ERRNBR   ;SET ERROR NUMBER TO 5401.
055400  012737  021560  005470    MOV     @EM5401,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
055406  012737  024644  005472    MOV     @ER0503,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
                                ;+
                                ; Reset the DUT to a known state, remove the status codes from the fifo.
                                ;  Clear TX and RX interrupt enable bits in the CSR.
                                ; This subroutine reports error >>>>> 5401 <<<<<.
                                ;
055414  004737  030172            JSR     PC,CLNRST       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
055420  103111                    BCC     60$             ;EXIT TEST IF FATAL ERROR FOUND.
                                ;+
                                ; Find an active line on which to perform the test.
                                ;-
055422  004737  030772            JSR     PC,FINACT       ;FIND THE NUMBER OF THE FIRST ACTIVE LINE.
055426  103106                    BCC     60$             ;EXIT IF NO LINES ARE AVAILABLE.

                                ;+
                                ; Initialize the 256 byte data pattern.
                                ;  Ensure the data pattern is free from XON's or XOFF's to prevent errors.
                                ;  Note: the first two characters and the last two characters will be the same.
                                ;
055430  004737  031372            JSR     PC,INDTPX       ;INITIALISE THE DATA PATTERN.
                                ;+
                                ; Transmit a 191 character data pattern using DMA, on a single channel
                                ; at 38.4k baud, 8 bits per character, odd parity, 2 stop bits.
                                ;

                                    ;+
                                    ; Set internal loopback, enable IAUTO and RX on the selected line.
                                    ; Transmit the data pattern on the first available active line.
                                    ;-
055434  012700  000206               MOV     @206,R0         ;PASS INTERNAL LOPBCK, ENABLE RX AND IAUTO.
055440  004737  040250              JSR     PC,WTWLNC       ;INITILAISE THE LINE CONTROL REGISTER.
055444  012700  177670               MOV     @177670,R0      ;PASS THE LPR CONTENTS.
055450  004737  040324              JSR     PC,WTWLPR       ;SET THE LPR CONTENTS TO 38.4K BAUD.
055454  012704  000012               MOV     @10.,R4         ;PASS DELAY TIME OF 10 MILLI SECONDS.
```

```
11341 055460  004737  030370                    JSR     PC,DELAY        ;WAIT FOR LNCTRL AND LPR REGS TO BE UPDATED.
11342 055464  012702  004012                     MOV     @BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
11343 055470  012703  000277                     MOV     @191.,R3        ;PASS THE LENGTH OF THE DATA PATTERN.
11344 055474  004737  030624                    JSR     PC,DODMA        ;TRANSMIT THE DATA PATTERN.
11345 055500  103057                             BCC     50$             ;IF ERROR FOUND DURING DMA THEN ABORT TEST.
11346
11347                                          ;+
11348                                          ; Wait for DMA to complete, then wait for the last character to arrive in
11349                                          ; the fifo.
11350                                          ;-
11351 055502  005237  005466                       INC     ERRNBR          ;SET ERROR NUMBER TO 5402.
11352 055506  012701  170454                       MOV     @170454,R1      ;PASS TIME-OUT VALUE OF 300 MILLI SECS.
11353 055512  013702  002300                       MOV     CSRA,R2         ;PASS THE ADDRESS OF THE CSR.
11354 055516  004737  037740                      JSR     PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE, TX_ACTION SET.
11355 055522  103046                             BCC     50$             ;IF FIFO EMPTY, REPORT ERROR, ABORT THE TEST.
11356 055524  012704  000005                       MOV     @5,R4           ;PASS DELAY OF 5 MILLI SECS.
11357 055530  004737  030370                      JSR     PC,DELAY        ;WAIT FOR LAST CHAR TO ARRIVE IN THE FIFO.
11358                                    ;+
11359                                    ; Read the contents of the fifo.  If any of the following conditions occur
11360                                    ; report the error and abort the test;
11361                                    ;  Fifo empty too soon.
11362                                    ;  BMP code found.
11363                                    ;  Xoff code found.
11364                                    ;  Extra (192) character found in fifo.
11365                                    ;
11366 055534  005004                             CLR     R4              ;CLEAR THE CHARACTER COUNT.
11367 055536  013705  002302                     MOV     RBUFA,R5        ;GET THE ADDRESS OF THE RECEIVER BUFFER REG.
11368 055542  012737  012267  005466  2$:        MOV     @5303.,ERRNBR   ;SET ERROR NUMBER TO 5403.
11369 055550  011502                             MOV     (R5),R2         ;GET THE ACTUAL DATA FROM THE FIFO.
11370 055552  100032                            BPL     50$             ;FIFO EMPTY, ABORT TEST.
11371 055554  005204                             INC     R4              ;COUNT THE CHARACTER.
11372                                      ;+
11373                                      ; Check if the read character is a BMP code.
11374                                      ;  If it is a BMP code save it on the queue to be reported later, and
11375                                      ;  abort the test.
11376                                      ;
11377 055556  005237  005466                       INC     ERRNBR          ;SET ERROR NUMBER TO 5404.
11378 055562  004737  027256                      JSR     PC,CHKBMP       ;CHECK IF CHARACTER IS A BMP CODE.
11379 055566  103001                             BCC     4$              ;BRANCH IF NOT A BMP CODE.
11380                                            ;REPORT ERROR "BMP CODE FOUND IN FIFO, TEST INVALIDATED".
11381 055570  000421                             BR      8$              ;REPORT THE ERROR AND ABORT THE TEST.
11382                                    ;+
11383                                    ; Check if the character is an XOFF.  Report the error if one is found.
11384                                    ;
11385
11386 055572  005237  005466            4$:        INC     ERRNBR          ;SET ERROR NUMBER TO 5405.
11387 055576  122702  000023                       CMPB    @23,R2          ;CHECK IF THE READ DATA IS AN XOFF.
11388 055602  001003                             BNE     6$              ;BRANCH IF NOT AN XOFF.
11389 055604  012701  021617                       MOV     @EM5402,R1      ;PASS THE MESSAGE TO BE REPORTED.
11390                                            ;REPORT THE ERROR "FIFO BAD, ALARM SIGNAL DEFECTIVE".
11391 055610  000411                             BR      8$              ;GO REPORT THE ERROR AND ABORT THE TEST.
11392
11393 055612  005237  005466            6$:        INC     ERRNBR          ;SET ERROR NUMBER TO 5406.
11394 055616  020427  000277                       CMP     R4,@191.        ;CHECK IF WE HAVE READ ALL THE CHARACTERS.
11395 055622  001347                             BNE     2$              ;LOOP BACK TO GET THE NEXT CHARACTER.
11396 055624  011502                             MOV     (R5),R2         ;TRY TO READ AN EXTRA CHARACTER FROM THE FIFO.
11397 055626  100006                            BPL     60$             ;EXIT IF NON FOUND.
```

HARDWARE TEST - FI3QLI - SEQ 0288

```
11398 055630  012701  021617                MOV     #EM5402,R1      ;PASS THE MESSAGE TO BE REPORTED.
11399                                       ;REPORT THE ERROR "FIFO BAD, ALARM SIGNAL DEFECTIVE".
11400
11401 055634                        8$:     ERROR                   ;       >>>>> ERRORS 5304 THRU 5306 <<<<<.
      055634  104460                                                                TRAP    C$ERROR
11402 055636  000402                        BR      60$             ;EXIT THE TEST.
11403
11404                                                               ;       >>>>> ERRORS 5402 AND 5403 <<<<<.
11405 055640  004737  036106          50$:    JSR     PC,TSABRT       ;REPORT TEST ABORTED. NON-TEST RELATED ERROR.
11406 055644  005037  002362          60$:     CLR    CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
11407
11408 055650                        ENDTST
      055650                                                                    L10072:
      055650  104401                                                                TRAP    C$ETST
```

```
 11410                                  .SBTTL  HARDWARE TEST           - FI3QLA -
 11411                                  ;**************************************************************************
 11412                                  ;*                        - FIFO 3/4 LEVEL ACTIVE TEST -
 11413                                  ;*
 11414                                  ;*      This test verifies that the DUT's fifo 3/4 level alarm system
 11415                                  ;*      becomes active when the fifo contains > 192 characters.
 11416                                  ;*      The test compares the actual number of XOFF (ASCII DC3)
 11417                                  ;*      characters that are found in the fifo with the expected number.
 11418                                  ;*      An error will be reported, if the counts are found to differ.
 11419                                  ;*      Any BMP code found will invalidate the test and cause it to be aborted.
 11420                                  ;*      However the BMP code will be placed on the BMP code queue, to be
 11421                                  ;*      reported later.
 11422                                  ;*      The characters are transmitted on the first available active line, in
 11423                                  ;*      internal loopback mode.
 11424                                  ;*
 11425                                  ; -*************************************************************************
 11426
 11427 055652                                   BGNTST
       055652                                                                   T32::
 11428          000040                    TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 11429 055652  012737  000040  002364    MOV     @TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (55)
 11430 055660  012737  177777  002362    MOV     @-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
 11431 055666  012737  000001  005464    MOV     @1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
 11432 055674  012737  012575  005466    MOV     @5501.,ERRNBR   ;SET ERROR NUMBER TO 5501.
 11433 055702  012737  021660  005470    MOV     @EM5501,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
 11434                                  ;+
 11435                                  ; Reset the DUT to a known state, remove the status codes from the fifo.
 11436                                  ;  Clear TX and RX interrupt enable bits in the CSR.
 11437                                  ; This subroutine reports error >>>>> 5501 <<<<<.
 11438                                  ;-
 11439 055710  004737  030172                   JSR     PC,CLNRST       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
 11440 055714  103402                           BCS     .+6             ;SKIP EXIT OF TEST IF NO FATAL ERROR FOUND.
 11441 055716  000137  056336                   JMP     60$             ;EXIT TEST FATAL ERROR FOUND.
 11442                                  ;+
 11443                                  ; Find an active line on which to perform the test.
 11444                                  ;-
 11445 055722  004737  030772                   JSR     PC,FINACT       ;FIND AN ACTIVE LINE.
 11446 055726  103402                           BCS     .+6             ;SKIP EXIT OF TEST IF ACTIVE LINE FOUND.
 11447 055730  000137  056336                   JMP     60$             ;EXIT TEST.
 11448                                  ;+
 11449                                  ; Initialize the 256 byte data pattern.
 11450                                  ;  Ensure the data pattern is free from XON's or XOFF's to prevent errors.
 11451                                  ;  Note: the first two characters and the last two characters will be the same.
 11452                                  ;-
 11453 055734  004737  031372                   JSR     PC,INDTPX       ;INITIALISE DATA PATTERN.
 11454                                  ;+
 11455                                  ; Transmit a 256 character data pattern using DMA, on a single channel
 11456                                  ; at 38.4k baud, 8 bits per character, odd parity, 2 stop bits.
 11457                                  ;
 11458                                      ;+
 11459                                      ; Set internal loopback, enable IAUTO and receiver on the selected line.
 11460                                      ; Transmit the first 191 characters on the first available active line.
 11461                                      ;-
 11462 055740  005237  005466          2$:       INC     ERRNBR          ;SET ERROR NUMBER TO 5502.
 11463 055744  012700  000206                    MOV     @206,R0         ;PASS INTERNAL LOPBCK, ENABLE RX AND IAUTO.
 11464 055750  004737  040250                   JSR     PC,WTWLNC       ;INITIALISE THE LINE CONTROL REGISTER.
 11465 055754  012700  177670                    MOV     @177670,R0      ;PASS THE LPR CONTENTS.
```

```
11466 055760  004737  040324                JSR     PC,WTWLPR       ;SET THE LPR CONTENTS TO 38.4K BAUD.
11467 055764  012704  000012                 MOV    #10.,R4         ;PASS DELAY TIME OF 10 MILLI SECONDS.
11468 055770  004737  030370                JSR     PC,DELAY        ;WAIT FOR LNCTRL AND LPR REGS TO BE UPDATED.
11469 055774  010105                         MOV    R1,R5           ;COPY THE LINE NUMBER.
11470 055776  012702  004012                 MOV    #BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
11471 056002  012703  000277                 MOV    #191.,R3        ;PASS THE LENGTH OF THE DATA PATTERN.
11472 056006  004737  030624                JSR     PC,DODMA        ;TRANSMIT THE DATA PATTERN.
11473 056012  103147                         BCC    50$             ;ABORT THE TEST IF ERROR FOUND DURING DMA TX.
11474
11475                                      ;+
11476                                      ; Wait for DMA to complete, then wait for the last character to arrive in
11477                                      ; the fifo.
11478                                      ;-
11479 056014  005237  005466                   INC    ERRNBR          ;SET ERROR NUMBER TO 5503.
11480 056020  012701  170454                   MOV    #170454,R1      ;PASS TIME-OUT VALUE OF 300 MILLI SECS.
11481 056024  013702  002300                   MOV    CSRA,R2         ;PASS THE ADDRESS OF THE CSR.
11482 056030  004737  037740                  JSR    PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE, TX_ACTION SET.
11483 056034  103136                          BCC    50$             ;IF NO TX_ACTION WAS RECEIVED, ABORT THE TEST.
11484 056036  012704  000005                   MOV    #5,R4           ;PASS DELAY OF 5 MILLI SECS.
11485 056042  004737  030370                  JSR    PC,DELAY        ;WAIT FOR LAST CHAR TO ARRIVE IN THE FIFO.
11486
11487                                      ;+
11488                                      ;  Transmit a null character which will cause an XOFF to be generated.
11489 056046  005237  005466                ;-
11490 056052  010501                           INC    ERRNBR          ;SET ERROR NUMBER TO 5504.
11491 056054  012702  004012                   MOV    R5,R1           ;PASS THE LINE NUMBER.
11492 056060  012703  000001                   MOV    #BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
11493 056064  004737  030624                   MOV    #1,R3           ;PASS THE NUMBER OF
11494 056070  103120                          JSR    PC,DODMA        ;TX A NULL CHARACTER TO CAUSE AN XOFF.
11495                                         BCC    50$             ;ABORT THE TEST IF ERROR FOUND DURING DMA TX.
11496
11497                                      ;+
11498                                      ; Wait for the XOFF to be received before TX the next 42 characters
11499                                      ; which will cause a further 21 XOFF's to be generated.
11500 056072  005237  005466                ;-
11501 056076  012701  170012                   INC    ERRNBR          ;SET ERROR NUMBER TO 5505.
11502 056102  013702  002300                   MOV    #170012,R1      ;PASS TIME-OUT VALUE OF 10 MILLI SECS.
11503 056106  004737  037740                   MOV    CSRA,R2         ;PASS THE ADDRESS OF THE CSR.
11504 056112  103107                          JSR    PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE, TX_ACTION SET.
11505 056114  012704  000005                  BCC    50$             ;IF NO TX_ACTION WAS RECEIVED, ABORT THE TEST.
11506 056120  004737  030370                   MOV    #5,R4           ;PASS DELAY OF 5 MILLI SECS.
11507                                         JSR    PC,DELAY        ;WAIT FOR XOFF TO GET INTO THE FIFO.
11508                                      ;+
11509                                      ; Initialise the 256 byte data pattern to all nulls.
11510 056124  012702  004012                ;-
11511 056130  105022                           MOV    #BUFBAS,R2      ;INITIALIZE THE DATA PATTERN TO BE
4$:                                            CLRB   (R2)+           ;  ALL NULLS.
11512 056132  020227  004412                   CMP    R2,#BUFMID      ;
11513 056136  103774                          BLO    4$              ;
11514
11515                                      ;+
11516                                      ; Transmit a further 31 null characters which will cause 31 XOFF's to be
11517                                      ; generated.
11518                                      ;-
11519 056140  005237  005466                   INC    ERRNBR          ;SET ERROR NUMBER TO 5506.
11520 056144  010501                           MOV    R5,R1           ;PASS THE LINE NUMBER.
11521 056146  012702  004012                   MOV    #BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
11522 056152  012703  000037                   MOV    #31.,R3         ;PASS THE LENGTH OF THE DATA PATTERN.
```

```
11523 056156  004737  030624                    JSR     PC,DODMA        ;TRANSMIT THE DATA PATTERN.
11524 056162  103063                             BCC     50$             ;ABORT THE TEST IF ERROR FOUND DURING DMA TX.
11525                                          ;+
11526                                          ; Wait for the XOFF's and the null characters  to be received.
11527                                          ;-
11528 056164  005237  005466                     INC     ERRNBR          ;SET ERROR NUMBER TO 5507.
11529 056170  012701  170454                     MOV     #170454,R1      ;PASS TIME-OUT VALUE OF 300 MILLI SECS.
11530 056174  013702  002300                     MOV     CSRA,R2         ;PASS THE ADDRESS OF THE CSR.
11531 056200  004737  037740                    JSR     PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE, TX_ACTION SET.
11532 056204  103052                            BCC     50$             ;IF NO TX_ACTION WAS RECEIVED, ABORT THE TEST.
11533 056206  012704  000005                     MOV     #5,R4           ;PASS DELAY OF 5 MILLI SECS.
11534 056212  004737  030370                    JSR     PC,DELAY        ;WAIT FOR XOFF TO GET INTO THE FIFO.
11535                                          ;+
11536                                          ; Read the fifo until empty, counting the number of XOFF characters
11537                                          ; that are found.
11538                                          ;-
11539 056216  005004                             CLR     R4              ;CLEAR CHARACTER COUNTER.
11540 056220  005003                             CLR     R3              ;CLEAR THE XOFF FOUND COUNTER.
11541 056222  012701  170001                     MOV     #170001,R1      ;INDICATE TO TEST DATA.VALID BIT, TIME-OUT 1MS.
11542 056226  012737  012604  005466  6$:        MOV     #5508.,ERRNBR   ;SET UP ERROR NUMBER EACH TIME AROUND THE LOOP.
11543 056234  013702  002302                     MOV     RBUFA,R2        ;INDICATE TO CHECK RECEIVE BUFFER REGISTER.
11544 056240  004737  037740                    JSR     PC,WAIBIS       ;WAIT FOR RECEIVED CHAR OR TIME-OUT.
11545 056244  103032                            BCC     50$             ;GO REPORT ERROR IF FIFO EMPTY.
11546 056246  005204                             INC     R4              ;COUNT THE CHARACTER.
11547                                        ;+
11548                                        ; Check if for BMP codes in the fifo, abort the test if any are found.
11549                                        ;  Save the BMP code on the queue to be reported later.
11550                                        ;-
11551 056250  005237  005466                     INC     ERRNBR          ;SET ERROR NUMBER TO 5509.
11552 056254  004737  027256                    JSR     PC,CHKBMP       ;CHECK IF WE HAVE GOT A BMP CODE.
11553 056260  103422                            BCS     12$             ;GO REPORT THE ERROR IF WE FOUND A BMP CODE.
11554                                        ;+
11555                                        ; Check for XOFF character.
11556                                        ;-
11557 056262  122702  000023           8$:       CMPB    #23,R2          ;CHECK IF THE RECEIVED CHARACTER WAS AN XOFF.
11558 056266  001001                            BNE     10$             ;BRANCH IF CHARACTER WAS NOT AN XOFF.
11559 056270  005203                             INC     R3              ;INCREMENT XOFF FOUND COUNT.
11560                                        ;+
11561                                        ; Check if all the characters including the XON have been removed.
11562                                        ;-
11563 056272  020427  000400           10$:    CMP     R4,#256.        ;CHECK IF WE HAVE REMOVED ALL THE CHARACTERS.
11564 056276  002753                            BLT     6$              ;GO GET THE NEXT CHAR IF WE HAVE NOT FINISHED.
11565
11566                                        ;+
11567                                        ; Check if the correct number of XOFF's were found in the fifo,
11568                                        ; report error if count is incorrect.
11569                                        ;-
11570 056300  013737  012606  005466              MOV     5510.,ERRNBR    ;SET UP THE ERROR NUMBER TO 5510.
11571 056306  022703  000040                     CMP     #32.,R3         ;COMPARE EXPECTED XOFF COUNT WITH ACTUAL COUNT.
11572 056312  001411                            BEQ     60$             ;EXIT TEST IF SUCCESS.
11573 056314  012737  024644  005472             MOV     #ER0503,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
11574 056322  012701  021617                     MOV     #EM5402,R1      ;PASS THE MESSAGE TO BE REPORTED.
11575                                          ;REPORT THE ERROR "FIFO BAD, ALARM SIGNAL DEFECTIVE".
11576 056326                           12$:    ERROR                   ;                >>>>> ERROR <<<<<.
      056326  104460                                                                              TRAP    C$ERROR
11577 056330  000402                            BR      60$             ;ABORT THE TEST.
11578
```

HARDWARE TEST - FI3QLA - SEQ 0292

```
11579 056332  004737  036106          50$:    JSR     PC,TSABRT       ;REPORT TEST ABORTED.  ERROR # SHOWS REASON.
11580 056336  005037  002362          60$:     CLR    CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
11581
11582 056342                                  ENDTST
      056342                                                                  L10073:
      056342  104401                                                                  TRAP    C$ETST
```

