11/45/55

DIAGNOSTIC TEST 2

MD-11-DEFPB-A

EP-DEFPB-A-DL-A

FICHE 1 OF 1

NOV 1976

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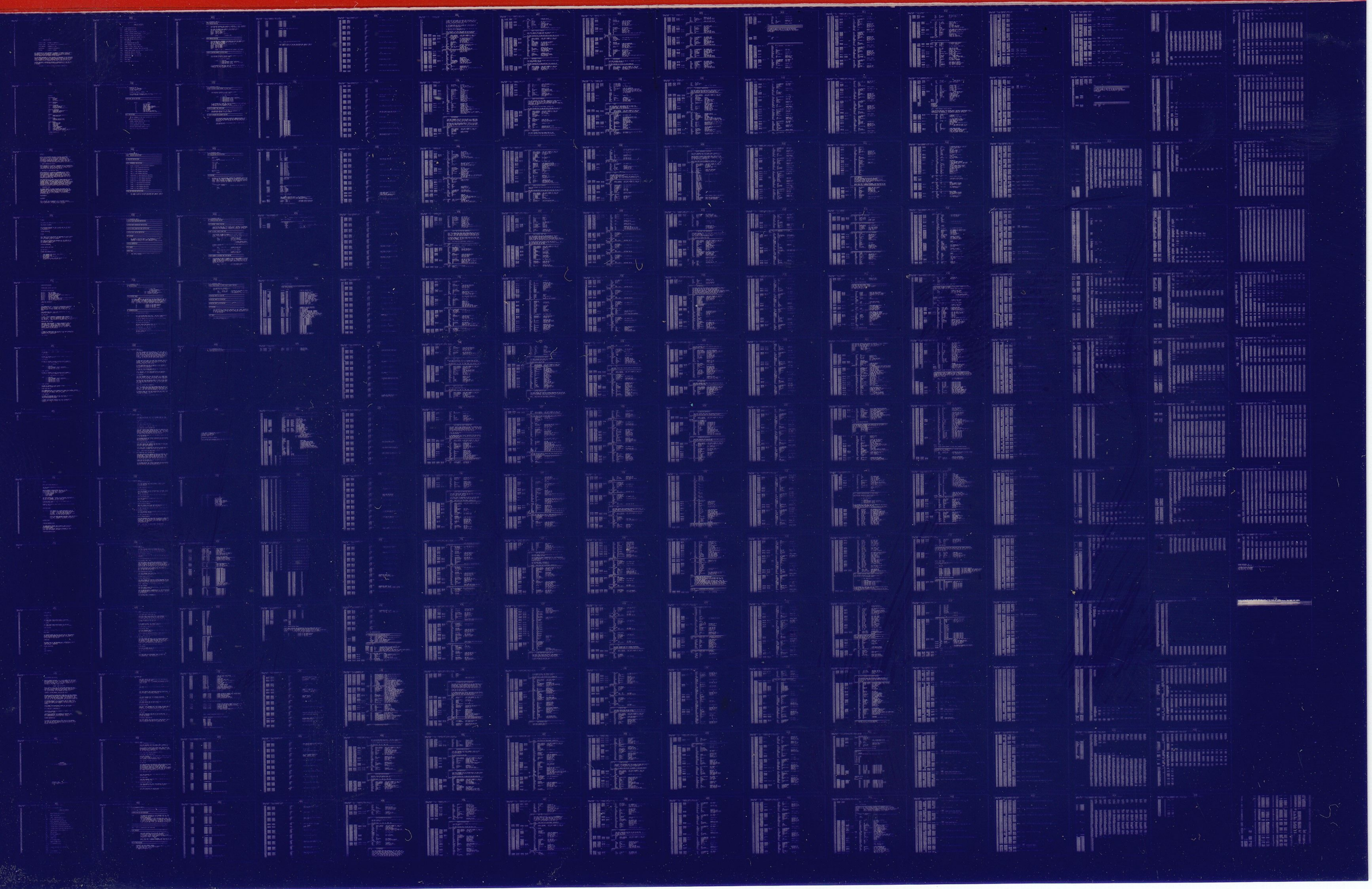
MADE IN USA



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IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DEFPB-A-D

PRODUCT NAME: PDP11-45/55/70 FP11C DIAGNOSTIC PART 2

DATE CREATED: FEBRUARY 21,1976

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: DONALD W. MONROE

CONTENTS

1. ABSTRACT

DEFPA/B ARE PROGRAMS DESIGNED TO DETECT AND REPORT LOGIC FAULTS IN THE FP11-C FLOATING POINT PROCESSOR (FPP). THEY CONSIST OF 237(8) INDIVIDUAL TESTS DESIGNED AND SEQUENCED TO DETECT AND ATTEMPT TO IDENTIFY LOGIC FAULTS AT A MINIMUM HARDWARE/SOFTWARE LEVEL. THESE TESTS ARE PARTITIONED INTO TWO STAND-ALONE PROGRAMS AS DESCRIBED BELOW.

A. BASIC INSTRUCTION TESTS

DEFPA CONSISTS OF A LOGICALLY SEQUENCED SET OF INSTRUCTION TESTS DESIGNED TO VERIFY THE INTEGRITY OF THOSE INSTRUCTIONS, LOGIC OPERATIONS, AND DATA PATHS USED BY THE MORE COMPLEX INSTRUCTIONS SUCH AS MULTIPLY AND DIVIDE.

B. MULTIPLY-DIVIDE-AND ROM TESTS

DEFPB CONSISTS OF A LOGICALLY SEQUENCED SET OF TESTS FOR THE MULTIPLY, MODULO, DIVIDE INSTRUCTIONS, AND THE MEMORY MANAGEMENT ROMS FOLLOWED BY A TEST OF ALL THE LOCATIONS OF THE A-BRANCH, NO-MEM BRANCH, AND ADX ROMS THAT HAVE NOT PREVIOUSLY BEEN TESTED. THIS LAST TEST IS ALSO USED TO VERIFY THE "DISABLE INTERRUPT" BIT IN THE CONTROL STORE OF THE FPP.

UPON DETECTION OF A LOGIC FAULT AN "ERROR SERVICE" ROUTINE IS CALLED THAT REPORTS IT AS HARD COPY ON THE CONSOLE TERMINAL DEVICE. THE ERROR SERVICE ROUTINE ALSO FACILITATES OPERATOR CONTROL OF THE PROGRAM SEQUENCE VIA CONSOLE SWITCH REGISTER OPTIONS. AFTER REPORTING THE ERROR, THE PROGRAM CONTINUES ON ITS NORMAL SEQUENCE UNLESS MODIFIED BY THE OPERATOR ACTIVATING A SWITCH, SUCH AS "HALT ON ERROR".

C. IMPORTANT NOTE

THE ERROR REPORTS IN THESE PROGRAMS ARE BASED UPON THE KNOWLEDGE THAT ALL PREVIOUS TESTS ARE FAULTLESS AND THAT THERE IS ONLY ONE SINGLE POINT FAILURE IN THE PROCESSOR. THIS MEANS THAT IF EITHER PROGRAM, OR THE PROGRAMS THEMSELVES, ARE NOT RUN IN SEQUENCE, THE ERROR MESSAGE MAY NOT BE VALID.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP 11/45,55, OR 70 PROCESSOR WITH OPERATORS CONSOLE, LA30 OR EQUIVALENT TERMINAL, A KW11-L OR KW11-P OR EQUIVALENT CLOCK, AND AN FP11-C FLOATING POINT PROCESSOR.

2.2 STORAGE

BOTH DEFPA AND DEFPB REQUIRE 16K OF MEMORY TO LOAD AND RUN.

2.3 PRELIMINARY PROGRAMS

BOTH PROGRAMS REQUIRE THE CPU CLUSTER AND 16K OF MEMORY TO BE WORKING PROPERLY. DEFPB REQUIRES THAT DEFPA HAS RUN SUCCESSFULLY.

3. LOADING PROCEDURE

3.1 METHOD

FOR A PDP 11/45 OR 55 SYSTEM THE PROGRAMS WILL BE ON PAPER TAPE. DEFPA WILL CONSIST OF TWO TAPES. BOTH THESE TAPES MUST BE LOADED TO RUN THE PROGRAM.

FOR A PDP 11/70 SYSTEM THE PROGRAMS WILL BE SUPPLIED ON THE DIAGNOSTIC MEDIA. REFER TO THE XXDP OPERATING MANUAL FOR FURTHER INFORMATION.

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

SEE SECTION 5.1.

4.2 PROGRAM AND OPERATOR ACTION

1. LOAD PROGRAM INTO MEMORY (SEE SECTION 3)
2. LOAD ADDRESS 200.
3. SET SWITCHES (SEE SECTION 5.1)
4. PRESS START
5. THE PROGRAM(S) WILL LOOP AND AN END OF PASS MESSAGE WILL BE TYPED EVERY PASS.

5. OPERATING PROCEDURE

5.1 OPPERATIONAL SWITCH SETTINGS

THE SWITCH SETTINGS ARE:

SW<15>=1 ... HALT ON ERROR
SW<14>=1 ... LOOP ON CURRENT TEST
SW<13>=1 ... INHIBIT ERROR TYPE OUTS
SW<12>=1 ... SKIP MEMORY MANAGEMENT TESTS (DEFPB ONLY)
SW<11>=1 ... INHIBIT ITERATIONS
SW<10>=1 ... RING BELL ON ERROR
SW<9>=1 ... LOOP ON ERROR (ERROR COUNT IN DISPLAY REGISTER)
SW<8>=1 ... LOOP ON TEST IN SW'S<7:0>
SW<8>=0 ... LOAD MICRO-BREAK REGISTER WITH SW'S<7:0>

5.2 SUBROUTINE ABSTRACTS

5.2.1 SCOPE

THIS SUBROUTINE CALL (VIA AN IOT INSTRUCTION) IS PLACED BETWEEN EACH TEST. IT RECORDS THE STARTING ADDRESS OF EACH TEST IN LOCATION "$LPADR" AND "$LPERR" AS IT IS BEING ENTERED. IT ALSO CONTROLS TEST ITTERATION, AND LOOPING.

5.2.2 ERROR

THIS SUBROUTINE CALL (VIA A EMT INSTRUCTION) IS USED TO REPORT ALL ERRORS. (REFER TO 6)

5.2.3 TRAP CATCHER

A ".+2" - "HALT" SEQUENCE IS REPEATED FROM LOCATION 0 TO LOCATION 776 TO CATCH ANY UNEXPECTED TRAPS (EXCEPT 4, 24 114, AND 244). THUS, ANY UNEXPECTED TRAPS WILL HALT AT THE DEVICE TRAP VECTOR +2. (TRAP VECTOR+4 IN ADDRESS DISPLAY LIGHTS)

5.2.4 SPURIOUS TRAP CATCHER

THERE ARE THREE ROUTINES TO HANDLE UNEXPECTED TRAPS TO LOCATIONS 4 (CPU ERROR), 114 (PARITY ERROR), AND 244 (FPP INTERRUPT). THE ROUTINES PRINT A SHORT MESSAGE FOLLOWED BY THE PROGRAM COUNTER (PC) OF THE ERROR CALL (ERRPC), THE PC AT THE TIME OF THE TRAP (PCOFTRP), AND THE APPROPRIATE ERROR REGISTER.

5.2.5 TRAP

A NUMBER OF SUBROUTINES ARE CALLED BY THE TRAP INSTRUCTION. FOLLOWING ARE THE CALLS USED AND THE LABEL OF THE STARTING ADDRESS OF THE SUBROUTINES.

5.2.5.1 TYPE ($TYPE)

ROUTINE TO TYPE AN ASCII STRING ON THE TTY.

THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER
A LINE FEED.

5.2.5.2 TYPOC ($TYPOC)

ROUTINE TO CONVERT A 16-BIT BINARY NUMBER TO A 6-DIGIT
OCTAL NUMBER AND TYPE IT.

5.2.5.3 FL20 ($FL20)

ROUTINE TO CONVERT A 32-BIT FLOATING POINT NUMBER TO
A 13-DIGIT OCTAL ASCIZ NUMBER IN THE FOLLOWING FORMAT:

W XXX YYY ZZZZZZ

WHERE W = SIGN BIT
X = 8-BIT EXPONENT (RIGHT JUSTIFIED)
Y = FRACTION BITS <57:51> (RIGHT JUSTIFIED)
Z = FRACTION BITS <50:35>

5.2.5.4 FLD20 ($FLD20)

ROUTINE TO CONVERT A 64-BIT FLOATING POINT NUMBER TO
A 26-DIGIT OCTAL ASCIZ NUMBER IN THE FOLLOWING FORMAT:

U VVV WWW XXXXXX YYYYYY ZZZZZZ

WHERE U = SIGN BIT
W = 8-BIT EXPONENT (RIGHT JUSTIFIED)
W = FRACTION BITS <57:51> (RIGHT JUSTIFIED)
X = FRACTION BITS <50:35>
Y = FRACTION BITS <34:19>
Z = FRACTION BITS <18:03>

5.2.5.5 TYPDS ($TYPDS)

ROUTINE TO CONVERT A 16-BIT BINARY NUMBER TO A 5-DIGIT
SIGNED DECIMAL NUMBER AND TYPE IT.

5.2.6 POWER DOWN AND UP

THIS SUBROUTINE CALL (VIA A POWER DOWN) SAVES THE GENERAL PURPOSE
REGISTERS AND PSW UPON A POWER DOWN. WHEN POWER IS RESTORED A MESSAGE
IS TYPED AND THE CURRENT TEST WILL RESTART.

5.2.7 CLOCK HANDLER

IN DEFPA THIS ROUTINE SETS UP THE LINE CLOCK TO INTERRUPT
THE CENTRAL PROCESSOR EXACTLT ONE CLOCK PERIOD
AFTER THE ROUTINE IS EXITED.

IN DEFPB THIS ROUTINE HANDLES THE CLOCK INTERRUPTS AND
CONTROLS THE NUMBER OF SECONDS THAT THE ROM TEST IS
LOOPED ON.

5.3 OPERATOR ACTION

NEITHER PROGRAM REQUIRES OPERATOR INTERVENTION.

6. ERRORS

6.1 ERROR HALTS AND DESCRIPTION

THE FOLLOWING DESCRIPTION PERTAINS TO ACT11 AND STAND-ALONE OPERATION.

WHEN AN ERROR IS ENCOUNTERED THE CALL TO THE ERROR ROUTINE IS MADE AND AN ERROR MESSAGE PERTAINING TO THE ERROR WILL BE TYPED. EACH ERROR TYPE OUT WILL CONTAIN THE FOLLOWING:

1. AN ERROR MESSAGE
2. A DATA HEADER
3. A DATA STRING

THE DATA STRING WILL CONTAIN, AT A MINIMUM, THE ERROR PC AND THE TEST NUMBER. IN SOME CASES THE EXPECTED AND ACTUAL VALUES OF A REGISTER ARE ALSO INCLUDED.

FLOATING POINT DATA IS TYPED IN THE FORMAT SHOWN IN 5.2.5.3 OR 5.2.5.4.

REFER TO THE LISTING UNDER $ERRTB FOR THE TYPES OF ERRORS THAT CAN OCCUR.

6.2 ERROR RECOVERY

SW<15:9>=0 - MOST ERRORS WILL CAUSE EXECUTION TO GO TO THE START OF THE NEXT TEST AFTER THE MESSAGE IS TYPED. A FEW TESTS ARE DIVIDED INTO SECTIONS. IN THESE TESTS AN ERROR WILL CAUSE EXECUTION TO GO TO THE NEXT SECTION.

SW<15>=1 - AFTER THE ERROR MESSAGE HAS BEEN TYPED THE PROGRAM WILL HALT. PRESSING THE CONSOLE CONTINUE WILL CAUSE THE PROGRAM TO CONTINUE AS IF SW<15>=0.

7. RESTRICTIONS

7.1 STARTING RESTRICTIONS

THE USER SHOULD ENSURE THAT EITHER A LINE CLOCK OR A PROGRAMMABLE CLOCK IS INSTALLED TO OBTAIN MAXIMUM TEST EFFECTIVENESS.
IF A LINE CLOCK IS NOT INSTALLED A MESSAGE IS TYPED (ON FIRST PASS) AND THE PROGRAM CONTINUES WITH THE NEXT TEST.

