DHU11

DHU-11 FUNC TST PART 1

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AH-T795A-MC

FICHE 1 OF 1

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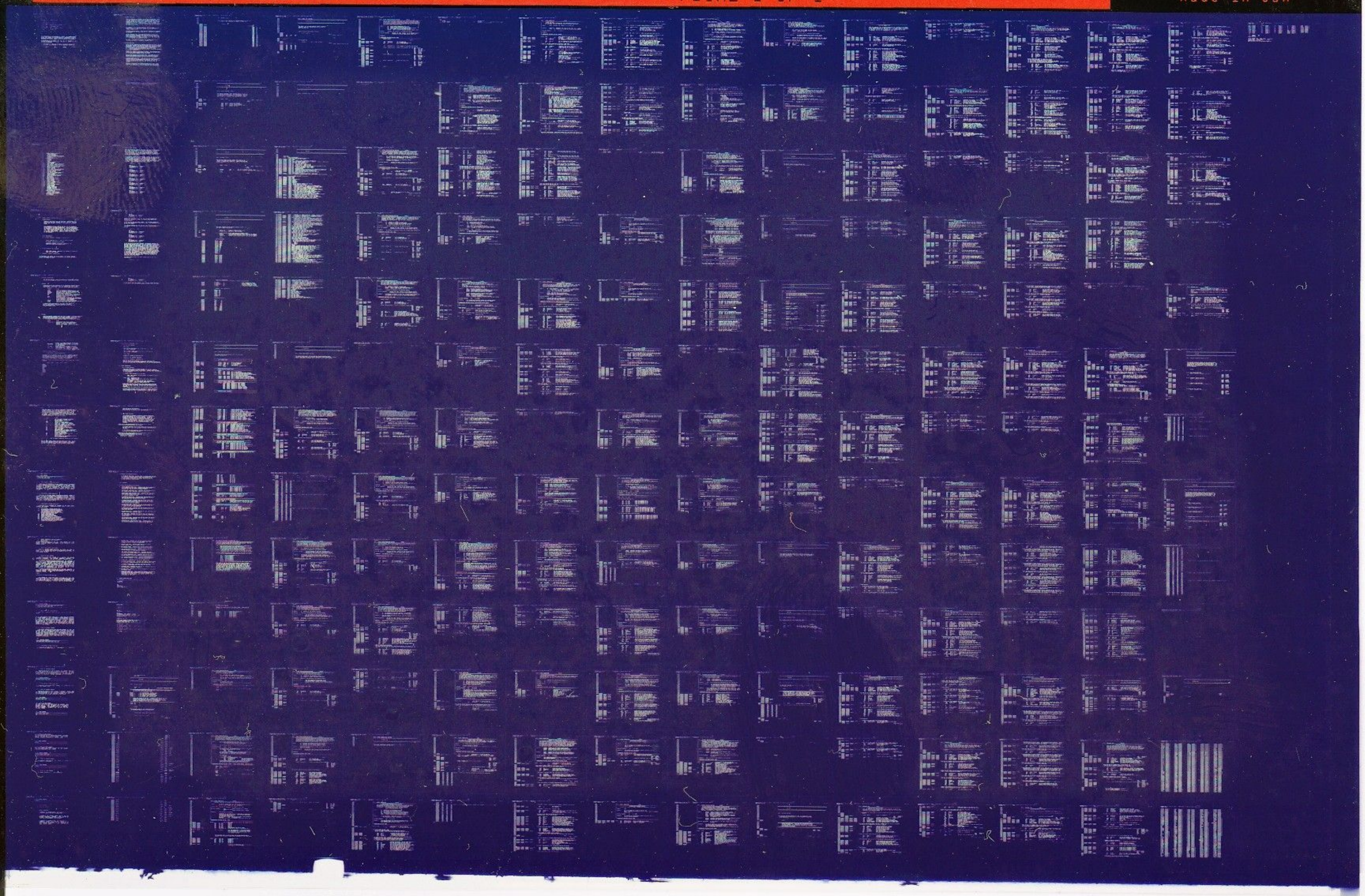

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                IDENTIFICATION
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PRODUCT CODE:   AC-T794A-MC

PRODUCT NAME:   CZDHUAO DHU-11 FUNC TST PART1

PRODUCT DATE:   15 DECEMBER 1983

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AUTHOR:         ANTHONY HART

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TABLE OF CONTENTS

1.0 GENERAL PROGRAM CONSIDERATIONS
1.1 PROGRAM ABSTRACT
1.2 SYSTEM REQUIREMENTS
1.3 RELATED DOCUMENTS AND STANDARDS
1.4 DIAGNOSTIC HIERARCY PREREQUISITES
1.5 ASSUMPTIONS
2.0 OPERATING INSTRUCTIONS
2.1 COMMANDS
2.2 SWITCHES
2.3 FLAGS
2.4 EXTENDED COMMAND SYNTAX
2.4.1 START COMMAND
2.4.1.1 TESTS SWITCH (/TESTS:<TEST-LIST>)
2.4.1.2 PASS SWITCH (/PASS:<PASS-CNT>)
2.4.1.3 FLAGS SWITCH (/FLAGS:<FLAG-LIST>)
2.4.1.4 END OF PASS SWITCH (/EOP:<INCR>)
2.4.1.5 EFFECT OF START COMMAND
2.4.2 RESTART COMMAND
2.4.2.1 TESTS, PASS, AND FLAGS SWITCHES
2.4.2.2 UNITS SWITCH (/UNITS:<UNIT-LIST>)
2.4.2.3 EFFECT OF RESTART COMMAND
2.4.3 CONTINUE COMMAND
2.4.3.1 FLAG SWITCH (/FLAGS:<FLAG-LIST>)
2.4.3.2 EFFECT OF CONTINUE COMMAND
2.4.4 PROCEED COMMAND
2.4.4.1 FLAGS SWITCH (/FLAGS:<FLAG-LIST>)
2.4.4.2 EFFECT OF PROCEED COMMAND
2.4.5 ADD COMMAND
2.4.6 EFFECT OF ADD COMMAND
2.4.7 DROP COMMAND
2.4.8 EFFECT OF DROP COMMAND
2.4.9 PRINT COMMAND
2.4.9.1 EFFECT OF PRINT COMMAND
2.4.10 DISPLAY COMMAND
2.4.10.1 EFFECT OF DISPLAY COMMAND
2.4.11 FLAGS COMMAND
2.4.11.1 EFFECT OF FLAGS COMMAND
2.4.12 ZFLAGS COMMAND
2.4.13 ZFLAGS COMMAND
2.4.14 CONTROL CHARACTERS
2.5 HARDWARE QUESTIONS
2.6 SOFTWARE QUESTIONS
2.7 EXTENDED P-TABLE DIALOGUE
2.8 QUICK START-UP PROCEDURE (XXDP+)
3.0 ERROR INFORMATION
3.1 TYPES OF ERROR MESSAGES
3.2 SPECIFIC ERROR MESSAGES
4.0 PERFORMANCE AND PROGRESS REPORTS
5.0 TEST SUMMARIES
6.0 EXAMPLE ERROR FREE PASS

1.0 GENERAL PROGRAM CONSIDERATIONS

1.1 PROGRAM ABSTRACT

CZDHUAO IS PART ONE OF THE DHU FUNCTIONAL VERIFICATION TEST. THIS PART OF THE TEST VERIFIES THE RESET, SELFTEST, REGISTER ACCESS, AND INTERRUPT FUNCTIONS OF THE BOARD ARE FUNCTIONING CORRECTLY.

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

1.2 SYSTEM REQUIREMENTS

THE FOLLOWING HARDWARE IS REQUIRED TO RUN THE DHU FVT:

- O UNIBUS PROCESSOR WITH AT LEAST 32K BYTES OF MEMORY.
- O DHU BOARDS INSTALLED ON THE UNIBUS.
- O APPROPRIATE PROGRAM LOAD DEVICE SUPPORTING XXDP+ MEDIA OR A DOWN LINE LOADING SYSTEM.

1.3 RELATED DOCUMENTS AND STANDARDS

- O XXDP+ USER'S MANUAL - DESCRIBES THE RUNNING OF DIAGNOSTICS UNDER THE XXDP+ MONITOR.

1.4 DIAGNOSTIC HIERARCY PREREQUISITES

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

2.0 OPERATING INSTRUCTIONS

THIS SECTION CONTAINS A BRIEF DESCRIPTION OF THE RUNTIME SERVICES.
FOR DETAILED INFORMATION, REFER TO THE XXDP+ USER'S MANUAL (CHQUS).

2.1 COMMANDS

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

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

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

2.2 SWITCHES

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

SWITCH	EFFECT
/TESTS:LIST	EXECUTE ONLY THOSE TESTS SPECIFIED IN THE LIST. LIST IS A STRING OF TEST NUMBERS, FOR EXAMPLE - /TESTS:1:5:7-10. THIS LIST WILL CAUSE TESTS 1,5,7,8,9,10 TO

```
                                BE RUN.  ALL OTHER TESTS WILL NOT BE RUN.
        /PASS:DDDDD             EXECUTE DDDDD PASSES (DDDDD = 1 TO 64000)
        /FLAGS:FLGS             SET SPECIFIED FLAGS.SEE THE FLAGS SECTION
                                OF THIS DOCUMENT.
        /EOP:DDDDD              REPORT END OF PASS MESSAGE AFTER EVERY
                                DDDDD PASSES ONLY.  (DDDDD = 1 TO 64000)
        /UNITS:LIST             TEST/ADD/DROP ONLY THOSE UNITS SPECIFIED
                                IN THE LIST.  LIST EXAMPLE - /UNITS:0:5:10-12
                                USE UNITS 0,5,10,11,12 (UNIT NUMBERS = 0-63)

EXAMPLE OF SWITCH USAGE:

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

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

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

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

2.3 FLAGS

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

FLAG	EFFECT
HOE	HALT ON ERROR - CONTROL IS RETURNED TO RUNTIME SERVICES COMMAND MODE
LOE	LOOP ON ERROR
IER*	INHIBIT ALL ERROR REPORTS
IBR*	INHIBIT ALL ERROR REPORTS EXCEPT FIRST LEVEL (FIRST LEVEL CONTAINS ERROR TYPE, NUMBER, PC, TEST AND UNIT)
IXR*	INHIBIT EXTENDED ERROR REPORTS (THOSE CALLED BY PRINTX MACRO'S)
PRI	DIRECT MESSAGES TO LINE PRINTER
PNT	PRINT TEST NUMBER AS TEST EXECUTES
BOE	"BELL" ON ERROR
UAM	UNATTENDED MODE (NO MANUAL INTERVENTION)
ISR	INHIBIT STATISTICAL REPORTS (DOES NOT APPLY TO DIAGNOSTICS WHICH DO NOT SUPPORT STATISTICAL REPORTING)
IDR	INHIBIT PROGRAM DROPPING OF UNITS
ADR	EXECUTE AUTODROP CODE
LOT	LOOP ON TEST
EVL	EXECUTE EVALUATION (ON DIAGNOSTICS WHICH HAVE EVALUATION SUPPORT)

*SEE THE ERROR INFORMATION SECTION OF THIS DOCUMENT.

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

```
/FLAGS:LOE:IER:BOE
```

2.4 EXTENDED COMMAND SYNTAX

2.4.1 START COMMAND -

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

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

<TEST-LIST> IS A SEQUENCE OF DECIMAL NUMBERS (1:2 ETC.) OR RANGES OF DECIMAL NUMBERS (1-5:8-10 ETC.), SEPERATED BY COLONS, THAT SPECIFY THE TESTS TO BE EXECUTED.TESTS WILL BE EXECUTED IN NUMERICAL ORDER REGARDLESS OF THE ORDER OF SPECIFICATION. THE DEFAULT IS TO EXECUTE ALL TESTS. ON THIS AND ALL SWITCHES, THE ANGLE BRACKETS <> ARE PUNCTUATION USED IN THE DEFINITION ONLY, AND ARE NOT TO BE TYPED BY THE OPERATOR. SEE EXAMPLE AT END OF "EFFECT OF START COMMAND" SECTION.

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

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

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

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

HOE	HALT ON ERROR, CAUSING COMMAND MODE TO BE ENTERED WHEN AN ERROR IS ENCOUNTERED.
LOE	LOOP ON ERROR, CAUSING THE DIAGNOSTIC TO LOOP CONTINUOUSLY WITHIN THE SMALLEST DEFINED BLOCK OF CODING (SEGMENT, SUBTEST, OR TEST) CONTAINING THE ERROR.
IER	INHIBIT ERROR REPORTING.
IBE	INHIBIT BASIC ERROR REPORTS.
IXE	INHIBIT EXTENDED ERROR REPORTS.
PRI	DIRECT ALL MESSAGES TO A LINE PRINTER.
PNT	PRINT NUMBER OF TEST BEING EXECUTED.
BOE	BELL ON ERROR (NOT RELATED TO BELL PROMPTING).
UAM	RUN IN UNATTENDED MODE, BYPASSING MANUAL INTERVENTION (ILLEGAL FOR THIS DIAGNOSTIC).
ISR	INHIBIT STATISTICAL REPORTS.

IDU INHIBIT DROPPING OF UNITS BY DIAGNOSTIC.
(HAS NO EFFECT IN THIS DIAGNOSTIC.)
LOT LOOP ON TEST.
THE FLAGS NAMED OR EQUATED TO 1 ARE SET, THOSE EQUATED TO 0 ARE CLEARED. A FLAG NOT SPECIFIED IS CLEARED. IF THE FLAGS SWITCH IS NOT GIVEN ALL FLAGS ARE CLEARED. SEE EXAMPLE AT END OF "EFFECT OF START COMMAND" SECTION.

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

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

2.4.1.5 EFFECT OF START COMMAND -

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

THE HARDWARE PARAMETER DIALOGUE COMMENCES WITH THE QUESTION "# UNITS (D) ?" TO WHICH THE OPERATOR SHOULD REPLY WITH THE NUMBER OF UNITS TO BE TESTED. FOLLOWING THIS ARE THE QUESTIONS WHEREBY THE P-TABLES THEMSELVES ARE BUILT. EACH P-TABLE IS A CORE-RESIDENT TABLE CONTAINING ALL THE HARDWARE INFORMATION FOR ONE COMPLETE UNIT.EACH QUESTION IS FOLLOWED BY THE RESPONSE RADIX (D FOR DECIMAL, B FOR BINARY, O FOR OCTAL, L FOR YES/NO) IN PARENTHESES AND THE DEFAULT VALUE AFTER THE PARENTHESES. FOR THE ACTUAL HARDWARE P-TABLE QUESTIONS SEE THE "HARDWARE PARAMETERS" SECTION.

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

EXAMPLE:

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

THIS COMMAND WILL CAUSE THREE PASSES TO BE MADE, WITH EACH PASS CONSISTING OF TESTS 1,3, AND 4. THERE IS NO DIFFERENCE BETWEEN SAYING <FLAG> AND SAYING <FLAG=1>. THE NOTATION <FLAG=0> IS MEANINGFUL ONLY ON A COMMAND OTHER THAN START TO CLEAR A FLAG THAT WAS PREVIOUSLY SET. NOTE THAT ON ALL COMMANDS ONLY THE FIRST THREE LETTERS ARE SCANNED.

2.4.2 RESTART COMMAND -

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

2.4.2.1 TESTS, PASS, AND FLAGS SWITCHES -

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

2.4.2.2 UNITS SWITCH (/UNITS:<UNIT-LIST>) - <UNIT-LIST> IS A SEQUENCE OF DECIMAL NUMBERS (0,1 ETC.) OR RANGES OF DECIMAL NUMBERS (0-5, 8-10 ETC.) THAT SPECIFY THE UNITS TO BE TESTED. THE NUMBERS ARE SEPARATED BY COLONS. THE NUMBERS MAY RANGE FROM 0 THRU N-1 (N IS THE NUMBER OF UNITS SPECIFIED IN THE PREVIOUS START COMMAND). THE NUMB INDICATES THE POSITION OF THE P-TABLE AS THE DATA WAS ENTER D 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 UNITS SWITCH SHOULD NOT BE USED WITH THIS PROGRAM. THE SOFTWARE DIALOGUE MAY OPTIONALLY BE REEXECUTED (OPERATOR WILL BE ASKED). THE COMMAND CAN BE USED AFTER COMMAND MODE HAS BEEN REENTERED IN ANY OF THE THREE NORMAL WAYS: A) THE REQUESTED NUMBER OF PASSES HAVE BEEN MADE, B) AN ERROR WAS ENCOUNTERED WITH THE HALT ON ERROR FLAG SET, OR C) A CONTROL/C WAS ENTERED BY THE OPERATOR.

2.4.3 CONTINUE COMMAND -

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

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

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

2.4.3.2 EFFECT OF CONTINUE COMMAND -

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

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

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

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

2.4.4.2 EFFECT OF PROCEED COMMAND -

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

2.4.5 ADD COMMAND -
****
ADD/UNITS:<UNIT-LIST>
****

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

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

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

2.4.9 PRINT COMMAND -
****
PRI(NT)
****

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

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

2.4.10.1 EFFECT OF DISPLAY COMMAND -

THE HARDWARE P-TABLE FOR THE TEST STATION IS PRINTED IN THE FORMAT IN WHICH IT WAS 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 REQUESTES THE CSR ADDRESS OF THE SPECIFIED DHU-11. THE DEFAULT ANSWER FOR THIS QUESTION IS ADDRESS 160460 (OCTAL).

2. INTERRUPT VECTOR ADDRESS - THIS QUESTION REQUESTS THE INTERRUPT VECTOR ADDRESS OF THE SPECIFIED DHU-11. THE DEFAULT ANSWER IS 310 (OCTAL).

3. ACTIVE LINES BIT MAP - THIS QUESTION REQUESTS AN OCTAL BIT MAP OF THE SERIAL COMMUNICATION LINES ON THE DHU11 WHICH ARE BEING SELECTED FOR TESTING. IF THE BIT IN THE BIT MAP IS SET WHICH CORRESPONDS TO A PARTICULAR LINE (I.E. BIT 5 FOR LINE 5) THAT LINE WILL BE TESTED BY THE FVT.

4. BR LEVEL - THIS QUESTION REQUESTS THE INTERRUPT BR LEVEL OF THE SPECIFIED DHU-11. THE DEFAULT ANSWER IS BR 5.

2.6 SOFTWARE QUESTIONS

AFTER YOU HAVE ANSWERED THE HARDWARE QUESTIONS OR AFTER A RESTART OR CONTINUE COMMAND, THE RUNTIME SERVICES WILL ASK FOR SOFTWARE PARAMETERS. THESE PARAMETERS WILL GOVERN SOME DIAGNOSTIC SPECIFIC OPERATION MODES. YOU WILL BE PROMPTED BY "CHANGE SW (L) ?" IF YOU WISH TO CHANGE ANY PARAMETERS, ANSWER BY TYPING "Y". THE SOFTWARE QUESTIONS AND THE DEFAULT VALUES ARE DESCRIBED IN THE NEXT PARAGRAPH(S).

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

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

3. EXTENDED ERROR REPORTING - THIS QUESTION ASKS WHETHER EXTENDED ERROR INFORMATION IS REQUIRED OTHER THAN THE "TEST FAILED" MESSAGE, ON EACH ERROR REPORTED. THE DEFAULT IS "NO" I.E. ONLY A MESSAGE REPORTING THE FACT THAT THE TEST FAILED WILL BE PRINTED.

4. NUMBER OF INDIVIDUAL DATA ERRORS TO REPORT ON A LINE - THIS QUESTION IS ASKED ONLY IF THE PREVIOUS QUESTION WAS ANSWERED "YES". THE QUESTION ASKS FOR THE NUMBER OF DATA ERRORS WHICH

SHOULD BE REPORTED INDIVIDUALLY BY THIS PROGRAM FOR EACH LINE
FOR EACH TRANSMISSION TEST. ERRORS WHICH ARE NOT REPORTED
INDIVIDUALLY ARE REPORTED IN SUMMARY ERROR REPORTS.

2.7 EXTENDED P-TABLE DIALOGUE

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

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

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

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

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

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

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

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

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

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

```
        UNIT 8
        CSR ADDRESS (O)  160000<CR>
        SUB-DEVICE # (O) ?  7<CR>
        Q-FACTOR (O) 1 ?  <CR>
```

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

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

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

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

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

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

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

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

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

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

```
UNIT 1
CSR ADDRESS (0) ?  160000<CR>
SUB-DEVICE # (0) ?  0-7<CR>
Q FACTOR (0) 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) QUESTIONS
3. TYPE "R NAME", WHERE NAME IS THE NAME OF THE BIN OR BIC FILE FOR THIS PROGRAM
4. TYPE "START"
5. ANSWER THE "CHANGE HW" QUESTION WITH "Y"
6. ANSWER ALL THE HARDWARE QUESTIONS
7. ANSWER THE "CHANGE SW" QUESTION WITH "N"

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

3.0 ERROR INFORMATION

3.1 TYPES OF ERROR MESSAGES

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

THE GENERAL ERROR MESSAGE IS OF THE FORM:

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

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

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

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

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

3.2 SPECIFIC ERROR MESSAGES

THIS PROGRAM IS INTENDED TO PROVIDE A GO/NOGO INDICATION OF THE FUNCTIONALITY OF THE DHU-11 BOARDS. TO EXECUTE THE PROGRAM IN THIS MODE THE OPERATOR NEED ONLY ANSWER THE "EXTENDED ERROR REPORTING" SOFTWARE QUESTION WITH "NO". THE PROGRAM WILL THEN ONLY PRINT THE NAME OF THE FAILING TEST THE TEST AND ERROR NUMBERS. FOR A LIST OF THE TEST NAMES IN THIS PROGRAM SEE THE TEST SUMMARIES SECTION OF THIS DOCUMENT. AN EXAMPLE OF SUCH A AN ERROR MESSAGE IS THE FOLLOWING:

```
CZDHU DVC FTL ERR 01603 ON UNIT 02 TST 15 SUB 000 PC: XXXXXX
DEVICE REGISTER WORD READ/WRITE TEST FAILED.
```

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

IF THE OPERATOR HAD REQUESTED EXTENDED ERROR REPORTING THE SAME WOULD BE REPORTED AS FOLLOWS:

```
CZDHU DVC FTL ERR 01603 ON UNIT 02 TST 15 SUB 000 PC: XXXXXX
DEVICE REGISTER WORD READ/WRITE TEST FAILED.
  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 ARE INCLUDED WITHIN CZDHUA:

1. DEVICE REGISTER ACCESS TEST - VERIFIES THAT THE UUT REGISTERS WILL RESPOND WITH THE CORRECT UNIBUS HANDSHAKING SIGNALS. VERIFIES THAT THE UUT IS AT THE CORRECT 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 CLEARS WITHIN A SHORT TIME AFTER IT IS SET WHEN THE SKIP SELFTEST SEQUENCE IS USED.

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

5. RX.FLAG FIELD TEST - VERIFIES THAT THE 3 DATA STATUS BITS (OVERRUN, FRAMING AND PARITY ERROR BITS) ARE ALL SET ON EACH OF THE SKIP SELFTEST CODES IN THE FIFO AFTER A MASTER 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 HAVE BEEN READ.

7. RX.DATA.VALID TEST - VERIFIES THAT THE RX.DATA.VALID BIT IS SET FOR ALL THE CODES IN THE FIFO AND CLEAR AFTER ALL THE CODES HAVE BEEN READ.

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

9. BMP CHECK TEST - VERIFIES THAT THE DUT DOES NOT IMMEDIATELY FAIL THE BACKGROUND MONITOR PROGRAM, AS THIS MAY INVALIDATE FURTHER TESTS.

10. SKIP SELFTEST TEST - VERIFIES THAT THE DUT SKIPS THE SELFTEST IN THE TIME ALLOWED, AND THAT THE FIFO CONTAINS THE CORRECT CODES AFTER ITS COMPLEATION.

11. DIAGNOSTIC.FAIL (SKIP SELFTEST) TEST - VERIFIES USING THE SKIP SELFTEST SEQUENCE THAT THE DIAG.FAIL BIT GOES TO BOTH THE ACTIVE AND INACTIVE STATES WITHIN THE ALLOWED TIMES.

12. SELFTEST TEST - VERIFIES THAT THE DUT'S SELFTEST EXECUTES WITHIN THE CORRECT TIME AND THAT THE CORRECT CODES ARE RETURNED IN THE FIFO AFTER ITS COMPLEATION.

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

14. ROM VERSION NUMBER - VERIFIES THAT THE ROM VERSION NUMBERS ARE REPORTED CORRECTLY AND IF REQUESTED PRINTS THEM OUT.

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

16. WORD ACCESS READ/MODIFY/WRITE TEST - VERIFIES THAT THE REGISTERS WILL RESPOND CORRECTLY TO READ/MODIFY/WRITE ACCESES.

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

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

19. ID.BIT TEST - VERIFIES THAT THE ID BIT READS AS SET.

20. TX.ENABLE (INACTIVE) TEST - VERIFIES THAT WHEN A LINE'S TX.ENBL BIT IS CLEAR, TRANSMISSION WILL NOT TAKE PLACE ON THAT LINE.

21. TX.ENABLE (ACTIVE) TEST - VERIFIES THAT WHEN A LINE'S TX.ENBL BIT IS SET, TRANSMISSION WILL TAKE PLACE ON THAT LINE.

22. INTERRUPT TEST - VERIFIES THAT THE DUT WILL GENERATE RECEPTION AND TRANSMISSION INTERRUPTS CORRECTLY.

23. BR LEVEL TEST - VERIFIES THAT THE DUT INTERRUPTS AT THE CORRECT BUS REQUEST LEVEL.

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

6.0 EXAMPLE ERROR FREE PASS

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

```
.R CZDHUAO
CZDHUAO.BIN


DRS
CZDHU-A-0
DHU-11 FUNC TST PART1
UNIT IS DHU-11
```

```
RESTRT ADDR:   147670
DR>STA/PAS:1

CHANGE HW (L)   ? Y

# UNITS (D)  ?  2

UNIT 0
CSR ADDRESS:  (O)  160460 ? ↑Z

UNIT 1
CSR ADDRESS:  (O)  160460 ?  160500
INTERRUPT VECTOR ADDRESS:  (O)  310  ? 320
ACTIVE LINE BIT MAP:  (O)  177777  ? <CR>
INTERRUPT BR LEVEL:  (O)  5  ? <CR>

CHANGE SW  (L)  ? Y

REPORT UNIT NUMBER AS EACH UNIT IS TESTED:  (L) Y ? <CR>
ROM VERSION PRINTOUT ON THE FIRST PASS:  (L) Y ? <CR>
EXTENDED ERROR REPORTING:  (L) N  ? Y
NUMBER OF INDIVIDUAL DATA ERRORS TO REPORT ON A LINE:  (D)  0 ? 1

TESTING UNIT  :  0(D)

ROM VERSION NUMBERS:  PROC_1 =  2(D)   PROC_2 =  2(D)

TESTING UNIT  :  1(D)

ROM VERSION NUMBERS:  PROC_1 =  2(D)   PROC_2 =  2(D)

CZDHU EOP        1
    0 TOTAL ERRS

DR>
```

```
                                        ε

                                                .LIST SEQ,LOC,BIN,MEB
                                                .NLIST CND

                                        ;*****************************************************************************
                                        ;
                                        ;                       FVTA.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 BGNRPT,BGNSW,BGNSFT,BGNDU,ERRTBL


002000                                          HEADER  CZDHU,A,0,16,0,PRI07
002000                                                                          L$NAME::
002000          103                                                                     .ASCII /C/
002001          132                                                                     .ASCII /Z/
```

```
002002      104                                                    .ASCII /D/
002003      110                                                    .ASCII /H/
002004      125                                                    .ASCII /U/
002005      000                                                    .BYTE   0
002006      000                                                    .BYTE   0
002007      000                                                    .BYTE   0
002010                                                     L$REV::
002010      101                                                    .ASCII  /A/
002011                                                     L$DEPO::
002011      060                                                    .ASCII  /0/
002012                                                     L$UNIT::
002012   000000                                                    .WORD   0
002014                                                     L$TIML::
002014   000016                                                    .WORD   16
002016                                                     L$HPCP::
002016   035722                                                    .WORD   L$HARD
002020                                                     L$SPCP::
002020   036114                                                    .WORD   L$SOFT
002022                                                     L$HPTP::
002022   002206                                                    .WORD   L$HW
002024                                                     L$SPTP::
002024   002220                                                    .WORD   L$SW
002026                                                     L$LADP::
002026   036476                                                    .WORD   L$LAST
002030                                                     L$STA::
002030   000000                                                    .WORD   0
002032                                                     L$CO::
002032   000000                                                    .WORD   0
002034                                                     L$DTYP::
002034   000000                                                    .WORD   0
002036                                                     L$APT::
002036   000000                                                    .WORD   0
002040                                                     L$DTP::
002040   002124                                                    .WORD   L$DISPATCH
002042                                                     L$PRIO::
002042   000340                                                    .WORD   PRIO7
002044                                                     L$ENVI::
002044   000000                                                    .WORD   0
002046                                                     L$EXP1::
002046   000000                                                    .WORD   0
002050                                                     L$MREV::
002050      003                                                    .BYTE   C$REVISION
002051      003                                                    .BYTE   C$EDIT
002052                                                     L$Er::
002052   000000                                                    .WORD   0
002054   000000                                                    .WORD   0
002056                                                     L$SPC::
002056   000000                                                    .WORD   0
002060                                                     L$DEVP::
002060   004032                                                    .WORD   L$DVTYP
002062                                                     L$REPP::
002062   024102                                                    .WORD   L$RPT
002064                                                     L$EXP4::
002064   000000                                                    .WORD   0
002066                                                     L$EXP5::
002066   000000                                                    .WORD   0
002070                                                     L$AUT::
```

```
002070  000000                                                    .WORD   0
002072                                                    L$DUT::
002072  024756                                                    .WORD   L$DU
002074                                                    L$LUN::
002074  000000                                                    .WORD   0
002076                                                    L$DESP::
002076  004042                                                    .WORD   L$DESC
002100                                                    L$LOAD::
002100  104035                                                    EMT     E$LOAD
002102                                                    L$ETP::
002102  003762                                                    .WORD   L$ERRTBL
002104                                                    L$ICP::
002104  024116                                                    .WORD   L$INIT
002106                                                    L$CCP::
002106  024740                                                    .WORD   L$CLEAN
002110                                                    L$ACP::
002110  024736                                                    .WORD   L$AUTO
002112                                                    L$PRT::
002112  024110                                                    .WORD   L$PROT
002114                                                    L$TEST::
002114  000000                                                    .WORD   0
002116                                                    L$DLY::
002116  000000                                                    .WORD   0
002120                                                    L$HIME::
002120  000000                                                    .WORD   0
1112
```

```
                                .SBTTL  DISPATCH TABLE

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

002122                                  DISPATCH 24
002122  000030                                                          .WORD   24
002124                                                          L$DISPATCH::
002124  025074                                                          .WORD   T1
002126  025356                                                          .WORD   T2
002130  025606                                                          .WORD   T3
002132  026052                                                          .WORD   T4
002134  026250                                                          .WORD   T5
002136  026442                                                          .WORD   T6
002140  026660                                                          .WORD   T7
002142  027066                                                          .WORD   T8
002144  027274                                                          .WORD   T9
002146  027470                                                          .WORD   T10
002150  027704                                                          .WORD   T11
002152  030132                                                          .WORD   T12
002154  030426                                                          .WORD   T13
002156  030714                                                          .WORD   T14
002160  031314                                                          .WORD   T15
002162  031562                                                          .WORD   T16
002164  031752                                                          .WORD   T17
002166  032270                                                          .WORD   T18
002170  032532                                                          .WORD   T19
002172  032646                                                          .WORD   T20
002174  033164                                                          .WORD   T21
002176  033540                                                          .WORD   T22
002200  034676                                                          .WORD   T23
002202  035640                                                          .WORD   T24
```

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

002204                                  BGNHW   DFPTBL
002204  000004                                                                  .WORD   L10000-L$HW/2
002206                                                                  L$HW::
002206                                                                  DFPTBL::

002206  160460                          .WORD   160460  ;DEFAULT CSR ADDRESS
002210  000310                          .WORD   310     ;DEFAULT VECTOR ADDRESS
002212  177777                          .WORD   177777  ;DEFAULT ACTIVE LINES BIT MAP
002214     005                          .BYTE   5       ;DEFAULT BR LEVEL
                                        .EVEN

002216                                  ENDHW
002216                                                                  L10000:
```

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

002216                                  BGNSW   SFPTBL
002216  000002                                                                  .WORD   L10001-L$SW/2
002220                                                                  L$SW::
002220                                                                  SFPTBL::

002220  000021                          OPTION::        .WORD   21      ;BIT MAP OF PROGRAM CONTROL FLAGS
002222  000000                          NDERPT::        .WORD   0       ;DEFAULT NUMBER OF INDIVIDUAL DATA ERRORS TO RPT.

002224                                  ENDSW
002224                                                                  L10001:
```

```
                                ;*****************************************************************************************
                                ;
                                ;               FVTA.EQU
                                ;
                                ;*****************************************************************************************


                                .SBTTL  GLOBAL EQUATES SECTION



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

        000020                          NUMLNS==20      ;NUMBER OF LINES ON DHU11 IS 16.
        177777                          MAPLNS==177777  ;BIT MAP OF LINES ON DHU11.

                                ;****** DEVICE REGISTER OFFSETS FROM THE CSR'S ADDRESS ******
        000004                          LPRO==4         ;LINE PARAMETER REGISTER OFFSET FROM THE CSR ADDRESS
        000006                          FSLSO==6        ;FIFOSIZE/STATUS REGISTER OFFSET FROM THE CSR ADDRESS
        000016                          TXBFCO==16      ;TRANSMIT COUNT REGISTER OFFSET FROM THE CSR ADDRESS

    002224                              EQUALS
                                ;
                                ; BIT DIFINITIONS
                                ;
        100000                  BIT15== 100000
        040000                  BIT14== 40000
        020000                  BIT13== 20000
        010000                  BIT12== 10000
        004000                  BIT11== 4000
        002000                  BIT10== 2000
        001000                  BIT09== 1000
        000400                  BIT08== 400
        000200                  BIT07== 200
        000100                  BIT06== 100
        000040                  BIT05== 40
        000020                  BIT04== 20
        000010                  BIT03== 10
        000004                  BIT02== 4
        000002                  BIT01== 2
        000001                  BIT00== 1
                                ;
        001000                  BIT9==  BIT09
        000400                  BIT8==  BIT08
        000200                  BIT7==  BIT07
        000100                  BIT6==  BIT06
        000040                  BIT5==  BIT05
        000020                  BIT4==  BIT04
        000010                  BIT3==  BIT03
        000004                  BIT2==  BIT02
        000002                  BIT1==  BIT01
        000001                  BIT0==  BIT00
```

```
                        ;
                        ; EVENT FLAG DEFINITIONS
                        ;   EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
                        ;
000040                  EF.START==      32.                     ; START COMMAND WAS ISSUED
000037                  EF.RESTART==    31.                     ; RESTART COMMAND WAS ISSUED
000036                  EF.CONTINUE==   30.                     ; CONTINUE COMMAND WAS ISSUED
000035                  EF.NEW==        29.                     ; A NEW PASS HAS BEEN STARTED
000034                  EF.PWR==        28.                     ; A POWER-FAIL/POWER-UP OCCURRED
                        ;
                        ;
                        ; PRIORITY LEVEL DEFINITIONS
                        ;
000340                  PRI07== 340
000300                  PRI06== 300
000240                  PRI05== 240
000200                  PRI04== 200
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
1242
```

```
                                ;*****************************************************************************
                                ;
                                ;               FVTA.GDT
                                ;
                                ;*****************************************************************************


                                .SBTTL  GLOBAL DATA SECTION

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


                                ;*******************************************************************
                                ;       UNIT VARIBLE AREA
                                ;*******************************************************************

002224  177777                          ACTLNS:: .WORD  177777  ;ACTIVE LINE BIT MAP.
002226  000300                          RXVECA:: .WORD  300     ;RX VECTOR ADDRESS.
002230  000304                          TXVECA:: .WORD  304     ;TX VECTOR ADDRESS.
002232  000000                          UNITN:: .WORD   0       ;UNIT NUMBER.
002234     004                          BRLEVL:: .BYTE  4       ;INTERRUPT BUS REQUEST LEVEL
                                                 .EVEN

                                ;*******************************************************************
                                ;       DEVICE REGISTER ADDRESS TABLE
                                ;*******************************************************************
002236                                  DRADRT::
002236  160020                          CSRA::  .WORD   160020  ;DHU-11 CSR ADDRESS.
002240  160022                  RXTMA:: RBUFA:: .WORD   160022  ;DHU-11 RECIEVE BUFFER/TIMER ADDRESS.
002242  160024                          LPRA::  .WORD   160024  ;DHU-11 LINE PARAMETER REGISTER ADDRESS.
002244  160026                  FDATA:: FSLSA:: .WORD   160026  ;DHU-11 FIFO SIZE/LINE STATUS REGISTER ADDRESS.
                                                                ;AND FIFO DATA REGISTER ADDRESS.
002246  160030                          LNCTRA:: .WORD  160030  ;DHU-11 LINE CONTROL REGISTER ADDRESS.
002250  160032                          TXAD1A:: .WORD  160032  ;DHU-11 TRANSMIT BUFFER 1 REGISTER ADDRESS
002252  160034                          TXAD2A:: .WORD  160034  ;DHU-11 TRANSMIT BUFFER 2 REGISTER ADDRESS
002254  160036                          TXBFCA:: .WORD  160036  ;DHU-11 TRANSMIT BUFFER COUNT REGISTER ADDRESS

                                ;*******************************************************************
                                ;       REGISTER MESSAGE ADDRESS TABLE
                                ;*******************************************************************
002256  005470                          RMATB8:: .WORD  DR00MG  ;ADDRESS OF "CSR" MESSAGE.
002260  005474                                   .WORD  DR02MG  ;ADDRESS OF "RBUF" MESSAGE.
002262  005501                                   .WORD  DR04MG  ;ADDRESS OF "LPR" MESSAGE.
002264  005505                                   .WORD  DR06MG  ;ADDRESS OF "STAT" MESSAGE.
002266  005523                                   .WORD  DR10MG  ;ADDRESS OF "LNCTRL" MESSAGE.
002270  005532                                   .WORD  DR12MG  ;ADDRESS OF "TBUFFAD1" MESSAGE.
002272  005543                                   .WORD  DR14MG  ;ADDRESS OF "TBUFAD2" MESSAGE.
002274  005554                                   .WORD  DR16MG  ;ADDRESS OF "TBUFFCT" MESSAGE.

                                ;*******************************************************************
                                ;       ASSORTED GLOBAL VARIABLES:
                                ;*******************************************************************
```

```
002276  000000                    BUFPTR:: .WORD  0        ;STORAGE FOR RECEIVE CHARACTER BUFFER POINTER.
002300  000000                    EXOERR:: .WORD  0        ;"EXIT ON ERROR" FLAG.
002302  000000                    CTRLCF:: .WORD  0        ;STORAGE FOR THE CONTROL-C FLAG.
002304  000000                    IESTAT:: .WORD  0        ;STORAGE FOR THE INTERRUPT ENABLE BIT STATES.
002306  000000                    PASCNT:: .WORD  0        ;STO'G FOR PASS COUNT USED IN ROM VERSION TEST.
002310  000000                    RXINTC:: .WORD  0        ;STORAGE FOR RECEIVER INTERRUPT FLAGS.
002312  000000                    RXINTF:: .WORD  0        ;STORAGE FOR RECEIVER INTERRUPT FLAGS.
002314  000000                    TP4FLG:: .WORD  0        ;FLAGS SET WHEN AN EXPECTED 004 TRAP OCCURS.
002316  000000                    TP4VEC:: .WORD  0        ;STORAGE FOR THE NORMAL 004 TRAP VECTOR.
002320  000001                    TSTNUM:: .WORD  1        ;STORAGE FOR THE TEST NUMBER.
002322  000000                    TXINTC:: .WORD  0        ;STORAGE FOR TRANSMIT INTERRUPT COUNT.
002324  000000                    TXINTF:: .WORD  0        ;STORAGE FOR TRANSMIT INTERRUPT FLAGS.
002326  000000                    WORD1::  .WORD  0        ;LOCATION FOR PASSING INDIRECT PARAMETERS.

                          ;*******************************************************************************
                          ;       LINE TIME CLOCK VARIABLES AND STORAGE.
                          ;*******************************************************************************
002330  177546                    CLKCSR:: .WORD  177546   ;CSR ADDRESS OF THE LTC.
002332  000300                    CLKBRL:: .WORD  PRI06    ;INTERRUPT PRIORITY LEVEL OF THE LTC.
002334  000100                    CLKVEC:: .WORD  100      ;INTERRUPT VECTOR ADDRESS OF THE LTC.
002336  000074                    CLKHRZ:: .WORD  60.      ;INTERRUPT FREQUENCY OF THE LTC.
002340  000000                    TIMER1:: .WORD  0        ;HARDWARE CLOCK COUNTER #1.
002342  000000                    TIMER2:: .WORD  0        ;HARDWARE CLOCK COUNTER #2.
002344  000170                    TIMER3:: .WORD  120.     ;HARDWARE BREAK COUNTER LOCATION.
002346  000170                    BCOUNT:: .WORD  120.     ;BREAK COUNT VALUE IN CLOCK TICKS.
002350  000021                    MSTICK:: .WORD  17.      ;NUMBER OF MILLI-SECONDS PER LTC TICK.
002352  000062                    MSLCNT:: .WORD  62       ;LOOP COUNT (USED BY MSLOOP) TO DELAY 1 MS.

                          ;*******************************************************************************
                          ;       MEMORY MANAGEMENT VARIABLES AND FLAGS.
                          ;*******************************************************************************
002354  177572                    MMSR0:: .WORD   177572   ;ADDRESS OF MEM MGT STATUS REGISTER #0.
002356  000000                    MMPRES:: .WORD  0        ;MEM MGT PRESENT FLAG (0 IF MM NOT PRESENT).
002360  000000                    MMENAB:: .WORD  0        ;MEM MGT ENABLED FLAG (0 IF MM NOT ENABLED).
002362  172340                    PAR0A:: .WORD   172340   ;ADDRESS OF MEM MGT PAR #0.

                          ;*****************************************************************
                          ;       BIT MASK TABLE OF UN-USED DHU DEVICE REGISTER BITS.
                          ;*****************************************************************
002364  137660                    UNBTTB::.WORD   137660   ;UNUSED BIT MASK FOR THE CSR
                                          .WORD   177777   ;UNUSED BIT MASK FOR THE RBUF/RXTIMER REG
002370  000007                            .WORD   7        ;UNUSED BIT MASK FOR THE LPR
002372  177777                            .WORD   177777   ;UNUSED BIT MASK FOR THE STAT/FIFOSIZE/DATA REG
002374  166051                            .WORD   166051   ;UNUSED BIT MASK FOR THE LNCTRL
002376  000000                            .WORD   0        ;UNUSED BIT MASK FOR THE TBUFFAD1
002400  177774                            .WORD   177774   ;UNUSED BIT MASK FOR THE TBUFFAD2
002402  000000                            .WORD   0        ;UNUSED BIT MASK FOR THE TBUFFCT

                          ;*******************************************************************************
                          ;       TABLE OF WORDS WITH CORRESPONDING BIT SET FOR GENERATION OF BIT MAPS.
                          ;*******************************************************************************
002404  000001            BITTBL:: .WORD  1                ;BIT 0 SET.
002406  000002                    .WORD   2                ;BIT 1 SET.
002410  000004                    .WORD   4                ;BIT 2 SET.
002412  000010                    .WORD   10               ;BIT 3 SET.
002414  000020                    .WORD   20               ;BIT 4 SET.
002416  000040                    .WORD   40               ;BIT 5 SET.
```

```
002420  000100                    .WORD   100             ;BIT 6 SET.
002422  000200                    .WORD   200             ;BIT 7 SET.
002424  000400                    .WORD   400             ;BIT 8 SET.
002426  001000                    .WORD   1000            ;BIT 9 SET.
002430  002000                    .WORD   2000            ;BIT 10 SET.
002432  004000                    .WORD   4000            ;BIT 11 SET.
002434  010000                    .WORD   10000           ;BIT 12 SET.
002436  020000                    .WORD   20000           ;BIT 13 SET.
002440  040000                    .WORD   40000           ;BIT 14 SET.
002442  100000                    .WORD   100000          ;BIT 15 SET.

                        ;*******************************************************************
                        ;*      GPR SAVE AREA ZERO.
                        ;*******************************************************************
002444                  GPRS0B::                        ;BASE OF GPR SAVE AREA NUMBER ZERO.
002444  000000                    .WORD   0               ;WORD 1, STORAGE FOR R1.
002446  000000                    .WORD   0               ;WORD 2, STORAGE FOR R2.
002450  000000                    .WORD   0               ;WORD 3, STORAGE FOR R3.
002452  000000                    .WORD   0               ;WORD 4, STORAGE FOR R4.
002454  000000                    .WORD   0               ;WORD 5, STORAGE FOR R5.

                        ;*******************************************************************
                        ;*      TRANSMISSION AND RECEPTION VARIABLES, POINTERS, AND FLAGS.
                        ;*******************************************************************
002456  000000                    ERSMRF:: .WORD  0       ;ERROR SUMMARY REPORT FLAGS.
002460                            ERCNTB:: .BLKW  16.     ;TABLE OF ERROR COUNTERS.

                        ;*******************************************************************
                        ;       STORAGE AREA FOR THE BMP CODE QUEUE.
                        ;*******************************************************************
002520  000000                    BMPCQP:: .WORD  0       ;POINTER USED TO ACCESS THE NEXT CELL IN QUE.
002522                            BMPCQB:: .BLKW  64.     ;STORAGE FOR 32 CELLS, TEST# PLUS BMP CODE.
002722                            BMPCQE::                ;LAST ADDRESS PLUS 2 OF THE BMP CODE QUEUE.

                        ;*******************************************************************
                        ;       GENERAL TABLE AND BUFFER AREA--513 WORDS.
                        ;*******************************************************************
002722                  BUFBAS::                        ;BASE OF MEMORY BUFFER.
002722                  ERLTBL::        .BLKW   128.    ;FIRST HALF OF GENERAL TABLE OR BUFFER.
003322                  BUFMID::        .BLKW   64.     ;SECOND HALF OF GENERAL TABLE OR BUFFER.
003522                  BUF3QT::        .BLKW   64.     ;LAST QUARTER OF THE BUFFER AREA.
003722                  BUFEND::                        ;END OF GENERAL PURPOSE MEMORY BUFFER.
003722                  ENDETB::        .BLKW   16.     ;BUFFER OVERFLOW SPACE.