```
11584                                   .SBTTL  HARDWARE TEST           - FI3QAI -
11585                                   ;++*************************************************************************
11586                                   ;*                  - FIFO 3/4 ALARM LEVEL ACTIVE/INACTIVE TEST -
11587                                   ;*
11588                                   ;*      This test verifies that the DUT's fifo 3/4 level alarm system
11589                                   ;*      becomes active and inactive at the correct levels.
11590                                   ;*      Any BMP code found will invalidate the test and cause it to be aborted.
11591                                   ;*      However the BMP code will be placed on the BMP code queue, to be
11592                                   ;*      reported later.
11593                                   ;*      The characters are transmitted on the first available active line, in
11594                                   ;*      internal loopback mode.
11595                                   ;*
11596                                   ;--*************************************************************************
11597
11598 056344                                       BGNTST
      056344                                                                    T33::
11599          000041                            TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
11600 056344  012737  000041  002364             MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (56)
11601 056352  012737  177777  002362             MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
11602 056360  012737  000001  005464             MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
11603 056366  012737  012741  005466             MOV     #5601.,ERRNBR   ;SET ERROR NUMBER TO 5601.
11604 056374  012737  021715  005470             MOV     #EM5601,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
11605                                   ;+
11606                                   ; Reset the DUT to a known state, remove the status codes from the fifo.
11607                                   ;  Clear TX and RX interrupt enable bits in the CSR.
11608                                   ; This subroutine reports error >>>>> 5601 <<<<<.
11609                                   ;-
11610 056402  004737  030172                       JSR     PC,CLNRST       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
11611 056406  103402                       BCS     2$              ;SKIP EXITING TEST A SUCCESSFUL RESET.
11612 056410  000137  057026                       JMP     60$             ;EXIT THIS TEST.
11613 056414                            2$:
11614                                   ;+
11615                                   ; Find an active line on which to perform the test.
11616                                   ;-
11617 056414  004737  030772                       JSR     PC,FINACT       ;FIND AN ACTIVE LINE.
11618 056420  103402                       BCS     .+6             ;SKIP EXIT OF TEST IF ACTIVE LINE FOUND.
11619 056422  000137  057026                       JMP     60$             ;EXIT TEST.
11620                                   ;+
11621                                   ; Initialize the 256 byte data pattern.
11622                                   ;  Ensure the data pattern is free from XON's or XOFF's to prevent errors.
11623                                   ;  Note: the first two characters and the last two characters will be the same.
11624                                   ;-
11625 056426  004737  031372                       JSR     PC,INDTPX       ;INITIALISE THE DATA PATTERN.
11626                                   ;+
11627                                   ; Transmit a 256 character date pattern using DMA, on a single channel
11628                                   ; at 38.4k baud, 8 bits per character, odd parity, 2 stop bits.
11629                                   ;-
11630                                       ;+
11631                                       ; Set internal loopback, enable IAUTO and receiver on the selected line.
11632                                       ; Transmit the first 191 characters on the first available active line.
11633                                       ;-
11634 056432  005237  005466                   INC     ERRNBR          ;SET ERROR NUMBER TO 5602.
11635 056436  012700  000206                   MOV     #206,R0         ;PASS INTERNAL LOPBCK, ENABLE RX AND IAUTO.
11636 056442  004737  040250                   JSR     PC,WTWLNC       ;INITILAISE THE LINE CONTROL REGISTER.
11637 056446  012700  177670                   MOV     #177670,R0      ;PASS THE LPR CONTENTS.
11638 056452  004737  040324                   JSR     PC,WTWLPR       ;SET THE LPR CONTENTS TO 38.4K BAUD.
11639 056456  012704  000012                   MOV     #10.,R4         ;PASS DELAY TIME OF 10 MILLI SECONDS.
```

HARDWARE TEST - FI3QAI -

```
11640 056462  004737  030370                JSR     PC,DELAY        ;WAIT FOR LNCTRL AND LPR REGS TO BE UPDATED.
11641 056466  010105                         MOV     R1,R5           ;COPY THE LINE NUMBER.
11642 056470  012702  004012                MOV     #BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
11643 056474  012703  000277                MOV     #191.,R3        ;PASS THE LENGTH OF THE DATA PATTERN.
11644 056500  004737  030624                JSR     PC,DODMA        ;TRANSMIT THE DATA PATTERN.
11645 056504  103146                         BCC     50$             ;EXIT IF ERROR FOUND DURING DMA TX.
11646                                      ;+
11647                                      ; Wait for DMA to complete, then wait for the last character to arrive in
11648                                      ; the fifo.
11649                                      ;-
11650 056506  005237  005466                 INC     ERRNBR          ;SET ERROR NUMBER TO 5603.
11651 056512  012701  170454                 MOV     #170454,R1      ;PASS TIME-OUT VALUE OF 300 MILLI SECS.
11652 056516  013702  002300                 MOV     CSRA,R2         ;PASS THE ADDRESS OF THE CSR.
11653 056522  004737  037740                JSR     PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE, TX_ACTION SET.
11654 056526  103135                        BCC     50$             ;BRANCH IF FIFO EMPTY, ABORT THE TEST.
11655 056530  012704  000005                 MOV     #5,R4           ;PASS DELAY OF 5 MILLI SECS
11656 056534  004737  030370                JSR     PC,DELAY        ;WAIT FOR LAST CHAR TO ARRIVE IN THE FIFO.
11657
11658                                      ;+
11659                                      ;  Transmit a null character which will cause an XOFF to be generated.
11660                                      ;-
11661 056540  005237  005466                 INC     ERRNBR          ;SET ERROR NUMBER TO 5604.
11662 056544  010501                         MOV     R5,R1           ;PASS THE LINE NUMBER.
11663 056546  012702  004012                MOV     #BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
11664 056552  012703  000001                MOV     #1,R3           ;PASS THE NUMBER OF
11665 056556  004737  030624                JSR     PC,DODMA        ;TX A NULL CHARACTER TO CAUSE AN XOFF.
11666 056562  103117                         BCC     50$             ;ABORT THE TEST IF ERROR FOUND DURING DMA TX.
11667                                      ;+
11668                                      ; Wait for the XOFF to be received before continuing the test.
11669                                      ;-
11670 056564  005237  005466                 INC     ERRNBR          ;SET ERROR NUMBER TO 5605.
11671 056570  012701  170012                 MOV     #170012,R1      ;PASS TIME-OUT VALUE OF 10 MILLI SECS.
11672 056574  013702  002300                 MOV     CSRA,R2         ;PASS THE ADDRESS OF THE CSR.
11673 056600  004737  037740                JSR     PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE, TX_ACTION SET.
11674 056604  103106                        BCC     50$             ;IF NO TX_ACTION WAS RECEIVED, ABORT THE TEST.
11675 056606  012704  000005                 MOV     #5,R4           ;PASS DELAY OF 5 MILLI SECS.
11676 056612  004737  030370                JSR     PC,DELAY        ;WAIT FOR XOFF TO GET INTO THE FIFO.
11677
11678 056616  010577  123456                 MOV     R5,@CSRA        ;SELECT THE LINE READY FOR TRANSMISSION.
11679                                      ;+
11680                                      ; Read three characters, transmit one character until the first 192 characters
11681                                      ; have been read from the fifo, ie until the half level is reached.
11682                                      ;  Then read the fifo until empty.
11683                                      ; Count all XOFF's that are detected.
11684                                      ;-
11685 056622  005005                         CLR     R5              ;CLEAR THE TX FLAG.
11686 056624  005004                         CLR     R4              ;CLEAR THE CHARACTER COUNTER.
11687 056626  012703  000300                 MOV     #192.,R3        ;SET UP READ COUNTER FOR THE FIRST 192 CHARS.
11688
11689 056632  012700  000003           4$:   MOV     #3,R0           ;SET READ COUNTER.
11690 056636  012701  170005           6$:   MOV     #170005,R1      ;INDICATE TO TEST DATA.VALID BIT, TIME-OUT 5MS.
11691 056642  013702  002302                 MOV     RBUFA,R2        ;INDICATE TO CHECK RECEIVE BUFFER REGISTER.
11692 056646  004737  037740                JSR     PC,WAIBIS       ;WAIT FOR RECEIVED CHAR OR TIME OUT.
11693 056652  103046                        BCC     14$             ;EXIT LOOP IF TIME-OUT, FIFO EMPTY.
11694 056654  005300                         DEC     R0              ;DECREMENT READ COUNTER.
11695 056656  005303                         DEC     R3              ;DECREMENT CHAR COUNTER.
11696 056660  003002                         BGT     8$              ;SKIP DISBL'G TX IF FIRST 192 CHARS NOT READ.
```

HARDWARE TEST - FI3QAI -

```
11697 056662  052705  100000                BIS     #BIT15,R5       ;DISABLE ANY FURTHER TRANSMISSIONS.
11698                                     ;+
11699                                     ; Check if the read character is a BMP code.
11700                                     ;  If it is a BMP code save it on the queue to be reported later, and
11701                                     ;  abort the test.
11702                                     ;-
11703 056666  012737  012746  005466  8$:    MOV     #5606.,ERRNBR   ;SET UP ERROR NUMBER EACH TIME AROUND LOOP.
11704 056674  004737  027256              JSR     PC,CHKBMP       ;CHECK IF CHARACTER IS A BMP CODE.
11705 056700  103446                      BCS     16$             ;GO REPORT ERROR AND ABORT TEST IF BMP FOUND.
11706                                     ;+
11707                                     ; Check for XOFF character.  If one is found, count it.
11708                                     ; Transmit a null character until the first 192 chars have been read.
11709                                     ;-
11710 056702  122702  000023          10$:    CMPB    #23,R2          ;CHECK IF THE RECEIVED CHARACTER WAS AN XOFF.
11711 056706  001001                      BNE     12$             ;BRANCH IF CHARACTER WAS NOT AN XOFF.
11712 056710  005204                       INC     R4              ;INCREMENT THE XOFF CHAR FOUND COUNTER.
11713
11714 056712  005700                  12$:    TST     R0              ;CHECK READ COUNT, TO SEE IF A CHAR CAN BE TX.
11715 056714  001350                      BNE     6$              ;BRANCH IF 3 CHARS NAVE NOT YET BEEN READ.
11716 056716  005705                       TST     R5              ;CHECK THE TRANSMISSION ENABLED FLAG.
11717 056720  100744                      BMI     4$              ;SKIP TRANSMITTING A CHARACTER IF TX DISABLED.
11718 056722  012777  100000  123352        MOV     #100000,@TXCHA  ;TX A NULL CHARACTER.
11719 056730  010446                       MOV     R4,-(SP)        ;SAVE THE XOFF COUNT ON THE STACK.
11720                                   ;+
11721                                   ; Wait for the character to be received before continuing the test.
11722                                   ;-
11723 056732  005237  005466               INC     ERRNBR          ;SET ERROR NUMBER TO 5607.
11724 056736  012701  170012               MOV     #170012,R1      ;PASS TIME-OUT VALUE OF 10 MILLI SECS.
11725 056742  013702  002300               MOV     CSRA,R2         ;PASS THE ADDRESS OF THE CSR.
11726 056746  004737  037740              JSR     PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE, TX_ACTION SET.
11727 056752  103023                      BCC     50$             ;IF NO TX_ACTION WAS RECEIVED, ABORT THE TEST.
11728 056754  012704  000005               MOV     #5,R4           ;PASS DELAY OF 5 MILLI SECS.
11729 056760  004737  030370              JSR     PC,DELAY        ;WAIT FOR XOFF TO GET INTO THE FIFO.
11730 056764  012604                       MOV     (SP)+,R4        ;RESTORE THE XOFF COUNT.
11731 056766  000721                      BR      4$              ;GO RESET THE READ COUNT AND GET NEXT CHAR.
11732
11733                                   ;+
11734                                   ; Check if the correct number of XOFF's were found in the fifo
11735                                   ; Report error if count is incorrect.
11736                                   ;-
11737 056770  012737  012750  005466  14$:    MOV     #5608.,ERRNBR   ;SET ERROR NUMBER TO 5608.
11738 056776  020427  000077               CMP     R4,#63.         ;COMPARE THE EXPECTED AND ACTUAL XOFF COUNTS.
11739 057002  001411                      BEQ     60$             ;EXIT TEST IF SUCCESS.
11740 057004  012737  024644  005472        MOV     #ER0503,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
11741 057012  012701  021617               MOV     #EM5402,R1      ;PASS THE MESSAGE TO BE REPORTED.
11742                                     ;REPORT THE ERROR "FIFO BAD, ALARM SIGNAL DEFECTIVE".
11743 057016                          16$:    ERROR                   ;                >>>>> ERROR <<<<<.
      057016  104460                                                                    TRAP    C$ERROR
11744 057020  000402                      BR      60$             ;EXIT THIS TEST.
11745
11746 057022  004737  036106          50$:    JSR     PC,TSABRT       ;REPORT TEST ABORTED.  ERROR # INDICATES FAULT.
11747 057026  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
11748
11749 057032                              ENDTST
      057032                                                                    L10074:
      057032  104401                                                                    TRAP    C$ETST
```

```
                                .SBTTL  HARDWARE TEST           - FIHAVL -
                                ;+*****************************************************************************
                                ;*                  - FIFO HALF LEVEL ACTIVE/INACTIVE TEST -
                                ;*
                                ;*      This test checks that the DUT's fifo half level alarm system
                                ;*      becomes active and inactive at the correct levels.
                                ;*      Any BMP code found will  nvalidate the test and cause it to be aborted.
                                ;*      However the BMP code will be placed on the BMP code queue, to be
                                ;*      reported later.
                                ;*      The characters are transmitted on the first available active line, in
                                ;*      internal loopback mode.
                                ;*
                                ; -*****************************************************************************

057034                                  BGNTST
057034                                                                          T34::
000042                           TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
057034  012737  000042  002364          MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (57)
057042  012737  177777  002362          MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
057050  012737  000001  005464          MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
057056  012737  013105  005466          MOV     #5701.,ERRNBR   ;SET ERROR NUMBER TO 5701.
057064  012737  021763  005470          MOV     #EM5701,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
057072  012737  024644  005472          MOV     #ERO503,ERRBLK  ;SELECT THE ERROR REPORTING ROUTINE.
                                ;+
                                ; Reset the DUT to a known state, remove the status codes from the fifo.
                                ;  Clear TX and RX interrupt enable bits in the CSR.
                                ; This subroutine reports error >>>>> 5701 <<<<<.
                                ;-
057100  004737  030172                  JSR     PC,CLNRST       ;RESET THE DHV11 M, REPORT ANY ERRORS FOUND.
057104  103402                          BCS     2$              ;SKIP EXITING TEST A SUCCESSFUL RESET.
057106  000137  057472                  JMP     60$             ;EXIT THIS TEST.
057112                          2$:
                                ;+
                                ; Find an act've line on which to perform the test.
                                ;-
057112  004737  030772                  JSR     PC,FINACT       ;FIND AN ACTIVE LINE.
057116  103165                          BCC     60$             ;EXIT IF NO ACTIVE LINES AVAILABLE.
                                ;+
                                ; Initialize the 256 byte data pattern.
                                ;  Ensure the data pattern is free from XON's or XOFF's to prevent errors.
                                ;  Note: the first two characters and the last two characters w ll be the same.
                                ;
057120  004737  031372                  JSR     PC,INDTPX       ;INITIALISE THE DATA PATTERN.
                                ;+
                                ; Fill the fifo by transmitting 225 chars (ie 225 + 31 XOFF's).
                                ; Transmit data pattern us ng DMA, on a single channel
                                ; at 38.4k baud, 8 bits per character, odd parity, 2 stop bits.
                                ;-
                                    ;+
                                    ; Set internal loopback, enable IAUTO and receiver on the selected line
                                    ; Transmit the 225 characters on the first available active line.
                                    ;
057124  005237  005466                  INC     ERRNBR          ;SET ERROR NUMBER TO 5702.
057130  004737  035672                  JSR     PC,SETPAR       ;SET UP PARAMETERS FOR TRANSMISSION.
057134  012700  000341                  MOV     #225.,R0        ;PASS LENGTH OF DATA PATTERN.
057140  004737  036220                  JSR     PC,TXDATP       ;TRANSMIT DATA PATTERN.
057144  103150                          BCC     50$             ;EXIT IF ERROR FOUND DURING TX.
```

```
11807 057146  010105                        MOV     R1,R5           ;COPY THE LINE NUMBER.
11808                                     ;+
11809                                     ; Wait for DMA to complete, then wait for the last character to arrive in
11810                                     ; the fifo.
11811                                     ;-
11812 057150  005237  005466                 INC     ERRNBR          ;SET ERROR NUMBER TO 5703.
11813 057154  004737  040014                JSR     PC,WAITTX       ;WAIT FOR TRANSMISSION TO COMPLETE.
11814 057160  103142                        BCC     50$             ;GO REPORT ERROR IF TX FAILED TO COMPLETE.
11815                                   ;+
11816                                   ; Read the first 130 characters from the fifo  if any XON's are found
11817                                   ; report the error. If any BMP codes are found then save them on the queue
11818                                   ; and abort the test.
11819                                   ;-
11820 057162  005237  005466                 INC     ERRNBR          ;SET ERROR NUMBER TO 5704.
11821 057166  012700  000202                 MOV     #130.,R0        ;PASS THE NUMBER OF CHARS TO READ.
11822 057172  004737  034056                JSR     PC,READBX       ;READ THE FIRST 130 CHARS FROM THE FIFO.
11823 057176  103133                        BCC     50$             ;GO REPORT ERROR IF BMP CODE FOUND.
11824 057200  005237  005466                 INC     ERRNBR          ;SET ERROR NUMBER TO 5705.
11825 057204  005701                         TST     R1              ;CHECK IF AN XON WAS FOUND.
11826 057206  001125                        BNE     40$             ;GO REPORT ERROR IF AN XON WAS FOUND.
11827
11828                                     ;+
11829                                     ;  Transmit a null character.
11830                                     ;-
11831 057210  010577  123064                 MOV     R5,@CSRA        ;SELECT THE LINE READY FOR TRANSMISSION.
11832 057214  012777  100000  123060         MOV     #100000,@TXCHA  ;TRANSMIT A NULL CHARACTER.
11833 057222  005237  005466                 INC     ERRNBR          ;SET ERROR NUMBER TO 5706.
11834 057226  004737  040014                JSR     PC,WAITTX       ;WAIT FOR TX TO COMPLETE.
11835 057232  103115                        BCC     50$             ;GO REPORT ERROR IF TX DID NOT COMPLETE.
11836                                   ;+
11837                                   ; Read three characters, to cause the XON to be generated.
11838                                   ;-
11839 057234  005237  005466                 INC     ERRNBR          ;SET ERROR NUMBER TO 5707.
11840 057240  012700  000003                 MOV     #3,R0           ;SET THE READ COUNT TO 3.
11841 057244  004737  034056                JSR     PC,READBX       ;READ 3 CHARACTERS FROM THE FIFO.
11842 057250  103106                        BCC     50$             ;GO REPORT ERROR IF FIFO EMPTY.
11843 057252  005237  005466                 INC     ERRNBR          ;SET ERROR NUMBER TO 5708.
11844 057256  005701                         TST     R1              ;CHECK IF AN XON WAS FOUND.
11845 057260  001100                        BNE     40$             ;GO REPORT ERROR IF AN XON WAS FOUND.
11846                                   ;+
11847                                   ; Transmit 62 characters to bracket the XON and fill the fifo with 191 chars.
11848                                   ;-
11849 057262  012700  000076                 MOV     #62.,R0         ;PASS LENGTH OF DATA PATTERN.
11850 057266  010501                         MOV     R5,R1           ;PASS THE LINE NUMBER.
11851 057270  005237  005466                 INC     ERRNBR          ;SET ERROR NUMBER TO 5709.
11852 057274  004737  036220                JSR     PC,TXDATP       ;TRANSMIT DATA PATTERN.
11853 057300  103072                        BCC     50$             ;EXIT IF ERROR FOUND DURING TX.
11854
11855                                     ;+
11856                                     ; Wait for DMA to complete, then wait for the last character to arrive in
11857                                     ; the fifo.
11858                                     ;-
11859 057302  005237  005466                 INC     ERRNBR          ;SET ERROR NUMBER TO 5710.
11860 057306  004737  040014                JSR     PC,WAITTX       ;WAIT FOR TX TO COMPLETE
11861 057312  103065                        BCC     50$             ;GO REPORT ERROR IF TX FAILED TO COMPLETE.
11862                                   ;+
11863                                   ; Read the first 126 characters.
```

```
11864                                   ; Read the next 4 characters and check if they are in the following order
11865                                   ; NULL, XOFF, XON, NULL.
11866                                   :-
11867 057314  005237  005466                    INC     ERRNBR          ;SET ERROR NUMBER TO 5711.
11868 057320  012700  000176                    MOV     #126.,R0        ;SET UP READ COUNTER.
11869 057324  004737  034056                   JSR     PC,READBX       ;READ THE FIRST 126 CHARS.
11870 057330  103056                           BCC     50$             ;GO REPORT THE ERROR IF FIFO EMPTY.
11871 057332  005237  005466                    INC     ERRNBR          ;SET ERROR NUMBER TO 5712.
11872 057336  005701                           TST     R1              ;CHECK IF AN XON WAS FOUND.
11873 057340  001050                           BNE     40$             ;GO REPORT ERROR IF AN XON WAS FOUND.
11874 057342  005237  005466                    INC     ERRNBR          ;SET ERROR NUMBER TO 5713.
11875 057346  012701  021617                    MOV     #EM5402,R1      ;PASS THE MESSAGE TO BE REPORTED.
11876 057352  013703  002302                    MOV     RBUFA,R3        ;GET THE RECEIVER BUFFER ADDRESS.
11877 057356  011302                           MOV     (R3),R2         ;READ THE NULL CHARACTER FROM THE FIFO.
11878 057360  120227  000000                    CMPB    R2,#000         ;CHECK IF IT IS A NULL CHARACTER.
11879 057364  001036                           BNE     40$             ;GO REPORT THE ERROR IF NOT THE SAME.
11880 057366  005237  005466                    INC     ERRNBR          ;SET ERROR NUMBER TO 5714.
11881 057372  011302                           MOV     (R3),R2         ;READ THE XOFF FROM THE FIFO.
11882 057374  120227  000023                    CMPB    R2,#23          ;CHECK IF THE READ CHAR IS AN XOFF.
11883 057400  001030                           BNE     40$             ;GO REPORT THE ERROR IF NOT THE SAME.
11884 057402  011302                           MOV     (R3),R2         ;READ THE XON FROM THE FIFO.
11885 057404  005237  005466                    INC     ERRNBR          ;SET ERROR NUMBER TO 5715.
11886 057410  120227  000021                    CMPB    R2,#21          ;CHECK IF THE READ CHARACTER IS AN XON.
11887 057414  001022                           BNE     40$             ;GO REPORT THE ERROR IF NOT THE SAME.
11888 057416  005237  005466                    INC     ERRNBR          ;SET ERROR NUMBER TO 5716.
11889 057422  011302                           MOV     (R3),R2         ;READ THE NULL CHARACTER FROM THE FIFO.
11890 057424  120227  000000                    CMPB    R2,#000         ;CHECK IF IT IS A NULL CHARACTER.
11891 057430  001014                           BNE     40$             ;GO REPORT THE ERROR IF NOT THE SAME.
11892
11893                                   ;+
11894                                   ; Read the remaining characters from the fifo.
11895                                   ;-
11896 057432  012700  000075            6$:      MOV     #61.,R0         ;SET UP READ COUNTER.
11897 057436  005237  005466                     INC     ERRNBR          ;SET ERROR NUMBER TO 5717.
11898 057442  004737  034056                    JSR     PC,READBX       ;READ THE FIRST 61 CHARS.
11899 057446  103007                           BCC     50$             ;GO REPORT THE ERROR IF FIFO EMPTY.
11900 057450  005237  005466                    INC     ERRNBR          ;SET ERROR NUMBER TO 5718.
11901 057454  005701                           TST     R1              ;CHECK IF AN XON WAS FOUND.
11902 057456  001001                           BNE     40$             ;GO REPORT ERROR IF AN XON WAS FOUND.
11903 057460  000404                            BR     60$             ;EXIT THE TEST.
11904 057462                            40$:    ERROR                   ;                >>>>> ERROR <<<<<
      057462  104460                                                                              TRAP    C$ERROR
11905 057464  000402                           BR      60$             ;EXIT THE TEST.
11906
11907 057466  004737  036106            50$:    JSR     PC,TSABRT       ;REPORT TEST ABORTED.  ERROR # INDICATES FAULT.
11908 057472  005037  002362            60$:     CLR    CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
11909
11910 057476                                    ENDTST
      057476                                                                          L10075.
      057476  104401                                                                      TRAP    C$ETST
```