7.2 OPERATING RESTRICTIONS

```
370                                     NONE
371
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8. MISCELLANEOUS

8.1 EXECUTION TIME

A. DEFPA

THE FIRST PASS TAKES APPROXIMATELY 5 SECONDS.
ALL SUBSEQUENT PASSES TAKE APPROXIMATELY 2 MINUTES.

B. DEFPB

THE FIRST PASS TAKES APPROXIMATELY 30 SECONDS.
ALL SUBSEQUENT PASSES TAKE APPROXIMATELY 90 SECONDS.

8.2 STACK POINTER

THE STACK IS INITIALLY SET TO 1100.

8.3 PASS COUNT

THE PROGRAM MAKES ONE PASS FOR EACH END OF PASS MESSAGE.
THE END OF PASS MESSAGE DESCRIBES THE TOTAL NUMBER OF
PASSES COMPLETED AND THE TOTAL NUMBER OF ERRORS SINCE
THE LAST END OF PASS MESSAGE.

8.4 ITERATIONS

.

THE FIRST PASS OF THE PROGRAMS WILL AUTOMATICALLY INHIBIT
ITERATIONS. ALL SUBSEQUENT PASSES WILL PERFORM FULL,
(2000 DECIMAL) ITERATIONS.

8.5 SPECIAL REGISTERS

NONE

8.6 T-BIT TRAPPING

NONE

8.7 OSCILLOSCOPE SYNC POINTS

SW<8>=0 CAUSES SWITCHES <7:0> TO BE LOADED INTO THE MICRO-BREAK REGISTER IN THE FPP. THIS LOAD OCCURS IN THE SCOPE AND ERROR ROUTINES. WHEN THE FPP GOES THROUGH THE ROM STATE SELECTED BY SWITCHES <7:0>, A PULSE IS GENERATED AND IS AVAILABLE ON THE BACK PLANE ON PIN:

D05B2 (DB2 ON SLOT 5)

SINCE CERTAIN TESTS USE THE MICRO-TRAP FEATURE FOR FAULT ISOLATION, THE MICRO-MATCH SYNC ROM STATE CANNOT BE SELECTED FROM THE SWITCHES. THERE WILL BE A DEFAULT ROM ADDRESS SYNC PULSE DEFINED IN THE HEADER FOR THOSE TESTS.

8.8 A-BRANCH, NO-MEM BRANCH, AND ADX ROM TESTS

THE LAST 3 TESTS OF DEFPB TEST THOSE CELLS OF THE A-BRANCH, NO-MEM BRANCH, AND ADX ROMS THAT WERE NOT PREVIOUSLY TESTED. THESE TESTS ARE ALSO USED TO VERIFY THE OPERATION OF THE "DSI" BIT IN THE FPP CONTROL STORE. THIS IS DONE BY TURNING THE CLOCK ON (TO CAUSE INTERRUPTS) AND LOOPING ON THESE TESTS.

THE PROGRAM DEFAULTS TO A 30 SECOND LOOP ON THESE TESTS. IF THIS TIME NEEDS TO BE CHANGED, LOCATION "TIMES" IN THE COMMON TAGS AREA CAN BE CHANGED TO THE DESIRED NUMBER OF SECONDS.

WHILE THESE TESTS ARE BEING LOOPED ON, THE SECOND COUNT IS DISPLAYED IN THE HIGH BYTE OF THE DATA LIGHTS.

8.9 ACT11 AND APT11 COMPATABILITY

LOCATION 46 CONTAINS THE ADDRESS OF "$ENDAD" FOR THE ACT11 SEQUENCE TABLE.

LOCATION 44 CONTAINS THE ADDRESS OF "$APTHDR" FOR APT11 COMPATABILITY. THE ENVIRONMENT TABLE, MAIL BOX AND COMMUNICATIONS ROUTINE ARE ALSO INCLUDED.

9. PROGRAM DESCRIPTION

FOLLOWING IS A DESCRIPTION OF EACH TEST OF THE PROGRAM. THE TITLE OF THE TEST INDICATES THE FUNCTION BEING TESTED AND THE NARRATIVE DESCRIBES THE SPECIFIC FAULTS THAT THE PROGRAM IS LOOKING FOR.

PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2

DOCUMENT
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PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2
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                          21        COPYRIGHT (C) FEBRUARY 21,1976
                                    DIGITAL EQUIPMENT CORP.
                                    MAYNARD, MASS. 01754

                                    PROGRAM BY DONALD W. MONROE

                                    THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                    PACKAGE (MAINDEC-11-DZQAC-B2),NOV 21, 1975.


                          ;*********************************************************************
                     46   ; OPERATIONAL SWITCH SETTINGS
                          ;*********************************************************************

                          47
                                              SWITCH              USE
                                              ------      ------------------
                                                15        HALT ON ERROR
                                                14        LOOP ON TEST
                                                13        INHIBIT ERROR TYPEOUTS
                                                12        INHIBIT MEMORY MANAGEMENT TEST
                                                11        INHIBIT ITERATIONS
                                                10        BELL ON ERROR
                                                 9        LOOP ON ERROR
                                                 8        LOOP ON TEST IN SWR<7:0>
                                                 8=0      LOAD MICRO BREAK WITH SWR<7:0>

                          ;*********************************************************************
                     60   ; BASIC DEFINITIONS
                          ;*********************************************************************

                          62        INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***

                          77        MISCELLANEOUS DEFINITIONS

                          83        GENERAL PURPOSE REGISTER DEFINITIONS

                          104       PRIORITY LEVEL DEFINITIONS

                          114       "SWITCH REGISTER" SWITCH DEFINITIONS

                          142       DATA BIT DEFINITIONS (BIT00 TO BIT15)

                          170       BASIC "CPU" TRAP VECTOR ADDRESSES
```

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                                PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2
                                ;*****************************************************************
                        187     ;CACHE   REGISTER DEFINITIONS
                                ;*****************************************************************

                                ;*****************************************************************
                        198     ;CPU REGISTER DEFINITIONS
                                ;*****************************************************************

                                ;*****************************************************************
                        212     ;MEMORY MANAGEMENT DEFINITIONS
                                ;*****************************************************************

                                215     MEMORY MANAGEMENT STATUS REGISTER ADDRESSES

                                226     USER "I" PAGE DESCRIPTOR REGISTERS

                                237     USER "D" PAGE DESCRIPTOR REGISTORS

                                248     USER "I" PAGE ADDRESS REGISTERS

                                259     USER "D" PAGE ADDRESS REGISTERS

                                270     SUPERVISOR "I" PAGE DESCRIPTOR REGISTERS

                                281     SUPERVISOR "D" PAGE DESCRIPTOR REGISTERS

                                292     SUPERVISOR "I" PAGE ADDRESS REGISTERS

                                303     SUPERVISOR "D" PAGE ADDRESS REGISTERS

                                314     KERNEL "I" PAGE DESCRIPTOR REGISTERS

                                325     KERNEL "D" PAGE DESCRIPTOR REGISTERS

                                336     KERNEL "I" PAGE ADDRESS REGISTERS

                                347     KERNEL "D" PAGE ADDRESS REGISTERS

                                ;*****************************************************************
                        361     ;UNIBUS MAP REGISTER DEFINITIONS
                                ;*****************************************************************

                                364     THE LOWER 16 BITS OF THE MAP REGISTERS ARE LABELED 'MAPLXX'
                                        THE UPPER 6 BITS OF THE MAP REGISTERS ARE LABELED 'MAPHXX'
```

PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2

```
                448     ;*****************************************************************
                        ;FLOATING POINT REGISTER DEFINITIONS
                        ;*****************************************************************

                462     ;*****************************************************************
                        ;FLOATING POINT STATUS BIT DEFINITIONS
                        ;*****************************************************************

                478     ;*****************************************************************
                        ;FLOATING POINT EXCEPTION CODE DEFINITIONS
                        ;*****************************************************************

                487     ;*****************************************************************
                        ;FLOATING POINT VECTOR DEFINITION
                        ;*****************************************************************

                496     ;*****************************************************************
                        ;TRAP CATCHER
                        ;*****************************************************************

                499             ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS

                506     ;*****************************************************************
                        ;STARTING ADDRESS(ES)
                        ;*****************************************************************

                509     ;*****************************************************************
                        ;ACT11 HOOKS
                        ;*****************************************************************

                520     ;*****************************************************************
                        ;COMMON TAGS
                        ;*****************************************************************

                523             THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
                                USED IN THE PROGRAM.
```

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                        PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2
                                ;*****************************************************************
          581                   ; APT MAILBOX-ETABLE
                                ;*****************************************************************

                                600                             BITS 15-11=CPU TYPE
                                                                        11/04=01,11/05=02,11/20=03,11/40
                                                                        11/70=06,PDQ=07,Q=10
                                                                BIT 10=REAL TIME CLOCK
                                                                BIT  9=FLOATING POINT PROCESSOR
                                                                BIT  8=MEMORY MANAGEMENT


                                ;*****************************************************************
          764                   ; ERROR POINTER TABLE
                                ;*****************************************************************

                                766     THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCU
                                        THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
                                        LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE I
                                        NOTE1:  IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
                                        NOTE2:  EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS

                                772             EM              ;;POINTS TO THE ERROR MESSAGE
                                                DH              ;;POINTS TO THE DATA HEADER
                                                DT              ;;POINTS TO THE DATA
                                                DF              ;;POINTS TO THE DATA FORMAT

                                ;*****************************************************************
         1477                   ; APT PARAMETER BLOCK
                                ;*****************************************************************

                                1563    TEST 1  MULF*MO*(DST=0)*-(SRC=0)

                                1565            THE A OR NO-MEM ROMS COULD FAIL.  THE ONLY OTHER POSSIBL
                                                FAILURES WOULD BE ROM STATE 350 OR THE 4F1 BRANCH.

                                                IF THE 4F1 BRANCH FAILS THE ACD+1 WILL ALSO BE CLEARED.

                                                FPU ROM FLOW - 30, 61, 350, 351

                                1602    TEST 2  MULF*-MO*-(DST=0)*(SRC=0)

                                                THE ONLY THING THAT SHOULD FAIL IN THIS TEST IS THE A
                                                BRANCH OR THE ADX ROMS OR STATE 344.

                                                FPU ROM FLOW - 11, 130, 61, 344, 351

                                1635    TEST 3  MULF*-MO*IMM*(DST=0)*(SRC=0)

                                                THE ONLY THING THAT SHOULD FAIL IN THIS TEST IS THE ADX
                                                ROM OR STATE 354.

                                                FPU ROM FLOW - 11, 131, 61, 354, 351
```

PDP11-45 55 TO FP11-C DIAGNOSTIC PART 2

1668 TEST 4 MULF*SWR*ADD

THIS TEST ENSURES THAT ROM STATES 61, 340, 233, AND 112 SETUP THE SC AND SHIFT CONTROL PROPERLY, THAT FRHK MUL SWR IS NOT STUCK LOW, THAT FRHL MPY/DIV ADD(1) L IS NOT STUCK HIGH, AND THAT FRMH FORCE MPY/DIV ADD CAUSES THE FALU TO AN ADD. THIS IS DONE BY FIRST SETTING A MICRO-TRAP ON STATE 117 TO TEST MUL SWR AND THEN A TRAP IS SET ON 112 TO ENSURE THE OTHER FUNCTIONS ARE WORKING PROPERLY.

1677

IF FRME SHFC 0(0)H AND 1(0)H ARE TIED TOGETHER, THE SHIF CONTROL WILL BE LOADED WITH THE VALUE OF THE NORM POS ENCODER. THIS WILL CAUSE A LEFT SHIFT OF 7 IN THE AR AND A RIGHT SHIFT OF 8 IN THE QR.

IF FXPP SC00 DOES NOT GET TO FRMA AS A HIGH OR DOES NOT GET TO RAD00 AS A HIGH EXECUTION WILL GO TO STATE 112 INSTEAD OF 113 IN SECTION 2.

IF FRHL MPY SIGN EXTEND DOES NOT GO LOW, THE AR WILL END UP WITH 0.01 IN IT INSTEAD OF 0.10.

NOTE: SECTION 1 OF THIS TEST DOES NOT ALLOW SWITCHES <7: TO BE LOADED INTO THE MICROBREAK FOR SYNC PURPOSES.

1768 TEST 5 MULF*SWR*SUB

THIS TEST ENSURES THAT FRHL MPY/DIV ADD (1) L GOES HIGH WHEN FRHK STRING IS HIGH. THIS SIGNAL CAUSES FRMH FORCE MPY/DIV SUB TO GO LOW FORCING THE FALU TO DO A SUBTRACT.

SECTION 2 OF THIS TEST MICRO-TRAPS ON STATE 117 TO CHECK THAT FRHK MPY SIGN EXTEND GOES HIGH. IF THIS TRAP DOES NOT OCCUR THEN FRHK E108 PIN 1 & 13 ARE NOT GOING HIGH I STATE 112.

1861 TEST 6 LOGIC TEST OF FRHK MUL SWR*FD(0)

THIS TEST CHECKS THE LOGIC THAT CAUSES FRHK MUL SWR TO G HIGH. THE PARTICULAR GATES BEING TESTED ARE E107, E108, AND E115. THEY ARE TESTED BY SETTING A MICRO-TRAP ON TH -SWR ROM STATE THAT WOULD BE ENTERED IF THE LOGIC FAILS.

IN CERTAIN CASES THE TRAP MAY OCCUR AFTER THE FIRST TIME THRU THE 2F3 BRANCH. IN THESE CASES THE QR WILL BE CHEC TO ENSURE THE CORRECT DATA.

NOTE: SYNC POINT NOT SELECTABLE. DEFAULT=116

```
                                PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2
                        1970    TEST 7  MULF (.5*1)

                                THIS TEST MULTIPLIES 1 BY 0.5 TO ENSURE THAT ALL THE
                                ROM SIGNALS IN STATES 116, 110, AND 72 FUNCTION PROPERLY

                                FPU ROM FLOW - 11, 131, 61, 340, 233, 112, 3(116), 110.

                        1999    TEST 10 MULF (.111...1*1)

                                THIS TEST CHECKS ROM STATE 111.

                                FPU ROM FLOW - 11, 130, 61, 340, 233, 112, 113, 3(117).

                        2027    TEST 11 HIGH ORDER MUL SHIFT ENCODER ROM

                                THIS TEST CHECKS EVERY ADDRESS ON THE HIGH ORDER MUL SHI
                                ENCODER.  THIS IS DONE IN TWO SECTIONS.  THE FIRST SECTI
                                RUNS A COUNT PATTERN THROUGH QR BITS <41:35>.  THE SECON
                                SECTION STARTS EACH MULTIPLY WITH QR BITS <41:35> ALL ON
                                AND RUNS A COUNT PATTERN THRU QR BITS <48:42>.

                                SINCE THE MULCIPLICAND IS "1.0" THE RESULT SHOULD BE IDE
                                TO THE MULTIPLIER.

                                IF AN ERROR OCCURS THE TYPEOUT INDICATES THE ROM ADDRESS
                                AND THE EXPECTED OUTPUT OF THE ROM FOR EACH SHIFT OF THA
                                PARTICULAR MULTIPLY.

                        2084    TEST 12 LOGIC TESTS OF FRHK MUL SWR*FD(1)

                                THIS TEST CHECKS THE A-BRANCH AND ADX ROMS FOR MULD AND
                                THE GATES THAT DRIVE FRHK MUL SWR WITH FD(1).  IN PARTIC
                                FRLH E1, FRHK E107, AND E108.

                                THIS LOGIC TEST IS PERFORMED BY SETTING A MICRO-TRAP OFF
                                THE 2F3 BRANCH TO ENSURE THAT FRHK MUL SWR GOES HIGH.

                                NOTE:   SYNC POINT NOT SELECTABLE. DEFAULT=116

                        2246    TEST 13 LOW ORDER MUL SHIFT ENCODER ROM

                                THIS TEST CHECKS EVERY ADDRESS ON THE LOW ORDER MUL SHIF
                                ENCODER ROM.  THIS IS DONE IN TWO SECTIONS, THE FIRST
                                SECTION RUNS A COUNT PATTERN THRU QR BITS <9:3>.  THE
                                SECOND SECTION STARTS EACH MULTIPLY WITH QR BITS<9:3>
                                ALL ONE'S AND RUNS A COUNT PATTERN THRU QR BITS <16:10>.

                                SINCE THE MULTIPLICAND IS "1.0" THE RESULT SHOULD BE
                                IDENTICAL TO THE MULTIPLIER.

                                IF AN ERROR OCCURS THE TYPEOUT INDICATES THE ROM ADDRESS
                                AND THE EXPECTED OUTPUT OF THE ROM FOR EACH SHIFT OF THE
                                LOWER 24 BITS OF THAT PARTICULAR MULTIPLY.
```

FCP11-45 ES TO FP11-C DIAGNOSTIC PART 2

2304 TEST 14 MODF*MO*(SRC=0)*(DST=0)

THIS TEST ENSURES THAT FXPC FIPB08(1) GETS TO FPMA AS A HIGH AND THAT THE A BRANCH AND NO-MEM ROMS FUNCTION PROPERLY.