003762                            ERRTBL
003762                                                                          L$ERRTBL::
003762  000000          ERRTYP::        .WORD   0
003764  000000          ERRNBR::        .WORD   0
003766  000000          ERRMSG::        .WORD   0
003770  000000          ERRBLK::        .WORD   0

                                  .EVEN
```

```
.SBTTL  GPR HANDLING ROUTINES FOR SUBROUTINE CALLS.
;*****************************************************************************
;*      THERE ARE 4 ROUTINES AND MACRO DEFINITIONS USED FOR THE HANDLING OF
;*      GPR VALUES DURING SUBROUTINE CALLS WITHIN THIS PROGRAM.  THE FOUR
;*      ROUTINES/MACRO CALLS HAVE THE FOLLOWING NAMES:
;*
;*      SAVE - MACRO DEFINITION USED AT THE BEGINNING OF A SUBROUTINE TO
;*              SAVE THE GPR CONTENTS FOR LATER RESTORATION.
;*      PASS - MACRO DEFINITION USED AT THE END OF A SUBROUTINE TO RESTORE
;*              THE PREVIOUSLY SAVED GPR CONTENTS AND TO LEAVE THE CONTENTS
;*              OF THE SPECIFIED GPR(S) INTACT (NOT RESTORED).
;*      PREG05 - SUBROUTINE WHICH IS CALLED FROM THE SAVE AND PASS MACRO
;*              EXPANSIONS WHICH ACTUALLY PERFORMS THE ACTIONS ON THE GPRS.
;*
;*      DURING A SUBROUTINE WHICH USES THESE GPR SAVE ROUTINES THE VALUES
;*      OF THE GPRS ARE STORED ON THE STACK IN THE FOLLOWING STACK FRAME:
;*
;*              SP     -> RET PC INTO PREG05 ROUTINE.
;*              SP+2   -> GPR R0 CONTENTS.
;*              SP+4   -> GPR R1 CONTENTS.
;*              SP+6   -> GPR R2 CONTENTS.
;*              SP+8   -> GPR R3 CONTENTS.
;*              SP+10  -> GPR R4 CONTENTS.
;*              SP+12  -> GPR R5 CONTENTS.
;*              SP+14  -> RET PC INTO CALLER OF SUB'TNE WHICH CALLED PREG05.
;*
;*      EACH LEVEL OF SUB'TNE CALLING USES 8 WORDS OF STACK OVERHEAD.
;*      THE SAVE AND PASS MACROS CAN ALSO BE USED IN "STRAIGHT LINE CODE"
;*      TO SAVE AND RESTORE THE GPR VALUES.  IN ANY CASE, AFTER THE
;*      ISSUING OF A PASS CALL THE GPRS WILL BE RESTORED TO THE VALUES
;*      THEY HAD PRIOR TO THE LAST SAVE CALL (EXCEPT FOR THE EXCEPTED,
;*      OR PASSED INTACT, GPRS SPECIFIED AS PARAMETERS TO THE PASS CALL)
;*      AND THE SP WILL ALSO BE RESTORED TO ITS CONDITION BEFORE THE LAST
;*      SAVE CALL.  THE PROGRAMMER MUST BE SURE THAT THE SP HAS THE SAME
;*      VALUE WHEN THE PASS MACRO IS CALLED AS IT HAD IMMEDIATELY AFTER
;*      THE SAVE MACRO WAS CALLED.
;*****************************************************************************
```

K3


```
                                .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                                  ROSLOT==        2       ;OFFSET FOR RO.
```

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

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

```
.SBTTL  GLOBAL MACRO DEFINITION          - PASS -
;*****************************************************************************
;*      THIS MACRO IS USED IN CONJUNCTION WITH THE SAVE MACRO.  IT IS
;*      CALLED AT END OF A SUBROUTINE TO PASS PARAMETERS IN GPRS BACK TO THE
;*      CALLING ROUTINE BY ALTERING THE GPR SAVE AREA ON THE STACK AND THEN
;*      RETURNING TO PREG05 TO RESTORE THE GPRS TO THEIR SAVED VALUES.
;*
;* INPUTS:      ONLY ALLOWED ARGUMENTS ARE "R0" THRU "R5".
;*              R0SLOT THRU R5SLOT MUST BE EQUATED TO THEIR RESPECTIVE GPR SAVE
;*                      SLOT OFFSETS BEFORE CALLING THIS MACRO.
;*
;* OUTPUTS:     THE GPR VALUES ARE PUT IN THEIR RESPECTIVE SLOTS ON THE STACK.
;*
;* CALLING SEQUENCE:    PASS    R0,R1,...
;*
;* COMMENTS:    ANY COMBINATION OF GPR ARGUMENTS MAY BE LISTED IN ANY ORDER.
;*              FOR EXAMPLE, THE FOLLOWING ARE LEGAL:
;*                      PASS    R1
;*                      PASS    R4,R0,R2
;*              THE GPRS LISTED AS ARGUMENTS WILL BE PASSED INTACT TO THE
;*              CALLING ROUTINE, ALL OTHER GPRS WILL BE RESTORED.
;*              THE SP MUST BE AT ITS ORIGINAL VALUE WHEN PASS IS CALLED.
;*
;*              THE MACRO CALL
;*                      PASS    R0,R3
;*              EXPANDS INTO THE FOLLOWING ASSEMBLY CODE:
;*                      MOV     R0,R0SLOT(SP)           ;PUT R0 IN STACK SLOT.
;*                      MOV     R3,R3SLOT(SP)           ;PUT R3 IN STACK SLOT.
;*                      JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
;*              IN THIS EXAMPLE GPRS R1, R2, R4, AND R5 WILL BE RESTORED TO
;*              THEIR VALUES CONTAINED IN THE STACK FRAME AND R0 AND R3
;*              WILL BE LEFT AT THEIR VALUES PRIOR TO THIS PASS CALL.
;*
;* SUBORDINATE ROUTINES CALLED: (PREGRT - LABEL WITHIN PREG05, VALUE ON STACK.)
;*****************************************************************************

        .MACRO  PASS    A,B,C,D,E,F
        .IRP    X,<A,B,C,D,E,F>
        .IF     NB,X
        .LIST
                        MOV     X,X'SLOT(SP)            ;PUT X IN STACK SLOT.
        .NLIST
        .ENDC
        .ENDM
        .LIST
                        JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
        .NLIST
        .ENDM   PASS
```

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

003772                          PREG05:                 ;R5 HAS BEEN LOADED ON THE STACK BY THE SUBROUTINE CALL
003772  010446                          MOV     R4,-(SP)        ;SAVE R4
003774  010346                          MOV     R3,-(SP)        ;SAVE R3
003776  010246                          MOV     R2,-(SP)        ;SAVE R2
004000  010146                          MOV     R1,-(SP)        ;SAVE R1
004002  010046                          MOV     R0,-(SP)        ;SAVE R0
004004  010546                          MOV     R5,-(SP)        ;PUSH RETURN PC ON TOP OF STACK
004006  016605  000014                  MOV     R5SLOT(SP),R5   ;RESTORE R5 TO VALUE IT HAD BEFORE CALLS

004012  004736                          JSR     PC,@(SP)+       ;CALL THE SUBROUTINE AT THE RETURN ADDRESS
                                                                ;FROM THE PREG05 CALL, PUTTING THE PRESENT
                                                                ;PC ON THE STACK AS A RETURN ADDRESS INTO
                                                                ;THIS (PREG05) ROUTINE.

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

004014  012605                  PREGRT:: MOV    (SP)+,R5        ;PUT RETURN PC IN R5.
004016  012600                          MOV     (SP)+,R0        ;RESTORE R0.
004020  012601                          MOV     (SP)+,R1        ;RESTORE R1.
004022  012602                          MOV     (SP)+,R2        ;RESTORE R2.
004024  012603                          MOV     (SP)+,R3        ;RESTORE R3.
004026  012604                          MOV     (SP)+,R4        ;RESTORE R4.

004030  000205                          RTS     R5              ;RETURN TO THE SUBROUTINE WHICH CALLED PREG05.
                                                                  ;RESTORING R5 IN THE PROCESS.
```

```
                                .SBTTL  GLOBAL TEXT SECTION
                                ;*******************************************************************************
                                ;
                                ;               FVTSKL1.P11
                                ;
                                ;*******************************************************************************


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

                                ;
                                ; NAMES OF DEVICES SUPPORTED BY PROGRAM
                                ;
004032                                  DEVTYP  <DHU-11>
004032                                                                          L$DVTYP::
004032  104     110     125                                                             .ASCIZ  /DHU 11/
004035  055     061     061
004040  000
                                                                                        .EVEN

                                ; TEST DESCRIPTION
                                ;
004042                                  DESCRIPT        <DHU 11 FUNC TST PART1>
004042                                                                          L$DESC::
004042  104     110     125                                                             .ASCIZ  /DHU-11 FUNC TST PAR
T1/
004045  055     061     061
004050  040     106     125
004053  116     103     040
004056  124     123     124
004061  040     120     101
004064  122     124     061
004067  000
                                                                                        .EVEN
                                        .EVEN
```

```
                                ;*****************************************************************************************
*
                                ;
                                ;                FVTA.FMT
                                ;
                                ;*****************************************************************************************


                                ;
                                ; FORMAT STATEMENTS USED IN PRINT CALLS
                                ;
```

```
                                ;*****************************************************************************
                                ;
                                ;                    FVTA.MSG
                                ;
                                ;*****************************************************************************
%%

          .NLIST BIN
          .SBTTL  GLOBAL MESSAGE AREA
                  ; ********* FORMAT STATEMENTS **********
004070  MFUNIT:: .ASCIZ /%N%A TESTING UNIT :%D4%N/
004121  EF0503:: .ASCIZ /%T%N/
004126  EF0505:: .ASCIZ /%A    %D5%A ILLEGAL INTERRUPTS RECEIVED.%N/
004201  EF1401:: .ASCIZ /%N%A ROM VERSION NUMBERS: PROC_1 = %D2%A(D)   PROC_2 = %D2%A(D)%N/
004303  EF1402:: .ASCIZ /%T%A ROM VERSION NUMBER %T%N/
004340  EF1601:: .ASCIZ /%A  %T%A, TEST ABORTED %N/
004372  EF1602:: .ASCIZ /%A    EXPECTED DATA: %O6%A (O).%N/
004434  EF1603:: .ASCIZ /%A    ACTUAL DATA:   %O6%A (O).%N/
004476  EF1604:: .ASCIZ /%A  BAD BIT(S) IN DEVICE %T%A REGISTER FOR LINE %D2%A (D).%N/
004573  EF3001:: .ASCIZ /%A    EXPECTED OR CORRECT VALUE: %O3%N/
004642  EF3002:: .ASCIZ /%A    ACTUAL OR MEASURED  VALUE: %O3%N/
004711  EF9006:: .ASCIZ /%A  %T%A %D2%A(D)%N/
004735  EF9010:: .ASCIZ /%A    NUMBER OF ERRORS DETECTED ON LINE %D2%A(D) IS %D5%A(D)%N/
005034  EF9016:: .ASCIZ /%A  UNEXPECTED %T%A FOR LINE %D2%A(D) IN FIFO AFTER RESET:%N/
005131  EF9017:: .ASCIZ /%A    %T%A (WITH ERROR FLAGS) IS %O6%A(O)%N/
005205  EF9018:: .ASCII /%A  %T%A IN SELFTEST CODE FIFO SLOT FOR LINE %D2/
005265           .ASCIZ /%A(D) AFTER RESET.%N/
005312  EF9301:: .ASCIZ /%A %T%D2%A(D),  BMP CODE REPORTED :%O3%A(O)%N/
005370  EF9302:: .ASCIZ /%A  OVERFLOW OCCURRED (MORE THAN 31 BMP CODES FOUND IN QUEUE)%N/

                  ;********* ERROR MESSAGES ************
005470  DR00MG:: .ASCIZ /CSR/
005474  DR02MG:: .ASCIZ /RBUF/
005501  DR04MG:: .ASCIZ /LPR/
005505  DR06MG:: .ASCIZ /FIFOSIZE,STAT/
005523  DR10MG:: .ASCIZ /LNCTRL/
005532  DR12MG:: .ASCIZ /TBUFFAD1/
005543  DR14MG:: .ASCIZ /TBUFFAD2/
005554  DR16MG:: .ASCIZ /TBUFFCT/
005564  EM0103:: .ASCIZ / DEVICE REGISTER ADDRESS TEST FAILED./
005632  EM0201:: .ASCIZ / MASTER RESET TEST FAILED./
005665  EM0202:: .ASCIZ /  MASTER RESET BIT DID NOT CLEAR AFTER BOARD RESET./
005751           .ASCIZ /    WAITED 5 SECONDS.  BIT DEFECTIVE OR FIRMWARE HUNG./
006040  EM0203:: .ASCIZ /  MASTER RESET BIT CLEAR IMMEDIATELY AFTER BOARD RESET./
006130           .ASCIZ /    BIT DEFECTIVE OR BOARD FIRMWARE ERROR./
006203  EM0204:: .ASCIZ \  MR BIT WENT CLEAR WITHIN 1/2 SECOND OF BOARD RESET.\
006271           .ASCIZ /    BIT DEFECTIVE OR SELFTEST WAS (INCORRECTLY) SKIPPED./
006362  EM0301:: .ASCIZ /MASTER RESET (SKIP SELFTEST) TEST FAILED./
006434  EM0302:: .ASCIZ /  MR BIT CLR WITHIN 10 MILISECOND AFTER BOARD RESET./
006521           .ASCIZ /    BIT DEFECTIVE OR BOARD FIRMWARE ERROR./
006574  EM0303:: .ASCIZ \  MR BIT WENT CLEAR 1/5 TO 5 SECONDS AFTER RESET.\
006656           .ASCIZ /    SELFTEST DID NOT GET SKIPPED (SHOULD HAVE BEEN SKIPPED)./
006753  EM0401:: .ASCIZ /RBUF REGISTER RX CHARACTER FIELD TEST FAILED./
007031  EM0402:: .ASCIZ /  IMPROPER CODE FOUND IN RX FIFO AFTER DUT RESET./
007113           .ASCIZ /    EXPECTED: SELFTEST CODE,   ACTUAL: IMPROPER CODE./
007201  EM0501:: .ASCIZ /RBUF REGISTER ERROR FLAGS FIELD TEST FAILED/
007255  EM0502:: .ASCIZ /  RX ERROR FLAG(S) FOUND CLEAR ON SELFTEST CODE./
```

```
007336            .ASCIZ /    EXPECTED: ALL ERROR FLAGS SET,  ACTUAL: FLAG(S) CLEAR./
007431  EM0525::  .ASCIZ /  RX INTERRUPT(S) RECEIVED WITH RX INTERRUPTS DISABLED./
007521  EM0526::  .ASCIZ /  TX INTERRUPT(S) RECEIVED WITH TX INTERRUPTS DISABLED./
007611  EM0601::  .ASCIZ /CSR RX.DATA.AVAIL BIT TEST FAILED/
007653  EM0602::  .ASCIZ /  RX.DATA.AVAIL BIT FOUND CLEAR AFTER RESET COMPLETION./
007743            .ASCIZ /    EXPECTED BIT TO BE SET FROM SELFTEST CODES IN FIFO./
010033  EM0603::  .ASCIZ /  RX.DATA.AVAIL BIT COULD NOT BE CLEARED BY PURGING FIFO./
010125            .ASCIZ /    600 CHARS READ FROM FIFO WITHOUT R.D.A BIT CLEARING./
010216  EM0701::  .ASCIZ /RBUF RX.DATA.VALID BIT TEST FAILED/
010261  EM0702::  .ASCIZ /  RX.DATA.VALID BIT FOUND CLEAR AFTER RESET COMPLETION./
010351            .ASCIZ /    EXPECTED BIT TO BE SET FROM SELFTEST CODES IN FIFO./
010441  EM0703::  .ASCIZ /  RX.DATA.VALID BIT COULD NOT BE CLEARED BY PURGING FIFO./
010533            .ASCIZ /    600 CHARS READ FROM FIFO WITHOUT R.D.V BIT CLEARING./
010624  EM0801::  .ASCIZ /RBUF RX.LINE.NUMBER FIELD TEST FAILED/
010672  EM0802::  .ASCIZ /  LINE NUMBER WRONG ON A SELFTEST CODE./
010742  EM0901::  .ASCIZ /CHECK FOR BMP_CODES TEST FAILED/
011002  EM0902::  .ASCIZ /UNEXPECTED BMP CODES FOUND./
011036  EM1001::  .ASCIZ /SKIP SELF-TEST TEST FAILED/
011071  EM1002::  .ASCIZ /  SKIP SELF-TEST TOOK TOO LONG TO COMPLETE, > 50 MS./
011156  EM1003::  .ASCIZ /  SKIP SELF-TEST COMPLETED TOO SOON, < 10 MS./
011234  EM1101::  .ASCIZ /DIAGNOSTIC FAIL (SKP SELFTEST) TEST FAILED/
011307  EM1201::  .ASCIZ /SELF-TEST TEST FAILED/
011335  EM1202::  .ASCIZ /  SELF-TEST TOOK TOO LONG TO COMPLETE, > 5 SECONDS./
011421  EM1203::  .ASCIZ \  SELF-TEST COMPLETED TOO SOON, < 1/2 SECOND.\
011477  EM1204::  .ASCIZ /  SELF-TEST DID NOT EXECUTE/
011533  EM1205::  .ASCIZ /  DIAG_FAIL BIT BAD/
011557  EM1301::  .ASCIZ /FAIL SELF-TEST TEST FAILED/
011612  EM1302::  .ASCIZ / SELF-TEST ERROR REPORTING BAD/
011651  EM1401::  .ASCIZ /ROM VERSION_NUMBER TEST FAILED/
011710  EM1402::  .ASCIZ /  FIFO EMPTY, ONE OR MORE ROM VERSION_NUMBERS MISSING/
011776  EM1403::  .ASCIZ /  ROM VERSION_NUMBER FOUND OUT OF SEQUENCE/
012051  EM1404::  .ASCIZ /  ONE OR MORE ROM VERSION_NUMBERS MISSING/
012123  EM1405::  .ASCIZ /    PROC_1/
012136  EM1406::  .ASCIZ /    PROC_2/
012151  EM1407::  .ASCIZ /NOT FOUND/
012163  EM1408::  .ASCIZ /FOUND/
012171  EM1601::  .ASCIZ /TIMEOUT OCCURRED WAITING FOR MASTER RESET TO CLEAR/
012254  EM1604::  .ASCIZ \DEVICE REGISTER WORD READ/WRITE TEST FAILED\
012330  EM1701::  .ASCIZ \DEVICE REGISTER WORD READ/MODIFY/WRITE TEST FAILED\
012413  EM1801::  .ASCIZ \DEVICE REGISTER BYTE READ/WRITE TEST FAILED\
012467  EM1901::  .ASCIZ \DEVICE REGISTER BYTE READ/MODIFY/WRITE TEST FAILED\
012552  EM2001::  .ASCIZ /DEVICE STAT REGISTER ID BIT TEST FAILED/
012622  EM2002::  .ASCIZ /ID BIT BAD.  EXPECTED: SET, ACTUAL. CLEAR./
012675  EM2301::  .ASCIZ /TX_ENABLE (INACTIVE) BIT TEST FAILED/
012742  EM2302::  .ASCIZ /  TX_ENABLE BIT BAD ON LINE: /
013000  EM2401::  .ASCIZ /TX_ENABLE (ACTIVE) BIT TEST FAILED/
013043  EM2601::  .ASCIZ /RECEIVE INTERRUPT TEST FAILED/
013101  EM2602::  .ASCIZ /  NO RX INT GENERATED (DATA_VALID SET, RX INTS ENABLED)./
013172  EM2603::  .ASCIZ /  NO RX INT GENERATED (NO CODES IN FIFO AFTER RESET)./
013260  EM2604::  .ASCIZ /  NO RX INT GENERATED (RX_DATA_AVAIL CLR, RX INTS ENABLED)./
013354  EM2605::  .ASCIZ /  RX INTERRUPT GENERATED WITH RX_DATA_AVAIL CLEAR./
013437  EM2606::  .ASCIZ /TRANSMIT INTERRUPT TEST ERROR:/
013476  EM2607::  .ASCIZ /  TX_ACTION SET REPEATEDLY AFTER BOARD RESET, NO DATA SENT./
013572  EM2608::  .ASCIZ /  TX_ACTION STUCK SET AFTER BOARD RESET./
013643  EM2609::  .ASCIZ /  TX INTERRUPT GENERATED WITH TX_ACTION CLEAR./
013722  EM2610::  .ASCIZ /  NO TX INTERRUPT WITH TX_ACTION SET AND TX INTS ENABLED./
014014  EM2611::  .ASCIZ /  TX_ACTION NOT SET AFTER CHARS SENT ON ALL LINES./
```

```
014077  EM2612:: .ASCIZ /  NO RX INT GENERATED (RX_DATA_AVAIL SET, RX INTS ENABLED)./
014173  EM3001:: .ASCIZ /INTERRUPT BR LEVEL TEST FAILED/
014232  EM3002:: .ASCIZ /  NO RX_DATA_AVAIL FROM SELFTEST CODES IN FIFO AFTER RESET./
014326  EM3003:: .ASCIZ /  TX INTERRUPT GENERATED AT WRONG BR LEVEL:/
014402  EM3004:: .ASCIZ /  RX INTERRUPT GENERATED AT WRONG BR LEVEL:/
014456  EM3005:: .ASCIZ /  TX INTERRUPT GIVEN PRECEDENCE OVER SIMULTANEOUS RX INT./
014550  EM3101:: .ASCIZ /DIAGNOSTIC FIELD (BMP) TEST FAILED/
014613  EM3102:: .ASCIZ /  DIAGNOSTIC FIELD (BMP REQUEST) BAD ON LINE: /
014672  EM9010:: .ASCIZ /ACTUAL OR MEASURED /
014716  EM9014:: .ASCIZ /SUMMARY REPORTS FOR LINES WITH EXCESSIVE NUMBERS OF ERRORS:/
015012  EM9017:: .ASCII /  FIFO WILL NOT PURGE (DATA.VALID STUCK SET),/
015067           .ASCIZ / REMAINDER OF TEST SKIPPED./
015123  EM9018:: .ASCIZ /NO CODE/
015133  EM9019:: .ASCIZ /NON-SELFTEST/
015150  EM9020:: .ASCIZ /SELFTEST ERROR CODE/
015174  EM9022:: .ASCIZ /DATA CHARACTER/
015213  EM9023:: .ASCIZ /MODEM STATUS CODE/
015235  EM9024:: .ASCIZ /SELFTEST CODE/
015253  EM9301:: .ASCIZ /BMP CODE REPORT/
015273  EM9302:: .ASCIZ /BMP CODE FOUND IN TEST /
015323  EM9303:: .ASCIZ /THE LAST BMP CODE WAS FOUND IN TEST /
015370  EM9304:: .ASCIZ /UNEXPECTED BMP CODES FOUND DURING THIS PASS/
                 .EVEN
                                  .LIST BIN
```

```
;*****************************************************************************
;
;                    FVTSKL2.P11
;
;*****************************************************************************


.SBTTL  GLOBAL ERROR REPORT SECTION

;++
; THE GLOBAL ERROR REPORT SECTION CONTAINS MESSAGE PRINTING AREAS
; USED BY MORE THAN ONE TEST TO OUTPUT ADDITIONAL ERROR INFORMATION.  PRINTB
; (BASIC) AND PRINTX (EXTENDED) CALLS ARE USED TO CALL PRINT SERVICES.
;--
```

```
                                .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER0101 -
                                ;*******************************************************************************
                                ;*      THIS IS AN FRROR REPORTING SUBROUTINE WHICH PRINTS ADDITIONAL ERROR
                                ;*      INFORMATION IF AN ERROR IS DETECTED IN TEST 1 (REGISTER ADDRESS
                                ;*      ACCESS TEST). IF THE "EXTENDED ERROR INFO" OPTION HAS BEEN SELECTED
                                ;*      THEN THIS SUBROUTINE WILL REPORT THE TYPE OF ACCESS (READ OR WRITE OR
                                ;*      BOTH) WHICH CAUSED A BUS TIME-OUT TRAP (004 TRAP).A MESSAGE INDICATING
                                ;*      THAT THE DHU MAY BE AT THE WRONG UNIBUS 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.
                                ;*******************************************************************************

 015444                                 BGNMSG  ER0101
 015444                                                                                 ER0101::
 015444                                 SAVE                    ;SAVE THE GPR CONTENTS.
 015444  004567  166322                         JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.

 015450  012700  000100                  MOV     #BIT06,R0       ;SET-UP THE BIT MAP FOR 'REPORT EXT'D ERROR INFO'
 015454  046700  164540                  BIC     OPTION,R0       ;TRY AND CLEAR THE FLAG.
 015460  001036                         BNE     6$              ;EXIT IF OPTION NOT SELECTED.
                                ;*
                                ; REPORT EXTENDED ERROR INFOMATION
                                ;-

 015462  032705  000001                  BIT     #BIT0,R5        ;TEST FOR READ ERROR.
 015466  001410                         BEQ     2$              ;SKIP READ ERROR MSG IF NO READ ERROR.
 015470                                 PRINTB  #MSG1           ;PRINT READ ERROR MESSAGE.
 015470  012746  015562                                                         MOV     #MSG1,-(SP)
 015474  012746  000001                                                         MOV     #1,-(SP)
 015500  010600                                                                 MOV     SP,R0
 015502  104414                                                                 TRAP    C$PNTB
 015504  062706  000004                                                         ADD     #4,SP
 015510  032705  000002         2$:      BIT     #BIT1,R5        ;TEST FOR WRITE ERROR.
 015514  001410                         BEQ     4$              ;SKIP WRITE ERROR MSG IF NO WRITE ERROR.
 015516                                 PRINTB  #MSG2           ;PRINT WRITE ERROR MESSAGE.
 015516  012746  015640                                                         MOV     #MSG2,-(SP)
 015522  012746  000001                                                         MOV     #1,-(SP)
 015526  010600                                                                 MOV     SP,R0
 015530  104414                                                                 TRAP    C$PNTB
 015532  062706  000004                                                         ADD     #4,SP
 015536                         4$:      PRINTX  #MSG3           ;SUGGEST THAT DHU MAY BE AT WRONG ADDRESS.
 015536  012746  015717                                                         MOV     #MSG3,-(SP)
 015542  012746  000001                                                         MOV     #1,-(SP)
 015546  010600                                                                 MOV     SP,R0
 015550  104415                                                                 TRAP    C$PNTX
 015552  062706  000004                                                         ADD     #4,SP
```

```
1872 015556                          6$:     PASS                        ;RESTORE THE GPR CONTENTS.
     015556  004736                                      JSR     PC,@(SP)+                   ;RETURN TO PREG05 SUBRT.
1873 015560                                  ENDMSG
     015560                                                                                   L10002:
     015560  104423                                                                                  TRAP    C$MSG
1874
1875 015562     045     101     102  MSG1::  .ASCIZ  /%ABUS TIME-OUT TRAP CAUSED BY READ ATTEMPT.%N/
     015565     125     123     040
     015570     124     111     115
     015573     105     055     117
     015576     125     124     040
     015601     124     122     101
     015604     120     040     103
     015607     101     125     123
     015612     105     104     040
     015615     102     131     040
     015620     122     105     101
     015623     104     040     101
     015626     124     124     105
     015631     115     120     124
     015634     056     045     116
     015637     000
1876 015640     045     101     102  MSG2::  .ASCIZ  /%ABUS TIME-OUT TRAP CAUSED BY WRITE ATTEMPT.%N/
     015643     125     123     040
     015646     124     111     115
     015651     105     055     117
     015654     125     124     040
     015657     124     122     101
     015662     120     040     103
     015665     101     125     123
     015670     105     104     040
     015673     102     131     040
     015676     127     122     111
     015701     124     105     040
     015704     101     124     124
     015707     105     115     120
     015712     124     056     045
     015715     116     000
1877 015717     045     101     104  MSG3::  .ASCIZ  /%ADHU MAY BE AT THE WRONG UNIBUS ADDRESS.%N%N/
     015722     110     125     040
     015725     115     101     131
     015730     040     102     105
     015733     040     101     124
     015736     040     124     110
     015741     105     040     127
     015744     122     117     116
     015747     107     040     125
     015752     116     111     102
     015755     125     123     040
     015760     101     104     104
     015763     122     105     123
     015766     123     056     045
     015771     116     045     116
     015774     000
1878
1879                                         .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. THE MESSAGES ARE ONLY
                                        ;*      PRINTED IF EXT'D ERROR REPORTING HAS BEEN REQUESTED.
                                        ;*
                                        ;* 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.
                                        ;*******************************************************************************

015776                                          BGNMSG  ER0201
015776                                                                                          ER0201::
015776                                          SAVE                            ;SAVE THE GPR CONTENTS.
015776  004567  165770                                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.

016002  012700  000100                           MOV    #BIT06,R0       ;TRY TO CLEAR THE
016006  046700  164206                           BIC    OPTION,R0       ;EXT'D ERROR REPORTING FLAG
016012  001025                                  BNE     4$              ;EXIT IF FLAG NOT SET.

016014  010102                                   MOV    R1,R2
016016  105722                          2$:      TSTB   (R2)+           ;CHECK FOR A ZERO BYTE (END OF MESSAGE).
016020  001376                                  BNE     2$              ;LOOP UNTIL NEXT MESSAGE IS FOUND.

016022                                          PRINTB  #EF0503,R1      ;PRINT THE FIRST MESSAGE.
016022  010146                                                                          MOV     R1,-(SP)
016024  012746  004121                                                                  MOV     #EF0503,-(SP)
016030  012746  000002                                                                  MOV     #2,-(SP)
016034  010600                                                                          MOV     SP,R0
016036  104414                                                                          TRAP    C$PNTB
016040  062706  000006                                                                  ADD     #6,SP
016044                                          PRINTB  #EF0503,R2      ;PRINT THE SECOND MESSAGE.
016044  010246                                                                          MOV     R2,-(SP)
016046  012746  004121                                                                  MOV     #EF0503,-(SP)
016052  012746  000002                                                                  MOV     #2,-(SP)
016056  010600                                                                          MOV     SP,R0
016060  104414                                                                          TRAP    C$PNTB
016062  062706  000006                                                                  ADD     #6,SP

016066                                  4$:     PASS                    ;RESTORE THE GPR CONTENTS.
016066  004736                                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.

016070                                          ENDMSG
016070                                                                                  L10003:
016070  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, PROVIDED
                                ;*      EXTENDED ERROR REPORTING HAS BEEN REQUESTED.
                                ;*
                                ;* 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.
                                ;*******************************************************************************

016072                                  BGNMSG  ER0503
016072                                                                                  ER0503::

016072  012700  000100                   MOV    #BIT06,R0       ;TRY TO CLEAR THE
016076  046700  164116                   BIC    OPTION,R0       ;EXT'D ERROR REPORTING FLAG
016102  001011                          BNE     2$              ;EXIT IF FLAG NOT SET.


016104                                  PRINTB  #EF0503,R1      ;PRINT THE MESSAGE.
016104  010146                                                                          MOV     R1,-(SP)
016106  012746  004121                                                                  MOV     #EF0503,-(SP)
016112  012746  000002                                                                  MOV     #2,-(SP)
016116  010600                                                                          MOV     SP,R0
016120  104414                                                                          TRAP    C$PNTB
016122  062706  000006                                                                  ADD     #6,SP

016126                          2$:     ENDMSG
016126                                                                  L10004:
016126  104423                                                                          TRAP    C$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.
                                ;*******************************************************************

016130                                  BGNMSG  ER0504
016130                                                                                  ER0504::

016130  012700  000100                   MOV    #BIT06,R0       ;TRY TO CLEAR THE
016134  046700  164060                   BIC    OPTION,R0       ;EXT'D ERROR REPORTING FLAG
016140  001022                          BNE     2$              ;EXIT IF FLAG NOT SET.

016142                                  PRINTB  #EF0503,R1      ;PRINT THE FIRST LINE OF THE MESSAGE.
016142  010146                                                                          MOV     R1,-(SP)
016144  012746  004121                                                                  MOV     #EF0503,-(SP)
016150  012746  000002                                                                  MOV     #2,-(SP)
016154  010600                                                                          MOV     SP,R0
016156  104414                                                                          TRAP    C$PNTB
015160  062706  000006                                                                  ADD     #6,SP
016164                                  PRINTX  #EF0505,R2      ;PRINT THE NUMBER OF INTS RECEIVED.
016164  010246                                                                          MOV     R2,-(SP)
016166  012746  004126                                                                  MOV     #EF0505,-(SP)
016172  012746  000002                                                                  MOV     #2,-(SP)
016176  010600                                                                          MOV     SP,R0
016200  104415                                                                          TRAP    C$PNTX
016202  062706  000006                                                                  ADD     #6,SP

                        2$:             ENDMSG
016206                                                                          L10005:
016206  104423                                                                          TRAP    C$MSG
```

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

 016210                                 BGNMSG  ER1401
 016210                                                                                  ER1401::

 016210  012700  000100                  MOV     #BIT06,R0       ;TRY TO CLEAR THE
 016214  046700  164000                  BIC     OPTION,R0       ;EXT'D ERROR REPORTING FLAG
 016220  001053                         BNE     60$             ;EXIT IF FLAG NOT SET.

 016222                                 PRINTB  #EF0503,R1      ;REPORT THE ERROR MESSAGE PASSED IN.
 016222  010146                                                                          MOV     R1,-(SP)
 016224  012746  004121                                                                  MOV     #EF0503,-(SP)
 016230  012746  000002                                                                  MOV     #2,-(SP)
 016234  010600                                                                          MOV     SP,R0
 016236  104414                                                                          TRAP    C$PNTB
 016240  062706  000006                                                                  ADD     #6,SP

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

 016244  012705  000143                  MOV     #99.,R5         ;GET INVALID ROM NUMBER.
 016250  012701  012123                  MOV     #EM1405,R1      ;SELECT PROC_1 MESSAGE.
 016254  012702  012151                  MOV     #EM1407,R2      ;SELECT THE "NOT FOUND" MESSAGE.
 016260  120305                          CMPB    R3,R5           ;CHECK PROC_1 ROM VERSION NUMBER.
 016262  001402                         BEQ     2$              ;GO REPORT PROC_1 CODE NOT FOUND.
 016264  012702  012163                  MOV     #EM1408,R2      ;SELECT "FOUND" MESSAGE.
 016270  004767  000026         2$:     JSR     PC,50$          ;GO REPORT MESSAGE.

 016274  012701  012136                  MOV     #EM1406,R1      ;SELECT PROC_2 MESSAGE.
 016300  012702  012151                  MOV     #EM1407,R2      ;SELECT THE "NOT FOUND" MESSAGE.
 016304  120405                          CMPB    R4,R5           ;CHECK PROC_2 ROM VERSION NUMBER.
 016306  001402                         BEQ     4$              ;GO REPORT PROC_2 CODE NOT FOUND.
 016310  012702  012163                  MOV     #EM1408,R2      ;SELECT "FOUND" MESSAGE.
 016314  004767  000002         4$:     JSR     PC,50$          ;GO REPORT THE MESSAGE.
 016320  000413                         BR      60$             ;EXIT.
```

```
2033
2034 016322                    50$:    PRINTX  #EF1402,R1,R2   ;REPORT THE MESSAGE.
     016322  010246                                                          MOV     R2,-(SP)
     016324  010146                                                          MOV     R1,-(SP)
     016326  012746  004303                                                  MOV     #EF1402,-(SP)
     016332  012746  000003                                                  MOV     #3,-(SP)
     016336  010600                                                          MOV     SP,R0
     016340  104415                                                          TRAP    C$PNTX
     016342  062706  000010                                                  ADD     #10,SP
2035 016346  000207                         RTS     PC              ;RETURN.
2036 016350                    60$:    ENDMSG
     016350                                                          L10006:
     016350  104423                                                          TRAP    C$MSG
```

```
                                .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER1601 -
                                ;*****************************************************************************
                                ;*      THIS AN ERROR REPORTING SUBROUTINE WHICH PRINTS ADDITIONAL ERROR
                                ;*      INFORMATION IF AN ERROR IS DETECTED IN ONE OF THE DEVICE REGISTER
                                ;*      ACCESS TESTS, PROVIDED EXTENDED ERROR REPORTING HAS BEEN REQUESTED.
                                ;*      THIS SUBROUTINE REPORTS THE ACTUAL AND EXPECTED FROM THE DEVICE
                                ;*      REGISTER(S) WHICH IS(ARE) IN FAULTY.
                                ;*
                                ;* INPUTS:      R1 - ACTUAL DATA (UNUSED BITS SET TO 0).
                                ;*              R2 - EXPECTED DATA (UNUSED BITS SET TO 0).
                                ;*              R3 - OFFSET (IN BYTES) TO THE REGISTER BEING TESTED.
                                ;*              R5 - LINE NUMBER OF REGISTER BEING TESTED.
                                ;*              RMATBB - LABEL AT BASE OF REGISTER MESSAGE ADDRESS TABLE.
                                ;*
                                ;* OUTPUTS:     MESSAGES ARE PRINTED AT THE OPERATORS CONSOLE.
                                ;*
                                ;* CALLING SEQUENCE:    INCLUDE THE LABLE "ER1601" AS THE MESSAGE POINTER
                                ;*                      PARAMETER IN THE DRS ERROR REPORT MACRO CALL.
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: NONE
                                ;*****************************************************************************
016352                                  BGNMSG  ER1601
016352                                                                                  ER1601::

016352  012700  000100                   MOV    #BIT06,R0        ;TRY TO CLEAR THE
016356  046700  163636                   BIC    OPTION,R0        ;EXT'D ERROR REPORTING FLAG
016362  001036                          BNE     2$               ;EXIT IF FLAG NOT SET.


016364  016304  002256                   MOV    RMATBB(R3),R4    ;FETCH ADDRESS OF REGISTER NAME MESSAGE.

016370                                  PRINTB  #EF1604,R4,R5    ;REPORT BASIC MESSAGE (REG NAME AND LINE #).
016370  010546                                                                          MOV     R5,-(SP)
016372  010446                                                                          MOV     R4,-(SP)
016374  012746  004476                                                                  MOV     #EF1604,-(SP)
016400  012746  000003                                                                  MOV     #3,-(SP)
016404  010600                                                                          MOV     SP,R0
016406  104414                                                                          TRAP    C$PNTB
016410  062706  000010                                                                  ADD     #10,SP
016414                                  PRINTX  #EF1602,R2       ;PRINT THE EXPECTED DATA.
016414  010246                                                                          MOV     R2,-(SP)
016416  012746  004372                                                                  MOV     #EF1602,-(SP)
016422  012746  000002                                                                  MOV     #2,-(SP)
016426  010600                                                                          MOV     SP,R0
016430  104415                                                                          TRAP    C$PNTX
016432  062706  000006                                                                  ADD     #6,SP
016436                                  PRINTX  #EF1603,R1       ;PRINT THE ACTUAL DATA.
016436  010146                                                                          MOV     R1,-(SP)
016440  012746  004434                                                                  MOV     #EF1603,-(SP)
016444  012746  000002                                                                  MOV     #2,-(SP)
016450  010600                                                                          MOV     SP,R0
016452  104415                                                                          TRAP    C$PNTX
016454  062706  000006                                                                  ADD     #6,SP
016460                          2$:     ENDMSG
016460                                                                          L10007:
```

```
        016460  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, PROVIDED EXTENDED ERROR INFOMATION HAS BEEN
                                ;*      REQUESTED, OTHERWISE ONLY A "TEST FAILURE" MESSAGE WILL BE PRINTED.
                                ;*
                                ;* INPUTS:      R1 - CONTAINS THE ADDRESS OF THE MESSAGE TO BE PRINTED.
                                ;*              ERRMSG - CONTAINS THE ADDRESS OF THE MESSAGE THAT INDICATES
                                ;*              THE TEST THAT IS BEING PERFORMED, EG DMA, BREAK ETC.
                                ;*
                                ;* OUTPUTS:     MESSAGES ARE PRINTED AT THE OPERATORS CONSOLE.
                                ;*              "TESTNAME TEST ABORTED"
                                ;*
                                ;* CALLING SEQUENCE:    INCLUDE THE LABLE "ER1603" AS THE MESSAGE POINTER
                                ;*                      PARAMETER IN THE DRS ERROR REPORT MACRO CALL.
                                ;*
                                ;* COMMENTS:
                                ;*
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: NONE.
                                ;*******************************************************************
016462                                  BGNMSG  ER1603
016462                                                                          ER1603::
016462                                  SAVE                    ;SAVE THE CONTENTS OF THE GPRS.
016462  004567  165304                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.

016466  012700  000100                   MOV    #BIT06,R0       ;TRY TO CLEAR THE
016472  046700  163522                   BIC    OPTION,R0       ;EXT'D ERROR REPORTING FLAG
016476  001024                          BNE     2$              ;EXIT IF FLAG NOT SET.


016500                                   PRINTB #EF0503,R1      ;PRINT BASIC MESSAGE ON OPERATORS CONSOLE.
016500  010146                                                                  MOV     R1,-(SP)
016502  012746  004121                                                          MOV     #EF0503,-(SP)
016506  012746  000002                                                          MOV     #2,-(SP)
016512  010600                                                                  MOV     SP,R0
016514  104414                                                                  TRAP    C$PNTB
016516  062706  000006                                                          ADD     #6,SP

016522  016702  165240                   MOV    ERRMSG,R2       ;GET THE "TEST MESSAGE".
016526                                   PRINTB #EF1601,R2      ;PRINT "TEST ABORTED" MESSAGE.
016526  010246                                                                  MOV     R2,-(SP)
016530  012746  004340                                                          MOV     #EF1601,-(SP)
016534  012746  000002                                                          MOV     #2,-(SP)
016540  010600                                                                  MOV     SP,R0
016542  104414                                                                  TRAP    C$PNTB
016544  062706  000006                                                          ADD     #6,SP

016550                          2$:     PASS                    ;RESTORE THE CONTENTS OF THE GPRS.
016550  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
016552                                  ENDMSG
016552                                                                          L10010:
016552  104423                                                                  TRAP    C$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. UNLESS EXTENDED ERROR
                                ;*      REPORTING HAS BEEN REQUESTED, ONLY THE TEST FAIL MESSAGE
                                ;*      BE PRINTED.
                                ;*
                                ;* 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.
                                ;*******************************************************************

016554                                  BGNMSG  ER3001
016554                                                                          ER3001::

016554  012700  000100                   MOV    #BIT06,R0       ;TRY TO CLEAR THE
016560  046700  163434                   BIC    OPTION,R0       ;EXT'D ERROR REPORTING FLAG
016564  001033                          BNE     2$              ;EXIT IF FLAG NOT SET.

016566                                  PRINTB  #EF0503,R1      ;PRINT THE FIRST LINE OF THE MESSAGE.
016566  010146                                                                  MOV     R1,-(SP)
016570  012746  004121                                                          MOV     #EF0503,-(SP)
016574  012746  000002                                                          MOV     #2,-(SP)
016600  010600                                                                  MOV     SP,R0
016602  104414                                                                  TRAP    C$PNTB
016604  062706  000006                                                          ADD     #6,SP
016610                                  PRINTX  #EF3001,R5      ;REPORT EXPECTED BR LEVEL.
016610  010546                                                                  MOV     R5,-(SP)
016612  012746  004573                                                          MOV     #EF3001,-(SP)
016616  012746  000002                                                          MOV     #2,-(SP)
016622  010600                                                                  MOV     SP,R0
016624  104415                                                                  TRAP    C$PNTX
016626  062706  000006                                                          ADD     #6,SP
016632                                  PRINTX  #EF3002,R4      ;REPORT ACTUAL BR LEVEL.
016632  010446                                                                  MOV     R4,-(SP)
016634  012746  004642                                                          MOV     #EF3002,-(SP)
016640  012746  000002                                                          MOV     #2,-(SP)
016644  010600                                                                  MOV     SP,R0
016646  104415                                                                  TRAP    C$PNTX
016650  062706  000006                                                          ADD     #6,SP

016654                          2$:     ENDMSG
016654                                                                  L10011:
016654  104423                                                                  TRAP    C$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, PROVIDED EXTENDED ERROR REPORTING HAS
                                ;*      BEEN REQUESTED BY THE OPERATOR.
                                ;*
                                ;* 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.
                                ;*****************************************************************************

016656                                  BGNMSG  ER9004
016656                                                                                          ER9004::

016656  012700  000100                   MOV    #BIT06,R0       ;TRY TO CLEAR THE
016662  046700  163332                   BIC    OPTION,R0       ;EXT'D ERROR REPORTING FLAG
016666  001040                          BNE     6$              ;EXIT IF FLAG NOT SET.

016670                                  PRINTB  #EF0503,#EM9014 ;REPORT THE SECONDARY ERROR MESSAGE.
016670  012746  014716                                                          MOV     #EM9014,-(SP)
016674  012746  004121                                                          MOV     #EF0503,-(SP)
016700  012746  000002                                                          MOV     #2,-(SP)
016704  010600                                                                  MOV     SP,R0
016706  104414                                                                  TRAP    C$PNTB
016710  062706  000006                                                          ADD     #6,SP
016714  005002                           CLR    R2              ;CLEAR THE LINE COUNTER.
016716  016703  163534                   MOV    ERSMRF,R3       ;GET THE ERROR SUMMARY FLAGS.
016722  005004                           CLR    R4              ;CLEAR "LINE COUNTER TIMES 2" OFFSET.
016724  000241                  2$:      CLC                    ;CLEAR THE CARRY FOR THE FOLLOWING ROTATE.
016726  006003                           ROR    R3              ;SHIFT ANOTHEP ERROR SUMMARY FLAG INTO CARRY.
016730  103013                          BCC     4$              ;SKIP PRINTIN. MESSAGE IF FLAG FOR LINE CLEAR.
016732                                  PRINTX  #EF9010,R2,ERCNTB(R4)
016732  016446  002460                                                          MOV     ERCNTB(R4),-(SP)
016736  010246                                                                  MOV     R2,-(SP)
016740  012746  004735                                                          MOV     #EF9010,-(SP)
016744  012746  000003                                                          MOV     #3,-(SP)
016750  010600                                                                  MOV     SP,R0
016752  104415                                                                  TRAP    C$PNTX
016754  062706  000010                                                          ADD     #10,SP
016760  012405                  4$:      MOV    (R4)+,R5        ;INCREMENT THE LINE OFFSET BY 2.
016762  005202                           INC    R2              ;INCREMT THE LINE COUNTER.
016764  005703                           TST    R3              ;CHECK THE ERROR SUMMARY FLAGS.
016766  001356                          BNE     2$              ;IF MORE FLAGS SET, LOOP TO DO OTHER LINES.

016770                          6$:     ENDMSG
016770                                                                          L10012:
```

```
        016770  104423                                                  TRAP    C$MSG
```

```
                                .SBTTL  GLOBAL ERROR REPORTING ROUTINE          - ER9007 -
                                ;*******************************************************************************
                                ;*      THIS IS AN ERROR REPORTING SUBROUTINE WHICH IS USED TO REPORT THAT
                                ;*      SOMETHING OTHER THAN A SELFTEST CODE WAS FOUND IN A SELFTEST CODE
                                ;*      FIFO SLOT DURING THE REMOVAL OF THE SELFTEST CODES FROM THE FIFO.
                                ;*      THIS ROUTINE IS USED BY THE RSTRPT ROUTINE. EXTENDED ERROR INFOMATION
                                ;*      IS GIVEN ONLY WHEN REQUESTED IN THE SOFTWARE QUESTIONS.
                                ;*
                                ;* 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.
                                ;*******************************************************************************

016772                                  BGNMSG  ER9007
016772                                                                                          ER9007::

016772  012700  000100                   MOV    #BIT06,R0       ;TRY TO CLEAR THE
016776  046700  163216                   BIC    OPTION,R0       ;EXT'D ERROR REPORTING FLAG
017002  001026                          BNE     2$              ;EXIT IF FLAG NOT SET.

017004  042703  177760                   BIC    #177760,R3      ;REMOVE ALL BUT LINE # BITS FROM LINE # WORD.
017010                                  PRINTB  #EF9018,R1,R3   ;REPORT SECONDARY ERROR MESSAGE.
017010  010346                                                                          MOV     R3,-(SP)
017012  010146                                                                          MOV     R1,-(SP)
017014  012746  005205                                                                  MOV     #EF9018,-(SP)
017020  012746  000003                                                                  MOV     #3,-(SP)
017024  010600                                                                          MOV     SP,R0
017026  104414                                                                          TRAP    C$PNTB
017030  062706  000010                                                                  ADD     #10,SP
017034                                  PRINTX  #EF9017,R1,R2   ;REPORT THE ACTUAL INCORRECT CODE.
017034  010246                                                                          MOV     R2,-(SP)
017036  010146                                                                          MOV     R1,-(SP)
017040  012746  005131                                                                  MOV     #EF9017,-(SP)
017044  012746  000003                                                                  MOV     #3,-(SP)
017050  010600                                                                          MOV     SP,R0
017052  104415                                                                          TRAP    C$PNTX
017054  062706  000010                                                                  ADD     #10,SP

017060                          2$:     ENDMSG
017060                                                                          L10013:
017060  104423                                                                          TRAP    C$MSG
```

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

 017062                                 BGNMSG  ER9008
 017062                                                                                         ER9008::

 017062  012700  000100                  MOV     #BIT06,R0       ;TRY TO CLEAR THE
 017066  046700  163126                  BIC     OPTION,R0       ;EXT'D ERROR REPORTING FLAG
 017072  001030                         BNE     2$              ;EXIT IF FLAG NOT SET.

                                ;+
                                ; EXTRACT THE LINE NUMBER FROM THE INCORRECT CODE OR CHARACTER WHICH WAS READ
                                ;    FROM THE SELFTEST CODE FIFO SLOT.
                                ;-
 017074  010203                          MOV     R2,R3
 017076  000303                          SWAB    R3
 017100  042703  177760                  BIC     #177760,R3      ;CALCULATE LINE NUMBER OF CODE.
 017104                                 PRINTB  #EF9016,R1,R3   ;REPORT TYPE OF INCORRECT CODE FOUND.
 017104  010346                                                                         MOV     R3,-(SP)
 017106  010146                                                                         MOV     R1,-(SP)
 017110  012746  005034                                                                 MOV     #EF9016,-(SP)
 017114  012746  000003                                                                 MOV     #3,-(SP)
 017120  010600                                                                         MOV     SP,R0
 017122  104414                                                                         TRAP    C$PNTB
 017124  062706  000010                                                                 ADD     #10,SP
 017130                                 PRINTX  #EF9017,R1,R2   ;REPORT THE ACTUAL INCORRECT CODE.
 017130  010246                                                                         MOV     R2,-(SP)
 017132  010146                                                                         MOV     R1,-(SP)
 017134  012746  005131                                                                 MOV     #EF9017,-(SP)
 017140  012746  000003                                                                 MOV     #3,-(SP)
 017144  010600                                                                         MOV     SP,R0
 017146  104415                                                                         TRAP    C$PNTX
 017150  062706  000010                                                                 ADD     #10,SP

 017154                         2$:     ENDMSG
 017154                                                                         L10014:
 017154  104423                                                                         TRAP    C$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.
                                ;*****************************************************************************

017156                                  BGNMSG  ER9101
017156                                                                                  ER9101::

017156  012700  000100                   MOV    #BIT06,R0       ;TRY TO CLEAR THE
017162  046700  163032                   BIC    OPTION,R0       ;EXT'D ERROR REPORTING FLAG
017166  001012                          BNE     2$              ;EXIT IF FLAG NOT SET.


017170                                  PRINTB  #EF9006,R2,R1   ;REPORT THE STRING FOLLOWED BY THE NUMBER.
017170  010146                                                                          MOV     R1,-(SP)
017172  010246                                                                          MOV     R2,-(SP)
017174  012746  004711                                                                  MOV     #EF9006,-(SP)
017200  012746  000003                                                                  MOV     #3,-(SP)
017204  010600                                                                          MOV     SP,R0
017206  104414                                                                          TRAP    C$PNTB
017210  062706  000010                                                                  ADD     #10,SP

017214                          2$:     ENDMSG
017214                                                                          L10015:
017214  104423                                                                          TRAP    C$MSG
```

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

 017216                                 BGNMSG  ER9301
 017216                                                                                  ER9301::
 017216                                 SAVE                    ;SAVE THE GPRS ON THE STACK.
 017216  004567  164550                         JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.

 017222  012700  000100                  MOV     #BIT06,R0       ;TRY TO CLEAR THE
 017226  046700  162766                  BIC     OPTION,R0       ;EXT'D ERROR REPORTING FLAG
 017232  001064                         BNE     60$             ;EX`  IF FLAG NOT SET.

 017234                                 PRINTB  #EF0503,R1      ;REPORT UNEXPECTED BMP CODES FOUND.
 017234  010146                                                                          MOV     R1,-(SP)
 017236  012746  004121                                                                  MOV     #EF0503,-(SP)
 017242  012746  000002                                                                  MOV     #2,-(SP)
 017246  010600                                                                          MOV     SP,R0
 017250  104414                                                                          TRAP    C$PNTB
 017252  062706  000006                                                                  ADD     #6,SP
 017256  012703  002522                  MOV     #BMPCQB,R3      ;GET THE START ADDRESS OF THE BMP CODE QUEUE.
 017262  012705  015273                  MOV     #EM9302,R5      ;GET THE MESSAGE TO BE REPORTED.
 017266  012301                 2$:     MOV     (R3)+,R1        ;GET THE NUMBER OF THE TEST THAT WAS EXECUTING.
 017270  012304                         MOV     (R3)+,R4        ;GET BMP CODE THAT WAS REPORTED OFF THE QUEUE.
 017272  004767  000056                 JSR     PC,50$          ;GO REPORT THE BMP CODE.
 017276  020302                         CMP     R3,R2           ;CHECK IF ALL CODES HAVE BEEN REPORTED.
 017300  103772                         BLO     2$              ;IF IT IS NOT THE LAST BMP CODE THEN LOOP.
                                ;+
                                ; CHECK IF OVERFLOW HAS OCCURRED.
                                ;  THE CONDITIONS FOR OVERFLOW ARE: THE POINTER CONTAINS THE ADDRESS OF THE
                                ;  LAST CELL IN THE QUEUE, AND A BMP CODE HAS ALREADY BEEN WRITTEN INTO THAT
                                ;  CELL.
                                ;-
 017302  020227  002716                  CMP     R2,#BMPCQE-4    ;CHECK IF THE POINTER IS AT THE LAST LOCATION.
 017306  001036                         BNE     60$             ;EXIT IF NOT AT THE LAST LOCATION.
 017310  005762  000002                 TST     2(R2)           ;CHECK FOR A BMP CODE IN THE LAST CELL
 017314  001433                         BEQ     60$             ;EXIT IF NO OVERFLOW HAS OCCURED. CELL EMPTY.
 017316  012301                         MOV     (R3)+,R1        ;GET THE TEST NUMBER OFF THE QUEUE.
 017320  011304                         MOV     (R3),R4         ;GET THE BMP CODE OFF THE QUEUE.
 017322  012705  015323                 MOV     #EM9303,R5      ;SELECT THE MESSAGE TO BE REPORTED.
```

```
017326                          PRINTX  #EF9302         ;REPORT OVERFLOW CONDITION.
017326  012746  005370                                                          MOV     #EF9302,-(SP)
017332  012746  000001                                                          MOV     #1,-(SP)
017336  010600                                                                  MOV     SP,R0
017340  104415                                                                  TRAP    C$PNTX
017342  062706  000004                                                          ADD     #4,SP
017346  004767  000002          JSR     PC,50$          ;REPORT THE LAST BMP CODE PLACED ON THE QUEUE.
017352  000414                  BR      60$             ;EXIT.

017354                  50$:    PRINTX  #EF9301,R5,R1,R4  ;PRINT THE MESSAGE.
017354  010446                                                                  MOV     R4,-(SP)
017356  010146                                                                  MOV     R1,-(SP)
017360  010546                                                                  MOV     R5,-(SP)
017362  012746  005312                                                          MOV     #EF9301,-(SP)
017366  012746  000004                                                          MOV     #4,-(SP)
017372  010600                                                                  MOV     SP,R0
017374  104415                                                                  TRAP    C$PNTX
017376  062706  000012                                                          ADD     #12,SP
017402  000207                  RTS     PC              ;RETURN.
017404                  60$:    PASS                    ;RESTORE THE GPR CONTENTS.
017404  004736                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.

017406                          ENDMSG
017406                                                                  L10016:
017406  104423                                                                  TRAP    C$MSG
```

```
.SBTTL  GLOBAL SUBROUTINES SECTION
;*****************************************************************************
;
;                FVTSKL3.P11
;
;*****************************************************************************


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

```
                                .SBTTL  GLOBAL SUBROUTINE                - ALTFLD -
                                ;** ************************************************************************
                                ;*                - ALTER DEVICE REGISTER FIELDS ROUTINE -
                                ;*      THIS SUBROUTINE ALTERS THE SPECIFIED FIELD OF THE SPECIFIED DEVICE
                                ;*      REGISTER 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 - BIT 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 FIELDS ALTERED.
                                ;*                  CSR IND.ADR.REG FIELD - DESTROYED.
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,ALTFLD
                                ;*
                                ;* COMMENTS:    THIS ROUTINE READS THE SPECIFIED REGISTERS FOR ALL LINES
                                ;*              WITH NUMBERS LOWER THAN THE HIGHES SPECIFIED LINE.
                                ;*              THIS ROUTINE DOES NOT READ THE CSR.
                                ;*
                                ;* SUBROUTINES CALLED: NONE.
                                ;-- ************************************************************************

017410                          ALTFLD:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
017410  004567  164356                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.

                                ;+
                                ; SET UP TO LOOP FOR EACH LINE:
                                ;    PREPARE THE WORD TO BE ORED INTO THE REGISTER CONTENTS.
                                ;    SET UP THE WORD TO WRITE INTO THE IND.ADR.REG FIELD OF THE CSR.
                                ;-
017414  010400                          MOV     R4,R0           ;CALCULATE THE NEW CONTENTS OF THE
017416  005100                          COM     R0              ;  REGISTER FIELDS WHICH ARE TO BE
017420  040002                          BIC     R0,R2           ;  ALTERRED BY THIS ROUTINE.
017422  016705  162656                  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.
                                ; EXIT THE LOOP IF NO MORE LINES TO ALTER, OR IF WE HAVE ALTERED THE MAX
                                ;    ALLOWABLE NUMBER OF LINES (AS SPECIFIED BY NUMLNS).
                                ;-
017426  000241                          CLC                     ;PREPARE FOR ROTATE, "TST R5" DOES THIS BELOW.
017430  006003                  2$:     ROR     R3              ;GET THE LINE SELECT BIT FOR THIS LINE.
017432  103006                          BCC     4$              ;SKIP SETUP IF LINE IS NOT SELECTED.
017434  010577  162576                  MOV     R5,@CSRA        ;SET OUT CSR IND.ADR.REG FIELD TO THIS LINE.
017440  011100                          MOV     (R1),R0         ;GET THE PRESENT CONTENTS OF THE REG TO ALTER.
017442  040400                          BIC     R4,R0           ;CLEAR THE BIT FIELDS WE ARE TO ALTER.
017444  050200                          BIS     R2,R0           ;OR IN THE NEW STATES OF THE FIELDS.
017446  010011                          MOV     R0,(R1)         ;WRITE THE NEW REGISTER CONTENTS TO THE REG.
017450  005205                  4$:     INC     R5              ;SET LINE NUMBER TO THE NEXT LINE.
017452  005703                          TST     R3              ;CHECK FOR UNHANDLED LINES, CLEAR CARRY FLAG.
017454  001365                          BNE     2$              ;LOOP IF SELECTED LINE(S) IS NOT HANDLED.
```

```
2422
2423 017456                    60$:   PASS                    ;RESTORE GPRS.
     017456  004736                                  JSR      PC,@(SP)+          ;RETURN TO PREGO5 SUBRT.
2424 017460  000207                   RTS     PC               ;RETURN TO CALLING ROUTNE.
```

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

017462                          CALMSL:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
017462  004567  164304                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
017466  005067  000210                  CLR     62$             ;CLEAR THE 2ND TIME FLAG.
                                ;*
                                ; SYNCHRONIZE WITH THE LTC.
                                ;-
017472  012705  000001          2$:     MOV     #1,R5           ;SET OUTER LOOP COUNTER TO 1 LOOP.
                                                        ;INCREASE THE VALUE LOADED INTO THIS COUNTER IF THE <**
                                                        ;FOLLOWING LOOP FAILS ON FUTURE, FASTER PROCESSORS. <**
017476  005000                          CLR     R0              ;CLEAR THE WAIT FOR CLOCK INT COUNTER.
017500  012767  000001  162632          MOV     #1,TIMER1       ;SET UP COUNT OF 1 TO SYNCH WITH LTC.
017506  005767  162626          4$:     TST     TIMER1          ;CHECK FOR COUNTER HAVING GONE TO ZERO.
017512  001410                          BEQ     6$              ;JUMP OUT OF LOOP IF LTC HAS INTERRUPTED.
017514  005200                          INC     R0              ;COUNT THIS ITERATION OF THE INNER LOOP.
017516  001373                          BNE     4$              ;LOOP IF COUNTER HAS NOT TURNED OVER.
017520  005305                          DEC     R5              ;DECREMENT THE INNER LOOP COUNTER.
017522  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.
                                ;-
017524  005067  162606                  CLR     CLKHRZ          ;CLEAR LTC FREQUENCY WORD TO INDICATE NO LTC.
017530  000241                          CLC                     ;INDICATE FAILURE FOR RETURN.
017532  000461                          BR      60$             ;BYPASS THE FOLLOWING CALIBRATION PROCEDURES.
                                ;*
                                ; WE ARE NOW SYNCHRONIZED WITH THE LTC.
                                ; SET UP FOR THE CALIBRATION LOOP.
                                ;-
017534  012704  002340          6$:     MOV     #TIMER1,R4      ;WILL TEST TIMER1 IN THE LOOP BELOW.
```

```
017540  005001                          CLR     R1              ;CLEAR THE OUTER LOOP COUNTER.
017542  005002                          CLR     R2              ;INDICATE TO CHECK ALL BITS OF TIMER1.
017544  005003                          CLR     R3              ;INDICATE TO CHECK FOR TIMER1 CLEAR.
017546  012714  000001                  MOV     #1,(R4)         ;LOAD TIMER1 WITH COUNT OF 1.