```
11912                                   .SBTTL  HARDWARE TEST           - BREAKB -
11913                                   ;+*****************************************************************************
11914                                   ;*                      - BREAK generation test -
11915                                   ;*      This test verifies that all serial transmit lines can generate a break
11916                                   ;*      by setting the brk bit in the associated LNCTRL register.
11917                                   ;*      Use of the internal loopback feature of the DUARTS is made to minimise
11918                                   ;*      any external effects caused on the serial lines by this test.
11919                                   ;*      Framing error detection is used to indicate the presence of a break,
11920                                   ;*      by setting the appropriate bit in the RBUF register.
11921                                   ;- *****************************************************************************
11922
11923 057500                                   BGNTST
     057500                                                                      T35::
11924
11925 057500  012737  177777  002362            MOV     #1,CTRLCF       ;INDICATE THAT WE ARE IN A TEST.
11926         000043                            TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
11927 057506  012737  000043  002364            MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (64)
11928 057514  012737  000001  005464            MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
11929 057522  012737  014401  005466            MOV     #6401.,ERRNBR   ;SET THE FIRST ERROR NUMBER IN ERROR TABLE.
11930 057530  012737  022031  005470            MOV     #EM6401,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERRTBL.
11931                                   ;+
11932                                   ; Reset the DUT to a known state. remove the status codes from the fifo.
11933                                   ;  Clear TX and RX interrupt enable bits in the CSR.
11934                                   ; This subroutine reports error >>>>> 6401 <<<<<.
11935                                   ;-
11936 057536  004737  030172                    JSR     PC,CLNRST       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
11937 057542  103165                            BCC     60$             ;EXIT TEST IF FATAL ERROR FOUND.
11938                                   ;+
11939                                   ; Set up Device Under Test (DUT) to:
11940                                   ;    Disable transmission and reception interrupts.
11941                                   ;    Delay for 10 milli-seconds to allow time to clear any breaks.
11942                                   ;-
11943 057544  004737  036542                    JSR     PC,TXIE0        ;DISABLE TRANSMISSION INTERRUPTS.
11944 057550  004737  035546                    JSR     PC,RXIE0        ;DISABLE RECEPTION INTERRUPTS.
11945 057554  012705  000377                    MOV     #MAPLNS,R5      ;PASS ACTIVE LINE BIT MAP.
11946 057560  012700  000200                    MOV     #200,R0         ;PASS INTERNAL LOOPBACK MODE.
11947 057564  004737  040250                    JSR     PC,WTWLNC       ;SELECT INTERNAL LOOPBACK,DISABLE DMA.
11948 057570  012704  000012                    MOV     #10.,R4         ;PASS DELAY TIME OF 10 MILLI SECONDS.
11949 057574  004737  030370                    JSR     PC,DELAY        ;DELAY TO ALLOW ANY BREAKS TO BE CLEARED.
11950                                   ;+
11951                                   ; Set up transmission and reception parameters for all lines.
11952                                   ; 9600 baud,8 char,1 stopbit,no parity.
11953                                   ;
11954 057600  012700  156430                    MOV     #156430,R0      ;SET UP BAUD RATE,ETC.
11955 057604  004737  040324                    JSR     PC,WTWLPR       ;SET COMMUNICATION PARAMETERS ON ALL LINES.
11956                                   ;+
11957                                   ; Enable transmitters on all active lines.
11958                                   ;
11959 057610  013705  002272                    MOV     ACTLNS,R5       ;PASS ACTIVE LINE BIT MAP.
11960 057614  004737  036446                    JSR     PC,TXENB!       ;ENABLE TRANSMISSIONS ON ALL LINES.
11961                                   ;+
11962                                   ; Purge the FIFO of any unwanted characters.
11963                                   ; This routine reports errors with numbers >>>>> 6402 thru 6404 <<<<<.
11964                                   ;
11965 057620  005237  005466                    INC     ERRNBR          ;SET ERROR NUMBER TO 6402.
11966 057624  004737  033004                    JSR     PC,PUFIFR       ;PURGE FIFO.
11967 057630  103132                            BCC     60$             ;ABORT TEST IF FIFO WILL NOT CLEAR.
```

```
11968                                   ;+
11969                                   ; Verify break generation on individual lines.
11970                                   ;  Clear breaks on all lines.
11971                                   ;  Delay for 10 milli-seconds to allow time for any breaks to be cleared.
11972                                   ;  Select line,set break bit in LNCTRL register.
11973                                   ;  Test for a character in the FIFO with frame error.
11974                                   ;-
11975 057632  005002                  2$:     CLR     R2              ;CLEAR LINE COUNTER.
11976 057634  012703  000001                  MOV     #1,R3           ;SET UP ACTIVE LINE BIT MASK.
11977 057640  030337  002272          4$:     BIT     R3,ACTLNS       ;CHECK IF THIS LINE IS ACTIVE.
11978 057644  001434                          BEQ     8$              ;GO SELECT NEXT LINE IF THIS ONE IS INACTIVE.
11979 057646  012700  000200                  MOV     #200,R0         ;SET UP PARAMETER TO CLEAR BREAK BITS.
11980 057652  004737  040250                  JSR     PC,WTWLNC       ;CLEAR BREAK BIT,RESELECT INTERNAL LOOPBACK.
11981 057656  012704  000012                  MOV     #10.,R4         ;PASS DELAY TIME OF 10 MILLI SECONDS.
11982 057662  004737  030370                  JSR     PC,DELAY        ;DELAY TO ALLOW BREAKS TO BE CLEARED.
11983                                   ;+
11984                                   ; Set break bit on selected line.
11985                                   ;  Set up parameters to test for the frame error bit set in RBUF.
11986                                   ;  Time-out = 5 milli seconds.
11987                                   ;  Call routine to check for condition found.
11988                                   ;
11989 057666  010305                  6$:     MOV     R3,R5           ;COPY ACTIVE LINE BIT MASK.
11990 057670  012700  000214                  MOV     #214,R0         ;SET BREAK,RESELECT LOOPBACK,ENABLE RECEPTION.
11991 057674  004737  040250                  JSR     PC,WTWLNC       ;SET BREAK ON SELECTED LINE.
11992                                   ;+
11993                                   ; Delay for 5 ms to allow time for break to be generated and received.
11994                                   ; Verify reception of a character with frame error bit set.
11995                                   ;
11996 057700  012704  000005                  MOV     #5.,R4          ;SET DELAY VALUE TO 5 MILLI SECS.
11997 057704  004737  030370                  JSR     PC,DELAY        ;ALLOW TIME FOR CHARACTER RECEPTION.
11998 057710  017700  122366                  MOV     @RBUFA,R0       ;GET CHARACTER FROM RBUF REGISTER.
11999 057714  032700  020000                  BIT     #BIT13,R0       ;CHECK FOR FRAME ERROR BIT.
12000 057720  001006                          BNE     8$              ;SKIP ERROR REPORT IF SET.
12001 057722  012701  022060                  MOV     #EM6402,R1      ;SELECT MESSAGE TO BE PRINTED.
12002                                   ;REPORT ERROR"BREAK NOT RECEIVED ON LINE #nn"
12003 057726                                    ERRDF   6405,EM6401,ER6401 ;           >>>>> ERROR #6405 <<<<<.
      057726  104455                                                                    TRAP    C$ERDF
      057730  014405                                                                    .WORD   6405
      057732  022031                                                                    .WORD   EM6401
      057734  025204                                                                    .WORD   ER6401
12004 057736  006303                  8$:     ASL     R3              ;SHIFT BIT MASK FOR NEXT LINE.
12005 057740  005202                          INC     R2              ;NEXT LINE
12006 057742  020227  000010                  CMP     R2,#NUMLNS      ;CHECK FOR MAX LINE COUNT.
12007 057746  001334                          BNE     4$              ;IF <>,LOOP TO CHECK NEXT LINE
12008                                   ;+
12009                                   ; Verify break generation on all lines simultaneously.
12010                                   ;  Clear breaks on all lines.
12011                                   ;  Delay for 10 milli-seconds to allow time for any breaks to be cleared
12012                                   ;  Purge the FIFO.
12013                                   ;  Set break bit in LNCTRL registers on all active lines.
12014                                   ;  Test for characters in the FIFO with frame error.
12015                                   ;
12016 057750  012705  000377                  MOV     #MAPLNS,R5      ;SET UP LINE TO CLEAR BREAKS ON.
12017 057754  012700  000200                  MOV     #200,R0         ;SET UP PARAMETER TO CLEAR BREAK BITS.
12018 057760  004737  040250                  JSR     PC,WTWLNC       ;CLEAR BREAK BIT,RESELECT INTERNAL LOOPBACK.
12019 057764  012704  000012                  MOV     #10.,R4         ;PASS DELAY TIME OF 10 MILLI SECONDS.
12020 057770  004737  030370                  JSR     PC,DELAY        ;DELAY TO ALLOW BREAKS TO BE CLEARED.
```

```
12021                                   ;*
12022                                   ; Purge the FIFO of unwanted characters.
12023                                   ;
12024 057774  004737  032722                  JSR     PC,PUFIFO       ;PURGE FIFO.
12025 060000  103044                          BCC     50$             ;GO REPORT ERROR IF FAILED TO CLEAN_OUT FIFO.
12026                                 ;*
12027                                 ; Set up parameters for setting the break bit on all active lines.
12028                                 ; Then call routine to do it.
12029                                 ;
12030 060002  013705  002272          10$:    MOV     ACTLNS,R5       ;SET UP ACTIVE LINE BIT MASK.
12031 060006  012700  000214                  MOV     #214,R0         ;SET BREAK,RESELECT LOOPBACK,ENABLE RECEPTION.
12032 060012  004737  040250                  JSR     PC,WTWLNC       ;SET BREAK ON SELECTED LINES.
12033                                   ;*
12034                                   ;  Delay for 10 milli seconds,to allow time for reception.
12035                                   ;  Test for characters in fifo with frame error bit set.
12036                                   ;
12037 060016  012704  000012                  MOV     #10.,R4         ;SET DELAY VALUE TO 10 MILLI SECS.
12038 060022  004737  030370                  JSR     PC,DELAY        ;ALLOW TIME FOR CHARACTER RECEPTION.
12039 060026  010502                          MOV     R5,R2           ;COPY ACTIVE LINE BIT MAP.
12040 060030  004737  031674                  JSR     PC,MAPCNT       ;COUNT THE NUMBER OF LINES AVAILABLE.
12041 060034  017701  122242          12$:    MOV     @RBUFA,R1       ;GET CHARACTER FROM RBUF REGISTER.
12042 060040  100011                        BPL     14$             ;BRANCH IF DATA_VALID NOT SET.
12043 060042  032701  020000                  BIT     #BIT13,R1       ;CHECK FOR FRAME ERROR BIT.
12044 060046  001406                          BEQ     14$             ;DO NOT CLR FLG FOR THIS LINE IF FRAME BIT CLR.
12045 060050  000301                          SWAB    R1              ;GET LINE NUMBER IN LOW BYTE.
12046 060052  042701  177400                  BIC     #177400,R1      ;CLEAR EVERTHING BUT THE LINE NUMBER.
12047 060056  004737  031646                  JSR     PC,LINBIT       ;CALC BIT MASK FROM LINE NUMBER.
12048 060062  040005                          BIC     R0,R5           ;CLEAR LINE FLAG.
12049 060064  005302                  14$:    DEC     R2              ;DECREMENT THE LINE NUMBER COUNTER.
12050 060066  001362                        BNE     12$             ;LOOP TO GET THE NEXT CHARACTER.
12051 060070  005705                          TST     R5              ;CHECK IF ANY BREAKS NOT RECEIVED.
12052 060072  001411                        BEQ     60$             ;EXIT TEST IF ALL CLE ?.
12053 060074  012701  022060                  MOV     #EM6402,R1      ;SELECT MESSAGE TO BE PRINTED.
12054                                 ;REPORT ERROR"BREAK NOT RECEIVED ON LINE #nn".
12055 060100                                  ERRDF   6406,EM6401,ER6401;             >>>>> ERROR #6407 <<<<<.
      060100  104455                                                                          TRAP    C$ERDF
      060102  014406                                                                          .WORD   6406
      060104  022031                                                                          .WORD   EM6401
      060106  025204                                                                          .WORD   ER6401
12056 060110  000402                          BR      60$             ;EXIT THE TEST.
12057
12058 060112  004737  036106          50$:    JSR     PC,TSABRT       ;ABORT THE TEST.
12059 060116  005037  002362          60$:    CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
12060 060122                          ENDTST
      060122                                                                        L10076:
      060122  104401                                                                         TRAP    C$ETST
```

```
12062                                   .SBTTL  HARDWARE TEST           - NORERR -
12063                                   ;**************************************************************************
12064                                   ;*                      - NO OVERRUN ERROR TEST -
12065                                   ;*
12066                                   ;*      This test verifies that the DUT will not report data overrun
12067                                   ;*      errors when they do not occurr.
12068                                   ;*      This test puts 256 characters in the DUT FIFO plus 4 in each active
12069                                   ;*      UART and verifies that no overrun errors are reported.
12070                                   ;*      Any BMP code found will invalidate the test and cause it to be aborted.
12071                                   ;*      However the BMP code will be placed on the BMP code queue, to be
12072                                   ;*      reported later.
12073                                   ;*
12074                                   ;--**************************************************************************
12075
12076 060124                                       BGNTST
     060124                                                                    T36::
12077           000044                           TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
12078 060124   012737  000044  002364            MOV     @TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (66)
12079 060132   012737  177777  002362            MOV     @ 1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
12080 060140   012737  000001  005464            MOV     @1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
12081 060146   012737  014711  005466            MOV     @6601.,ERRNBR   ;SET ERROR NUMBER TO 6601.
12082 060154   012737  022121  005470            MOV     @EM6601,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
12083                                   ;+
12084                                   ; Reset the DUT to a known state, remove the status codes from the fifo.
12085                                   ;  Clear TX and RX interrupt enable bits in the CSR.
12086                                   ; This subroutine reports error >>>>> 6601 <<<<<.
12087                                   ;-
12088 060162   004737  030172                    JSR     PC,CLNRST       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
12089 060166   103402                            BCS     .+6             ;SKIP EXIT OF TEST IF NO FATAL ERROR FOUND.
12090 060170   000137  060616                    JMP     60$             ;EXIT THE TEST, FATAL ERROR WAS FOUND.
12091                                   ;+
12092                                   ; Find an active line on which to perform the test.
12093                                   ; Initialize the 256 byte data pattern.
12094                                   ;
12095 060174   004737  030772                    JSR     PC,FINACT       ;FIND AN ACTIVE LINE.
12096 060200   103402                            BCS     .+6             ;SKIP EXIT OF TEST IF NO FATAL ERROR FOUND.
12097 060202   000137  060616                    JMP     60$             ;EXIT THE TEST, FATAL ERROR WAS FOUND.
12098 060206   004737  031342                    JSR     PC,INDATP       ;INITIALISE DATA PATTERN.
12099                                   ;+
12100                                   ; Transmit a 265 character data pattern using DMA, on a single channel
12101                                   ; at 38.4k baud, 8 bits per character, odd parity, 2 stop bits.
12102                                   ;-
12103                                       ;+
12104                                       ; Set internal loopback on the selected line.
12105                                       ; Transmit the data pattern on the first available active line.
12106                                       ;-
12107 060212   005237  005466                    INC     ERRNBR          ;SET THE ERROR REPORT NUMBER TO 6602.
12108 060216   012700  000204                    MOV     @204,R0         ;PASS PARAMETER FOR INTERNAL LOPBCK,ENABLE RX.
12109 060222   004737  040250                    JSR     PC,WTWLNC       ;INITILAISE THE LINE CONTROL REGISTER.
12110 060226   012700  177670                    MOV     @177670,R0      ;PASS THE LPR CONTENTS.
12111 060232   004737  040324                    JSR     PC,WTWLPR       ;SET THE LPR CONTENTS TO 38.4K BAUD.
12112 060236   012704  000012                    MOV     @10.,R4         ;PASS DELAY TIME OF 10 MILLI SECONDS.
12113 060242   004737  030370                    JSR     PC,DELAY        ;WAIT FOR LNCTRL AND LPR REGS TO BE UPDATED.
12114 060246   012702  004012                    MOV     @BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
12115 060252   012703  000400                    MOV     @BUFMID-BUFBAS,R3 ;PASS THE LENGTH OF THE DATA PATTERN.
12116 060256   004737  030624                    JSR     PC,DODMA        ;TRANSMIT THE DATA PATTERN.
12117 060262   103153                            BCC     50$             ;EXIT IF ERROR FOUND DURING DMA TX.
```

```
12118                                   ;+
12119                                   ; Wait for DMA to complete, then wait for the last character to arrive in
12120                                   ; the fifo.
12121                                   ;-
12122 060264  005237  005466                  INC     ERRNBR          ;SET ERROR NUMBER TO 6603.
12123 060270  012701  170536                  MOV     #170536,R1      ;PASS TIME-OUT VALUE OF 350 MILLI SECS.
12124 060274  013702  002300                  MOV     CSRA,R2         ;PASS THE ADDRESS OF THE CSR.
12125 060300  004737  037740                  JSR     PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE, TX_ACTION SET.
12126 060304  103142                          BCC     50$             ;ABORT THE TEST IF TIME-OUT ON DMA COMPLETION.
12127 060306  012704  000005                  MOV     #5,R4           ;PASS DELAY OF 5 MILLI SECS.
12128 060312  004737  030370                  JSR     PC,DELAY        ;WAIT FOR LAST CHAR TO ARRIVE IN THE FIFO.
12129
12130                                   ;+
12131                                   ; Transmit 4 characters on each active line.
12132                                   ;-
12133 060316  013705  002272                  MOV     ACTLNS,R5       ;ALTER PARAMETERS FOR ALL ACTIVE LINES.
12134 060322  012700  000204                  MOV     #204,R0         ;PASS PARAMETER FOR INTERNAL LOPBCK,ENABLE RX.
12135 060326  004737  040250                  JSR     PC,WTWLNC       ;INITILAISE THE LINE CONTROL REGISTER.
12136 060332  012700  177670                  MOV     #177670,R0      ;PASS THE LPR CONTENTS.
12137 060336  004737  040324                  JSR     PC,WTWLPR       ;SET THE LPR CONTENTS TO 38.4K BAUD.
12138 060342  012704  000012                  MOV     #10.,R4         ;PASS DELAY TIME OF 10 MILLI SECONDS.
12139 060346  004737  030370                  JSR     PC,DELAY        ;WAIT FOR LNCTRL AND LPR REGS TO BE UPDATED.
12140
12141 060352  012702  004012                  MOV     #BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
12142 060356  012703  000004                  MOV     #4,R3           ;PASS THE LENGTH OF THE DATA PATTERN.
12143 060362  005001                          CLR     R1              ;CLEAR THE LINE COUNTER.
12144 060364  005237  005466                  INC     ERRNBR          ;SET ERROR NUMBER TO 6604.
12145 060370  010100                  2$:     MOV     R1,R0
12146 060372  006300                          ASL     R0              ;CALCULATE THE LINE OFFSET FROM THE LINE #.
12147 060374  036037  002534  002272          BIT     BITTBL(R0),ACTLNS  ;TEST FOR THIS LINE BEING ACTIVE.
12148 060402  001403                          BEQ     4$              ;SKIP THE TX ON THIS LINE IF IT IS NOT ACTIVE.
12149 060404  004737  030624                  JSR     PC,DODMA        ;TRANSMIT THE 5 CHAR DATA PATTERN.
12150 060410  103100                          BCC     50$             ;ABORT IF ERROR FOUND DURING DMA TX.
12151 060412  005201                  4$:     INC     R1              ;INCREMENT THE LINE COUNTER.
12152 060414  020127  000010                  CMP     R1,#NUMLNS      ;TEST FOR ALL POSSIBLE LINES HANDLED
12153 060420  002763                          BLT     2$              ;LOOP IF NOT ALL LINES HANDLED.
12154
12155 060422  005237  005466                  INC     ERRNBR          ;SET ERROR NUMBER TO 6605.
12156 060426  012701  170040                  MOV     #170040,R1      ;PASS TIME-OUT VALUE OF 32 MILLI SECS.
12157 060432  013702  002300                  MOV     CSRA,R2         ;PASS THE ADDRESS OF THE CSR.
12158 060436  004737  037740                  JSR     PC,WAIBIS       ;WAIT FOR A DMA TO COMPLETE, TX_ACTION SET.
12159 060442  103063                          BCC     50$             ;ABORT THE TEST IF TIME-OUT ON DMA COMPLETION.
12160 060444  012704  000005                  MOV     #5,R4           ;PASS DELAY OF 5 MILLI SECS.
12161 060450  004737  030370                  JSR     PC,DELAY        ;WAIT FOR LAST CHAR TO ARRIVE IN THE FIFO.
12162                                   ;+
12163                                   ; Read the FIFO checking for overrun errors.  Report errors if found.
12164                                   ; Abort the test if a BMP code was found in the fifo.
12165                                   ;-
12166 060454  013702  002272                  MOV     ACTLNS,R2
12167 060460  004737  031674                  JSR     PC,MAPCNT       ;GET THE NUMBER OF ACTIVE LINES.
12168 060464  006302                          ASL     R2
12169 060466  006302                          ASL     R2              ;MULTIPLY NUMBER OF ACTIVE LINES BY 4.
12170 060470  012705  000400                  MOV     #256.,R5
12171 060474  060205                          ADD     R2,R5           ;CALCULATE NUMBER OF CHARACTERS TO RX.
12172 060476  005004                          CLR     R4              ;CLEAR THE CHARACTER COUNTER.
12173 060500  012737  014716  005466  6$:     MOV     #6606.,ERRNBR   ;SET UP ERROR NUMBER EACH TIME AROUND LOOP.
12174 060506  017702  121570                  MOV     @RBUFA,R2       ;READ A CHARACTER FROM THE FIFO.
```