FPU ROM FLOW-30,61,354,355

2327 TEST 15 MODF*-MO*(INT=0)

THIS TEST ENSURES THAT AN INTEGER RESULT OF ZERO CAUSES ZERO TO BE STORED IN THE DST ACC+1 AND THE FRACTION IN THE DST ACCUMULATOR.

FPU ROM FLOW-MULTIPLY,76,266,327,305.325,NORMALIZE

2368 TEST 16 MODF*(INT=2**25)*-BOU

THIS TEST GENERATES A NUMBER WHO'S FRACTIONAL PART IS ZERO.

FPU ROM FLOW-MULTIPLY,76,266.327,307,7.341

2418 TEST 17 MODF*-(INT=0)*-(FRAC=0)

THIS TEST CHECKS THE FLOWS THAT GET EXECUTED WHEN THE RESULT CONTAINS AN INTEGER AND A FRACTION.

FPU ROM FLOW-MULTIPLY,76,266,327,307,5,2(332),336.170.10

2448 TEST 20 MODF*BOU*-(FV*FIV)

THIS TEST ENSURES THAT AN INTEGER OVERFLOW ON MODF CAUSE THE INTEGER TO BE CLEARED.

FPU ROM FLOW-MULTIPLY,76,266,327,307,7,341,102,242,107

2477 TEST 21 MODF*-(INT=0)*(FRAC=0)

THIS TEST ENSURES THAT ROM STATE 105 DETECTS A ZERO FRAC A MICRO TRAP IS SET ON STATE 343 (NORMALIZE) IN CASE THIS FAILS. IF THIS FAILS, THE MICRO-BREAK REGISTER CAN LOADED FROM THE SWITCHES SINCE THE FPU WILL HANG IF IT G THE NORMALIZE FLOWS.

NOTE: SYNC POINT NOT SELECTABLE. DEFAULT=343

FPU ROM FLOW-MULTIPLY,76,266,327,307,5,332.336.170.105.1

PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2

2511 TEST 22 MODD*(INT=0)

THIS TEST ENSURES STATE 365 STORES ZERO IN THE
DST ACC+1 AND THAT STATE 325 ROUNDS THE FRACTION.

FPU ROM FLOW-MULTIPLY,76,266,326,365,325,NORMALIZE

2555 TEST 23 MODD*-(INT=0)*-(FRAC=0)

THIS TEST ENSURES THAT ROM STATES 326 AND 327 ARE WORKIN
PROPERLY

FPU ROM FLOW-MULTIPLY,76,266,326,367,5,332,336,170,105,1

2593 TEST 24 FALU LOGICAL "AND" TEST

THIS TEST CHECKS THE LOGICAL AND FUNCTION OF THE FALU.
THIS IS DONE BY FLOATING A ONE THRU AR<57:3>, THUS
MAKING THE RESULT OF THE MULTIPLY HAVE AN INTEGER OF 1.0
(201*0.1) AND THE FRACTION WILL BE .5+PATTERN (200*0.1+P
WHERE PATTERN IS THE VALUE OF AR <56:3> FOR THE PARTICUL

THE SECOND SECTION ALSO FLOATS A ONE THRU AR<57:3>
BUT, IN THIS TEST THE INTEGER WILL BE 1.0+COUNT (270*0.1
AND THE FRACTION WILL BE ZERO.

2697 TEST 25 DIVF*-MO*(DST=0)*-(SRC=0)

THIS TEST ENSURES THAT STATE 352 STORES ZERO IN THE RESU
THE A-BRANCH AND ADX ROMS ARE OK.

FPU ROM FLOW-11,130,73,352

2733 TEST 26 INITIAL TESTS OF DIVF

THIS TEST ENSURE THAT SPECIFIC SIGNALS REQUIRED FOR THE
FUNCTIONING PROPERLY. EACH SECTION DESCRIBES THE SIGNAL(
TESTED. A MICRO-TRAP IS SET ON STATE 14 TO TEST THESE SI

NOTE: SYNC POINT NOT SELECTABLE. DEFAULT=14

2864 TEST 27 NORM NEG ENCODER

THIS TEST RUNS A COUNT PATTERN ACROSS THE INPUTS TO THE
NORM NEG ENCODED ON FRHK.

THIS IS DONE BY USING A NUMERATOR OF 0.1 AND DENOMINATOR
THAT COUNTS BETWEEN 0.10000001 AND 0.11111111. THE EXEC
IS INTERRUPTED AT STATE 14 AND THE QR CHECKED FOR THE CO
AMOUNT OF SHIFTS

THE PATTERNS FROM 1.00000000 TO 1.11111111 ARE NOT CHECK
THEY ARE IMPOSSIBLE TO GENERATE.

```
1006                                PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2
1007                                                NOTE:   SYNC POINT NOT SELECTABLE. DEFAULT=14
1008
1009                        2957    TEST 30 Q REG NORM SHIFT COUNT LOOK UP
1010
1011                                THIS TEST FIRST CHECKS ROM STATE 4 AND ADDRESS 4 OF THE
1012                                NORM SHIFT COUNT LOOK-UP ROM. IF FRHK DIV DONE
1013                                IS STUCK HIGH THE FPP WILL HANG IN ROM STATE 14.
1014
1015                                A COUNT PATTERN IS THEN RUN THRU BITS <57:50> OF THE QR
1016                                CHECK ALL LOCATIONS IN THE ROM.
1017
1018                        2965
1019                                IF AN ERROR OCCURS, THE TYPEOUT INDICATES THE ROM ADDRES
1020                                AND ROMOUT DATA THAT WAS BEING TESTED.
1021
1022                                FPU ROM FLOW-11,130,73,342,X(14),4,NORMALIZE
1023
1024                        3017    TEST 31 DIVD INITIAL TESTS
1025
1026                                THIS TEST ENSURES THAT FRLH DLE PREC QT HI B(1) AND LO B
1027                                ARE FUNCTIONING PROPERLY.
1028
1029                        3021            THIS IS DONE BY TRAPPING ON STATE 14 AND LOOKING AT THE
1030
1031                                NOTE:   SYNC POINT NOT SELECTABLE. DEFAULT=14
1032
1033                        3089    TEST 32 FRLJ QSI -1,-2, & -3
1034
1035                                THIS TEST CHECKS THE QSI -1,-2, & -3 MUX ON FRLH WITH
1036                                THE DIVIDE FUNCTION. THERE ARE FOUR CONDITIONS THAT
1037                                ARE CHECKED: 1) LEFT SHIFT 7*FALU59; 2) LEFT SHIFT 7*-FA
1038                                3) LEFT SHIFT 3*FALU59;AND 4) LEFT SHIFT 3*-FALU59.
1039                                CONDITION 1 WAS TESTED IN THE PREVIOUS TEST.
1040
1041                                NOTE:   SYNC POINT NOT SELECTABLE. DEFAULT=14
1042
1043                        3177    TEST 33 DIVD*-MD*IMM
1044
1045                                THIS TEST DIVIDES 127(10) BY 255(10) TO ENSURE THAT STAT
1046                                246 IS FUNCTIONING PROPERLY.
1047
1048                                FPU ROM FLOW-20,141,73,342,14,4,246,NORMALIZE
1049
1050                        3211    TEST 34 STST
1051
1052                                THIS TEST USES THE MICRO-BREAK TRAP TO CHECK THE
1053                                STST INSTRUCTION.  EACH SECTION OF THIS TEST CHECKS
1054                                A DIFFERENT MODE OF THE INSTRUCTION.
1055
```

PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2

3270 TEST 35 FIUV

THIS TEST CHECKS THE 9 CONDITIONS THAT CAN CAUSE AN
INTERRUPT ON A MINUS ZERO
IF SECTION ONE FAILS TO INTERRUPT THE PROBLEM IS MOST
LIKELY ON FRMB. ALL OTHER FAILURES SHOULD BE DUE TO THE
CONTROL STORE.

3435 TEST 36 FIU

THIS TEST CHECKS THE 4 PLACES WHERE AN UNDERFLOW TRAP
CAN OCCUR.

3557 TEST 37 FIV

THIS TEST CHECKS THE 5 POSSIBLE OVERFLOW CONDITIONS. IT
ALSO INCLUDES 3 ADDITIONAL CHECKS OF THE STCF TO ENSURE
CONTROL STORE IS FUNCTIONING PROPERLY.

3677 TEST 40 FIC

THIS TEST ENSURES THAT THE INTEGER CONVERSION
INTERRUPT OCCURS FROM ALL 3 POSSIBLE ROM STATES.

3731 TEST 41 DIVIDE BY ZERO

THIS TEST CHECKS THE TWO ROM STATES THAT CAN BE USED WHE
AN ATTEMPT TO DIVIDE BY ZERO IS MADE.

3775 TEST 42 ILLEGAL OP-CODES

THIS TEST FIRST ENSURES THAT THE ILLEGAL OP-CODE TRAP FU
PROPERLY. IT THEN CHECKS ALL THE POSSIBLE ADDRESSES OF
NO-MEM ROM THAT FORCE AN ILLEGAL OP CODE TRAP.

LAST, IT CHECKS THE FID BIT TO ENSURE IT FUNCTIONS PROPE

3834 TEST 43 NO-MEM ROM

THIS TEST COMPLETES THE TEST OF THE NO-MEM ROM. IT
CONSISTS OF TESTING THOSE OP-CODES THAT CAN USE R6 OR R7
AS LEGAL REGISTERS.