017552  016705  162574          8$:     MOV     MSLCNT,R5       ;LOAD MS LOOP COUNT.
017556  011400                  10$:    MOV     (R4),R0         ;GET THE TIMER1 VALUE.
017560  010067  000120                  MOV     R0,64$          ;SAVE WORD (LIKE IN THE REAL LOOP).
017564  040200                          BIC     R2,R0           ;LEAVE ALL THE BITS.
017566  020003                          CMP     R0,R3           ;COMPARE AGAINST ZERO.
017570  000261                          SEC                     ;SET CARRY IN CASE OF SUCCESS.
017572  001406                          BEQ     12$             ;EXIT LOOP IF TIMER1 HAS CLEARED.
017574  005305                          DEC     R5              ;COUNT DOWN THE INSIDE MS LOOP COUNT.
017576  001367                          BNE     10$             ;LOOP IF MS NOT UP.
017600  005301                          DEC     R1              ;DECREMENT THE MS TIME COUNT.
017602  001363                          BNE     8$              ;KEEP LOOPING.
017604  004767  000440                  JSR     PC,OOPS         ;WE OVERFLOWED, SOMETHING IS WRONG, ABORT.
                                ;+
                                ; WE HAVE NOW HAVE LOOP COUNT INFORMATION FOR ONE CLOCK TICK.
                                ; WE HAVE NEGATIVE OF NUMBER OF OUTER LOOPS IN R1, EACH IS MSLCNT INNER LOOPS.
                                ; WE HAVE THE PORTION OF THE LAST OUTER LOOP NOT EXECUTED, IN R5.
                                ; NOW WE CALCULATE THE TOTAL NUMBER OF INNER LOOPS EXECUTED.
                                ;-
017610  005401                  12$:    NEG     R1              ;GET NUMBER OF OUTER LOOPS.
017612  016702  162534                  MOV     MSLCNT,R2       ;GET THE NUMBER OF INNER LOOPS PER OUTER LOOP.
017616  010203                          MOV     R2,R3           ;COPY NUMBER OF LOOPS FOR MULTIPLY.
017620  160502                          SUB     R5,R2           ;CALC # OF INNER LOOPS DONE IN LAST OUTER LOOP
017622  010204                          MOV     R2,R4           ;  AND ADD TO ACCUMULATOR LSWORD.
017624  005005                          CLR     R5              ;CLEAR ACCUMULATOR MSWORD.
017626  005301                  14$:    DEC     R1              ;CHECK R1 FOR 0 CONDITION
017630  100403                          BMI     16$             ; SKIP MULTIPLICATION IF ZERO
017632  060304                          ADD     R3,R4           ;MULTIPLY NUMBER OF INNER
017634  005505                          ADC     R5              ; LOOPS PER OUTER LOOP BY
017636  000773                          BR      14$             ;NUMBER OF OUTER LOOPS PERFORMED.
                                ;+
                                ; DIVIDE THE TOTAL NUMBER OF INNER LOOPS BY THE NUMBER OF MS PER LTC TICK.
                                ;-
017640  016701  162504          16$:    MOV     MSTICK,R1       ;# OF MS PER LTC TICK IS DIVISOR.
017644  010403                          MOV     R4,R3           ;LSWORD OF LOOP COUNT IS LSWORD OF DIVIDEND.
017646  010502                          MOV     R5,R2           ;MSWORD OF LOOP COUNT IS MSWORD OF DIVIDEND.
017650  004767  003140                  JSR     PC,UNSDIV       ;DIVIDE NUMBER OF LOOPS BY MS PER LTC TICK.
017654  103402                          BCS     18$             ;BYPASS OOPS IF WE'RE OK.
017656  004767  000366                  JSR     PC,OOPS         ;CLOCK ROUTINES ARE NOT LONG ENOUGH, OR BUG.
017662  010167  162464          18$:    MOV     R1,MSLCNT       ;SET NEW VALUE FOR MS LOOP COUNT.
017666  005167  000010                  COM     62$             ;SET THE 2ND ITERATION FLAGS IF 1ST ITERATION.
017672  001277                          BNE     2$              ;BRANCH IF ONLY ONE ITERATION DONE.
017674  000261                          SEC                     ;SET THE SUCCESS FLAG FOR EXIT.

017676                          60$:    PASS                    ;RESTORE GPRS.
017676  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
017700  000207                          RTS     PC              ; CARRY - SUCCESS FLAG. SET IF SUCCESS.

017702  000000                  62$:    .WORD   0               ;2ND CALIBRATION ITERATION FLAGS.
017704  000000                  64$:    .WORD   0               ;DUMMY WORD FOR STORAGE OF THE READ WORD.
```

E6


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

 017706                                 CKTRAP:: SAVE                          ;SAVE CONTENTS OF GPRS R0 THRU R5.
 017706  004567  164060                                 JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
 017712  005067  162376                         CLR     TP4FLG                  ;CLEAR THE 004 TRAP FLAGS.
 017716  011011                                 MOV     (R0),(R1)               ;PERFORM THE MOVE IN QUESTION.
 017720  005767  162370                 ADRPTR:: TST    TP4FLG                  ;CHECK FOR OCCURENCE OF TRAP.
 017724  000261                                 SEC                             ;INDICATE SUCCESS.
 017726  001401                                 BEQ     60$                     ;EXIT WITH SUCCESS IF TRAP DID NOT OCCUR.
 017730  000241                                 CLC                             ;INDICATE FAILURE.
 017732                                 60$:    PASS                            ;RESTORE GPRS.
 017732  004736                                 JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
 017734  000207                                 RTS     PC
```

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

017736                          CLNRST:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
017736  004567  164030                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                                ;*
                                ; RESET THE DUT.
                                ;  THIS ROUTINE REPORTS ERRORS WITH NUMBERS FROM ERRNBR THRU ERRNBR+2.
                                ;-
017742  004767  001344                  JSR     PC,RESETT               ;RESET THE DUT TO A KNOWN STATE.
017746  103002                          BCC     60$                     ;EXIT ROUTINE WITH ABORT TEST INDICATOR.
                                ;*
                                ; PURGE THE FIFO OF ERROR CODES, SAVE ANY BMP CODES FOUND.
                                ;-
017750  004767  000522                  JSR     PC,PUFIFO               ;PURGE THE FIFO.

017754                          60$:                                    ;EXIT THE TEST USING RESETT OR PUFIFO STATUS.
017754                                  PASS                            ;RESTORE GPRS, PASS THE FOLLOWING INTACT:
017754  004736                                          JSR     PC,@(SP)+       ;RETURN TO PREG05 SUBRT.
                                                                        ;CARRY BIT:IF CLEAR, THEN ABORT THE TEST.
017756  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.
                                        ;-- ************************************************************************

017760                                  CLR16W:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
017760  004567  164006                                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
017764  012701  000020                          MOV     #16.,R1                 ;SET THE LOOP COUNTER TO 16.
017770  005020                          2$:     CLR     (R0)+                   ;CLEAR A WORD OF MEMORY.
017772  005301                                  DEC     R1                      ;COUNT THIS LOOP.
017774  001375                                  BNE     2$                      ;LOOP IF NOT 16 WORD CLEARED.
017776                                  60$:    PASS                            ;RESTORE GPRS.
017776  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
020000  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.
                                        ;-- ************************************************************************

020002                                  CNTERR:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
020002  004567  163764                                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                                        ;*
                                        ; COUNT THE ERROR ON THE COUNTER FOR THE SPECIFIED LINE.
                                        ;-
020006  006305                                  ASL     R5                      ;FORM WORD OFFSET FROM LINE NUMBER.
020010  016501  002460                          MOV     ERCNTB(R5),R1           ;GET THE PRESENT ERROR COUNT FOR THIS LINE.
020014  005201                                  INC     R1                      ;COUNT ERROR.
020016  103402                                  BCS     2$                      ;OVERFLOW?  YES, DON'T UPDATE COUNTER IN TABLE.
020020  010165  002460                          MOV     R1,ERCNTB(R5)           ;UPDATE ERROR COUNTER TABLE ENTRY.
020024  005767  162172                  2$:     TST     NDERPT
020030  001411                                  BEQ     60$                     ;SUMMARYS DISABLED?  YES, EXIT WITH CARRY 0.
020032  020167  162164                          CMP     R1,NDERPT               ;NO,  CHECK FOR ENOUGH ERRORS FOR SUMMARY USE.
020036  101002                                  BHI     4$                      ;ENOUGH ERRORS TO USE SUMMARY?  YES, GO HANDLE.
020040  000241                                  CLC                             ;INDICATE NOT TO USE SUMMARY REPORT YET.
020042  000404                                  BR      60$                     ;EXIT WITH CARRY 0.
020044  056567  002404  162404          4$:     BIS     BITTBL(R5),ERSMRF               ;SET THE ERROR SUMMARY FLAG FOR LINE.
020052  000261                                  SEC                             ;INDICATE TO USE SUMMARY REPORT.
020054                                  60$:    PASS                            ;RESTORE GPRS.
020054  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
020056  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.
                                ;*****************************************************************************

020060                          DELAY:: SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
020060  004567  163706                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
020064  010401                          MOV     R4,R1           ;PASS NUMBER OF MS DELAY AS TIME-OUT VALUE.
020066  012702  177777                  MOV     #-1,R2          ;TELL MSLOOP ROUTINE TO CHECK ALL BITS.
020072  005003                          CLR     R3              ;TELL MSLOOP RTN TO CHECK FOR ALL BITS CLEAR.
020074  012704  020116                  MOV     #62$,R4         ;TELL MSLOOP TO CHECK DUMMY NON-ZERO WORD.
020100  004767  000130                  JSR     PC,MSLOOP       ;DELAY THE REQUESTED # OF MS.
020104  103002                          BCC     60$             ;EXIT ROUTINE IF WE TIMED-OUT.]
020106  004767  000136                  JSR     PC,OOPS         ;IF NO TIME-OUT, BAD PROGRAM OR HOST MACHINE.
020112                          60$:    PASS                    ;RESTORE GPRS.
020112  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
020114  000207                          RTS     PC

020116  177777                  62$:    .WORD   -1              ;DUMMY, NON-ZERO WORD.
```

```
                                .SBTTL  GLOBAL SUBROUTINE                - MSLGET -
                                ;*******************************************************************************
                                ;*      - MILLI SECONDS LOOP WHICH RETURNS READ WORD AND REMAINING TIME -
                                ;*      THIS SUBROUTINE IS A GENERAL PURPOSE TEST LOOP SUBROUTINE.  IT IS USED
                                ;*      TO VERIFY THAT A CERTAIN ACTION OCCURS BEFORE A TIME-OUT PERIOD.  THE
                                ;*      CALLING ROUTINE PASSES IN WHICH BITS SHOULD BE SET AND CLEARED FOR THE
                                ;*      DESIRED CONDITION AND THE TIME-OUT VALUE IN MILLI-SECONDS.
                                ;*      THIS ROUTINE CHECKS FOR THE DESIRED CONDITION UPON ENTRANCE INTO THE
                                ;*      ROUTINE AND THEN ONCE EACH MILLI-SECOND THERE AFTER.
                                ;*      UPON RETURN, THE LAST WORD WHICH WAS READ TO CHECK FOR THE CONDITION
                                ;*      IS RETURNED BY THIS SUBROUTINE.
                                ;*
                                ;* INPUTS:      R1 - TIME-OUT VALUE IN MILLI-SECONDS (UP TO 64K MS).
                                ;*              R2 - BIT MAP OF BITS TO TEST (1 INDICATES TO TEST THE BIT).
                                ;*              R3 - DESIRED STATES OF THE INDICATED FIELDS IN R2.
                                ;*              R4 - ADDRESS OF THE WORD TO TEST.
                                ;*              MSLCNT - MILLI SECOND SOFTWARE LOOP COUNT.
                                ;*
                                ;* OUTPUTS:     R0 - THE LAST WORD WHICH WAS READ TO CHECK FOR THE CONDITION.
                                ;*              R1 - REMAINING NUMBER OF MS IN TIME-OUT TIME.
                                ;*              CARRY - SUCCESS FLAG (SET IF CONDITION IS MET BEFORE TIME-OUT).
                                ;*
                                ;* CALLING SEQUENCE:    JSR     PC,MSLGET
                                ;*
                                ;* COMMENTS:    THIS ROUTINE WORKS WITH OR WITHOUT A HARDWARE CLOCK, BUT THE
                                ;*              CALIBRATION IS ONLY GUARENTEED WHEN A LINE CLOCK IS AVAILABLE
                                ;*              ON THE SYSTEM.
                                ;*              THIS ROUTINE CAN BE USED AS A DELAY ROUTINE, BY SPECIFYING THE
                                ;*              DESIRED DELAY AS THE TIME-OUT AND SPECIFYING A CONDITION TO
                                ;*              LOOK FOR WHICH WILL NOT BE MET DURING THE DELAY.
                                ;*              IF A TIME-OUT VALUE OF 0 IS SPECIFIED, THIS ROUTINE CHECKS FOR
                                ;*              THE DESIRED CONDITION BEFORE RETURNING.  IT INDICATES SUCCESS
                                ;*              IF THE CONDITION IS MET, FAILURE OTHERWISE.
                                ;*
                                ;*
                                ;* SUBORDINATE ROUTINES CALLED: NONE.
                                ;*******************************************************************************

020120                          MSLGET:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
020120  004567  163646                           JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                                ;*
                                ; SET UP MASK FOR REMOVING UNUSED BITS IN THE TEST WORD, AND CLEAR UNUSED
                                ; BITS IN THE DESIRED STATE WORD TO ALLOW DIRECT COMPARISON.
                                ;-
020124  005102                          COM     R2              ;GET MASK OF UNUSED BITS.
020126  040203                          BIC     R2,R3           ;MASK OUT UNUSED BITS IN DESIRED STATE WORD.
                                ;*
                                ; HANDLE THE TEST AND EXIT IF WE HAVE A 0 TIME-OUT VALUE.
                                ;-
020130  005701                          TST     R1              ;TEST THE TIME-OUT VALUE FOR ZERO.
020132  001011                          BNE     2$              ;IF NON-ZERO TIME-OUT, GO LOOP AND TEST.
020134  011400                          MOV     (R4),R0         ;GET THE WORD TO TEST BEFORE EXITING.
020136  010067  000070                  MOV     R0,62$          ;SAVE VALUE SO WE CAN RETURN IT.
020142  040200                          BIC     R2,R0           ;MASK OUT UNTESTED BITS OF WORD.
020144  020003                          CMP     R0,R3           ;COMPARE AGAINST DESIRED STATE WORD.
020146  000261                          SEC                     ;INDICATE SUCCESS IN CASE WORDS ARE EQUAL.
020150  001420                          BEQ     6$              ;EXIT WITH SUCCESS IF WORDS ARE EQUAL.
```

```
020152  000241                          CLC                     ;INDICATE FAILURE (TIME-OUT).
020154  000416                          BR      6$              ;EXIT WITH FAILURE, WORDS AREN'T EQUAL.
                                ;+
                                ; NON-ZERO TIME-OUT VALUE.  LOOP, WAITING FOR CONDITION OR TIME-OUT.
                                ;-
020156  016705  162170          2$:     MOV     MSLCNT,R5       ;LOAD MS LOOP COUNT.
020162  011400                  4$:     MOV     (R4),R0         ;GET THE WORD TO TEST.
020164  010067  000042                  MOV     R0,62$          ;SAVE WORD IN CASE THIS IS THE LAST.
020170  040200                          BIC     R2,R0           ;MASK OUT UNTESTED BITS OF WORD.
020172  020003                          CMP     R0,R3           ;COMPARE AGAINST DESIRED STATE WORD.
020174  000261                          SEC                     ;SET CARRY IN CASE OF SUCCESS.
020176  001405                          BEQ     6$              ;EXIT WITH SUCCESS IF WORDS ARE EQUAL.
020200  005305                          DEC     R5              ;COUNT DOWN THE INSIDE MS LOOP COUNT.
020202  001367                          BNE     4$              ;LOOP IF MS NOT UP.
020204  005301                          DEC     R1              ;DECREMENT THE MS TIME COUNT.
020206  001363                          BNE     2$              ;IF TIME NOT UP, LOOP TO COUNT ANOTHER MS.
020210  000241                          CLC                     ;CLEAR CARRY, WE TIMED-OUT.
                                ;+
                                ; HAVE EITHER FOUND CONDITION, OR TIMED-OUT (POSSIBLY FROM 0 TIME-OUT VALUE).
                                ; RESTORE THE LAST CONTENTS READ FROM THE TEST WORD.  EXIT ROUTINE.
                                ;-
020212  016700  000014          6$:     MOV     62$,R0          ;PASS OUT THE LAST READ WORD.
020216                          60$:    PASS    R0,R1           ;RESTORE GPRS, EXCEPT THE FOLLOWING:
020216  010066  000002                                  MOV     R0,R0SLOT(SP)           ;PUT R0 IN STACK SLOT.
020222  010166  000004                                  MOV     R1,R1SLOT(SP)           ;PUT R1 IN STACK SLOT.
020226  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                                                ;R0 - LAST READ WORD CHECKED FOR CONDITION.
                                                                ;R1 - REMAINING TIME (0 IF TIME-OUT OCCURED).
020230  000207                          RTS     PC              ;CARRY - SET IF SUCCESS, CLEAR IF TIME-OUT.
                                ;+
                                ; LOCAL STORAGE.
                                ;-
020232  000000                  62$:    .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.
                                ;*******************************************************************************

020234                          MSLOOP:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
020234  004567  163532                                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.

                                ;+
                                ; CALLING THE MSLGET ROUTINE FROM THE MSLOOP ROUTINE ISOLATES THE CALLER OF
                                ; MSLOOP FROM THE RETURNED TEST WORD AND REMAINING TIME OUT VALUES.
                                ;-
020240  004767  177654                  JSR     PC,MSLGET               ;CALL THE MULTI-PURPOSE MS LOOP AND SEARCH RTN.

020244                          60$:    PASS                            ;RESTORE GPRS,
020244  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
020246  000207                          RTS     PC                      ;CARRY - SET IF SUCCESS, CLEAR IF TIME-OUT.
```

```
                                        .SBTTL  GLOBAL SUBROUTINE                - OOPS -
                                        ;** ***********************************************************************
                                        ;*                        - PROGRAM ABORT SUBROUTINE -
                                        ;*      THIS SUBROUTINE IS USED TO ABORT THE PROGRAM WHEN A FATAL ERROR IS
                                        ;*      DETECTED IN THE PROGRAM OR THE HOST SYSTEM HARDWARE.  AN ERROR MESSAGE
                                        ;*      IS PRINTED GIVING SOME INFORMATION ABOUT THE NATURE OF THE ABORT.
                                        ;*
                                        ;* INPUTS:      R1 - ERROR CODE GIVING REASON FOR ABORT.
                                        ;*
                                        ;* OUTPUTS:     AN ERROR MESSAGE IS PRINTED.
                                        ;*              A LIST OF RETURN PC VALUES FOR ALL SUBROUTINE CALLS IS PRINTED.
                                        ;*
                                        ;* CALLING SEQUENCE:    JSR     PC,OOPS
                                        ;*
                                        ;* COMMENTS:
                                        ;*
                                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                                        ;-- ***********************************************************************

020250                                  OOPS::  SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
020250  004567  163516                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                                            ; REPORT "HOST COMPUTER HARDWARE OR SOFTWARE BUG ENCOUNTERED." ERROR.
020254                                          ERRSF   101,EM0101
020254  104454                                                                          TRAP    C$ERSF
020256  000145                                                                          .WORD   101
020260  020314                                                                          .WORD   EM0101
020262  000000                                                                          .WORD   0
                                            ; REPORT "PROGRAM HUNG, WAITING FOR A CONTROL-C."
020264                                          PRINTF  #EM0102
020264  012746  020400                                                                  MOV     #EM0102,-(SP)
020270  012746  000001                                                                  MOV     #1,-(SP)
020274  010600                                                                          MOV     SP,R0
020276  104417                                                                          TRAP    C$PNTF
020300  062706  000004                                                                  ADD     #4,SP
020304                                  2$:     BREAK                   ;LOOK FOR OPERATOR CONTROL-C INPUT.
020304  104422                                                                          TRAP    C$BRK
020306  000776                                  BR      2$              ;INFINITE LOOP.
020310                                  60$:    PASS                    ;DON'T NEED THIS, BUT SOMEBODY MAY CHANGE THIS
020310  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
020312  000207                                  RTS     PC              ; ROUTINE IN THE FUTURE, SO BE CONSISTANT.

020314     110     117     123  EM0101:: .ASCIZ /HOST COMPUTER HARDWARE OR SOFTWARE BUG ENCOUNTERED./
020317     124     040     103
020322     117     115     120
020325     125     124     105
020330     122     040     110
020333     101     122     104
020336     127     101     122
020341     105     040     117
020344     122     040     123
020347     117     106     124
020352     127     101     122
020355     105     040     102
020360     125     107     040
020363     105     116     103
020366     117     125     116
020371     124     105     122
```

```
        020374    105    104    056
        020377    000
   2873 020400    045    116    045  EM0102:: .ASCIZ /⌘N⌘APROGRAM HUNG, WAITING FOR A CONTROL-C. <**************⌘N⌘N/
        020403    101    120    122
        020406    117    107    122
        020411    101    115    040
        020414    110    125    116
        020417    107    054    040
        020422    127    101    111
        020425    124    111    116
        020430    107    040    106
        020433    117    122    040
        020436    101    040    103
        020441    117    116    124
        020444    122    117    114
        020447    055    103    056
        020452    040    074    052
        020455    052    052    052
        020460    052    052    052
        020463    052    052    052
        020466    052    052    052
        020471    045    116    045
        020474    116    000
   2874                                   .EVEN
```

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

020476                                  PUFIFO::SAVE                            ;SAVE CONTENTS OF GPRS R0 THRU R5.
020476  004567  163270                                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
020502  012701  001000                          MOV     #512.,R1        ;SET MAXIMUM TRY COUNT OF 512.
020506  016704  161526                          MOV     RBUFA,R4        ;GET ADDRESS OF THE RECEIVER BUFFER REGISTER.

020512  011402                          2$:     MOV     (R4),R2         ;GET THE CONTENTS OF THE RECEIVER BUFFER REG.
020514  100016                                  BPL     6$              ;EXIT IF THE FIFO IS EMPTY, DATA_VALID CLR.
                                        ;*
                                        ; CHECK IF THE READ CHARACTER IS ACTUALLY A BMP CODE.
                                        ;  IF IT IS, THEN SAVE IT ON THE BMP CODE QUEUE TO BE REPORTED LATER.
                                        ;-
020516  012700  070000                          MOV     #70000,R0       ;GENERATE A BIT MAP OF CHAR ERROR BITS
020522  040200                                  BIC     R2,R0           ; WHICH ARE NOT SET FOR CHAR.
020524  001006                                  BNE     4$              ;THROW CHAR AWAY IF NOT BMP OR SELFTEST CODE.
                                          ;*
                                          ; CHECK IF THE READ DATA IS MODEM STATUS , BMP OR SELFTEST?.
                                          ;-
020526  012700  000301                          MOV     #301,R0         ; CHECK IF BMP.
020532  040200                                  BIC     R2,R0           ;TRY TO CLEAR BMP FLAGS IN THE READ DATA.
020534  001002                                  BNE     4$              ;IF IT IS MODEM OR SELFTEST CODE THROW IT AWAY.
020536  004767  001470                          JSR     PC,SAVBMP       ;SAVE BMP CODE ON THE QUEUE.

020542  005301                          4$:     DEC     R1              ;DECREMENT THE TRY COUNT.
020544  001362                                  BNE     2$              ;LOOP TO TRY AGAIN.
020546  000241                                  CLC                     ;CLEAR CARRY,TO INDICATE FIFO NOT PURGED.
020550  000401                                  BR      60$             ;EXIT WITH CARRY CLEAR.
020552  000261                          6$:     SEC                     ;SET CARRY, TO INDICATE FIFO PURGED.

020554                                  60$:    PASS                    ;RESTORE GPRS.
020554  004736                                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                                                        ;CARRY BIT, SET INDICATES FIFO PURGED.
020556  000207                                  RTS     PC
```

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

020560                          RDPDR:: SAVE                            ;SAVE CONTENTS OF GPRS R0 THRU R5.
020560  004567  163206                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
020564  012767  016352  163176          MOV     #ER1601,ERRBLK          ;SET UP THE ADDRESS OF THE ERROR REPORT RTN.
                                ;*
                                ; DETERMINE WHETHER REGISTER DATA SHOULD BE INVERTED FROM DATA PATTERN.
                                ;-
020572  005704                          TST     R4                      ;CHECK THE OPERAND TYPE INDICATOR.
020574  100001                         BPL     2$                       ;BIC WRITE PERFORMED?  NO, USE STANDARD DATA.
020576  005102                          COM     R2                      ;YES, INVERT THE DATA PATTERN.
                                ;*
                                ; SET UP OUTER LOOP.
                                ;-
020600  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.
                                ;-
```

```
020602  010267  000222          4$:     MOV     R2,70$          ;SAVE THE OUTER LOOP DATA PATTERN.
020606  010577  161424                  MOV     R5,@CSRA        ;SET CSR IND.ADR.REG FIELD TO THIS LINE.
020612  010500                          MOV     R5,R0
020614  006300                          ASL     R0
020616  036067  002404  161400          BIT     BITTBL(R0),ACTLNS
020624  001467                         BEQ     16$             ;IS THE LINE ACTIVE?  NO, SKIP THE LINE.
020626  012703  000004                  MOV     #LPRO,R3        ;YES, INITIALIZE REGISTER OFFSET FOR LPR.
                                ;+
                                ;       THE INNER LOOP FOLLOWS.  EACH PASS THROUGH THIS LOOP READS AND COMPARES
                                ;       DATA FROM A DEVICE REGISTER.
                                ;-
020632  010204                  6$:     MOV     R2,R4           ;SAVE THE INNER LOOP DATA PATTERN.
020634  046302  002364                  BIC     UNBTTB(R3),R2   ;REMOVE UNUSED BITS FROM EXPECTED DATA.
020640  016300  002236                  MOV     DRADRT(R3),R0
020644  005766  000010                  TST     R3SLOT(SP)      ;CHECK THE ACCESS TYPE INDICATOR.
020650  001002                         BNE     8$              ;BYTE ACCESS?  YES, GO PERFORM BYTE READ.
020652  011001                          MOV     (R0),R1         ;NO, PERFORM WORD READ OF DEVICE REGISTER.
020654  000416                         BR      12$
020656  100410                  8$:    BMI     10$             ;LOW BYTE ACCESS?  YES, GO DO LOW BYTE READ.
020660  005200                          INC     R0              ;HIGH BYTE ACCESS.  FORM HIGH BYTE ADDRESS.
020662  111001                          MOVB    (R0),R1         ;READ THE HI BYTE OF THE DUT REGISTER.
020664  000301                          SWAB    R1              ;PUT HI BYTE BACK INTO THE HI BYTE.
020666  042701  000377                  BIC     #377,R1         ;REMOVE THE UNUSED BYTE IN ACTUAL DATA.
020672  042702  000377                  BIC     #377,R2         ;REMOVE THE UNUSED BYTE IN EXPECTED DATA.
020676  000405                         BR      12$
020700  111001                  10$:    MOVB    (R0),R1         ;READ THE LOW BYTE OF THE DUT REGISTER.
020702  042701  177400                  BIC     #177400,R1      ;REMOVE THE UNUSED BYTE.
020706  042702  177400                  BIC     #177400,R2      ;FORM EXPECTED LOW BYTE FOR COMAPARISON.

020712  046301  002364          12$:    BIC     UNBTTB(R3),R1   ;REMOVE UNUSED BITS FROM ACTUAL DATA.
020716  020102                          CMP     R1,R2           ;COMPARE ACTUAL AND EXPECTED DATA.
020720  001414                         BEQ     14$             ;ACTUAL = EXPECTED?  YES, SKIP ERROR.
020722  004767  177054                 JSR     PC,CNTERR       ;NO, COUNT THE ERROR, CHECK FOR ERROR SUMMARY.
020726  103411                         BCS     14$             ;USE ERROR SUMMARY?  YES, SKIP ERROR.
                                    ;NO, REPORT "BAD BIT(S) IN DEVICE XXXXX REGISTER FOR LINE NN (D)."
020730                                 ERROR
020730  104460                                                                                  TRAP    C$ERROR
                                ;+
                                ;EXIT THIS ROUTINE AND SET THE "EXIT ON ERROR" FLAG, IF EXTENDED ERROR
                                ;REPORTING HAS NOT BEEN REQUESTED.
                                ;-
020732  032767  000100  161260          BIT     #BIT06,OPTION   ;HAS EXTENDED ERROR REPORTING BEEN REQUESTED ?
020740  001004                         BNE     14$             ;BRANCH IF IT HAS.
020742  012767  000001  161330          MOV     #1,EXOERR       ;SET THE EXIT ON ERROR FLAG.
020750  000425                         BR      60$             ;EXIT THE ROUTINE.

020752  010402                  14$:    MOV     R4,R2           ;RESTORE THE INNER LOOP DATA PATTERN.
020754  004767  000444                 JSR     PC,ROLDAP       ;ROTATE DATA PATTERN LEFT, NOT THROUGH CARRY.
020760  062703  000002                  ADD     #2,R3           ;SET REGISTER OFFSET TO THE NEXT REGISTER.
020764  020327  000006                  CMP     R3,#FSLSO       ;CHECK THAT THIS IS NOT THE FIFOSIZE/DATA REG.
020770  001002                         BNE     15$             ;AVOID ALTERING THE OFFSET IF IT ISN'T
020772  062703  000002                  ADD     #2,R3           ;POINT AT THE NEXT REGISTER.
020776  020327  000016          15$:    CMP     R3,#TXBFCO      ;COMPARE REG OFFSET WITH OFFSET OF LAST REG.
021002  003713                          BLE     6$              ;LOOP IF NOT ALL REG DONE FOR THIS LINE.
                                ;+
                                ; BACK INTO THE OUTER LOOP.  NOW SET UP FOR NEXT LINE.  LOOP IF NOT DONE.
                                ;-
```

```
021004  016702  000020          16$:    MOV     70$,R2          ;SET UP TO ROTATE THE DATA PATTERN.
021010  004767  000410                  JSR     PC,ROLDAP       ;ROTATE THE DATA PATTERN.
021014  005205                          INC     R5              ;COUNT THIS LINE
021016  020527  000020                  CMP     R5,@NUMLNS      ;COMPARE LINE COUNT WITH NUMBER OF LINES.
021022  002667                          BLT     4$              ;LOOP IF SOME LINES NOT DONE.

021024                          60$:    PASS                    ;RESTORE GPRS.
021024  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
021026  000207                          RTS     PC

021030  000000                  70$:    .WORD   0               ;STORAGE FOR DATA PATTERN OUTSIDE INNER LOOP.
```

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

021032                          REGTST:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
021032  004567  162734                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                                ;+
                                ; SET UP THE GPRS FOR THE WRITTING OF THE DATA PATTERN.
                                ;-
021036  012705  000020                  MOV     #16.,R5         ;SET UP LOOP COUNTER TO COUNT 16 ITERATIONS.
021042  012702  167410                  MOV     #167410,R2      ;INITIALIZE THE DATA PATTERN.
021046  032704  000001                  BIT     #BIT0,R4        ;TEST FOR R/W ACCESS.
021052  001001                          BNE     2$              ;R/M/W ACCESS?  YES, R4 IS ALL SET UP.
021054  005004                          CLR     R4              ;NO, INDICATE R/W ACCESS.
021056                          2$:
                                ;+
                                ; SET UP THE GPRS FOR THE CLEARING OR SETTING OF ALL THE USED BITS.
                                ;-
021056  010400                          MOV     R4,R0           ;PASS OPERATION TYPE INDICATOR AROUND SWAP0.
021060  004767  001272                  JSR     PC,SWAP0        ;GET ALTERNATE GPR SET IN R1 THRU R5.
021064  016701  162674                  MOV     ERRNBR,R1       ;SAVE THE INITIAL ERROR NUMBER.
021070  010004                          MOV     R0,R4
021072  005404                          NEG     R4              ;SET UP OP TYPE FOR CLEARING OR SETTING.
021074  005002                          CLR     R2              ;SET UP CLEAR WRITE PATTERN.
021076  026627  000012  000002          CMP     R4SLOT(SP),#2   ;TEST FOR CLEAR THEN MOV TEST SEQUENCE.
021104  001401                          BEQ     4$              ;CLEAR THEN MOV?  YES, LEAVE WRITE PAT CLEAR.
021106  005102                          COM     R2              ;NO, SET ALL BITS OF WRITE PATTERN.
021110  005003                  4$:     CLR     R3              ;INDICATE THAT WORD ACCESSES SHOULD BE USED.
021112  005000                          CLR     R0              ;SET ALTERNATE BYTE EXPECTED DATA PAT TO CLEAR.
021114  026627  000012  177776          CMP     R4SLOT(SP),#-2  ;TEST FOR SET THEN MOV TEST SEQUENCE.
021122  001001                          BNE     6$              ;SET THEN MOV?  YES, LEAVE ALT BYTE PAT CLEAR.
021124  005100                          COM     R0              ;NO, SET ALT BYTE EXPECTED DATA PAT TO ALL 1'S.
021126  004767  001224          6$:     JSR     PC,SWAP0        ;RESTORE SWAPPED GPR VALUES TO R1 THRU R5.
                                ;+
                                ; START OF DATA PATTERN LOOP.
```

```
                                        ;-
021132                                  8$:
                                            ;+
                                            ; SET OR CLEAR ALL THE USED BITS OF THE DEVICE REGISTERS FOR ALL LINES.
                                            ; VERIFY THAT ALL THE BITS WERE SET OR CLEARED CORRECTLY.
                                            ;-
021132  004767  001220                          JSR     PC,SWAPO        ;GET ALTERNATE GPRS FOR SETTING INTIAL STATES.
021136  004767  002062                          JSR     PC,WDPDR        ;GO CLEAR ALL USED REGISTER BITS, ALL LINES.
021142  010167  162616                           MOV    R1,ERRNBR       ;SET UP ERROR NUMBER TO INITIAL ERRNBR.
021146  004767  177406                          JSR     PC,RDPDR        ;VERIFY ALL USED REGISTER BITS, ALL LINES.
                                        ;+
                                        ;EXIT THIS ROUTINE IF AN ERROR HAS BEEN FOUND AND EXTENDED ERROR REPORTING
                                        ;HAS BEEN REQUESTED,  I.E.  EXOERR IS NON-ZERO.
                                        ;-
021152  005767  161122                           TST    EXOERR          ;HAS AN ERROR BEEN FOUND ?
021156  001035                                  BNE     60$             ;EXIT THIS ROUTINE IF IT HAS.

021160  004767  001172                          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.
                                            ;-
021164  004767  002034                          JSR     PC,WDPDR        ;WRITE DATA PATTERN TO DEVICE REGISTERS.
021170  005267  162570                           INC    ERRNBR          ;SET ERROR NUMBER TO INITIAL+1.
021174  004767  177360                          JSR     PC,RDPDR        ;VERIFY DATA PATTERN IN ALTERRED BYTE(S).
                                        ;+
                                        ;EXIT THIS ROUTINE IF AN ERROR HAS BEEN FOUND AND EXTENDED ERROR REPORTING
                                        ;HAS BEEN REQUESTED.
                                        ;-
021200  005767  161074                           TST    EXOERR          ;HAS AN ERROR BEEN FOUND ?
021204  001022                                  BNE     60$             ;EXIT THIS ROUTINE IF IT HAS.

021206  005703                                   TST    R3              ;CHECK THE BYTE INDICATOR.
021210  001414                                  BEQ     10$             ;WORD ACCESS?  YES, SKIP SECOND BYTE CHECK.
                                            ;+
                                            ; CHECK THAT THE ALTERNATE (UNMODIFIED) BYTE IS CLEAR OR SET AS EXPECTED.
                                            ;-
021212  010201                                   MOV    R2,R1           ;SAVE THE DATA PATTERN.
021214  010002                                   MOV    R0,R2           ;GET THE ALTERNATE BYTE EXPECTED DATA.
021216  005403                                   NEG    R3              ;INDICATE THAT OTHER BYTE IS TO BE CHECKED.
021220  005267  162540                           INC    ERRNBR          ;SET ERROR NUMBER TO INITIAL+2.
021224  004767  177330                          JSR     PC,RDPDR        ;VERIFY DATA PATS IN OTHER BYTES OF REGISTERS.
                                        ;+
                                        ;EXIT THIS ROUTINE IF AN ERROR HAS BEEN FOUND AND EXTENDED ERROR REPORTING
                                        ;HAS BEEN REQUESTED.
                                        ;-
021230  005767  161044                           TST    EXOERR          ;HAS AN ERROR BEEN FOUND ?
021234  001006                                  BNE     60$             ;EXIT THIS RO  INE IF IT HAS.

021236  005403                                   NEG    R3              ;RESTORE BY    DICATOR.
021240  010102                                   MOV    R1,R2           ;RESTORE DA    ATTERN.
                                            ;+
                                            ; PEPARE THE NEXT DATA PATTERN AND LOOP IF NOT DONE.
                                            ;-
021242  004767  000156                  10$:    JSR     PC,ROLDAP       ;ROTATE DATA PATTERN LEFT, NOT THROUGH CARRY.
021246  005305                                   DEC    R5              ;COUNT THIS ITERATION OF THE LOOP.
021250  003330                                  BGT     8$              ;ALL PATTERNS DONE?  NO, LOOP.
```

```
                                                                        ;YES, RESTORE ERROR NUMBER AND EXIT.
021252  016767  161166  162504  60$:    MOV     GPRSOB,ERRNBR           ;GET THE ERROR NUMBR FROM GPR SWAP STORAGE.
021260                                  PASS                            ;RESTORE GPRS.
021260  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
021262  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:
                                        ;-- ************************************************************************

021264                                  REPSMR:: SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
021264  004567  162502                                   JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
021270  005767  161162                          TST     ERSMRF           ;CHECK THE "PRINT LINE ERROR SUMMARY" FLAGS.
021274  001404                                  BEQ     60$              ;EXIT WITHOUT ACTION IF NO SUMMARY FLAGS SET.
                                        ;+
                                        ; WE HAVE SOME ERROR SUMMARIES TO REPORT.
                                        ;-
021276  012767  016656  162464                  MOV     #ER9004,ERRBLK   ;SELECT ERROR REPORTING ROUTINE.
                                                ;+
                                                ; REPORT
                                                ;    "ERROR SUMMARY REPORT FOR LINES WITH EXCESSIVE NUMBERS OF ERRORS:"
                                                ;-
021304                                          ERROR
021304  104460                                                                                  TRAP    C$ERROR
021306                                  60$:    PASS                     ;RESTORE GPRS.
021306  004736                                           JSR     PC,@(SP)+                ;RETURN TO PREG05 SUBRT.
021310  000207                                  RTS     PC
```

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

021312                          RESETT:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
021312  004567  162454                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
021316  012702  000040                  MOV     #BIT05,R2               ;SET BIT MASK OF MASTER RESET BIT.
                                ;*
                                ; TEST THE STATE OF THE MASTER RESET BIT IN THE CSR.
                                ;  IF MR IS SET THEN WAIT FOR SELF-TEST TO COMPLETE.
                                ;   IF TIME-OUT OCCURS, REPORT THE ERROR AND PASS-OUT ABORT TEST INDICATOR.
                                ;-
021322  016704  160710                  MOV     CSRA,R4                 ;GET THE ADDRESS OF THE DUT'S CSR.
021326  030214                          BIT     R2,(R4)                 ;CHECK STATE OF MASTER RESET BIT.
021330  001406                          BEQ     2$                      ;DON'T DELAY IF MR IS ALREADY CLEAR.
021332  005003                          CLR     R3                      ;SET UP DESIRED STATE OF MASTER RESET BIT.
021334  012701  011610                  MOV     #5000.,R1               ;PASS TIME-OUT VALUE OF 5 SECONDS.
021340  004767  176554                  JSR     PC,MSLGET               ;WAIT FOR SELF-TEST TO COMPLETE, MR CLEAR.
021344  103012                          BCC     4$                      ;GO REPORT ERROR IF TIMEOUT OCCURRED.

                                ;*
                                ; SET MASTER RESET BIT IN CSR.  CLEAR TX AND RX ENABLE BITS, ETC.
                                ;  SKIP THE SELFTEST.
                                ;  TIME-OUT OF 5 SECS, JUST IN CASE THE SELF-TEST EXECUTES.
                                ;-
021346  010277  160664          2$:     MOV     R2,@CSRA                ;SET MASTER RESET BIT, DISABLE TX AND RX INTS.
021352  004767  000722                  JSR     PC,SKPSTS               ;TRY TO SKIP THE SELFTEST.
                                  ;*
                                  ;   SET SELF-TEST TIME-OUT OF 5 SECONDS, AND WAIT FOR M.R TO CLEAR.
                                  ;   IF TIME-OUT OCCURS, THEN REPORT THE FATAL ERROR AND PASS-OUT THE ABORT
                                  ;   TEST INDICATOR.
                                  ;-
021356  005003                          CLR     R3                      ;SET UP DESIRED STATE OF MASTER RESET BIT.
021360  012701  011610                  MOV     #5000.,R1               ;PASS TIME-OUT VALUE OF 5 SECONDS.
021364  004767  176530                  JSR     PC,MSLGET               ;WAIT FOR SELF-TEST TO COMPLETE, MR CLEAR.
021370  103410                          BCS     6$                      ;SKIP ERROR REPORT IF MR CLEARED IN TIME.
```

```
                                        ;+
                                        ; SET UP ERROR MESSAGE TO REPORT "FATAL ERROR FOUND DURING RESET,TEST ABORTED".
                                        ; INDICATE TEST IS TO BE ABORTED BY CLEARING THE CARRY BIT.
                                        ;-
021372  012701  012171                  4$:     MOV     #EM1601,R1      ;PASS ERROR MESSAGE TO REPORT.
021376  012767  016462  162364                  MOV     #ER1603,ERRBLK  ;PASS ADDRESS OF ERROR HANDLING ROUTINE.
                                                ;REPORT ERROR "TIME-OUT OCCURRED WAITING FOR MASTER RESET TO CLEAR"
                                                ; "TEST ABORTED"
021404                                          ERROR                   ;               >>>>> ERROR <<<<<
021404  104460                                                                                  TRAP    C$ERROR
021406  000241                                  CLC                     ;INDICATE TEST IS TO BE ABORTED.
021410  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).
                                        ;-
021412  005067  160666                  6$:      CLR    IESTAT          ;CLEAR TX AND RX INTERRUPT STATUS FLAGS.
021416  000261                                   SEC                    ;INDICATE SUCCESS, CONTINUE TEST.

021420                                  60$:    PASS                    ;RESTORE GPRS, PASS THE FOLLOWING INTACT:
021420  004736                                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                                                        ;CARRY BIT:IF CLEAR,INDICATES ABORT TEST.
021422  000207                                  RTS     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
                                        ;*****************************************************************************

021424                                  ROLDAP::SAVE                            ;SAVE CONTENTS OF GPRS R0 THRU R5.
021424  004567  162342                                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
021430  005702                                  TST     R2                      ;CHECK MSB, AND CLEAR CARRY.
021432  100001                                  BPL     2$                      ;BRANCH IF CLEAR.
021434  000261                                  SEC                             ;SET CARRY IF MSB SET
021436  006102                          2$:     ROL     R2                      ;ROTATE DATA PATTERN LEFT
021440                                  60$:    PASS    R2                      ;REST RE GPRS,EXCEPT
021440  010266  000006                                  MOV     R2,R2.LOT(SP)           ;PUT R2 IN STACK SLOT.
021444  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                                                                ;R2 - CONTAINS THE ROTATED DATA PATTERN
021446  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.
                                        ;-- ***********************************************************************

021450                                  RSTRPT:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
021450  004567  162316                                  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.
                                        ;-
021454  005003                                  CLR     R3              ;CLEAR THE CODE COUNTER.
021456  016705  162302                          MOV     ERRNBR,R5       ;SAVE ERRNBR FOR RESTORATION LATER.
021462  017702  160552                  2$:     MOV     @RBUFA,R2       ;READ A CHAR FROM THE DUT FIFO.
021466  100422                                  BMI     4$              ;SKIP ERROR IF DATA.VALID SET FOR CHAR.
                                        ;+
                                        ; WE EXPECT A SELFTEST CODE, BUT THIS FIFO SLOT IS EMPTY.
                                        ;-
021470  010567  162270                          MOV     R5,ERRNBR       ;RESTORE ERROR NUMBER TO INTITIAL VALUE.
021474  012701  015123                          MOV     #EM9018,R1      ;PASS ERROR MESSAGE INFO TO ER9007 ROUTINE.
021500  012767  016772  162262                  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."
                                        ;-
021506                                          ERROR                   ;               >>>>> ERROR <<<<<.
021506  104460                                                                                  TRAP    C$ERROR
                                        ;+
                                        ; EXIT THIS ROUTINE IF EXTENDED ERROR REPORTING HAS NOT BEEN REQUESTED.
                                        ;-
021510  032767  000100  160502                  BIT     #BIT06,OPTION   ;HAS EXTENDED ERROR REPORTING BEEN REQUESTED ?
021516  001003                                  BNE     3$              ;AVOID SET THE FLAG IF IT HAS.
021520  012767  000001  160552                  MOV     #1,EXOERR       ;SET THE EXIT ON ERROR FLAG
```

```
                                        ;+
                                        ; INIDICATE "SUCCESS" (BECAUSE FIFO IS PURGED), AND EXIT THIS ROUTINE.
                                        ;-
021526  000261                  3$:        SEC                     ;SET SUCCESS FLAG.
021530  000167  000406                    JMP     60$             ;EXIT ROUTINE.
                                        ;+
                                        ; DETERMINE IF THIS IS NOT A SELFTEST CODE.
                                        ;-
021534  012700  070001          4$:        MOV     #70001,R0       ;GENERATE BIT MAP OF ANY CLEAR ERROR BITS OR
021540  040200                             BIC     R2,R0           ;  BIT 0 WHICH ARE CLEAR.
021542  001042                            BNE     8$              ;GO TO REPORT ERROR IF THIS IS NOT A TEST CODE.
                                        ;+
                                        ; WE HAVE A TEST CODE (EITHER BMP OR SELFTEST CODE).
                                        ; DETERMINE WHAT TYPE OF CODE WE HAVE.
                                        ;-
021544  032702  000200                     BIT     #BIT7,R2        ;TEST ROM VERSION CODE INDICATOR BIT.
021550  001462                            BEQ     10$             ;SKIP ERRORS IF SELFTEST ROM VERSION CODE.
021552  120227  000203                     CMPB    R2,#203         ;CHECK IF SKIP SELF TEST CODE.
021556  001457                            BEQ     10$             ;SKIP ERROR REPORT IF SKIP SELF TEST CODE FOUND
021560  120227  000201                     CMPB    R2,#201         ;CHECK IF NULL CODE PRESENT.
021564  001454                            BEQ     10$             ;SKIP ERROR REPORT IF SELF TEST NULL CODE.
021566  012700  000300                     MOV     #300,R0         ;TEST CODE TYPE BITS FOR BOTH CODE
021572  040200                             BIC     R2,R0           ;  TYPE BITS SET (INDICATING BMP CODE).
021574  001003                            BNE     6$              ;IF IT IS NOT A BMP CODE GO REPORT ERROR.
021576  004767  000430                    JSR     PC,SAVBMP       ;SAVE THE BMP CODE ON THE QUEUE.
021602  000445                            BR      10$             ;GO GET THE NEXT CHARACTER FROM THE FIFO.
                                        ;+
                                        ; WE HAVE A SELFTEST ERROR CODE.
                                        ;-
021604  010567  162154          6$:        MOV     R5,ERRNBR       ;RESTORE ERROR NUMBER TO INTITIAL VALUE.
021610  005267  162150                     INC     ERRNBR          ;CALCULATE INITIAL ERROR NUMBER PLUS 1.
021614  012701  015150                     MOV     #EM9020,R1      ;PASS ERROR MESSAGE INFO TO ER9008 ROUTINE.
021620  012767  017062  162142             MOV     #ER9008,ERRBLK  ;SELECT PROPER ERROR REPORT ROUTINE.
                                        ;+
                                        ; REPORT ERROR WITH NUMBER INITIAL ERRNRB + 1.
                                        ;    "UNEXPECTED SELFTEST ERROR CODE FOR LINE NN IN FIFO AFTER RESET:"
                                        ;-
021626                                     ERROR                   ;               >>>>> ERROR <<<<<.
021626  104460                                                                                    TRAP    C$ERROR
                                        ;+
                                        ; EXIT THIS ROUTINE IF EXTENDED ERROR REPORTING HAS NOT BEEN REQUESTED.
                                        ;-
021630  032767  000100  160362             BIT     #BIT06,OPTION   ;HAS EXTENDED ERROR REPORTING BEEN REQUESTED ?
021636  001027                            BNE     10$             ;AVOID SET THE FLAG IF IT HAS AND GO TO
                                                                  ;THE END OF THE LOOP.
021640  012767  000001  160432             MOV     #1,EXOERR       ;SET THE "EXIT ON ERROR" FLAG
021646  000534                            BR      50$             ;EXIT THE ROUTINE WITH FAILURE SINCE THE FIFO
                                                                  ;IS NOT PRUGED.
                                        ;+
                                        ; WE HAVE A NON-SELFTEST CODE (EITHER BMP CODE OR DATA CHAR).
                                        ;-
021650  010567  162110          8$:        MOV     R5,ERRNBR       ;RESTORE ERROR NUMBER TO INTITIAL VALUE.
021654  062767  000002  162102             ADD     #2,ERRNBR       ;CALCULATE INITIAL ERROR NUMBER PLUS 2.
021662  012701  015133                     MOV     #EM9019,R1      ;PASS ERROR MESSAGE INFO TO ER9007 ROUTINE.
021666  012767  016772  162074             MOV     #ER9007,ERRBLK  ;SELECT PROPER ERROR REPORT ROUTINE.
                                        ;+
                                        ; REPORT ERROR WITH NUMBER INITIAL ERRNRB + 2.
```

```
                                        ;   'NON SELFTEST CODE IN SELFTEST CODE FIFO SLOT FOR LINE NN AFTER RESET."
                                        ;-
021674                                      ERROR                   ;                >>>>> ERROR <<<<<.
021674  104460                                                                                      TRAP    C$ERROR
                                        ;+
                                        ; EXIT THIS ROUTINE IF EXTENDED ERROR REPORTING HAS NOT BEEN REQUESTED.
                                        ;-
021676  032767  000100  160314              BIT     #BIT06,OPTION   ;HAS EXTENDED ERROR REPORTING BEEN REQUESTED ?
021704  001004                              BNE     10$             ;AVOID SET THE FLAG IF IT HAS AND GO TO
                                                                    ;THE END OF THE LOOP.
021706  012767  000001  160364              MOV     #1,EXOERR       ;SET THE "EXIT ON ERROR" FLAG
021714  000511                              BR      50$             ;EXIT THE ROUTINE WITH FAILURE.