```
12175 060512  100032                    BPL     10$             ;EXIT THE READ LOOP IF THE FIFO IS EMPTY.
12176                                 ;+
12177                                 ; Check if the read character is a BMP code.
12178                                 ;  If it is a BMP code save it on the queue to be reported later, and
12179                                 ;  abort the test.
12180                                 ;-
12181 060514  004737  027256          JSR     PC,CHKBMP       ;CHECK IF CHARACTER IS A BMP CODE.
12182 060520  103002                  BCC     8$              ;BRANCH IF NOT A BMP CODE.
12183 060522                          ERROR                   ;               >>>>> ERROR #6606 <<<<<.
      060522  104460                                                                  TRAP    C$ERROR
12184 060524  000434                  BR      60$             ;EXIT THIS TEST.
12185
12186 060526  005237  005466    8$:    INC     ERRNBR          ;SET ERROR NUMBER TO 6607.
12187 060532  005204                  INC     R4              ;COUNT THIS CHARACTER.
12188 060534  020405                  CMP     R4,R5           ;COMPARE # OF CHARS WITH MAX # OF CHARS.
12189 060536  003025                   BGT     50$             ;ABORT TEST IF TOO MANY VALID CHARS READ.
12190 060540  032702  040000          BIT     #BIT14,R2       ;TEST THE OVERRUN BIT OF THE READ CHAR.
12191 060544  001755                   BEQ     6$              ;LOOP TO READ THE NEXT CHAR IF NO ERROR.
12192 060546  005237  005466           INC     ERRNBR          ;SET ERROR NUMBER TO 6608.
12193 060552  012737  025302  005472   MOV     #ER7801,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
12194 060560  012701  022147           MOV     #EM6602,R1      ;PASS THE MESSAGE TO BE REPORTED.
12195 060564  010203                   MOV     R2,R3
12196 060566  000303                   SWAB    R3
12197 060570  042703  177760           BIC     #177760,R3      ;GET FAILING LINE NUMBER.
12198                                 ;REPORT "OVERRUN ERROR REPORTED WHEN NONE FORCED, ON LINE nn ..."
12199 060574                          ERROR                   ;               >>>>> ERROR  #6608 <<<<<.
      060574  104460                                                                  TRAP    C$ERROR
12200 060576  000740                  BR      6$              ;LOOP TO READ THE NEXT CHAR.
12201
12202 060600  012737  014721  005466  10$:    MOV     #6609.,ERRNBR   ;SET ERROR NUMBER TO 6609.
12203 060606  020405                   CMP     R4,R5           ;COMPARE NUMBER OF CHARS READ WITH EXPECTED.
12204 060610  001402                  BEQ     60$             ;EXIT TEST WITHOUT ABORT IF CORRECT # OF CHARS.
12205
12206 060612  004737  036106    50$:    JSR     PC,TSABRT       ;ABORT THE TEST, NON-RELATED TEST ERROR FOUND.
12207 060616  005037  002362    60$:     CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
12208 060622                          ENDTST
      060622                                                  L10077:
      060622  104401                                                  TRAP    C$ETST
```

```
12210                                   .SBTTL  HARDWARE TEST           - ORERR -
12211                                   ;+*********************************************************************************
12212                                   ;*                      - OVERRUN ERROR TEST -
12213                                   ;*
12214                                   ;*      This test verifies that the DUT will report data overrun errors when
12215                                   ;*      they occurr.
12216                                   ;*      This test puts 256 characters in the DUT FIFO plus 5 in each active
12217                                   ;*      UART and verifies that overrun errors are reported on all active lines.
12218                                   ;*      Any BMP code found will invalidate the test and cause it to be aborted.
12219                                   ;*      However the BMP code will be placed on the BMP code queue, to be
12220                                   ;*      reported later.
12221                                   ;*
12222                                   ;- *********************************************************************************
12223
12224 060624                                  BGNTST
     060624                                                                 T37::
12225          000045                    TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
12226 060624  012737  000045  002364    MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (67)
12227 060632  012737  177777  002362    MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
12228 060640  012737  000001  005464    MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
12229 060646  012737  015055  005466    MOV     #6701.,ERRNBR   ;SET ERROR NUMBER TO 6701.
12230 060654  012737  022221  005470    MOV     #EM6701,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
12231                                   ;+
12232                                   ; Reset the DUT to a known state, remove the status codes from the fifo.
12233                                   ;  Clear TX and RX interrupt enable bits in the CSR.
12234                                   ; This subroutine reports error >>>>> 6701 <<<<<.
12235                                   ;-
12236 060662  004737  030172                    JSR     PC,CLNRST       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
12237 060666  103402                    BCS     .+6             ;SKIP EXIT OF TEST IF NO FATAL ERROR FOUND.
12238 060670  000137  061544            JMP     60$             ;EXIT THE TEST, FATAL ERROR WAS FOUND.
12239                                   ;+
12240                                   ; Find an active line on which to perform the test.
12241                                   ; Initialize the 256 byte data pattern.
12242                                   ;-
12243 060674  004737  030772                    JSR     PC,FINACT       ;FIND AN ACTIVE LINE.
12244 060700  103402                    BCS     .+6             ;IF ACTIVE LINE IS FOUND, DON'T ABORT TEST.
12245 060702  000137  061544            JMP     60$             ;ABORT THE TEST, NO ACTIVE LINES WERE FOUND.
12246 060706  004737  031342            JSR     PC,INDATP       ;INITIALISE DATA PATTERN.
12247                                   ;+
12248                                   ; Transmit a 265 character data pattern using DMA, on a single channel
12249                                   ; at 38.4k baud, 8 bits per character, odd parity, 2 stop bits.
12250                                   ;
12251                                        ;+
12252                                        ; Set internal loopback on the selected line.
12253                                        ; Transmit the data pattern on the first available active line.
12254                                        ;
12255 060712  005237  005466                INC     ERRNBR          ;SET ERROR NUMBER TO 6702.
12256 060716  012700  000204                MOV     #204,R0         ;PASS PARAMETER FOR INTERNAL LOPBCK,ENABLE RX.
12257 060722  004737  040250               JSR     PC,WTWLNC       ;INITILAISE THE LINE CONTROL REGISTER.
12258 060726  012700  177670                MOV     #177670,R0      ;PASS THE LPR CONTENTS.
12259 060732  004737  040324               JSR     PC,WTWLPR       ;SET THE LPR CONTENTS TO 38.4K BAUD.
12260 060736  012704  000012                MOV     #10.,R4         ;PASS DELAY TIME OF 10 MILLI SECONDS.
12261 060742  004737  030370               JSR     PC,DELAY        ;WAIT FOR LNCTRL AND LPR REGS TO BE UPDATED.
12262 060746  012702  004012                MOV     #BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
12263 060752  012703  000400                MOV     #BUFMID-BUFBAS,R3 ;PASS THE LENGTH OF THE DATA PATTERN.
12264 060756  004737  030624               JSR     PC,DODMA        ;TRANSMIT THE DATA PATTERN.
12265 060762  103402                       BCS     .+6             ;IF NO ERROR FOUND DURING DMA TX, DON'T ABORT.
```

```
12266 060764  000137  061540                JMP     50$             ;ABORT TEST, ERROR FOUND DURING DMA TX.
12267                                     ;+
12268                                     ; Wait for DMA to complete, then wait for the last character to arrive in
12269                                     ; the fifo.
12270                                     ;-
12271 060770  005237  005466                INC     ERRNBR          ;SET ERROR NUMBER TO 6703.
12272 060774  012701  170536                MOV     #170536,R1      ;PASS TIME-OUT VALUE OF 350 MILLI SECS.
12273 061000  013702  002300                MOV     CSRA,R2         ;PASS THE ADDRESS OF THE CSR.
12274 061004  004737  037740                JSR     PC,WAIBIS       ;WAIT FOR DMA TO COMPLETE, TX_ACTION SET.
12275 061010  103402                       BCS     .+6             ;IF NO TIME-OUT ON DMA COMPLETION, DON'T ABORT.
12276 061012  000137  061540                JMP     50$             ;ABORT TEST, TIME-OUT ON DMA COMPLETION.
12277 061016  012704  000005                MOV     #5,R4           ;PASS DELAY OF 5 MILLI SECS.
12278 061022  004737  030370                JSR     PC,DELAY        ;WAIT FOR LAST CHAR TO ARRIVE IN THE FIFO.
12279                                     ;+
12280                                     ; Transmit 5 characters on each active line.
12281                                     ;-
12282 061026  013705  002272                MOV     ACTLNS,R5       ;ALTER PARAMETERS FOR ALL ACTIVE LINES.
12283 061032  012700  000204                MOV     #204,R0         ;PASS PARAMETER FOR INTERNAL LOPBCK,ENABLE RX.
12284 061036  004737  040250                JSR     PC,WTWLNC       ;INITILAISE THE LINE CONTROL REGISTER.
12285 061042  012700  177670                MOV     #177670,R0      ;PASS THE LPR CONTENTS.
12286 061046  004737  040324                JSR     PC,WTWLPR       ;SET THE LPR CONTENTS TO 38.4K BAUD.
12287 061052  012704  000012                MOV     #10.,R4         ;PASS DELAY TIME OF 10 MILLI SECONDS.
12288 061056  004737  030370                JSR     PC,DELAY        ;WAIT FOR LNCTRL AND LPR REGS TO BE UPDATED.
12289
12290 061062  012702  004012                MOV     #BUFBAS,R2      ;PASS THE START OF THE DATA PATTERN TO TX.
12291 061066  012703  000005                MOV     #5,R3           ;PASS THE LENGTH OF THE DATA PATTERN.
12292 061072  005001                       CLR     R1              ;CLEAR THE LINE COUNTER.
12293 061074  005237  005466                INC     ERRNBR          ;SET ERROR NUMBER TO 6704.
12294 061100  010100              2$:       MOV     R1,R0
12295 061102  006300                       ASL     R0              ;CALCULATE LINE OFFSET FROM THE LINE #.
12296 061104  036037  002534  002272        BIT     BITTBL(R0),ACTLNS  ;TEST FOR THIS LINE BEING ACTIVE.
12297 061112  001405                       BEQ     4$              ;SKIP THE TX ON THIS LINE IF IT IS NOT ACTIVE.
12298 061114  004737  030624                JSR     PC,DODMA        ;TRANSMIT THE 5 CHAR DATA PATTERN.
12299 061120  103402                       BCS     .+6             ;IF NO TIME-OUT ON DMA COMPLETION, DON'T ABORT.
12300 061122  000137  061540                JMP     50$             ;ABORT TEST, TIME-OUT ON DMA COMPLETION.
12301 061126  005201              4$:       INC     R1              ;INCREMENT THE LINE NUMBER COUNTER.
12302 061130  020127  000010                CMP     R1,#NUMLNS      ;TEST FOR ALL POSSIBLE LINES HANDLED
12303 061134  002761                       BLT     2$              ;LOOP IF NOT ALL LINES HANDLED.
12304
12305 061136  005237  005466                INC     ERRNBR          ;SET ERROR NUMBER TO 6705.
12306 061142  012701  170040                MOV     #170040,R1      ;PASS TIME OUT VALUE OF 32 MILLI SECS.
12307 061146  013702  002300                MOV     CSRA,R2         ;PASS THE ADDRESS OF THE CSR.
12308 061152  004737  037740                JSR     PC,WAIBIS       ;WAIT FOR A DMA TO COMPLETE, TX ACTION SET.
12309 061156  103170                       BCC     50$             ;ABORT THE TEST IF TIME-OUT ON DMA COMPLETION.
12310 061160  012704  000005                MOV     #5,R4           ;PASS DELAY OF 5 MILLI SECS.
12311 061164  004737  030370                JSR     PC,DELAY        ;WAIT FOR LAST CHAR TO ARRIVE IN THE FIFO.
12312                                     ;+
12313                                     ; Read 256 chars from the FIFO checking for BMP codes.
12314                                     ; Abort the test if a BMP code was found in the fifo.
12315                                     ;-
12316 061170  012704  000400                MOV     #256.,R4        ;SET UP THE CHARACTER COUNTER.
12317 061174  012737  015062  005466  6$:   MOV     #6706.,ERRNBR   ;SET UP ERROR NUMBER EACH TIME AROUND LOOP.
12318 061202  017702  121074                MOV     @RBUFA,R2       ;READ A CHARACTER FROM THE FIFO.
12319 061206  100154                       BPL     50$             ;ABORT THE TEST IF DATA.VALID IS CLEAR.
12320 061210  005237  005466                INC     ERRNBR          ;SET ERROR NUMBER TO 6707.
12321 061214  004737  027256                JSR     PC,CHKBMP       ;CHECK IF CHARACTER IS A BMP CODE.
12322 061220  103545                       BCS     24$             ;REPORT ERROR AND ABORT TEST IF A BMP CODE.
```

```
12323 061222  005304                          DEC     R4              ;COUNT THIS CHARACTER.
12324 061224  001363                          BNE     6$              ;LOOP IF NOT 256 CHARS READ FROM FIFO.
12325                                 ;+
12326                                 ; Read the remaining and verify 1 overrun plus 1 char from each line.
12327                                 ;-
12328 061226  005004                          CLR     R4              ;CLEAR THE OVERRUN ERROR FLAGS.
12329 061230  012700  003712                  MOV     #RXCNTB,R0
12330 061234  004737  030214                  JSR     PC,CLR16W       ;CLEAR RX CHAR COUNT TABLE.
12331 061240  012737  015064  005466  8$:     MOV     #6708.,ERRNBR   ;SET UP ERROR NUMBER EACH TIME AROUND LOOP.
12332 061246  017702  121030                  MOV     @RBUFA,R2       ;READ A CHARACTER FROM THE FIFO.
12333 061252  100047                          BPL     14$             ;GO ANALYZE THE RESULTS IF ALL CHARS READ.
12334 061254  004737  027256                  JSR     PC,CHKBMP       ;CHECK IF CHAR IS A BMP CODE.
12335 061260  103525                          BCS     24$             ;REPORT ERROR AND ABORT TEST IF A BMP CODE.
12336 061262  005237  005466                  INC     ERRNBR          ;SET ERROR NUMBER TO 6709.
12337 061266  010200                          MOV     R2,R0
12338 061270  000300                          SWAB    R0
12339 061272  042700  177760                  BIC     #177760,R0      ;CALCULATE THE LINE NUMBER OF THE CHAR.
12340 061276  006300                          ASL     R0              ;FORM WORD TABLE OFFSET FOR TABLE ACCESS.
12341 061300  042702  007400                  BIC     #7400,R2        ;REMOVE LINE NUMBER FROM THE READ CHAR.
12342 061304  036037  002534  002272          BIT     BITTBL(R0),ACTLNS       ;TEST FOR ACTIVE LINE.
12343 061312  001512                          BEQ     50$             ;ABORT TEST IF FOR INACTIVE LINE.
12344 061314  005237  005466                  INC     ERRNBR          ;SET ERROR NUMBER TO 6710.
12345 061320  005760  003712                  TST     RXCNTB(R0)      ;CHECK THE RX CHAR COUNTER FOR THIS LINE.
12346 061324  001006                          BNE     10$             ;IS THIS FIRST CHAR ON LINE?
12347 061326  020227  140000                  CMP     R2,#140000      ;YES, TEST FOR NULL CHAR WITH OVERRUN.
12348 061332  001414                          BEQ     12$             ;IS CHAR A NULL?
12349 061334  056004  002534                  BIS     BITTBL(R0),R4   ;NO, SET THE OVERRUN BIT ERROR FLAG FOR LINE.
12350 061340  000411                          BR      12$             ;GO COUNT THE CHAR AND CONTINUE.
12351 061342  026027  003712  000004  10$:     CMP     RXCNTB(R0),#4
12352 061350  002073                          BGE     50$             ;5TH CHAR ON THIS LINE?  YES, ABORT.
12353 061352  032702  040000                  BIT     #BIT14,R2       ;NO, CHECK OVERRUN BIT.
12354 061356  001402                          BEQ     12$             ;IS OVERRUN BIT CLEAR?  YES, GO COUNT CHAR.
12355 061360  056004  002534                  BIS     BITTBL(R0),R4   ;NO, SET THE OVERRUN BIT ERROR FLAG FOR LINE.
12356 061364  005260  003712          12$:     INC     RXCNTB(R0)      ;COUNT THIS CHARACTER.
12357 061370  000723                          BR      8$              ;LOOP UNTIL ALL CHARS ARE READ FROM FIFO.
12358                                 ;+
12359                                 ; Test for abort condit'ons.  Only none abort conditions are:
12360                                 ;    1) 2 chars RXed on a line and no overrun error bit failure detected.
12361                                 ;    2) 2 to 4 chars RXed on a line and an overrun bit failure detected.
12362                                 ;-
12363 061372  005001                  14$:     CLR     R1              ;INITIALIZE LINE LOOP, CLEAR LINE OFFSET.
12364 061374  012737  015067  005466  16$:     MOV     #6711.,ERRNBR   ;SET UP ERROR NUMBER EACH TIME AROUND LOOP.
12365 061402  036137  002534  002272          BIT     BITTBL(R1),ACTLNS
12366 061410  001415                          BEQ     18$             ;LINE ACTIVE?  NO, NEXT LINE.
12367 061412  026127  003712  000002          CMP     RXCNTB(R1),#2   ;YES.
12368 061420  002447                          BLT     50$             ;FEWER THAN 2 CHARS RXED?  YES, ABORT.
12369 061422  036104  002534                  BIT     BITTBL(R1),R4   ;NO.
12370 061426  001006                          BNE     18$             ;OVERRUN BIT ERROR FLAG SET?  YES, NEXT LINE.
12371 061430  005237  005466                  INC     ERRNBR          ;SET LINE NUMBER TO 6712.
12372 061434  026127  003712  000002          CMP     RXCNTB(R1),#2
12373 061442  001036                          BNE     50$             ;NOT 2 CHARS RXED?  YES, ABORT.  NO, NEXT LINE.
12374 061444  062701  000002  18$:     ADD     #2,R1           ;SET LINE OFFSET TO THE NEXT LINE.
12375 061450  020127  000020          CMP     R1,#NUMLNS*2
12376 061454  002747                          BLT     16$             ;ALL LINES DONE?  NO, LOOP.  YES, CONTINUE.
12377                                 ;+
12378                                 ; Check for overrun error bit failures, print error message  f found.
12379                                 ;
```

HARDWARE TEST - ORERR - SEQ 0308

```
12380 061456  012737  015071  005466          MOV     #6713.,ERRNBR   ;SET UP ERROR NUMBER.
12381 061464  005001                          CLR     R1              ;INITIALIZE LOOP.  CLEAR LINE OFFSET.
12382 061466  010102                  20$:     MOV     R1,R2           ;COPY THE LINE OFFSET.
12383 061470  036104  002534                   BIT     BITTBL(R1),R4   ;OVERRUN BIT FAILURE FLAGS ARE IN R4.
12384 061474  001411                          BEQ     22$             ;ERROR FLAG CLEAR?  YES, NEXT LINE.
12385 061476  010103                          MOV     R1,R3
12386 061500  006203                          ASR     R3              ;CALCULATE LINE NUMBER FROM LINE OFFSET.
12387 061502  012737  025302  005472          MOV     #ER7801,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
12388 061510  012701  022244                  MOV     #EM6702,R1      ;PASS THE MESSAGE TO BE REPORTED.
12389                                     ;REPORT "OVERRUN ERROR NOT REPORTED CORRECTLY WHEN FORCED, ON LINE nn ..."
12390 061514                              ERROR                   ;               >>>>> ERROR  #6713 <<<<<.
      061514  104460                                                                  TRAP    C$ERROR
12391 061516  010201                          MOV     R2,R1           ;RESTORE THE LINE OFFSET THAT WAS DESTROYED.
12392 061520  046104  002534          22$:     BIC     BITTBL(R1),R4   ;CLEAR THE LINE ERROR FLAG WE JUST HANDLED.
12393 061524  001407                          BEQ     60$             ;ALL FAILURE BITS HANDLED?  YES, EXIT TEST.
12394 061526  062701  000002                  ADD     #2,R1           ;NO, INCREMENT THE LINE OFFSET.
12395 061532  000755                          BR      20$             ;LOOP TO HANDLE THE NEXT LINE.
12396
12397 061534                          24$:    ;REPORT "BMP CODE FOUND IN FIFO, TEST INVAILDATED."
12398 061534                              ERROR                   ;               >>>>> ERROR <<<<<.
      061534  104460                                                                  TRAP    C$ERROR
12399 061536  000402                          BR      60$             ;EXIT THIS TEST.
12400
12401 061540  004737  036106          50$:    JSR     PC,TSABRT       ;ABORT THE TEST.  ERROR # INDICATES FAULT TYPE.
12402 061544  005037  002362          60$:     CLR    CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
12403
12404 061550                              ENDTST
      061550                                                      L10100:
      061550  104401                                                      TRAP    C$ETST
```