3923 TEST 44 FP PRIORITY ARBITRATION

THIS TEST CHECKS THE FLOATING POINT TRAP PRIORITY ARBITR
LOGIC ON TMCA FOR PIR7 AND STACK LIMIT YELLOW. THE
MEMORY MANAGEMENT ARBITRATION IS PERFORMED LATER.

```
                                PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2
                        3976    TEST 45 MEMORY MANAGEMENT FUNCTIONS

                                THIS TEST ENSURES THAT THE SIGNAL SAPK I SPACEA (0) IS
                                ENABLED DURING THE TWO FLOATING POINT "BUST" CYCLES.

                                THIS IS DONE BY MAKING THE D SPACE PAR, THAT WOULD BE
                                REFERENCED BY THE FP INSTRUCTION, NON-RESIDENT.  SINCE
                                THE INSTRUCTION IS IMMEDIATE MODE, I SPACE SHOULD BE FOR
                                AND THE TRAP SHOULD NOT OCCUR.

                                NOTE: THIS TEST CAN BE DISABLED BY SWITCH 12.

                        4047    TEST 46 FP AND MGMT TRAP ARBITRATION

                                THIS TEST ENSURES THAT TMCA HONOR SEGT CAUSES TMCA HONOR
                                FP TRAP TO GO HIGH.
                                THIS IS DONE BY SETTING THE FP TRAP WITH A MINUS ZERO TR
                                THEN CAUSING A MEMORY MANAGEMENT TRAP.

                                NOTE: SWITCH 12 SKIPS THIS TEST

                        4092    TEST 47 FPA AND FEA

                                THIS TEST EXECUTES TWO PIECES OF CODE IN DIFFERENT PARTS
                                THE PROGRAM TO TEST THE FPA AND FEA REGISTERS.  THIS TES
                                SETS UP THE DATA AND FP VECTOR AND THEN JUMPS TO
                                THE APPROPRIATE LOCATIONS.  THESE TWO PARTICULAR LOCATIO
                                CODE TO CAUSE A 25252 (125252 IF MORE THAN 16K OF MEMORY
                                AND 52524 PATTERN TO PLACED IN THE FPA AND THE INSTRUCTI
                                WILL CAUSE THIS PATTERN TO BE PUT IN THE FEA.

                        4139    TEST 50 FXPB IMMEDIATE (MODE 1 & 4)

                        4141            THIS TEST ENSURES THAT FXPB IMMEDIATE GOES HIGH FOR
                                        ADDRESS MODE 1 AND 4.

                        4178    TEST 51 FMM *USER MODE

                                THIS TEST ENSURES THAT FRLN FMM(1) DOES NOT GO HIGH IN
                                SUPERVISOR OR USER MODE.

                        4197    TEST 52 ACCUMULATOR ADDRESSING

                                THIS TEST CHECKS THE LOGIC THAT DRIVES THE ACCUMULATOR A
                                LINES ON FXPN THAT HAVE NOT ALREADY BEEN TESTED.

                        4224    TEST 53 ACCUMULATOR VOLATILITY

                                THIS TEST EXECUTES THE WALKING ONE'S AND ZERO'S ALGORITH
                                ON THE FLOATING POINT ACCUMULATORS.
```

```
                        PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2
                        ;*******************************************************************
                4343    ;*******************************************************************
                        ;*******************************************************************
                4345    ;A-BRANCH AND ADX ROM EXERCISER
                        ;*******************************************************************
                4346    ;               THE REMAINING SUBTESTS IN THIS PROGRAM TEST ALL THE
                        ;               LOCATIONS IN THE A-BRANCH AND ADX ROMS THAT HAVE NOT
                        ;               ALREADY BEEN TESTED.
                        ;               THE ENTIRE SEQUENCE IS FIRST EXECUTED ONCE. THEN, THE
                        ;               LINE (OR PROGRAMMABLE) CLOCK IS TURNED ON AND THIS SEQUE
                        ;               IS LOOPED ON FOR APPROXIMATELY 30 SECONDS. THE PURPOSE
                        ;               OF THIS IS TRY AND ENSURE THAT THE DSI BIT IN THE CONTRO
                        ;               STORE IS FUNCTIONAL IN ALL THE APPROPRIATE ROM STATES.
                        ;
                        ;*******************************************************************
                4355    ;*******************************************************************
                        ;
                4358    ;   TEST 54 A-BRANCH*ADX ROM EXERCISER
                        ;
                        ;*******************************************************************
                5459    ;CLOCK HANDLER
                        ;*******************************************************************
                        ;
                5460    ;               THIS CODE CONTROLS THE CLOCK AND THE LOOPING ON THE
                        ;               PREVIOUS TESTS WHILE THE CLOCK IS RUNNING.
                        ;               A TICK COUNT IS KEPT IN THE LOCATION CALLED "TICKS".
                        ;               THE LOCATION CALLED "TIME" CONTROLS THE NUMBER OF SECOND
                        ;               BEFORE END OF PASS IS REPORTED.
                        ;
                        ;               WHILE THIS TEST IS BEING PERFORMED, THE HIGH BYTE OF THE
                        ;               DATA LIGHTS WILL INCREMENT APPROXIMATELY ONCE PER SECOND
                        ;
                        ;*******************************************************************
                5543    ;END OF PASS ROUTINE
                        ;*******************************************************************
                        ;
                5546    ;   INCREMENT THE PASS NUMBER ($PASS)
                        ;   TYPE "END PASS #XXXXX TOTAL NUMBER OF ERRORS SINCE LAST REPORT Y
                        ;   WHERE XXXXX AND YYYYY ARE DECIMAL NUMBERS
                        ;   IF THERES A MONITOR GO TO IT
                        ;   IF THERE ISN'T JUMP TO LOOP
```

```
                                PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2
                                ;*******************************************************************
                        5592    ;SCOPE HANDLER ROUTINE
                                ;*******************************************************************

                        5595    ;       THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
                                ;       AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7

                        5597    ;       AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
                                ;       THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                ;       SW14=1  LOOP ON TEST
                                ;       SW11=1  INHIBIT ITERATIONS
                                ;       SW09=1  LOOP ON ERROR
                                ;       SW08=1  LOOP ON TEST IN SWR<7:0>
                                ;       CALL
                                ;               SCOPE           ;;SCOPE=IOT

                                ;*******************************************************************
                        5665    ;ERROR HANDLER ROUTINE
                                ;*******************************************************************

                        5668    ;       THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
                                ;       SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
                                ;       AND GO TO $ERRTYP ON ERROR
                                ;       THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                ;       SW15=1  HALT ON ERROR
                                ;       SW13=1  INHIBIT ERROR TYPEOUTS
                                ;       SW10=1  BELL ON ERROR
                                ;       SW09=1  LOOP ON ERROR
                                ;       CALL
                                ;               ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER

                                ;*******************************************************************
                        5727    ;CONVERT FLOATING BINARY TO OCTAL ASCIZ
                                ;*******************************************************************

                        5728
                                ;       THIS ROUTINE CONVERTS A 32 BIT FLOATING NUMBER TO AN OCTAL
                                ;       ASCIZ STRING IN THE FOLLOWING FORMAT:

                                ;               W  XXX  YYY ZZZZZZ

                                ;       WHERE   W = SIGN BIT
                                ;               X = 8-BIT EXPONENT (RIGHT JUSTIFIED)
                                ;               Y = FRACTION BITS <57:51> (RIGHT JUSTIFIED)
                                ;               Z = FRACTION BITS <50:35>

                                ;       IT IS ENTERED BY A TRAP CALL WITH THE ADDRESS OF THE FLOATING
                                ;       NUMBER IN THE WORD FOLLOWING THE CALL.
                                ;       IT RETURNS WITH THE ADDRESS OF THE ASCIZ STRING ON THE STACK.
```

```
1257                                    PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2
1258                                    ;*****************************************************************
1259                            5799    ;CONVERT FLOATING DOUBLE BINARY TO OCTAL ASCIZ
1260                                    ;*****************************************************************
1261
1262                                    5800
1263                                            ;THIS ROUTINE CONVERTS A 64 BIT FLOATING NUMBER TO AN OCTAL
1264                                            ;ASCIZ STRING IN THE FOLLOWING FORMAT:
1265
1266                                                            ;U  VVV  WWW XXXXXX YYYYYY ZZZZZZ
1267
1268                                                    ;WHERE   U = SIGN BIT
1269                                                            ;V = 8-BIT EXPONENT (RIGHT JUSTIFIED)
1270                                                            ;W = FRACTION BITS <57:51> (RIGHT JUSTIFIED,
1271                                                            ;X = FRACTION BITS <50:35>
1272                                                            ;Y = FRACTION BITS <34:19>
1273                                                            ;Z = FRACTION BITS <18:03>
1274
1275                                            ;IT IS ENTERED BY A TRAP CALL WITH THE ADDRESS OF THE FLOATING
1276                                            ;NUMBER IN THE WORD FOLLOWING THE CALL.
1277                                            ;IT RETURNS WITH THE ADDRESS OF THE ASCIZ STRING ON THE STACK.
1278
1279                                    ;*****************************************************************
1280                            5851    ;ROUTINE TO START THE LINE CLOCK
1281                                    ;*****************************************************************
1282
1283                                    5852    ;THIS ROUTINE SETS UP THE LINE CLOCK TO GUARANTEE THE
1284                                            ;MAXIMUM DELAY BEFORE IT WILL INTERRUPT.
1285
1286                                    ;*****************************************************************
1287                            5881    ;MUL SHIFT ENCODER ROM CONVERT ROUTINE
1288                                    ;*****************************************************************
1289
1290                                    5882
1291                                                    ;THIS ROUTINE TAKES THE CONTENTS OF $REG0 AND $REG1 AS A
1292                                                    ;MULTIPLIER AND GENERATES THE ROM ADDRESSES AND OUTPUT
1293                                                    ;DATA OF THE MUL SHIFT ENCODER ROM FOR THE ENTIRE MULTI-
1294                                                    ;PLICATION.
1295
1296                                    5930            ;THIS ROUTINE DOES A MAINTENANCE TRAP TO LOAD THE FEC
1297                                                    ;REGISTER WITH 2.
1298
```

```
                                PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2
                                ;*******************************************************************
                        5944    ;SAVE AND RESTORE R0-R5 ROUTINES
                                ;*******************************************************************

                                5947    ;SAVE R0-R5
                                        ;CALL:
                                        ;       SAVREG
                                        ;UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
                                        ;
                                        ;TOP---(+16)
                                        ; +2---(+18)
                                        ; +4---R5
                                        ; +6---R4
                                        ; +8---R3
                                        ;+10---R2
                                        ;+12---R1
                                        ;+14---R0

                                5974    ;RESTORE R0-R5
                                        ;CALL:
                                        ;       RESREG

                                ;*******************************************************************
                        5990    ;TYPE ROUTINE
                                ;*******************************************************************

                                5993    ;ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 B
                                        ;THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE
                                        ;NOTE1:  $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CH
                                        ;NOTE2:  $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED
                                        ;NOTE3:  $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
                                        ;
                                        ;CALL:
                                        ;1) USING A TRAP INSTRUCTION
                                        ;       TYPE    ,MESADR         ::MESADR IS FIRST ADDRESS OF AN
                                        ;OR
                                        ;       TYPE
                                        ;       MESADR
```

```
                                PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2
                                ;*******************************************************************
                        6070    ;APT COMMUNICATIONS ROUTINE
                                ;*******************************************************************

                                ;*******************************************************************
                        6129    ;ERROR MESSAGE TYPEOUT ROUTINE
                                ;*******************************************************************

                                ;
                        6131    ;       THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE
                                ;       ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE"
                                ;       AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.

                                ;*******************************************************************
                        6274    ;BINARY TO OCTAL (ASCII) AND TYPE
                                ;*******************************************************************

                                ;
                        6277    ;       THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIG
                                ;       OCTAL (ASCII) NUMBER AND TYPE IT.
                                ;       $TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS
                                ;       CALL:
                                ;               MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;               TYPOS                   ;;CALL FOR TYPEOUT
                                ;               .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS
                                ;               .BYTE   M               ;;M=1 OR 0
                                ;                                       ;;1=TYPE LEADING ZEROS
                                ;                                       ;;0=SUPPRESS LEADING ZER
                                ;
                                ;       $TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE
                                ;       $TYPOS OR $TYPOC
                                ;       CALL:
                                ;               MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;               TYPON                   ;;CALL FOR TYPEOUT
                                ;
                                ;       $TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                                ;       CALL:
                                ;               MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;               TYPOC                   ;;CALL FOR TYPEOUT
                                ;
                                ;*******************************************************************
                        6352    ;CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
                                ;*******************************************************************

                                ;
                        6355    ;       THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIG
                                ;       SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER
                                ;       NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE T
                                ;       BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS
                                ;       REPLACED WITH SPACES.
                                ;       CALL:
                                ;               MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE S
                                ;               TYPDS                   ;;GO TO THE ROUTINE
```

```
                                PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2
                        6420    ;*****************************************************************
                        6420    ; DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
                        6420    ;*****************************************************************
                        6421    ;
                        6422    ;
                        6423    ; THIS ROUTINE WILL CONVERT A 32-BIT 'UNSIGNED BINARY NUMBER TO AN
                        6424    ; UNSIGNED OCTAL ASCIZ NUMBER.
                        6425    ; CALL
                        6426    ;       MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY
                        6427    ;       JSR     PC,@#$DB2O      ;;CALL THE ROUTINE
                        6428    ;       RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ
                        6429    ;
                        6430    ;
                        6431    ;*****************************************************************
                        6432    ; UNEXPECTED TRAP TO 4 ROUTINE
                        6460    ;*****************************************************************
                        6461    ;
                        6462    ;
                        6463    ;*****************************************************************
                        6464    ; UNEXPECTED TRAP TO 114 ROUTINE
                        6474    ;*****************************************************************
                        6475    ;
                        6476    ;
                        6477    ;*****************************************************************
                        6478    ; UNEXPECTED TRAP TO 244 ROUTINE
                        6489    ;*****************************************************************
                        6490    ;
                        6491    ;
                        6492    ;*****************************************************************
                        6493    ; TRAP DECODER
                        6497    ;*****************************************************************
                        6498    ;
                        6499    ;
                        6500    ; THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTIO
                        6501    ; AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDR
                        6502    ; OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
                        6503    ; GO TO THAT ROUTINE.
                        6504    ;
                        6505    ;
                        6506    ;*****************************************************************
                        6507    ; TRAP TABLE
                        6514    ;*****************************************************************
                        6515    ;
                        6516    ; THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLE
                        6517    ; BY THE "TRAP" INSTRUCTION.
```

```
                                PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2
                                ;*****************************************************************
                        5532    ;POWER DOWN AND UP RO.T!"F
                                ;*****************************************************************
```

```
                        .TITLE  PDP11-45/55/70 FP11-C DIAGNOSTIC PART 2
                        ;*COPYRIGHT (C) FEBRUARY 21,1976
                        ;*DIGITAL EQUIPMENT CORP.
                        ;*MAYNARD, MASS. 01754
                        ;*
                        ;*PROGRAM BY DONALD W. MONROE
                        ;*
                        ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                        ;*PACKAGE (MAINDEC-11-DZQAC-B2),NOV 21, 1975.
                        ;*
```

```
1466
1467
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1473
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1494
```

```
.SBTTL  OPERATIONAL SWITCH SETTINGS
;*
;*      SWITCH                  USE
;*      ------          --------------------
;*        15            HALT ON ERROR
;*        14            LOOP ON TEST
;*        13            INHIBIT ERROR TYPEOUTS
;*        12            INHIBIT MEMORY MANAGEMENT TEST
;*        11            INHIBIT ITERATIONS
;*        10            BELL ON ERROR
;*         9            LOOP ON ERROR
;*         8            LOOP ON TEST IN SWR<7:0>
;*        8=0           LOAD MICRO BREAK WITH SWR<7:0>
```

```
                                .SBTTL  BASIC DEFINITIONS

                                ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100                          STACK=  1100            ;;FIRST ADDRESS OF THE STACK
001100                          KERSTK= STACK           ;;KERNEL STACK
000700                          SUPSTK= STACK-200       ;;SUPERVISOR STACK
000600                          USESTK= STACK-300       ;;USER STACK
                                .EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
                                .EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL
177776                          PS=     177776          ;;PROCESSOR STATUS WORD
                                .EQUIV  PS,PSW
177774                          STKLMT= 177774          ;;STACK LIMIT REGISTER
177772                          PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                          DSWR=   177570          ;;HARDWARE SWITCH REGISTER
177570                          DDISP=  177570          ;;HARDWARE DISPLAY REGISTER
177546                          LKS=    177546          ;;LINE CLOCK (KW11-L) STATUS REGISTER

                                ;*MISCELLANEOUS DEFINITIONS
000011                          HT=     11              ;;CODE FOR HORIZONTAL TAB
000012                          LF=     12              ;;CODE LINE FEED
000015                          CR=     15              ;;CODE CARRIAGE RETURN
000200                          CRLF=   200             ;;CODE FOR CARRIAGE RETURN-LINE FEED

                                ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                          R0=     %0              ;;GENERAL REGISTER
000001                          R1=     %1              ;;GENERAL REGISTER
000002                          R2=     %2              ;;GENERAL REGISTER
000003                          R3=     %3              ;;GENERAL REGISTER
000004                          R4=     %4              ;;GENERAL REGISTER
000005                          R5=     %5              ;;GENERAL REGISTER
000006                          R6=     %6              ;;GENERAL REGISTER
000007                          R7=     %7              ;;GENERAL REGISTER
                                .EQUIV  R0,R10          ;;GENERAL REGISTER
                                .EQUIV  R1,R11          ;;GENERAL REGISTER
                                .EQUIV  R2,R12          ;;GENERAL REGISTER
                                .EQUIV  R3,R13          ;;GENERAL REGISTER
                                .EQUIV  R4,R14          ;;GENERAL REGISTER
                                .EQUIV  R5,R15          ;;GENERAL REGISTER
                                .EQUIV  R6,SP           ;;STACK POINTER
                                .EQUIV  SP,KSP          ;;KERNEL STACK POINTER
                                .EQUIV  SP,SSP          ;;SUPERVISOR STACK POINTER
                                .EQUIV  SP,USP          ;;USER STACK POINTER
                                .EQUIV  R7,PC           ;;PROGRAM COUNTER

                                ;*PRIORITY LEVEL DEFINITIONS
000000                          PR0=    0               ;;PRIORITY LEVEL 0
000040                          PR1=    40              ;;PRIORITY LEVEL 1
000100                          PR2=    100             ;;PRIORITY LEVEL 2
000140                          PR3=    140             ;;PRIORITY LEVEL 3
000200                          PR4=    200             ;;PRIORITY LEVEL 4
000240                          PR5=    240             ;;PRIORITY LEVEL 5
000300                          PR6=    300             ;;PRIORITY LEVEL 6
000340                          PR7=    340             ;;PRIORITY LEVEL 7

                                ;*"SWITCH REGISTER" SWITCH DEFINITIONS
```

```
                100000                  SW15=   100000
                040000                  SW14=   40000
                020000                  SW13=   20000
                010000                  SW12=   10000
                004000                  SW11=   4000
                002000                  SW10=   2000
                001000                  SW09=   1000
                000400                  SW08=   400
                000200                  SW07=   200
                000100                  SW06=   100
                000040                  SW05=   40
                000020                  SW04=   20
                000010                  SW03=   10
                000004                  SW02=   4
                000002                  SW01=   2
                000001                  SW00=   1
                                        .EQUIV  SW09,SW9
                                        .EQUIV  SW08,SW8
                                        .EQUIV  SW07,SW7
                                        .EQUIV  SW06,SW6
                                        .EQUIV  SW05,SW5
                                        .EQUIV  SW04,SW4
                                        .EQUIV  SW03,SW3
                                        .EQUIV  SW02,SW2
                                        .EQUIV  SW01,SW1
                                        .EQUIV  SW00,SW0

                                        ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
                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
                                        .EQUIV  BIT09,BIT9
                                        .EQUIV  BIT08,BIT8
                                        .EQUIV  BIT07,BIT7
                                        .EQUIV  BIT06,BIT6
                                        .EQUIV  BIT05,BIT5
                                        .EQUIV  BIT04,BIT4
                                        .EQUIV  BIT03,BIT3
                                        .EQUIV  BIT02,BIT2
                                        .EQUIV  BIT01,BIT1
                                        .EQUIV  BIT00,BIT0

                                        ;*BASIC "CPU" TRAP VECTOR ADDRESSES
```

```
                        ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
                        RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
                        TBITVEC=14              ;;"T" BIT
                        TRTVEC= 14              ;;TRACE TRAP
                        BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
                        IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
                        PWRVEC= 24              ;;POWER FAIL
                        EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
                        TRAPVEC=34              ;;"TRAP" TRAP
                        TKVEC=  60              ;;TTY KEYBOARD VECTOR
                        TPVEC=  64              ;;TTY PRINTER VECTOR
                        LKVEC=  100             ;;LINE CLOCK (KW11-L) VECTER
                        CACHVEC=114             ;;CACHE ERROR INTERRUPT VECTOR
                        PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
                        MMVEC=  250             ;;MEMORY MANAGEMENT VECTOR

                        .SBTTL  CACHE   REGISTER DEFINITIONS

                        LOADRS = 177740         ;;LOWER 16 BITS OF ADDRESS THAT CAUSED ERROR
                        HIADRS = 177742         ;;UPPER SIX BITS OF ADDRESS THAT CAUSED ERROR
                        MEMERR = 177744         ;;CACHE ERROR REGISTER
                        CONTRL = 177746         ;;MEMORY CONTROL REGISTER
                        MAINT  = 177750         ;;MEMORY MAINTENENCE REGISTER
                        HITMIS = 177752         ;;HIT MISS REGISTER "1" IMPLIES HIT IN CACHE

                        .SBTTL  CPU REGISTER DEFINITIONS

                        SIZELO = 177760         ;;MEMORY SIZE REGISTER NUMBER TO PUT INTO A PAR
                                                ;;TO GET TO THE LAST 32 WORDS OF MEMORY
                        SIZEHI = 177762         ;;HIGH SIZE REGISTER, RESERVED FOR FUTURE USE
                                                ;;CURRENTLY ALL ZERO
                        SYSTID = 177764         ;;SYSTEM ID REGISTER
                        CPUERR = 177766         ;;CPU ERROR REGISTER HOLDS CONDITION THAT CAUSED
                                                ;;THE TRAP TO ERRVEC (000004)



                        .SBTTL  MEMORY MANAGEMENT DEFINITIONS


                        ;*MEMORY MANAGEMENT STATUS REGISTER ADDRESSES

                        MMR0=   177572
                        MMR1=   177574
                        MMR2=   177576
                        MMR3=   172516
                        .EQUIV  MMR0,SR0