                                        ;+
                                        ; END OF LOOP, LOOP IF NOT ALL CHARS HAVE BEEN READ FROM THE FIFO.
                                        ;-
021716  005203                      10$:    INC     R3              ;SET CODE COUNTER FOR NEXT ITERATION OF LOOP.
021720  020327  000010                      CMP     R3,#8.          ;TEST FOR ALL CODES READ.
021724  002656                              BLT     2$              ;LOOP IF NOT CHARS READ FROM FIFO.
                                        ;+
                                        ; PURGE THE FIFO UNTIL DATA.VALID IS CLEAR OR UNTIL TOO MANY CHARS ARE READ.
                                        ;-
021726  012704  000022                      MOV     #18.,R4         ;INITIALIZE THE CHARACTER COUNTER.
021732  010567  162026                      MOV     R5,ERRNBR       ;GET INITIAL VALUE OF THE ERROR NUMBER.
021736  062767  000003  162020              ADD     #3,ERRNBR       ;CALCULATE ERROR NUMBER OF NEXT ERROR.
021744  012767  017062  162016              MOV     #ER9008,ERRBLK  ;SELECT PROPER ERROR REPORT ROUTINE.
021752  017702  160262              12$:    MOV     @RBUFA,R2       ;READ A CHARACTER FROM THE DUT FIFO.
021756  000261                              SEC                     ;INDICATE SUCCESS IN CASE DATA.VALID IS CLEAR.
021760  100070                              BPL     60$             ;EXIT ROUTINE WITH SUCCESS IF DATA.VALID CLEAR.
                                        ;+
                                        ; WE HAVE A CHARACTER.
                                        ; DETERMINE IF CHARACTER IS A DATA CHARACTER.
                                        ;-
021762  012700  070000                      MOV     #70000,R0       ;TEST BITS 12 THRU 14 OF THE
021766  040200                              BIC     R2,R0           ;  CODE READ FROM THE DUT FIFO.
021770  001403                              BEQ     14$             ;SKIP THIS ERROR IF CODE IS NOT A DATA CHAR.
                                        ;+
                                        ; WE HAVE AN UNEXPECTED DATA CHARACTER: SET UP AND GO TO REPORT ERROR.
                                        ;-
021772  012701  015174                      MOV     #EM9022,R1      ;SELECT ERROR MSG INFO FOR ER0808 ROUTINE.
021776  000423                              BR      22$             ;GO TO REPORT THIS ERROR.
                                        ;+
                                        ; WE HAVE AN UNEXPECTED CODE.
                                        ; DETERMINE IF THE CODE IS A MODEM STATUS CODE.
                                        ;-
022000  032702  000001              14$:    BIT     #BIT0,R2        ;TEST MODEM STATUS INDICATOR BIT OF CODE.
022004  001003                              BNE     16$             ;SKIP THIS ERROR IF NOT MODEM STATUS CODE.
                                        ;+
                                        ; WE HAVE A MODEM STATUS CODE: SET UP AND GO TO REPORT ERROR.
                                        ;-
022006  012701  015213                      MOV     #EM9023,R1      ;SELECT ERROR MSG INFO FOR ER0808 ROUTINE.
022012  000415                              BR      22$             ;GO TO REPORT THIS ERROR.
                                        ;+
                                        ; WE HAVE AN ONBOARD TEST CODE.
                                        ; DETERMINE IF THIS CODE IS A BMP CODE.
                                        ;-
022014  032702  000200              16$:    BIT     #BIT7,R2        ;TEST THE ROM VERSION BIT OF THE CODE.
```

```
022020  001404                          BEQ     18$             ;GOTO SET UP FOR SELFTEST CODE IF ROM VERSION.
022022  012700  000300                   MOV     #300,R0
022026  040200                           BIC     R2,R0           ;TEST THE ERROR TYPE BITS OF THE CODE.
022030  001403                          BEQ     20$             ;SKIP THIS ERROR IF BMP CODE.
                                    ;+
                                    ; WE HAVE A SELFTEST CODE: SET UP AND GO TO REPORT ERROR.
                                    ;
022032  012701  015235          18$:     MOV     #EM9024,R1      ;SELECT ERROR MSG INFO FOR ER0808 ROUTINE.
022036  000403                          BR      22$             ;GO TO REPORT THIS ERROR.
                                    ;+
                                    ; WE HAVE A BMP CODE: SAVE IT ON THE QUEUE.
                                    ;
022040  004767  000166          20$:    JSR     PC,SAVBMP       ;SAVE THE BMP CODE ON THE QUEUE.
022044  000411                          BR      24$             ;
                                    ;+
                                    ; REPORT THE ERROR WITH ERROR NUMBER OF INITIAL ERRNBR + 3.
                                    ;    "UNEXPECTED XXX XXXX FOR LINE NN IN FIFO AFTER RESET:"
                                    ;-
022046                          22$:    ERROR                   ;               >>>>> ERROR <<<<<.
022046  104460                                                                                  TRAP    C$ERROR
                                    ;+
                                    ; EXIT THIS ROUTINE IF EXTENDED ERROR REPORTING HAS NOT BEEN REQUESTED.
                                    ;-
022050  032767  000100  160142           BIT     #BIT06,OPTION   ;HAS EXTENDED ERROR REPORTING BEEN REQUESTED ?
022056  001004                          BNE     24$             ;AVOID SETTING THE FLAG IF IT HAS AND GO TO
                                                                ;THE END OF THE LOOP.
022060  012767  000001  160212           MOV     #1,EXOERR       ;SET THE "EXIT ON ERROR" FLAG
022066  000424                          BR      50$             ;EXIT THE ROUTINE WITH FAILURE.

                                    ;+
                                    ; END OF LOOP.
                                    ; COUNT THE CHARACTER WE JUST RECEIVED, AND CHECK FOR TOO MANY RECEIVED.
                                    ;-
022070  005304                  24$:     DEC     R4              ;COUNT THIS CHARACTER.
022072  001327                          BNE     12$             ;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."
                                    ;-
022074  012701  015012                   MOV     #EM9017,R1      ;SELECT PROPER ERROR MESSAGE.
022100  010567  161660                   MOV     R5,ERRNBR       ;GET INITIAL ERROR NUMBER.
022104  062767  000004  161652           ADD     #4,ERRNBR       ;CALCULATE INITIAL ERRNBR + 4.
022112  012767  016072  161650           MOV     #ER0503,ERRBLK  ;SELECT PROPER ERROR REPORT ROUTINE.
                                        ;PRINT ERROR REPORT.
022120                                  ERROR                   ;               >>>>> ERROR <<<<<.
022120  104460                                                                                  TRAP    C$ERROR
                                    ;+
                                    ; EXIT THIS ROUTINE IF EXTENDED ERROR REPORTING HAS NOT BEEN REQUESTED.
                                    ;-
022122  032767  000100  160070           BIT     #BIT06,OPTION   ;HAS EXTENDED ERROR REPORTING BEEN REQUESTED ?
022130  001003                          BNE     50$             ;AVOID SETTING THE FLAG IF IT HAS.
022132  012767  000001  160140           MOV     #1,EXOERR       ;SET THE "EXIT ON ERROR" FLAG

022140  000241                  50$:     CLC                     ;CLEAR THE SUCCESS FLAG.

022142                          60$:    PASS                    ;RESTORE GPRS.
```

```
      022142  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
 3538 022144  000207                          RTS     PC                              ; CARRY - SUCCESS FLAG (SET IF FIFO IS PURGED).
```

```
                                        .SBTTL  GLOBAL SUBROUTINE                - RXIEO -
                                        ;** ***********************************************************************
                                        ;*                    - RECEIVER INTERRUPT DISABLE -
                                        ;*      THIS ROUTINE IS USED TO DISABLE RECEIVER INTERRUPTS IN THE DHU11.
                                        ;*
                                        ;* INPUTS:      NONE.
                                        ;*
                                        ;* OUTPUTS:     THE RX.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,RXIEO
                                        ;*
                                        ;* COMMENTS:    THE CONTENTS OF THE INDIRECT ADDRESS REGISTER FIELD IN
                                        ;*              THE DUT CSR ARE DESTROYED.
                                        ;*
                                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                                        ;-- ***********************************************************************
022146  010046                          RXIEO::  MOV     R0,-(SP)        ;SAVE CONTENTS OF R0 ON THE STACK.
022150                                           GETPRI -(SP)            ;SAVE PROCESSOR PRIORITY ON STACK.
022150  104440                                                                                   TRAP    C$GPRI
022152  010046                                                                                   MOV     R0,-(SP)
022154                                           SETPRI #PRI07           ;IGNORE ANY INTERRUPT THAT MAY BE GENERATED.
022154  012700  000340                                                                           MOV     #PRI07,R0
022160  104441                                                                                   TRAP    C$SPRI
022162  042767  137777  160114                   BIC     #137777,IESTAT  ;CLEAR RX.INT.ENBL BIT IN IESTAT.
022170  016777  160110  160040                   MOV     IESTAT,@CSRA    ;DISABLE RX INTERRUPTS.
022176                                           SETPRI (SP)+            ;ENABLE INTERRUPTS TO THE PROCESSOR AGAIN.
022176  012600                                                                                   MOV     (SP)+,R0
022200  104441                                                                                   TRAP    C$SPRI
022202  012600                                   MOV     (SP)+,R0        ;RESTORE R0.
022204  000207                                  RTS     PC
```

```
                                        .SBTTL  GLOBAL SUBROUTINE                - RXIE1 -
                                        ;** ************************************************************************
                                        ;*                        - RECEIVER INTERRUPT ENABLE
                                        ;*      THIS ROUTINE IS USED TO ENABLE RECEIVER INTERRUPTS IN THE DHU11.
                                        ;*
                                        ;* INPUTS:       NONE.
                                        ;*
                                        ;* OUTPUTS:      THE RX.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,RXIE1
                                        ;*
                                        ;* COMMENTS:     THE CONTENTS OF THE INDIRECT ADDRESS REGISTER FIELD IN
                                        ;*               THE DUT CSR ARE DESTROYED.
                                        ;*
                                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                                        ;-- ************************************************************************

022206  052767  000100  160070  RXIE1::  BIS     #BIT06,IESTAT    ;SET RX.INT.ENBL BIT IN IESTAT.
022214  042767  137677  160062          BIC     #137677,IESTAT   ;CLEAR ALL OTHER BITS, EXCEPT TX AND RX I.E.
022222  016777  160056  160006          MOV     IESTAT,@CSRA     ;ENABLE RX INTERRUPTS.
022230  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.
                                ;-  ************************************************************************

022232                          SAVBMP:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
022232  004567  161534                           JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
022236  016704  160256                  MOV     BMPCQP,R4               ;GET THE POINTER TO THE NEXT LOCATION IN QUEUE.
022242  116724  160052                  MOVB    TSTNUM,(R4)+            ;SAVE THE CURRENT TEST NUMBER ON THE QUEUE.
022246  005204                          INC     R4                      ;INCREMENT THE POINTER TO GIVE AN EVEN ADDRESS.
022250  042702  177400                  BIC     #177400,R2              ;CLEAR THE UNWANTED BITS FROM THE BMP CODE.
022254  010224                          MOV     R2,(R4)+                ;SAVE THE BMP CODE ON THE QUEUE.
022256  020427  002722                  CMP     R4,#BMPCQE              ;CHECK IF OVERFLOW WILL OCCUR THE NEXT TIME.
022262  103402                          BLO     2$                      ;GO SAVE THE POINTER IF WE WILL NOT OVERFLOW.
022264  162704  000004                  SUB     #4,R4                   ;RESET THE POINTER TO THE LAST LOCATION IN QUE.
022270  010467  160224          2$:     MOV     R4,BMPCQP               ;SAVE THE POINTER.

022274                          60$:    PASS                            ;RESTORE GPRS.
022274  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
022276  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.
                                ;-- ************************************************************************

022300                          SKPSTS:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
022300  004567  161466                                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
022304  012704  000012                          MOV     #10.,R4         ;PASS DELAY VALUE OF 10 MILLI-SECONDS.
022310  004767  175544                          JSR     PC,DELAY        ;DELAY FOR 10 MILLI-SECONDS.
                                ;*
                                ; WRITE SKIP SELF-TEST CODE (52525) TO ALL THE INDEXED DUT REGISTERS.
                                ;-
022314  012701  000060                          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 DHU-11.
022320  012703  052525                          MOV     #52525,R3       ;INITIALISE THE SKIP SELF-TEST CODE.
022324  005301                  4$:             DEC     R1              ;SELECT THE NEXT SET OF DEVICE REGISTERS.
022326  016704  157704                          MOV     CSRA,R4         ;GET THE ADDRESS OF THE CSR OF THE DUT.
022332  010124                                  MOV     R1,(R4)+        ;SELECT A BANK OF DUT REGISTERS.
022334  010324                  6$:             MOV     R3,(R4)+        ;WRITE THE CODE TO A DUT REGISTER.
022336  020467  157712                          CMP     R4,TXBFCA       ;COMPARE POINTER WITH LAST REGISTER ADDRESS.
022342  103774                                  BLO     6$              ;LOOP IF NOT ALL REGS DONE IN THIS BANK.
022344  032701  000017                          BIT     #17,R1          ;TEST FOR IND.ADR.REG FIELD DECREMENTED TO 0.
022350  001365                                  BNE     4$              ;LOOP UNTIL ALL REGISTERS CONTAIN THE CODE.

022352                          60$:            PASS                    ;RESTORE GPRS.
022352  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
022354  000207                                  RTS     PC
```

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

022356  010046                  SWAPO::  MOV     R0,-(SP)        ;SAVE THE CONTENTS OF R0.
                                ;+
                                ; LOAD THE STACK FROM THE GPRS.
                                ;-
022360  010146                           MOV     R1,-(SP)        ;SAVE THE CONTENTS OF R1.
022362  010246                           MOV     R2,-(SP)        ;SAVE THE CONTENTS OF R2.
022364  010346                           MOV     R3,-(SP)        ;SAVE THE CONTENTS OF R3.
022366  010446                           MOV     R4,-(SP)        ;SAVE THE CONTENTS OF R4.
022370  010546                           MOV     R5,-(SP)        ;SAVE THE CONTENTS OF R5.
                                ;+
                                ; LOAD THE GPRS FROM THE GPR SAVE AREA 0.
                                ;-
022372  012700  002444                   MOV     #GPRS0B,R0      ;GET THE BASE ADDRESS OF GPR SAVE AREA 0.
022376  012001                           MOV     (R0)+,R1        ;LOAD R1 WITH GPR SAVE AREA 0 WORD 1.
022400  012002                           MOV     (R0)+,R2        ;LOAD R1 WITH GPR SAVE AREA 0 WORD 2.
022402  012003                           MOV     (R0)+,R3        ;LOAD R1 WITH GPR SAVE AREA 0 WORD 3.
022404  012004                           MOV     (R0)+,R4        ;LOAD R1 WITH GPR SAVE AREA 0 WORD 4.
022406  012005                           MOV     (R0)+,R5        ;LOAD R1 WITH GPR SAVE AREA 0 WORD 5.
                                ;+
                                ; LOAD THE GPR SAVE AREA 0 FROM THE STACK.
                                ;-
022410  012640                           MOV     (SP)+,-(R0)     ;LOAD GPR SAVE AREA 0 WORD 5 WITH SAVED R5.
022412  012640                           MOV     (SP)+,-(R0)     ;LOAD GPR SAVE AREA 0 WORD 4 WITH SAVED R4.
022414  012640                           MOV     (SP)+,-(R0)     ;LOAD GPR SAVE AREA 0 WORD 3 WITH SAVED R3.
022416  012640                           MOV     (SP)+,-(R0)     ;LOAD GPR SAVE AREA 0 WORD 2 WITH SAVED R2.
022420  012640                           MOV     (SP)+,-(R0)     ;LOAD GPR SAVE AREA 0 WORD 1 WITH SAVED R1.

022422  012600                           MOV     (SP)+,R0        ;RESTORE THE INITIAL VALUE OF R0.

022424  000207                          RTS     PC
```

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

022426                                  TSABRT:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
022426  004567  161340                                   JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
022432  012701  022450                          MOV     #2$,R1                  ;PASS ADDRESS OF FIRST MESSAGE TO BE REPORTED.
022436  012767  016462  161324                  MOV     #ER1603,ERRBLK          ;SET-UP THE ERROR REPORTING ROUTINE.
022444                                          ERROR                           ;                >>>>> ERROR <<<<<.
022444  104460                                                                                                  TRAP    C$ERROR
022446  000432                                  BR      60$                     ;
022450     040     116     117          2$:     .ASCIZ / NON-RELATED TEST ERROR FOUND DURING TEST EXECUTION/
022453     116     055     122
022456     105     114     101
022461     124     105     104
022464     040     124     105
022467     123     124     040
022472     105     122     122
022475     117     122     040
022500     106     117     125
022503     116     104     040
022506     104     125     122
022511     111     116     107
022514     040     124     105
022517     123     124     040
022522     105     130     105
022525     103     125     124
022530     111     117     116
022533     000
                                        .EVEN
022534                                  60$:    PASS                            ;RESTORE GPRS.
022534  004736                                           JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
022536  000207                                  RTS     PC
```

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

022540                          TXDSBL:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
022540  004567  161226                           JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
022544  010500                          MOV     R5,R0                   ;COPY BIT MAP OF LINES TO DISABLE TRANSMISSION.
022546  012701  000001                  MOV     #BIT0,R1                ;INITIALIZE THE SELECTED LINE BIT MASK.
022552  016702  157474                  MOV     TXAD2A,R2               ;GET THE ADDRESS OF THE TBUFFAD2 REGISTER.
022556  005202                          INC     R2                      ;GET THE ADDRESS OF THE MSBYTE OF TBUFFAD2 REG.
022560  012703  000020                  MOV     #NUMLNS,R3              ;GET MAXIMUM LINE NUMBER PLUS ONE.
022564  016704  157514                  MOV     IESTAT,R4               ;GET THE STATES OF THE INT ENABLE BITS.
022570  005005                          CLR     R5                      ;LOG POSSIBLE TX DISABLED ON ALL LINES.
                                ;+
                                ; SELECT EVERY LINE IN TURN, AND LOG THE STATE OF EACH TX.ENABLE BIT.
                                ;-
022572  010477  157440          2$:     MOV     R4,@CSRA                ;WRITE TO DUT CSR TO SELECT LINE REGISTERS.
022576  105712                          TSTB    (R2)                    ;CHECK STATE OF TX.ENABLE BIT ON SELECTED LINE.
022600  100001                          BPL     4$                      ;SKIP NEXT INSTRUCTION IF TX.ENABLE CLEAR.
022602  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.
                                ;-
022604  030100                  4$:     BIT     R1,R0                   ;CHECK STATE OF DISABLE LINE BIT MAP.
022606  001402                          BEQ     6$                      ;BRANCH IF THIS LINE TO REMAIN UNALTERED.
022610  142712  000200                  BICB    #BIT7,(R2)              ;CLEAR TX.ENABLE BIT ON SELECTED LINE.
022614  005204                  6$:     INC     R4                      ;PREPARE TO SELECT REGISTERS FOR NEXT LINE.
022616  006301                          ASL     R1                      ;SHIFT BIT MAP FOR NEXT LINE.
022620  005303                          DEC     R3                      ;DECREMENT LINE NUMBER.
022622  001363                          BNE     2$                      ;LOOP TO CHECK NEXT LINE.

022624                          60$:    PASS    R5                      ;RESTORE GPRS,EXCEPT
022624  010566  000014                           MOV     R5,R5SLOT(SP)           ;PUT R5 IN STACK SLOT.
022630  004736                                   JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                                                         ;R5 - PREVIOUS STATES OF ALL TX.ENABLE BITS.
022632  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.
                                ;-- ************************************************************************

022634                          TXENBL:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
022634  004567  161132                           JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
022640  010500                          MOV     R5,R0                   ;COPY BIT MAP OF LINES TO ENABLE.
022642  012701  000001                  MOV     #BIT0,R1                ;INITIALIZE THE SELECTED LINE BIT MASK.
022646  016702  157400                  MOV     TXAD2A,R2               ;GET THE ADDRESS OF THE TBUFFAD2 REGISTER.
022652  005202                          INC     R2                      ;GET THE ADDRESS OF THE MSBYTE OF TBUFFAD2 REG.
022654  012703  000020                  MOV     #NUMLNS,R3              ;GET MAXIMUM LINE NUMBER.
022660  016704  157420                  MOV     IESTAT,R4               ;GET THE STATES OF THE INT ENABLE BITS.
022664  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.
                                ;-
022666  010477  157344          2$:     MOV     R4,@CSRA                ;WRITE TO DUT CSR TO SELECT LINE REGISTERS.
022672  105712                          TSTB    (R2)                    ;CHECK STATE OF TX.ENABLE BIT ON SELECTED LINE.
022674  100401                          BMI     4$                      ;SKIP NEXT INSTRUCTION IF TX.ENABLE SET.
022676  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.
                                ;-
022700  030100                  4$:     BIT     R1,R0                   ;CHECK STATE OF TX.ENABLE LINE BIT MAP.
022702  001402                          BEQ     6$                      ;BRANCH IF THIS LINE TO REMAIN UNALTERED.
022704  152712  000200                  BISB    #BIT7,(R2)              ;ENABLE TRANSMISSION ON SELECTED LINE.
022710  005204                  6$:     INC     R4                      ;PREPARE TO SELECT REGISTERS FOR NEXT LINE.
022712  006301                          ASL     R1                      ;SHIFT BIT MAP FOR NEXT LINE.
022714  005303                          DEC     R3                      ;DECREMENT LINE NUMBER.
022716  001363                          BNE     2$                      ;LOOP TO CHECK NEXT LINE.

022720                          60$:    PASS    R5                      ;RESTORE GPRS,EXCEPT
022720  010566  000014                                  MOV     R5,R5SLOT(SP)           ;PUT R5 IN STACK SLOT.
022724  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                                                        ;R5 - LINE BIT MAP CORRESPONDING TO THE
                                                                        ; PREVIOUS LINES THAT WERE DISABLED.
022726  000207                          RTS     PC
```

```
                                        .SBTTL  GLOBAL SUBROUTINE                - TXIEO -
                                        ;++ ***********************************************************************
                                        ;*                        - TRANSMITTER INTERRUPT DISABLE -
                                        ;*      THIS ROUTINE IS USED TO DISABLE TRANSMITTER INTERRUPTS IN THE DHU11.
                                        ;*
                                        ;* 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,TXIEO
                                        ;*
                                        ;* COMMENTS:     THE CONTENTS OF THE INDIRECT ADDRESS REGISTER FIELD IN
                                        ;*               THE DUT CSR ARE DESTROYED.
                                        ;*
                                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                                        ;-- ***********************************************************************
022730  010046                          TXIEO::  MOV     R0,-(SP)        ;SAVE CONTENTS OF R0 ON THE STACK.
022732                                          GETPRI  -(SP)            ;SAVE CURRENT PROCESSOR PRIORITY ON THE STACK.
022732  104440                                                                                   TRAP    C$GPRI
022734  010046                                                                                   MOV     R0,-(SP)
022736                                          SETPRI  #PRI07           ;IGNORE ANY INTERRUPTS THAT MAY BE GENERATED.
022736  012700  000340                                                                           MOV     #PRI07,R0
022742  104441                                                                                   TRAP    C$SPRI
022744  042767  177677  157332           BIC     #177677,IESTAT   ;CLEAR TX.INT.ENBL BIT IN IESTAT.
022752  016777  157326  157256           MOV     IESTAT,@CSRA     ;DISABLE TX INTERRUPTS.
022760                                   SETPRI (SP)+             ;ENABLE INTERRUPTS TO THE PROCESSOR AGAIN.
022760  012600                                                                                   MOV     (SP)+,R0
022762  104441                                                                                   TRAP    C$SPRI
022764  012600                           MOV     (SP)+,R0         ;RESTORE R0.
022766  000207                          RTS     PC
```

```
                                        .SBTTL  GLOBAL SUBROUTINE                - TXIE1 -
                                        ;** ***********************************************************************
                                        ;*                        - TRANSMITTER INTERRUPT ENABLE -
                                        ;*      THIS ROUTINE IS USED TO ENABLE TRANSMITTER INTERRUPTS IN THE DHU11.
                                        ;*
                                        ;* 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.
                                        ;-- ***********************************************************************

022770  052767  040000  157306  TXIE1::  BIS     #BIT14,IESTAT   ;SET TX.INT.ENBL BIT IN IESTAT.
022776  042767  137677  157300          BIC     #137677,IESTAT  ;CLEAR ALL BITS EXCEPT TX RX I.E BITS.
023004  016777  157274  157224          MOV     IESTAT,@CSRA    ;ENABLE TX INTERRUPTS.
023012  000207                         RTS     PC
```

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

023014                          UNSDIV:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
023014  004567  160752                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                                ;*
                                ; CHECK FOR QUOTIENT GREATER THAN 16 BITS CONDITION.
                                ;-
023020  010204                          MOV     R2,R4           ;GET MSW OF DIVIDEND FOR SUBTRACT.
023022  160104                          SUB     R1,R4           ;SUBTRACT DIVISOR FROM MSW OF DIVIDEND.
023024  103403                          BCS     2$              ;IF IT DIDN'T GO, WE HAVE QUOTIENT < 16 BITS.
023026  012701  177777                  MOV     #-1,R1          ;SET QUOTIENT TO ALL ONES (177777).
023032  000442                          BR      60$             ;EXIT WITH CARRY CLEAR.
                                ;*
                                ; SET UP COUNTERS AND VARIOUS WORKING GPRS.
                                ;-
023034  005004                  2$:     CLR     R4              ;CLEAR THE LSW OF THE DIVISOR.
023036  000241                          CLC                     ;CLEAR CARRY FOR THE SHIFT OF THE DIVISOR.
023040  006001                          ROR     R1              ; DIVISOR BY
023042  006004                          ROR     R4              ; 2(UNSIGNED)
023044  012700  000020                  MOV     #16.,R0         ;SET UP INITIAL SHIFT COUNT TO 16.
                                ;*
                                ; THE SUBTRACT AND SHIFT LOOP.
                                ;-
023050  010246                  4$:     MOV     R2,-(SP)        ;SAVE MSWORD OF DIVIDEND.
023052  010346                          MOV     R3,-(SP)        ;SAVE LSWORD OF DIVIDEND.
023054  160403                          SUB     R4,R3           ;LSWORD DIVIDEND - LSWORD OF DIVISOR.
023056  005602                          SBC     R2              ;MSWORD DIVIDEND - BORROW .
023060  103402                          BCS     6$              ;IF BORROW FROM BORROW SUBTRACT, IT DIDN'T GO.
023062  160102                          SUB     R1,R2           ;MSWORD DIVIDEND - MSWORD OF DIVISOR.
023064  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.
                                ;-
023066  012603                  6$:     MOV     (SP)+,R3        ;RESTORE LSWORD OF DIVIDEND.
023070  012602                          MOV     (SP)+,R2        ;RESTORE MSWORD OF DIVIDEND.
```

```
023072  000401                        BR      10$             ;GOTO SHIFT 1 INTO THE QUOTIENT.
                                ;+
                                ; IT WENT, SO WE RESTORE THE STACK AND SHIFT A 0 INTO QUOTIENT (WILL BE
                                ; COMPLEMENTED LATER).   CARRY IS CLEAR.
                                ;
023074  012626                8$:     MOV     (SP)+,(SP)+     ;POP THE SAVED DIVIDEND OFF OF THE STACK.
                                ;+
                                ; SHIFT THE RESULT OF THE SUBTRACT ATTEMPT INTO THE QUOTIENT SHIFT REG.
                                ;-
023076  006105                10$:    ROL     R5              ;SHIFT NEXT BIT INTO THE INVERTED QUOTIENT.
023100  000241                        CLC                     ;DIVIDE THE
023102  006001                        ROR     R1              ;  DEVISOR BY
023104  006004                        ROR     R4              ;  2 (UNSIGNED).
023106  005300                        DEC     R0              ;COUNT THIS SHIFT AND SUBTRACT.
023110  001357                        BNE     4$              ;LOOP FOR ANOTHER SHIFT & SUB IF NOT DONE.
023112  005105                        COM     R5              ;GET QUOTIENT FROM INVERTED QUOTIENT.
                                ;+
                                ; NOW WE EITHER ROUND UP OR LEAVE QUOTIENT ALONE.
                                ;
023114  000241                        CLC                     ;CLEAR THE CARRY FOR THE SHIFT OF THE DIVIDEND.
023116  006103                        ROL     R3              ;MULTIPLY LSWORD OF DIVIDEND BY 2, MSWORD IS 0.
023120  103402                        BCS     12$             ;IF CARRY FROM SHIFT, ROUND UP.
023122  160403                        SUB     R4,R3           ;SUBTRACT DIVISOR FROM DIVIDEND.
023124  103403                        BCS     14$             ;IF BORROW, DON'T ROUND UP.
                                ;+
                                ; ROUND UP,,EXTRA SUBTRACT WENT.
                                ;-
023126  005205                12$:    INC     R5              ;INCREMENT THE QUOTIENT BY ONE.
023130  001001                        BNE     14$             ;IF NO OVERFLOW, WE LEAVE THE ROUND UP.
023132  005305                        DEC     R5              ;DON'T LET ROUNDING CAUSE OVERFLOW.
                                ;+
                                ; ALL DONE, PASS QUOTIENT AND EXIT.
                                ;-
023134  010501                14$:    MOV     R5,R1           ;PASS QUOTIENT BACK IN R1.
023136  000261                        SEC                     ;INDICATE NO OVERFLOW.

023140                        60$:    PASS    R1              ;RESTORE GPRS, LEAVE THE FOLLOWING INTACT:
023140  010166  000004                                MOV     R1,R1SLOT(SP)           ;PUT R1 IN STACK SLOT.
023144  004736                                        JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
                                                                ;R1 - 16 BIT, UNSIGNED QUOTIENT.
023146  000207                        RTS     PC              ;CARRY - SET INDICATES NO OVERFLOW (SUCCESS).
```

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

023150                          WAIBIS:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
023150  004567  160616                                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
023154  010204                          MOV     R2,R4                   ;SET UP THE ADDRESS PARAMETER FOR MSLGET.
023156  010102                          MOV     R1,R2
023160  042701  170000                  BIC     #170000,R1              ;SEPERATE DELAY COUNT OUT OF PASSED PARAMETER.
023164  042702  007777                  BIC     #7777,R2                ;SEPERATE LINE NUMBER FIELD OF PASSED PARAM.
023170  000302                          SWAB    R2                      ;PUT LINE NUMBER FIELD IN LSBYTE.
023172  006202                          ASR     R2                      ;SHIFT THE LINE NUMBER FIELD INTO THE PROPER
023174  006202                          ASR     R2                      ;  POSITION TO USE IT AS A WORD TABLE OFFSET
023176  006202                          ASR     R2                      ;  FOR THE TABLE LOOKUP OF THE LINE BIT MAP.
023200  016202  002404                  MOV     BITTBL(R2),R2           ;GET BIT MAP OF LINE TO TEST FROM TABLE.
023204  010203                          MOV     R2,R3                   ;INDICATE THAT THE BIT SHOULD BE SET.
023206  004767  174706                  JSR     PC,MSLGET               ;WAIT FOR THE BIT TO BE SET WITHIN TIME-OUT.
                                                                        ;  CARRY IS CORRECT UPON MSLGET RETURN.
023212  010002                          MOV     R0,R2                   ;PASS LAST VALUE READ AS OUTPUT PARAMETER.
023214                          60$:    PASS    R2                      ;RESTORE GPRS, EXCEPT THE FOLLOWING:
023214  010266  000006                                  MOV     R2,R2SLOT(SP)           ;PUT R2 IN STACK SLOT.
023220  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
                                                                        ;  R2 - LAST VALUE READ LOOKING FOR CONDITION.
023222  000207                          RTS     PC                      ;  CARRY - SUCCESS FLAG (SET IF BIT FOUND SET).
```

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

023224                          WDPDR:: SAVE                            ;SAVE CONTENTS OF GPRS R0 THRU R5.
023224  004567  160542                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                                ;+
                                ; SET UP OUTER LOOP WHICH WRITES THE DATA PATTERN TO EACH LINE'S REGISTERS
                                ;-
023230  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.
                                ;-
023232  010204                  2$:     MOV     R2,R4                   ;SAVE THE OUTER LOOP DATA PATTERN.
```

```
023234  010577  156776                    MOV     R5,@CSRA          ;SET CSR IND.ADR.REG FIELD TO THIS LINE.
023240  006305                            ASL     R5                ;TURN LINE NUMBER INTO A WORD OFFSET.
023242  036567  002404  156754            BIT     BITTBL(R5),ACTLNS
023250  001456                           BEQ     20$               ;LINE ACTIVE?  NO, SKIP THIS LINE.
023252  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.
                                  ;-
023256  010200                    4$:     MOV     R2,R0
023260  046100  002364                    BIC     UNBTTB(R1),R0     ;CLEAR BIT FIELDS FOR UNUSED REGISTER BITS.
023264  016103  002236                    MOV     DRADRT(R1),R3     ;GET THE ADDRESS OF THE DEVICE REGISTER.
023270  005766  000010                    TST     R3SLOT(SP)        ;CHECK THE OPERAND TYPE INDICATOR.
023274  003402                           BLE     6$                ;HIGH BYTE?  NO, SKIP HIGH BYTE ADDRESS SET UP.
023276  005203                            INC     R3                ;YES, SET THE REG ADDRESS TO THE HIGH BYTE.
023300  000300                            SWAB    R0                ;MOVE HIGH BYTE DATA INTO THE LOW BYTE.
023302  005766  000010            6$:     TST     R3SLOT(SP)        ;CHECK THE OPERAND TYPE INDICATOR.
023306  001412                           BEQ     12$               ;WORD ACCESS?  YES, GO PERFORM WORD ACCESS.
                                      ;+
                                      ;PERFORM BYTE ACCESS TO THE SPECIFIED BYTE OF THE SPECIFIED REGISTER.
                                      ;-
023310  005766  000012                    TST     R4SLOT(SP)        ;NO, CHECK THE ACCESS TYPE INDICATOR.
023314  100403                           BMI     8$                ;USE BIC?  YES, GO PERFORM BICB INSTRUCTION.
023316  001404                           BEQ     10$               ;USE MOV?  YES, GO PERFORM MOVB INSTRUCTION.
023320  150013                            BISB    R0,(R3)           ;NEITHER.  PERFORM BISB ACCESS TO REGISTER.
023322  000415                           BR      18$
023324  140013                    8$:     BICB    R0,(R3)           ;PERFORM BICB ACCESS TO REGISTER.
023326  000413                           BR      18$
023330  110013                    10$:    MOVB    R0,(R3)           ;PERFORM MOVB ACCESS TO REGI' ~~.
023332  000411                           BR      18$
                                      ;+
                                      ;PERFORM WORD ACCESS TO THE SPECIFIED REGISTER.
                                      ;-
023334  005766  000012            12$:    TST     R4SLOT(SP)        ;CHECK THE ACCESS TYPE INDICATOR.
023340  100403                           BMI     14$               ;USE BIC?  YES, GO PERFORM BIC INSTRUCTION.
023342  001404                           BEQ     16$               ;USE MOV?  YES, GO PERFORM MOV INSTRUCTION.
023344  050013                            BIS     R0,(R3)           ;NEITHER.  PERFORM BIS ACCESS TO REGISTER.
023346  000403                           BR      18$
023350  040013                    14$:    BIC     R0,(R3)           ;PERFORM BIC ACCESS TO REGISTER.
023352  000401                           BR      18$
023354  010013                    16$:    MOV     R0,(R3)           ;PERFORM MOV ACCESS TO REGISTER.
                                      ;+
                                      ; PREPARE THE DATA PATTERN AND OFFSET FOR THE NEXT REGISTER ON THIS LINE.
                                      ;-
023356  004767  176042            18$:    JSR     PC,ROLDAP         ;ROTATE DATA PATTERN LEFT, NOT THROUGH CARRY.
023362  062701  000002                    ADD     #2,R1             ;INCREMENT OFFSET FOR NEXT REGISTER.
023366  020127  000006                    CMP     R1,#FSLSO         ;CHECK IF THIS IS THE FIFOSIZE/DATA REG
023372  001002                           BNE     19$               ;AVOID ALTERING THE OFFSET IF IT ISN'T.
023374  062701  000002                    ADD     #2,R1             ;AVOID TESTING THESE REGISTERS.
023400  020127  000016            19$:    CMP     R1,#TXBFCO        ;COMPARE REG OFFSET WITH OFFSET OF LAST REG.
023404  003724                           BLE     4$                ;LOOP IF NOT ALL REG DONE FOR THIS LINE.
                                  ;+
                                  ; BACK INTO THE OUTER LOOP.  NOW SET UP FOR NEXT LINE.  LOOP IF NOT DONE.
                                  ;-
023406  010402                    20$:    MOV     R4,R2             ;SET UP TO ROTATE THE DATA PATTERN.
023410  004767  176010                   JSR     PC,ROLDAP         ;ROTATE THE DATA PATTERN.
023414  006205                            ASR     R5                ;CONVERT BACK TO LINE NUMBER FROM WORD OFFSET.
```

```
023416  005205                          INC     R5              ;COUNT THIS LINE.
023420  020527  000020                  CMP     R5,#NUMLNS      ;COMPARE LINE COUNT WITH NUMBER OF LINES.
023424  002702                          BLT     2$              ;LOOP IF SOME LINES NOT DONE.

023426                          60$:    PASS                    ;RESTORE GPRS.
023426  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREGO5 SUBRT.
023430  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  F 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.
                                ;-- ************************************************************************

023432                          WTWLNC:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
023432  004567  160334                                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                                ;+
                                ; SET UP THE PARAMETERS FOR THE CALL TO ALTFLD.
                                ;-
023436  016701  156604                  MOV     LNCTRA,R1       ;SET UP THE REGISTER ADDRESS PARAMETER.
023442  010002                          MOV     R0,R2           ;SET UP THE DESIRED REGISTER CONTENTS.
023444  010503                          MOV     R5,R3           ;SET UP THE BIT MAP OF LINES TO ALTER.
023446  012704  177777                  MOV     #-1,R4          ;SELECT ALL REGISTER BITS TO BE ALTERED.
                                ;+
                                ; CALL THE SUBROUTINE WHICH ALTERS THE REGISTER CONTENTS.
                                ;-
023452  004767  173732                  JSR     PC,ALTFLD       ;ALTER THE REGISTER CONTENTS.

023456                          60$:    PASS                            ;RESTORE GPRS.
023456  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
023460  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.
                                ;-- ************************************************************************

023462                          WTWLPR:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
023462  004567  160304                                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
                                ;+
                                ; SET UP THE PARAMETERS FOR THE CALL TO ALTFLD.
                                ;-
023466  016701  156550                  MOV     LPRA,R1         ;SET UP THE REGISTER ADDRESS PARAMETER.
023472  010002                          MOV     R0,R2           ;SET UP THE DESIRED REGISTER CONTENTS.
023474  010503                          MOV     R5,R3           ;SET UP THE BIT MAP OF LINES TO ALTER.
023476  012704  177777                  MOV     #-1,R4          ;SELECT ALL REGISTER BITS TO BE ALTERED.
                                ;+
                                ; CALL THE SUBROUTINE WHICH ALTERS THE REGISTER CONTENTS.
                                ;-
023502  004767  173702                  JSR     PC,ALTFLD       ;ALTER THE REGISTER CONTENTS.

023506                          60$:    PASS                            ;RESTORE GPRS.
023506  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
023510  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
                                        ;-- ************************************************************************

023512                                  CACHRX::SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
023512  004567  160254                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
023516  016701  156566                  MOV     RXINTC,R1               ;GET THE RECEIVER INTERRUPT COUNT
023522  005201                          INC     R1                      ;INCREMENT THE COUNT
023524  102001                          BVC     2$                      ;BRANCH IF NO OVERFLOW OCCURRED
023526  005301                          DEC     R1                      ;RESET THE COUNT TO 177777
023530  010167  156554                  2$:     MOV     R1,RXINTC       ;SAVE NEW COUNT VALUE
023534                                  60$:    PASS                    ;RESTORE GPRS.
023534  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
023536  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
                                        ;-- ************************************************************************

023540                                  CACHTX::SAVE                    ;SAVE CONTENTS OF GPRS R0 THRU R5.
023540  004567  160226                          JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
023544  016701  156552                  MOV     TXINTC,R1               ;GET THE TRANSMISSION INTERRUPT COUNT
023550  005201                          INC     R1                      ;INCREMENT THE COUNT
023552  102001                          BVC     2$                      ;BRANCH IF NO OVERFLOW OCCURRED
023554  005301                          DEC     R1                      ;RESET THE COUNT TO 177777
023556  010167  156540          2$:     MOV     R1,TXINTC               ;SAVE NEW COUNT VALUE
023562                          60$:    PASS                            ;RESTORE GPRS.
023562  004736                                  JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
023564  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.
                                        ;-- ************************************************************************

023566  005767  156546          CLKINT:: TST     TIMER1          ;CHECK FOR TIMER1 AT ZERO.
023572  001402                          BEQ     2$              ;BRANCH TO LEAVE IT AT ZERO IF IT IS ZERO.
023574  005367  156540                  DEC     TIMER1          ;DECREMENT TIME COUNT.
023600  005767  156536          2$:     TST     TIMER2          ;CHECK FOR TIMER2 AT ZERO.
023604  001402                          BEQ     4$              ;BRANCH TO LEAVE IT ALONE IF IT'S ALREADY ZERO.
023606  005367  156530                  DEC     TIMER2          ;DECREMENT TIME COUNT.
023612  005367  156526          4$:     DEC     TIMER3          ;DECREMENT THE BREAK COUNT.
023616  001006                          BNE     60$             ;EXIT IF NOT TIME TO CALL BREAK.
023620  016767  156522  156516           MOV     BCOUNT,TIMER3   ;SET UP TIME TILL NEXT BREAK.
023626  010046                          MOV     R0,-(SP)        ;SAVE CONTENTS OF R0 FROM BREAK MACRO.
023630                                  BREAK                   ;CHECK FOR OPERATOR CONTROL/C.
023630  104422                                                                          TRAP    C$BRK
023632  012600                          MOV     (SP)+,R0        ;RESTORE CONTENTS OF R0.
023634  000002                  60$:    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 NOT PURGED BY THIS ROUTINE.
                                        ;*
                                        ;* SUBORDINATE ROUTINES CALLED: NONE.
                                        ;-- ************************************************************************

023636                                  RXBRRT:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
023636  004567  160130                                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
023642  017700  156372                          MOV     @RBUFA,R0       ;READ THE CHAR OUT OF THE FIFO.
023646  016701  156436                          MOV     RXINTC,R1       ;GET THE INTERUPT COUNT.
023652  005201                                  INC     R1              ;INCREMENT THE COUNT.
023654  001402                                  BEQ     2$              ;BYPASS UPDATING COUNT IF OVERFLOW OCCURRED.
023656  010167  156426                          MOV     R1,RXINTC       ;SAVE NEW COUNT VALUE.
023662  016701  156424          2$:             MOV     RXINTF,R1       ;GET THE RX INTERRUPT FLAGS.
023666  052701  000001                          BIS     #BIT0,R1        ;SET THE RX INTERRUPT HAS OCCURRED FLAG.
023672  032767  000001  156424                  BIT     #BIT0,TXINTF    ;TEST THE "TX INT HAS OCCURRED" FLAG.
023700  001402                                  BEQ     4$              ;SKIP SETTING ERROR FLAG IF NO TX INT.
023702  052701  040000                          BIS     #BIT14,R1       ;SET THE INTERRUPT ORDER ERROR FLAG.
023706  010167  156400          4$:             MOV     R1,RXINTF       ;UPDATE THE RX INTERRUPT FLAGS.
023712                          60$:            PASS                    ;RESTORE GPRS.
023712  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
023714  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.
                                ;-- ************************************************************************

023716                          RXINPT:: SAVE                   ;SAVE CONTENTS OF GPRS R0 THRU R5.
023716  004567  160050                           JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
023722  017701  156310                  MOV     @CSRA,R1        ;READ THE CONTENTS OF THE CSR.
023726  032701  000200                  BIT     #BIT7,R1        ;TEST RX.DATA.AVAIL BIT.
023732  001003                          BNE     2$              ;BRANCH AROUND SETTING FLAG IF BIT IS SET.
023734  052767  100000  156350          BIS     #BIT15,RXINTF   ;SET THE RX.DATA.AVAIL CLEAR FLAG.
023742  016701  156342          2$:     MOV     RXINTC,R1       ;GET THE INTERUPT COUNT.
023746  005201                          INC     R1              ;INCREMENT THE COUNT.
023750  001402                          BEQ     4$              ;BYPASS UPDATING COUNT IF OVERFLOW OCCURRED.
023752  010167  156332                  MOV     R1,RXINTC       ;SAVE NEW COUNT VALUE.
023756  016702  156314          4$:     MOV     BUFPTR,R2       ;GET THE POINTER TO NEXT FREE BUFFER WORD.
023762  017722  156252                  MOV     @RBUFA,(R2)+    ;READ A CHAR FROM THE FIFO INTO BUFFER.
023766  020267  157730                  CMP     R2,BUFEND       ;TEST FOR POINTER BEYOND END OF BUFFER.
023772  103002                          BHIS    60$             ;SKIP THE PTR UPDATE IF PTR OUT OF BOUNDS.
023774  010267  156276                  MOV     R2,BUFPTR       ;UPDATE THE BUFFER POINTER.
024000                          60$:    PASS                    ;RESTORE GPRS.
024000  004736                                   JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
024002  000002                          RTI
```

```
                                        .SBTTL  GLOBAL TRAP SERVICE ROUTINE     - TP4RTN -
                                        ;*****************************************************************************
                                        ;*      BUS TIME-OUT TRAP (004 TRAP) SERVICE ROUTINE -
                                        ;*      THIS ROUTINE 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.
                                        ;*****************************************************************************

024004  021627  017720                  TP4RTN:: CMP    (SP),#ADRPTR    ;COMPARE EXPECTED ADR AGAINST TRAP RET PC.
024010  001402                                   BEQ    2$              ;IF THEY MATCH, CONTINUE THIS ROUTINE.
024012  000177  156300                           JMP    @TP4VEC         ;IF NOT,JUMP TO NORMAL 004 TRAP SERVICE RTN.
024016  052767  100000  156270          2$:      BIS    #BIT15,TP4FLG   ;SET THE 004 TRAP OCCURED FLAG.
024024  000002                                   RTI                    ;ALL DONE, GO BACK TO THE TEST.
```

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

024026                                  TXINTR:: SAVE                           ;SAVE CONTENTS OF GPRS R0 THRU R5.
024026  004567  157740                                  JSR     R5,PREG05       ;CALL REGISTER SAVE SUBRT.
024032  016701  156264                          MOV     TXINTC,R1               ;GET THE TX INTERUPT COUNT.
024036  005201                                  INC     R1                      ;INCREMENT THE COUNT.
024040  102001                                  BVC     2$                      ;BRANCH IF NO OVERFLOW OCCURRED.
024042  005301                                  DEC     R1                      ;RESET THE COUNT TO 177777.
024044  010167  156252                  2$:     MOV     R1,TXINTC               ;SAVE NEW COUNT VALUE.
024050  016703  156250                          MOV     TXINTF,R3               ;GET THE TX INTERRUPT FLAGS.
024054  017702  156156                          MOV     @CSRA,R2                ;READ THE CSR.
024060  100402                                  BMI     4$                      ;SKIP SETTING OF FLAG IF TX.ACTION IS SET.
024062  052703  100000                          BIS     #BIT15,R3               ;SET THE TX.ACTION CLEAR FLAG.
024066  052703  000001                  4$:     BIS     #BIT0,R3                ;SET THE TX INT HAS OCCURRED FLAG.
024072  010367  156226                          MOV     R3,TXINTF               ;UPDATE THE TX INTERRUPT FLAGS.
024076                                  60$:    PASS                            ;RESTORE GPRS.
024076  004736                                          JSR     PC,@(SP)+               ;RETURN TO PREG05 SUBRT.
024100  000002                                  RTI
```

```
                                ;*****************************************************************************
                                ;
                                ;               FVTA.RPT
                                ;
                                ;*****************************************************************************


                                .SBTTL  REPORT CODING SECTION

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

 024102                                 BGNRPT
 024102                                                                 L$RPT::

 024102                                 EXIT    RPT
 024102  000167                                                                 .WORD   J$JMP
 024104  000000                                                                 .WORD   L10017-2-.

                                        .EVEN

 024106                                 ENDRPT
 024106                                                                 L10017:
 024106  104425                                                                 TRAP    C$RPT
```