```
12406                                   .SBTTL  HARDWARE TEST                   - DMAADR
12407                                   ;** ************************************************************************
12408                                   ;*                              - DMA ADDRESSING TEST -
12409                                   ;*      THIS TEST VERIFIES , AS FAR AS POSSIBLE , THAT THE DUT CAN PERFORM A
12410                                   ;*      DMA FROM A FULL 22 BIT OR 18 BIT ADDRESS. THE TEST RELIES ON FINDING A
12411                                   ;*      COMPLEMENTARY PAIR OF ADDRESSES BETWEEN THE TOP OF PHYSICAL MEMORY AND
12412                                   ;*      THE START OF THE TOP OF THE DIAGNOSTIC PROGRAM .
12413                                   ;*      THIS MAY INVOLVE REMOVING PART OF THE DIAGNOSTIC RUNTIME SERVICES AND
12414                                   ;*      THEN RESTORING. THE NUMBER OF BITS THAT HAVE BEEN SUCCESSFULLY TESTED
12415                                   ;*      WILL BE PRINTED AT THE CONSOLE AT THE END OF THE TEST.
12416                                   ;*
12417                                   ;*
12418                                   ;-- ************************************************************************
12419 061552                           BGNTST
       06155                                                                    T38::
12420
12421           000046                   TNUM ==        TNUM + 1 ;INCREMENT THE ASSEMBLY TIME TEST COUNTER
12422 061552   012737   000046  002364          MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER
12423 061560   012737   177777  002362          MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST
12424 061566   012737   000001  005464          MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE
12425 061574   012737   010461  005466          MOV     #4401.,ERRNBR   ;SET ERROR NUMBER TO 4401
12426 061602   012737   020333  005470          MOV     #EM4401,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN TABLE
12427 061610   012737   024644  005472          MOV     #ERO503,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE
12428
12429                                   ;*
12430                                   ; CLEAR THE SUCCESS FLAG TO INDICATE TEST FAILURE IN CASE IT DOES
12431                                   ;-
12432
12433 061616   005037   063344                  CLR     SUCSS           ;INDICATE FAILURE , IN CASE THE DUT FAILS
12434
12435
12436                                   ;*
12437                                   ; SET UP THE 004 TRAP VECTOR TO CATCH ANY EXPECTED TRAPS THAT OCCUR
12438                                   ;
12439
12440 061622   013737   000004  002422          MOV     @#4,TP4VEC      ;SAVE EXISTING 004 TRAP VECTOR
12441 061630   012737   041042  000004          MOV     #TP4RTN,@#4     ;SET 004 TRAP VECTOR TO OUR SERVICE ROUTINE
12442
12443                                   ;*
12444                                   ; RESET THE DUT TO A KNOWN STATE,REMOVE THE STATUS CODES FROM THE FIFO.
12445                                   ; CLEAR TX AND RX INTERUPT ENABLE BITS IN THE CSR
12446                                   ;-
12447
12448 061636   004737   030172                  JSR     PC,CLNRST       ;RESET THE DHV11 M , REPORT ANY ERRORS
12449 061642   103402                          BCS     .+6             ;SKIP EXIT OF TEST IF NO FATAL ERROR FOUND.
12450 061644   000137   063306                  JMP     60$             ;EXIT THE TEST, FATAL ERROR WAS FOUND.
12451
12452
12453                                   ;*
12454                                   ; DETERMINE WHETHER MEMORY MANAGEMENT IS PRESENT
12455                                   ;
12456
12457 061650   005737   002470                  TST     MMPRES          ;IF MEM MGT IS PRESENT THEN
12458 061654   001007                          BNE     1$              ;AVOID SETTING THE DMA TEST ADDR FOR
12459                                                                  ;A 16 BIT MACHINE.
12460 061656   012737   001252  002432          MOV     #1252,DMTSTA    ;SET UP THE FIRST DMA TEST ADDR FOR
12461                                                                  ;A 16 BIT MACHINE
```

HARDWARE TEST - DMAADR -

```
12462 061664  012737  000021  063334          MOV     #17.,BITSTD     ;SET THE BITS TESTED TO 16 + 1
12463 061672  000513                          BR      10$             ;SINCE MEM MGT ISN'T PRESENT
12464                                                                 ;THERE'S NO NEED TO DETERMINE WHETHER ITS
12465                                                                 ;A 22 OR AN 18 BIT MACHINE, SO BRANCH.
12466
12467
12468                                 ;+
12469                                 ; DETERMINE WHETHER THE HOST IS AN 18 OR A 22 BIT MACHINE. THIS IS ACCOMPLISHED
12470                                 ; BY TRYING TO READ A 22 BIT ADDRESS AND COMPARING THE READ DATA WITH THAT
12471                                 ; FROM THE EQUIVALENT 18 BIT ADDRESS.
12472                                 ;-
12473
12474                                 ;+
12475                                 ; SET UP THE PARS 1 THROUGH 5 TO RELOCATE TO THE SAME ADDRESS
12476                                 ;
12477
12478 061674  012700  000200          1$:       MOV     #200,R0         ;SET THE PAGE BASE ADDRESS TO 200 $$$
12479 061700  012701  002476                    MOV     #PARATB+2,R1    ;POINT AT THE START OF THE PAR ADDRESS TABLE $$$
12480
12481 061704  010031                  2$:       MOV     R0,@(R1)+       ;LOAD THE PAR
12482 061706  062700  000200                    ADD     #200,R0         ;CALCULATE THE NEXT PAGE ADDRESS
12483 061712  022701  002510                    CMP     #PAR6A,R1       ;LOOP UNTIL PARS 0 THROUGH 5 $$$
12484 061716  001372                          BNE     2$              ;ARE LOADED.
12485
12486
12487                                 ;+
12488                                 ; SET UP THE PDRS FOR , NO ABORT/TRAP,UPWARD EXPANSION,128 BLOCKS PER PAGE
12489                                 ;
12490
12491 061720  012700  077406                    MOV     #77406,R0       ;BIT PATTERN FOR THE PDRS
12492 061724  012701  002514                    MOV     #PDRATB,R1      ;POINT AT START OF PDR ADDR TABLE
12493 061730  010031                  4$:       MOV     R0,@(R1)+       ;
12494 061732  022701  002534                    CMP     #PDRATE,R1      ;LOOP UNTIL ALL PDRS HAVE
12495 061736  001374                          BNE     4$              ;BEEN SET UP.
12496
12497                                 ;+
12498                                 ; SET THE MEM MGT STATUS REG #3 FOR, 22 BIT ADDRESSSING,
12499                                 ;  NO UNIBUS MAPPING, NO D SPACE
12500                                 ;-
12501                                 ;
12502 061740  012777  000020  120520          MOV     #20,@MMSR3      ;SET UP STATUS REG #3
12503
12504                                 ;+
12505                                 ; USE PAR #6 TO DETERMINE WHETHER THIS IS AN 18 OR A 22 BIT MACHINE BY SETTING
12506                                 ; IT TO 100000. THIS WILL SELECT A 22 BIT ADDRESS ON A 22 BIT MACHINE,
12507                                 ; ON AN 18 BIT MACHINE HOWEVER, THE MSBS WILL BE LOST AND THE MEMORY LOCATION
12508                                 ; READ WILL BE THE EQUIVALENT 18 BIT ADDRESS.
12509                                 ;   PAR #6 IS USED BECAUSE WE CAN BE SURE THAT THE DIAGNOSTIC WILL NOT COME
12510                                 ; UNDER ITS INFLUENCE.
12511                                 ;-
12512
12513 061746  012777  100000  120532          MOV     #100000,@PAR5A  ;LOAD THE PAGE ADDR INTO THE PAGE ADDR REG. $$$
12514
12515                                 ;+
12516                                 ;  SET UP THE LOOP TO ATTEMPT TO READ A 22 BIT ADDR
12517                                 ;-
12518
```

HARDWARE TEST - DMAADR - SEQ 0311

```
12519 061754  012703  000005                    MOV     #5,R3           ;INITIALISE LOOP COUNT
12520 061760  012702  005260                    MOV     #SDPBAS,R2      ;SELECT THE VIRTUAL ADDRESS #SDPBAS, THIS WILL BE
12521                                                                    ;BITS 0 TO 12 OF THE PHYSICAL ADDRESS
12522 061764  010204                          MOV     R2,R4           ;SAVE THE DATA ADDRESS
12523 061766  062704  120000                    ADD     #120000,R4      ;CONVERT THE VIRT. ADDR INTO AN ADDR WITHIN $$$
12524                                                                    ;THE INFLUENCE OF PAR #6.
12525 061772  012737  000001  002426            MOV     #BIT0,BITLNG    ;INDICATE A 22 BIT MACHINE IN CASE IT IS
12526
12527 062000  106427  000340          6$:     MTPS    #PRI07          ;DISABLE CLOCK INTERUPTS
12528
12529 062004  010400                          MOV     R4,R0           ;SET UP THE MOVE SOURCE
12530 062006  012701  06*340                  MOV     #DEST,R1        ;SET UP THE DESTINATION
12531
12532                                 ;+
12533                                 ; ENABLE THE MEM MGT AND ATTEMPT TO READ THE 22 BIT ADDRESS. IF A TRAP OCCURS
12534                                 ;  THEN THE HOST MUST BE A 22 BIT MACHINE SINCE WE HAVE ENSURED THAT
12535                                 ;  THE 18 BIT ADDRESS EXISTS.
12536                                 ;-
12537
12538 062012  012777  000001  120444            MOV     #BIT0,@MMSR0    ;ENABLE MEM MGT
12539 062020  004737  030112                    JSR     PC,CKTRAP       ;PERFORM THE MOVE AND CHECK FOR A TRAP
12540 062024  005077  120434                    CLR     @MMSR0          ;DISABLE MEM MGT
12541
12542 062030  106427  000240                   MTPS    #PRI05          ;ENABLE CLOCK INTERUPTS
12543
12544 062034  005737  002424                    TST     TP4FLG          ;DID A TRAP OCCUR ?
12545 062040  001022                           BNE     8$              ;YES . THEN JUMP AND INDICATE A 22 BIT MACHINE
12546
12547                                 ;+
12548                                 ; SINCE A TRAP HASN'T OCCURED THEN EITHER THE MACHINE IS A 22 BIT MACHINE WITH
12549                                 ;  MEMORY AT THE ADDRESS JUST READ . OR . ITS AN 18 BIT MACHINE IN WHICH CASE
12550                                 ;  THE ADDRESS JUST READ WOULD BE ONE OF THE DATA WORDS AT ADDRESS #SDPBAS.
12551                                 ;-
12552
12553 062042  023712  063340                    CMP     DEST,(R2)       ;COMPARE READ WORD WITH DATA WORD
12554 062046  001017                           BNE     8$              ;IF NOT THE SAME THEN JUMP AND INDICATE A
12555                                                                    ; 22 BIT MACHINE.
12556
12557                                 ;+
12558                                 ; IN ORDER TO MAKE SURE THAT THIS REALLY ISN'T A 22 BIT MACHINE  I.E. THAT
12559                                 ;  THE MATCH OF THE READ WORD AND THE DATA WORD WAS NOT MERELY COINCIDENCE.
12560                                 ;   ANOTHER FOUR ADDRESSES ARE READ AND COMPARED WITH THE DATA.
12561                                 ;-
12562
12563 062050  062702  000002                    ADD     #2,R2           ;SELECT NEXT TEST DATA ADDRESS
12564 062054  062704  000002                    ADD     #2,R4           ;SELECT NEXT READ ADDRESS
12565 062060  005303                           DEC     R3              ;DECREMENT THE DATA COUNT
12566 062062  001346                           BNE     6$              ;REPEAT THE READ ATTEMPTS UNTILL ALL FIVE DATA
12567                                                                    ;WORDS HAVE BEEN SUCCESSFULLY MATCHED, AND THEN
12568 062064  005037  002426                    CLR     BITLNG          ;INDICATE AN 18 BIT MACHINE.
12569
12570                                 ;+
12571                                 ; SET UP THE HIGHEST POSSIBLE TEST ADDRESS IN DMTSTA
12572                                 ;-
12573
12574 062070  012737  005252  002432            MOV     #5252,DMTSTA    ;SET UP THE FIRST DMA TEST ADDRESS FOR THE
12575                                                                    ; 18 BIT MACHINE
```

HARDWARE TEST DMAADR -

```
12576 062076  012737  000023  063334          MOV     #19.,BITSTD     ;SET THE BITS TESTED TO 18 BITS + 1.
12577 062104  000406                          BR      10$             ;AVOID SETTING DMTSTA FOR THE 22 BIT MACHINE
12578 062106  012737  125252  002432  8$:     MOV     #125252,DMTSTA  ;SET UP THE FIRST PAGE ADDR FOR
12579                                                                 ;A 22 BIT MACHINE.
12580 062114  012737  000027  063334          MOV     #23.,BITSTD     ;SET THE BITS TESTED TO 22 BITS +1.
12581
12582                                 ;+
12583                                 ; TRY AND FIND A COMPLEMENTARY PAIR OF ADDRESSES WITHIN THE MEMORY AND SAVE
12584                                 ;  THE CONTENTS OF THE TWO AREAS. THE TEST IS ABANDONED IF A COMPLEMENTARY
12585                                 ;  PAIR HAS NOT BEEN FOUND BEFORE THE AREA OF MEMORY CONTAINING THE
12586                                 ;  DIAGNOSTIC IS ENCOUNTERED.
12587                                 ;-
12588
12589 062122  012737  041020  000004  10$:     MOV     @TP4BRT,@#4     ;CHANGE THE 004 TRAP VECTOR TO POINT TO
12590                                                                 ;TP4BRT SINCE THIS IS THE ROUTINE ASSOCIATED
12591                                                                 .WITH THE BYTE SUBROUTINE CKTRPB.
12592
12593 062130                                  MEMORY  FFREM           ;GET THE ADDRESS OF THE FIRST FREE WORD
       062130  104431                                                                  TRAP    C$MEM
       062132  010037  002430                                                          MOV     R0,FFREM
12594                                                                 ;OF MEMORY ABOVE THE DIAGNOSTIC.
12595
12596 062136  012701  004012          MOV     #BUFBAS,R1      ;POINT AT THE BUFFER WHERE THE CONTENTS OF
12597                                                         ;THE MEMORY BEING READ ARE TO BE SAVED.
12598 062142  005004                  CLR     R4              ;CLEAR THE COMPLEMENTARY PAIR INDICATOR (CPI)
12599 062144  106427  000340          MTPS    #PRI07          ;DISABLE LTC INTERRUPTS
12600
12601 062150  005204          12$:    INC     R4              ;INCREMENT THE CPI
12602 062152  005005                  CLR     R5              ;INDICATE THAT A SAVE OF THE DATA AT
12603                                                         ;(DMTSTA) IS REQUIRED.
12604 062154  012703  000020          MOV     #16.,R3         ;SET THE NUMBER OF BYTES TO BE READ
12605 062160  004737  030502          JSR     PC,DMRW         ;SAVE THE DATA CONTAINED AT ADDRESS DMTSTA.
12606 062164  012701  004412          MOV     #BUFMID,R1      ;POINT AT SECOND STORAGE AREA
12607 062170  005737  002424          TST     TP4FLG          ;IF WE HAVE VALID MEMORY THEN AVOID CLEARING
12608 062174  001403                  BEQ     14$             ;THE CPI AND RESETING THE SAVE AREA ADDR
12609
12610 062176  005004                  CLR     R4              ;CLEAR THE CPI.
12611 062200  012701  004012          MOV     #BUFBAS,R1      ;RESET THE ADDR FOR THE SAVED DATA STORE
12612 062204  022704  000002  14$:     CMP     #2,R4           ;IF A PAIR OF COMPLEMENTARY ADDRESSSES HAVE
12613                                                         ;BEEN FOUND THEN
12614 062210  001447                  BEQ     17$             ;GO AND WRITE THE TEST DATA TO THESE ADDRS.
12615 062212  013737  002432  063342  MOV     DMTSTA,ODTSTA   ;SAVE THE OLD DMTSTA
12616 062220  000241                  CLC                     ;CLEAR CARRY READY FOR THE ROTATION
12617 062222  006037  002432          ROR     DMTSTA          ;COMPLEMENT THE DMTSTA TO PRODUCE THE NEXT
12618                                                         ; DMA TEST ADDR.
12619 062226  005337  063334          DEC     BITSTD          ;DECREMENT THE NUMBER OF BITS TESTED COUNT
12620
12621                                 ;+
12622                                 ; CHECK THAT THE NEW DMTSTA IS NOT INSIDE THE DIAGNOSTIC PROGRAM
12623                                 ;-
12624
12625 062232  032737  176000  002432  BIT     #176000,DMTSTA  ;IS THE DMTSTA > 1252 . IF IT IS THEN WE'RE
12626                                                         ; SAFE SO.
12627 062240  001343                  BNE     12$             ;BRANCH AND CONTINUE WITH THE SEARCH
12628 062242  004737  030430          JSR     PC,DM16B        ;CONVERT THE DMTSTA TO A PHYSICAL ADDR.
12629 062246  020037  002430          CMP     R0,FFREM        ;ARE WE INSIDE THE DIAGNOSTIC REGION ?
12630 062252  103336                  BHIS    12$             ;NO . THEN BRANCH AND CONTINUE WITH THE SEARCH
```

```
12631
12632                                   ;*
12633                                   ;SINCE WE ARE NOW INSIDE THE DIAGNOSTIC, WE INCREMENT BIT #14 OF THE DMTSTA
12634                                   ;PHYSICAL ADDRESSS AND IF WE RE STILL INSIDE THE DIAGNOSTIC WE ABANDON THE
12635                                   ;TEST. ONCE WE ARE IN THIS REGION WE ARE ONLY ABLE TO TEST THE LOWEST 14 BITS.
12636                                   ;-
12637
12638
12639 062254  022737  000252  002432          CMP     #252,DMTSTA     ;IF THE BIT HAS ALREADY BEEN SET THEN
12640 062262  001014                        BNE     15$             ;ABANDON THE TEST,AFTER REPORTING THE ERROR ,
12641                                                                 ; BECAUSE NO SUITABLE MEMORY HAS BEEN FOUND.
12642 062264  012737  000652  002432          MOV     #652,DMTSTA     ;SET THE BIT
12643 062272  062700  040000                  ADD     #40000,R0       ;ADD THE BIT INTO THE PHYSICAL ADDR
12644 062276  020037  002430                  CMP     R0,FFREM        ;IF WE'RE NOW STILL INSIDE THE DIAGNOSTIC THEN
12645 062302  103404                        BLO     15$             ;REPORT ERROR AND ABANDON THE TEST.
12646 062304  012737  000016  063334          MOV     #14.,BITSTD     ;OTHERWISE SET THE BITS TESTED TO 14 BITS.
12647 062312  000716                        BR      12$             ;CONTINUE WITH THE SEARCH.
12648
12649
12650 062314  005237  005466        15$:      INC     ERRNBR          ;SET THE ERROR NUMBER TO 4402
12651 062320  012701  020355                  MOV     #EM4402,R1      ;SELECT MESSAGE TO BE REPORTED.
12652                                                                 ; " NO SUITABLE ADDR FOUND. DMA TEST ABORTED "
12653
12654
12655 062324  000137  063304        16$:      JMP     34$             ;JUMP TO THE ERROR.
12656
12657
12658                                   ;*
12659                                   ; WRITE THE TEST DATA INTO  HE TWO AREAS JUST FOUND. IF A TRAP OCCURS WHILE
12660                                   ; WE ARE WRITING DATA INTO THESE AREAS THEN THE HOST MACHINE IS AT FAULT.
12661                                   ;-
12662
12663 062330  012700  005260        17$:      MOV     #SDPBAS,R0      ;SET UP THE SOURCE ADDR FOR THE MOVE AS OUR
12664                                                                 ;TEST DATA PATTERN.
12665 062334  013737  002432  063336          MOV     DMTSTA,DUMY     ;SAVE THE LOWER DMTSTA
12666 062342  013737  063342  002432          MOV     ODTSTA,DMTSTA   ;START WITH THE HIGHER OF THE TWO
12667                                                                 ; COMPLEMENTARY ADDRESSES.
12668 062350  012703  000020                  MOV     #16.,R3         ;SET THE NUMBER OF DATA BYTES TO BE WRITTEN
12669 062354  012705  000001                  MOV     #1,R5           ;INDICATE TO WRITE TO DMTSTA
12670
12671
12672 062360  012701  000340                  MOV     #340,R1         ;SET PRIORITY 7 TO DISABLE THE CLOCK
12673 062364  004737  036016                JSR     PC,STPSW        ;
12674
12675 062370  005237  005466                  INC     ERRNBR          ;SET THE ERROR NUMBER TO 4403
12676 062374  012701  020423                  MOV     #EM4403,R1      ;SELECT THE MESSAGE.
12677                                                                 ; "HOST FAILURE. WRITE FAILED TO AN ADDR WHICH
12678                                                                 ;HAD BEEN SUCCESSFULLY READ, TEST ABANDONED "
12679
12680 062400  004737  030502                JSR     PC,DMRW         ;PERFORM THE TRANSFER
12681 062404  005737  002424                  TST     TP4FLG          ;EXIT IF HOST FAILURE
12682 062410  001345                        BNE     16$             ;AND REPORT ERROR.
12683 062412  013737  063336  002432          MOV     DUMY,DMTSTA     ;SELECT THE LOWER DMA TEST ADDR.
12684 062420  012700  005304                  MOV     #SDP2B,R0       ;SELECT THE NEXT DATA PATTERN
12685 062424  004737  030502                JSR     PC,DMRW         ;PERFORM THE TRANSFER
12686 062430  005737  002424                  TST     TP4FLG          ;EXIT IF HOST FAILURE
12687 062434  001333                        BNE     16$             ;
```