                        .EQUIV  MMR1,SR1
                        .EQUIV  MMR2,SR2
                        .EQUIV  MMR3,SR3

                        ;*USER "I" PAGE DESCRIPTOR REGISTERS
```

```
1663
1664            177600                  UIPDR0= 177600
1665            177602                  UIPDR1= 177602
1666            177604                  UIPDR2= 177604
1667            177606                  UIPDR3= 177606
1668            177610                  UIPDR4= 177610
1669            177612                  UIPDR5= 177612
1670            177614                  UIPDR6= 177614
1671            177616                  UIPDR7= 177616
1672
1673                                    ;*USER "D" PAGE DESCRIPTOR REGISTORS
1674
1675            177620                  UDPDR0= 177620
1676            177622                  UDPDR1= 177622
1677            177624                  UDPDR2= 177624
1678            177626                  UDPDR3= 177626
1679            177630                  UDPDR4= 177630
1680            177632                  UDPDR5= 177632
1681            177634                  UDPDR6= 177634
1682            177636                  UDPDR7= 177636
1683
1684                                    ;*USER "I" PAGE ADDRESS REGISTERS
1685
1686            177640                  UIPAR0= 177640
1687            177642                  UIPAR1= 177642
1688            177644                  UIPAR2= 177644
1689            177646                  UIPAR3= 177646
1690            177650                  UIPAR4= 177650
1691            177652                  UIPAR5= 177652
1692            177654                  UIPAR6= 177654
1693            177656                  UIPAR7= 177656
1694
1695                                    ;*USER "D" PAGE ADDRESS REGISTERS
1696
1697            177660                  UDPAR0= 177660
1698            177662                  UDPAR1= 177662
1699            177664                  UDPAR2= 177664
1700            177666                  UDPAR3= 177666
1701            177670                  UDPAR4= 177670
1702            177672                  UDPAR5= 177672
1703            177674                  UDPAR6= 177674
1704            177676                  UDPAR7= 177676
1705
1706                                    ;*SUPERVISOR "I" PAGE DESCRIPTOR REGISTERS
1707
1708            172200                  SIPDR0= 172200
1709            172202                  SIPDR1= 172202
1710            172204                  SIPDR2= 172204
1711            172206                  SIPDR3= 172206
1712            172210                  SIPDR4= 172210
1713            172212                  SIPDR5= 172212
1714            172214                  SIPDR6= 172214
1715            172216                  SIPDR7= 172216
1716
1717                                    ;*SUPERVISOR "D" PAGE DESCRIPTOR REGISTERS
1718
```

```
                        SDPDR0= 172220
                        SDPDR1= 172222
                        SDPDR2= 172224
                        SDPDR3= 172226
                        SDPDR4= 172230
                        SDPDR5= 172232
                        SDPDR6= 172234
                        SDPDR7= 172236

                        ;*SUPERVISOR "I" PAGE ADDRESS REGISTERS

                        SIPAR0= 172240
                        SIPAR1= 172242
                        SIPAR2= 172244
                        SIPAR3= 172246
                        SIPAR4= 172250
                        SIPAR5= 172252
                        SIPAR6= 172254
                        SIPAR7= 172256

                        ;*SUPERVISOR "D" PAGE ADDRESS REGISTERS

                        SDPAR0= 172260
                        SDPAR1= 172262
                        SDPAR2= 172264
                        SDPAR3= 172266
                        SDPAR4= 172270
                        SDPAR5= 172272
                        SDPAR6= 172274
                        SDPAR7= 172276

                        ;*KERNEL "I" PAGE DESCRIPTOR REGISTERS

                        KIPDR0= 172300
                        KIPDR1= 172302
                        KIPDR2= 172304
                        KIPDR3= 172306
                        KIPDR4= 172310
                        KIPDR5= 172312
                        KIPDR6= 172314
                        KIPDR7= 172316

                        ;*KERNEL "D" PAGE DESCRIPTOR REGISTERS

                        KDPDR0= 172320
                        KDPDR1= 172322
                        KDPDR2= 172324
                        KDPDR3= 172326
                        KDPDR4= 172330
                        KDPDR5= 172332
                        KDPDR6= 172334
                        KDPDR7= 172336

                        ;*KERNEL "I" PAGE ADDRESS REGISTERS

                        KIPAR0= 172340
```

```
1775            172342                  KIPAR1= 172342
1776            172344                  KIPAR2= 172344
1777            172346                  KIPAR3= 172346
1778            172350                  KIPAR4= 172350
1779            172352                  KIPAR5= 172352
1780            172354                  KIPAR6= 172354
1781            172356                  KIPAR7= 172356
1782
1783                                    ;*KERNEL "D" PAGE ADDRESS REGISTERS
1784
1785            172360                  KDPAR0= 172360
1786            172362                  KDPAR1= 172362
1787            172364                  KDPAR2= 172364
1788            172366                  KDPAR3= 172366
1789            172370                  KDPAR4= 172370
1790            172372                  KDPAR5= 172372
1791            172374                  KDPAR6= 172374
1792            172376                  KDPAR7= 172376
1793
1794
1795
1796
1797                                    .SBTTL  UNIBUS MAP REGISTER DEFINITIONS
1798
1799
1800                                    ;*THE LOWER 16 BITS OF THE MAP REGISTERS ARE LABELED 'MAPLXX'
1801                                    ;*THE UPPER 6 BITS OF THE MAP REGISTERS ARE LABELED 'MAPHXX'
1802
1803
1804            170200                  MAPL00 = 170200
1805            170202                  MAPH00 = 170202
1806            170204                  MAPL01 = 170204
1807            170206                  MAPH01 = 170206
1808            170210                  MAPL02 = 170210
1809            170212                  MAPH02 = 170212
1810            170214                  MAPL03 = 170214
1811            170216                  MAPH03 = 170216
1812            170220                  MAPL04 = 170220
1813            170222                  MAPH04 = 170222
1814            170224                  MAPL05 = 170224
1815            170226                  MAPH05 = 170226
1816            170230                  MAPL06 = 170230
1817            170232                  MAPH06 = 170232
1818            170234                  MAPL07 = 170234
1819            170236                  MAPH07 = 170236
1820            170240                  MAPL10 = 170240
1821            170242                  MAPH10 = 170242
1822            170244                  MAPL11 = 170244
1823            170246                  MAPH11 = 170246
1824            170250                  MAPL12 = 170250
1825            170252                  MAPH12 = 170252
1826            170254                  MAPL13 = 170254
1827            170256                  MAPH13 = 170256
1828            170260                  MAPL14 = 170260
1829            170262                  MAPH14 = 170262
1830            170264                  MAPL15 = 170264
```

```
1831    170266          MAPH15 = 170266
1832    170270          MAPL16 = 170270
1833    170272          MAPH16 = 170272
1834    170274          MAPL17 = 170274
1835    170276          MAPH17 = 170276
1836    170300          MAPL20 = 170300
1837    170302          MAPH20 = 170302
1838    170304          MAPL21 = 170304
1839    170306          MAPH21 = 170306
1840    170310          MAPL22 = 170310
1841    170312          MAPH22 = 170312
1842    170314          MAPL23 = 170314
1843    170316          MAPH23 = 170316
1844    170320          MAPL24 = 170320
1845    170320          MAPH24 = 170320
1846    170324          MAPL25 = 170324
1847    170326          MAPH25 = 170326
1848    170330          MAPL26 = 170330
1849    170332          MAPH26 = 170332
1850    170334          MAPL27 = 170334
1851    170336          MAPH27 = 170336
1852    170340          MAPL30 = 170340
1853    170342          MAPH30 = 170342
1854    170344          MAPL31 = 170344
1855    170346          MAPH31 = 170346
1856    170350          MAPL32 = 170350
1857    170352          MAPH32 = 170352
1858    170354          MAPL33 = 170354
1859    170356          MAPH33 = 170356
1860    170360          MAPL34 = 170360
1861    170362          MAPH34 = 170362
1862    170364          MAPL35 = 170364
1863    170366          MAPH35 = 170366
1864    170370          MAPL36 = 170370
1865    170372          MAPH36 = 170372
1866    170374          MAPL37 = 170374
1867    170376          MAPH37 = 170376
1868                    .EQUIV  MAPL00,MAPL0
1869                    .EQUIV  MAPH00,MAPH0
1870                    .EQUIV  MAPL01,MAPL1
1871                    .EQUIV  MAPH01,MAPH1
1872                    .EQUIV  MAPL02,MAPL2
1873                    .EQUIV  MAPH02,MAPH2
1874                    .EQUIV  MAPL03,MAPL3
1875                    .EQUIV  MAPH03,MAPH3
1876                    .EQUIV  MAPL04,MAPL4
1877                    .EQUIV  MAPH04,MAPH4
1878                    .EQUIV  MAPL05,MAPL5
1879                    .EQUIV  MAPH05,MAPH5
1880                    .EQUIV  MAPL06,MAPL6
1881                    .EQUIV  MAPH06,MAPH6
1882                    .EQUIV  MAPL07,MAPL7
1883                    .EQUIV  MAPH07,MAPH7
1884                    .SBTTL  FLOATING POINT REGISTER DEFINITIONS
1885    000000          AC0     =%0
1886    000001          AC1     =%1
```

```
                000002          AC2     =%2
                000003          AC3     =%3
                000004          AC4     =%4
                000005          AC5     =%5
                000006          AC6     =%6
                000007          AC7     =%7
                170004          MSN     =170004
                001160          COUNT   =$REGC
                001162          STEP    =$REG1
                001164          OFFSET  =$REG2

                                .SBTTL  FLOATING POINT STATUS BIT DEFINITIONS
                                .EQUIV  BIT0,FC
                                .EQUIV  BIT1,FV
                                .EQUIV  BIT2,FZ
                                .EQUIV  BIT3,FN
                                .EQUIV  BIT4,FMM
                                .EQUIV  BIT5,FT
                                .EQUIV  BIT6,FL
                                .EQUIV  BIT7,FD
                                .EQUIV  BIT8,FIC
                                .EQUIV  BIT9,FIV
                                .EQUIV  BIT10,FIU
                                .EQUIV  BIT11,FIUV
                                .EQUIV  BIT14,FID
                                .EQUIV  BIT15,FER

                                .SBTTL  FLOATING POINT EXCEPTION CODE DEFINITIONS
                                .EQUIV  BIT1,FOCE
                                .EQUIV  BIT2,FDZ
                000006          FICE=6
                000010          FO=10
                000012          FU=12
                000014          FUV=14
                000016          MT=16

                                .SBTTL  FLOATING POINT VECTOR DEFINITION
                000244          FPPVEC=244
                000100          LKVEC   =100
                177546          LKSTAT  =177546
                172540          PCLKST  =172540
                172542          COSETB  =172542
                172544          COUNTER =172544
                000104          PKVEC   =104

                                .SBTTL  TRAP CATCHER

                000000                  .=0
                                ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
                000174          .=174
000174  000000  DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
000176  000000  SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER

                                .SBTTL  STARTING ADDRESS(ES)
```

```
  1943  000200  000137  004036                  JMP     @#START ;;JUMP TO STARTING ADDRESS OF PROGRAM
  1944
  1945                                  .SBTTL  ACT11 HOOKS
  1946
  1947                                  ;;**********************************************************************
  1948                                  ;HOOKS REQUIRED BY ACT11
  1949          000204                          $SVPC=.                 ;SAVE PC
  1950          000046                          .=46
  1951  000046 033102                          $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
  1952          000052                          .=52
  1953  000052 000000                          .WORD   0               ;;2)SET LOC.52 TO ZERO
  1954          000204                          .=$SVPC                 ;; RESTORE PC
```

```
                                .SBTTL  COMMON TAGS

                                ;;*****************************************************************
                                ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
                                ;*USED IN THE PROGRAM.

001100                                  .=1100
001100                  $CMTAG:                         ;;START OF COMMON TAGS
001100  000000                  .WORD   0
001102  000                     $TSTNM: .BYTE   0       ;;CONTAINS THE TEST NUMBER
001103  000                     $ERFLG: .BYTE   0       ;;CONTAINS ERROR FLAG
001104  000000                  $ICNT:  .WORD   0       ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000                  $LPADR: .WORD   0       ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000                  $LPERR: .WORD   0       ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000                  $ERTTL: .WORD   0       ;;CONTAINS TOTAL ERRORS DETECTED
001114  000                     $ITEMB: .BYTE   0       ;;CONTAINS ITEM CONTROL BYTE
001115  001                     $ERMAX: .BYTE   1       ;;CONTAINS MAX. ERRORS PER TEST
001116  000000                  $ERRPC: .WORD   0       ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000                  $GDADR: .WORD   0       ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000                  $BDADR: .WORD   0       ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000                  $GDDAT: .WORD   0       ;;CONTAINS 'GOOD' DATA
001126  000000                  $BDDAT: .WORD   0       ;;CONTAINS 'BAD' DATA
001130  000000                          .WORD   0       ;;RESERVED--NOT TO BE USED
001132  000000                          .WORD   0
001134  000000                          .WORD   0
001136  177570                  SWR:    .WORD   DSWR    ;;ADDRESS OF SWITCH REGISTER
001140  177570                  DISPLAY: .WORD  DDISP   ;;ADDRESS OF DISPLAY REGISTER
001142  177560                  $TKS:   177560          ;;TTY KBD STATUS
001144  177562                  $TKB:   177562          ;;TTY KBD BUFFER
001146  177564                  $TPS:   177564          ;;TTY PRINTER STATUS REG. ADDRESS
001150  177566                  $TPB:   177566          ;;TTY PRINTER BUFFER REG. ADDRESS
001152  000                     $NULL:  .BYTE   0       ;;CONTAINS NULL CHARACTER FOR FILLS
001153  002                     $FILLS: .BYTE   2       ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001154  012                     $FILLC: .BYTE   12      ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001155  000                     $TPFLG: .BYTE   0       ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001156  000000                  $REGAD: .WORD   0       ;;CONTAINS THE ADDRESS FROM
                                                        ;;WHICH  ($REG0) WAS OBTAINED
001160  000000                  $REG0:  .WORD   0       ;;CONTAINS (($REGAD)+0)
001162  000000                  $REG1:  .WORD   0       ;;CONTAINS (($REGAD)+2)
001164  000000                  $REG2:  .WORD   0       ;;CONTAINS (($REGAD)+4)
001166  000000                  $REG3:  .WORD   0       ;;CONTAINS (($REGAD)+6)
001170  000000                  $REG4:  .WORD   0       ;;CONTAINS (($REGAD)+10)
001172  000000                  $REG5:  .WORD   0       ;;CONTAINS (($REGAD)+12)
001174  000000                  $REG6:  .WORD   0       ;;CONTAINS (($REGAD)+14)
001176  000000                  $REG7:  .WORD   0       ;;CONTAINS (($REGAD)+16)
001200  000000                  $TMP0:  .WORD   0       ;;USER DEFINED
001202  000000                  $TMP1:  .WORD   0       ;;USER DEFINED
001204  000000                  $TMP2:  .WORD   0       ;;USER DEFINED
001206  000000                  $TMP3:  .WORD   0       ;;USER DEFINED
001210  000000                  $TMP4:  .WORD   0       ;;USER DEFINED
001212  000000                  $TMP5:  .WORD   0       ;;USER DEFINED
001214  000000                  $TMP6:  .WORD   0       ;;USER DEFINED
001216  000000                  $TMP7:  .WORD   0       ;;USER DEFINED
001220  000000                  $TIMES: 0               ;;MAX. NUMBER OF ITERATIONS
001222  000000                  $ESCAPE:0               ;;ESCAPE ON ERROR ADDRESS
```

```
  2011  001224  177607  000377          $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
  2012  001230     077                  $QUES:  .ASCII  /?/              ;;QUESTION MARK
  2013  001231     015                  $CRLF:  .ASCII  <15>             ;;CARRIAGE RETURN
  2014  001232  000012                  $LF:    .ASCIZ  <12>             ;;LINE FEED
```

```
                                ;;*****************************************************************
                                .SBTTL  APT MAILBOX-ETABLE
                                ;;*****************************************************************
                                .EVEN
001234                          $MAIL:                          ;;APT MAILBOX
001234  000000                  $MSGTY: .WORD   AMSGTY          ;;MESSAGE TYPE CODE
001236  000000                  $FATAL: .WORD   AFATAL          ;;FATAL ERROR NUMBER
001240  000000                  $TESTN: .WORD   ATESTN          ;;TEST NUMBER
001242  000000                  $PASS:  .WORD   APASS           ;;PASS COUNT
001244  000000                  $DEVCT: .WORD   ADEVCT          ;;DEVICE COUNT
001246  000000                  $UNIT:  .WORD   AUNIT           ;;I/O UNIT NUMBER
001250  000000                  $MSGAD: .WORD   AMSGAD          ;;MESSAGE ADDRESS
001252  000000                  $MSGLG: .WORD   AMSGLG          ;;MESSAGE LENGTH
001254                          $ETABLE:                        ;;APT ENVIRONMENT TABLE
001254     000                  $ENV:   .BYTE   AENV            ;;ENVIRONMENT BYTE
001255     000                  $ENVM:  .BYTE   AENVM           ;;ENVIRONMENT MODE BITS
001256  000000                  $SWREG: .WORD   ASWREG          ;;APT SWITCH REGISTER
001260  000000                  $USWR:  .WORD   AUSWR           ;;USER SWITCHES
001262  000000                  $CPUOP: .WORD   ACPUOP          ;;CPU TYPE,OPTIONS
                                ;*                              BITS 15-11=CPU TYPE
                                ;*                                      11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
                                ;*                                      11/70=06,PDQ=07,Q=10
                                ;*                              BIT 10=REAL TIME CLOCK
                                ;*                              BIT  9=FLOATING POINT PROCESSOR
                                ;*                              BIT  8=MEMORY MANAGEMENT
001264                          $ETEND:
                                .MEXIT
001264  000000                  $ERPSW: .WORD                   ;ERROR PSW
001266  000000                  $STSTNM:.WORD                   ;TEST NUMBER FOR TYPEOUT
001270  000000                  $FEC:   .WORD                   ;FLOATING EXCEPTION CODE
001272  000000                  $FEA:   .WORD                   ;FLOATING EXCEPTION ADDRESS
001274     000                  $FT:    .BYTE                   ;TRUNCATE/ROUND MODE
001275     000                  $FL:    .BYTE                   ;INTEGER/INTEGER LONG MODE
001276  000000                  $FD:    .WORD                   ;FLOATING/FLOATING DOUBLE MODE
001300  000004                  $FLT:   .BLKW   4               ;BUFFER FOR FLOATING CONVERSIONS
001310  000042                  $FLBUFF:.BLKB   42              ;BUFFER FOR ASCII FLOATING NUMBERS
001352  000005                  $BUFF:  .BLKW   5               ;BUFFER
001364  000000                  $FPS:   .WORD
001366  000000                  TICKS:  .WORD
001370  000030                  TIMES:  .WORD   30
001372  000000                  $CPUERR:.WORD
001374  052532                  ADRPTR: .WORD   ADRTBL
001376  054532                  OUTPTR: .WORD   OUTTBL
001400     367     366     377  MULTBL: .BYTE   367,366,377,365,367,376,377,364
001403     365     367     376
001406     377     364
001410     367     366     377          .BYTE   367,366,377,375,367,376,377,363
001413     375     367     376
001416     377     363
001420     367     366     377          .BYTE   367,366,377,365,367,376,377,374
001423     365     367     376
001426     377     374
001430     367     366     377          .BYTE   367,366,377,375,367,376,377,362
001433     375     367     376
```

```
2071  001436  377  362
2072  001440  367  366  377          .BYTE   367,366,377,365,367,376,377,364
2073  001443  365  367  376
2074  001446  377  364
2075  001450  367  366  377          .BYTE   367,366,377,375,367,376,377,373
2076  001453  375  367  376
2077  001456  377  373
2078  001460  367  366  377          .BYTE   367,366,377,365,367,376,377,374
2079  001463  365  367  376
2080  001466  377  374
2081  001470  367  366  377          .BYTE   367,366,377,375,367,376,377,372
2082  001473  375  367  376
2083  001476  377  372
2084  001500  367  366  377  100$:   .BYTE   367,366,377,365,367,376,377,364
2085  001503  365  367  376
2086  001506  377  364
2087  001510  367  366  377          .BYTE   367,366,377,375,367,376,377,363
2088  001513  375  367  376
2089  001516  377  363
2090  001520  367  366  377          .BYTE   367,366,377,365,367,376,377,374
2091  001523  365  367  376
2092  001526  377  374
2093  001530  367  366  377          .BYTE   367,366,377,375,367,376,377,372
2094  001533  375  367  376
2095  001536  377  372
2096  001540  367  366  377          .BYTE   367,366,377,365,367,376,377,364
2097  001543  365  367  376
2098  001546  377  364
2099  001550  367  366  377          .BYTE   367,366,377,375,367,376,377,373
2100  001553  375  367  376
2101  001556  377  373
2102  001560  367  366  377          .BYTE   367,366,377,365,367,376,377,374
2103  001563  365  367  376
2104  001566  377  374
2105  001570  367  366  377          .BYTE   367,366,377,375,367,376,377,372
2106  001573  375  367  376
2107  001576  377  372
2108  001600  362  367  366  $200:   .BYTE   362,367,366,377,365,367,376,377
2109  001603  377  365  367
2110  001606  376  377
2111  001610  364  367  366          .BYTE   364,367,366,377,375,367,376,377
2112  001613  377  375  367
2113  001616  376  377
2114  001620  363  367  366          .BYTE   363,367,366,377,365,367,376,377
2115  001623  377  365  367
2116  001626  376  377
2117  001630  374  367  366          .BYTE   374,367,366,377,375,367,376,377
2118  001633  377  375  367
2119  001636  376  377
2120  001640  362  367  366          .BYTE   362,367,366,377,365,367,376,377
2121  001643  377  365  367
2122  001646  376  377
2123  001650  364  367  366          .BYTE   364,367,366,377,375,367,376,377
2124  001653  377  375  367
2125  001656  376  377
2126  001660  373  367  366          .BYTE   373,367,366,377,365,367,376,377
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2127  001663  377  365  367
2128  001666  376  377
2129  001670  374  367  366          .BYTE   374,367,366,377,375,367,376,377
2130  001673  377  375  367
2131  001676  376  377
2132  001700  362  367  366  $300:   .BYTE   362,367,366,377,365,367,376,377
2133  001703  377  365  367
2134  001706  376  377
2135  001710  364  367  366          .BYTE   364,367,366,377,375,367,376,377
2136  001713  377  375  367
2137  001716  376  377
2138  001720  363  367  366          .BYTE   363,367,366,377,365,367,376,377
2139  001723  377  365  367
2140  001726  376  377
2141  001730  374  367  366          .BYTE   374,367,366,377,375,367,376,377
2142  001733  377  375  367
2143  001736  376  377
2144  001740  372  367  366          .BYTE   372,367,366,377,365,367,376,377
2145  001743  377  365  367
2146  001746  376  377
2147  001750  364  367  366          .BYTE   364,367,366,377,375,367,376,377
2148  001753  377  375  367
2149  001756  376  377
2150  001760  373  367  366          .BYTE   373,367,366,377,365,367,376,377
2151  001763  377  365  367
2152  001766  376  377
2153  001770  374  367  366          .BYTE   374,367,366,377,375,367,376,377
2154  001773  377  375  367
2155  001776  376  377
2156  002000  171006       ILLOP:    .WORD   171006          ;22
2157  002002  171406                 .WORD   171406          ;23
2158  002004  172006                 .WORD   172006          ;24
2159  002006  172406                 .WORD   172406          ;25
2160  002010  173006                 .WORD   173006          ;26
2161  002012  173406                 .WORD   173406          ;27
2162  002014  174006                 .WORD   174006          ;30
2163  002016  174406                 .WORD   174406          ;31
2164  002020  176006                 .WORD   176006          ;34
2165  002022  177406                 .WORD   177406          ;37
2166  002024  170006                 .WORD   170006          ;46
2167  002026  170016                 .WORD   170016          ;56
2168  002030  170017                 .WORD   170017          ;57
2169  002032  170406                 .WORD   170406          ;64
2170  002034  170506                 .WORD   170506          ;65
2171  002036  170606                 .WORD   170606          ;66
2172  002040  170706                 .WORD   170706          ;67
2173  002042  170010                 .WORD   170010          ;150
2174  002044  170013                 .WORD   170013          ;153
2175  002046  170014                 .WORD   170014          ;154
2176  002050  170015                 .WORD   170015          ;155
2177  002052  170026                 .WORD   170026          ;246
2178  002054  170027                 .WORD   170027          ;247
2179  002056  170036                 .WORD   170036          ;256
2180  002060  170037                 .WORD   170037          ;257
2181  002062  170040                 .WORD   170040          ;340
2182  002064  170041                 .WORD   170041          ;341
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 2183  002066  170042                          .WORD   170042          ;342
 2184  002070  170043                          .WORD   170043          ;343
 2185  002072  170044                          .WORD   170044          ;344
 2186  002074  170045                          .WORD   170045          ;345
 2187  002076  170030                          .WORD   170030          ;350
 2188  002100  170031                          .WORD   170031          ;351
 2189  002102  170032                          .WORD   170032          ;352
 2190  002104  170033                          .WORD   170033          ;353
 2191  002106  170034                          .WORD   170034          ;354
 2192  002110  170035                          .WORD   170035          ;355
 2193  002112                          ILLEND:
 2194  002112  000024                  WALKBUF:.BLKW   24
 2195  002162  000000                  $ACO:   .WORD
 2196  002164  000000                          .WORD
 2197  002166  000000                          .WORD
 2198  002170  000000                          .WORD
 2199
 2200                                  .SBTTL  ERROR POINTER TABLE
 2201
 2202                                  ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
 2203                                  ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
 2204                                  ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
 2205                                  ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
 2206                                  ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:
 2207
 2208                                  ;*      EM              ;;POINTS TO THE ERROR MESSAGE
 2209                                  ;*      DH              ;;POINTS TO THE DATA HEADER
 2210                                  ;*      DT              ;;POINTS TO THE DATA
 2211                                  ;*      DF              ;;POINTS TO THE DATA FORMAT
 2212
 2213
 2214  002172                          $ERRTB:
 2215
 2216
```

```
2217
2218
2219  002172  037633                ;ITEM 1
2220  002174  037665                EM1             ;DST CHANGED ON MULF*DST=0
2221                                DH1             ;ERRPC      DATA        TEST NO
2222  002176  037752                                ;       EXPECT      ACTUAL
2223  002200  037764                DT1             ;$ERRPC,$TMP0 , $TMP2,$$STSTNM
2224                                DF1             ;0,1,1.0
2225
2226  002202  037771                ;ITEM 2
2227  002204  037665                EM2             ;4F1 BRANCH FAILED
2228  002206  037752                DH1
2229  002210  037764                DT1
2230                                DF1
2231
2232  002212  040104                ;ITEM 3
2233  002214  040130                EM3             ;CONDITION CODES BAD
2234                                DH3             ;ERRPC      FPS         TEST NO
2235  002216  040200                                ;     EXPECT      ACTUAL
2236  002220  000000                DT3             ;$ERRPC,$TMP0,$TMP1,$$TSTNM
2237                                0
2238
2239  002222  040212                ;ITEM 4
2240  002224  040231                EM4             ;ADX ROM FAILED
2241  002226  040250                DH4             ;ERRPC    TEST NO
2242  002230  000000                DT4             ;$ERRPC,$$TSTNM
2243                                0
2244
2245  002232  040256                ;ITEM 5
2246  002234  040231                EM5             ;FRHK MUL SWR STUCK LOW
2247  002236  040250                DH4
2248  002240  000000                DT4
2249                                0
2250
2251  002242  040305                ;ITEM 6
2252  002244  040231                EM6             ;FXPP SC00 NOT GETTING TO FRMA AS A HIGH
2253  002246  040250                DH4
2254  002250  000000                DT4
2255                                0
2256
2257  002252  040355                ;ITEM 7
2258  002254  037665                EM7             ;FRME SHFC 0(0)H NOT GOING H WHEN 1(0) IS LOW
2259  002256  040436                DH1
2260  002260  037764                DT7             ;$ERRPC,$TMP0,$TMP4,$$TSTNM
2261                                DF1
2262
2263  002262  040450                ;ITEM 10
2264                                EM10            ;QR DATA BAD, CHECK MUL SHIFT ENCODER
2265  002264  037665                                ;ROMOUT IN STATE 233
2266  002266  040622                DH1
2267  002270  037764                DT10            ;$ERRPC,$TMP0,$TMP4,$$TSTNM
2268                                DF1
2269
2270  002272  040634                ;ITEM 11
2271  002274  037665                EM11            ;FRHL MYP SIGN EXTEND NOT GOING LOW
2272  002276  040436                DH1
                                    DT7
```