E10


```
                                .SBTTL  PROTECTION TABLE

                                ;*****************************************************************************************
*
                                ;
                                ;               FVTSKL4.P11
                                ;
                                ;*****************************************************************************************



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

 024110                                 BGNPROT
 024110                                                                         L$PROT::

 024110  177777                         -1              ;OFFSET INTO P-TABLE FOR CSR ADDRESS
 024112  177777                         -1              ;OFFSET INTO P-TABLE FOR MASSBUS ADDRESS
 024114  177777                         -1              ;OFFSET INTO P-TABLE FOR DRIVE NUMBER

 024116                                 ENDPROT
```

```
                                ;*****************************************************************************
                                ;
                                ;               FVTA.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.
                                ;*
                                ;*****************************************************************************
                                ;--
 024116                                 BGNINIT
 024116                                                                                  L$INIT::
                                ;SEE IF PROGRAM JUST STARTED, BR IF YES
 024116                                 READEF  #EF.START
 024116  012700  000040                                                                  MOV     #EF.START,R0
 024122  104447                                                                          TRAP    C$REFG
 024124                                 BCOMPLETE       NEWSTA
 024124  103416                                                                          BCS     NEWSTA
                                ;SEE IF PROGRAM JUST RESTARTED, BR IF YES
 024126                                 READEF  #EF.RESTART
 024126  012700  000037                                                                  MOV     #EF.RESTART,R0
 024132  104447                                                                          TRAP    C$REFG
 024134                                 BCOMPLETE       NEWRES
 024134  103556                                                                          BCS     NEWRES
                                ;SEE IF THIS IS A NEW PASS, BR IF YES
 024136                                 READEF  #EF.NEW
 024136  012700  000035                                                                  MOV     #EF.NEW,R0
 024142  104447                                                                          TRAP    C$REFG
 024144                                 BCOMPLETE       NEWPAS
 024144  103555                                                                          BCS     NEWPAS
                                ;SEE IF PROGRAM WAS JUST CONTINUED
 024146                                 READEF  #EF.CONTINUE
 024146  012700  000036                                                                  MOV     #EF.CONTINUE,R0
 024152  104447                                                                          TRAP    C$REFG
 024154                                 BNCOMPLETE      GETPRM
 024154  103161                                                                          BCC     GETPRM
 024156  000167  000540                 JMP     ENDIT
 024162                         NEWSTA:
 024162                                 BRESET                          ;RESET THE BUS TO PREVENT ILLEGAL INTERRUPTS.
 024162  104433                                                                          TRAP    C$RESET
                                ;+
                                ; SET UP FOR LINE TIME CLOCK INTERRUPTS.
                                ;-
 024164                                 CLOCK   L,R1                    ;GET THE CLOCK PARAMETERS.
 024164  012700  000114                                                                  MOV     #'L,R0
 024170  104462                                                                          TRAP    C$CLCK
```

```
     024172  010001                                                                    MOV     R0,R1
4610 024174  012167  156130                 MOV     (R1)+,CLKCSR            ;STORE CLOCK CSR ADDRESS.
4611 024200  012167  156126                 MOV     (R1)+,CLKBRL            ;STORE CLOCK BUS REQ INT LEVEL.
4612 024204  012167  156124                 MOV     (R1)+,CLKVEC            ;STORE CLOCK INTERRUPT VECTOR.
4613 024210  012167  156122                 MOV     (R1)+,CLKHRZ            ;STORE CLOCK FREQUENCY.
4614 024214  026727  156116  000062         CMP     CLKHRZ,#50.             ;TEST FOR 50HZ LINE FREQUENCY.
4615 024222  001004                         BNE     2$                      ;BRANCH IF CLOCK IS NOT 50HZ.
4616 024224  012767  000024  156116         MOV     #20.,MSTICK             ;INDICATE 20MS PER CLOCK TICK.
4617 024232  000403                         BR      4$
4618 024234  012767  000021  156106  2$:    MOV     #17.,MSTICK             ;INDICATE 17 MS PER CLOCK TICK.
4619 024242                          4$:    SETVEC  CLKVEC,#CLKINT,PRI06    ;INITIALIZE CLOCK INTERRUPT VECTOR.
     024242  016746  154032                                                                MOV     PRI06,-(SP)
     024246  012746  023566                                                                MOV     #CLKINT,-(SP)
     024252  016746  156056                                                                MOV     CLKVEC,-(SP)
     024256  012746  000003                                                                MOV     #3,-(SP)
     024262  104437                                                                        TRAP    C$SVEC
     024264  062706  000010                                                                ADD     #10.SP
4620 024270  016700  156042                 MOV     CLKHRZ,R0               ;INITIALIZE THE BREAK COUNT
4621 024274  006300                         ASL     R0                      ; TO CAUSE A BREAK
4622 024276  010067  156044                 MOV     R0,BCOUNT               ; EVERY 2 SECONDS.
4623 024302                                 SETPRI  #PRI05                  ;ALLOW CLOCK INTERRUPTS DISABLE OTHERS.
     024302  012700  000240                                                                MOV     #PRI05,R0
     024306  104441                                                                        TRAP    C$SPRI
4624                                 ;+
4625                                 ; ENABLE THE LINE TIME CLOCK (LTC) CHECKING TO MAKE SURE THAT THE CSR
4626                                 ; IS ACCESSABLE.
4627                                 ;    FIRST SET UP TO CATCH ANY 004 TRAPS WHICH OCCUR:
4628                                 ;-
4629 024310  016767  153470  156000         MOV     4,TP4VEC        ;SAVE THE EXISTING 004 TRAP VECTOR.
4630 024316  012767  024004  153460         MOV     #TP4RTN,4       ;SET 004 TRAP VECTOR TO OUR SERVICE RTN ADR.
4631                                 ;+
4632                                 ;    ENABLE LTC CHECKING FOR 004 TRAP IN CASE CSR IS NOT THERE.
4633                                 ;-
4634 024324  005067  155764                 CLR     TP4FLG          ;CLEAR THE 004 TRAP FLAG.
4635 024330  012767  000100  155770         MOV     #BIT6,WORD1     ;SET UP TO SET BIT6 OF THE LTC CSR.
4636 024336  012700  002326                 MOV     #WORD1,R0       ;SET UP WORD1 AS THE CKTRAP MOVE SOURCE.
4637 024342  016701  155762                 MOV     CLKCSR,R1       ;SET UP LTC CSR AS DESTINATION FOR CKTRAP MOVE.
4638 024346  004767  173334                 JSR     PC,CKTRAP       ;MOVE AND CHECK FOR TRAP.
4639 024352  016767  155740  153424         MOV     TP4VEC,4        ;RESTORE THE NORMAL 004 TRAP VECTOR.
4640 024360  103403                         BCS     6$              ;IF NO TRAP, LTC IS THERE SO CONTINUE.
4641 024362  005067  155750                 CLR     CLKHRZ          ;CLEAR LTC FREQUENCY WORD TO INDICATE NO LTC.
4642 024366  000402                         BR      8$              ;BYPASS THE FOLLOWING CALIBRATION PROCEDURES.
4643                                 ;+
4644                                 ; CALIBRATE THE DELAY ROUTINE MILLI-SECOND DELAY COUNT VALUE.
4645                                 ;-
4646 024370  004767  173066          6$:    JSR     PC,CALMSL
4647                                 ;+
4648                                 ; CHECK FOR MEMMORY MANAGEMENT PRESENT ON THIS MACHINE.
4649                                 ; IF MEM MGT IS PRESENT, DISABLE IT.
4650                                 ;-
4651 024374  016767  153404  155714  8$:     MOV     4,TP4VEC        ;SAVE THE EXISTING 004 TRAP VECTOR.
4652 024402  012767  024004  153374         MOV     #TP4RTN,4       ;SET 004 TRAP VECTOR TO OUR SERVICE RTN ADR.
4653 024410  005067  155700                 CLR     TP4FLG          ;CLEAR THE 004 TRAP FLAG.
4654 024414  005067  155706                 CLR     WORD1           ;PREPARE TO CLEAR THE MEM MGT SR0 REGISTER.
4655 024420  012700  002326                 MOV     #WORD1,R0       ;SELECT CLEARED WORD AS CKTRAP RTN SOURCE.
4656 024424  016701  155724                 MOV     MMSR0,R1        ;SELECT MEM MGT SR0 REGISTER AS DESTINATION.
4657 024430  005067  155722                 CLR     MMPRES          ;INDICATE NO MEM MGT PRESENT IN CASE IT ISN'T.
```

```
024434  005067  155720                    CLR     MMENAB          ;INDICATE MEM MGT IS NOT ENABLED.
024440  004767  173242                    JSR     PC,CKTRAP       ;CLEAR THE MEM MCT SRO REG AND CHECK FOR TRAP.
024444  016767  155646  153332            MOV     TP4VEC,4        ;RESTORE THE NORMAL 004 TRAP VECTOR.
024452  103003                            BCC     10$             ;SKIP INDICATING MEM MGT PRESENT IF IT ISN'T.
024454  012767  000001  155674            MOV     #1,MMPRES       ;INDICATE THAT MEM MGT IS PRESENT.
024462  005067  155620          10$:      CLR     PASCNT          ;CLR COUNTER USED IN REPORTING ROM VERSION #.
024466  000167  000006                    JMP     NEWPAS          ;SKIP AROUND THE BUS RESET, IT'S BEEN DONE.

024472                          NEWRES:   BRESET                  ;RESET THE BUS TO PREVENT ILLEGAL INTERRUPTS.
024472  104433                                                                                    TRAP    C$RESET
024474  005067  155606                    CLR     PASCNT          ;CLR COUNTER USED IN REPORTING ROM VERSION #.
024500                          NEWPAS:
024500  012767  177777  155524            MOV     #-1,UNITN       ;RESET LOGICAL DEVICE TO -1
                                ;+
                                ; INCREMENT THE PASS COUNTER, CORRECT FOR ANY OVERFLOW.
                                ;  THIS COUNTER IS USED IN THE ROM VERSION TEST.
                                ;-
024506  005267  155574                    INC     PASCNT          ;INCREMENT THE PASS COUNTER.
024512  001002                            BNE     GETPRM          ;BRANCH IF WE HAVE NOT YET! OVERFLOWED.
024514  005367  155566                    DEC     PASCNT          ;SET PASS COUNT TO 177777 OCTAL.

                                ; GET THE HARDWARE PARAMETERS FOR THIS UNIT.
024520                          GETPRM:
024520  005267  155506                    INC     UNITN           ;INCREMENT LOGICAL DEVICE NUMBER
024524  026767  155502  155260            CMP     UNITN,L$UNIT    ;SEE IF MAXIMUM UNIT NO. EXCEEDED
024532  002362                            BGE     NEWPAS          ;BR IF YES

024534                                    GPHARD  UNITN,R1        ;GET P-TABLE POINTER INTO R1
024534  016700  155472                                                                    MOV     UNITN,R0
024540  104442                                                                            TRAP    C$GPHRD
024542  010001                                                                            MOV     R0,R1
024544                                    BCOMPLETE       30$     ;BR IF DEVICE AVAILABLE
024544  103401                                                                            BCS     30$
024546  000764                            BR      GETPRM          ;SKIP THIS DEVICE


                                          ;*********** HARDWARE PARAMETER MOVING CODE ****************
024550  012167  155462          30$:      MOV     (R1)+,CSRA      ;STORE DHU-11 CSR ADDRESS IN DEV.REG.ADDRESS TABLE
024554  012102                            MOV     (R1)+,R2        ;GET THE RX INTERRUPT VECTOR ADDRESS.
024556  010267  155444                    MOV     R2,RXVECA       ;STORE RX INT VECTOR ADDRESS.
024562  062702  000004                    ADD     #4,R2           ;CALCULATE TX INTERRUPT VECTOR ADDRESS.
024566  010267  155436                    MOV     R2,TXVECA       ;STORE TX INT VECTOR ADDRESS.
024572  012167  155426                    MOV     (R1)+,ACTLNS    ;STORE DHU-11 ACTIVE LINE BIT MAP
024576  111167  155432                    MOVB    (R1),BRLEVL     ;STORE DHU-11 INTERUPT BUS REQUEST LEVEL
                                ;+
                                ;         CALCULTATE DEVICE REGISTER ADDRESSES,AND PUT THEM IN THE
                                ;         DEVICE REGISTER ADDRESS TABLE.
                                ;-
024602  016701  155430                    MOV     CSRA,R1         ;COPY CSR ADDRESS
024606  005201                            INC     R1              ;INCREMENT CSR ADDRESS
024610  005201                            INC     R1              ; COPY BY 2.
024612  012703  000007                    MOV     #7,R3           ;SET UP REGISTER COUNT
024616  012702  002240                    MOV     #RBUFA,R2       ;GET LOCATION WHERE RBUF ADDRESS GOES IN TABLE
024622  010122                  12$:      MOV     R1,(R2)+        ;STORE REGISTER ADDRESS IN TABLE
024624  005201                            INC     R1              ;INCREMENT REGISTER ADDRESS
024626  005201                            INC     R1              ; BY 2,FOR THE NEXT DEVICE REGISTER.
024630  005303                            DEC     R3              ;DECREMENT REGISTER COUNT
```

```
024632  001373                          BNE     12$             ;LOOP IF NOT DONE

                                ;+
                                ; INITIALISE THE BMP CODE QUEUE.
                                ;-
024634  012700  002522                  MOV     #BMPCQB,R0      ;GET THE START ADDRESS OF THE QUEUE.
024640  012701  002722                  MOV     #BMPCQE,R1      ;GET THE END ADDRESS OF THE QUEUE.
024644  010067  155650                  MOV     R0,BMPCQP       ;SET THE POINTER TO THE START OF THE QUEUE.
024650  005020                  14$:    CLR     (R0)+           ;CLEAR OUT THE CONTENTS OF THE QUEUE.
024652  020001                          CMP     R0,R1           ;CHECK IF END OF QUEUE HAS BEEN REACHED.
024654  103775                          BLO     14$             ;LOOP IF NOT ALL DONE.

                                ;+
                                ; REPORT THE UNIT NUMBER IF THE SOFTWARE P-TABLE QUESTION WAS ANSWERED YES,
                                ;  AND THE MAXIMUM UNIT NUMBER IS GREATER THAN 1.
                                ;-
024656  032767  000020  155334          BIT     #BIT4,OPTION    ;CHECK IF THE QUESTION WAS ANSWERED YES.
024664  001416                          BEQ     16$             ;SKIP REPORTING UNIT NUMBER IF IT IS DISABLED.
024666  026727  155120  000001          CMP     L$UNIT,#1       ;CHECK MAXIMUM NUMBER OF UNITS SELECTED.
024674  003412                          BLE     16$             ;DO NOT REPORT UNIT NUMBER IF MAX NUMBER < 1.
024676                                  PRINTF  #MFUNIT,UNITN   ;REPORT UNIT NUMBER.
024676  016746  155330                                                          MOV     UNITN,-(SP)
024702  012746  004070                                                          MOV     #MFUNIT,-(SP)
024706  012746  000002                                                          MOV     #2,-(SP)
024712  010600                                                                  MOV     SP,R0
024714  104417                                                                  TRAP    C$PNTF
024716  062706  000006                                                          ADD     #6,SP
024722                          16$:

024722  005067  155354          ENDIT:  CLR     CTRLCF          ;CLR THE CTRL-C TEST ABORT FLAG.
                                ;+
                                ; SET THE PROCESSOR PRIORITY TO ALLOW LTC INTERRUPTS BUT NOT OTHERS.
                                ;-
024726                                  SETPRI  #PRIO7                  ;SET PROCESSOR PRIORITY TO 7.
024726  012700  000340                                                          MOV     #PRIO7,R0
024732  104441                                                                  TRAP    C$SPRI
024734                                  ENDINIT
024734                                                          L10021:
024734  104411                                                                  TRAP    C$INIT

        000000                          TNUM == 0               ;INITIALIZE THE ASSEMBLER TEST NUMBER VARIABLE.
```

```
                                ;*****************************************************************************
                                ;
                                ;               FVTA.ATD
                                ;
                                ;*****************************************************************************


                                .SBTTL  AUTODROP SECTION


                                ;++
                                ; THIS CODE IS EXECUTED IMMEDIATELY AFTER THE INITIALIZE CODE IF
                                ; THE "ADR" FLAG WAS SET.  THE UNIT(S) UNDER TEST ARE CHECKED TO
                                ; SEE IF THEY WILL RESPOND.  THOSE THAT DON'T ARE IMMEDIATELY
                                ; DROPPED FROM TESTING.
                                ;--

 024736                                 BGNAUTO
 024736                                                                 L$AUTO::


 024736                                 ENDAUTO
 024736                                                                 L10022:
 024736  104461                                                                 TRAP    C$AUTO
```

```
                                        ;*****************************************************************************
                                        ;
                                        ;               FVT.CUC
                                        ;
                                        ;*****************************************************************************



                                        .SBTTL  CLEANUP CODING SECTION

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

 024740                                         BGNCLN
 024740                                                                                         L$CLEAN::

 024740  005767  155336                          TST     CTRLCF          ;DID WE GET HERE BY CTRL-C FROM TEST?
 024744  001401                                 BEQ     2$              ;CTRL-C FROM TEST?  NO, SKIP BUS RESET.
 024746                                         BRESET                  ;YES, CLR ANY DMAS OR OUTSTANDING INTERRUPTS.
 024746  104433                                                                                 TRAP    C$RESET
 024750                                 2$:
 024750                                         EXIT    CLN
 024750  104432                                                                                 TRAP    C$EXIT
 024752  000002                                                                                 .WORD   L10023-.


                                                .EVEN

 024754                                         ENDCLN
 024754                                                                                         L10023:
 024754  104412                                                                                 TRAP    C$CLEAN
```

```
                                ;*****************************************************************************
                                ;
                                ;               FVTA.DRP
                                ;
                                ;*****************************************************************************



                                .SBTTL  DROP UNIT SECTION

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

 024756                                 BGNDU
 024756                                                                         L$DU::

                                ;*****************************************************************************
                                ;       INSERT DROP CODE HERE.  THIS CODE WILL BE EXECUTED AFTER
                                ;       A "DROP" COMMAND OR A "DODU" MACRO EXECUTION.  THE PURPOSE
                                ;       OF THIS CODE IS TO DO ANY NECESSARY HOUSEKEEPING AFTER A
                                ;       UNIT HAS BEEN DROPPED.  THIS SECTION IS OPTIONAL.
                                ;*****************************************************************************

 024756                                  PRINTF #DROP,R0        ;REPORT UNIT THAT HAS BEEN DROPPED.
 024756  010046                                                                 MOV     R0,-(SP)
 024760  012746  025002                                                         MOV     #DROP,-(SP)
 024764  012746  000002                                                         MOV     #2,-(SP)
 024770  010600                                                                 MOV     SP,R0
 024772  104417                                                                 TRAP    C$PNTF
 024774  062706  000006                                                         ADD     #6,SP
 025000  000427                          BR      EDROP          ;BRANCH AROUND THE MESSAGE.

 025002     045     101     040  DROP:   .ASCIZ/%A UNIT%D6%A DROPPED FROM FURTHER TESTING.%N/
 025005     125     116     111
 025010     124     045     104
 025013     066     045     101
 025016     040     104     122
 025021     117     120     120
 025024     105     104     040
 025027     106     122     117
 025032     115     040     106
 025035     125     122     124
 025040     110     105     122
 025043     040     124     105
 025046     123     124     111
 025051     116     107     056
 025054     045     116     000
                                        .EVEN
 025060                         EDROP:
 025060                                 EXIT    DU
 025060  000167                                                                 .WORD   J$JMP
 025062  000000                                                                 .WORD   L10024 2-.
```

```
4853
4854 025064                                ENDDU
     025064                                                                L10024:
     025064  104453                                                                TRAP    C$DU
```

```
                                ;*****************************************************************************
                                ;
                                ;               FVTA.ADD
                                ;
                                ;*****************************************************************************



                                .SBTTL  ADD UNIT SECTION

                                ;++
                                ; THE ADD-UNIT SECTION CONTAINS ANY CODE THE PROGRAMMER WISHES
                                ;  TO BE EXECUTED IN CONJUNCTION WITH THE ADDING OF A UNIT BACK
                                ;  TO THE TEST CYCLE.
                                ;--

 025066                                 BGNAU
 025066                                                                         L$AU::

                                ;*****************************************************************************
                                ;       INSERT ADD CODE HERE.  THIS CODE WILL BE EXECUTED AFTER
                                ;       AN "ADD" COMMAND.  THE PURPOSE OF THIS CODE IS TO DO ANY
                                ;       HOUSEKEEPING THAT MAY BE NECESSARY AFTER A UNIT HAS BEEN ADDED.
                                ;       THIS SECTION IS OPTIONAL.
                                ;*****************************************************************************

 025066                                 EXIT    AU
 025066  000167                                                                 .WORD   J$JMP
 025070  000000                                                                 .WORD   L10025-2-.


                                .EVEN

 025072                         ENDAU
 025072                                                                         L10025:
 025072  104452                                                                 TRAP    C$AU
```

```
                                        .SBTTL  HARDWARE TEST          - ADRA -
                                        ;+
                                        ;*******************************************************************************
                                        ;*                        - REGISTER ADDRESS TEST -
                                        ;*
                                        ;*      THIS TEST VERIFIES THAT THE DEVICE REGISTERS WILL RESPOND TO THE PROPER
                                        ;*      UNIBUS HANDSHAKING SIGNALS WHEN ACCESSED. IF THE DHU11 DOES NOT RESPOND
                                        ;*      TO THE ACCESS ATTEMPTS (IF THE DHU11 IS AT THE WRONG ADDRESS, FOR EXAMPLE)
                                        ;*      THE 004 BUS TIME-OUT TRAP IS DETECTED BY THIS ROUTINE AND AN ERROR
                                        ;*      IS REPORTED. THIS TEST IS PERFORMED ON LINE 0 ONLY.
                                        ;*
                                        ;*******************************************************************************
                                        ;-

025074                                          BGNTST
025074                                                                                  T1::
        000001                                  TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
025074  012767  000001  155216                  MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (1)
025102  012767  177777  155172                  MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
025110  012767  000145  156646                  MOV     #101.,ERRNBR    ;SET THE TEST ERROR NUMBER IN THE TABLE.
025116  012767  005564  156642                  MOV     #EM0103,ERRMSG  ;SET UP THE TEST FAILURE MESSAGE IN THE TABLE.
025124  012767  015444  156636                  MOV     #ER0101,ERRBLK  ;SET-UP THE ERROR ROUTINE IN THE ERROR TABLE.
                                        ;+
                                        ; SET UP TO CATCH ANY 004 TRAPS WHICH OCCUR:
                                        ;-
025132  016767  152646  155156                  MOV     4,TP4VEC        ;SAVE THE EXISTING 004 TRAP VECTOR.
025140  012767  024004  152636                  MOV     #TP4RTN,4       ;SET 004 TRAP VECTOR TO OUR SERVICE RTN ADR.
025146  005005                                  CLR     R5              ;CLEAR THE ERROR FLAGS.

                                        ;+
                                        ; HERE BEGINS THE LOOP TO TEST THE REGISTERS FOR A LINE.
                                        ;    FIRST TEST THE CSR AND SET THE IND.ADR.REG (I.A.R) FIELD.
                                        ;-
025150  016700  155062                          MOV     CSRA,R0         ;SET UP CSR AS THE CKTRAP MOVE SOURCE.
025154  012701  025346                          MOV     #52$,R1         ;SET UP DESTINATION LOCATION FOR CKTRAP MOVE.
025160  004767  172522                          JSR     PC,CKTRAP       ;MOVE AND CHECK FOR TRAP.
025164  103402                                  BCS     4$              ;IF NO TRAP, BYPASS ERROR.
025166  052705  100001                          BIS     #100001,R5      ;SET FATAL READ ERROR FLAGS.
025172  042767  000017  000146  4$:             BIC     #17,52$         ;CLEAR THE I.A.R FIELD OF THE CSR DATA.
025200  010100                                  MOV     R1,R0           ;USE OLD DESTINATION FOR SOURCE OF CKTRAP MOVE.
025202  016701  155030                          MOV     CSRA,R1         ;SET UP CSR AS THE CKTRAP MOVE DESTINATION.
025206  004767  172474                          JSR     PC,CKTRAP       ;MOVE AND CHECK FOR TRAP.
025212  103403                                  BCS     6$              ;IF NO TRAP, BYPASS ERROR.
025214  052705  100002                          BIS     #100002,R5      ;SET FATAL WRITE ERROR FLAGS.
025220  000434                                  BR      40$             ;EXIT AND REPORT FATAL ERROR.
                                        ;+
                                        ;    NOW, WE TEST EACH REGISTER FOR THIS LINE.
                                        ;-
025222  012702  000010          6$:             MOV     #8.,R2          ;INIT REGISTER COUNTER TO 8.
025226  016767  155004  000110                  MOV     CSRA,50$        ;INITIALIZE THE REGISTER POINTER.
025234  012700  025344          8$:             MOV     #50$,R0         ;SET UP REGISTER AS THE SOURCE FOR CKTRAP MOVE.
025240  012701  025346                          MOV     #52$,R1         ;SET UP LOCAL STORAGE AS THE DES FOR CKTRAP.
025244  004767  172436                          JSR     PC,CKTRAP       ;PERFORM THE MOVE, CHECK FOR TRAP.
025250  103402                                  BCS     10$             ;IF NO TRAP, BYPASS THE SETTING OF ERROR FLAGS.
025252  052705  100001                          BIS     #100001,R5      ;SET FATAL READ ERROR FLAGS.
025256  010100                  10$:            MOV     R1,R0           ;USE OLD DEST AS SRC FOR CKTRAP MOVE.
025260  012701  025344                          MOV     #50$,R1         ;SET UP REGISTER AS THE DEST FOR CKTRAP MOVE.
```

```
025264  004767  172416                  JSR     PC,CKTRAP       ;PERFORM THE MOVE, CHECK FOR TRAP.
025270  103402                          BCS     12$             ;IF NO TRAP, BYPASS THE SETTING OF ERROR FLAGS.
025272  052705  100002                   BIS    #100002,R5      ;SET FATAL WRITE ERROR FLAGS.
025276  005267  000042          12$:     INC    50$             ;INCREMENT THE REGISTER
025302  005267  000036                   INC    50$             ; POINTER BY 2.
025306  005302                           DEC    R2              ;COUNT THE REGISTER.
025310  001351                          BNE     8$              ;LOOP TO TEST THE NEXT REGISTER ADDRESS.

                                ;+
                                ; DONE CHECKING DEVICE REGISTER ADDRESSES.
                                ;    REPORT ANY ERRORS AND EXIT.
                                ;-

025312  016767  155000  152464  40$:     MOV    TP4VEC,4        ;RESTORE THE NORMAL 004 TRAP VECTOR.
025320  005705                           TST    R5              ;CHECK THE ERROR FLAGS.
025322  100012                          BPL     60$             ;EXIT ROUTINE IF NO ERRORS.

                                ;+
                                ; REPORT "DEVICE REGISTER ACCESS TEST FAILED"
                                ;-
025324                                  ERROR
025324  104460                                                                          TRAP    C$ERROR

025326                                  DODU    UNITN           ;DROP THIS UNIT FROM FUTHER TESTING.
025326  016700  154700                                                                  MOV     UNITN,R0
025332  104451                                                                          TRAP    C$DODU
025334  005067  154742                   CLR    CTRLCF          ;INDICATE NO CTRL-C ABORT FROM TEST.
025340                                  DOCLN                   ;ABORT THIS SUB PASS.
025340  104444                                                                          TRAP    C$DCLN
025342  000402                          BR      60$             ;

                                ;*************** LOCAL STORAGE. ****************************************
025344  000000                  50$:    .WORD   0               ;STORAGE FOR THE SOURCE OR DEST OF THE CKTRAP MOVE.
025346  000000                  52$:    .WORD   0               ;STORAGE FOR THE SOURCE OR DEST OF THE CKTRAP MOVE.
                                ;****************** END ****************************************************

025350  005067  154726          60$:     CLR    CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
025354                                  ENDTST
025354                                                                          L10026:
025354  104401                                                                          TRAP    C$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.
                                        ;*
                                        ;-- ************************************************************************
025356                                          BGNTST
025356                                                                                          T2::
        000002                                  TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
025356  012767  000002  154734           MOV    #TNUM,TSTNUM            ;SET UP THE TEST NUMBER.        (2)
025364  012767  177777  154710           MOV    #-1,CTRLCF              ;INDICATE THAT WE ARE IN A TEST.
025372                                  SETPRI  #PRIO5                  ;ALLOW LTC INTERRUPTS.
025372  012700  000240                                                                                  MOV     #PRIO5,R0
025376  104441                                                                                          TRAP    C$SPRI
025400  012767  000001  156354           MOV    #1,ERRTYP               ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
025406  012767  005632  156352           MOV    #EM0201,ERRMSG          ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
025414  012767  015776  156346           MOV    #ER0201,ERRBLK          ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                        ;+
                                        ; WAIT UP TO 5 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
                                        ;-
025422  012701  011610                   MOV    #5000.,R1               ;TIME-OUT VALUE IS 5.0 SECONDS.
025426  012702  000040                   MOV    #BIT05,R2               ;WAITING FOR MASTER RESET BIT.
025432  005003                           CLR    R3                      ;WAITING FOR BIT TO CLEAR.
025434  016704  154576                   MOV    CSRA,R4                 ;BIT IS IN THE DUT'S CSR.
025440  004767  172454                  JSR     PC,MSLGET               ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
025444  103410                           BCS    2$                      ;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.
                                        ;-
025446                                          BRESET                  ;NO, TRY TO JOG DEVICE WITH BUS RESET.
025446  104433                                                                                          TRAP    C$RESET
025450  004767  174624                  JSR     PC,SKPSTS               ;TRY TO SKIP THE SELFTEST.
025454  012701  011610                   MOV    #5000.,R1               ;TIME-OUT VALUE IS 5.0 SECONDS.
025460  004767  172434                  JSR     PC,MSLGET               ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
025464  103016                           BCC    4$                      ;GO REPORT ERROR IF MR BIT DID NOT CLEAR.
                                        ;+
                                        ; SET THE MASTER RESET BIT AND VERIFY THAT IT CLEARS WITHIN THE PROPER TIME.
                                        ;-
025466  012701  011610                  2$:      MOV    #5000.,R1               ;TIME-OUT VALUE IS 5.0 SECONDS.
025472  010214                           MOV    R2,(R4)                 ;SET THE DUT MASTER RESET BIT.
025474  004767  172420                  JSR     PC,MSLGET               ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
025500  103010                           BCC    4$                      ;GO REPORT ERROR IF MR BIT DID NOT CLEAR.
025502  012702  011610                   MOV    #5000.,R2
025506  160102                           SUB    R1,R2                   ;CALCULATE # OF MS FOR MR TO CLEAR.
025510  001413                           BEQ    6$                      ;GO REPORT ERROR IF MR CLEAR IMMEDIATELY.
025512  020227  000764                   CMP    R2,#500.
025516  002417                          BLT     8$                      ;GO REPORT ERROR IF MR CLEAR IN < 1/2 SECOND.
025520  000424                           BR     60$                     ;EXIT THE TEST WITHOUT ERROR.
                                        ;+
                                        ; ERROR REPORTS:
                                        ;-
                                            ;REPORT MR BIT WOULD NOT CLEAR AFTER A DUT RESET.
025522  012767  000311  156234  4$:      MOV    #201.,ERRNBR            ;SET THE ERROR NUMBER IN ERROR TABLE.
025530  012701  005665                   MOV    #EM0202,R1              ;SELECT ERROR MESSAGE.
025534                                  ERROR                           ;REPORT ERROR.          >>>>> ERROR #201 <<<<<
```

```
     025534  104460                                                                                    TRAP    C$ERROR
5034 025536  000415                          BR      60$                ;EXIT THE TEST.
5035
5036                                   ;REPORT MR BIT CLEAR IMMEDIATELY AFTER DUT RESET.
5037 025540  012767  000312  156216  6$:     MOV     #202.,ERRNBR       ;SET THE ERROR NUMBER IN ERROR TABLE.
5038 025546  012701  006040                  MOV     #EM0203,R1         ;SELECT ERROR MESSAGE.
5039 025552                                 ERROR                      ;REPORT ERROR.          >>>>> ERROR #202 <<<<<
     025552  104460                                                                                    TRAP    C$ERROR
5040 025554  000406                          BR      60$                ;EXIT THE TEST.
5041
5042                                   ;REPORT MR CLEAR WITHIN 1/2 SECOND OF DUT RESET.
5043 025556  012767  000313  156200  8$:     MOV     #203.,ERRNBR       ;SET THE ERROR NUMBER IN ERROR TABLE.
5044 025564  012701  006203                  MOV     #EM0204,R1         ;SELECT ERROR MESSAGE.
5045 025570                                 ERROR                      ;REPORT ERROR.          >>>>> ERROR #203 <<<<<
     025570  104460                                                                                    TRAP    C$ERROR
5046
5047 025572                          60$:   SETPRI  #PRI07             ;DISABLE ALL INTERRUPTS.
     025572  012700  000340                                                                            MOV     #PRI07,R0
     025576  104441                                                                                    TRAP    C$SPRI
5048 025600  005067  154476                  CLR     CTRLCF             ;INDICATE THAT WE COMPLETED THE TEST.
5049 025604                                 ENDTST
     025604                                                                                  L10027:
     025604  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.
                                        ;*
                                        ;-- ************************************************************************
025606                                          BGNTST
025606                                                                                          T3::
        000003                                  TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
025606  012767  000003  154504           MOV    #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (3)
025614  012767  177777  154460           MOV    #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
025622                                  SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
025622  012700  000240                                                                          MOV     #PRI05,R0
025626  104441                                                                                  TRAP    C$SPRI
025630  012767  000001  156124           MOV    #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
025636  012767  006362  156122           MOV    #EM0301,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
025644  012767  015776  156116           MOV    #ER0201,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                        ;+
                                        ; WAIT UP TO 5 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
                                        ;-
025652  012701  011610                   MOV    #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
025656  012702  000040                   MOV    #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
025662  005003                           CLR    R3              ;WAITING FOR BIT TO CLEAR.
025664  016704  154346                   MOV    CSRA,R4         ;BIT IS IN THE DUT'S CSR.
025670  004767  172224                  JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
025674  103410                           BCS    2$              ;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.
                                        ;-
025676                                  BRESET                  ;NO, TRY TO JOG DEVICE WITH BUS RESET.
025676  104433                                                                                  TRAP    C$RESET
025700  004767  174374                  JSR     PC,SKPSTS       ;TRY TO SKIP THE SELFTEST.
025704  012701  011610                   MOV    #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
025710  004767  172204                  JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
025714  103024                           BCC    6$              ;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.
                                        ;-
025716  012701  000310          2$:      MOV    #200.,R1        ;TIME-OUT VALUE IS 1/5 SECOND.
025722  010214                           MOV    R2,(R4)         ;SET THE DUT MASTER RESET BIT.
025724  004767  174350                  JSR     PC,SKPSTS       ;TRY TO SKIP THE SELFTEST.
025730  004767  172164                  JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
025734  103007                          BCC     4$              ;GO FIND OUT WHAT IS WRONG IF MR NOT CLEAR.
025736  012702  000310                   MOV    #200.,R2
025742  160102                           SUB    R1,R2           ;CALCULATE # OF MS FOR MR TO CLEAR.
025744  020227  000012                   CMP    R2,#10.
025750  002415                          BLT     8$              ;GO REPORT ERROR IF MR CLEAR IN < 10 MS.
025752  000431                           BR     60$             ;EXIT THE TEST WITHOUT ERROR.
                                        ;+
                                        ; MR DID NOT CLEAR WITHIN 1/5 SECOND, SEE IF IT CLEARS WITHIN 5 SECONDS.
                                        ;-
025754  012701  011300          4$:      MOV    #4800.,R1       ;TIME-OUT VALUE IS 5 SECONDS MINUS 1/5 SECOND.
025760  004767  172134                  JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
025764  103416                           BCS    10$             ;GO REPORT ERROR IF MR CLEARED FINALLY.
```

```
                                        ;+
                                        ; ERROR REPORTS:
                                        ;-
                                            ;REPORT MR BIT WOULD NOT CLEAR AFTER A DUT RESET.
025766  012767  000455  155770  6$:         MOV     #0301.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
025774  012701  005665                      MOV     #EM0202,R1      ;SELECT ERROR MESSAGE.
026000                                     ERROR                    ;REPORT ERROR.          >>>>> ERROR #0301 <<<<<
026000  104460                                                                                     TRAP    C$ERROR
026002  000415                             BR      60$              ;EXIT THE TEST.

                                            ;REPORT MR BIT CLEAR WITHIN 10 MS AFTER DUT RESET.
026004  012767  000456  155752  8$:         MOV     #0302.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
026012  012701  006434                      MOV     #EM0302,R1      ;SELECT ERROR MESSAGE.
026016                                     ERROR                    ;REPORT ERROR.          >>>>> ERROR #0302 <<<<<
026016  104460                                                                                     TRAP    C$ERROR
026020  000406                             BR      60$              ;EXIT THE TEST.

                                            ;REPORT MR CLEARED BETWEEN 1/5 SECOND AND 5 SECONDS OF DUT RESET.
026022  012767  000457  155734  10$:        MOV     #0303.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
026030  012701  006574                      MOV     #EM0303,R1      ;SELECT ERROR MESSAGE.
026034                                     ERROR                    ;REPORT ERROR.          >>>>> ERROR #0303 <<<<<
026034  104460                                                                                     TRAP    C$ERROR

026036                                 60$:    SETPRI  #PRIO7       ;DISABLE ALL INTERRUPTS.
026036  012700  000340                                                                             MOV     #PRIO7,R0
026042  104441                                                                                     TRAP    C$SPRI
026044  005067  154232                      CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
026050                                     ENDTST
026050                                                                                     L10030:
026050  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.
                                        ;*
                                        ;-- ************************************************************************
026052                                          BGNTST
026052                                                                                          T4::
026052                                          SETPRI  #PRIO5          ;ALLOW LTC INTERRUPTS.
026052  012700  000240                                                                          MOV     #PRIO5,R0
026056  104441                                                                                  TRAP    C$SPRI
        000004                                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
026060  012767  000004  154232                   MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (4)
026066  012767  177777  154206                   MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE WITHIN A TEST.
026074  012767  000001  155660                   MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
026102  012767  006753  155656                   MOV     #EM0401,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
026110  012767  015776  155652                   MOV     #ER0201,ERRBLK ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                        ;+
                                        ; SET THE DUT CSR MASTER RESET (MR) BIT, PERFORM THE SKIP SELFTEST SEQUENCE,
                                        ;  AND WAIT UP TO 5 SECONDS FOR THE MR BIT TO CLEAR.
                                        ;-
026116  012701  011610                           MOV     #5000.,R1      ;TIME-OUT VALUE IS 5.0 SECONDS.
026122  012702  000040                           MOV     #BIT05,R2      ;WAITING FOR MASTER RESET BIT.
026126  005003                                   CLR     R3             ;WAITING FOR BIT TO CLEAR.
026130  016704  154102                           MOV     CSRA,R4        ;BIT IS IN THE DUT'S CSR.
026134  010214                                   MOV     R2,(R4)        ;SET THE DUT MASTER RESET BIT.
026136  004767  174136                          JSR     PC,SKPSTS       ;SKIP THE SELFTEST.
026142  004767  171752                          JSR     PC,MSLGET       ;WAIT FOR DUT CSR MR BIT TO CLEAR.
026146  103015                                  BCC     4$              ;GO REPORT ERROR IF MR DID NOT CLEAR.
                                        ;+
                                        ; READ 6 CHARACTERS FROM THE DUT AND VERIFY THAT THEY ARE VALID SELFTEST
                                        ;  CODES.
                                        ;-
026150  012400                                   MOV     (R4)+,R0       ;INCREMENT POINTER TO POINT TO DUT RBUF REGSTR.
026152  012701  000006                           MOV     #6,R1          ;INITIALIZE THE LOOP COUNTER.
026156  011402                          2$:      MOV     (R4),R2        ;READ A CHARACTER FROM THE DUT RBUF REGISTER.
026160  010200                                   MOV     R2,R0
026162  042700  177476                           BIC     #177476,R0     ;REMOVE ALL BUT BITS SPECIFIC TO SELFTEST CODE.
026166  020027  000201                           CMP     R0,#201        ;CHECK THAT BITS 0,6, AND 7 ARE CORRECT.
026172  001012                                  BNE     6$              ;GO REPORT ERROR IF CODE IS NOT SELFTEST CODE.
026174  005301                                   DEC     R1             ;COUNT THIS LOOP ITERATION.
026176  001367                                  BNE     2$              ;LOOP IF NOT ALL LINES DONE.
026200  000415                                  BR      60$             ;EXIT TEST, NO ERROR FOUND.

                                        ;+
                                        ; ERROR REPORTS:
                                        ;-
                                            ;REPORT MR BIT WOULD NOT CLEAR AFTER A DUT RESET.
026202  012767  000621  155554  4$:              MOV     #0401.,ERRNBR  ;SET THE ERROR NUMBER IN ERROR TABLE.
026210  012701  005665                           MOV     #EM0202,R1     ;SELECT ERROR MESSAGE.
026214                                          ERROR                  ;REPORT ERROR.          >>>>> ERROR #0401 <<<<<
026214  104460                                                                                          TRAP    C$ERROR
026216  000406                                  BR      60$             ;EXIT THE TEST.

                                            ;REPORT IMPROPER CODE FOUND IN DUT RBUF AFTER RESET (SKIP SELFTEST).
```

```
026220  012767  000622  155536  6$:     MOV     #0402.,ERRNBR    ;SET THE ERROR NUMBER IN ERROR TABLE.
026226  012701  007031                   MOV     #EM0402,R1       ;SELECT ERROR MESSAGE.
026232                                  ERROR                    ;REPORT ERROR.          >>>>> ERROR #0402 <<<<<
026232  104460                                                                                   TRAP    C$ERROR
                                                                                                
026234                          60$:    SETPRI  #PRI07           ;DISABLE ALL INTERRUPTS.
026234  012700  000340                                                                           MOV     #PRI07,R0
026240  104441                                                                                   TRAP    C$SPRI
026242  005067  154034                   CLR     CTRLCF           ;INDICATE THAT WE COMPLETED THE TEST.
026246                                  ENDTST
026246                                                                                  L10031:
026246  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.
                                        ;*
                                        ;-- ************************************************************************
026250                                          BGNTST
026250                                                                                          T5::
026250                                          SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
026250  012700  000240                                                                          MOV     #PRI05,R0
026254  104441                                                                                  TRAP    C$SPRI
        000005                                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
026256  012767  000005  154034                   MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (5)
026264  012767  177777  154010                   MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE WITHIN A TEST.
026272  012767  000001  155462                   MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
026300  012767  007201  155460                   MOV     #EM0501,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
026306  012767  015776  155454                   MOV     #ER0201,ERRBLK ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                        ;*
                                        ; SET THE DUT CSR MASTER RESET (MR) BIT, PERFORM THE SKIP SELFTEST SEQUENCE.
                                        ;  AND WAIT UP TO 5 SECONDS FOR THE MR BIT TO CLEAR.
                                        ;-
026314  012701  011610                           MOV     #5000.,R1      ;TIME-OUT VALUE IS 5.0 SECONDS.
026320  012702  000040                           MOV     #BIT05,R2      ;WAITING FOR MASTER RESET BIT.
026324  005003                                   CLR     R3             ;WAITING FOR BIT TO CLEAR.
026326  016704  153704                           MOV     CSRA,R4        ;BIT IS IN THE DUT'S CSR.
026332  010214                                   MOV     R2,(R4)        ;SET THE DUT MASTER RESET BIT.
026334  004767  173740                          JSR     PC,SKPSTS       ;SKIP THE SELFTEST.
026340  004767  171554                          JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
026344  103013                                  BCC     4$              ;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.
                                        ;-
026346  012400                                   MOV     (R4)+,R0       ;INCREMENT POINTER TO POINT TO DUT RBUF REGSTR.
026350  012701  000010                           MOV     #8.,R1         ;INITIALIZE THE LOOP COUNTER.
026354  011402                          2$:      MOV     (R4),R2        ;READ A CHARACTER FROM THE DUT RBUF REGISTER.
026356  012700  070000                           MOV     #70000,R0
026362  040200                                   BIC     R2,R0          ;CALCULATE BIT MAP OF CLEAR RX ERROR FLAGS.
026364  001012                                  BNE     6$              ;GO REPORT ERROR IF NOT ALL RX ERROR FLAGS SET.
026366  005301                                   DEC     R1             ;COUNT THIS LOOP ITERATION.
026370  001371                                  BNE     2$              ;LOOP IF NOT ALL LINES DONE.
026372  000415                                  BR      60$             ;EXIT TEST, NO ERROR FOUND.
                                        ;*
                                        ; ERROR REPORTS:
                                        ;-
                                            ;REPORT MR BIT WOULD NOT CLEAR AFTER A DUT RESET.
026374  012767  000765  155362  4$:          MOV     #0501.,ERRNBR  ;SET THE ERROR NUMBER IN ERROR TABLE.
026402  012701  005665                       MOV     #EM0202,R1     ;SELECT ERROR MESSAGE.
026406                                      ERROR                  ;REPORT ERROR.          >>>>> ERROR #0501 <<<<<
026406  104460                                                                                      TRAP    C$ERROR
026410  000406                              BR      60$             ;EXIT THE TEST.

                                            ;REPORT ONE OR MORE RX ERROR FLAGS FOUND CLEAR WITH SELFTEST CODE.
026412  012767  000766  155344  6$:          MOV     #0502.,ERRNBR  ;SET THE ERROR NUMBER IN ERROR TABLE.
```

```
026420  012701  007255                  MOV     #EM0502,R1      ;SELECT ERROR MESSAGE.
026424                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0502 <<<<<
026424  104460                                                                                  TRAP    C$ERROR

026426                          60$:    SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
026426  012700  000340                                                                          MOV     #PRI07,R0
026432  104441                                                                                  TRAP    C$SPRI
026434  005067  153642                  CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
026440                                  ENDTST
026440                                                                          L10032:
026440  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.
                                        ;*
                                        ;-- ***********************************************************************
026442                                          BGNTST
026442                                                                                          T6::
026442                                          SETPRI  #PRIO5          ;ALLOW LTC INTERRUPTS.
026442  012700  000240                                                                          MOV     #PRIO5,R0
026446  104441                                                                                  TRAP    C$SPRI
        000006                                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
026450  012767  000006  153642                   MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (6)
026456  012767  177777  153616                   MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE WITHIN A TEST.
026464  012767  000001  155270                   MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
026472  012767  007611  155266                   MOV     #EM0601,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
026500  012767  015776  155262                   MOV     #ER0201,ERRBLK ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                        ;+
                                        ; SET THE DUT CSR MASTER RESET (MR) BIT, PERFORM THE SKIP SELFTEST SEQUENCE,
                                        ;  AND WAIT UP TO 5 SECONDS FOR THE MR BIT TO CLEAR.
                                        ;-
026506  012701  011610                           MOV     #5000.,R1      ;TIME-OUT VALUE IS 5.0 SECONDS.
026512  012702  000040                           MOV     #BIT05,R2      ;WAITING FOR MASTER RESET BIT.
026516  005003                                   CLR     R3             ;WAITING FOR BIT TO CLEAR.
026520  016704  153512                           MOV     CSRA,R4        ;BIT IS IN THE DUT'S CSR.
026524  010214                                   MOV     R2,(R4)        ;SET THE DUT MASTER RESET BIT.
026526  004767  173546                          JSR     PC,SKPSTS       ;SKIP THE SELFTEST.
026532  004767  171362                          JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
026536  103016                                  BCC     4$              ;GO REPORT ERROR IF MR DID NOT CLEAR.
                                        ;+
                                        ; CHECK THAT THE RX DATA AVAILABLE BIT IS SET.
                                        ;-
026540  032714  000200                           BIT     #BIT7,(R4)     ;TEST THE DUT RX.DATA.AVAIL BIT.
026544  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.
                                        ;-
026546  012705  001130                           MOV     #600.,R5       ;ALLOW READING 600 CHARS BEFORE ERROR.
026552  010403                                   MOV     R4,R3
026554  012300                                   MOV     (R3)+,R0       ;CALCULATE THE RBUF ADDRESS.
026556  011300                          2$:      MOV     (R3),R0        ;READ A CHARACTER FROM THE RX FIFO.
026560  032714  000200                           BIT     #BIT7,(R4)     ;TEST THE DUT RX.DATA.AVAIL BIT.
026564  001427                                  BEQ     60$             ;EXIT TEST WITHOUT ERROR IF RX.DATA.AVAIL CLR.
026566  005305                                   DEC     R5             ;COUNT THE CHARACTER JUST READ.
026570  001372                                  BNE     2$              ;LOOP IF NOT TOO MANY CHARS READ FROM FIFO.
026572  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.
026574  012767  001131  155162  4$:              MOV     #0601.,ERRNBR  ;SET THE ERROR NUMBER IN ERROR TABLE.
026602  012701  005665                           MOV     #EM0202,R1     ;SELECT ERROR MESSAGE.
026606                                          ERROR                  ;REPORT ERROR.          >>>>> ERROR #0601 <<<<<
026606  104460                                                                                  TRAP    C$ERROR
```

```
026610  000415                          BR      60$             ;EXIT THE TEST.

                                ;REPORT THAT RX.DATA.AVAIL BIT WAS NOT SET AFTER A RESET COMPLETION.
026612  012767  001132  155144  6$:      MOV     #0602.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
026620  012701  007653                   MOV     #EM0602,R1      ;SELECT ERROR MESSAGE.
026624                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0602 <<<<<
026624  104460                                                                                  TRAP    C$ERROR
026626  000406                          BR      60$             ;EXIT THE TEST.

                                ;REPORT THAT RX.DATA.AVAIL BIT COULD NOT BE CLEARED BY PURGING FIFO.
026630  012767  001133  155126  8$:      MOV     #0603.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
026636  012701  010033                   MOV     #EM0603,R1      ;SELECT ERROR MESSAGE.
026642                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0603 <<<<<
026642  104460                                                                                  TRAP    C$ERROR

026644                          60$:    SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
026644  012700  000340                                                                          MOV     #PRI07,R0
026650  104441                                                                                  TRAP    C$SPRI
026652  005067  153424                   CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
026656                                  ENDTST
026656                                                                                  L10033:
026656  104401                                                                                  TRAP    C$ETST
```

```
                                        .SBTTL  HARDWARE TEST           - RDVA -
                                        ;** ************************************************************************
                                        ;*                - RBUF RX DATA VALID BIT TEST -
                                        ;*      THIS TEST VERIFIES THAT THE DUT RBUF RX DATA VALID 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.
                                        ;*
                                        ;-- ************************************************************************
026660                                          BGNTST
026660                                                                                          T7::
026660                                          SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
026660  012700  000240                                                                          MOV     #PRI05,R0
026664  104441                                                                                  TRAP    C$SPRI
        000007                                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
026666  012767  000007  153424                   MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (7)
026674  012767  177777  153400                   MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE WITHIN A TEST.
026702  012767  000001  155052                   MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
026710  012767  010216  155050                   MOV     #EM0701,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
026716  012767  015776  155044                   MOV     #ER0201,ERRBLK ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                        ;+
                                        ; SET THE DUT CSR MASTER RESET (MR) BIT, PERFORM THE SKIP SELFTEST SEQUENCE,
                                        ;  AND WAIT UP TO 5 SECONDS FOR THE MR BIT TO CLEAR.
                                        ;-
026724  012701  011610                           MOV     #5000.,R1      ;TIME-OUT VALUE IS 5.0 SECONDS.
026730  012702  000040                           MOV     #BIT05,R2      ;WAITING FOR MASTER RESET BIT.
026734  005003                                   CLR     R3             ;WAITING FOR BIT TO CLEAR.
026736  016704  153274                           MOV     CSRA,R4        ;BIT IS IN THE DUT'S CSR.
026742  010214                                   MOV     R2,(R4)        ;SET THE DUT MASTER RESET BIT.
026744  004767  173330                          JSR     PC,SKPSTS       ;SKIP THE SELFTEST.
026750  004767  171144                          JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
026754  103012                                  BCC     4$              ;GO REPORT ERROR IF MR DID NOT CLEAR.
                                        ;+
                                        ; CHECK THAT THE RX DATA VALID BIT IS SET.
                                        ;-
026756  012400                                   MOV     (R4)+,R0       ;INCREMENT POINTER TO PNT TO DUT RBUF REG.
026760  005714                                   TST     (R4)           ;TEST THE DUT RX.DATA.VALID BIT.
026762  100016                                  BPL     6$              ;GO REPORT ERROR IF BIT IS NOT SET.
                                        ;+
                                        ; READ CHARACTERS FROM THE DUT RX FIFO AND WAIT FOR RX.DATA.VALID TO GO CLEAR.
                                        ;-
026764  012705  001130                           MOV     #600.,R5       ;ALLOW READING 600 CHARS BEFORE ERROR.
026770  011400                          2$:      MOV     (R4),R0        ;READ A CHARACTER FROM THE RX FIFO.
026772  100027                                  BPL     60$             ;EXIT TEST WITHOUT ERROR IF BIT IS CLEAR.
026774  005305                                   DEC     R5             ;COUNT THE CHARACTER JUST READ.
026776  001374                                  BNE     2$              ;LOOP IF NOT TOO MANY CHARS READ FROM FIFO.
027000  000416                                   BR     8$              ;GO REPORT ERROR IF RX.DATA.VALID WOULDN'T CLR.

                                        ;+
                                        ; ERROR REPORTS:
                                        ;-
                                            ;REPORT MR BIT WOULD NOT CLEAR AFTER A DUT RESET.
027002  012767  001275  154754          4$:      MOV     #0701.,ERRNBR  ;SET THE ERROR NUMBER IN ERROR TABLE.
027010  012701  005665                           MOV     #EM0202,R1     ;SELECT ERROR MESSAGE.
027014                                          ERROR                  ;REPORT ERROR.          >>>>> ERROR #0701 <<<<<
027014  104460                                                                                  TRAP    C$ERROR
027016  000415                                  BR      60$             ;EXIT THE TEST.
```

```
                                        ;REPORT THAT RX.DATA.VALID BIT WAS NOT SET AFTER A RESET COMPLETION.
027020  012767  001276  154736  6$:      MOV     #0702.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
027026  012701  010261                   MOV     #EM0702,R1      ;SELECT ERROR MESSAGE.
027032                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0702 <<<<<
027032  104460                                                                                  TRAP    C$ERROR
027034  000406                          BR      60$             ;EXIT THE TEST.

                                        ;REPORT THAT RX.DATA.VALID BIT COULD NOT BE CLEARED BY PURGING FIFO.
027036  012767  001277  154720  8$:      MOV     #0703.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
027044  012701  010441                   MOV     #EM0703,R1      ;SELECT ERROR MESSAGE.
027050                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0703 <<<<<
027050  104460                                                                                  TRAP    C$ERROR

027052                          60$:    SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
027052  012700  000340                                                                          MOV     #PRI07,R0
027056  104441                                                                                  TRAP    C$SPRI
027060  005067  153216                   CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
027064                                  ENDTST
027064                                                                          L10034:
027064  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.
                                        ;*
                                        ;-- ***********************************************************************
027066                                          BGNTST
027066                                                                                  T8::
027066                                          SETPRI  #PRIO5          ;ALLOW LTC INTERRUPTS.
027066  012700  000240                                                                          MOV     #PRIO5,R0
027072  104441                                                                                  TRAP    C$SPRI
        000010                                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
027074  012767  000010  153216                   MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (8)
027102  012767  177777  153172                   MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE WITHIN A TEST.
027110  012767  000001  154644                   MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
027116  012767  010624  154642                   MOV     #EM0801,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
                                        ;+
                                        ; SET THE DUT CSR MASTER RESET (MR) BIT, PERFORM THE SKIP SELFTEST SEQUENCE,
                                        ;  AND WAIT UP TO 5 SECONDS FOR THE MR BIT TO CLEAR.
                                        ;-
027124  012701  011610                           MOV     #5000.,R1      ;TIME-OUT VALUE IS 5.0 SECONDS.
027130  012702  000040                           MOV     #BIT05,R2      ;WAITING FOR MASTER RESET BIT.
027134  005003                                   CLR     R3             ;WAITING FOR BIT TO CLEAR.
027136  016704  153074                           MOV     CSRA,R4        ;BIT IS IN THE DUT'S CSR.
027142  010214                                   MOV     R2,(R4)        ;SET THE DUT MASTER RESET BIT.
027144  004767  173130                          JSR     PC,SKPSTS       ;SKIP THE SELFTEST.
027150  004767  170744                          JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
027154  103016                                  BCC     4$              ;GO REPORT ERROR IF MR DID NOT CLEAR.
                                        ;+
                                        ; READ CHARACTERS FROM THE DUT RX FIFO AND VERIFY THAT THE LINE NUMBERS ARE
                                        ;  CORRECT.
                                        ; EIGHT CHARACTERS ARE READ FROM THE FIFO.
                                        ;-
027156  005001                                   CLR     R1             ;CLEAR THE LINE COUNTER.
027160  012400                                   MOV     (R4)+,R0       ;INCREMENT POINTER TO PNT TO THE DUT RBUF REG.
027162  011402                          2$:      MOV     (R4),R2        ;READ A CHARACTER FROM THE DUT RX FIFO.
027164  010203                                   MOV     R2,R3
027166  000303                                   SWAB    R3
027170  042703  177760                           BIC     #177760,R3     ;REMOVE ALL BUT LINE NUMBER BITS.
027174  020301                                   CMP     R3,R1          ;COMPARE WITH EXPECTED LINE NUMBER.
027176  001017                                  BNE     6$              ;GO REPORT ERROR IF LINE NUMBERS DON'T MATCH.
027200  005201                                   INC     R1             ;INCREMENT THE EXPECTED LINE NUMBER.
027202  020127  000010                           CMP     R1,#8.         ;COMPARE NUMBER OF CODES READ WITH MAX.
027206  001365                                  BNE     2$              ;LOOP UNTIL CODES FOR ALL LINES ARE READ.
027210  000423                                   BR      60$            ;EXIT TEST WITHOUT ERROR.
                                        ;+
                                        ; ERROR REPORTS:
                                        ;-
                                            ;REPORT MR BIT WOULD NOT CLEAR AFTER A DUT RESET.
027212  012767  001441  154544  4$:              MOV     #0801.,ERRNBR  ;SET THE ERROR NUMBER IN ERROR TABLE.
027220  012767  016072  154542                   MOV     #ER0503,ERRBLK ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
027226  012701  005665                           MOV     #EM0202,R1     ;SELECT ERROR MESSAGE.
027232                                          ERROR                  ;REPORT ERROR.          >>>>> ERROR #0801 <<<<<
027232  104460                                                                                          TRAP    C$ERROR
```

```
027234  000411                          BR      60$             ;EXIT THE TEST.

                                ;REPORT THAT RX LINE NUMBER FIELD IS WRONG FOR SELFTEST CODE.
027236  012767  001442  154520  6$:      MOV     #0802.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
027244  012767  016072  154516          MOV     #ER0503,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
027252  012701  010672                  MOV     #EM0802,R1      ;SELECT ERROR MESSAGE.
027256                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #0802 <<<<<
027256  104460                                                                                  TRAP    C$ERROR

027260                          60$:    SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
027260  012700  000340                                                                          MOV     #PRI07,R0
027264  104441                                                                                  TRAP    C$SPRI
027266  005067  153010                  CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
027272                                  ENDTST
027272                                                                          L10035:
027272  104401                                                                                  TRAP    C$ETST
```

```
                                        .SBTTL  HARDWARE TEST           - BMPCHK -
                                        ;** ************************************************************************
                                        ;*                - BMP CHECK TEST -
                                        ;*      THIS TEST IS USED TO VERIFY THAT THE DUT DOES NOT IMMEDIATELY FAIL
                                        ;*      THE ON-BOARD BACKGROUND-MONITOR PROGRAM, AND HENCE INVALIDATE
                                        ;*      SUCCEEDING TESTS.
                                        ;*      THIS TEST LOOKS FOR BMP CODES IN THE FIFO FOR A SET PERIOD IMMEDIATELY
                                        ;*      AFTER THE SELF-TEST IS SKIPPED.
                                        ;*      ANY BMP CODES THAT ARE FOUND ARE SAVED ON THE QUEUE AND ARE ALSO
                                        ;*      REPORTED IN THIS TEST.
                                        ;*
                                        ;-- ************************************************************************
027274                                          BGNTST
027274                                                                                  T9::
027274                                          SETPRI  #PRIO5          ;ALLOW LTC INTERRUPTS.
027274  012700  000240                                                                          MOV     #PRIO5,R0
027300  104441                                                                                  TRAP    C$SPRI
        000011                                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
027302  012767  000011  153010                   MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (9)
027310  012767  177777  152764                   MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE WITHIN A TEST.
027316  012767  000001  154436                   MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
027324  012767  001605  154432                   MOV     #0901.,ERPNBR  ;SET THE ERROR NUMBER.
027332  012767  010742  154426                   MOV     #EM0901,ERRMSG ;SET THE ERROR MESSAGE
                                        ;+
                                        ; WAIT UP TO 3 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
                                        ;  IF TIME-OUT OCCURS, THEN EXIT THIS TEST.
                                        ;-
027340  012701  005670                           MOV     #3000.,R1      ;TIME-OUT VALUE IS 3.0 SECONDS.
027344  012702  000040                           MOV     #BIT05,R2      ;WAITING FOR MASTER RESET BIT.
027350  005003                                   CLR     R3             ;WAITING FOR BIT TO CLEAR.
027352  016704  152660                           MOV     CSRA,R4        ;BIT IS IN THE DUT'S CSR.
027356  004767  170536                          JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
027362  103027                                   BCC     50$            ;ABORT THE TEST IF MR DID NOT CLEAR.
                                        ;+
                                        ; RESET THE DUT, SKIP THE SELF-TEST.
                                        ;-
027364  010214                                   MOV     R2,(R4)        ;SET THE DUT MASTER RESET BIT.
027366  004767  172706                          JSR     PC,SKPST        ;WRITE THE SKIP SELFTEST CODES TO THE DUT.
                                        ;+
                                        ; WAIT FOR MASTER RESET  O CLEAR. DELAY FOR 500 MILLI-SECS BEFORE PURGING
                                        ; THE FIFO.
                                        ;-
027372  012704  000764                           MOV     #500.,R4       ;TIME-OUT VALUE IS 500 MILLI-SECONDS.
027376  004767  170456                          JSR     PC,DELAY        ;WAIT FOR BMP TO BEGIN EXECUTION.
027402  004767  171070                          JSR     PC,PUFIFO       ;PURGE THE FIFO, SAVING ANY BMP CODES.
027406  103015                                   BCC     50$            ;ABORT THE TEST IF THE FIFO DID NOT CLEAR.
                                        ;+
                                        ; REPORT THE ERROR IF ANY BMP CODES WERE FOUND.
                                        ;-
027410  016702  153104                           MOV     BMPCQP,R2      ;GET THE CONTENTS OF THE POINTER TO THE BMP Q.
027414  012703  002522                           MOV     #BMPCQB,R3     ;GET THE START ADDRESS OF THE QUEUE.
027420  020203                                   CMP     R2,R3          ;SEE IF THE POINTER HAS MOVED FROM THE BASE.
027422  001414                                  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"
```

```
 5506 027424  012701  011002                    MOV     #EM0902,R1       ;PASS THE MESSAGE TO BE REPORTED.
 5507 027430                                   ERRDF   0901,EM0901,ER9301 ;              >>>>> ERROR #0901 <<<<<.
      027430  104455                                                                                   TRAP    C$ERDF
      027432  001605                                                                                   .WORD   901
      027434  010742                                                                                   .WORD   EM0901
      027436  017216                                                                                   .WORD   ER9301
 5508 027440  000405                            BR      60$
 5509
 5510 027442  012767  001606  154314  50$:      MOV     #902.,ERRNBR     ;SET >>>>> ERROR #0902 <<<<<.
 5511 027450  004767  172752                    JSR     PC,TSABRT        ;REPORT NON-TEST RELATED ERROR.
 5512
 5513 027454                          60$:     SETPRI  #PRI07           ;DISABLE ALL INTERRUPTS.
      027454  012700  000340                                                                           MOV     #PRI07,R0
      027460  104441                                                                                   TRAP    C$SPRI
 5514 027462  005067  152614                    CLR     CTRLCF           ;INDICATE THAT WE COMPLETED THE TEST.
 5515 027466                                   ENDTST
      027466                                                                          L10036:
      027466  104401                                                                                   TRAP    C$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.
                                        ;*
                                        ;-- ***********************************************************************
027470                                          BGNTST
027470                                                                                          T10::
027470                                          SETPRI  #PRIO5          ;ALLOW LTC INTERRUPTS.
027470  012700  000240                                                                          MOV     #PRIO5,R0
027474  104441                                                                                  TRAP    C$SPRI
        000012                                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
027476  012767  000012  152614                   MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (10)
027504  012767  177777  152570                   MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE WITHIN A TEST.
027512  012767  000001  154242                   MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
027520  012767  011036  154240                   MOV     #EM1001,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
027526  012767  016072  154234                   MOV     #ER0503,ERRBLK ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                        ;+
                                        ; WAIT UP TO 5 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
                                        ;  IF TIME-OUT OCCURS, THEN EXIT THIS TEST.
                                        ;-
027534  012701  011610                           MOV     #5000.,R1      ;TIME-OUT VALUE IS 5.0 SECONDS.
027540  012702  000040                           MOV     #BIT05,R2      ;WAITING FOR MASTER RESET BIT.
027544  005003                                   CLR     R3             ;WAITING FOR BIT TO CLEAR.
027546  016704  152464                           MOV     CSRA,R4        ;BIT IS IN THE DUT'S CSR.
027552  004767  170342                          JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
027556  103037                                   BCC     50$            ;ABORT THE TEST IF MR DID NOT CLEAR.
                                        ;+
                                        ; DETERMINE IF THE DUT TAKES TOO SHORT OR TOO LONG A TIME TO SKIP T'  SELF-TEST
                                        ;  SET-UP A TIME-OUT OF 50 MILLI-SECOND, IF MR IS CLEAR IN LESS THA.. 10 MILLI
                                        ;   -SECOND, OR GREATER THAN 50 MILLI-SECONDS, REPORT THE ERROR.
                                        ;-
027560  012701  000062                           MOV     #50.,R1        ;TIME-OUT VALUE IS 50 MILLI-SECONDS.
027564  010214                                   MOV     R2,(R4)        ;SET THE DUT MASTER RESET BIT.
027566  004767  172506                          JSR     PC,SKPSTS       ;WRITE THE SKIP SELFTEST CODES TO THE DUT.
027572  004767  170322                          JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
027576  103011                                  BCC     2$              ;GO REPORT ERR IF SKIPPING STEST TOOK TOO LONG.
027600  020127  000050                           CMP     R1,#40.
027604  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 <<<<<.
                                        ;-
027606  012767  001753  154150                   MOV     #1003.,ERRNBR  ;SET ERROR NUMBER TO 1003.
027614  004767  171630                          JSR     PC,RSTRPT       ;CHECK SELF-TEST CODES IN THE FI^O.
027620  000423                                  BR      60$             ;EXIT TEST.
                                        ;+
                                        ; ERROR REPORTS:
                                        ;-
                                           ;REPORT SKIP SELF-TEST TOOK TOO LONG.
027622  012767  001751  154134  2$:              MOV     #1001.,ERRNBR  ;SET THE ERROR NUMBER IN THE ERROR TABLE.
```

```
027630  012701  011071                    MOV     #EM1002,R1      ;SELECT ERROR MESSAGE.
027634                                    ERROR                   ;REPORT ERROR.          >>>>> ERROR #1001 <<<<<
027634  104460                                                                                    TRAP    C$ERROR
027636  000414                            BR      60$             ;EXIT THE TEST.

                                        ;REPORT SKIP SELF-TEST COMPLETED TOO SOON.
027640  012767  001752  154116  4$:       MOV     #1002.,ERRNBR   ;SET THE ERROR NUMBER IN THE ERROR TABLE.
027646  012701  011156                    MOV     #EM1003,R1      ;SELECT ERROR MESSAGE.
027652                                    ERROR                   ;REPORT ERROR.          >>>>> ERROR #1002 <<<<<
027652  104460                                                                                    TRAP    C$ERROR
027654  000405                            BR      60$             ;EXIT THE TEST.

027656  012767  001753  154100  50$:      MOV     #1003.,ERRNBR   ;SET ERROR NUMBER.
027664  004767  172536                    JSR     PC,TSABRT       ;REPORT NON-TEST RELATED ERROR.

027670                          60$:      SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
027670  012700  000340                                                                            MOV     #PRI07,R0
027674  104441                                                                                    TRAP    C$SPRI
027676  005067  152400                    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
027702                                    ENDTST
027702                                                                          L10037:
027702  104401                                                                                    TRAP    C$ETST
```

```
                                        .SBTTL  HARDWARE TEST           - DFSKST -
                                        ;** ***********************************************************************
                                        ;*              - DIAGNOSTIC FAIL BIT, SKIP SELF-TEST TEST -
                                        ;*      THIS TEST VERIFIES THAT THE DIAGNOSTIC FAIL BIT OF THE DUT, CORRECTLY
                                        ;*      CHANGES STATE AS THE ON-BOARED SELFTEST IS SKIPPED.
                                        ;*
                                        ;-- ***********************************************************************
027704                                          BGNTST
027704                                                                                          T11::
027704                                          SETPRI  #PRI05          ;ALLOW LTC INTERRUPTS.
027704  012700  000240                                                                          MOV     #PRI05,R0
027710  104441                                                                                  TRAP    C$SPRI
        000013                                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
027712  012767  000013  152400                   MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (11)
027720  012767  177777  152354                   MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE WITHIN A TEST.
027726  012767  000001  154026                   MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
027734  012767  011234  154024                   MOV     #EM1101,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
027742  012767  016072  154020                   MOV     #ER0503,ERRBLK ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                        ;+
                                        ; WAIT UP TO 5 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
                                        ;  IF TIME-OUT OCCURS, THEN EXIT THIS TEST.
                                        ;-
027750  012701  011610                           MOV     #5000.,R1      ;TIME-OUT VALUE IS 5.0 SECONDS.
027754  012702  000040                           MOV     #BIT05,R2      ;WAITING FOR MASTER RESET BIT.
027760  005003                                   CLR     R3             ;WAITING FOR BIT TO CLEAR.
027762  016704  152250                           MOV     CSRA,R4        ;BIT IS IN THE DUT'S CSR.
027766  004767  170126                           JSR     PC,MSLGET      ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
027772  103044                                   BCC     50$            ;ABORT THE TEST IF MR DID NOT CLEAR.
                                        ;+
                                        ; RESET THE DUT, SKIP THE SELF-TEST.
                                        ;-
027774  010214                                   MOV     R2,(R4)        ;SET THE DUT MASTER RESET BIT.
027776  004767  172276                           JSR     PC,SKPSTS      ;WRITE THE SKIP SELFTEST CODES TO THE DUT.
                                        ;+
                                        ; SET TIME OUT OF 5 MILLI SECONDS, WAIT FOR DIAG_FAIL BIT TO SET.
                                        ;  IF TIME-OUT OCCURS GO REPORT THE ERROR.
                                        ;-
030002  012701  000005                           MOV     #5,R1          ;TIME-OUT VALUE IS 5 MILLI-SECONDS.
030006  012702  020000                           MOV     #BIT13,R2      ;WAITING FOR DIAGNOSTIC FAIL BIT.
030012  010203                                   MOV     R2,R3          ;WAITING FOR BIT TO SET.
030014  016704  152216                           MOV     CSRA,R4        ;BIT IS IN THE DUT'S CSR.
030020  004767  170074                           JSR     PC,MSLGET      ;WAIT FOR DUT_CSR_DF BIT TO CLEAR.
030024  103020                                   BCC     4$             ;IF DIAG_FAIL DID NOT SET, GO REPORT ERROR.

                                        ;+
                                        ; SET TIME-OUT OF 15 MILLI-SECS, WAIT FOR DIAG_FAIL TO CLEAR.
                                        ;  IF TIME-OUT OCCURS GO REPORT THE ERROR.
                                        ;  VERIFY THE DIAG_FAIL BIT IS IN A STABLE STATE BEFORE CONTINUING.  LOOP
                                        ;  BACK IF THE STATE WAS TRANSITORY, USING THE REMAINDER OF THE 15 MS TIME-OUT.
                                        ;-
030026  012701  000017                           MOV     #15.,R1        ;TIME-OUT VALUE IS 15 MILLI-SECONDS.
030032  005003                          2$:      CLR     R3             ;WAITING FOR BIT TO CLEAR.
030034  004767  170060                           JSR     PC,MSLGET      ;WAIT FOR DUT_CSR_DF BIT TO CLEAR.
030040  103012                                   BCC     4$             ;IF DIAG_FAIL DID NOT CLEAR, GO REPORT ERROR.
030042  010105                                   MOV     R1,R5          ;SAVE THE REMAINING TIME-OUT VALUE.
```

```
030044  012701  000001                  MOV     #1,R1           ;SET TIME-OUT OF 1 MILLI-SECOND.
030050  052703  020000                  BIS     #BIT13,R3       ;WAIT FOR BIT TO SET.
030054  004767  170040                  JSR     PC,MSLGET       ;DOUBLE CHECK TO ELIMINATE NOISE PROBLEMS.
030060  103016                          BCC     60$             ;EXIT IF DIAG_FAIL BIT STILL CLEAR.
030062  010501                          MOV     R5,R1           ;PASS THE REMAINING TIME-OUT VALUE.
030064  000762                          BR      2$              ;LOOP TO CHECK AGAIN.
                                ;+
                                ; ERROR REPORTS:
                                ;-
                                    ;REPORT DIAGNOSTIC FAIL BIT BAD.
030066  012767  002115  153670  4$:     MOV     #1101.,ERRNBR   ;SET THE ERROR NUMBER IN THE ERROR TABLE.
030074  012701  011533                  MOV     #EM1205,R1      ;SELECT ERROR MESSAGE.
030100                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR #1101 <<<<<
030100  104460                                                                                  TRAP    C$ERROR
030102  000405                          BR      60$             ;EXIT THE TEST.

030104  012767  002116  153652  50$:    MOV     #1102.,ERRNBR   ;SET THE ERROR NUMBER FOR TSABRT RTN.
030112  004767  172310                  JSR     PC,TSABRT       ;REPORT NON-TEST RELATED ERROR.

030116                          60$:    SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
030116  012700  000340                                                                          MOV     #PRI07,R0
030122  104441                                                                                  TRAP    C$SPRI
030124  005067  152152                  CLR     CTRLCF          ;INDICATE THAT WE COMPLETED A TEST.
030130                                  ENDTST
030130                                                                                  L10040:
030130  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.
                                        ;*
                                        ;-- ************************************************************************
 030132                                         BGNTST
 030132                                                                                         T12::
 030132                                         SETPRI  #PRIO5          ;ALLOW LTC INTERRUPTS.
 030132  012700  000240                                                                         MOV     #PRIO5,R0
 030136  104441                                                                                 TRAP    C$SPRI
         000014                                  TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 030140  012767  000014  152152                  MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (12)
 030146  012767  177777  152126                  MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
 030154  012767  000001  153600                  MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
 030162  012767  011307  153576                  MOV     #EM1201,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
 030170  012767  016072  153572                  MOV     #ER0503,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                        ;+
                                        ; WAIT UP TO 5 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
                                        ;  IF TIME-OUT OCCURS, THEN EXIT THIS TEST.
                                        ;-
 030176  012701  011610                          MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
 030202  012702  000040                          MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
 030206  005003                                  CLR     R3              ;WAITING FOR BIT TO CLEAR.
 030210  016704  152022                          MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
 030214  004767  167700                         JSR     PC,MSLGET        ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
 030220  103067                                  BCC     50$             ;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 5 SECOND, IF MR IS CLEAR IN LESS THAN 1/2 SECOND, OR
                                        ;  GREATER THAN 5 SECONDS, REPORT THE ERROR.
                                        ;-
 030222  012701  011610                          MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
 030226  010214                                  MOV     R2,(R4)         ;SET THE DUT MASTER RESET BIT.
 030230  004767  167664                         JSR     PC,MSLGET        ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
 030234  103034                                 BCC     4$               ;GO REPORT ERROR SELFTEST TOOK TOO LONG.
 030236  012702  011610                          MOV     #5000.,R2
 030242  160102                                  SUB     R1,R2           ;CALCULATE # OF MS SELFTEST TO COMPLETE.
 030244  020227  000062                          CMP     R2,#50.
 030250  002435                                 BLT     6$               ;SELFTEST SKIPPED?  YES, GO REPORT ERROR.
 030252  020227  000764                          CMP     R2,#500.
 030256  002441                                 BLT     8$               ;GO REP ERR IF SELFTEST COMPLETED IN < 1/2 SEC.
                                        ;+
                                        ; SELF-TEST COMPLETED WITHIN 1SEC TO 5 SECONDS.
                                        ;  CHECK THE STATE OF THE DIAGNOSTIC FAIL BIT, REPORT ERROR IF IT IS SET.
                                        ;-
 030260  032714  020000                          BIT     #BIT13,(R4)     ;DETERMINE IF THE DIAG_FAIL BIT IS CLEAR.
 030264  001412                                 BEQ     2$               ;SKIP ERROR REPORT IF BIT IS CLEAR.
                                            ;REPORT DIAGNOSTIC FAIL BIT BAD.
 030266  012767  002264  153470                  MOV     #1204.,ERRNBR   ;SET ERROR NUMBER TO IN ERROR TABLE.
 030274  012701  011533                          MOV     #EM1205,R1      ;SELECT THE ERROR MESSAGE.
 030300                                         ERROR                    ;                >>>>> ERROR #1204 <<<<<
 030300  104460                                                                                         TRAP    C$ERROR
                                            ;+
                                            ; EXIT THE TEST IF EXTENDED ERROR REPORTING HAS NOT BEEN ENABLED
```

```
                                        ;-
030302  032767  000100  151710              BIT     #BIT06,OPTION   ;EXIT WITH TEST FAILURE MESSAGE IF
030310  001440                             BEQ     60$             ;NO EXTENDED ERROR REPORTING HAS BEEN REQUESTED
                                                                   ;DURING THE SOFTWARE QUESTIONS.
                                ;+
                                ; VERIFY THAT THE SELF-TEST CODES IN THE FIFO ARE "GOOD" CODES ,IE THE DUT
                                ; SUCCESSFULLY COMPLETED THE SELF-TEST.
                                ; THIS SUBROUTINE REPORTS ERRORS WITH NUMBERS >>>>> 1205 THRU 1209 <<<<<.
                                ;-
030312  012767  002265  153444  2$:         MOV     #1205.,ERRNBR   ;SET ERROR NUMBER TO 1205.
030320  004767  171124                     JSR     PC,RSTRPT       ;CHECK SELF-TEST CODES IN THE FIFO.
030324  000432                             BR      60$             ;EXIT TEST.
                                ;+
                                ; ERROR REPORTS:
                                ;-
                                        ;REPORT SELF-TEST TOOK TOO LONG TO COMPLETE.
030326  012767  002261  153430  4$:         MOV     #1201.,ERRNBR   ;SET THE ERROR NUMBER IN THE ERROR TABLE.
030334  012701  011335                     MOV     #EM1202,R1      ;SELECT ERROR MESSAGE.
030340                                     ERROR                   ;REPORT ERROR.          >>>>> ERROR #1201 <<<<<
030340  104460                                                                                     TRAP    C$ERROR
030342  000423                             BR      60$             ;EXIT THE TEST.

                                        ;REPORT SELF-TEST DID NOT EXECUTE AFTER DUT RESET.
030344  012767  002262  153412  6$:         MOV     #1202.,ERRNBR   ;SET THE ERROR NUMBER IN ERROR TABLE.
030352  012701  011477                     MOV     #EM1204,R1      ;SELECT ERROR MESSAGE.
030356                                     ERROR                   ;REPORT ERROR.          >>>>> ERROR #1202 <<<<<
030356  104460                                                                                     TRAP    C$ERROR
030360  000414                             BR      60$             ;EXIT THE TEST.

                                        ;REPORT SELF-TEST COMPETED TOO SOON.
030362  012767  002263  153374  8$:         MOV     #1203.,ERRNBR   ;SET THE ERROR NUMBER IN THE ERROR TABLE.
030370  012701  011421                     MOV     #EM1203,R1      ;SELECT ERROR MESSAGE.
030374                                     ERROR                   ;REPORT ERROR.          >>>>> ERROR #1203 <<<<<
030374  104460                                                                                     TRAP    C$ERROR
030376  000405                             BR      60$             ;EXIT THE TEST.

030400  012767  002272  153356  50$:        MOV     #1210.,ERRNBR   ;SET THE ERROR NUMBER FOR TSABRT RTN.
030406  004767  172014                     JSR     PC,TSABRT       ;REPORT NON-TEST RELATED ERROR.

030412                          60$:       SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
030412  012700  000340                                                                             MOV     #PRI07,R0
030416  104441                                                                                     TRAP    C$SPRI
030420  005067  151656                     CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
030424                                     ENDTST
030424                                                                                     L10041:
030424  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.
                                        ;*
                                        ;-- ***********************************************************************
 030426                                         BGNTST
 030426                                                                                         T13::
 030426                                         SETPRI  #PRIO5          ;ALLOW LTC INTERRUPTS.
 030426  012700  000240                                                                         MOV     #PRIO5,R0
 030432  104441                                                                                 TRAP    C$SPRI
         000015                                  TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 030434  012767  000015  151656                  MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (13)
 030442  012767  177777  151632                  MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
 030450  012767  000001  153304                  MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
 030456  012767  011557  153302                  MOV     #EM1301,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
 030464  012767  016072  153276                  MOV     #ER0503,ERRBLK  ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
 030472  012767  002425  153264                  MOV     #1301.,ERRNBR   ;SET ERROR NUMBER TO 1301.
                                        ;+
                                        ; WAIT UP TO 5 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
                                        ;  IF TIME-OUT OCCURS, THEN EXIT THIS TEST.
                                        ;-
 030500  012701  011610                          MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
 030504  012702  000040                          MOV     #BIT05,R2       ;WAITING FOR MASTER RESET BIT.
 030510  005003                                  CLR     R3              ;WAITING FOR BIT TO CLEAR.
 030512  016704  151520                          MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
 030516  004767  167376                         JSR     PC,MSLGET        ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
 030522  103064                                  BCC     50$             ;GO REPORT ERROR IF MR DID NOT CLEAR.

                                        ;+
                                        ; RESET THE DUT, DELAY FOR 25 MILLI-SECONDS BEFORE WRITING THE FAIL_SELF_TEST
                                        ; CODE TO TBUFFCT REGISTER ON CHANNEL 0.
                                        ;-
 030524  012777  000040  151504                  MOV     #BIT05,@CSRA    ;SET DUT MASTER RESET BIT, SELECT CHANNEL 0.
 030532  012704  000031                          MOV     #25.,R4         ;PASS DELAY PERIOD OF 25 MILLI SECS.
 030536  004767  167316                         JSR     PC,DELAY         ;WAIT FOR SELFTEST TO INITIALISE.
 030542  012777  146314  151504                  MOV     #146314,@TXBFCA ;WRITE THE FAIL SELF-TEST CODE TO TBUFFCT REG.
                                        ;+
                                        ; WAIT UP TO 5 SECONDS FOR THE SELF-TEST TO COMPLETE.
                                        ;  IF TIME-OUT OCCURS, THEN EXIT THIS TEST.
                                        ;-
 030550  005267  153210                          INC     ERRNBR          ;SET ERROR NUMBER TO 1302.
 030554  012701  011610                          MOV     #5000.,R1       ;TIME-OUT VALUE IS 5.0 SECONDS.
 030560  012702  000040                          MOV     #BIT05,R2       ;PASS THE BIT MAP OF THE BIT TO TEST.
 030564  005003                                  CLR     R3              ;SET UP THE EXPECTED STATE.
 030566  016704  151444                          MOV     CSRA,R4         ;BIT IS IN THE DUT'S CSR.
 030572  004767  167322                         JSR     PC,MSLGET        ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
 030576  103036                                  BCC     50$             ;GO REPORT ERROR IF MR DID NOT CLEAR.
                                        ;+
                                        ; VERIFY THE DIAGNOSTIC FAIL BIT IS SET, INDICATING THE ERROR.
                                        ; REPORT ERROR IF DIAGNOSTIC FAIL BIT IS CLEAR.
                                        ;-
 030600  005267  153160                          INC     ERRNBR          ;SET ERROR NUMBER TO 1303.
```

```
030604  032714  020000                  BIT     #BIT13,(R4)     ;CHECK THE STATE OF THE DIAG_FAIL BIT.
030610  001425                          BEQ     10$             ;GO REPORT ERROR IF DIAG_FAIL BIT CLEAR.
                                ;+
                                ; REMOVE THE 8 SELF-TEST CODES FORM THE FIFO, AND VERIFY THAT AT LEAST
                                ; ONE IS A PROC1 TO RAM ERROR CODE (231).
                                ;-
030612  005267  153146                  INC     ERRNBR          ;SET ERROR NUMBER TO 1304.
030616  012700  000010                  MOV     #8.,R0          ;SET MAXIMUM READ COUNT.
030622  005001                          CLR     R1              ;CLEAR THE CORRECT CODE COUNTER.
030624  016704  151410                  MOV     RBUFA,R4        ;GET ADDRESS OF THE RECEIVER BUFFER REGISTER.
030630  011402                  6$:     MOV     (R4),R2         ;READ A CODE FROM THE FIFO.
030632  100020                          BPL     50$             ;GO REPORT ERROR IF THE FIFO IS EMPTY.
030634  042702  007400                  BIC     #7400,R2        ;REMOVE THE LINE NUMBER FROM THE CODE.
030640  120227  170231                  CMPB    R2,#170231      ;IS IT THE CORRECT ERROR CODE?.
030644  001001                          BNE     8$              ;SKIP NEXT INSTRUCTION, IF NOT A 231 CODE.
030646  005201                          INC     R1              ;INCREMENT COUNTER.
030650  005300                  8$:     DEC     R0              ;DECREMENT MAX READ COUNTER.
030652  001366                          BNE     6$              ;LOOP IF 8 CODES HAVE NOT BEEN READ.
030654  005701                          TST     R1              ;WERE ANY 231 CODES FOUND?.
030656  001010                          BNE     60$             ;YES, THEN EXIT.
030660  005267  153100                  INC     ERRNBR          ;NO, SET ERROR NUMBER TO 1305 AND REPORT ERROR.
                                ;REPORT SELF-TEST ERROR REPORTING BAD.
030664  012701  011612          10$:    MOV     #EM1302,R1      ;SELECT ERROR MESSAGE.
030670                                  ERROR                   ;REPORT ERROR.          >>>>> ERROR <<<<<
030670  104460                                                                                  TRAP    C$ERROR
030672  000402                          BR      60$             ;EXIT THE TEST.

030674  004767  171526          50$:    JSR     PC,TSABRT       ;REPORT NON-RELATED TEST ERROR.

030700                          60$:    SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
030700  012700  000340                                                                          MOV     #PRI07,R0
030704  104441                                                                                  TRAP    C$SPRI
030706  005067  151370                  CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
030712                                  ENDTST
030712                                                                          L10042:
030712  104401                                                                                  TRAP    C$ETST
```

```
                                        .SBTTL  HARDWARE TEST           - ROMVER -
                                        ;** ***********************************************************************
                                        ;*              - ROM VERSION TEST -
                                        ;*      THIS TEST VERIFIES THAT THE DUT'S SELF-TEST PLACES VALID ROM VERSION
                                        ;*      NUMBERS IN THE FIFO AFTER IT HAS BEEN SKIPPED.  THE ROM VERSION NUMBERS
                                        ;*      WILL BE REPORTED (ON THE FIRST PASS ONLY), IF AN AFFIRMATIVE ANSWER
                                        ;*      WAS GIVEN TO THE SOFTWARE P-TABLE QUESTION.
                                        ;*
                                        ;-- ***********************************************************************
030714                                          BGNTST
030714                                                                                  T14::
030714                                          SETPRI  #PRIO5          ;ALLOW LTC INTERRUPTS.
030714  012700  000240                                                                          MOV     #PRIO5,R0
030720  104441                                                                                  TRAP    C$SPRI
        000016                                   TNUM -- TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
030722  012767  000016  151370                   MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (14)
030730  012767  177777  151344                   MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE WITHIN A TEST.
030736  012767  000001  153016                   MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
030744  012767  011651  153014                   MOV     #EM1401,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERROR TABLE.
030752  012767  016072  153010                   MOV     #ER0503,ERRBLK ;SET ERROR ROUTINE ADDRESS IN ERROR TABLE.
                                        ;+
                                        ; WAIT UP TO 3 SECONDS FOR THE DUT MASTER RESET BIT TO CLEAR.
                                        ;  IF TIME-OUT OCCURS, THEN EXIT THIS TEST.
                                        ;-
030760  012701  005670                           MOV     #3000.,R1      ;TIME-OUT VALUE IS 3.0 SECONDS.
030764  012702  000040                           MOV     #BIT05,R2      ;WAITING FOR MASTER RESET BIT.
030770  005003                                   CLR     R3             ;WAITING FOR BIT TO CLEAR.
030772  016704  151240                           MOV     CSRA,R4        ;BIT IS IN THE DUT'S CSR.
030776  004767  167116                          JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
031002  103131                                   BCC     50$            ;ABORT THE TEST IF MR DID NOT CLEAR.
                                        ;+
                                        ; SET THE MASTER RESET BIT, AND SKIP THE SELF TEST.
                                        ;-
031004  010214                                   MOV     R2,(R4)        ;SET THE MASTER RESET BIT.
031006  004767  171266                          JSR     PC,SKPSTS       ;SKIP THE SELF TEST.
031012  012701  011610                           MOV     #5000.,R1      ;TIME-OUT VALUE IS 5.0 SECONDS.
031016  004767  167076                          JSR     PC,MSLGET       ;WAIT FOR DUT_CSR_MR BIT TO CLEAR.
031022  103121                                   BCC     50$            ;ABORT THE TEST IF MR DID NOT CLEAR.
                                        ;+
                                        ; REMOVE CHARACTERS FROM THE FIFO UNTIL EITHER;
                                        ; (A) THE FIFO IS PURGED, GO REPORT THE ERROR.
                                        ; (B) THE MAXIMUM TRY COUNTER IS ZERO, GO REPORT THE ERROR.
                                        ; (C) PROC_1'S ROM VERSION NUMBER WAS FOUND BEFORE PROC_2'S, GO REPORT ERROR.
                                        ; (D) BOTH ROM VERSION NUMBERS HAVE BEEN FOUND.
                                        ;-
031024  012705  000040                           MOV     #32.,R5        ;SET MAXIMUM TRY COUNTER.
031030  012703  000143                           MOV     #99.,R3        ;SET AN INVALID ROM VERSION NUMBER FOR PROC_1.
031034  010304                                   MOV     R3,R4          ;SET AN INVALID ROM VERSION NUMBER FOR PROC_2.
031036  012767  002571  152720                   MOV     #1401.,ERRNBR  ;SET THE ERROR NUMBER TO 1401.
031044  012701  011710                           MOV     #EM1402,R1     ;SELECT MESSAGE TO BE REPORTED IF FIFO EMPTY.
                                        2$:      MOV     @RBUFA,R2      ;READ THE NEXT CHAR FROM THE FIFO.
031050  017702  151164                          BPL     12$             ;GO REPORT ERROR IF FIFO EMPTY.
031054  100077                                  ;+
                                                ; CHECK IF THE READ DATA IS A BMP CODE.
```

```
                                        ;
031056  012700  000301                          MOV     #301,R0         ;SET-UP A BIT MASK OF A BMP CODE.
031062  040200                                  BIC     R2,R0           ;TRY TO CLEAR THE BIT MASK WITH THE READ DATA.
031064  001003                                  BNE     4$              ;BRANCH IF NOT A BMP CODE.
031066  004767  171140                          JSR     PC,SAVBMP       ;SAVE THE BMP CODE ON THE QUEUE.
031072  000435                                  BR      8$              ;
                                        ;+
                                        ; CHECK IF THE READ DATA IS A SELF-TEST CODE.
                                        ;-
031074  012700  000201                  4$:     MOV     #201,R0         ;SET-UP A BIT MASK OF A SELFTEST CODE.
031100  040200                                  BIC     R2,R0           ;TRY TO CLEAR THE BIT MASK WITH THE READ DATA.
031102  001431                                  BEQ     8$              ;BRANCH IF IT IS A SELFTEST CODE.
                                        ;+
                                        ; THE READ DATA IS A ROM VERSION NUMBER, DETERMINE WHICH ONE IT IS.
                                        ;-
031104  032702  000002                          BIT     #BIT1,R2        ;CHECK THE PROCESSOR NUMBER BIT IN THE CODE.
031110  001407                                  BEQ     6$              ;BRANCH IF IT IS PROC_1 ROM VERSION NUMBER.
031112  010204                                  MOV     R2,R4           ;SAVE PROC_2 ROM VERSION NUMBER.
031114  042704  177603                          BIC     #177603,R4      ;CLEAR ANY UNWANTED BITS.
031120  000241                                  CLC                     ;CLEAR THE CARRY BIT.
031122  006004                                  ROR     R4              ;SHIFT THE CODES ALONG TO GET THE ROM
031124  006004                                  ROR     R4              ; VERSION NUMBER IN THE LOW 5 BITS.
031126  000417                                  BR      8$              ;
031130  010203                          6$:     MOV     R2,R3           ;SAVE PROC_1 ROM VERSION NUMBER.
031132  042703  177603                          BIC     #177603,R3      ;CLEAR ANY UNWANTED BITS.
031136  000241                                  CLC                     ;CLEAR THE CARRY BIT.
031140  006003                                  ROR     R3              ;SHIFT THE CODE ALONG TO GET THE ROM
031142  006003                                  ROR     R3              ; VERSION NUMBER IN THE LOW 5 BITS.
031144  020427  000143                          CMP     R4,#99.         ;CHECK IF WE HAVE RECEIVE PROC_2 ROM CODE.
031150  001016                                  BNE     10$             ;GO REPORT BOTH ROM VERSION NUMBERS.
                                        ;+
                                        ; RECEIVED ROM VERSION NUMBERS OUT OF SEQUENCE.
                                        ;  IE, PROC_1'S ROM VERSION NUMBER FOUND IN THE FIFO BEFORE PROC_2'S.
                                        ;-
031152  012701  011776                          MOV     #EM1403,R1      ;SELECT THE ERROR MESSAGE TO BE REPORTED.
031156  012767  002572  152600                  MOV     #1402.,ERRNBR   ;SET THE ERROR NUMBER.
031164  000433                                  BR      12$             ;GO REPORT ERROR.

031166  005305                          8$:     DEC     R5              ;DECREMENT THE MAX TRY COUNTER.
031170  001327                                  BNE     2$              ;LOOP TO GET THE NEXT CHAR FROM THE FIFO.
031172  012701  012051                          MOV     #EM1404,R1      ;SELECT THE ERROR MESSAGE TO BE REPORTED.
031176  012767  002573  152560                  MOV     #1403.,ERRNBR   ;SET THE ERROR NUMBER.
031204  000423                                  BR      12$             ;GIVE UP, GO REPORT ERROR.
                                        ;+
                                        ; IF THIS IS THE FIRST PASS, AND SOFTWARE P-TABLE QUESTION WAS ANSWERED YES,
                                        ; THEN REPORT THE ROM VERSION NUMBERS TO THE OPERATOR.
                                        ;-
031206  032767  000001  151004          10$:    BIT     #BIT0,OPTION    ;CHECK ON THE STATE OF THE SOFTWARE SWITCH.
031214  001431                                  BEQ     60$             ;EXIT IF NO ROM VERSION PRINTOUT WAS REQUESTED.
031216  026727  151064  000001                  CMP     PASCNT,#1       ;CHECK IF THIS IS THE FIRST PASS.
031224  003025                                  BGT     60$             ;EXIT IF ROM VERS HAVE ALREADY BEEN REPORTED.
031226                                          PRINTB #EF1401,R3,R4    ;PRINT THE ROM VERSION NUMBERS.
031226  010446                                                                          MOV     R4,-(SP)
031230  010346                                                                          MOV     R3,-(SP)
031232  012746  004201                                                                  MOV     #EF1401,-(SP)
031236  012746  000003                                                                  MOV     #3,-(SP)
```

```
        031242  010600                                                                                    MOV     SP,R0
        031244  104414                                                                                    TRAP    C$PNTB
        031246  062706  000010                                                                            ADD     #10,SP
   5950 031252  000412                          BR      60$                     ;EXIT THIS TEST.
   5951                                 ;-
   5952                                 ; ERROR REPORTS:
   5953                                 ;-
   5954 031254  012767  016210  152506  12$:    MOV     #ER1401,ERRBLK          ;SELECT THE ERROR REPORTING ROUTINE.
   5955 031262                          ERROR                                   ;REPORT ERROR.          >>>>> ERROR <<<<<
        031262  104460                                                                                    TRAP    C$ERROR
   5956 031264  000405                          BR      60$
   5957
   5958 031266  012767  002575  152470  50$:    MOV     #1405.,ERRNBR           ;SET UP ERROR NUMBER FOR TSABRT RTN.
   5959 031274  004767  171126                  JSR     PC,TSABRT               ;REPORT NON-TEST RELATED ERROR.
   5960
   5961 031300                          60$:    SETPRI  #PRI07                  ;DISABLE ALL INTERRUPTS.
        031300  012700  000340                                                                            MOV     #PRI07,R0
        031304  104441                                                                                    TRAP    C$SPRI
   5962 031306  005067  150770                  CLR     CTRLCF                  ;INDICATE THAT WE COMPLETED THE TEST.
   5963 031312                          ENDTST
        031312                                                                                    L10043:
        031312  104401                                                                                    TRAP    C$ETST
```