```
12688
12689                                   ;+
12690                                   ; SET UP THE DHV11-M TO PERFORM THE DMA.
12691                                   ;-
12692
12693                                   ;+
12694                                   ; SET INTERNAL LOOPBACK, ENABLE THE RECIEVER FUNCTION ON THE LINE.
12695                                   ; SET THE LPR ON THE LINE TO 38.4K BAUD, 8 BITS PER CHARACTER, ODD PARITY,
12696                                   ; 2 STOP BITS. ENABLE THE TRANSMITTER ON THE LINE.
12697                                   ;-
12698
12699 062436  005237  005466                    INC     ERRNBR          ;SET THE ERRNBR TO 4404
12700
12701
12702 062442  004737  030772                    JSR     PC,FINACT       ;FIRST FIND AN ACTIVE LINE ON WHICH TO PERFORM
12703                                                                     ; THE DMA.
12704 062446  010102                            MOV     R1,R2           ;SAVE THE LINE NUMBER ON WHICH THE DMA WILL OCCUR
12705 062450  012701  020520                    MOV     #EM4404,R1      ;SELECT THE MESSAGE,
12706                                                                     ; "NO ACTIVE LINES , TEST ABANDONED"
12707 062454  103402                            BCS     .+6             ;EXIT IF A LINE COULD NOT BE FOUND ,AFTER FIRST
12708 062456  000137  063106                    JMP     30$             ;RESTORING THE CONTENTS OF MEMORY.
12709 062462  010201                            MOV     R2,R1           ;RESTORE THE ACTIVE LINE NUMBER.
12710                                   ;+
12711                                   ; AN ACTIVE LINE HAS BEEN FOUND
12712                                   ;
12713
12714 062464  012700  000204                    MOV     #204,R0         ;PASS THE LNCTRL CONTENTS
12715 062470  004737  040250                    JSR     PC,WTWLNC       ;INITIALISE THE LNCTRL REGISTER
12716 062474  012700  177670                    MOV     #177670,R0      ;PASS THE LPR CONTENTS
12717 062500  004737  040324                    JSR     PC,WTWLPR       ;INITIALISE THE LPR REGISTER
12718 062504  004737  036446                    JSR     PC,TXENBL       ;ENABLE TRANSMITTER ON THE LINE
12719
12720                                   ;+
12721                                   ; INITIATE THE DMA
12722                                   ;-
12723
12724 062510  013705  063342                            MOV     ODTSTA,R5       ;START FROM THE HIGHER OF THE PAIR OF ADDR.
12725 062514  012704  005260                            MOV     #SDPBAS,R4      ;SET UP THE ADDR OF THE DATA PATTERN
12726 062520  010137  063332                            MOV     R1,80$          ;SAVE THE LINE NUMBER FOR THE DMA
12727 062524  012737  000002  063330                    MOV     #2,70$          ;INITIALISE THE LOOP COUNT
12728
12729 062532  012700  000052          18$:      MOV     #52,R0          ;SET UP THE LSB'S
12730 062536  005003                            CLR     R3              ;CLEAR THE REG THAT WILL HOLD THE 6 MSB'S
12731 062540  012702  000006                    MOV     #6,R2           ;CONVERT THE DMTSTA INTO
12732 062544  006305                  20$:      ASL     R5              ;A PHYSICAL ADDRESS WITH
12733 062546  006103                            ROL     R3              ;THE MSB S IN REG #3.
12734 062550  005302                            DEC     R2              ;
12735 062552  001374                            BNE     20$             ;
12736 062554  032705  000100                    BIT     #100,R5         ;TEST BIT #6 OF THE DMTSTA
12737 062560  001402                            BEQ     22$             ;
12738 062562  012700  000025                    MOV     #25,R0          ;ALTER THE LSB S IF BIT #6 WAS SET.
12739 062566  060005                  22$:      ADD     R0,R5           ;ADD IN THE LSB'S
12740 062570  052703  000200                    BIS     #200,R3         ;SET BIT #7.
12741
12742 062574  013777  063332  117476            MOV     80$,@CSRA       ;SELECT THE LINE ON WHICH TO PERFORM THE DMA.
12743
12744 062602  012737  010465  005466            MOV     #4405.,ERRNBR   ;SET ERROR NUMBER 4405
```

```
12745 062610  012701  020557                    MOV     #EM4405,R1      ;SELECT THE MESSAGE,
12746                                                                     ; " DMA_START BIT FOUND SET BEFORE DMA INIT.
12747                                                                     ;TEST ABANDONED"
12748 062614  105777  117474                    TSTB    @TXAD2A         ;TEST THE DUT DMA-START BIT
12749 062620  100532                           BMI     30$             ;EXIT WITH ERROR IF SET ,AFTER FIRST RESTORING
12750                                                                     ;THE CONTENTS OF MEMORY.
12751 062622  012777  000020  117466            MOV     #16.,@TXBFCA    ;SET UP CHARACTER COUNT
12752 062630  010577  117456                    MOV     R5,@TXAD1A      ;SET UP BITS 0 TO 15 OF THE PHYISCAL ADDR.
12753 062634  110377  117454                    MOVB    R3,@TXAD2A      ;SET UP BITS 16 TP 21 , AND INITIATE THE DMA.
12754
12755                                 ;+
12756                                 ; WAIT FOR THE DMA TO COMPLETE AND THE LAST CHARACTER TO BE RECIEVED
12757                                 ;-
12758
12759 062640  012701  170144                    MOV     #170144,R1      ;TEST BIT 15, TIME OUT OF 100 MS.
12760 062644  013702  002300                    MOV     CSRA,R2         ;PASS THE ADDR OF THE REG TO TEST.
12761
12762 062650  005237  005466                    INC     ERRNBR          ;SET ERROR NUMBER TO 4406
12763
12764 062654  004737  037740                   JSR     PC,WAIBIS       ;WAIT FOR BIT TO SET
12765 062660  012701  020653                    MOV     #EM4406,R1      ;SELECT THE MESSAGE ,
12766                                                                     ; " TIME-OUT OCCURED WAITING FOR DMA TO
12767                                                                     ;COMPLETE. TEST ABANDONED"
12768 062664  103110                           BCC     30$             ;EXIT IF TIME-OUT OCCCURED, AFTER FIRST ,
12769                                                                     ;RESTORING THE CONTENTS OF MEMORY.
12770 062666  010402                           MOV     R4,R2           ;SAVE R4
12771 062670  012704  000005                    MOV     #5,R4           ;SET 5 MS DELAY
12772 062674  004737  030370                   JSR     PC,DELAY        ;DELAY TO ALLOW LAST CHARACTER TO BE RECIEVED
12773 062700  010204                           MOV     R2,R4           ;RESTORE R4
12774
12775                                 ;+
12776                                 ; READ THE CONTENTS OF THE RXFIFO AND COMPARE THEM WITH THE CORRECT DATA
12777                                 ;-
12778
12779 062702  005003                           CLR     R3              ;CLEAR THE READ DATA COUNTER
12780 062704  012705  000200                    MOV     #128.,R5        ;SET THE MAX BMP CODE READ COUNT
12781
12782 062710  012737  010467  005466  24$:      MOV     #4407.,ERRNBR   ;SET THE ERRNBR TO 4407
12783 062716  012701  020727                    MOV     #EM4407,R1      ;SELECT THE MESSAGE ,
12784                                                                     ; " RXFIFO EMPTY TOO SOON, DMA FAILED
12785                                                                     ;TEST ABANDONED"
12786
12787 062722  017702  117354                    MOV     @RBUFA,R2       ;READ THE CHARACTER FROM THE FIFO
12788 062726  100067                           BPL     30$             ;BRANCH TO REPORT ERROR IF FIFO EMPTY TOO SOON,
12789                                                                     ;AFTER FIRST RESTORING THE CONTENTS OF MEMORY.
12790 062730  012700  170301                    MOV     #170301,R0      ;SET UP BIT MASK OF A BMP CODE
12791 062734  040200                           BIC     R2,R0           ;TRY TO CLEAR THE BMP CODE MASK
12792 062736  001011                           BNE     28$             ;BRANCH IF NOT A BMP CODF
12793 062740  004737  035624                   JSR     PC SAVBMP       ;SAVE THE BMP CODE ON THE QUEUE
12794
12795 062744  005237  005466                    INC     ERRNBR          ;SET THE ERRNBR TO 4408
12796 062750  012701  021011                    MOV     #EM4408,R1      ;SELECT THE MESSAGE,
12797                                                                     ; " TOO MANY BMP CODES FOUND IN THE RXFIFO,
12798                                                                     ;TEST ABANDONED"
12799
12800 062754  005305                           DEC     R5              ;DEC THE MAX BMP CODE READ COUNT
12801 062756  001453                           BEQ     30$             ;GO REPORT ERROR IF TOO MANY BMP CODES FOUND ,
```

```
12802
12803 062760  000753                          BR      24$             ;AFTER FIRST RESTORING THE CONTENTS OF MEMORY.
12804                                                                  ;DON'T COUNT THE BMP CODE AS A VALID CHARACTER
12805
12806 062762  012737  010471  005466  28$:     MOV     #4409.,ERRNBR   ;SET THE ERRNBR TO 4409
12807 062770  010201                           MOV     R2,R1           ;SAVE THE CHARACTER FROM THE FIFO
12808 062772  012702  021054                    MOV     #EM4409,R2      ;SELECT THE MESSAGE ,
12809                                                                  ;  " BAD BIT BETWEEN BITS 0 AND "
12810 062776  012737  026440  005472           MOV     #ER9101,ERRBLK  ;SELECT THE ERROR ROUTINE.
12811 063004  012737  177777  063344           MOV     #-1,SUCSS       ;INDICATE 'BAD BITS' FAILURE
12812
12813 063012  122401                           CMPB    (R4)+,R1        ;COMPARE CHAR FROM FIFO WITH THE CORRECT DATA.
12814 063014  001034                          BNE     30$             ;BRANCH IF INCORRECT AND RESTORE MEM CONT'S.
12815 063016  005037  063344                    CLR     SUCSS           ;INDICATE NON TEST SPECIFIC FAILURE  E.G. TIME-OUTS
12816 063022  005203                           INC     R3              ;COUNT THIS CHARACTER.
12817 063024  022703  000020                    CMP     #16.,R3         ;HAVE WE RECIEVED ALL THE CHARACTERS ?
12818 063030  001327                          BNE     24$             ;LOOP UNTIL ALL CHARACTERS (NON-BMP) ARE READ.
12819 063032  005337  063330                    DEC     70$             ;DECREMENT THE LOOP COUNT
12820 063036  001420                          BEQ     29$             ;BRANCH IF BOTH DMA'S ARE COMPLETED
12821 063040  012704  005304                    MOV     #SDP2B,R4       ;SET UP THE SECOND DATA PATTERN
12822 063044  013705  002432                    MOV     DMTSTA,R5       ;SET UP THE OTHER DMA TEST ADDRESS
12823
12824 063050  012737  010472  005466           MOV     #4410.,ERRNBR   ;SET ERRNBR TO 4410
12825 063056  012701  021111                    MOV     #EM4410,R1      ;SELECT THE MESSAGE ,
12826                                                                  ;    RXFIFO FAILED TO PURGE, TEST ABANDONED "
12827 063062  012737  024644  005472           MOV     #ER0503,ERRBLK  ;SELECT THE ERROR ROUTINE
12828
12829 063070  004737  032722                    JSR     PC,PUFIFO       ;PURGE THE RXFIFO
12830 063074  103004                          BCC     30$             ;EXIT WITH ERROR IF FIFO WOULD NOT PURGE ,
12831                                                                  ;AFTER FIRST RESTORING THE CONTENTS OF MEMORY.
12832 063076  000615                          BR      18$             ;OTHERWISE REPEAT.
12833
12834 063100  012737  000001  063344  29$:     MOV     #1,SUCSS        ;INDICATE THAT WE HAVE BEEN ABLE TO TEST,
12835                                                                  ;SOME OF THE BITS.
12836
12837
12838                                  ;+
12839                                  ; RESTORE THE ORIGINAL DATA IN THE MEMORY
12840                                  ;-
12841
12842 063106  013737  002432  063336  30$:     MOV     DMTSTA,DUMY     ;START WITH THE HIGHER OF THE PAIR OF DMTSTA
12843 063114  013737  063342  002432           MOV     ODTSTA,DMTSTA   ;
12844 063122  012700  004012                    MOV     #BUFBAS,R0      ;POINT AT THE START OF THE SAVED DATA AREA
12845 063126  012705  000001                    MOV     #1,R5           ;SELECT WRITE TO (DMTSTA)
12846 063132  012703  000020                    MOV     #16.,R3         ;PASS NUMBER OF BYTES TO BE WRITTEN
12847 063136  004737  030502                   JSR     PC,DMRW         ;RESTORE THE DATA
12848 063142  005737  002424                    TST     TP4FLG          ;GO REPORT ERROR IF A TRAP OCCURED
12849 063146  001012                          BNE     31$             ;
12850 063150  013737  063336  002432           MOV     DUMY,DMTSTA     ;NOW RESTORE THE DATA FROM THE LOWER
12851                                                                  ;OF THE PAIR OF TEST ADDRESSES.
12852 063156  012700  004412                    MOV     #BUFMID R0      ;POINT AT THE START OF THE SAVED DATA AREA
12853 063162  004737  030502                   JSR     PC,DMRW         ;RESTORE THE DATA
12854
12855 063166  005737  002424                    TST     TP4FLG          ;GO REPORT ANY ERRORS IF A NO TRAP
12856 063172  001411                          BEQ     32$             ; OCCURED DURING THE RESTORE.
12857
12858 063174  012737  010473  005466  31$:     MOV     #4411.,ERRNBR   ;SET THE ERROR NUMBER TO 4411
```

```
12859 063202  012701  021140                MOV     #EM4411,R1      ;SELECT THE MESSAGE ,
12860                                                                ; " HOST FAILURE. WRITE FAILURE TO AN ADDR
12861                                                                ;WHICH HAD PREVIOUSLY BEEN SUCCESSFULLY
12862                                                                ;WRITTEN TO. "
12863 063206  012737  024644  005472          MOV     #ER0503,ERRBLK  ;SELECT THE ERROR ROUTINE
12864 063214  000433                        BR      34$             ;REPORT THE ERROR
12865
12866                              ;+
12867                              ; HAS THE TEST BEEN SUCCESSFUL, PRINT THE BITS TESTED IF IT HAS,
12868                              ; REPORT THE ERRORS OTHERWISE.
12869                              ;-
12870
12871
12872 063216  005737  063344      32$:    TST     SUCSS           ;IF THE ERROR IS NON TEST SPECIFIC THEN
12873 063222  001430                      BEQ     34$             ;BRANCH TO REPORT ERRORS
12874 063224  013701  063334              MOV     BITSTD,R1       ;LOAD THE NUMBER OF BITS TESTED
12875 063230  005301                      DEC     R1              ;DEC TO GIVE THE BIT POSITION OF THE MSB TESTED.
12876 063232  022737  000001  063344      CMP     #1,SUCSS        ;IF THE BITS TESTED ARE BAD THEN
12877 063240  001021                      BNE     34$             ;BRANCH AND REPORT ERRORS.
12878
12879                              ;+
12880                              ; OTHERWISE DETERMINE IF PRINTING OF THE SUCCESSFULLY TESTED BITS WAS REQUESTED.
12881                              ;-
12882
12883
12884 063242  032737  000040  002262          BIT     #BIT05,OPTION   ; PRINT THE BITS TESTED IF THE SOFTWARE
12885 063250  001416                      BEQ     60$             ;OPTION HAS REQUESTED IT
12886 063252  010102                      MOV     R1,R2           ;CALCULATE THE NUMBER OF BITS WHICH HAVE
12887 063254  005202                      INC     R2              ;  BEEN TESTED SUCCESSFULLY.
12888 063256                              PRINTB  #EF4401,R1,R2   ;PRINT THE NUMBER OF BITS TESTED MESSSAGE.
      063256  010246                                                                  MOV     R2,-(SP)
      063260  010146                                                                  MOV     R1,-(SP)
      063262  012746  006412                                                          MOV     #EF4401,-(SP)
      063266  012746  000003                                                          MOV     #3,-(SP)
      063272  010600                                                                  MOV     SP,R0
      063274  104414                                                                  TRAP    C$PNTB
      063276  062706  000010                                                          ADD     #10,SP
12889 063302  000401                      BR      60$             ;EXIT THE TEST
12890
12891
12892 063304                      34$:    ERROR                   ;  REPORT ERRORS
      063304  104460                                                                  TRAP    C$ERROR
12893
12894
12895 063306  106427  000240      60$:    MTPS    #PRI05          ;ENABLE THE CLOCK
12896 063312  013737  002422  000004      MOV     TP4VEC,@#4      ;RESTORE THE NORMAL 004 TRAP VECTOR
12897 063320  005037  002362              CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST
12898
12899 063324                              EXIT    TST
      063324  104432                                                                  TRAP    C$EXIT
      063326  000020                                                                  .WORD   L10101-.
12900
12904
12902 [illegible]                 ;+
12903                             ; ********************** LOCAL VARIBLE AREA *********************************
12904                             ;-
12905
```

HARDWARE TEST - DMAADR - SEQ 0318

```
12906 063330  000000                70$:    .WORD   0               ;COUNTER FOR THE NUMBER OF DMA'S COMPLETED
12907 063332  000000                80$:    .WORD   0               ;SAVE AREA FOR THE ACTIVE LINE NUMBER
12908 063334  000000                BITSTD: .WORD   0               ;NUMBER OF BITS TESTED
12909 063336  000000                DUMY:   .WORD   0               ;DUMMY VARIABLE
12910 063340  000000                DEST:   .WORD   0               ;SAVE AREA FOR READ WORD , WHEN DETERMINING
12911                                                                 ;MACHINE ADDRESS LENGTH.
12912 063342  000000                ODTSTA: .WORD   0               ;HIGHER OF THE PAIR OF COMPLEMENTARY ADDR.
12913 063344  000000                SUCSS:  .WORD   0               ;SUCCESS INDICATOR,  1 - ERROR DUE TO BAD BITS
12914                                                                 ;                    1 - SUCCESSFUL TEST
12915                                                                 ;                    0 - OTHER ERRORS
12916
12917                               ;+
12918                               ;****************************** END ****************************************
12919                               ;-
12920
12921
12922
12923 063346                              ENDTST
      063346                                                                  L10101:
      063346  104401                                                                 TRAP    C$ETST
12924
```

```
12926                                   .SBTTL  HARDWARE TEST           - SHTSNG -
12927                                   ;++ ******************************************************************************
12928                                   ;*              - Short Single Character Mode Test -
12929                                   ;*      This test verifies that the Device Under Test (DUT) will perform
12930                                   ;*      transmission and reception correctly using the single character
12931                                   ;*      mode interrupts.  This test is is performed at 38.4K baud, 1 stop
12932                                   ;*      bit, odd parity, 8 bits per character.  A single 256 char data pattern
12933                                   ;*      is sent to each active line.
12934                                   ;*
12935                                   ;-- ******************************************************************************
12936
12937 063350                                       BGNTST
       063350                                                                                   T39::
12938          000047                            TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
12939 063350  012737  000047  002364             MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (90)
12940 063356  012737  177777  002362             MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
12941 063364  012737  000001  005464             MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
12942 063372  012737  021451  005466             MOV     #9001.,ERRNBR   ;SET THE FIRST ERROR NUMBER IN ERROR TABLE.
12943 063400  012737  022321  005470             MOV     #EM9001,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERRTBL.
12944 063406  005037  002650                     CLR     ERSMRF          ;INITIALIZE THE "REPORT ERROR SUMMARY" FLAGS.
12945                                   ;+
12946                                   ; Reset the DUT to a known state, remove the status codes from the fifo.
12947                                   ;  Clear TX and RX interrupt enable bits in the CSR.
12948                                   ; This subroutine reports error >>>>> 9001 <<<<<.
12949                                   ;-
12950 063412  004737  030172                     JSR     PC,CLNRST       ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
12951 063416  103402                     BCS     .+6             ;SKIP EXIT OF TEST IF NO FATAL ERROR FOUND.
12952 063420  000137  063704             JMP     60$             ;EXIT THE TEST, FATAL ERROR WAS FOUND.
12953 063424  012737  021452  005466             MOV     #9002.,ERRNBR   ;SET THE ERROR NUMBER.
12954
12955                                   ;+
12956                                   ; Set up for Transmit and Receive interrupts.
12957                                   ;-
12958 063432  106427  000240                     MTPS    #PRI05          ;DISABLE DEVICE INTERRUPTS.
12959 063436                             SETVEC  TXVECA,#TXSCHR,#PRI05   ;SELECT SINGLE CHAR TX INT SERVICE RTN.
       063436  012746  000240                                                            MOV     #PRI05,-(SP)
       063442  012746  041272                                                            MOV     #TXSCHR,-(SP)
       063446  013746  002270                                                            MOV     TXVECA,-(SP)
       063452  012746  000003                                                            MOV     #3,-(SP)
       063456  104437                                                                    TRAP    C$SVEC
       063460  062706  000010                                                            ADD     #10,SP
12960 063464                             SETVEC  RXVECA,#RXCHRS,#PRI05   ;SELECT RX INT SERVICE RTN.
       063464  012746  000240                                                            MOV     #PRI05,-(SP)
       063470  012746  040570                                                            MOV     #RXCHRS,-(SP)
       063474  013746  002266                                                            MOV     RXVECA,-(SP)
       063500  012746  000003                                                            MOV     #3,-(SP)
       063504  104437                                                                    TRAP    C$SVEC
       063506  062706  000010                                                            ADD     #10,SP
12961 063512  106427  000000                     MTPS    #PRI00          ;ALLOW INTERRUPTS.
12962                                   ;+
12963                                   ; Clear the error counter table.
12964                                   ; This table will accumulate error count totals for each line during this test.
12965                                   ;-
12966 063516  012700  003452                      MOV     #ERCNTB,R0
12967 063522  004737  030214                     JSR     PC,CLR16W       ;CLEAR THE RX ERROR COUNTERS TABLE.
12968                                   ;+
12969                                   ; Transmit and receive 256 byte data patterns.
```