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2273  002300  037764                    DF1
2274
2275                                    ;ITEM 12
2276  002302  040677                    EM12            ;FRHL MPY/DIV ADD(1)L NOT GOING LO., OR
2277  002304  037665                    DH1             ;NOT CAUSING FRMH FORCE MPY/DIV ADD
2278  002306  040436                    DT7             ;TO FORCE THE ADD
2279  002310  037764                    DF1
2280
2281                                    ;ITEM 13
2282  002312  041031                    EM13            ;AR DATA BAD
2283  002314  037665                    DH1
2284  002316  041046                    DT13            ;$ERRPC,$TMP2,$TMP6,$$TSTNM
2285  002320  037764                    DF1
2286
2287                                    ;ITEM 14
2288  002322  041060                    EM14            ;MUL SHF ENCODER ROMOUT BAD
2289  002324  041115                    DH14            ;ERRPC   ROMOUT  TEST NO
2290  002326  041142                    DT14            ;$ERRPC,$REG5,$$TSTNM
2291  002330  000000                    0
2292
2293                                    ;ITEM 15
2294  002332  041152                    EM15            ;FRHK MPY/DIV ADD(1)L NOT GOING HIGH
2295  002334  037665                    DH1
2296  002336  041046                    DT13
2297  002340  037764                    DF1
2298
2299                                    ;ITEM 16
2300  002342  041266                    EM16            ;FRHK MUL SWR NOT GOING LOW
2301  002344  040231                    DH4
2302  002346  040250                    DT4
2303  002350  000000                    0
2304
2305                                    ;ITEM 17
2306  002352  041407                    EM17            ;FRHK MPY SIGN EXTEND NOT GOING HIGH
2307  002354  037665                    DH1
2308  002356  041046                    DT13
2309  002360  037764                    DF1
2310
2311                                    ;ITEM 20
2312  002362  041453                    EM20            ;FRHK E115(4) NOT GOING LOW
2313  002364  040231                    DH4
2314  002366  040250                    DT4
2315  002370  000000                    0
2316
2317                                    ;ITEM 21
2318  002372  041506                    EM21            ;FRHK E115(4) NOT GOING HIGH
2319  002374  040231                    DH4
2320  002376  040250                    DT4
2321  002400  000000                    0
2322
2323                                    ;ITEM 22
2324  002402  041542                    EM22            ;FRHK E107(12) NOT GOING LOW
2325  002404  040231                    DH4
2326  002406  040250                    DT4
2327  002410  000000                    0
2328
```