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

031314                                          BGNTST
031314                                                                                          T15::
031314                                           SETPRI #PRIO5          ;ALLOW THE LTC TO INTERRUPT.
031314  012700  000240                                                                          MOV     #PRIO5,R0
031320  104441                                                                                  TRAP    C$SPRI
        000017                                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
031322  012767  000017  150770                   MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (16)
031330  012767  177777  150744                   MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE WITHIN A TEST.
031336  012767  000001  152416                   MOV     #1,ERRTYP      ;SET UP DEVICE FATAL INDICATOR IN ERROR TYPE.
031344  012767  003101  152412                   MOV     #1601.,ERRNBR  ;SET UP ERROR NUMBER IN THE ERROR TABLE.
031352  012767  012254  152406                   MOV     #EM1604,ERRMSG ;SET UP ERROR MESSAGE FOR TEST IN ERROR TABLE.
031360  005067  151072                           CLR     ERSMRF         ;CLEAR THE ERROR SUMMARY FLAGS.
031364  012700  002460                           MOV     #ERCNTB,R0
031370  004767  166364                          JSR     PC,CLR16W       ;CLEAR THE ERROR COUNTER TABLE.
031374  005067  150700                           CLR     EXOERR         ;CLEAR THE "EXIT ON ERROR" FLAG
                                        ;+
                                        ; RESET THE DUT TO A KNOWN STATE, DO NOT REMOVE THE STATUS CODES FROM THE FIFO.
                                        ;  CLEAR TX AND RX INTERRUPT ENABLE BITS IN THE CSR.
                                        ; THIS SUBROUTINE REPORTS ERRORS >>>>> 1601 <<<<<.
                                        ;-
031400  004767  167706                          JSR     PC,RESETT      ;RESET THE DHU-11, REPORT ANY ERRORS FOUND.
031404  103402                                  BCS     .+6            ;FATAL RESET ERROR?  NO, CONTINUE WITH TEST.
031406  000167  000142                          JMP     60$            ;YES,  EXIT THE TEST.
                                        ;+
                                        ; VERIFY READ/WRITE CAPABILITY TO INDIRECT ADDRESS FIELD OF CSR
                                        ;-
031412  005267  152346                           INC     ERRNBR        ;SET THE ERROR REPORT NUMBER TO 1602.
031416  012702  000017                           MOV     #17,R2         ;SET LOOP COUNT.
031422  016704  150610                           MOV     CSRA,R4        ;GET CSR ADDRESS.
031426  010214                          2$:      MOV     R2,(R4)        ;WRITE COUNT TO CSR.
031430  011401                                   MOV     (R4),R1        ;READ BACK THE CONTENTS OF THE CSR
031432  042701  177760                           BIC     #177760,R1     ;MASK OUT ALL BUT THE IND.ADR.REG FIELD.
031436  020102                                   CMP     R1,R2          ;CHECK FOR CORRECT DATA WRITTEN/READ.
031440  001412                                  BEQ     4$              ;IS EXPECTED DATA BAD?  NO, SKIP ERROR REPORT.
                                            ;REPORT "BAD BIT(S) IN DEVICE CSR REGISTER FOR LINE  0 (D)."
031442  012767  016352  152320                   MOV     #ER1601,ERRBLK ;SELECT THE PROPER ERROR REPORT ROUTINE.
031450  005003                                   CLR     R3             ;SET OFFSET TO 0 TO CAUSE REPORT OF CSR REG.
031452  005005                                   CLR     R5             ;CAUSE REPORT OF LINE 0.
031454                                          ERROR                   ;  >>>>> ERROR # 1602 <<<<<
031454  104460                                                                                  TRAP    C$ERROR
                                        ;+
                                        ; EXIT THE TEST IF EXTENDED ERROR REPORTING HAS NOT BEEN REQUESTED.
                                        ;-
031456  032767  000100  150534                   BIT     #BIT06,OPTION  ;HAS EXTENDED ERROR BEEN REQUESTED ?
031464  001433                                  BEQ     60$             ;EXIT THE TEST IF IT HASN'T.

031466  005302                          4$:      DEC     R2             ;DECREMENT LOOP COUNT/IND.ADD.REG ADDRESS.
031470  002356                                  BGE     2$              ;LOOP BACK TO TEST NEXT ADDRESS IF NOT DONE.
```

```
                                        ;+
                                        ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL REGISTERS ON ALL
                                        ;   ACTIVE LINES.  BEFORE WRITING EACH PATTERN, CLEAR ALL THE BITS.
                                        ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1603 - 1605 <<<<<.
                                        ;-
031472  005267  152266                          INC     ERRNBR          ;SET THE ERROR NUMBER TO 1603.
031476  005003                                  CLR     R3              ;INDICATE THAT WORD ACCESSES ARE TO BE USED.
031500  012704  000002                          MOV     #2,R4           ;INDICATE R/W ACCESS, CLEAR FIRST.
031504  004767  167322                         JSR     PC,REGTST        ;WRITE AND VERIFY DATA PATTERNS.
                                        ;+
                                        ; EXIT THE TEST IF AN ERROR HAS BEEN FOUND AND EXTENDED ERROR REPORTING HAS
                                        ; NOT BEEN REQUESTED, I.E.  EXOERR IS NON-ZERO.
                                        ;-
031510  005767  150564                          TST     EXOERR          ;IS THE "EXIT ON ERROR" FLAG SET ?
031514  001017                                 BNE     60$              ;EXIT IF IT IS.
                                        ;+
                                        ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL REGISTERS ON ALL
                                        ;   ACTIVE LINES.  BEFORE WRITING EACH PATTERN, SET ALL THE BITS.
                                        ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1606 - 1608 <<<<<.
                                        ;-
031516  012767  003106  152240                  MOV     #1606.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
031524  005003                                  CLR     R3              ;INDICATE THAT WORD ACCESSES ARE TO BE USED.
031526  005404                                  NEG     R4              ;INDICATE R/W ACCESS, SET FIRST.
031530  004767  167276                         JSR     PC,REGTST        ;WRITE AND VERIFY DATA PATTERNS.
                                        ;+
                                        ; EXIT THE TEST IF AN ERROR HAS BEEN FOUND AND EXTENDED ERROR REPORTING HAS
                                        ; NOT BEEN REQUESTED, I.E.  EXOERR IS NON-ZERO.
                                        ;-
031534  005767  150540                          TST     EXOERR          ;IS THE "EXIT ON ERROR" FLAG SET ?
031540  001005                                 BNE     60$              ;EXIT IF IT IS.
                                        ;+
                                        ; PRINT ERROR SUMMARY REPORTS IF NECESSARY.
                                        ;   THE FOLLOWING ROUTINE REPORTS ERRORS WITH NUMBER >>>>> ERROR # 1609 <<<<<
                                        ;-
031542  012767  003111  152214                  MOV     #1609.,ERRNBR   ;SET UP ERROR NUMBER FOR NEXT RTN.
031550  004767  167510                         JSR     PC,REPSMR        ;REPORT ERROR SUMMARY IF NECESSARY.
031554  005067  150522          60$:            CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
031560                                         ENDTST
031560                                                                                  L10044:
031560  104401                                                                                  TRAP    C$ETST
```

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

 031562                                         BGNTST
 031562                                                                                         T16::
 031562                                          SETPRI #PRI05           ;ALLOW THE LTC TO INTERRUPT.
 031562  012700  000240                                                                         MOV     #PRI05,R0
 031566  104441                                                                                 TRAP    C$SPRI
         000020                                  TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 031570  012767  000020  150522                  MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (17)
 031576  012767  177777  150476                  MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE WITHIN A TEST.
 031604  012767  000001  152150                  MOV     #1,ERRTYP       ;SET UP DEVICE FATAL INDICATOR IN ERROR TYPE.
 031612  012767  003245  152144                  MOV     #1701.,ERRNBR   ;SET UP ERROR NUMBER IN THE ERROR TABLE.
 031620  012767  012330  152140                  MOV     #EM1701,ERRMSG  ;SET UP ERROR MESSAGE FOR TEST IN ERROR TABLE.
 031626  005067  150624                          CLR     ERSMRF          ;CLEAR THE ERROR SUMMARY FLAGS.
 031632  012700  002460                          MOV     #ERCNTB,R0
 031636  004767  166116                         JSR     PC,CLR16W        ;CLEAR THE ERROR COUNTER TABLE.
 031642  005067  150432                          CLR     EXOERR          ;CLEAR THE "EXIT ON ERROR" FLAG
                                        ;+
                                        ; RESET THE DUT TO A KNOWN STATE, DO NOT REMOVE THE STATUS CODES FROM THE FIFO.
                                        ;  CLEAR TX AND RX INTERRUPT ENABLE BITS IN THE CSR.
                                        ; THIS SUBROUTINE REPORTS ERRORS >>>>> 1701 <<<<<.
                                        ;-
 031646  004767  167440                         JSR     PC,RESETT        ;RESET THE DHU-11, REPORT ANY ERRORS FOUND.
 031652  103402                                 BCS     .+6              ;FATAL RESET ERROR?  NO, CONTINUE WITH TEST.
 031654  000167  000064                         JMP     60$              ;YES,  EXIT THE TEST.
                                        ;+
                                        ; THE READ/MODIFY/WRITE CAPABILITY TO INDIRECT ADDRESS FIELD OF CSR IS
                                        ;  NOT TESTED THIS THIS FORM OF ACCESS IS ILLEGAL.
                                        ;-


                                        ;+
                                        ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL REGISTERS ON ALL
                                        ;   ACTIVE LINES USING R/M/W.  BEFORE WRITING EACH PATTERN, CLEAR ALL THE BITS.
                                        ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1703 - 1705 <<<<<.
                                        ;-
 031660  012767  003247  152076                  MOV     #1703.,ERRNBR   ;SET THE ERROR NUMBER TO 1703.
 031666  005003                                  CLR     R3              ;INDICATE THAT WORD ACCESSES ARE TO BE USED.
 031670  012704  000001                          MOV     #1,R4           ;INDICATE R/M/W ACCESS, CLEAR FIRST.
 031674  004767  167132                         JSR     PC,REGTST        ;WRITE AND VERIFY DATA PATTERNS.
                                        ;+
                                        ; EXIT THE TEST IF AN ERROR HAS BEEN FOUND AND EXTENDED ERROR REPORTING HAS
                                        ; NOT BEEN REQUESTED, I.E.  EXOERR IS NON-ZERO.
                                        ;-
 031700  005767  150374                          TST     EXOERR          ;IS THE "EXIT ON ERROR" FLAG SET ?
 031704  001017                                 BNE     60$              ;EXIT IF IT IS.
                                        ;+
                                        ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL REGISTERS ON ALL
                                        ;   ACTIVE LINES USING R/M/W.  BEFORE WRITING EACH PATTERN, SET ALL THE BITS.
                                        ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1706 - 1708 <<<<<.
```

```
                                        ;-
031706  012767  003252  152050                  MOV     #1706.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
031714  005003                                  CLR     R3              ;INDICATE THAT WORD ACCESSES ARE TO BE USED.
031716  005404                                  NEG     R4              ;INDICATE R/M/W ACCESS, SET FIRST.
031720  004767  167106                          JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
                                        ;+
                                        ; EXIT THE TEST IF AN ERROR HAS BEEN FOUND AND EXTENDED ERROR REPORTING HAS
                                        ; NOT BEEN REQUESTED, I.E.  EXOERR IS NON-ZERO.
                                        ;-
031724  005767  150350                          TST     EXOERR          ;IS THE "EXIT ON ERROR" FLAG SET ?
031730  001005                                  BNE     60$             ;EXIT IF IT IS.

                                        ;+
                                        ; PRINT ERROR SUMMARY REPORTS IF NECESSARY.
                                        ;   THE FOLLOWING ROUTINE REPORTS ERRORS WITH NUMBER >>>>> ERROR # 1709 <<<<<
                                        ;-
031732  012767  003255  152024                  MOV     #1709.,ERRNBR   ;SET UP ERROR NUMBER FOR NEXT RTN.
031740  004767  167320                          JSR     PC,REPSMR       ;REPORT ERROR SUMMARY IF NECESSARY.
031744  005067  150332          60$:            CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
031750                                          ENDTST
031750                                                                          L10045:
031750  104401                                                                          TRAP    C$ETST
```

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

031752                                          BGNTST
031752                                                                                          T17::
031752                                           SETPRI #PRIO5          ;ALLOW THE LTC TO INTERRUPT.
031752  012700  000240                                                                          MOV     #PRIO5,R0
031756  104441                                                                                  TRAP    C$SPRI
        000021                                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
031760  012767  000021  150332                   MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (18)
031766  012767  177777  150306                   MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE WITHIN A TEST.
031774  012767  000001  151760                   MOV     #1,ERRTYP      ;SET UP DEVICE FATAL INDICATOR IN ERROR TYPE.
032002  012767  003411  151754                   MOV     #1801.,ERRNBR  ;SET UP ERROR NUMBER IN THE ERROR TABLE.
032010  012767  012413  151750                   MOV     #EM1801,ERRMSG ;SET UP ERROR MESSAGE FOR TEST IN ERROR TABLE.
032016  005067  150434                           CLR     ERSMRF         ;CLEAR THE ERROR SUMMARY FLAGS.
032022  012700  002460                           MOV     #ERCNTB,R0
032026  004767  165726                          JSR     PC,CLR16W       ;CLEAR THE ERROR COUNTER TABLE.
032032  005067  150242                           CLR     EXOERR         ;CLEAR THE "EXIT ON ERROR" FLAG.
                                        ;+
                                        ; RESET THE DUT TO A KNOWN STATE, DO NOT REMOVE THE STATUS CODES FROM THE FIFO.
                                        ;  CLEAR TX AND RX INTERRUPT ENABLE BITS IN THE CSR.
                                        ; THIS SUBROUTINE REPORTS ERRORS >>>>> 1801 <<<<<.
                                        ;-
032036  004767  167250                          JSR     PC,RESETT       ;RESET THE DHU-11, REPORT ANY ERRORS FOUND.
032042  103402                                  BCS     .+6             ;FATAL RESET ERROR?  NO, CONTINUE WITH TEST.
032044  000167  000212                          JMP     60$             ;YES,  EXIT THE TEST.
032050  012767  003412  151706                   MOV     #1802.,ERRNBR  ;SET THE ERROR REPORT NUMBER TO 1802.
                                        ;+
                                        ; VERIFY READ/WRITE CAPABILITY TO INDIRECT ADDRESS FIELD OF CSR.
                                        ; USE BYTE ACCESSES.
                                        ;-
032056  012702  000017                           MOV     #17,R2         ;SET LOOP COUNT.
032062  016704  150150                           MOV     CSRA,R4        ;GET CSR ADDRESS.
032066  110214                          2$:      MOVB    R2,(R4)        ;WRITE COUNT TO CSR.
032070  111401                                   MOVB    (R4),R1        ;READ BACK THE CONTENTS OF THE CSR
032072  042701  177760                           BIC     #177760,R1     ;MASK OUT ALL BUT THE IND.ADR.REG FIELD.
032076  020102                                   CMP     R1,R2          ;CHECK FOR CORRECT DATA WRITTEN/READ.
032100  001412                                  BEQ     4$              ;IS EXPECTED DATA BAD?  NO, SKIP ERROR REPORT.
                                            ;REPORT "BAD BIT(S) IN DEVICE CSR REGISTER FOR LINE  0 (D)."
032102  012767  016352  151660                   MOV     #ER1601,ERRBLK ;SELECT THE PROPER ERROR REPORT ROUTINE.
032110  005003                                   CLR     R3             ;SET OFFSET TO 0 TO CAUSE REPORT OF CSR REG.
032112  005005                                   CLR     R5             ;CAUSE REPORT OF LINE 0.
032114                                          ERROR                   ;  >>>>> ERROR # 1802 <<<<<
032114  104460                                                                                  TRAP    C$ERROR
                                            ;+
                                            ; EXIT THE TEST IF EXTENDED ERROR REPORTING HAS NOT BEEN ENABLED
                                            ;-
032116  032767  000100  150074                   BIT     #BIT06,OPTION  ;EXIT WITH TEST FAILURE MESSAGE IF
032124  001456                                  BEQ     60$             ;NO EXTENDED ERROR REPORTING HAS BEEN REQUESTED
                                                                        ;DURING THE SOFTWARE QUESTIONS.
```

```
032126  005302                  4$:     DEC     R2              ;DECREMENT LOOP COUNT/IND.ADD.REG ADDRESS.
032130  002356                          BGE     2$              ;LOOP BACK TO TEST NEXT ADDRESS IF NOT DONE.
                                ;+
                                ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL LOWER BYTES OF ALL
                                ;   REGISTERS ON ALL ACTIVE LINES.  USE READ/WRITE ACCESSES.  BEFORE WRITING
                                ;   EACH PATTERN, CLEAR ALL THE USED BITS OF ALL ACTIVE REGISTERS.
                                ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1803 - 1805 <<<<<.
                                ;-
032132  005267  151626                  INC     ERRNBR          ;SET THE ERROR NUMBER TO 1803.
032136  012703  177777                  MOV     #-1,R3          ;INDICATE THAT LO BYTE ACCESSES ARE TO BE USED.
032142  012704  000002                  MOV     #2,R4           ;INDICATE R/W ACCESS, CLEAR FIRST.
032146  004767  166660                  JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
                                ;+
                                ; EXIT THE TEST IF AN ERROR HAS BEEN FOUND AND EXTENDED ERROR REPORTING HAS
                                ; NOT BEEN REQUESTED, I.E.  EXOERR IS NON-ZERO.
                                ;-
032152  005767  150122                  TST     EXOERR          ;IS THE "EXIT ON ERROR" FLAG SET ?
032156  001041                          BNE     60$             ;EXIT IF IT IS.