```
12970                                   ;-
12971                                   ;+
12972                                   ; Initialize the long data pattern and parameters for the SCHTST call.
12973                                   ;-
12974 063526  012737  021465  005466          MOV     #9013.,ERRNBR   ;SET THE ERROR NUMBER TO 9013.
12975 063534  012702  004012          4$:     MOV     #BUFBAS,R2      ;INITIALIZE THE LONG DATA
12976 063540  005003                          CLR     R3              ;  PATTERN IN THE GENERAL
12977 063542  110322                  6$:     MOVB    R3,(R2)+        ;  DATA BUFFER TO A 256
12978 063544  005203                          INC     R3              ;  BYTE PATTERN COUNTING
12979 063546  020227  004412                  CMP     R2,#BUFMID      ;  FROM ZERO TO 255.
12980 063552  103773                        BLO     6$              ;
12981                                   ;+
12982                                   ; Initialize for, and get the LPR contents.
12983                                   ;-
12984 063554  005037  002634                  CLR     GPRSOB          ;CLEAR THE GPR SAVE AREA R1 STORAGE TO INDICATE
12985                                                                 ;  THAT THIS IS THE FIRST TIME IN GETLP2.
12986 063560  004737  036036          8$:     JSR     PC,SWAPO        ;SWAP GPRS WITH GPR SAVE AREA ZERO FOR GETLP1.
12987 063564  004737  031134                  JSR     PC,GETLP2       ;GET NEXT SET OF LPR CONTENTS, OR CARRY CLEAR.
12988 063570  004737  036036                  JSR     PC,SWAPO        ;SWAP BACK GPRS AND GPR SAVE AREA ZERO.
12989 063574  103036                        BCC     10$             ;EXIT LOOP IF ALL COMBINATIONS OF LPRS DONE.
12990 063576  010001                         MOV     R0,R1           ;PASS THE LPR CONTENTS TO GETTIM AND VANSUP.
12991 063600  004737  031264                JSR     PC,GETTIM       ;GET TIME-OUT BASED ON MINIMUM BAUDRATE IN USE.
12992 063604  012702  004012                 MOV     #BUFBAS,R2      ;SET UP POINTER TO START OF SHORT DATA PATTERN.
12993 063610  012703  000400                 MOV     #BUFMID-BUFBAS,R3  ;SET UP THE DATA PATTRN LENGTH.
12994 063614  012704  000001                 MOV     #1,R4           ;SPECIFY TO SEND 1 DATA PATTERN TO EACH LINE.
12995 063620  004737  037466                JSR     PC,VANSUP       ;SET UP "VANILLA FLAVORED" TX/RX.
12996 063624  004737  027530                JSR     PC,CHRMSK       ;GET THE BIT MASK OF UNUSED TX/RX BITS.
12997 063630  004737  032722                JSR     PC,PUFIFO       ;PURGE THE DUT RECEIVE CHARACTER FIFO.
12998 063634  004737  033176                JSR     PC,PURRXB       ;PURGE THE RX CHAR BUFFER IN MEMORY.
12999 063640  004737  031442                JSR     PC,INICHR       ;SEND INITIAL CHARS TO ALL ACTIVE LINES.
13000 063644  012737  021465  005466          MOV     #9013.,ERRNBR   ;SET THE ERROR NUMBER TO 9013.
13001                                   ;+
13002                                   ; The following routine reports the error with numbers 9013 thru 9018.
13003                                   ;-
13004 063652  004737  033232                  JSR     PC,RDCHRS       ;READ AND VERIFY THE RX CHARACTERS.
13005 063656  012737  021473  005466          MOV     #9019.,ERRNBR   ;SET THE ERROR REPORT NUMBER TO 9019.
13006                                   ;+
13007                                   ; The following routine reports the error with numbers 9019 thru 9022.
13008                                   ;-
13009 063664  004737  037154                  JSR     PC,TXRREP       ;REPORT FINAL ERRORS FROM RX/RX.
13010                                   ;+
13011                                   ; Loop to select the next baudrate and line parameters.
13012                                   ;-
13013 063670  000733                          BR      8$
13014
13015 063672  012737  021477  005466  10$:     MOV     #9023.,ERRNBR   ;SELECT NUMBER 9023 FOR THE NEXT ERROR REPORT.
13016 063700  004737  034502                  JSR     PC,REPSMR       ;REPORT ERROR SUMMARIES IF CALLED FOR.
13017
13018                                 ;+
13019                                 ; All done, have completed the test.
13020                                 ;    Disable interrupts.
13021                                 ;    Clear the interrupt vectors.
13022                                 ;-
13023 063704  106427  000240          60$:    MTPS    #PRIO5          ;DISABLE DEVICE INTERRUPTS.
13024 063710                                  CLRVEC  TXVECA          ;RETURN TX INT VECTOR TO UNUSED POOL.
      063710  013700  002270                                                          MOV     TXVECA,R0
      063714  104436                                                                  TRAP    C$CVEC
```

```
13025 063716                          CLRVEC  RXVECA          ;RETURN RX INT VECTOR TO UNUSED POOL.
      063716  013700  002266                                                  MOV     RXVECA,R0
      063722  104436                                                          TRAP    C$CVEC
13026 063724  005037  002362           CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
13027
13028 063730                          ENDTST
      063730                                                  L10102:
      063730  104401                                                          TRAP    C$ETST
```

```
13030                                   .SBTTL  HARDWARE TEST           - SHTDMA -
13031                                   ;** ************************************************************************
13032                                   ;*                      - Short DMA Mode Test -
13033                                   ;*      This test verifies that the Device Under Test (DUT) will perform
13034                                   ;*      transmission and reception correctly using the DMA mode transmission.
13035                                   ;*      This test is performed at 9.6K baud, 5 bits per character, 2 stop bits
13036                                   ;*      and even parity.  A single 512 byte data pattern is transmitted and
13037                                   ;*      received to/from each active line.
13038                                   ;*
13039                                   ; - ************************************************************************
13040 063732                                   BGNTST
       063732                                                                                   T40::
13041           000050                           TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
13042 063732   012737  000050  002364           MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (91)
13043 063740   012737  177777  002362           MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE IN A TEST.
13044 063746   012737  000001  005464           MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
13045 063754   012737  021615  005466           MOV     #9101.,ERRNBR  ;SET THE FIRST ERROR NUMBER IN ERROR TABLE.
13046 063762   012737  023647  005470           MOV     #EM9101,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERRTBL.
13047 063770   005037  002650                   CLR     ERSMRF         ;INITIALIZE THE "REPORT ERROR SUMMARY" FLAGS.
13048                                   ;*
13049                                   ; Reset the DUT to a known state, remove the status codes from the f'fo.
13050                                   ;  Clear TX and RX interrupt enable bits in the CSR.
13051                                   ; This subroutine reports error >>>>> 9101 <<<<<.
13052                                   ;-
13053 063774   004737  030172                   JSR     PC,CLNRST      ;RESET THE DHV11-M, REPORT ANY ERRORS FOUND.
13054 064000   103402                           BCS     2$             ;SKIP AROUND TEST EXIT IF NO FATAL ERROR FOUND
13055 064002   000137  064270                   JMP     60$            ;RESET FAILURE, ABORT THIS TEST.
13056                                   ;*
13057                                   ; Set up for Transm t  nterrupts.
13058                                   ;-
13059 064006   106427  000240           2$:     MTPS    #PRI05         ;DISABLE DEVICE INTERRUPTS.
13060 064012                                   SETVEC  TXVECA,#TXDMA,#PRI05    ;SELECT DMA TX INT SERVICE RTN.
       064012   012746  000240                                                           MOV     #PRI05,-(SP)
       064016   012746  041064                                                           MOV     #TXDMA,-(SP)
       064022   013746  002270                                                           MOV     TXVECA,-(SP)
       064026   012746  000003                                                           MOV     #3,-(SP)
       064032   104437                                                                   TRAP    C$SVEC
       064034   062706  000010                                                           ADD     #10,SP
13061 064040                                   SETVEC  RXVECA,#RXCHRS,#PRI05   ;SELECT RX INT SERVICE RTN.
       064040   012746  000240                                                           MOV     #PRI05,-(SP)
       064044   012746  040570                                                           MOV     #RXCHRS,-(SP)
       064050   013746  002266                                                           MOV     RXVECA,-(SP)
       064054   012746  000003                                                           MOV     #3,-(SP)
       064060   104437                                                                   TRAP    C$SVEC
       064062   062706  000010                                                           ADD     #10,SP
13062 064066   106427  000000                   MTPS    #PRI00         ;ALLOW INTERRUPTS.
13063                                   ;*
13064                                   ; Transmit, receive, and check 512 byte data patterns.
13065                                   ;-
13066                                       ;*
13067                                       ; Initialize the 512 byte pattern and the various data pattern pointers.
13068                                       ;-
13069 064072   005001                           CLR     R1             ;CLEAR THE DATA BYTE COUNTER.
13070 064074   012702  004012                   MOV     #BUFBAS,R2     ;GET THE BASE OF THE DATA PATTERN BUFFER.
13071 064100   110122                   6$:     MOVB    R1,(R2)+       ;WRITE A BYTE OF THE DATA PATTERN.
13072 064102   105201                           INCB    R1             ;GET THE NEXT BYTE FOR THE DATA PATTERN.
13073 064104   001375                           BNE     6$             ;LOOP UNTIL FIRST 1/2 OF PATTERN IS DONE.
```

```
13074 064106  105301                  8$:     DECB    R1              ;GET THE NEXT BYTE FOR THE DATA PATTERN.
13075 064110  110122                          MOVB    R1,(R2)+        ;WRITE A BYTE OF THE DATA PATTERN.
13076 064112  105701                          TSTB    R1              ;CHECK FOR DONE WRITING DATA PATTERN.
13077 064114  001374                          BNE     8$              ;LOOP IF DATA PATTERN IS NOT DONE.
13078 064116  110122                  10$:    MOVB    R1,(R2)+        ;WRITE A BYTE OF THE 32 BYTE OVERFLOW REGION.
13079 064120  005201                          INC     R1              ;COUNT THIS BYTE.
13080 064122  020127  000040                  CMP     R1,#32.         ;TEST FOR 32 BYTES WRITTEN.
13081 064126  001373                          BNE     10$             ;LOOP UNTIL 32 BYTES ARE WRITTEN.
13082                                 ;+
13083                                 ; Specify 9.6K baud, 2 stop bits, even parity, and 5 bits per character.
13084                                 ; Perform DMA transmission and reception of 512 byte data pattern.
13085                                 ;-
13086                                     ;+
13087                                     ; The following routine reports the error with numbers 914 thru 921.
13088                                     ;    LPR CHANGE bit error flags may be set by this subroutine.
13089                                     ;
13090 064130  012701  156740          12$:    MOV     #156740,R1      ;9.6K BAUD,2 STOP, EVEN PARITY, 5 BITS/CHAR.
13091 064134  004737  031264                  JSR     PC,GETTIM       ;GET TIME-OUT BASED ON MINIMUM BAUDRATE IN USE.
13092 064140  012702  004012                   MOV    #BUFBAS,R2      ;SET UP THE START ADR OF THE DATA PATTERN.
13093 064144  012703  001000                   MOV    #512.,R3        ;SET UP THE DATA PATTERN LENGTH.
13094 064150  012704  000001                   MOV    #1,R4           ;SPECIFY TO SEND 1 DATA PATTERN TO EACH LINE.
13095 064154  004737  037466                  JSR     PC,VANSJP       ;SET UP "VANILLA FLAVORED" TX/RX.
13096 064160  012737  177740  002366           MOV    #177740,IBM     ;FORM BIT MAP OF UNUSED BITS FOR 5 BITS/CHAR.
13097 064166  012737  021633  005466           MOV    #9115.,ERRNBR   ;SET ERROR NUMBER TO 9115.
13098                                         ;+
13099                                         ; This routine reports erros with numbers >>>>> 9115 thru 9117 <<<<<.
13100                                         ;-
13101 064174  004737  033004                  JSR     PC,PUFIFR       ;PURGE THE DUT RECEIVE CHARACTER FIFO.
13102 064200  103033                          BCC     60$             ;ABORT THIS TEST IF FIFO WOULD NOT PURGE.
13103 064202  012737  021636  005466           MOV    #9118.,ERRNBR   ;SET ERROR NUMBER TO 9118.
13104
13105 064210  004737  033176                  JSR     PC,PURRXB       ;PURGE THE RX CHAR BUFFER IN MEMORY.
13106 064214  004737  031554                  JSR     PC,INIDMA       ;SEND THE FIRST BATCH OF DATA PATTERNS.
13107                                     ;+
13108                                     ; This routine reports the error with numbers >>>>> 9118 thru 9123 <<<<<.
13109                                     ;-
13110 064220  004737  033232                  JSR     PC,RDCHRS       ;READ AND VERIFY THE RX CHARACTERS.
13111 064224  012737  021644  005466           MOV    #9124.,ERRNBR   ;SET ERROR NUMBER TO 9124.
13112                                     ;+
13113                                     ; This routine reports errors with numbers >>>>> 9124 thru 9127 <<<<<.
13114                                     ;-
13115 064232  004737  037154                  JSR     PC,TXRREP       ;REPORT FINAL ERRORS FROM RX/RX.
13116                                 ;+
13117                                 ; All done.  Have either run out of active lines, or completed the test.
13118                                 ;    Disable interrupts.
13119                                 ;    Clear the interrupt vectors.
13120                                 ;-
13121 064236  106427  000240                  MTPS    #PRIO5          ;DISABLE DEVICE INTERRUPTS.
13122 064242                                  CLRVEC  TXVECA          ;RETURN TX INT VECTOR TO UNUSED POOL.
       064242  013700  002270                                                  MOV     TXVECA,R0
       064246  104436                                                          TRAP    C$CVEC
13123 064250                                  CLRVEC  RXVECA          ;RETURN RX INT VECTOR TO UNUSED POOL.
       064250  013700  002266                                                  MOV     RXVECA,R0
       064254  104436                                                          TRAP    C$CVEC
13124
13125 064256  012737  021666  005466           MOV    #9142.,ERRNBR   ;SELECT NUMBER 9142 FOR THE NEXT ERROR REPORT.
13126 064264  004737  034502                  JSR     PC,REPSMR       ;REPORT ERROR SUMMARIES IF CALLED FOR.
```

HARDWARE TEST - SHTDMA -

```
13127 064270  106427  000240          60$:    MTPS    #PRIO5          ;DISABLE DEVICE INTERRUPTS.
13128 064274  005037  002362                   CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
13129 064300                                   ENDTST
      064300                                                                  L10103:
      064300  104401                                                                  TRAP    C$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.
                                ;*
                                ; - ************************************************************************
064302                          BGNTST
064302                                                                          T41::
                 000051          TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
064302  012737  000051  002364  MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (93)
064310  012737  177777  002362  MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
064316  013702  002660          MOV     BMPCQP,R2       ;GET THE CONTENTS OF THE POINTER.
064322  012703  002662          MOV     #BMPCQB,R3      ;GET THE START ADDRESS OF THE QUEUE.
064326  020203                  CMP     R2,R3           ;SEE IF THE POINTER HAS MOVED FROM THE BASE.
064330  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"

064332  012701  024163          MOV     #EM9304,R1      ;PASS THE FIRST MESSAGE TO BE REORTED.
064336                          ERRDF   9301,EM9301,ER9301 ;            >>>>> ERROR #9301 <<<<<.
064336  104455                                                                  TRAP    C$ERDF
064340  022125                                                                  .WORD   9301
064342  024046                                                                  .WORD   EM9301
064344  026600                                                                  .WORD   ER9301

064346  012737  002662  002660          MOV     #BMPCQB,BMPCQP  ;SET POINTER BACK TO THE BEGINING OF THE QUE.

064354  005037  002362  60$:    CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
064360                          ENDTST
064360                                                                  L10104:
064360  104401                                                                  TRAP    C$ETST
```

```
 13163                          ;******************************************************************************
 13164                          ;
 13165                          ;               VDHE.HWQ
 13166                          ;
 13167                          ;******************************************************************************
 13169
 13170
 13171                          .SBTTL  HARDWARE PARAMETER CODING SECTION
 13172
 13173
 13174
 13175                          ;++
 13176                          ; THE HARDWARE PARAMETER CODING SECTION CONTAINS MACROS
 13177                          ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES   THE
 13178                          ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
 13179                          ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
 13180                          ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
 13181                          ; WITH THE OPERATOR.
 13182                          ;--
 13183
 13184 064362                           BGNHRD
       064362  000015                                                    .WORD L10105-L$HARD/2
       064364                                                   L$HARD::
 13185
 13195                          ;DEVICE CSR ADDRESS QUESTION:
 13196 064364                           GPRMA   HWPTQ1,0,0,160000,177776,YES
       064364  000031                                                    .WORD   T$CODE
       064366  064416                                                    .WORD   HWPTQ1
       064370  160000                                                    .WORD   T$LOLIM
       064372  177776                                                    .WORD   T$HILIM
 13197                          ;DEVICE INTERRUPT VECTOR QUESTION:
 13198 064374                           CPRMA   HWPTQ2,2,0,40,776,YES
       064374  001031                                                    .WORD   T$CODE
       064376  064434                                                    .WORD   HWPTQ2
       064400  000040                                                    .WORD   T$LOLIM
       064402  000776                                                    .WORD   T$HILIM
 13199                          ;INTERRUPT BR  EVEL QUESTION:
 13200 064404                           GPRMD   HWPTQ5,6,0,177400,0,6,YES
       064404  003032                                                    .WORD   T$CODE
       064406  064467                                                    .WORD   HWPTQ5
       064410  177400                                                    .WORD   177400
       064412  000000                                                    .WORD   T$LOLIM
       064414  000006                                                    .WORD   T$HILIM
 13201
 13202
 13203 064416                           ENDHRD
                                                                         .EVEN
       064416                                                   L10105:
 13204
 13211
 13212 064416   103   123   122       HWPTQ1: .ASCIZ  /CSR ADDRESS: /
       064421   040   101   104
       064424   104   122   105
       064427   123   123   072
       064432   040   000
 13213 064434   111   116   124       HWPTQ2: .ASCIZ  /INTERRUPT VECTOR ADDRESS: /
       064437   105   122   122
```

HARDWARE PARAMETER CODING SECTION SEQ 0327

```
                064442      125     120     124
                064445      040     126     105
                064450      103     124     117
                064453      122     040     101
                064456      104     104     122
                064461      105     123     123
                064464      072     040     000
13214           064467      111     116     124         HWPTQ5: .ASCIZ  /INTERRUPT BR LEVEL: /
                064472      105     122     122
                064475      125     120     124
                064500      040     102     122
                064503      040     114     105
                064506      126     105     114
                064511      072     040     000
13215
13216                                                   .EVEN
```

```
13219                   ;*****************************************************************************
*
13220                   ;
13221                   ;               VDHE.SWQ
13222                   ;
13223                   ;*****************************************************************************
*
13225
13226
13227                   .SBTTL  SOFTWARE PARAMETER CODING SECTION
13228
13229                   ;++
13230                   ; THE SOFTWARE PARAMETER CODING SECTION CONTAINS MACROS
13231                   ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
13232                   ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
13233                   ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
13234                   ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
13235                   ; WITH THE OPERATOR.
13236                   ;--
13237
13238                   ;       NO SOFTWARE QUESTIONS ARE INCLUDED.
13239                   ;       BGNSFT
13240
13249                   ;       ENDSFT
13250
13251
13258                           .EVEN
```

SOFTWARE PARAMETER CODING SECTION

```
13260
13261                                   ;**********************************************************************************************
13262                                   ;
13263                                   ;               FVTSKL6.P11
13264                                   ;
13265                                   ;**********************************************************************************************
13266
13267
13268
13269 064514                            $PATCH::
13270 064514                                    .BLKW   24
13271
13278
13279
13280
13281
13282 064564                                    LASTAD
                                                                                .EVEN
      064564  000000                                                           .WORD   0
      064566  000000                                                           .WORD   0
      064570                            L$LAST::
13283 064570                                    ENDMOD
13284
13285
13286
13287
13288
13289
13290
13291           000001                          .END
```

Symbol table