```
2329                                            ;ITEM 23
2330  002412  041576                            EM23            ;FRHK MUL SWR DID NOT ENABLE
2331  002414  037665                            DH1             ;FRMH FORCE A
2332  002416  041046                            DT13
2333  002420  037764                            DF1
2334
2335                                            ;ITEM 24
2336  002422  041647                            EM24            ;RESULT WRONG
2337  002424  037665                            DH1
2338  002426  037752                            DT1
2339  002430  037764                            DF1
2340
2341                                            ;ITEM 25
2342  002432  041664                            EM25            ;FRHK + FRLH MUL SHIFT ENCODER
2343  002434  040231                            DH4             ;ROM FAILED
2344  002436  040250                            DT4
2345  002440  000000                            0
2346
2347                                            ;ITEM 26
2348  002442  042001                            EM26            ;FRHK MUL SWR NOT GOING HIGH
2349  002444  042067                            DH26            ;                       DATA
2350                                            ;       EXPECT                                  ACTUAL
2351  002446  042134                            DT26            ;$TMP0,$TMP4
2352  002450  042142                            DF26            ;2,2
2353
2354                                            ;ITEM 27
2355  002452  042144                            EM27            ;FRLH E1(11) NOT GOING LOW
2356  002454  042067                            DH26
2357  002456  042134                            DT26
2358  002460  042142                            DF26
2359
2360                                            ;ITEM 30
2361  002462  042216                            EM30            ;FRHK E107 NOT GOING LOW
2362  002464  042067                            DH26
2363  002466  042134                            DT26
2364  002470  042142                            DF26
2365
2366                                            ;ITEM 31
2367  002472  042274                            EM31            ;FRLH E1(11) NOT GOING HIGH WITH
2368  002474  042067                            DH26            ;BOTH INPUTS ON A HIGH
2369  002476  042134                            DT26
2370  002500  042142                            DF26
2371
2372                                            ;ITEM 32
2373  002502  042363                            EM32            ;FRHK E107(6) NOT GOING LOW
2374  002504  042067                            DH26            ;WITH H,L,H INPUT
2375  002506  042134                            DT26
2376  002510  042142                            DF26
2377
2378                                            ;ITEM 33
2379  002512  042437                            EM33            ;FRHK E107(12) NOT GOING LOW
2380  002514  042067                            DH26            ;WITH H,H,L INPUT.
2381  002516  042134                            DT26
2382  002520  042142                            DF26
2383
2384                                            ;ITEM 34
```

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2385  002522  042514                EM34            ;FXPC FIR&08 NOT GETTING TO FPMA AS A HIGH
2386  002524  037665                DH1
2387  002526  037752                DT1
2388  002530  037764                DF1
2389
2390                                ;ITEM 35
2391  002532  042627                EM35            ;STATE 305 DID NOT CLEAR DST+1
2392  002534  037665                DH1
2393  002536  037752                DT1
2394  002540  037764                DF1
2395
2396                                ;ITEM 36
2397  002542  042665                EM36            ;FRACTION IS WRONG ON MODF*INT=0
2398  002544  037665                DH1
2399  002546  037752                DT1
2400  002550  037764                DF1
2401
2402                                ;ITEM 37
2403  002552  042725                EM37            ;STATE 266 DID NOT SET BN
2404  002554  037665                DH1
2405  002556  037752                DT1
2406  002560  037764                DF1
2407
2408                                ;ITEM 40
2409  002562  042756                EM40            ;FRAC ACC DID NOT CLEAR IN STATE 341
2410  002564  037665                DH1
2411  002566  037752                DT1
2412  002570  037764                DF1
2413
2414                                ;ITEM 41
2415  002572  043026                EM41            ;INTEGER PORTION WRONG IN STATE  7
2416  002574  037665                DH1
2417  002576  037752                DT1
2418  002600  037764                DF1
2419
2420                                ;ITEM 42
2421  002602  043067                EM42            ;FRACTION WRONG ON MODF
2422  002604  037665                DH1
2423  002606  037752                DT1
2424  002610  037764                DF1
2425
2426                                ;ITEM 43
2427  002612  043115                EM43            ;INTEGER WRONG ON MODF
2428  002614  037665                DH1
2429  002616  037752                DT1
2430  002620  037764                DF1
2431
2432                                ;ITEM 44
2433  002622  043142                EM44            ;INTEGER DID NOT CLEAR ON OVERFLOW
2434  002624  037665                DH1
2435  002626  037752                DT1
2436  002630  037764                DF1
2437
2438                                ;ITEM 45
2439  002632  043204                EM45            ;STATE 105 NOT DETECTING ZERO FRACTION
2440  002634  040231                DH4
```

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2441  002636  040250                DT4
2442  002640  000000                0
2443
2444                                ;ITEM 46
2445  002642  043252                EM46            ;LOGICAL "AND" FAILED ON FRACTION
2446  002644  042067                DH26
2447  002646  042134                DT26
2448  002650  042142                DF26
2449
2450                                ;ITEM 47
2451  002652  043313                EM47            ;LOGICAL "AND" FAILED ON INTEGER
2452  002654  042067                DH26
2453  002656  043354                DT47            ;$REG4,$TMP4
2454  002660  042142                DF26
2455
2456                                ;ITEM 50
2457  002662  043362                EM50            ;DIVF*DST=0 DID NOT CLR DST
2458  002664  037665                DH1
2459  002666  037752                DT1
2460  002670  037764                DF1
2461
2462                                ;ITEM 51
2463  002672  043415                EM51            ;FRHC FALU59 NOT GETTING TO FRLF AS A HIGH
2464  002674  037665                DH1
2465  002676  037752                DT1
2466  002700  037764                DF1
2467
2468                                ;ITEM 52
2469  002702  043467                EM52            ;FRHK DIV DONE STUCK LOW OR FRHC FALU59
2470  002704  037665                DH1             ;NOT GETTING TO FRHL AS A HIGH
2471  002706  040436                DT7
2472  002710  037764                DF1
2473
2474                                ;ITEM 53
2475  002712  043574                EM53            ;QR DATA BAD
2476  002714  037665                DH1
2477  002716  037752                DT1
2478  002720  037764                DF1
2479
2480                                ;ITEM 54
2481  002722  043610                EM54            ;FRLH HI QUOT GEN BIT DID NOT GO LOW
2482  002724  037665                DH1
2483  002726  040436                DT7
2484  002730  037764                DF1
2485
2486                                ;ITEM 55
2487  002732  043654                EM55            ;FRHC FALU59 NOT GETTING TO FRLF AS A LOW
2488  002734  037665                DH1
2489  002736  040436                DT7
2490  002740  037764                DF1
2491
2492                                ;ITEM 56
2493  002742  043725                EM56            ;FRHC FALU59 NOT GETTING TO FRHL DIV
2494  002744  037665                DH1             ;NORM MUX AS A HIGH
2495  002746  040436                DT7
2496  002750  037764                DF1
```

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2497
2498                                            ;ITEM 57
2499  002752  043574                           EM53
2500  002754  037665                           DH1
2501  002756  040436                           DT7
2502  002760  037764                           DF1
2503
2504                                            ;ITEM 60
2505  002762  044014                           EM60          ;FRHL MPY/DIV ADD(1)L DID NOT GO LOW
2506  002764  037665                           DH1           ;WITH FALU59L ON A LOW
2507  002766  041046                           DT13
2508  002770  037764                           DF1
2509
2510                                            ;ITEM 61
2511  002772  000000                           0             ;DELETED
2512  002774  037665                           DH1
2513  002776  041046                           DT13
2514  003000  037764                           DF1
2515
2516                                            ;ITEM 62
2517  003002  044107                           EM62          ;FRLF HI QUOT GEN BIT NOT GOING HIGH
2518  003004  037665                           DH1
2519  003006  040436                           DT7
2520  003010  037764                           DF1
2521
2522                                            ;ITEM 63
2523  003012  044153                           EM63          ;FRHL MPY/DIV ADD(1)L NOT GOING HIGH
2524  003014  037665                           DH1
2525  003016  041046                           DT13
2526  003020  037764                           DF1
2527
2528                                            ;ITEM 64
2529  003022  044247                           EM64          ;FRHK NORM NEG ENCODER FAILED
2530  003024  044304                           DH64
2531  003026  044364                           DT64
2532  003030  044374                           DF64
2533
2534                                            ;ITEM 65
2535  003032  044400                           EM65          ;RESULT WRONG ON DIV
2536  003034  037665                           DH1
2537  003036  037752                           DT1
2538  003040  037764                           DF1
2539
2540                                            ;ITEM 66
2541  003042  044424                           EM66          ;NORM SHIFT COUNT ROM FAILED
2542  003044  044474                           DH66          ;DATA NORM ROM
2543                                                        ;EXPECT ACTUAL ADDRESS ROMOUT
2544  003046  044574                           DT66          ;$TMP0,$TMP2,$REG5,$REG6
2545  003050  044374                           DF64
2546
2547                                            ;ITEM 67
2548  003052  044606                           EM67          ;FRLF DLE PREC QT LO NOT GOING LOW
2549  003054  042067                           DH26
2550  003056  042134                           DT26
2551  003060  042142                           DF26
2552
```