                                ;+
                                ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL HIGH BYTES OF ALL
                                ;   REGISTERS ON ALL ACTIVE LINES.  USE READ/WRITE ACCESSES.  BEFORE WRITING
                                ;   EACH PATTERN, CLEAR ALL THE USED BITS OF ALL ACTIVE REGISTERS.
                                ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1806 - 1808 <<<<<.
                                ;-
032160  012767  003416  151576          MOV     #1806.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
032166  005403                          NEG     R3              ;INDICATE THAT HI BYTE ACCESSES ARE TO BE USED.
032170  004767  166636                  JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
                                ;+
                                ; EXIT THE TEST IF AN ERROR HAS BEEN FOUND AND EXTENDED ERROR REPORTING HAS
                                ; NOT BEEN REQUESTED, I.E.  EXOERR IS NON-ZERO.
                                ;-
032174  005767  150100                  TST     EXOERR          ;IS THE "EXIT ON ERROR" FLAG SET ?
032200  001030                          BNE     60$             ;EXIT IF IT IS.
                                ;+
                                ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL LOWER BYTES OF ALL
                                ;   REGISTERS ON ALL ACTIVE LINES.  USE READ/WRITE ACCESSES.  BEFORE WRITING
                                ;   EACH PATTERN, SET ALL THE USED BITS OF ALL ACTIVE REGISTERS.
                                ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1809 - 1811 <<<<<.
                                ;-
032202  012767  003421  151554          MOV     #1809.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
032210  005403                          NEG     R3              ;INDICATE THAT LO BYTE ACCESSES ARE TO BE USED.
032212  005404                          NEG     R4              ;INDICATE R/W ACCESS, SET FIRST.
032214  004767  166612                  JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
                                ;+
                                ; EXIT THE TEST IF AN ERROR HAS BEEN FOUND AND EXTENDED ERROR REPORTING HAS
                                ; NOT BEEN REQUESTED, I.E.  EXOERR IS NON-ZERO.
                                ;-
032220  005767  150054                  TST     EXOERR          ;IS THE "EXIT ON ERROR" FLAG SET ?
032224  001016                          BNE     60$             ;EXIT IF IT IS.
                                ;+
                                ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL HIGH BYTES OF ALL
                                ;   REGISTERS ON ALL ACTIVE LINES.  USE READ/WRITE ACCESSES.  BEFORE WRITING
                                ;   EACH PATTERN, SET ALL THE USED BITS OF ALL ACTIVE REGISTERS.
                                ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1812 - 1814 <<<<<.
                                ;-
032226  012767  003424  151530          MOV     #1812.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
```

```
032234  005403                          NEG     R3              ;INDICATE THAT HI BYTE ACCESSES ARE TO BE USED.
032236  004767  166570                  JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
                                ;+
                                ; EXIT THE TEST IF AN ERROR HAS BEEN FOUND AND EXTENDED ERROR REPORTING HAS
                                ; NOT BEEN REQUESTED, I.E.  EXOERR IS NON-ZERO.
                                ;-
032242  005767  150032                  TST     EXOERR          ;IS THE "EXIT ON ERROR" FLAG SET ?
032246  001005                          BNE     60$             ;EXIT IF IT IS.
                                ;+
                                ; PRINT ERROR SUMMARY REPORTS IF NECESSARY.
                                ;   THE FOLLOWING ROUTINE REPORTS ERRORS WITH NUMBER >>>>> ERROR # 1815 <<<<<
                                ;-
032250  012767  003427  151506          MOV     #1815.,ERRNBR   ;SET UP ERROR NUMBER FOR NEXT RTN.
032256  004767  167002                  JSR     PC,REPSMR       ;REPORT ERROR SUMMARY IF NECESSARY.
032262  005067  150014          60$:    CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
032266                                  ENDTST
032266                                                                  L10046:
032266  104401                                                                  TRAP    C$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.
                                        ;*
                                        ;-- ************************************************************************

032270                                          BGNTST
032270                                                                                          T18::
032270                                           SETPRI #PRI05          ;ALLOW THE LTC TO INTERRUPT.
032270  012700  000240                                                                          MOV     #PRI05,R0
032274  104441                                                                                  TRAP    C$SPRI
        000022                                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
032276  012767  000022  150014                   MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (19)
032304  012767  177777  147770                   MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE WITHIN A TEST.
032312  012767  000001  151442                   MOV     #1,ERRTYP      ;SET UP DEVICE FATAL INDICATOR IN ERROR TYPE.
032320  012767  003555  151436                   MOV     #1901.,ERRNBR  ;SET UP ERROR NUMBER IN THE ERROR TABLE.
032326  012767  012467  151432                   MOV     #EM1901,ERRMSG ;SET UP ERROR MESSAGE FOR TEST IN ERROR TABLE.
032334  005067  150116                           CLR     ERSMRF         ;CLEAR THE ERROR SUMMARY FLAGS.
032340  012700  002460                           MOV     #ERCNTB,R0
032344  004767  165410                          JSR     PC,CLR16W       ;CLEAR THE ERROR COUNTER TABLE.
032350  005067  147724                           CLR     EXOERR         ;CLEAR THE "EXIT ON ERROR" FLAG.
                                        ;+
                                        ; RESET THE DUT TO A KNOWN STATE, DO NOT REMOVE THE STATUS CODES FROM THE FIFO.
                                        ;  CLEAR TX AND RX INTERRUPT ENABLE BITS IN THE CSR.
                                        ; THIS SUBROUTINE REPORTS ERRORS >>>>> 1901 <<<<<.
                                        ;-
032354  004767  166732                          JSR     PC,RESETT      ;RESET THE DHU-11, REPORT ANY ERRORS FOUND.
032360  103402                                  BCS     .+6            ;FATAL RESET ERROR?  NO, CONTINUE WITH TEST.
032362  000167  000136                          JMP     60$            ;YES,  EXIT THE TEST.
032366  012767  003557  151370                   MOV     #1903.,ERRNBR  ;SET THE ERROR REPORT NUMBER TO 1903.
                                        ;+
                                        ; THE READ/MODIFY/WRITE CAPABILITY TO INDIRECT ADDRESS FIELD OF CSR IS NOT
                                        ; TESTED SINCE THIS IS AN ILLEGAL FORM OF ACCESS TO THIS REGISTER.
                                        ;-


                                        ;+
                                        ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL LOWER BYTES OF ALL
                                        ;   REGISTERS ON ALL ACTIVE LINES.  USE READ/MODIFY/WRITE ACCESSES.  BEFORE
                                        ;   WRITING EACH PATTERN, CLEAR ALL THE USED BITS OF ALL ACTIVE REGISTERS.
                                        ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1903 - 1905 <<<<<.
                                        ;-
032374  005267  151364                           INC     ERRNBR         ;SET THE ERROR NUMBER TO 1903.
032400  012703  177777                           MOV     #-1,R3         ;INDICATE THAT LO BYTE ACCESSES ARE TO BE USED.
032404  012704  000001                           MOV     #1,R4          ;INDICATE R/M/W ACCESS, CLEAR FIRST.
032410  004767  166416                          JSR     PC,REGTST       ;WRITE AND VERIFY DATA PATTERNS.
                                        ;+
                                        ; EXIT THE TEST IF AN ERROR HAS BEEN FOUND AND EXTENDED ERROR REPORTING HAS
                                        ; NOT BEEN REQUESTED, I.E.  EXOERR IS NON-ZERO.
                                        ;-
032414  005767  147660                           TST     EXOERR         ;IS THE "EXIT ON ERROR" FLAG SET ?
032420  001041                                  BNE     60$             ;EXIT IF IT IS.
                                        ;+
                                        ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL HIGH 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 WITH NUMBERS  >>>>> ERROR 1906 - 1908 <<<<<.
                                        ;-
032422  012767  003562  151334                  MOV     #1906.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
032430  005403                                  NEG     R3              ;INDICATE THAT HI BYTE ACCESSES ARE TO BE USED.
032432  004767  166374                         JSR     PC,REGTST        ;WRITE AND VERIFY DATA PATTERNS.
                                        ;+
                                        ; EXIT THE TEST IF AN ERROR HAS BEEN FOUND AND EXTENDED ERROR REPORTING HAS
                                        ; NOT BEEN REQUESTED, I.E.  EXOERR IS NON-ZERO.
                                        ;-
032436  005767  147636                          TST     EXOERR          ;IS THE "EXIT ON ERROR" FLAG SET ?
032442  001030                                 BNE     60$              ;EXIT IF IT IS.
                                        ;+
                                        ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL LOWER BYTES OF ALL
                                        ;   REGISTERS ON ALL ACTIVE LINES.  USE READ/MODIFY/WRITE ACCESSES.  BEFORE
                                        ;   WRITING EACH PATTERN, SET ALL THE USED BITS OF ALL ACTIVE REGISTERS.
                                        ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1909 - 1911 <<<<<.
                                        ;-
032444  012767  003565  151312                  MOV     #1909.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
032452  005403                                  NEG     R3              ;INDICATE THAT LO BYTE ACCESSES ARE TO BE USED.
032454  005404                                  NEG     R4              ;INDICATE R/M/W ACCESS, SET FIRST.
032456  004767  166350                         JSR     PC,REGTST        ;WRITE AND VERIFY DATA PATTERNS.
                                        ;+
                                        ; EXIT THE TEST IF AN ERROR HAS BEEN FOUND AND EXTENDED ERROR REPORTING HAS
                                        ; NOT BEEN REQUESTED, I.E.  EXOERR IS NON-ZERO.
                                        ;-
032462  005767  147612                          TST     EXOERR          ;IS THE "EXIT ON ERROR" FLAG SET ?
032466  001016                                 BNE     60$              ;EXIT IF IT IS.
                                        ;+
                                        ; WRITE AND VERIFY 16 DATA PATTERNS IN ALL USED BITS OF ALL HIGH BYTES OF ALL
                                        ;   REGISTERS ON ALL ACTIVE LINES.  USE READ/MODIFY/WRITE ACCESSES.  BEFORE
                                        ;   WRITING EACH PATTERN, SET ALL THE USED BITS OF ALL ACTIVE REGISTERS.
                                        ;    REGTST ROUTINE REPORTS ERRORS WITH NUMBERS  >>>>> ERROR 1912 - 1914 <<<<<.
                                        ;-
032470  012767  003570  151266                  MOV     #1912.,ERRNBR   ;SET UP ERROR NUMBER FOR REGTST ROUTINE.
032476  005403                                  NEG     R3              ;INDICATE THAT HI BYTE ACCESSES ARE TO BE USED.
032500  004767  166326                         JSR     PC,REGTST        ;WRITE AND VERIFY DATA PATTERNS.
                                        ;+
                                        ; EXIT THE TEST IF AN ERROR HAS BEEN FOUND AND EXTENDED ERROR REPORTING HAS
                                        ; NOT BEEN REQUESTED. I.E.  EXOERR IS NON-ZERO.
                                        ;-
032504  005767  147570                          TST     EXOERR          ;IS THE "EXIT ON ERROR" FLAG SET ?
032510  001005                                 BNE     60$              ;EXIT IF IT IS.
                                        ;+
                                        ; PRINT ERROR SUMMARY REPORTS IF NECESSARY.
                                        ;   THE FOLLOWING ROUTINE REPORTS ERRORS WITH NUMBER >>>>> ERROR # 1915 <<<<<
                                        ;-
032512  012767  003573  151244                  MOV     #1915.,ERRNBR   ;SET UP ERROR NUMBER FOR NEXT RTN.
032520  004767  166540                         JSR     PC,REPSMR        ;REPORT ERROR SUMMARY IF NECESSARY.
032524  005067  147552                 60$:     CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
032530                                         ENDTST
032530                                                                                          L10047:
032530  104401                                                                                          TRAP    C$ETST
```

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

 032532                                         BGNTST
 032532                                                                                         T19::
 032532                                          SETPRI #PRI05           ;ALLOW THE LTC TO INTERRUPT.
 032532  012700  000240                                                                         MOV     #PRI05,R0
 032536  104441                                                                                 TRAP    C$SPRI
         000023                                  TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 032540  012767  000023  147552                  MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (20)
 032546  012767  177777  147526                  MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
 032554  012767  000001  151200                  MOV     #1,ERRTYP       ;SET UP DEVICE FATAL INDICATOR IN ERROR TYPE.
 032562  012767  003721  151174                  MOV     #2001.,ERRNBR   ;SET UP ERROR NUMBER IN THE ERROR TABLE.
 032570  012767  012552  151170                  MOV     #EM2001,ERRMSG  ;SET UP ERROR MESSAGE FOR TEST IN ERROR TABLE.
                                        ;+
                                        ; RESET THE DUT TO A KNOWN STATE, DO NOT REMOVE THE STATUS CODES FROM THE FIFO.
                                        ;  CLEAR TX AND RX INTERRUPT ENABLE BITS IN THE CSR.
                                        ; THIS SUBROUTINE REPORTS ERRORS >>>>> 2001 <<<<<.
                                        ;-
 032576  004767  166510                         JSR     PC,RESETT       ;RESET THE DHU-11, REPORT ANY ERRORS FOUND.
 032602  103016                                 BCC     60$             ;FATAL RESET ERROR?  YES,  EXIT THE TEST.
                                        ;+
                                        ; READ THE STAT REGISTER ID BIT AND VERIFY THAT IT IS CLEAR.
                                        ;-
 032604  017701  147434                          MOV     @FSLSA,R1       ;READ THE STAT REGISTER CONTENTS.
 032610  032701  000400                          BIT     #BIT8,R1        ;CHECK THE ID BIT.
 032614  001011                                 BNE     60$             ;ID BIT SET?  YES, EXIT THE TEST.
 032616  012767  003722  151140                  MOV     #2002.,ERRNBR   ;NO,  SET THE ERROR REPORT NUMBER TO 2002.
 032624  012701  012622                          MOV     #EM2002,R1      ;GET THE PROPER ERROR MESSAGE.
 032630  012767  016072  151132                  MOV     #ER0503,ERRBLK  ;SELECT THE PROPER ERROR REPORT ROUTINE.
 032636                                         ERROR                   ;ERROR NUMBER >>>>> 2002 <<<<<
 032636  104460                                                                                 TRAP    C$ERROR
 032640  005067  147436          60$:            CLR     CTRLCF          ;INDICATE THAT WE COMPLETED THE TEST.
 032644                                         ENDTST
 032644                                                                                         L10050:
 032644  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.
                                        ;*
                                        ;-- ************************************************************************

032646                                          BGNTST
032646                                                                                          T20::
032646                                          SETPRI  #PRIO5          ;ALLOW LTC INTERRUPTS.
032646  012700  000240                                                                          MOV     #PRIO5,R0
032652  104441                                                                                  TRAP    C$SPRI
        000024                                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
032654  012767  000024  147436                   MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (23)
032662  012767  177777  147412                   MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE IN A TEST.
032670  012767  000001  151064                   MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
032676  012767  004375  151060                   MOV     #2301.,ERRNBR  ;SET THE FIRST ERROR NUMBER IN ERROR TABLE.
032704  012767  012675  151054                   MOV     #EM2301,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERRTBL.
032712  012767  017156  151050                   MOV     #ER9101,ERRBLK ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
                                        ;*
                                        ; RESET THE DUT TO A KNOWN STATE, REMOVE THE STATUS CODES FROM THE FIFO.
                                        ;  CLEAR TX AND RX INTERRUPT ENABLE BITS IN THE CSR.
                                        ; THIS SUBROUTINE REPORTS ERROR >>>>> 2301 <<<<<.
                                        ;-
032720  004767  165012                          JSR     PC,CLNRST      ;RESET THE DHU-11, REPORT ANY ERRORS FOUND.
032724  103114                                  BCC     60$            ;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.
                                        ;-
032726  016705  147272                           MOV     ACTLNS,R5      ;PASS THE ACTIVE LINE BIT MAP.
032732  012700  000200                           MOV     #200,R0        ;PASS THE LNCTRL CONTENTS.
032736  004767  170470                          JSR     PC,WTWLNC       ;INITIALISE THE LNCTRL REGISTERS.
032742  012700  177670                           MOV     #177670,R0     ;PASS THE LPR CONTENTS.
032746  004767  170510                          JSR     PC,WTWLPR       ;INITIALSE THE LPR REGISTERS ON ALL LINES.
032752  012704  000012                           MOV     #10.,R4        ;PASS DELAY TIME OF 10 MILLI-SECONDS.
032756  004767  165076                          JSR     PC,DELAY        ;WAIT FOR LNCTR AND LPR REGS TO BE UPDATED.
032762  012705  177777                           MOV     #MAPLNS,R5     ;PASS THE BIT MAP CORRESPONDING TO ALL LINES.
032766  004767  167642                          JSR     PC,TXENBL       ;ENABLE TRANSMITTERS ON ALL LINES.
                                        ;*
                                        ; TEST ALL ACTIVE LINES INDIVIDUALLY.
                                        ; DISABLE TRANSMISSION ON EACH ACTIVE LINE.
                                        ;-
032772  012703  000001                           MOV     #1,R3          ;SET UP THE LINE BIT MAP FOR CHANNEL 0.
032776  005004                                   CLR     R4             ;CLEAR THE LINE NUMBER COUNTER.
033000  012767  004376  150756  2$:              MOV     #2302.,ERRNBR  ;SET THE ERROR NUMBER TO 2302.
033006  030367  147212                          BIT     R3,ACTLNS       ;CHECK IF THE LINE IS ACTIVE.
033012  001453                                  BEQ     6$             ;SKIP TESTING THIS LINE IF IT IS INACTIVE.
                                                ;*
                                                ; CLEAR THE TX_ENABLE BIT IN TBUFFAD2 REGISTER.
                                                ; SELECT THE LINE UNDER TEST.
                                                ;   VERI Y IT IS CLEAR, REPORT ERROR IF SET.
                                                ;-
```

```
033014  010305                          MOV     R3,R5           ;PASS THE BIT MAP OF THE LINE UNDER TEST.
033016  004767  167516                  JSR     PC,TXDSBL       ;DISABLE TRANSMISSION ON THE LINE UNDER TEST.
033022  010477  147210                  MOV     R4,@CSRA        ;SELECT THE LINE CURRENTLY UNDER TEST.
033026  005777  147220                  TST     @TXAD2A         ;VERIFY THE TX_ENABLE BIT IS SET.
033032  100433                          BMI     4$              ;GO REPORT ERROR IF TX_ENABLE BIT SET.
                                        ;+
                                        ; WRITE DATA BYTE (ASCII <LF>) TO THE OUTPUT FIFO.
                                        ; WAIT FOR A TX_ACTION TO BE RETURNED, REPORT ERROR IF A TX_ACTION
                                        ; IS FOUND BEFORE TIME-OUT OCCURS.
                                        ;-
033034  012767  004377  150722          MOV     #2303.,ERRNBR   ;SET ERROR NUMBER TO 2303.
033042  112777  000012  147174          MOVB    #12,@FDATA      ;WRITE THE DATA BYTE TO THE DUT'S OUTPUT FIFO.
033050  012701  170003                  MOV     #170003,R1      ;TEST BIT 15, TIMEOUT OF 3 MILLI SECS.
033054  016702  147156                  MOV     CSRA,R2         ;PASS THE ADDRESS OF THE REGISTER TO TEST.
033060  004767  170064                  JSR     PC,WAIBIS       ;WAIT FOR TX_ACTION TO COME BACK.
033064  103416                          BCS     4$              ;GO REPORT ERROR IF A TX-ACTION FOUND.
                                        ;+
                                        ; WAIT FOR THE DATA TO APPEAR IN THE FIFO, REPORT ERROR IF DATA FOUND.
                                        ;-
033066  005267  150672                  INC     ERRNBR          ;SET ERROR NUMBER TO 2304.
033072  012701  070012                  MOV     #70012,R1       ;TEST BIT 7, TIMEOUT OF 10 MILLI SECS.
033076  016702  147134                  MOV     CSRA,R2         ;PASS THE ADDRESS OF THE REGISTER TO TEST.
033102  004767  170042                  JSR     PC,WAIBIS       ;WAIT FOR RX_DATA_AVAILABLE TO SET.
033106  103405                          BCS     4$              ;REPORT ERROR IF DATA RECEIVED IN THE FIFO.
033110  005267  150650                  INC     ERRNBR          ;SET ERROR NUMBER TO 2305.
033114  017702  147120                  MOV     @RBUFA,R2       ;READ THE DATA FROM THE FIFO.
033120  100010                          BPL     6$              ;SKIP ERROR REPORT IF DATA ISN'T THERE.

033122  010401                  4$:     MOV     R4,R1           ;PASS THE NUMBER OF CURRENT LINE UNDER TEST.
033124  012702  012742                  MOV     #EM2302,R2      ;PASS THE MESSAGE TO BE REPORTED.
                                                                ;"TX_ENABLE BIT BAD ON LINE: NN".
033130                                  ERROR                   ;                >>>>> ERROR <<<<<.
        033130  104460                                                                          TRAP    C$ERROR

033132  032767  000100  147060          BIT     #BIT06,OPTION   ;EXIT THE TEST, WITH THE TEST FAILED MESSAGE,
033140  001406                          BEQ     60$             ;IF EXTENDED ERROR REPORTING HAS NOT BEEN
                                                                ;REQUESTED.

                                        ;+
                                        ; VERIFY ALL ACTIVE LINES HAVE BEEN TESTED.
                                        ;-
033142  000241                  6$:     CLC                     ;CLEAR THE CARRY BIT PRIOR TO ROTATION.
033144  006103                          ROL     R3              ;SHIFT THE BIT MAP FOR THE NEXT LINE.
033146  005204                          INC     R4              ;INCREMENT THE LINE NUMBER COUNTER.
033150  020427  000020                  CMP     R4,#NUMLNS      ;HAVE ALL THE LINES BEEN TESTED?.
033154  002711                          BLT     2$              ;NO; BRANCH TO TEST THE NEXT LINE.

033156  005067  147120          60$:    CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
033162                                  ENDTST
        033162                                                                          L10051:
        033162  104401                                                                          TRAP    C$ETST
```

```
                                        .SBTTL  HARDWARE TEST           - TXENBA-
                                        ;** ************************************************************************
                                        ;*                        - TX_ENABLE (ACTIVE) TEST -
                                        ;*      THIS TEST VERIFIES THAT WHEN THE TX_ENABLE BIT IS SET IN THE APPRORIATE
                                        ;*      LINE REGISTER, TRANSMISSION WILL TAKE PLACE ON THAT LINE.
                                        ;*      THIS TEST IS PERFORMED IN INTERNAL LOOPBACK, AND ON ALL ACTIVE LINES.
                                        ;*
                                        ;-- ************************************************************************

 033164                                         BGNTST
 033164                                                                                  T21::
 033164                                         SETPRI  #PRIO5          ;ALLOW LTC INTERRUPTS.
 033164  012700  000240                                                                  MOV     #PRIO5,R0
 033170  104441                                                                          TRAP    C$SPRI
         000025                                  TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 033172  012767  000025  147120                  MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (24)
 033200  012767  177777  147074                  MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
 033206  012767  000001  150546                  MOV     #1,ERRTYP       ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
 033214  012767  004541  150542                  MOV     #2401.,ERRNBR   ;SET THE FIRST ERROR NUMBER IN ERROR TABLE.
 033222  012767  013000  150536                  MOV     #EM2401,ERRMSG  ;SET ERROR MESSAGE ADDRESS IN ERRTBL.
 033230  012767  017156  150532                  MOV     #ER9101,ERRBLK  ;SELECT THE CORRECT ERROR REPORTING ROUTINE.
                                        ;*
                                        ; RESET THE DUT TO A KNOWN STATE, REMOVE THE STATUS CODES FROM THE FIFO.
                                        ;  CLEAR TX AND RX INTERRUPT ENABLE BITS IN THE CSR.
                                        ; THIS SUBROUTINE REPORTS ERROR >>>>> 2401 <<<<<.
                                        ;-
 033236  004767  164474                         JSR     PC,CLNRST       ;RESET THE DHU-11, REPORT ANY ERRORS FOUND.
 033242  103133                                 BCC     60$             ;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.
                                        ; DISABLE TRANSMITTERS ON ALL LINES.
                                        ;-
 033244  016705  146754                         MOV     ACTLNS,R5       ;PASS THE ACTIVE LINE BIT MAP.
 033250  012700  000200                         MOV     #200,R0         ;PASS THE LNCTRL CONTENTS.
 033254  004767  170152                         JSR     PC,WTWLNC       ;INITIALISE THE LNCTRL REGISTERS.
 033260  012700  177670                         MOV     #177670,R0      ;PASS THE LPR CONTENTS.
 033264  004767  170172                         JSR     PC,WTWLPR       ;INITIALSE THE LPR REGISTERS ON ALL LINES.
 033270  012704  000012                         MOV     #10.,R4         ;PASS DELAY TIME OF 10 MILLI-SECONDS.
 033274  004767  164560                         JSR     PC,DELAY        ;WAIT FOR LNCTR AND LPR REGS TO BE UPDATED.
 033300  012705  177777                         MOV     #MAPLNS,R5      ;PASS THE BIT MAP CORRESPONDING TO ALL LINES.
 033304  004767  167230                         JSR     PC,TXDSBL       ;DISABLE TRANSMITTERS ON ALL LINES.
                                        ;*
                                        ; TEST ALL ACTIVE LINES INDIVIDUALLY.
                                        ; ENABLE TRANSMISSION ON EACH ACTIVE LINE.
                                        ;-
 033310  012703  000001                         MOV     #1,R3           ;SET UP THE LINE BIT MAP FOR CHANNEL 0.
 033314  005004                                 CLR     R4              ;CLEAR THE LINE NUMBER COUNTER.
 033316  012767  004542  150440  2$:            MOV     #2402.,ERRNBR   ;SET THE ERROR NUMBER TO 2402.
 033324  030367  146674                         BIT     R3,ACTLNS       ;CHECK IF THE LINE IS ACTIVE.
 033330  001467                                 BEQ     8$              ;SKIP TESTING THIS LINE IF IT IS INACTIVE.
                                        ;*
                                        ; SELECT THE LINE UNDER TEST.
                                        ;  SET THE TX_ENABLE BIT IN TBUFFAD2 REGISTER.
                                        ;   VERIFY IT IS SET, REPORT ERROR IF CLEAR.
                                        ;-
```

```
033332  010305                          MOV     R3,R5           ;PASS THE BIT MAP OF THE LINE UNDER TEST.
033334  004767  167274                  JSR     PC,TXENBL       ;ENABLE TRANSMISSION ON THE LINE UNDER TEST.
033340  012705  000012                  MOV     #10.,R5         ;SET TXCHAR/LOOP COUNT TO 10.
033344  010477  146666                  MOV     R4,@CSRA        ;SELECT THE LINE CURRENTLY UNDER TEST.
033350  005777  146676                  TST     @TXAD2A         ;VERIFY THE TX_ENABLE BIT IS SET.
033354  100045                          BPL     6$              ;GO REPORT ERROR IF TX_ENABLE BIT CLEAR.
                                        ;+
                                        ; WRITE DATA BYTE (ASCII <LF>) TO OUTPUT FIFO.
                                        ; WAIT FOR A TX_ACTION TO BE RETURNED, REPORT ERROR IF NO TX_ACTION
                                        ; FOUND BEFORE TIME-OUT OCCURS.
                                        ;-
033356  012767  004543  150400  4$:     MOV     #2403.,ERRNBR   ;SET ERROR NUMBER TO 2403.
033364  112777  000012  146652          MOVB    #12,@FDATA      ;WRITE THE DATA BYTE TO THE DUT'S OUTPUT FIFO.
033372  012701  170004                  MOV     #170004,R1      ;TEST BIT 15, TIMEOUT OF 4 MILLI SECS.
033376  016702  146634                  MOV     CSRA,R2         ;PASS THE ADDRESS OF THE REGISTER TO TEST.
033402  004767  167542                  JSR     PC,WAIBIS       ;WAIT FOR TX_ACTION TO COME BACK.
033406  103030                          BCC     6$              ;GO REPORT ERROR IF NO TX-ACTION FOUND.
                                        ;+
                                        ; WAIT FOR THE DATA TO APPEAR IN THE FIFO, REPORT ERROR IF TIME-OUT.
                                        ;-
033410  005267  150350                  INC     ERRNBR          ;SET ERROR NUMBER TO 2404.
033414  012701  070012                  MOV     #70012,R1       ;TEST BIT 7, TIMEOUT OF 10 MILLI SECS.
033420  016702  146612                  MOV     CSRA,R2         ;PASS THE ADDRESS OF THE REGISTER TO TEST.
033424  004767  167520                  JSR     PC,WAIBIS       ;WAIT FOR RX_DATA_AVAILABLE TO SET.
033430  103017                          BCC     6$              ;REPORT ERROR IF NO DATA RECEIVED IN THE FIFO.
033432  005267  150326                  INC     ERRNBR          ;SET ERROR NUMBER TO 2405.
033436  017702  146576                  MOV     @RBUFA,R2       ;READ THE DATA FROM THE FIFO.
033442  100012                          BPL     6$              ;GO REPORT ERROR IF THER IS'NT ANY DATA THERE.
033444  005267  150314                  INC     ERRNBR          ;SET ERROR NUMBER TO 2406.
033450  000302                          SWAB    R2              ;PUT THE LINE NUMBER IN THE LOW BYTE.
033452  042702  177760                  BIC     #177760,R2      ;CLEAR THE UNWANTED BITS.
033456  020204                          CMP     R2,R4           ;DID THE DATA COME FROM THE CORRECT LINE?.
033460  001003                          BNE     6$              ;NO; GO REPORT THE ERROR.
033462  005305                          DEC     R5              ;DECREMENT THE TXCHAR/LOOP COUNTER.
033464  001334                          BNE     4$              ;LOOP TO TX THE NEXT CHAR.
033466  000410                          BR      8$              ;GO TEST THE NEXT LINE.

033470  010401                  6$:     MOV     R4,R1           ;PASS THE NUMBER OF CURRENT LINE UNDER TEST.
033472  012702  012742                  MOV     #EM2302,R2      ;PASS THE MESSAGE TO BE REPORTED.
                                                                ;"TX_ENABLE BIT BAD ON LINE: NN".
033476                                  ERROR                   ;                >>>>> ERROR <<<<<.
033476  104460                                                                                  TRAP    C$ERROR

033500  032767  000100  146512          BIT     #BIT06,OPTION   ;EXIT THE TEST IF EXTENDED ERROR REPORTING
033506  001411                          BEQ     60$             ;HAS NOT BEEN ENABLED, SINCE THE TEST HAS FAILED.

                                ;+
                                ; VERIFY ALL ACTIVE LINES HAVE BEEN TESTED.
                                ;-
033510  010305                  8$:     MOV     R3,R5           ;PASS THE BIT MAP OF THE LINE UNDER TEST.
033512  004767  167022                  JSR     PC,TXDSBL       ;CLEAR THE TX_ENABLE BIT ON THIS LINE.
033516  000241                          CLC                     ;CLEAR THE CARRY BIT PRIOR TO ROTATION.
033520  006103                          ROL     R3              ;SHIFT THE BIT MAP FOR THE NEXT LINE.
033522  005204                          INC     R4              ;INCREMENT THE LINE NUMBER COUNTER.
033524  020427  000020                  CMP     R4,#NUMLNS      ;HAVE ALL THE LINES BEEN TESTED?.
033530  002672                          BLT     2$              ;NO; BRANCH TO TEST THE NEXT LINE.
```

```
6615 033532  005067  146544          60$:     CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
6616 033536                                   ENDTST
     033536                                                                                L10052:
     033536  104401                                                                                TRAP    C$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.
                                        ;*
                                        ;-- ***********************************************************************

 033540                                         BGNTST
 033540                                                                                         T22::
 033540                                         SETPRI  #PRI05          ;ALLOW THE LTC TO INTERRUPT.
 033540  012700  000240                                                                         MOV     #PRI05,R0
 033544  104441                                                                                 TRAP    C$SPRI
         000026                                  TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 033546  012767  000026  146544                  MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (26)
 033554  012767  177777  146520                  MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
 033562  012767  000001  150172                  MOV     #1,ERRTYP       ;SET ERROR FATAL ERROR TYPE IN ERROR TABLE.
 033570  012767  003101  150166                  MOV     #1601.,ERRNBR   ;SET FIRST ERROR REPORT NUMBER IN ERROR TABLE.
 033576  012767  013043  150162                  MOV     #EM2601.,ERRMSG ;SET TEST ERROR MESSAGE IN ERROR TABLE.
                                        ;+
                                        ; RESET THE DUT TO A KNOWN STATE, DO NOT REMOVE THE STATUS CODES FROM THE FIFO.
                                        ;  CLEAR TX AND RX INTERRUPT ENABLE BITS IN THE CSR.
                                        ; THIS SUBROUTINE REPORTS ERRORS FROM >>>>> 2601 THRU 2602 <<<<<.
                                        ;-
 033604  004767  165502                         JSR     PC,RESETT       ;RESET THE DHU-11, REPORT ANY ERRORS FOUND.
 033610  103402                                 BCS     2$              ;SKIP AROUND ABORTING TEST IF NO ERROR FOUND.
 033612  000167  001044                         JMP     60$             ;ABORT TEST IF FATAL ERROR FOUND DURING RESET.
 033616  012767  005053  150140          2$:     MOV     #2603.,ERRNBR   ;SET THE ERROR REPORT NUMBER TO 2603.
                                        ;+
                                        ; ENABLE TRANSMITTERS ON ALL LINES.
                                        ;-
 033624  012705  177777                  4$:     MOV     #MAPLNS,R5      ;PASS ACTIVE LINE BIT MAP.
 033630  004767  167000                         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.
                                        ;-
 033634  005067  146450                          CLR     RXINTC          ;CLEAR THE RX INTERRUPT COUNTER.
 033640  005067  146446                          CLR     RXINTF          ;CLEAR THE RX INTERRUPT FLAGS.
 033644  005067  146452                          CLR     TXINTC          ;CLEAR THE TX INTERRUPT COUNTER.
 033650  012767  002722  146420                  MOV     #BUFBAS,BUFPTR  ;LOAD THE BUFFER PTR WITH THE BUFFER BASE ADR.
 033656                                         SETVEC  RXVECA,#RXINPT,#PRI06 ;SET UP INTERRUPT VECTOR TO CATCH RX INT.
 033656  012746  000300                                                                         MOV     #PRI06,-(SP)
 033662  012746  023716                                                                         MOV     #RXINPT,-(SP)
 033666  016746  146334                                                                         MOV     RXVECA,-(SP)
 033672  012746  000003                                                                         MOV     #3,-(SP)
 033676  104437                                                                                 TRAP    C$SVEC
 033700  062706  000010                                                                         ADD     #10,SP
 033704                                         SETVEC  TXVECA,#CACHTX,#PRI06 ;SET UP INTERRUPT VECTOR TO CATCH TX INT.
 033704  012746  000300                                                                         MOV     #PRI06,-(SP)
 033710  012746  023540                                                                         MOV     #CACHTX,-(SP)
```

```
033714  016746  146310                                                                    MOV     TXVECA,-(SP)
033720  012746  000003                                                                    MOV     #3,-(SP)
033724  104437                                                                            TRAP    C$SVEC
033726  062706  000010                                                                    ADD     #10,SP
6664 033732                                 SETPRI  #PRI04          ;ALLOW DEVICE INTERRUPTS.
     033732  012700  000200                                                               MOV     #PRI04,R0
     033736  104441                                                                       TRAP    C$SPRI
6665                                    ;+
6666                                    ;ENABLE RECEPTION INTERRUPTS.
6667                                    ;DELAY 4 MS TO ALLOW TIME FOR THE INTERRUPTS TO TAKE PLACE.
6668                                    ;DISABLE RECEPTION INTERRUPTS.
6669                                    ;-
6670 033740  004767  166242                 JSR     PC,RXIE1        ;ENABLE THE RECEPTION INTERRUPTS.
6671 033744  012704  000004                  MOV    #4,R4           ;PASS 4 MS COUNT TO THE DELAY ROUTINE.
6672 033750  004767  164104                 JSR     PC,DELAY        ;DELAY 4 MILLI-SECONDS.
6673 033754  004767  166166                 JSR     PC,RXIE0        ;DISABLE RECEPTION INTERRUPTS.
6674                                    ;+
6675                                    ; VERIFY THAT THE CORRECT INTERRUPTS TOOK PLACE.
6676                                    ;    TEST THE INT COUNTER TO VERIFY THAT INTERRUPTS TOOK PLACE.
6677                                    ;-
6678 033760  005767  146324                  TST    RXINTC          ;CHECK THE RX INTERRUPT COUNT.
6679 033764  001017                         BNE     6$              ;SKIP THE FOLLOWING ERRORS IF COUNT <> 0.
6680                                    ;+
6681                                    ; DETERMINE REASON FOR NO RX INTERRUPTS AND PRINT PROPER ERROR MESSAGE.
6682                                    ;-
6683 033766  012701  013260                  MOV    #EM2604,R1      ;SET UP MSG IN CASE "RX.DATA.AVAIL IS CLR".
6684 033772  032777  000200  146236          BIT    #BIT7,@CSRA     ;TEST THE RX.DATA.AVAIL BIT OF THE CSR.
6685 034000  001416                         BEQ     8$              ;GO REPORT ERROR IF RX.DATA.AVAIL IS CLR.
6686 034002  012701  013172                  MOV    #EM2603,R1      ;SET UP MSG IN CASE "DATA.VALID IS CLEAR".
6687 034006  032777  100000  146224          BIT    #BIT15,@RBUFA   ;TEST THE DATA.VALID BIT OF THE FIFO.
6688 034014  001410                         BEQ     8$              ;GO REPORT ERROR IF DATA.VALID IS CLEAR.
6689 034016  012701  013101                  MOV    #EM2602,R1      ;SET UP MSG,"DATA.VALID IS SET".
6690 034022  000405                         BR      8$              ;GO REPORT THE ERROR.
6691                                    ;+
6692                                    ; IF RX INTS OCCURRED WITH RX.DATA.AVAIL CLEAR, REPORT THE ERROR.
6693                                    ;-
6694 034024  005767  146262          6$:     TST    RXINTF          ;CHECK THE RX INTERRUPT FLAGS.
6695 034030  100014                         BPL     10$             ;SKIP THE ERROR IF FLAG IS CLEAR.
6696 034032  012701  013354                  MOV    #EM2605,R1      ;SET UP THE PROPER MESSAGE.
6697                                    ;+
6698                                    ; REPORT THE ERROR WHICH HAS BEEN FOUND.
6699                                    ;-
6700 034036                          8$:    ERRDF   2603,EM2601,ER0503;             >>>>> ERROR #2603 <<<<<.
     034036  104455                                                                       TRAP    C$ERDF
     034040  005053                                                                       .WORD   2603
     034042  013043                                                                       .WORD   EM2601
     034044  016072                                                                       .WORD   ER0503
6701
6702                                    ;+
6703                                    ; EXIT THE TEST IF EXTENDED ERROR REPORTING HAS NOT BEEN ENABLED
6704                                    ;-
6705
6706 034046  032767  000100  146144          BIT    #BIT6,OPTION    ;EXIT WITH TEST FAILURE MESSAGE IF
6707 034054  001002                         BNE     .+6             ;
6708 034056  000167  000556                 JMP     34$             ;NO EXTENDED ERROR REPORTING HAS BEEN REQUESTED
6709
6710                                 ;+
```

```
                                        ; VERIFY THAT NO TX INTERRUPTS HAVE BEEN GENERATED SO FAR IN THIS TEST.
                                        ;-
034062  016702  146234                  10$:    MOV     TXINTC,R2           ;LOAD # OF TX INTERRUPTS FOR ER0504 RTN.
034066  001414                                  BEQ     12$                 ;SKIP ERROR IF NO TX INTERRUPTS.
                                            ;REPORT "TX INTERRUPTS(S) RECEIVED WITH TX INTERRUPTS DISABLED."
034070  012701  007521                          MOV     #EM0526,R1          ;SET UP MESSAGE ADR FOR INDIRECT PRINT.
034074                                          ERRDF   2604,EM2601,ER0504:                 >>>>> ERROR #2604 <<<<<.
        034074  104455                                                                                      TRAP    C$ERDF
        034076  005054                                                                                      .WORD   2604
        034100  013043                                                                                      .WORD   EM2601
        034102  016130                                                                                      .WORD   ER0504

                                            ;+
                                            ; EXIT THE TEST IF EXTENDED ERROR REPORTING HAS NOT BEEN ENABLED
                                            ;-

034104  032767  000100  146106                  BIT     #BIT06,OPTION       ;EXIT WITH TEST FAILURE MESSAGE IF
034112  001002                                  BNE     .+6                 ;
034114  000167  000520                          JMP     34$                 ;NO EXTENDED ERROR REPORTING HAS BEEN REQUESTED

                                        ;+
                                        ; CLEAN OUT THE INTERRUPT VECTORS USED IN THIS TEST.
                                        ;-
034120                                  12$:    SETPRI  #PRI06              ;DISABLE DEVICE INTERRUPTS.
        034120  012700  000300                                                                              MOV     #PRI06,R0
        034124  104441                                                                                      TRAP    C$SPRI
034126                                          CLRVEC  RXVECA              ;RETURN RX INT VECTOR TO UNUSED POOL.
        034126  016700  146074                                                                              MOV     RXVECA,R0
        034132  104436                                                                                      TRAP    C$CVEC
034134                                          CLRVEC  TXVECA              ;RETURN TX INT VECTOR TO UNUSED POOL.
        034134  016700  146070                                                                              MOV     TXVECA,R0
        034140  104436                                                                                      TRAP    C$CVEC

                                        ;+
                                        ; TEST TRANSMISSION INTERRUPTS.
                                        ;    SET UP FOR RX AND TX INTERRUPTS:
                                        ;    RX INTERRUPT SERVICE ROUTINE COUNTS RX INTERRUPTS.
                                        ;    TX INTERRUPT SERVICE ROUTINE COUNTS THE INTERRUPT AND SETS FLAGS.
                                        ;-
034142  005067  146142                          CLR     RXINTC              ;CLEAR THE RX INTERRUPT COUNTER.
034146  005067  146150                          CLR     TXINTC              ;CLEAR THE TX INTERRUPT COUNTER.
034152  005067  146146                          CLR     TXINTF              ;CLEAR THE RX INTERRUPT FLAGS.
034156                                          SETVEC  RXVECA,#CACHRX,#PRI06 ;SET UP INTERRUPT VECTOR TO CATCH RX INT.
        034156  012746  000300                                                                              MOV     #PRI06,-(SP)
        034162  012746  023512                                                                              MOV     #CACHRX,-(SP)
        034166  016746  146034                                                                              MOV     RXVECA,-(SP)
        034172  012746  000003                                                                              MOV     #3,-(SP)
        034176  104437                                                                                      TRAP    C$SVEC
        034200  062706  000010                                                                              ADD     #10,SP
034204                                          SETVEC  TXVECA,#TXINTR,#PRI06 ;SET UP INT VECTOR TO TX INT ROUTINE.
        034204  012746  000300                                                                              MOV     #PRI06,-(SP)
        034210  012746  024026                                                                              MOV     #TXINTR,-(SP)
        034214  016746  146010                                                                              MOV     TXVECA,-(SP)
        034220  012746  000003                                                                              MOV     #3,-(SP)
        034224  104437                                                                                      TRAP    C$SVEC
        034226  062706  000010                                                                              ADD     #10,SP
034232                                          SETPRI  #PRI04              ;ALLOW DEVICE INTERRUPTS.
        034232  012700  000200                                                                              MOV     #PRI04,R0
```

```
     034236  104441                                                                                  TRAP    C$SPRI
                                                ;+
                                                ; VERIFY THAT THE TX_ACTION BIT IS CLEAR.
                                                ;-
     034240  012705  000022                          MOV     #18.,R5         ;INITIALIZE THE LOOP COUNTER.
     034244  012701  000144                          MOV     #100.,R1        ;SET 100 MS TIME-OUT.
     034250  012702  100000                          MOV     #BIT15,R2       ;SELECT TX ACTION BIT TO TEST.
     034254  016704  145756                          MOV     CSRA,R4         ;PASS OUT CSR AS THE WORD TO TEST.
     034260  012703  100000                  14$:    MOV     #BIT15,R3       ;WAIT FOR TX_ACTION TO BE SET.
     034264  004767  163744                          JSR     PC,MSLOOP       ;WAIT UP TO 100 MS FOR TX_ACTION SET.
     034270  103026                                  BCC     20$             ;IF TIME-OUT, CONSIDER TX_ACTION CLEAR.
     034272  005003                                  CLR     R3              ;NOW, WAIT FOR TX_ACTION CLEAR.
     034274  004767  163734                          JSR     PC,MSLOOP       ;WAIT UP TO 100 MS FOR TX_ACTION CLEAR.
     034300  103005                                  BCC     16$             ;IF TIME-OUT, REPORT TX_ACTION WON'T CLEAR.
     034302  005305                                  DEC     R5              ;DECREMENT THE TX_ACTION SET COUNTER.
     034304  001365                                  BNE     14$             ;LOOP IF NOT TOO MANY TX_ACTIONS FOUND.
                                                ;REPORT "TX_ACTION SET REPEATEDLY AFTER RESET, NO DATA SENT."
     034306  012701  013476                          MOV     #EM2607,R1      ;SELECT ERROR MESSAGE.
     034312  000402                                  BR      18$             ;GO TO REPORT THE ERROR.
     034314  012701  013572                  16$:    MOV     #EM2608,R1      ;SELECT TX_ACTION STUCK SET MSG.
     034320                                  18$:    ERRDF   2605,EM2606,ER0503;             >>>>> ERROR #2605 <<<<<.
     034320  104455                                                                                  TRAP    C$ERDF
     034322  005055                                                                                  .WORD   2605
     034324  013437                                                                                  .WORD   EM2606
     034326  016072                                                                                  .WORD   ER0503
                                                ;+
                                                ; EXIT THE TEST IF EXTENDED ERROR REPORTING HAS NOT BEEN ENABLED
                                                ;-
     034330  032767  000100  145662                  BIT     #BIT06,OPTION   ;EXIT WITH TEST FAILURE MESSAGE IF
     034336  001540                                  BEQ     34$             ;NO EXTENDED ERROR REPORTING HAS BEEN REQUESTED
     034340  004767  166424                          JSR     PC,TXIE1        ;ENABLE TX INTERRUPTS FOR THE TX_INT TESTING.
     034344  000430                                  BR      24$             ;GO TO TEST WITH TX_ACTION SET.
                                                ;+
                                                ; VERIFY THAT NO INTERRUPTS OCCUR WITH TX_ACTION CLEAR.
                                                ;-
                                                20$:    JSR     PC,TXIE1        ;ENABLE TX_INTERRUPTS.
     034346  004767  166416                          MOV     #50.,R4         ;PASS 50 MS TIME TO THE DELAY ROUTINE.
     034352  012704  000062                          JSR     PC,DELAY        ;DELAY 50 MILLI-SECONDS TO ALLOW INTS TO OCCUR.
     034356  004767  163476                          TST     TXINTC          ;TEST THE TX INTERRUPT COUNT.
     034362  005767  145734                          BEQ     24$             ;SKIP THE ERROR IF NO TX INTERRUPTS.
     034366  001417                                  MOV     #EM2607,R1      ;SELECT MESSAGE IN CASE TX INT FLAG CLEAR.
     034370  012701  013476                          TST     TXINTF          ;TEST THE TX INTERRUPT FLAGS.
     034374  005767  145724                          BPL     22$             ;GO REPORT ERROR IF TX FLAG IS CLEAR.
     034400  100002                                  MOV     #EM2609,R1      ;TX FLAG IS SET, SELECT PROPER ERROR MESSAGE.
     034402  012701  013643                  ;REPORT "TRANSMIT INTERRUPT TEST ERROR:..."
                                                22$:    ERRDF   2606,EM2606,ER0503;             >>>>> ERROR #2606 <<<<<.
     034406                                                                                          TRAP    C$ERDF
     034406  104455                                                                                  .WORD   2606
     034410  005056                                                                                  .WORD   EM2606
     034412  013437                                                                                  .WORD   ER0503
     034414  016072
                                                ;+
                                                ; EXIT THE TEST IF EXTENDED ERROR REPORTING HAS NOT BEEN ENABLED
                                                ;-
     034416  032767  000100  145574                  BIT     #BIT06,OPTION   ;EXIT WITH TEST FAILURE MESSAGE IF
     034424  001500                                  BEQ     32$             ;NO EXTENDED ERROR REPORTING HAS BEEN REQUESTED
```

```
                                        ;+
                                        ; PREPARE TX INTERRUPT COUNTER AND FLAGS.
                                        ;-
034426  005067  145670          24$:        CLR     TXINTC          ;CLEAR THE TX INTERRUPT COUNT.
034432  005067  145666                      CLR     TXINTF          ;CLEAR THE TX INTERRUPT FLAGS.
                                        ;+
                                        ; SET UP LINE PARAMETERS FOR TRANSMISSION.
                                        ;-
034436  012705  177777                      MOV     #MAPLNS,R5      ;PASS ACTIVE LINES BIT MAP.
034442  012700  000200                      MOV     #200,R0         ;PASS INERT STATE, INTERNAL LOOPBACK.
034446  004767  166760                     JSR     PC,WTWLNC        ;DISABLE RECPTION AND DMA, ETC. ON DUT.
034452  012700  156430                      MOV     #156430,R0      ;SPECIFY 9600BPS,1STOP,NO PARITY,8BITS/CHAR.
034456  004767  167000                     JSR     PC,WTWLPR        ;WRITE TO ALL LPR REGISTERS.
                                        ;+
                                        ; SEND A NULL CHAR TO EACH LINE.
                                        ;-
034462  016701  145616                      MOV     IESTAT,R1       ;SET UP THE STATE OF THE INTERRUPT ENABLE BITS.
034466  005002                              CLR     R2              ;CLEAR THE LINE COUNTER.
034470  010177  145542          25$:        MOV     R1,@CSRA        ;SET UP THE LINE NUMBER AND INTERRUPT ENABLE
                                                                    ;BITS IN THE CSR.
034474  112777  000000  145542              MOVB    #0,@FDATA       ;SEND A NULL CHARACTER TO THE OUTPUT FIFO.
034502  005201                              INC     R1              ;NEXT CSR CONTENTS.
034504  005202                              INC     R2              ;NEXT LINE.
034506  020227  000020                      CMP     R2,#NUMLNS      ;IF ALL LINES HAVE NOT BEEN SERVICED THEN
034512  002766                             BLT     25$              ;BRANCH.
                                        ;+
                                        ; DELAY 250 MILLI-SECONDS TO ALLOW INTERRUPTS TO OCCUR.
                                        ;-
034514  012704  000372                      MOV     #250.,R4        ;SET UP FOR 250 MS DELAY.
034520  004767  163334                     JSR     PC,DELAY         ;WAIT 250 MS.
                                        ;+
                                        ; VERIFY THAT TX INTERRUPTS OCCURRED.
                                        ;-
034524  005767  145572                      TST     TXINTC          ;CHECK THE TX INTERRUPT COUNTER.
034530  001010                             BNE     26$              ;SKIP THE FOLLOWING ERROR IF WE GOT TX INTS.
                                        ;+
                                        ; DETERMINE THE REASON THAT WE RECEIVED NO INTERRUPTS.
                                        ;-
034532  012701  013722                      MOV     #EM2610,R1      ;SET UP MSG IN CASE "TX_ACTION IS SET".
034536  005777  145474                      TST     @CSRA           ;CHECK THE DUT CSR.
034542  100410                             BMI     28$              ;GO TO REPORT ERROR IF TX_ACTION IS SET.
034544  012701  014014                      MOV     #EM2611,R1      ;SET UP "TX_ACTION NOT SET" MESSAGE.
034550  000405                             BR      28$              ;GO AND REPORT THE ERROR.
                                        ;+
                                        ; CHECK TO VERIFY THAT TX_ACTION WAS SET FOR EACH INTERRUPT.
                                        ;-
034552  005767  145546          26$:        TST     TXINTF          ;CHECK THE TX INTERRUPT FLAGS.
034556  100012                             BPL     30$              ;SKIP ERROR IF TX_ACTION CLR FLAG IS CLEAR.
034560  012701  013643                      MOV     #EM2609,R1      ;SET UP TX INT WITH "TX_ACTION CLR" MSG.
                                        ;+
                                        ; REPORT "TRANSMIT INTERRUPT TEST ERROR:...."
                                        ;-
034564                          28$:       ERRDF    2607,EM2606,ER0503;          >>>>> ERROR #2607 <<<<<.
034564  104455                                                                                TRAP    C$ERDF
034566  005057                                                                                .WORD   2607
034570  013437                                                                                .WORD   EM2606
```

```
     034572  016072                                                                                  .WORD   ER0503
6847
6848                                                ;+
6849                                                ; EXIT THE TEST IF EXTENDED ERROR REPORTING HAS NOT BEEN ENABLED
6850                                                ;-
6851 034574  032767  000100  145416                     BIT     #BIT06,OPTION   ;EXIT WITH TEST FAILURE MESSAGE IF
6852 034602  001411                                    BEQ     32$             ;NO EXTENDED ERROR REPORTING HAS BEEN REQUESTED
6853
6854                                            ;+
6855                                            ; VERIFY THAT NO RX INTERRUPTS HAVE BEEN GENERATED SO FAR IN THIS TEST.
6856                                            ;-
6857 034604  016702  145500                     30$:    MOV     RXINTC,R2       ;LOAD # OF RX INTERRUPTS FOR ER0504 RTN.
6858 034610  001406                                    BEQ     32$             ;SKIP ERROR IF NO RX INTERRUPTS.
6859 034612  012701  007431                             MOV     #EM0525,R1      ;SET UP MESSAGE ADR FOR INDIRECT PRINT.
6860                                                ;REPORT "RX INTERRUPTS(S) RECEIVED WITH RX INTERRUPTS DISABLED."
6861 034616                                            ERRDF   2608,EM2606,ER0504;             >>>>> ERROR #2608 <<<<<.
     034616  104455                                                                                  TRAP    C$ERDF
     034620  005060                                                                                  .WORD   2608
     034622  013437                                                                                  .WORD   EM2606
     034624  016130                                                                                  .WORD   ER0504
6862                                            ;+
6863                                            ; DISABLE INTERRUPTS AND CLEAN OUT THE INTERRUPT VECTORS USED IN THIS TEST.
6864                                            ;-
6865 034626  005001                             32$:    CLR     R1              ;CLEAR BOTH TRANSMITTER
6866 034630  004767  166074                            JSR     PC,TXIE0        ; INTERRUPT ENABLE AND RECEIVER
6867 034634  004767  165306                            JSR     PC,RXIE0        ; INTERRUPT ENABLE BITS IN THE DUT CSR.
6868 034640                                     34$:   SETPRI  #PRI06          ;DISABLE DEVICE INTERRUPTS.
     034640  012700  000300                                                                          MOV     #PRI06,R0
     034644  104441                                                                                  TRAP    C$SPRI
6869 034646                                            CLRVEC  RXVECA          ;RETURN RX INT VECTOR TO UNUSED POOL.
     034646  016700  145354                                                                          MOV     RXVECA,R0
     034652  104436                                                                                  TRAP    C$CVEC
6870 034654                                            CLRVEC  TXVECA          ;RETURN TX INT VECTOR TO UNUSED POOL.
     034654  016700  145350                                                                          MOV     TXVECA,R0
     034660  104436                                                                                  TRAP    C$CVEC
6871
6872 034662  005067  145414                     60$:    CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
6873 034666                                            SETPRI  #PRI07          ;DISABLE ALL INTERRUPTS.
     034666  012700  000340                                                                          MOV     #PRI07,R0
     034672  104441                                                                                  TRAP    C$SPRI
6874 034674                                            ENDTST
     034674                                                                                  L10053:
     034674  104401                                                                                  TRAP    C$ETST
6875
```

```
                                        .SBTTL  HARDWARE TEST           - BRLEVA -
                                        ;++ ***********************************************************************
                                        ;*                          - BR LEVEL TEST B -
                                        ;*      THIS TEST VERIFIES THAT THE DEVICE UNDER TEST (DUT) WILL GENERATE
                                        ;*      RECEPTION AND TRANSMISSION INTERRUPTS AT THE CORRECT BR LEVEL.
                                        ;*      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.
                                        ;*
                                        ;-- ***********************************************************************

034676                                          BGNTST
034676                                                                                          T23::
034676                                          SETPRI  #PRIO5          ;ALLOW LTC INTERRUPTS.
034676  012700  000240                                                                          MOV     #PRIO5,R0
034702  104441                                                                                  TRAP    C$SPRI
        000027                                   TNUM == TNUM + 1       ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
034704  012767  000027  145406                   MOV     #TNUM,TSTNUM   ;SET UP THE TEST NUMBER.        (30)
034712  012767  177777  145362                   MOV     #-1,CTRLCF     ;INDICATE THAT WE ARE IN A TEST.
034720  012767  000001  147034                   MOV     #1,ERRTYP      ;SET ERROR TYPE AS FATAL IN ERROR TABLE.
034726  012767  005671  147030                   MOV     #3001.,ERRNBR  ;SET THE FIRST ERROR NUMBER IN ERROR TABLE.
034734  012767  014173  147024                   MOV     #EM3001,ERRMSG ;SET ERROR MESSAGE ADDRESS IN ERRTBL.
034742  005067  145510                           CLR     ERSMRF         ;INITIALIZE THE "REPORT ERROR SUMMARY" FLAGS.
                                        ;+
                                        ; RESET THE DUT TO A KNOWN STATE, DO NOT REMOVE THE STATUS CODES FROM THE FIFO.
                                        ;  CLEAR TX AND RX INTERRUPT ENABLE BITS IN THE CSR.
                                        ; THIS SUBROUTINE REPORTS ERRORS FROM >>>>> 3001 THRU 3002 <<<<<.
                                        ;-
034746  004767  164340                          JSR     PC,RESETT      ;RESET THE DHU-11, REPORT ANY ERRORS FOUND.
034752  103402                                  BCS     2$             ;SKIP AROUND ABORTING TEST IF NO ERROR FOUND.
034754  000167  000644                          JMP     60$            ;ABORT TEST IF FATAL ERROR FOUND DURING RESET.
034760  012767  005673  146776  2$:              MOV     #3003.,ERRNBR  ;SET THE ERROR REPORT NUMBER TO 3003.
                                        ;+
                                        ; ENABLE TRANSMITTERS ON ALL LINES.
                                        ;-
034766  012705  177777                  4$:      MOV     #MAPLNS,R5     ;PASS ACTIVE LINE BIT MAP.
034772  004767  165636                          JSR     PC,TXENBL      ;ENABLE TRANSMISSION ON ALL LINES.
                                        ;+
                                        ; GENERATE A TRANSMISSION INTERRUPT REQUEST.
                                        ; PROCESSOR PRIORITY SHOULD BE AT 7 DISABLING INTS.
                                        ;-
034776                                          SETPRI  #PRIO7          ;DISABLE ALL INTERRUPTS.
034776  012700  000340                                                                          MOV     #PRIO7,R0
035002  104441                                                                                  TRAP    C$SPRI
035004                                          SETVEC  TXVECA,#TXINTR,#PRIO7 ;SET UP INTERRUPT VECTOR TO CATCH TX INT.
035004  012746  000340                                                                          MOV     #PRIO7,-(SP)
035010  012746  024026                                                                          MOV     #TXINTR,-(SP)
035014  016746  145210                                                                          MOV     TXVECA,-(SP)
035020  012746  000003                                                                          MOV     #3,-(SP)
035024  104437                                                                                  TRAP    C$SVEC
035026  062706  000010                                                                          ADD     #10,SP
                                            ;+
                                            ; SET UP DUT FOR TRANSMISSION INTERRUPTS:
                                            ;  SET UP INTERNAL LOOPBACK.
                                            ;  SET UP LINE PARAMETERS FOR TRANSMISSION.
                                            ;-
```

```
035032  012705  177777                  MOV     #MAPLNS,R5      ;PASS ACTIVE LINES BIT MASK.
035036  012700  000200                  MOV     #200,R0         ;PASS INERT STATE, INTERNAL LOOPBACK.
035042  004767  166364                  JSR     PC,WTWLNC       ;DISABLE RECPTION AND DMA, ETC. ON DUT.
035046  012700  156430                  MOV     #156430,R0      ;SPECIFY 9600BPS,1STOP,NO PARITY,8BITS/CHAR.
035052  004767  166404                  JSR     PC,WTWLPR       ;WRITE INTO ALL LPR REGISTERS.
                                    ;+
                                    ; SEND A NULL CHAR TO EACH LINE.
                                    ;-
035056  016701  145222                  MOV     IESTAT,R1       ;SET UP THE STATE OF THE INTERRUPT ENABLE BITS.
035062  010177  145150          5$:     MOV     R1,@CSRA        ;SET UP THE LINE NUMBER AND INTERRUPT ENABLE
                                                                ;BITS IN THE CSR.
035066  112777  000000  145150          MOVB    #0,@FDATA       ;SEND A NULL CHARACTER TO THE OUTPUT FIFO.
035074  005201                          INC     R1              ;NEXT LINE.
035076  020127  000020                  CMP     R1,#NUMLNS      ;IF ALL LINES HAVE NOT BEEN SERVICED THEN
035102  002767                          BLT     5$              ;BRANCH.
                                    ;+
                                    ; DELAY 50 MS TO ALLOW TIME FOR THE INTERRUPT TO BE GENERATED.
                                    ;-
035104  012704  000062                  MOV     #50.,R4         ;PASS 50 MS TIME TO THE DELAY ROUTINE.
035110  004767  162744                  JSR     PC,DELAY        ;DELAY 50 MILLI-SECONDS.
                                ;+
                                ; GENERATE A RECEPTION INTERRUPT REQUEST.
                                ;-
035114                                  SETVEC  RXVECA,#RXBRRT,#PRI07 ;SET UP INTERRUPT VECTOR TO CATCH RX INT.
035114  012746  000340                                                                  MOV     #PRI07,-(SP)
035120  012746  023636                                                                  MOV     #RXBRRT,-(SP)
035124  016746  145076                                                                  MOV     RXVECA,-(SP)
035130  012746  000003                                                                  MOV     #3,-(SP)
035134  104437                                                                          TRAP    C$SVEC
035136  062706  000010                                                                  ADD     #10,SP
                                ;+
                                ; SET UP FOR THE LOOP WHICH TESTS THE INTERRUPT BR LEVELS.
                                ;-
035142  012705  000340                  MOV     #340,R5         ;SET UP THE PRIORITY LEVEL TO 7.
035146  005003                          CLR     R3              ;CLEAR THE RX PRIORITY STORE AND FLAGS.
035150  005002                          CLR     R2              ;CLEAR THE TX PRIORITY STORE AND FLAGS.
                                    ;+
                                    ; ENABLE TX AND RX INTERRUPTS.
                                    ; PROCESSOR PRIORITY SHOULD BE AT 7 DISABLING THE INTERRUPTS.
                                    ;-
035152  004767  165030                  JSR     PC,RXIE1        ;ENABLE RECEIVER INTERRUPTS.
035156  004767  165606                  JSR     PC,TXIE1        ;ENABLE TRANSMITTER INTERRUPTS.
                                ;+
                                ; LOOP, LOWERING THE PROCESSOR PRIORITY UNTIL THE DUT INTERRUPTS ON RX AND TX.
                                ;-
035162  005067  145134          6$:     CLR     TXINTC          ;CLEAR THE TX INTERRUPT COUNTER.
035166  005067  145132                  CLR     TXINTF          ;CLEAR THE TX INTERRUPT FLAGS.
035172  005067  145112                  CLR     RXINTC          ;CLEAR THE RX INTERRUPT COUNTER.
035176  005067  145110                  CLR     RXINTF          ;CLEAR THE RX INTERRUPT FLAGS.
035202                                  SETPRI  R5              ;SET PROCESSOR PRIORITY TO THE SELECTED VALUE.
035202  010500                                                                          MOV     R5,R0
035204  104441                                                                          TRAP    C$SPRI
035206  012704  000001                  MOV     #1,R4           ;PASS 1 MS COUNT TO THE DELAY ROUTINE.
035212  004767  162642                  JSR     PC,DELAY        ;DELAY 1 MS TO ALLOW INTERRUPTS TO OCCUR.
                                    ;+
                                    ; DETERMINE IF ANY RX DUT INTERRUPTS OCCURRED.
                                    ; LOG THE PROCESSOR PRIORITY FOR THE RX INTERRUPT IF FIRST RX INT.
```

```
                                        ;-
035216  005767  145066                      TST     RXINTC          ;CHECK THE RECEIVE INTERRUPT COUNTER.
035222  001412                             BEQ     8$              ;SKIP THE PRIORITY LOG IF NO RX INT OCCURRED.
                                           ;+
                                           ; IF THIS IS THE FIRST RX INTERRUPT, LOG THE PRIORITY.
                                           ;-
035224  005703                              TST     R3              ;CHECK THE RX PRIORITY STORE AND FLAGS.
035226  001010                             BNE     8$              ;GOTO TEST FOR TX INTS IF NOT THE FIRST RX INT.
035230  010503                              MOV     R5,R3           ;LOG THE PRESENT PRIORITY IN THE RX PRIO STORE.
035232  052703  100000                      BIS     #BIT15,R3       ;SET THE RX INT HAS OCCURRED FLAG.
035236  016700  145050                      MOV     RXINTF,R0       ;GET THE RX INTERRUPT ROUTINE FLAGS.
035242  042700  137777                      BIC     #137777,R0      ;CLEAR ALL BUT THE TX INT ERROR FLAG.
035246  050003                              BIS     R0,R3           ;IF TX INT ERROR, SET BIT 14 OF THE PRIO FLAGS.
                                        ;+
                                        ; DETERMINE IF ANY TX DUT INTERRUPTS HAVE OCCURRED.
                                        ; LOG THE PRESENT PROCESSOR PRIORITY IF THIS IS THE FIRST TX INTERRUPT.
                                        ;-
035250  005767  145046          8$:         TST     TXINTC          ;CHECK THE TRANSMIT INTERRUPT COUNTER.
035254  001405                             BEQ     10$             ;SKIP THE PRIORITY LOG IF NO TX INT OCCURRED.
                                           ;+
                                           ; IF THIS IS THE FIRST TX INTERRUPT, LOG THE PRIORITY.
                                           ;-
035256  005702                              TST     R2              ;CHECK THE TX PRIORITY STORE AND FLAGS.
035260  100403                             BMI     10$             ;SKIP THE LOGGING IF NOT FIRST TX INTERRUPT.
035262  010502                              MOV     R5,R2           ;LOG THE PRESENT PRIORITY IN THE TX PRIO STORE.
035264  052702  100000                      BIS     #BIT15,R2       ;SET THE TX INT HAS OCCURRED FLAG.
                                        ;+
                                        ; SELECT NEXT PROCESSOR PRIORITY.
                                        ; TEST FOR BOTH RX AND TX INTERRUPTS HAVING OCCURRED, LOOP IF NOT.
                                        ;-
035270  162705  000040          10$:        SUB     #40,R5          ;DECREMENT PRIORITY LEVEL BY ONE.
035274  002402                             BLT     12$             ;GOTO CHECK FOR ERRORS IF BELOW PRIORITY ZERO.
035276  030203                              BIT     R2,R3           ;AND PRIO FLAGS TOGETHER, ALTER NONE OF THEM.
035300  100330                             BPL     6$              ;LOOP IF RX AND TX INTS HAVEN'T BOTH OCCURRED.
                                        ;+
                                        ; DISABLE INTERRUPTS AND CLEAR INTERRUPT VECTORS.
                                        ;-
035302                          12$:        SETPRI  #PRIO7          ;DISABLE ALL INTERRUPTS.
035302  012700  000340                                                                          MOV     #PRIO7,R0
035306  104441                                                                                  TRAP    C$SPRI
035310                                      CLRVEC  RXVECA          ;RETURN RX INT VECTOR TO UNUSED POOL.
035310  016700  144712                                                                          MOV     RXVECA,R0
035314  104436                                                                                  TRAP    C$CVEC
035316                                      CLRVEC  TXVECA          ;RETURN TX INT VECTOR TO UNUSED POOL.
035316  016700  144706                                                                          MOV     TXVECA,R0
035322  104436                                                                                  TRAP    C$CVEC
                                        ;+
                                        ; VERIFY THAT RX AND TX INTERRUPTS OCCURRED,
                                        ; AT THE PROPER BR LEVEL, AND
                                        ; IN THE PROPER ORDER.
                                        ;    DETERMINE IF TX INTERRUPT OCCURRED.
                                        ;-
035324  005702                              TST     R2              ;DETERMINE WHETHER TX INT OCCURRED OR NOT.
035326  100420                             BMI     16$             ;SKIP THESE ERRORS IF TX INT OCCURRED.
                                        ;+
                                        ; DETERMINE REASON THAT NO TX INT OCCURRED.
                                        ;-
```

```
035330  012701  013722                  MOV     #EM2610,R1      ;SELECT "NO TX INT FROM TX.ACTION" MESSAGE.
035334  005777  144676                  TST     @CSRA           ;CHECK THE TX.ACTION BIT OF THE DUT CSR.
035340  100402                         BMI     14$              ;SKIP TX.ACTION CLR MSG SELECTION IF IT IS SET.
035342  012701  014014                  MOV     #EM2611,R1      ;SELECT "TX.ACTION CLEAR AFTER CHARS SENT" MSG.
                                   ;REPORT "INTERRUPT BR LEVEL TEST ERROR:"
035346                          14$:    ERRDF   3003,EM3001,ER0503;             >>>>> ERROR #3003 <<<<<.
035346  104455                                                                                  TRAP    C$ERDF
035350  005673                                                                                  .WORD   3003
035352  014173                                                                                  .WORD   EM3001
035354  016072                                                                                  .WORD   ER0503

                                   ;+
                                   ; EXIT THE TEST IF EXTENDED ERROR REPORTING HAS NOT BEEN ENABLED
                                   ;-
035356  032767  000100  144634          BIT     #BIT06,OPTION   ;EXIT WITH TEST FAILURE MESSAGE IF
035364  001513                         BEQ     26$              ;NO EXTENDED ERROR REPORTING HAS BEEN REQUESTED

035366  000427                         BR      18$              ;SKIP THE BR LEVEL CHECK, NO TX INT OCCURRED.
                                   ;+
                                   ; VERIFY THAT THE TX INTERRUPT WAS AT THE PROPER BR LEVEL.
                                   ;-
035370  010204                  16$:    MOV     R2,R4           ;CALCULATE THE BR LEVEL
035372  042704  177400                  BIC     #177400,R4      ; THAT THE TRANMSIT
035376  006204                          ASR     R4              ; INTERRUPT WAS
035400  006204                          ASR     R4              ; REQUESTED AT, WHICH
035402  006204                          ASR     R4              ; IS ONE GREATER THAN
035404  006204                          ASR     R4              ; THE PROCESSOR PRIORITY
035406  006204                          ASR     R4              ; LEVEL AT WHICH THE
035410  005204                          INC     R4              ; TRANSMIT INTERRUPT OCCURRED.
035412  116705  144616                  MOVB    BRLEVL,R5       ;GET THE EXPECTED INTERRUPT BR LEVEL.
035416  120405                          CMPB    R4,R5           ;COMPARE THE INTERRUPT BR LEVEL WITH EXPECTED.
035420  001412                         BEQ     18$              ;SKIP THE ERROR IF BR LEVEL IS CORRECT.
                                   ;REPORT "TX INTERRUPT GENERATED AT WRONG BR LEVEL: ..."
035422  012701  014326                  MOV     #EM3003,R1      ;SELECT THE ERROR MESSAGE FOR THE ERROR CALL.
035426                                 ERRDF   3004,EM3001,ER3001;             >>>>> ERROR #3004 <<<<<.
035426  104455                                                                                  TRAP    C$ERDF
035430  005674                                                                                  .WORD   3004
035432  014173                                                                                  .WORD   EM3001
035434  016554                                                                                  .WORD   ER3001

                                   ;+
                                   ; EXIT THE TEST IF EXTENDED ERROR REPORTING HAS NOT BEEN ENABLED
                                   ;-
035436  032767  000100  144554          BIT     #BIT06,OPTION   ;EXIT WITH TEST FAILURE MESSAGE IF
035444  001463                         BEQ     26$              ;NO EXTENDED ERROR REPORTING HAS BEEN REQUESTED

                                   ;+
                                   ; DETERMINE IF RX INTERRUPT OCCURRED.
                                   ;-
035446  005703                  18$:    TST     R3              ;CHECK THE RX INT OCCURRED FLAG.
035450  100421                         BMI     22$              ;SKIP THESE ERRORS IF RX INT OCCURRED.
                                   ;+
                                   ; DETERMINE REASON THAT NO RX INT OCCURRED.
                                   ;-
035452  012701  014077                  MOV     #EM2612,R1      ;SELECT "NO RX INT FROM RX.DATA.AVAIL" MSG.
035456  032777  000200  144552          BIT     #BIT7,@CSRA     ;CHECK THE RX.DATA.AVAIL BIT OF THE DUT CSR.
035464  001002                         BNE     20$              ;SKIP RX.DATA.AVAIL CLR MSG IF BIT IS SET.
035466  012701  014232                  MOV     #EM3002,R1      ;SELECT "NO RX.DATA.AVAIL AFTER RESET" MSG.
```

```
                                        ;REPORT 'INTERRUPT BR LEVEL TEST ERROR:"
035472                            20$:    ERRDF   3005,EM3001,ER0503;          >>>>> ERROR #3005 <<<<<.
035472  104455                                                                                  TRAP    C$ERDF
035474  005675                                                                                  .WORD   3005
035476  014173                                                                                  .WORD   EM3001
035500  016072                                                                                  .WORD   ER0503
                                        ;+
                                        ; EXIT THE TEST IF EXTENDED ERROR REPORTING HAS NOT BEEN ENABLED
                                        ;-
035502  032767  000100  144510              BIT     #BIT06,OPTION   ;EXIT WITH TEST FAILURE MESSAGE IF
035510  001441                             BEQ     26$             ;NO EXTENDED ERROR REPORTING HAS BEEN REQUESTED

035512  000427                             BR      24$             ;SKIP THE BR CHECK IF NO RX INT OCCURRED.
                                        ;+
                                        ; VERIFY THAT THE RX INTERRUPT WAS AT THE PROPER BR LEVEL.
                                        ;-
035514  010304                    22$:      MOV     R3,R4           ;CALCULATE THE BR LEVEL
035516  042704  177400                    BIC     #177400,R4      ; THAT THE RECEIVE
035522  006204                            ASR     R4              ; INTERRUPT WAS
035524  006204                            ASR     R4              ; REQUESTED AT, WHICH
035526  006204                            ASR     R4              ; IS ONE GREATER THAN
035530  006204                            ASR     R4              ; THE PROCESSOR PRIORITY
035532  006204                            ASR     R4              ; LEVEL AT WHICH THE
035534  005204                            INC     R4              ; RECEIVE INTERRUPT OCCURRED.
035536  116705  144472                    MOVB    BRLEVL,R5       ;GET THE EXPECTED INTERRUPT BR LEVEL.
035542  120405                            CMPB    R4,R5           ;COMARE THE INTERRUPT BR LEVEL WITH EXPECTED.
035544  001412                             BEQ     24$             ;SKIP THE ERROR IF BR LEVEL IS CORRECT.
                                        ;REPORT "RX INTERRUPT GENERATED AT WRONG BR LEVEL: ..."
035546  012701  014402                    MOV     #EM3004,R1      ;SELECT ERROR MESSAGE FOR THE ERROR CALL.
035552                                     ERRDF   3006,EM3001,ER3001;          >>>>> ERROR #3006 <<<<<.
035552  104455                                                                                  TRAP    C$ERDF
035554  005676                                                                                  .WORD   3006
035556  014173                                                                                  .WORD   EM3001
035560  016554                                                                                  .WORD   ER3001
                                        ;+
                                        ; EXIT THE TEST IF EXTENDED ERROR REPORTING HAS NOT BEEN ENABLED
                                        ;-
035562  032767  000100  144430              BIT     #BIT06,OPTION   ;EXIT WITH TEST FAILURE MESSAGE IF
035570  001411                             BEQ     26$             ;NO EXTENDED ERROR REPORTING HAS BEEN REQUESTED

                                        ;+
                                        ; TEST FOR INTERRUPTS OCCURING IN THE PROPER ORDER.
                                        ;-
035572  032703  040000            24$:      BIT     #BIT14,R3       ;CHECK THE IMPROPER INT ORDER ERROR FLAG.
035576  001406                             BEQ     26$             ;SKIP ERROR REPORT IF ERROR DID NOT OCCUR.
                                        ;REPORT "TX INTERRUPT GIVEN PRECEDENCE OVER SIMULTANEOUS RX INT."
035600  012701  014456                    MOV     #EM3005,R1      ;SELECT THE ERROR MESSAGE FOR INDIRECT PRINT.
035604                                     ERRDF   3007,EM3001,ER0503;          >>>>> ERROR #3007 <<<<<.
035604  104455                                                                                  TRAP    C$ERDF
035606  005677                                                                                  .WORD   3007
035610  014173                                                                                  .WORD   EM3001
035612  016072                                                                                  .WORD   ER0503
                                        ;+
                                        ; CLEAN UP, EXIT THE TEST.
                                        ;-
035614  004767  165110            26$:      JSR     PC,TXIE0        ;CLEAR TRANSMITTER INTERRUPTS.
035620  004767  164322                     JSR     PC,RXIE0        ;CLEAR RECEIVER INTERRUPTS.
```

```
7117 035624  005067  144452          60$:     CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
7118 035630                                   SETPRI  #PRIO7          ;DISABLE ALL INTERRUPTS.
     035630  012700  000340                                                                   MOV     #PRIO7,R0
     035634  104441                                                                           TRAP    C$SPRI
7119 035636                                   ENDTST
     035636                                                                       L10054:
     035636  104401                                                                           TRAP    C$ETST
7120
```

```
                                        .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.
                                        ;*
                                        ;-- ************************************************************************
 035640                                         BGNTST
 035640                                                                                         T24::
          000030                                 TNUM == TNUM + 1        ;INCREMENT THE ASSEMBLY TIME TEST COUNTER.
 035640   012767  000030  144452                 MOV     #TNUM,TSTNUM    ;SET UP THE TEST NUMBER.        (93)
 035646   012767  177777  144426                 MOV     #-1,CTRLCF      ;INDICATE THAT WE ARE IN A TEST.
 035654   016702  144640                         MOV     BMPCQP,R2       ;GET THE CONTENTS OF THE POINTER.
 035660   012703  002522                         MOV     #BMPCQB,R3      ;GET THE START ADDRESS OF THE QUEUE.
 035664   020203                                 CMP     R2,R3           ;SEE IF THE POINTER HAS MOVED FROM THE BASE.
 035666   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"

 035670   012701  015370                        MOV     #EM9304,R1      ;PASS THE FIRST MESSAGE TO BE REORTED.
 035674                                         ERRDF   9301,EM9301,ER9301 ;            >>>>> ERROR #9301 <<<<<.
 035674   104455                                                                                        TRAP    C$ERDF
 035676   022125                                                                                        .WORD   9301
 035700   015253                                                                                        .WORD   EM9301
 035702   017216                                                                                        .WORD   ER9301

 035704   012767  002522  144606                 MOV     #BMPCQB,BMPCQP  ;SET POINTER BACK TO THE BEGINING OF THE QUE.

 035712   005067  144364          60$:          CLR     CTRLCF          ;INDICATE THAT WE ARE NOT WITHIN A TEST.
 035716                                         ENDTST
 035716                                                                                         L10055:
 035716   104401                                                                                        TRAP    C$ETST
```

```
                                        ;*****************************************************************************
                                        ;
                                        ;               FVTB.HWQ
                                        ;
                                        ;*****************************************************************************


                                        .SBTTL  HARDWARE PARAMETER CODING SECTION



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

035720                                          BGNHRD
035720  000022                                                                          .WORD L10056-L$HARD/2
035722                                                                          L$HARD::

                                        ;DEVICE CSR ADDRESS QUESTION:
035722                                          GPRMA   HWPTQ1,0,0,160000,177776,YES
035722  000031                                                                          .WORD   T$CODE
035724  035766                                                                          .WORD   HWPTQ1
035726  160000                                                                          .WORD   T$LOLIM
035730  177776                                                                          .WORD   T$HILIM

                                        ;DEVICE INTERRUPT VECTOR QUESTION:
035732                                          GPRMA   HWPTQ2,2,0,40,776,YES
035732  001031                                                                          .WORD   T$CODE
035734  036004                                                                          .WORD   HWPTQ2
035736  000040                                                                          .WORD   T$LOLIM
035740  000776                                                                          .WORD   T$HILIM

                                        ;ACTIVE LINES BIT MAP QUESTION:
035742                                          GPRMD   HWPTQ3,4,0,MAPLNS,0,MAPLNS,YES
035742  002032                                                                          .WORD   T$CODE
035744  036037                                                                          .WORD   HWPTQ3
035746  177777                                                                          .WORD   MAPLNS
035750  000000                                                                          .WORD   T$LOLIM
035752  177777                                                                          .WORD   T$HILIM

                                        ;INTERRUPT BR LEVEL QUESTION:
035754                                          GPRMD   HWPTQ4,6,0,377,0,6,YES
035754  003032                                                                          .WORD   T$CODE
035756  036065                                                                          .WORD   HWPTQ4
035760  000377                                                                          .WORD   377
035762  000000                                                                          .WORD   T$LOLIM
035764  000006                                                                          .WORD   T$HILIM


035766                                          ENDHRD
                                                                                        .EVEN
035766                                                                          L10056:
```

```
7205 035766    103    123    122        HWPTQ1: .ASCIZ  /CSR ADDRESS: /
     035771    040    101    104
     035774    104    122    105
     035777    123    123    072
     036002    040    000
7206 036004    111    116    124        HWPTQ2: .ASCIZ  /INTERRUPT VECTOR ADDRESS: /
     036007    105    122    122
     036012    125    120    124
     036015    040    126    105
     036020    103    124    117
     036023    122    040    101
     036026    104    104    122
     036031    105    123    123
     036034    072    040    000
7207 036037    101    103    124        HWPTQ3: .ASCIZ  /ACTIVE LINE BIT MAP: /
     036042    111    126    105
     036045    040    114    111
     036050    116    105    040
     036053    102    111    124
     036056    040    115    101
     036061    120    072    040
     036064    000
7208 036065    111    116    124        HWPTQ4: .ASCIZ  /INTERRUPT BR LEVEL: /
     036070    105    122    122
     036073    125    120    124
     036076    040    102    122
     036101    040    114    105
     036104    126    105    114
     036107    072    040    000
7209
7210                                    .EVEN
```

```
                                ;*****************************************************************************
                                ;
                                ;               FVTA.SWQ
                                ;
                                ;*****************************************************************************


                                .SBTTL  SOFTWARE PARAMETER CODING SECTION

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

036112                                  BGNSFT
036112  000017                                                          .WORD L10057-L$SOFT/2
036114                                                          L$SOFT::

                                ;UNIT NUMBER PRINTOUT QUESTION:
036114                                  GPRML   SWPTQ1,0,20,YES
036114  000130                                                          .WORD   T$CODE
036116  036152                                                          .WORD   SWPTQ1
036120  000020                                                          .WORD   20
                                ;ROM VERSION NUMBER PRINTOUT ON FIRST PASS QUESTION:
036122                                  GPRML   SWPTQ2,0,1,YES
036122  000130                                                          .WORD   T$CODE
036124  036226                                                          .WORD   SWPTQ2
036126  000001                                                          .WORD   1
                                ;EXTENDED ERROR REPORTING QUESTION:
036130                                  GPRML   SWPTQ3,0,100,YES
036130  000130                                                          .WORD   T$CODE
036132  036277                                                          .WORD   SWPTQ3
036134  000100                                                          .WORD   100
                                  ;+
                                  ; IF EXTENDED ERROR REPORTING IS NOT REQUIRED THEN SKIP THE NEXT QUESTION.
                                  ;+
036136                                  XFERF   ENDD
036136  006044                                                           WORD   T$CODE

                                ;NUMBER OF INDIVIDUAL DATA ERRORS TO REPORT ON A LINE QUESTION:
036140                                  GPRMD   SWPTQ4,2,D,177777,0,177777,YES
036140  001052                                                          .WORD   T$CODE
036142  036332                                                          .WORD   SWPTQ4
036144  177777                                                          .WORD   177777
036146  000000                                                          .WORD   T$LOLIM
036150  177777                                                          .WORD   T$HILIM
                                        .EVEN

                                ENDD:   ENDSFT
                                                                        .EVEN
036152                                                          L10057:
```

```
7266 036152   122   105   120      SWPTQ1: .ASCIZ  /REPORT UNIT NUMBER AS EACH UNIT IS TESTED: /
     036155   117   122   124
     036160   040   125   116
     036163   111   124   040
     036166   116   125   115
     036171   102   105   122
     036174   040   101   123
     036177   040   105   101
     036202   103   110   040
     036205   125   116   111
     036210   124   040   111
     036213   123   040   124
     036216   105   123   124
     036221   105   104   072
     036224   040   000
7267 036226   122   117   115      SWPTQ2: .ASCIZ  /ROM VERSION PRINTOUT ON THE FIRST PASS: /
     036231   040   126   105
     036234   122   123   111
     036237   117   116   040
     036242   120   122   111
     036245   116   124   117
     036250   125   124   040
     036253   117   116   040
     036256   124   110   105
     036261   040   106   111
     036264   122   123   124
     036267   040   120   101
     036272   123   123   072
     036275   040   000
7268 036277   105   130   124      SWPTQ3: .ASCIZ  /EXTENDED ERROR REPORTING: /
     036302   105   116   104
     036305   105   104   040
     036310   105   122   122
     036313   117   122   040
     036316   122   105   120
     036321   117   122   124
     036324   111   116   107
     036327   072   040   000
7269 036332   116   125   115      SWPTQ4: .ASCIZ  /NUMBER OF INDIVIDUAL DATA ERRORS TO REPORT ON A LINE: /
     036335   102   105   122
     036340   040   117   106
     036343   040   111   116
     036346   104   111   126
     036351   111   104   125
     036354   101   114   040
     036357   104   101   124
     036362   101   040   105
     036365   122   122   117
     036370   122   123   040
     036373   124   117   040
     036376   122   105   120
     036401   117   122   124
     036404   040   117   116
     036407   040   101   040
     036412   114   111   116
     036415   105   072   040
     036420   000
```

```
7270                                    .EVEN
```

```
                                ;*****************************************************************************
                                ;
                                ;               FVTSKL6.P11
                                ;
                                ;*****************************************************************************


036422                          $PATCH::
036422                                  .BLKW   24


036472                                  LASTAD
                                                                                        .EVEN
036472  000000                                                                          .WORD   0
036474  000000                                                                          .WORD   0
036476                          L$LAST::
036476                                  ENDMOD


        000001                          .END
```