```
ACTLNS  002272 G        CBLPRA  003272 G        C$GPHR= 000042          EF.STA= 000040 G        EM0701  013336 G
ADDR    036032          CBMAPA  003304 G        C$GPRI= 000040          EF0503  005630 G        EM0702  013373 G
ADR   = 000020 G        CBOFSA  003310 G        C$INIT= 000011          EF0505  005635 G        EM0703  013553 G
ADRPTR  030124 G        CHCNTB  003612 G        C$INLP= 000020          EF1401  005710 G        EM0801  013736 G
ALTFLD  026760 G        CHKBMP  027256 G        C$MANI= 000050          EF1402  006012 G        EM0802  013776 G
ASSEMB= 000010          CHKEXT  027326 G        C$MAP = 000102          EF1601  006047 G        EM0901  014051 G
BCOUNT  002456 G        CHKLOS  027426 G        C$MEM = 000031          EF1602  006073 G        EM0902  014102 G
BITLNG  002426 G        CHRMSK  027530 G        C$MMU = 000103          EF1603  006135 G        EM1001  014136 G
BITSTD  063334          CHRTOT  002646 G        C$MSG = 000023          EF1604  006177 G        EM1002  014202 G
BITTBL  002534 G        CKCHR   027566 G        C$OPNR= 000034          EF3001  006274 G        EM1003  014267 G
BIT0  = 000001 G        CKINAC  030004 G        C$OPNW= 000104          EF3002  006343 G        EM1101  014345 G
BIT00 = 000001 G        CKIRAP  030112 G        C$PNTB= 000014          EF4401  006412 G        EM1201  014371 G
BIT01 = 000002 G        CKTRPB  030142 G        C$PNTF= 000017          EF6401  006527 G        EM1202  014410 G
BIT02 = 000004 G        CLKBRL  002442 G        C$PNTS= 000016          EF7801  006604 G        EM1203  014474 G
BIT03 = 000010 G        CLKCSR  002440 G        C$PNTX= 000015          EF8401  006642 G        EM1204  014552 G
BIT04 = 000020 G        CLKHRZ  002446 G        C$PUTB= 000072          EF8402  006734 G        EM1205  014606 G
BIT05 = 000040 G        CLKINT  040430 G        C$PUTW= 000073          EF9001  007051 G        EM1301  014632 G
BIT06 = 000100 G        CLKVEC  002444 G        C$QIO = 000377          EF9002  007133 G        EM1302  014656 G
BIT07 = 000200 G        CLNRST  030172 G        C$RDBU= 000007          EF9003  007212 G        EM1401  014715 G
BIT08 = 000400 G        CLR16W  030214 G        C$REFG= 000047          EF9004  007246 G        EM1402  014745 G
BIT09 = 001000 G        CNTERR  030236 G        C$REL = 000077          EF9005  007303 G        EM1403  015033 G
BIT1  = 000002 G        CONMAP  030314 G        C$RESE= 000033          EF9006  007334 G        EM1404  015106 G
BIT10 = 002000 G        CSRA    002300 G        C$REVI= 000004          EF9007  007360 G        EM1405  015160 G
BIT11 = 004000 G        CSR0  = 000000 G        C$RFLA= 000021          EF9008  007454 G        EM1406  015173 G
BIT12 = 010000 G        CTRLCF  002362 G        C$RPT = 000025          EF9009  007513 G        EM1407  015206 G
BIT13 = 020000 G        C$AU  = 000052          C$SEFG= 000046          EF9010  007552 G        EM1408  015220 G
BIT14 = 040000 G        C$AUTO= 000061          C$SPRI= 000041          EF9012  007651 G        EM1601  015226 G
BIT15 = 100000 G        C$BRK = 000022          C$SVEC= 000037          EF9013  007765 G        EM1604  015311 G
BIT2  = 000004 G        C$BSEG= 000004          C$TOME= 000076          EF9016  010032 G        EM1701  015357 G
BIT3  = 000010 G        C$BSUB= 000002          DELAY   030370 G        EF9017  010127 G        EM1801  015434 G
BIT4  = 000020 G        C$CLCK= 000062          DEST    063340          EF9018  010203 G        EM1901  015502 G
BIT5  = 000040 G        C$CLEA= 000012          DFPTBL  002250 G        EF9019  010310 G        EM2001  015557 G
BIT6  = 000100 G        C$CLOS= 000035          DIAGMC= 000000          EF9020  010334 G        EM2002  015621 G
BIT7  = 000200 G        C$CLP1= 000006          DMRW    030502 G        EF9101  010415 G        EM2101  015674 G
BIT8  = 000400 G        C$CPBF= 000074          DMTSTA  002432 G        EF9103  010420 G        EM2102  015737 G
BIT9  = 001000 G        C$CPME= 000075          DM16B   030430 G        EF9301  010466 G        EM2201  016033 G
BMPCQB  002662 G        C$CVEC= 000036          DODMA   030624 G        EF9302  010544 G        EM2202  016070 G
BMPCQE  003062 G        C$DCLN= 000044          DPENDB  003312 G        EM0101  032456 G        EM2203  016162 G
BMPCQP  002660 G        C$DODU= 000051          DPLENB  003352 G        EM0102  032542 G        EM2301  016267 G
BOE   = 000400 G        C$DRPT= 000024          DPRSQB  005052 G        EM0103  010727 G        EM2302  016325 G
BRLEVL  002275 G        C$DU  = 000053          DPRSQE  005252 G        EM0201  010765 G        EM2401  016363 G
BRTBLB  002574 G        C$EDIT= 000000          DRADRT  002300 G        EM0202  011033 G        EM2601  016417 G
BRTBLE  002634 G        C$ERDF= 000055          DROP    042352          EM0203  011206 G        EM2602  016447 G
BUFBAS  004012 G        C$ERHR= 000056          DR00MG  010644 G        EM0204  011351 G        EM2603  016540 G
BUFEND  005012 G        C$ERRO= 000060          DR02MG  010650 G        EM0301  011530 G        EM2604  016626 G
BUFMID  004412 G        C$ERSF= 000054          DR04MG  010655 G        EM0302  011573 G        EM2605  016722 G
BUFPTR  002360 G        C$ERSO= 000057          DR06MG  010661 G        EM0303  011733 G        EM2606  017005 G
BUF3QT  004612 G        C$ESCA= 000010          DR10MG  010666 G        EM0401  012112 G        EM2607  017044 G
CACHRX  040354 G        C$ESEG= 000005          DR12MG  010675 G        EM0402  012161 G        EM2608  017140 G
CACHTX  040402 G        C$ESUB= 000003          DR14MG  010706 G        EM0501  012331 G        EM2609  017211 G
CALMSL  027032 G        C$ETST= 000001          DR16MG  010717 G        EM0502  012377 G        EM2610  017270 G
CBB     003272 G        C$EXIT= 000032          DUMY    063336          EM0509  012553 G        EM2611  017362 G
CBDPAA  003276 G        C$FREQ= 000101          EDROP   042430          EM0525  012557 G        EM3001  017445 G
CBDPLA  003300 G        C$FRME= 000100          EF.CON= 000036 G        EM0526  012647 G        EM3002  017476 G
CBDPNA  003302 G        C$GETB= 000026          EF.NEW= 000035 G        EM0601  012737 G        EM3003  017572 G
CBLNCA  003274 G        C$GETW= 000027          EF.PWR= 000034 G        EM0602  012773 G        EM3004  017646 G
CBLPBA  003306 G        C$GMAN= 000043          EF.RES= 000037 G        EM0603  013153 G        EM3005  017722 G
```

Symbol table

```
EM3101  020014 G      EM9024  023275 G      F$MOD = 000000        T$INIT= 000041        L$LADP  002026 G
EM3102  020050 G      EM9025  023313 G      F$MSG = 000011        I$MOD = 000041        L$LAST  064570 G
EM4001  020111 G      EM9026  023407 G      F$PROT= 000021        I$MSG = 000041        L$LOAD  002100 G
EM4002  020134 G      EM9027  023433 G      F$PWR = 000017        I$PROT= 000040        L$LUN   002074 G
EM4101  020170 G      EM9028  023513 G      F$RPT = 000012        I$PTAB= 000041        L$MREV  002050 G
EM4102  020213 G      EM9030  023572 G      F$SEG = 000003        I$PWR = 000041        L$NAME  002000 G
EM4103  020247 G      EM9101  023647 G      F$SOFT= 000005        I$RPT = 000041        L$PRIO  002042 G
EM4401  020333 G      EM9102  023703 G      F$SRV = 000010        I$SEG = 000041        L$PROT  041466 G
EM4402  020355 G      EM9104  023772 G      F$SUB = 000002        I$SETU= 000041        L$PRT   002112 G
EM4403  020423 G      EM9301  024046 G      F$SW  = 000014        I$SRV = 000041        L$REPP  002062 G
EM4404  020520 G      EM9302  024066 G      F$TEST= 000001        I$SUB = 000041        L$REV   002010 G
EM4405  020557 G      EM9303  024116 G      GETCHR  031052 G      I$TST = 000041        L$RPT   041460 G
EM4406  020653 G      EM9304  024163 G      GETLP2  031134 G      J$JMP = 000167        L$SPC   002056 G
EM4407  020727 G      ENDETB  005012 G      GETPRM  042074        LGRP1M  002370 G      L$SPCP  002020 G
EM4408  021011 G      ENDIT   042246        GETTIM  031264 G      LGRP2M  002372 G      L$SPTP  002024 G
EM4409  021054 G      ERCNTB  003452 G      GMANWD  002434 G      LINBIT  031646 G      L$STA   002030 G
EM4410  021111 G      ERLTBL  004012 G      GPRSOB  002634 G      LNCTRA  002310 G      L$SW    002262 G
EM4411  021140 G      ERRBLK  005472 G      G$CNTO= 000200        LNCTRO= 000010 G      L$TEST  002114 G
EM5101  021205 G      ERRMSG  005470 G      G$DELM= 000372        LOE   = 040000 G      L$TIML  002014 G
EM5102  021233 G      ERRNBR  005466 G      G$DISP= 000003        LOPBCK  002274 G      L$UNIT  002012 G
EM5103  021271 G      ERRTYP  005464 G      G$EXCP= 000400        LOT   = 000010 G      L10000  002260
EM5201  021321 G      ERSMRF  002650 G      G$HILI= 000002        LPCSLT= 000036 G      L10001  002266
EM5202  021345 G      ER0101  024240 G      G$LOLI= 000001        LPRA    002304 G      L10002  024342
EM5301  021403 G      ER0201  024562 G      G$NO  = 000000        LPRO  = 000004 G      L10003  024642
EM5302  021430 G      ER0503  024644 G      G$OFFS= 000400        L$ACP   002110 G      L10004  024666
EM5303  021507 G      ER0504  024670 G      G$OFSI= 000376        L$APT   002036 G      L10005  024734
EM5401  021560 G      ER1601  024736 G      G$PRMA= 000001        L$AU    042436 G      L10006  025032
EM5402  021617 G      ER1603  025034 G      G$PRMD= 000002        L$AUT   002070 G      L10007  025112
EM5501  021660 G      ER3001  025114 G      G$PRML= 000000        L$AUTO  042274 G      L10010  025202
EM5601  021715 G      ER6401  025204 G      G$RADA= 000140        L$CCP   002106 G      L10011  025300
EM5701  021763 G      ER7801  025302 G      G$RADB= 000000        L$CLEA  042276 G      L10012  025326
EM6401  022031 G      ER9001  025330 G      G$RADD= 000040        L$CO    002032 G      L10013  025416
EM6402  022060 G      ER9002  025420 G      G$RADL= 000120        L$DEPO  002011 G      L10014  025564
EM6601  022121 G      ER9003  025566 G      G$RADO= 000020        L$DESC  005544 G      L10015  025746
EM6602  022147 G      ER9004  025750 G      G$XFER= 000004        L$DESP  002076 G      L10016  026050
EM6701  022221 G      ER9005  026052 G      G$YES = 000010        L$DEVP  002060 G      L10017  026276
EM6702  022244 G      ER9007  026300 G      HELP  = 000000        L$DISP  002124 G      L10020  026354
EM9001  022321 G      ER9008  026356 G      HOE   = 100000 G      L$DLY   002116 G      L10021  026436
EM9003  022355 G      ER9101  026440 G      HWPTQ1  064416        L$DTP   002040 G      L10022  026464
EM9004  022377 G      ER9102  026466 G      HWPTQ2  064434        L$DTYP  002034 G      L10023  026576
EM9006  022415 G      ER9301  026600 G      HWPTQ5  064467        L$DU    042326 G      L10024  026756
EM9007  022470 G      EVL   = 000004 G      IBE   = 010000 G      L$DUT   002072 G      L10025  041464
EM9008  022553 G      EXCNTB  003412 G      IBM     002366 G      L$DVTY  005534 G      L10027  042272
EM9009  022634 G      E$END = 002100        IDU   = 000040 G      L$EF    002052 G      L10030  042274
EM9010  022660 G      E$LOAD= 000035        IER   = 020000 G      L$ENVI  002044 G      L10031  042324
EM9011  022704 G      FFREM   002430 G      IESTAT  002374 G      L$ERRT  005464 G      L10032  042434
EM9012  022714 G      FINACT  030772 G      INDATP  031342 G      L$ETP   002102 G      L10033  042442
EM9013  022724 G      F$AU  = 000015        INDTPX  031372 G      L$EXP1  002046 G      L10034  042732
EM9014  022733 G      F$AUTO= 000020        INICHR  031442 G      L$EXP4  002064 G      L10035  043146
EM9015  023027 G      F$BGN = 000040        INIDMA  031554 G      L$EXP5  002066 G      L10036  043376
EM9016  023043 G      F$CLEA= 000007        ISR   = 000100 G      L$HARD  064364 G      L10037  043560
EM9017  023052 G      F$DU  = 000016        IXE   = 004000 G      L$HIME  002120 G      L10040  043736
EM9018  023163 G      F$END = 000041        I$AU  = 000041        L$HPCP  002016 G      L10041  044140
EM9019  023173 G      F$HARD= 000004        I$AUTO= 000041        L$HPTP  002022 G      L10042  044332
EM9020  023210 G      F$HW  = 000013        I$CLN = 000041        L$HW    002250 G      L10043  044524
EM9022  023234 G      F$INIT= 000006        I$DU  = 000041        L$ICP   002104 G      L10044  044676
EM9023  023253 G      F$JMP = 000050        I$HRD = 000041        L$INIT  041474 G      L10045  045076
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Symbol table

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L10046  045310          O$AU   = 000000          RESETT  034530 G       SVCGBL= 000000          T$HILI= 000006
L10047  045556          O$BGNR= 000000          RMATBB  002340 G       SVCINS= 000001          T$LAST= 000001
L10050  046120          O$BGNS= 000000          ROLDAP  034642 G       SVCSUB= 000001          T$LOLI= 000000
L10051  046330          O$DU   = 000001          RRXNDN  034674 G       SVCTAG= 000001          T$LSYM= 010000
L10052  046544          O$ERRT= 000001          RSTRPT  034734 G       SVCTST= 000001          T$LTNO= 000051
L10053  047010          O$GNSW= 000001          RTXNDN  035316 G       SWAPO   036036 G        T$NEST= 177777
L10054  047260          O$POIN= 000001          RXBCNT  003066 G       S$LSYM= 010000          T$NS0  = 000000
L10055  047366          O$SETU= 000000          RXBDTX= 000030 G       TIMER1  002450 G        T$NS1  = 000004
L10056  047576          PARATB  002474 G        RXBEND  003270 G       TIMER2  002452 G        T$PTNU= 000000
L10057  050032          PARATE  002514 G        RXBETX= 000020 G       TIMER3  002454 G        T$SAVL= 177777
L10060  050332          PAR0A   002474 G        RXBFUL= 000100 G       TNUM   = 000051 G       T$SEGL= 177777
L10061  050670          PAR1A   002476 G        RXBIPT  003064 G       TP4BRT  041020 G        T$SUBN= 000000
L10062  051702          PAR2A   002500 G        RXBOPT  003062 G       TP4FLG  002424 G        T$TAGL= 177777
L10063  052554          PAR3A   002502 G        RXBRRT  040500 G       TP4RTN  041042 G        T$TAGN= 010106
L10064  053032          PAR4A   002504 G        RXBSTA  003070 G       TP4VEC  002422 G        T$TEMP= 000000
L10065  053420          PAR5A   002506 G        RXCHRS  040570 G       TRPAD2  030154 G        T$TEST= 000051
L10066  054040          PAR6A   002510 G        RXCNTB  003712 G       TSABRT  036106 G        T$TSTM= 177777
L10067  054434          PAR7A   002512 G        RXDONF  002654 G       TSTNUM  002364 G        T$TSTS= 000001
L10070  055056          PASCNT  002376 G        RXDSBL  035356 G       TXAD1A  002312 G        T$$AU  = 010033
L10071  055346          PCSLOT= 000016 G        RXENBL  035452 G       TXAD1O= 000012 G        T$$AUT= 010030
L10072  055650          PDRATB  002514 G        RXIE0   035546 G       TXAD2A  002314 G        T$$CLE= 010031
L10073  056342          PDRATE  002534 G        RXIE1   035600 G       TXAD2O= 000014 G        T$$DU  = 010032
L10074  057032          PDR0A   002514 G        RXINPT  040734 G       TXBFCA  002316 G        T$$HAR= 010105
L10075  057476          PDR1A   002516 G        RXINTC  002412 G       TXBFCO= 000016 G        T$$HW  = 010000
L10076  060122          PDR2A   002520 G        RXINTF  002414 G       TXCHA   002302 G        T$$INI= 010027
L10077  060622          PDR3A   002522 G        RXPTRB  003552 G       TXCHRO= 000002 G        T$$MSG= 010024
L10100  061550          PDR4A   002524 G        RXTOUT  002402 G       TXCNTB  003652 G        T$$PRO= 010026
L10101  063346          PDR5A   002526 G        RXVECA  002266 G       TXDATP  036220 G        T$$RPT= 010025
L10102  063730          PDR6A   002530 G        R0SLOT= 000002 G       TXDBLF  002656 G        T$$SW  = 010001
L10103  064300          PDR7A   002532 G        R1SLOT= 000004 G       TXDMA   041064 G        T$$TES= 010104
L10104  064360          PMSFLG  002436 G        R2SLOT= 000006 G       TXDONE  036242 G        T1      042444 G
L10105  064416          PNT    = 001000 G       R3SLOT= 000010 G       TXDONF  002652 G        T10     044700 G
MAPCNT  031674 G        PREGRT  005516 G        R4SLOT= 000012 G       TXDSBL  036352 G        T11     045100 G
MAPLNS= 000377 G        PREG05  005474          R5SLOT= 000014 G       TXENBL  036446 G        T12     045312 G
MFUNIT  005572 G        PRI    = 002000 G       SAVBMP  035624 G       TXENBM  002410 G        T13     045560 G
MMENAB  002472 G        PRI00  = 000000 G       SAVPRI  002406 G       TXIE0   036542 G        T14     046122 G
MMPRES  002470 C        PRI01  = 000040 G       SAVTEN  002404 G       TXIE1   036574 G        T15     046332 G
MMSR0   002464 G        PRI02  = 000100 G       SCBCTB  005252 G       TXINTC  002416 G        T16     046546 G
MMSR3   002466 G        PRI03  = 000140 G       SCBCTE  005254 G       TXINTF  002420 G        T17     047012 G
MSG1    024344 G        PRI04  = 000200 G       SCNSTB  005254 G       TXINTR  041216 G        T18     047262 G
MSG2    024422 G        PRI05  = 000240 G       SCNSTE  005256 G       TXPTRB  003512 G        T19     047370 G
MSG3    024501 G        PRI06  = 000300 G       SCTPTB  005256 G       TXRINI  036620 G        T2      042734 G
MSLCNT  002462 G        PRI07  = 000340 G       SCTPTE  005260 G       TXRLNB  005424 G        T20     047600 G
MSLGET  031726 G        PROTBL  005344 G        SDPBAS  005260 G       TXRLNE  005444 G        T21     050034 G
MS' OOP 032042 G        PRTLPR  032640 G        SDPEND  005300 G       TXROFF  037074 G        T22     050334 G
MSTICK  002460 G        PUFIF0  032722 G        SDP2B   005304 G       TXRON   037130 G        T23     050672 G
MUL16U  032056 G        PUFIFR  033004 G        SDP2E   005324 G       TXRREP  037154 G        T24     051704 G
NDERPT  002264 G        PURRXB  033176 G        SETPAR  035672 G       TXRXLB  005364 G        T25     052556 G
NEWCHR  032132 G        RBUFA   002302 G        SFPTBL  002262 G       TXRXLE  005424 G        T26     053034 G
NEWPAS  042054          RBUF0  = 000002 G       SKPSTS  035740 G       TXSCHR  041272 G        T27     053422 G
NEWRES  042046          RDCHRS  033232 G        STATA   002306 G       TXVECA  002270 G        T28     054042 G
NEWSTA  041540          RDMAST  033604 G        STAT0  = 000006 G       T$ARGC= 000003          T29     054436 G
NUMLNS= 000010 G        RDPDR   033636 G        STGTRB  005444 G       T$CODE= 003032          T3      043150 G
OOTSTA  063342          READBX  034056 G        STPSW   036016 G       T$ERRN= 022125          T30     055060 G
OOPS    032412 G        REGTST  034140 G        STSTB   003752 G       T$EXCP= 000000          T31     055350 G
OPTION  002262 G        REPCOD  034350 G        STSTE   004012 G       T$FLAG= 000040          T32     055652 G
O$APTS= 000000          REPSMR  034502 G        SUCSS   063344         T$GMAN= 000000          T33     056344 G
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Symbol table

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T34     057034 G        T40     063732 G        UAM   = 000200 G        WAIBIS  037740 G        WTWLPR  040324 G
T35     057500 G        T41     064302 G        UNBTTB  002320 G        WAITTX  040014 G        X$ALWA= 000000
T36     060124 G        T5      043562 G        UNITN   002276 G        WDPDR   040054 G        X$FALS= 000040
T37     060624 G        T6      043740 G        UNSDIV  037234 G        WORD1   002400 G        X$OFFS= 000400
T38     061552 G        T7      044142 G        UPDCHR  037370 G        WTWLNC  040250 G        X$TRUE= 000020
T39     063350 G        T8      044334 G        VANSUP  037466 G        WTWLNS  040300 G        $PATCH  064514 G
T4      043400 G        T9      044526 G        WAIBIC  037664 G

. ABS.  064570    000   (RW,I,GBL,ABS,OVR)
        000000    001   (RW,I,LCL,REL,CON)
Errors detected:  0

*** Assembler statistics


Work  file  reads: 296
Work  file writes: 312
Size of work file: 34680 Words  ( 136 Pages)
Size of core pool: 19714 Words  ( 75 Pages)
Operating  system: RSX-11M/PLUS (Under VAX/VMS)

Elapsed time: 00:59:22.86
CVDHEB0.BIN,CVDHEB0.LST/-SP=SVC40/ML,CVDHEB0.P11
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