SYMBOL TABLE

ACTLNS	002224	G	C$AU	= 000052	DROP	025002		EM0902	011002	G	EM9024	015235	G
ADR	= 000020	G	C$AUTO	= 000061	DR00MG	005470	G	EM1001	011036	G	EM9301	015253	G
ADRPTR	017720	G	C$BRK	= 000022	DR02MG	005474	G	EM1002	011071	G	EM9302	015273	G
ALTFLD	017410	G	C$BSEG	= 000004	DR04MG	005501	G	EM1003	011156	G	EM9303	015323	G
ASSEMB	= 000010		C$BSUB	= 000002	DR06MG	005505	G	EM1101	011234	G	EM9304	015370	G
BCOUNT	002346	G	C$CEFG	= 000045	DR10MG	005523	G	EM1201	011307	G	ENDD	036152	
BITTBL	002404	G	C$CLCK	= 000062	DR12MG	005532	G	EM1202	011335	G	ENDETB	003722	G
BIT0	= 000001	G	C$CLEA	= 000012	DR14MG	005543	G	EM1203	011421	G	ENDIT	024722	
BIT00	= 000001	G	C$CLOS	= 000035	DR16MG	005554	G	EM1204	011477	G	ERCNTB	002460	G
BIT01	= 000002	G	C$CLP1	= 000006	EDROP	025060		EM1205	011533	G	ERLTBL	002722	G
BIT02	= 000004	G	C$CVEC	= 000036	EF.CON	= 000036	G	EM1301	011557	G	ERRBLK	003770	G
BIT03	= 000010	G	C$DCLN	= 000044	EF.NEW	= 000035	G	EM1302	011612	G	ERRMSG	003766	G
BIT04	= 000020	G	C$DODU	= 000051	EF.PWR	= 000034	G	EM1401	011651	G	ERRNBR	003764	G
BIT05	= 000040	G	C$DRPT	= 000024	EF.RES	= 000037	G	EM1402	011710	G	ERRTYP	003762	G
BIT06	= 000100	G	C$DU	= 000053	EF.STA	= 000040	G	EM1403	011776	G	ERSMRF	002456	G
BIT07	= 000200	G	C$EDIT	= 000003	EF0503	004121	G	EM1404	012051	G	ER0101	015444	G
BIT08	= 000400	G	C$ERDF	= 000055	EF0505	004126	G	EM1405	012123	G	ER0201	015776	G
BIT09	= 001000	G	C$ERHR	= 000056	EF1401	004201	G	EM1406	012136	G	ER0503	016072	G
BIT1	= 000002	G	C$ERRO	= 000060	EF1402	004303	G	EM1407	012151	G	ER0504	016130	G
BIT10	= 002000	G	C$ERSF	= 000054	EF1601	004340	G	EM1408	012163	G	ER1401	016210	G
BIT11	= 004000	G	C$ERSO	= 000057	EF1602	004372	G	EM1601	012171	G	ER1601	016352	G
BIT12	= 010000	G	C$ESCA	= 000010	EF1603	004434	G	EM1604	012254	G	ER1603	016462	G
BIT13	= 020000	G	C$ESEG	= 000005	EF1604	004476	G	EM1701	012330	G	ER3001	016554	G
BIT14	= 040000	G	C$ESUB	= 000003	EF3001	004573	G	EM1801	012413	G	ER9004	016656	G
BIT15	= 100000	G	C$ETST	= 000001	EF3002	004642	G	EM1901	012467	G	ER9007	016772	G
BIT2	= 000004	G	C$EXIT	= 000032	EF9006	004711	G	EM2001	012552	G	ER9008	017062	G
BIT3	= 000010	G	C$GETB	= 000026	EF9010	004735	G	EM2002	012622	G	ER9101	017156	G
BIT4	= 000020	G	C$GETW	= 000027	EF9016	005034	G	EM2301	012675	G	ER9301	017216	G
BIT5	= 000040	G	C$GMAN	= 000043	EF9017	005131	G	EM2302	012742	G	EVL	= 000004	G
BIT6	= 000100	G	C$GPHR	= 000042	EF9018	005205	G	EM2401	013000	G	EXOERR	002300	G
BIT7	= 000200	G	C$GPLO	= 000030	EF9301	005312	G	EM2601	013043	G	E$END	= 002100	
BIT8	= 000400	G	C$GPRI	= 000040	EF9302	005370	G	EM2602	013101	G	E$LOAD	= 000035	
BIT9	= 001000	G	C$INIT	= 000011	EM0101	020314	G	EM2603	013172	G	FDATA	002244	G
BMPCQB	002522	G	C$INLP	= 000020	EM0102	020400	G	EM2604	013260	G	FSLSA	002244	G
BMPCQE	002722	G	C$MANI	= 000050	EM0103	005564	G	EM2605	013354	G	FSLSO	= 000006	G
BMPCQP	002520	G	C$MEM	= 000031	EM0201	005632	G	EM2606	013437	G	F$AU	= 000015	
BOE	= 000400	G	C$MSG	= 000023	EM0202	005665	G	EM2607	013476	G	F$AUTO	= 000020	
BRLEVL	002234	G	C$OPEN	= 000034	EM0203	006040	G	EM2608	013572	G	F$BGN	= 000040	
BUFBAS	002722	G	C$PNTB	= 000014	EM0204	006203	G	EM2609	013643	G	F$CLEA	= 000007	
BUFEND	003722	G	C$PNTF	= 000017	EM0301	006362	G	EM2610	013722	G	F$DU	= 000016	
BUFMID	003322	G	C$PNTS	= 000016	EM0302	006434	G	EM2611	014014	G	F$END	= 000041	
BUFPTR	002276	G	C$PNTX	= 000015	EM0303	006574	G	EM2612	014077	G	F$HARD	= 000004	
BUF3QT	003522	G	C$QIO	= 000377	EM0401	006753	G	EM3001	014173	G	F$HW	= 000013	
CACHRX	023512	G	C$RDBU	= 000007	EM0402	007031	G	EM3002	014232	G	F$INIT	= 000006	
CACHTX	023540	G	C$REFG	= 000047	EM0501	007201	G	EM3003	014326	G	F$JMP	= 000050	
CALMSL	017462	G	C$RESE	= 000033	EM0502	007255	G	EM3004	014402	G	F$MOD	= 000000	
CKTRAP	017706	G	C$REVI	= 000003	EM0525	007431	G	EM3005	014456	G	F$MSG	= 000011	
CLKBRL	002332	G	C$RFLA	= 000021	EM0526	007521	G	EM3101	014550	G	F$PROT	= 000021	
CLKCSR	002330	G	C$RPT	= 000025	EM0601	007611	G	EM3102	014613	G	F$PWR	= 000017	
CLKHRZ	002336	G	C$SEFG	= 000046	EM0602	007653	G	EM9010	014672	G	F$RPT	= 000012	
CLKINT	023566	G	C$SPRI	= 000041	EM0603	010033	G	EM9014	014716	G	F$SEG	= 000003	
CLKVEC	002334	G	C$SVEC	= 000037	EM0701	010216	G	EM9017	015012	G	F$SOFT	= 000005	
CLNRST	017736	G	C$TPRI	= 000013	EM0702	010261	G	EM9018	015123	G	F$SRV	= 000010	
CLR16W	017760	G	DELAY	020060	G	EM0703	010441	G	EM9019	015133	G	F$SUB	= 000002	
CNTERR	020002	G	DFPTBL	002206	G	EM0801	010624	G	EM9020	015150	G	F$SW	= 000014	
CSRA	002236	G	DIAGMC	= 000000		EM0802	010672	G	EM9022	015174	G	F$TEST	= 000001	
CTRLCF	002302	G	DRADRT	002236	G	EM0901	010742	G	EM9023	015213	G	GETPRM	024520	

```
GPRSOB  002444 G
G$CNTO= 000200
G$DELM= 000372
G$DISP= 000003
G$EXCP= 000400
G$HILI= 000002
G$LOLI= 000001
G$NO  = 000000
G$OFFS= 000400
G$OFSI= 000376
G$PRMA= 000001
G$PRMD= 000002
G$PRML= 000000
G$RADA= 000140
G$RADB= 000000
G$RADD= 000040
G$RADL= 000120
G$RADO= 000020
G$XFER= 000004
G$YES = 000010
HELP  = 000000
HOE   = 100000 G
HWPTQ1  035766
HWPTQ2  036004
HWPTQ3  036037
HWPTQ4  036065
IBE   = 010000 G
IDU   = 000040 G
IER   = 020000 G
IESTAT  002304 G
ISR   = 000100 G
IXE   = 004000 G
I$AU  = 000041
I$AUTO= 000041
I$CLN = 000041
I$DU  = 000041
I$HRD = 000041
I$INIT= 000041
I$MOD = 000041
I$MSG = 000041
I$PROT= 000040
I$PTAB= 000041
I$PWR = 000041
I$RPT = 000041
I$SEG = 000041
I$SETU= 000041
I$SFT = 000041
I$SRV = 000041
I$SUB = 000041
I$TST = 000041
J$JMP = 000167
LNCTRA  002246 G
LOE   = 040000 G
LOT   = 000010 G
LPCSLT= 000036 G
LPRA    002242 G
LPRO  = 000004 G
L$ACP   002110 G
L$APT   002036 G
L$AU    025066 G
L$AUT   002070 G
L$AUTO  024736 G
L$CCP   002106 G
L$CLEA  024740 G
L$CO    002032 G
L$DEPO  002011 G
L$DESC  004042 G
L$DESP  002076 G
L$DEVP  002060 G
L$DISP  002124 G
L$DLY   002116 G
L$DTP   002040 G
L$DTYP  002034 G
L$DU    024756 G
L$DUT   002072 G
L$DVTY  004032 G
L$EF    002052 G
L$ENVI  002044 G
L$ERRT  003762 G
L$ETP   002102 G
L$EXP1  002046 G
L$EXP4  002064 G
L$EXP5  002066 G
L$HARD  035722 G
L$HIME  002120 G
L$HPCP  002016 G
L$HPTP  002022 G
L$HW    002206 G
L$ICP   002104 G
L$INIT  024116 G
L$LADP  002026 G
L$LAST  036476 G
L$LOAD  002100 G
L$LUN   002074 G
L$MREV  002050 G
L$NAME  002000 G
L$PRIO  002042 G
L$PROT  024110 G
L$PRT   002112 G
L$REPP  002062 G
L$REV   002010 G
L$RPT   024102 G
L$SOFT  036114 G
L$SPC   002056 G
L$SPCP  002020 G
L$SPTP  002024 G
L$STA   002030 G
L$SW    002220 G
L$TEST  002114 G
L$TIML  002014 G
L$UNIT  002012 G
L10000  002216
L10001  002224
L10002  015560
L10003  016070
L10004  016126
L10005  016206
L10006  016350
L10007  016460
L10010  016552
L10011  016654
L10012  016770
L10013  017060
L10014  017154
L10015  017214
L10016  017406
L10017  024106
L10021  024734
L10022  024736
L10023  024754
L10024  025064
L10025  025072
L10026  025354
L10027  025604
L10030  026050
L10031  026246
L10032  026440
L10033  026656
L10034  027064
L10035  027272
L10036  027466
L10037  027702
L10040  030130
L10041  030424
L10042  030712
L10043  031312
L10044  031560
L10045  031750
L10046  032266
L10047  032530
L10050  032644
L10051  033162
L10052  033536
L10053  034674
L10054  035636
L10055  035716
L10056  035766
L10057  036152
MAPLNS= 177777 G
MFUNIT  004070 G
MMENAB  002360 G
MMPRES  002356 G
MMSR0   002354 G
MSG1    015562 G
MSG2    015640 G
MSG3    015717 G
MSLCNT  002352 G
MSLGET  020120 G
MSLOOP  020234 G
MSTICK  002350 G
NDERPT  002222 G
NEWPAS  024500
NEWRES  024472
NEWSTA  024162
NUMLNS= 000020 G
OOPS    020250 G
OPTION  002220 G
O$APTS= 000000
O$AU  = 000000
O$BGNR= 000001
O$BGNS= 000001
O$DU  = 000001
O$ERRT= 000001
O$GNSW= 000001
O$POIN= 000001
O$SETU= 000000
PAROA   002362 G
PASCNT  002306 G
PCSLOT= 000016 G
PNT   = 001000 G
PREGRT  004014 G
PREG05  003772
PRI   = 002000 G
PRI00 = 000000 G
PRI01 = 000040 G
PRI02 = 000100 G
PRI03 = 000140 G
PRI04 = 000200 G
PRI05 = 000240 G
PRI06 = 000300 G
PRI07 = 000340 G
PUFIFO  020476 G
RBUFA   002240 G
RDPDR   020560 G
REGTST  021032 G
REPSMR  021264 G
RESETT  021312 G
RMATBB  002256 G
ROLDAP  021424 G
RSTRPT  021450 G
RXBRRT  023636 G
RXIE0   022146 G
RXIE1   022206 G
RXINPT  023716 G
RXINTC  002310 G
RXINTF  002312 G
RXTMA   002240 G
RXVECA  002226 G
R0SLOT= 000002 G
R1SLOT= 000004 G
R2SLOT= 000006 G
R3SLOT= 000010 G
R4SLOT= 000012 G
R5SLOT= 000014 G
SAVBMP  022232 G
SFPTBL  002220 G
SKPSTS  022300 G
SVCGBL= 000000
SVCINS= 000001
SVCSUB= 000001
SVCTAG= 000001
SVCTST= 000001
SWAP0   022356 G
SWPTQ1  036152
SWPTQ2  036226
SWPTQ3  036277
SWPTQ4  036332
S$LSYM= 010000
TIMER1  002340 G
TIMER2  002342 G
TIMER3  002344 G
TNUM  = 000030 G
TP4FLG  002314 G
TP4RTN  024004 G
TP4VEC  002316 G
TSABRT  022426 G
TSTNUM  002320 G
TXAD1A  002250 G
TXAD2A  002252 G
TXBFCA  002254 G
TXBFCO= 000016 G
TXDSBL  022540 G
TXENBL  022634 G
TXIE0   022730 G
TXIE1   022770 G
TXINTC  002322 G
TXINTF  002324 G
TXINTR  024026 G
TXVECA  002230 G
T$ARGC= 000003
T$CODE= 001052
T$ERRN= 022125
T$EXCP= 000000
T$FLAG= 000050
T$GMAN= 000000
T$HILI= 177777
T$LAST= 000001
T$LOLI= 000000
T$LSYM= 010000
T$LTNO= 000030
T$NEST= 177777
T$NS0 = 000000
T$NS1 = 000005
T$PTNU= 000000
T$SAVL= 177777
T$SEGL= 177777
T$SUBN= 000000
T$TAGL= 177777
T$TAGN= 010060
T$TEMP= 000000
T$TEST= 000030
T$TSTM= 177777
T$TSTS= 000001
T$$AU = 010025
T$$AUT= 010022
```

SYMBOL TABLE

```
T$$CLE= 010023          T$$TES= 010055          T18     032270 G        T5      026250 G        WDPDR   023224 G
T$$DU = 010024          T1      025074 G        T19     032532 G        T6      026442 G        WORD1   002326 G
T$$HAR= 010056          T10     027470 G        T2      025356 G        T7      026660 G        WTWLNC  023432 G
T$$HW = 010000          T11     027704 G        T20     032646 G        T8      027066 G        WTWLPR  023462 G
T$$INI= 010021          T12     030132 G        T21     033164 G        T9      027274 G        X$ALWA= 000000
T$$MSG= 010016          T13     030426 G        T22     033540 G        UAM   = 000200 G        X$FALS= 000040
T$$PRO= 010020          T14     030714 G        T23     034676 G        UNBTTB  002364 G        X$OFFS= 000400
T$$RPT= 010017          T15     031314 G        T24     035640 G        UNITN   002232 G        X$TRUE= 000020
T$$SOF= 010057          T16     031562 G        T3      025606 G        UNSDIV  023014 G        $PATCH  036422 G
T$$SW = 010001          T17     031752 G        T4      026052 G        WAIBIS  023150 G

. ABS.  036476     000
        000000     001
ERRORS DETECTED:  0

VIRTUAL MEMORY USED:  28661 WORDS  ( 112 PAGES)
DYNAMIC MEMORY:  20060 WORDS  ( 77 PAGES)
ELAPSED TIME:  00:04:00
PARTA.BIN,PARTA.LST/-SP=SVC34R/ML,PARTA.P11
```