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2553
2554  003062  044651          ;ITEM 70
                              EM70            ;FRLH DLE PREC QT HI NOT GOING HIGH
2555  003064  042067          DH26
2556  003066  042134          DT26
2557  003070  042142          DF26
2558
2559                          ;ITEM 71
2560  003072  044721          EM71            ;FRLF E21(12) NOT GOING HIGH
2561  003074  042067          DH26
2562  003076  042134          DT26
2563  003100  042142          DF26
2564
2565                          ;ITEM 72
2566  003102  044755          EM72            ;FRLH DLE PREC QT HI NOT GOING LOW
2567  003104  042067          DH26
2568  003106  042134          DT26
2569  003110  042142          DF26
2570
2571                          ;ITEM 73
2572  003112  045017          EM73            ;FRLH DLE PREC QT LO NOT GOING HI
2573  003114  042067          DH26
2574  003116  042134          DT26
2575  003120  042142          DF26
2576
2577                          ;ITEM 74
2578  003122  043574          EM53
2579  003124  042067          DH26
2580  003126  042134          DT26
2581  003130  042142          DF26
2582
2583                          ;ITEM 75
2584  003132  045061          EM75            ;FRLH QSI-1 DID NOT GO LOW WHEN
2585  003134  042067          DH26            ;SELECTING C1 INPUT
2586  003136  042134          DT26
2587  003140  042142          DF26
2588
2589                          ;ITEM 76
2590  003142  045143          EM76            ;FRLJ QSI-1 DID NOT GO LOW WHEN
2591  003144  042067          DH26            ;SELECTING A1 INPUT
2592  003146  042134          DT26
2593  003150  042142          DF26
2594
2595                          ;ITEM 77
2596  003152  045225          EM77            ;FRLH QSI-1 DID NOT GO HIGH WHEN
2597  003154  042067          DH26            ;SELECTING A1 INPUT
2598  003156  042134          DT26
2599  003160  042142          DF26
2600
2601                          ;ITEM 100
2602  003162  045310          EM100           ;STATE 246 FAILED
2603  003164  042067          DH26
2604  003166  042134          DT26
2605  003170  042142          DF26
2606
2607                          ;ITEM 101
2608  003172  045335          EM101           ;FEC WRONG ON STST
```

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 2609  003174  045401                    DH101
 2610  003176  045450                    DT101
 2611  003200  000000                    0
 2612
 2613                                    ;ITEM 102
 2614  003202  045357                    EM102                   ;FEA WRONG ON STST
 2615  003204  045462                    DH102
 2616  003206  045532                    DT102
 2617  003210  000000                    0
 2618
 2619                                    ;ITEM 103
 2620  003212  045544                    EM103                   ;FMD TRAP FAILED-CHECK FRMB FMD
 2621  003214  040231                    DH4
 2622  003216  040250                    DT4
 2623  003220  000000                    0
 2624
 2625                                    ;ITEM 104
 2626  003222  045603                    EM104                   ;FEC WRONG ON FMD TRAP
 2627  003224  045401                    DH101
 2628  003226  045450                    DT101
 2629  003230  000000                    0
 2630
 2631                                    ;ITEM 105
 2632  003232  045653                    EM105                   ;FEA WRONG ON FMD TRAP
 2633  003234  045462                    DH102
 2634  003236  045522                    DT102
 2635  003240  000000                    0
 2636
 2637                                    ;ITEM 106
 2638  003242  045702                    EM106                   ;FMD FAILED-CHECK APPROPRIATE ROM STATE
 2639  003244  040231                    DH4
 2640  003246  040250                    DT4
 2641  003250  000000                    0
 2642
 2643                                    ;ITEM 107
 2644  003252  045751                    EM107                   ;UNDERFLOW DID NOT TRAP-CHECK
 2645  003254  040231                    DH4                     ;FRMA FIU(0)
 2646  003256  040250                    DT4
 2647  003260  000000                    0
 2648
 2649                                    ;ITEM 110
 2650  003262  046022                    EM110                   ;FEC WRONG ON UNDERFLOW
 2651  003264  045401                    DH101
 2652  003266  045450                    DT101
 2653  003270  000000                    0
 2654
 2655                                    ;ITEM 111
 2656  003272  046075                    EM111                   ;FEA WRONG ON UNDERFLOW
 2657  003274  045462                    DH102
 2658  003276  045532                    DT102
 2659  003300  000000                    0
 2660
 2661                                    ;ITEM 112
 2662  003302  046124                    EM112                   ;EXPONENT WRONG ON UNDERFLOW
 2663  003304  037665                    DH1
 2664  003306  037752                    DT1
```

```
2665  003310  037764                          DF1
2666
2667                                          ;ITEM 113
2668  003312  046160                          EM113                   ;OVERFLOW DID NOT TRAP-CHECK
2669  003314  040231                          DH4                     ;FRLN FVINT GETTING TO FRMA
2670  003316  040250                          DT4
2671  003320  000000                          0
2672
2673                                          ;ITEM 114
2674  003322  046247                          EM114                   ;EXPONENT WRONG ON OVERFLOW
2675  003324  037665                          DH1
2676  003326  037752                          DT1
2677  003330  037764                          DF1
2678
2679                                          ;ITEM 115
2680  003332  046302                          EM115                   ;FEC WRONG ON OVERFLOW-CHECK
2681  003334  045401                          DH101                   ;STATE 171
2682  003336  045450                          DT101
2683  003340  000000                          0
2684
2685                                          ;ITEM 116
2686  003342  046350                          EM116                   ;FEA WRONG ON OVERFLOW
2687  003344  045462                          DH102
2688  003346  045532                          DT102
2689  003350  000000                          0
2690
2691                                          ;ITEM 117
2692  003352  046376                          EM117                   ;FEC WRONG ON OVERFLOW-CHECK
2693  003354  045401                          DH101                   ;STATE 105
2694  003356  045450                          DT101
2695  003360  000000                          0
2696
2697                                          ;ITEM 120
2698  003362  046444                          EM120                   ;CONVERSION ERROR DID NOT TRAP
2699  003364  040231                          DH4                     ;CHECK FRLN FCINT GETTING TO FRMA
2700  003366  040250                          DT4
2701  003370  000000                          0
2702
2703                                          ;ITEM 121
2704  003372  046543                          EM121                   ;FEC WRONG ON CONVERSION ERROR
2705  003374  045401                          DH101
2706  003376  045450                          DT101
2707  003400  000000                          0
2708
2709                                          ;ITEM 122
2710  003402  046601                          EM122                   ;FEA WRONG ON CONVERSION ERROR
2711  003404  045462                          DH102
2712  003406  045532                          DT102
2713  003410  000000                          0
2714
2715                                          ;ITEM 123
2716  003412  046637                          EM123                   ;ILLEGAL OP CODE DID NOT TRAP
2717  003414  046715                          DH123                   ;ERRPC OPCODE TEST NO
2718  003416  046742                          DT123                   ;$ERRPC, $TMP0, $$TSTNM
2719  003420  000000                          0
2720
```

```
2721                                                    ;ITEM 124
2722  003422  046752                                    EM124                   ;FEC WRONG ON ILLEGAL OP CODE
2723  003424  045401                                    DH101
2724  003426  045450                                    DT101
2725  003430  000000                                    0
2726
2727                                                    ;ITEM 125
2728  003432  047007                                    EM125                   ;FEA WRONG ON ILLEGAL OP CODE
2729  003434  045462                                    DH102
2730  003436  045532                                    DT102
2731  003440  000000                                    0
2732
2733                                                    ;ITEM 126
2734  003442  047044                                    EM126                   ;LEGAL OP CODE FAILED
2735  003444  047104                                    DH126
2736  003446  040200                                    DT3
2737  003450  000000                                    0
2738
2739                                                    ;ITEM 127
2740  003452  047147                                    EM127                   ;LEGAL OP-CODE TRAPPED
2741  003454  047224                                    DH127
2742  003456  046742                                    DT123
2743  003460  000000                                    0
2744
2745                                                    ;ITEM 130
2746  003462  047251                                    EM130                   ;STATE 32 DID NOT LOAD FEC
2747  003464  045401                                    DH101
2748  003466  045450                                    DT101
2749  003470  000000                                    0
2750
2751                                                    ;ITEM 131
2752  003472  047307                                    EM131                   ;TMCA HONOR PIRT DID NOT GO HIGH
2753  003474  040231                                    DH4                     ;WITH FP TRAP PRESENT
2754  003476  040250                                    DT4
2755  003500  000000                                    0
2756
2757                                                    ;ITEM 132
2758  003502  047374                                    EM132                   ;TMCA HONOR FPTRAP DID NOT GO
2759  003504  040231                                    DH4                     ;HIGH WITH SL YELLOW PRESENT
2760  003506  040250                                    DT4
2761  003510  000000                                    0
2762
2763                                                    ;ITEM 133
2764  003512  047466                                    EM133                   ;SAPK I SPACEA (0) NOT GOING LOW OR
2765  003514  040231                                    DH4                     ;M8138-YA NOT INSTALLED
2766  003516  040250                                    DT4
2767  003520  000000                                    0
2768
2769                                                    ;ITEM 134
2770  003522  047570                                    EM134                   ;FEC WRONG IN STATE 356
2771  003524  045401                                    DH101
2772  003526  045450                                    DT101
2773  003530  000000                                    0
2774
2775                                                    ;ITEM 135
2776  003532  047635                                    EM135                   ;FEA WRONG ON DIV BY ZERO
```

```
 2777  003534  045462                  DH102
 2778  003536  045532                  DT102
 2779  003540  000000                  0
 2780
 2781                                  ;ITEM 136
 2782  003542  047666                  EM136                   ;FEC WRONG IN STATE 346
 2783  003544  045401                  DH101
 2784  003546  045450                  DT101
 2785  003550  000000                  0
 2786
 2787                                  ;ITEM 137
 2788  003552  047733                  EM137                   ;TMCA HONOR SEGT NOT DISABLING
 2789  003554  040231                  DH4                     ;FP TRAP
 2790  003556  040250                  DT4
 2791  003560  000000                  0
 2792
 2793                                  ;ITEM 140
 2794  003562  050001                  EM140                   ;NEGF AND FMO FAILED
 2795  003564  050025                  DH140                   ;ERRPC DATA TEST NO
 2796  003566  050076                  DT140                   ;$ERRPC, $TMPO, $REGO, $$TSTNM
 2797  003570  000000                  0
 2798
 2799                                  ;ITEM 141
 2800  003572  050110                  EM141                   ;FRMB IMM * REG WT NOT GOING LOW
 2801  003574  040231                  DH4
 2802  003576  040250                  DT4
 2803  003600  000000                  0
 2804
 2805                                  ;ITEM 142
 2806  003602  050154                  EM142                   ;THE SP IS WRONG
 2807  003604  050174                  DH142
 2808  003606  040200                  DT3
 2809  003610  000000                  0
 2810
 2811                                  ;ITEM 143
 2812  003612  050243                  EM143                   ;YELLOW ZONE AND FP TRAP DID NOT OCCUR
 2813  003614  040231                  DH4                     ;IN CORRECT SEQUENCE
 2814  003616  040250                  DT4
 2815  003620  000000                  0
 2816
 2817                                  ;ITEM 144
 2818  003622  050335                  EM144                   ;MGMT AND FP TRAP DID NOT OCCUR
 2819  003624  040231                  DH4                     ;IN CORRECT SEQUENCE.
 2820  003626  040250                  DT4
 2821  003630  000000                  0
 2822
 2823                                  ;ITEM 145
 2824  003632  050376                  EM145                   ;BIT STUCK IN FPA OR FEA
 2825  003634  045462                  DH102
 2826  003636  045532                  DT102
 2827  003640  000000                  0
 2828
 2829                                  ;ITEM 146
 2830  003642  050426                  EM146                   ;MODE 1 DID NOT CAUSE FXPB IMMEDITATE
 2831  003644  037665                  DH1                     ;TO GO TRUE
 2832  003646  037752                  DT1
```

```
2833  003650  037764                  DF1
2834
2835                                  ;ITEM 147
2836  003652  050505                  EM147           ;MODE 4 DID NOT CAUSE FXPB
2837  003654  037665                  DH1             ;IMMEDIATE TO GO TRUE
2838  003656  037752                  DT1
2839  003660  037764                  DF1
2840
2841                                  ;ITEM 150
2842  003662  050564                  EM150           ;PDRD PS14 NOT DISABLING FXCPN
2843  003664  040130                  DH3             ;FMM(1) H
2844  003666  040200                  DT3
2845  003670  000000                  0
2846
2847                                  ;ITEM 151
2848  003672  050631                  EM151           ;FXPN ACS0 DID NOT GO HIGH
2849  003674  047104                  DH126
2850  003676  040200                  DT3
2851  003700  000000                  0
2852
2853                                  ;ITEM 152
2854  003702  050714                  EM152           ;FXPN ACS1 DID NOT GO HIGH
2855  003704  047104                  DH126
2856  003706  040200                  DT3
2857  003710  000000                  0
2858
2859                                  ;ITEM 153
2860  003712  050777                  EM153                   ;SCRATCH PAD CHIP FAILED
2861  003714  051027                  DH153
2862  003716  051104                  DT153
2863  003720  042142                  DF26
2864
2865                                  ;ITEM 154
2866  003722  051114                  EM154           ;UNEXPECTED TRAP TO 4
2867  003724  051141                  DH154           ;ERRPC  PCOFTRP ERRREG  TEST NO
2868  003726  051176                  DT154           ;$ERRPC,$TMP0,$TMP1,$$TSTNM
2869  003730  000000                  0
2870
2871                                  ;ITEM 155
2872  003732  051114                  EM154           ;UNEXPECTED TRAP TO 4 (11/45)
2873  003734  051210                  DH155
2874  003736  051236                  DT155
2875  003740  000000                  0
2876
2877                                  ;ITEM 156
2878  003742  051246                  EM156           ;UNEXPECTED TRAP TO 114
2879  003744  051275                  DH156           ;ERRPC  PCOFTRP  ERRREG  LOADRS  HIADRS  TEST NO
2880  003746  051350                  DT156           ;$ERRPC,$TMP0,$TMP1,$TMP2,$TMP3,$$TSTNM
2881  003750  000000                  0
2882
2883                                  ;ITEM 157
2884  003752  051246                  EM156           ;UNEXPECTED TRAP TO 114 (11/45)
2885  003754  051210                  DH155
2886  003756  051236                  DT155
2887  003760  000000                  0
2888
```

```
2889
2890  003762  051366                    ;ITEM 160
2891  003764  051415                    EM160           ;UNEXPECTED TRAP TO 244
2892  003766  051460                    DH160           ;ERRPC  PCOFTRP   FEC     FEA   TEST NO
2893  003770  000000                    DT160           ;$ERRPC,$TMP0,$TMP1,$TMP2,$$TSTNM
2894                                    0
2895                                    ;ITEM 161
2896  003772  041647                    EM24
2897  003774  051474                    DH161
2898  003776  051554                    DT161
2899  004000  000000                    0
2900
2901                                    ;ITEM 162
2902  004002  041647                    EM24
2903  004004  051572                    DH162
2904  004006  040200                    DT3
2905  004010  000000                    0
2906
2907                                    ;ITEM 163
2908  004012  040212                    EM4
2909  004014  051210                    DH155
2910  004016  051236                    DT155
2911  004020  000000                    0
2912
2913                          .SBTTL  APT PARAMETER BLOCK
2914
2915                          ;;**********************************************************************
2916                          ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
2917                          ;;**********************************************************************
2918          004022                  .$X=.   ;;SAVE CURRENT LOCATION
2919          000024                  .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
2920  000024  000200                  200     ;;FOR APT START UP
2921          000044                  .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
2922  000044  004022                  $APTHDR ;;POINT TO APT HEADER BLOCK
2923          004022                  .=.$X   ;;RESET LOCATION COUNTER
2924                          ;;**********************************************************************
2925                          ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
2926                          ;INTERFACE SPEC.
2927
2928  004022                  $APTHD:
2929  004022  000000          $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
2930  004024  001234          $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
2931  004026  000035          $TSTM:  .WORD   35      ;;RUN TIM OF LONGEST TEST
2932  004030  000036          $PASTM: .WORD   36      ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
2933  004032  000000          $UNITM: .WORD           ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
2934  004034  000014                  .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
2935  004036                  START:
2936                          ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
2937  004036  012706  001100          MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
2938  004042  005026                  CLR     (R6)+           ;;CLEAR MEMORY LOCATION
2939  004044  022706  001126          CMP     #$BDDAT,R6      ;;DONE?
2940  004050  001374                  BNE     .-6             ;;LOOP BACK IF NO
2941  004052  012706  001100          MOV     #STACK,SP       ;;SETUP THE STACK POINTER
2942                          ;;INITIALIZE A FEW VECTORS
2943  004056  012737  033122  000020  MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
2944  004064  012737  000340  000022  MOV     #340,@#IOTVEC+2 ;;LEVEL 7
```

```
2945  004072  012737  033442  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
2946  004100  012737  000340  000032          MOV     #340,@#EMTVEC+2  ;;LEVEL 7
2947  004106  012737  037320  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
2948  004114  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
2949  004122  012737  037364  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
2950  004130  012737  000340  000026          MOV     #340,@#PWRVEC+2  ;;LEVEL 7
2951  004136  013737  032746  032740          MOV     $ENDCT,$EOPCT    ;;SETUP END-OF-PROGRAM COUNTER
2952  004144  005037  001220                  CLR     $TIMES           ;;INITIALIZE NUMBER OF ITERATIONS
2953  004150  005037  001222                  CLR     $ESCAPE          ;;CLEAR THE ESCAPE ON ERROR ADDRESS
2954  004154  112737  000001  001115          MOVB    #1,$ERMAX        ;;ALLOW ONE ERROR PER TEST
2955  004162  012737  004162  001106          MOV     #.,$LPADR        ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
2956  004170  012737  004170  001110          MOV     #.,$LPERR        ;;SETUP THE ERROR LOOP ADDRESS
2957                                  ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
2958                                  ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
2959  004176  013746  000004                  MOV     @#ERRVEC,-(SP)   ;;SAVE ERROR VECTOR
2960  004202  012737  004240  000004          MOV     #64$,@#ERRVEC    ;;SET UP ERROR VECTOR
2961  004210  012737  177570  001136          MOV     #DSWR,SWR        ;;SETUP FOR A HARDWARE SWICH REGISTER
2962  004216  012737  177570  001140          MOV     #DDISP,DISPLAY   ;;AND A HARDWARE DISPLAY REGISTER
2963  004224  022777  177777  174704          CMP     #-1,@SWR         ;;TRY TO REFERENCE HARDWARE SWR
2964  004232  001013                          BNE     65$              ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
2965                                                                   ;;AND  THE HARDWARE SWR IS NOT = -1
2966  004234  005737  000001                  TST     @#1              ;;FORCE A TRAP THROUGH ERRVEC
2967  004240  012737  000176  001136  64$:    MOV     #SWREG,SWR       ;;POINT TO SOFTWARE SWR
2968  004246  012737  000174  001140          MOV     #DISPREG,DISPLAY ;;POINT TO SOFTWARE DISPLAY REG
2969  004254  012716  004262                  MOV     #65$,(SP)        ;;REPLACE OLD PC WITH NEW
2970  004260  000006                          RTT                      ;;RESTORE PC AND PSW
2971  004262  012637  000004          65$:    MOV     (SP)+,@#ERRVEC   ;;RESTORE ERROR VECTOR
2972  004266  005037  001242                  CLR     $PASS            ;;CLEAR PASS COUNT
2973  004272  132737  000200  001255          BITB    #APTSIZE,$ENVM   ;;TEST USER SIZE UNDER APT
2974  004300  001403                          BEQ     3$               ;;YES,USE NON-APT SWITCH
2975  004302  012737  001256  001136          MOV     #$SWREG,SWR      ;;NO,USE APT SWITCH REGISTER
2976  004310                          3$:
2977                                  ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
2978  004310  005227  177777                  INC     #-1              ;;FIRST TIME?
2979  004314  001050                          BNE     66$              ;;BRANCH IF NO
2980  004316  022737  033102  000042          CMP     #$ENDAD,@#42     ;;ACT-11?
2981  004324  001444                          BEQ     66$              ;;BRANCH IF YES
2982  004326  104400  004334                  TYPE    ,67$             ;;TYPE ASCIZ STRING
2983  004332  000441                          BR      66$              ;;GET OVER THE ASCIZ
2984                                  ;;67$:  .ASCIZ  <CRLF>"MAINDEC-11-DEFPB-A...PDP11-45/55/70...FP11-C DIAGNOSTIC PART 2"<C
2985  004436                          66$:
2986  004436  012737  004456  000004          MOV     #LOOP,ERRVEC     ;SETUP ERRVEC FOR TIMEOUT
2987  004444  005737  177766                  TST     CPUERR           ;11/45 OR 11/70
2988  004450  012737  177766  001372          MOV     #CPUERR,$CPUERR  ;DO THIS IF 11/70
2989  004456  012737  037276  000244  LOOP:   MOV     #FPSPUR,@#FPPVEC;SET VECTOR TO SPURIOUS HANDLER
2990  004464  012737  000340  000246          MOV     #PR7,@#FPPVEC+2  ;SET PRIORITY 7 IN VECTOR PSW
2991  004472  012737  037156  000004          MOV     #CPSPUR,@#ERRVEC;SET TRAP TO 4 VECTOR
2992  004500  012737  000340  000006          MOV     #PR7,@#ERRVEC+2  ;SET TRAP TO 4 PSW
2993  004506  012737  037222  000114          MOV     #CACHSPU,@#CACHVEC;SET PARITY ERROR VECTOR
2994  004514  012737  000340  000116          MOV     #PR7,@#CACHVEC+2
2995
2996
2997
2998                                  ;;*****************************************************************
2999                                  ;*TEST 1         MULF*MD*(DST=0)*-(SRC=0)
3000                                  ;*
```

```
3001                                    ;*      THE A OR NO-MEM ROMS COULD FAIL.  THE ONLY OTHER POSSIBLE
3002                                    ;*      FAILURES WOULD BE ROM STATE 350 OR THE 4F1 BRANCH.
3003                                    ;*
3004                                    ;*      IF THE 4F1 BRANCH FAILS THE ACD+1 WILL ALSO BE CLEARED.
3005                                    ;*
3006                                    ;*      FPU ROM FLOW - 30, 61, 350, 351
3007                                    ;;*****************************************************************
3008  004522  000004                    TST1:   SCOPE
3009  004524  012737  000001  001240            MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
3010  004532  012737  004652  001222            MOV     #TST2,$ESCAPE   ;;ESCAPE TO TEST 2 ON ERROR
3011  004540  170400                            CLRF    AC0             ;CLEAR THE DST
3012  004542  172527  040000                    LDF     #^O040000,AC1   ;ENSURE DST+1 NON ZERO
3013  004546  172601                            LDF     AC1,AC2         ;LOAD THE SRC NON-ZERO
3014  004550  170127  000013                    LDFPS   #13             ;LOAD COMPLIMENT CC'S
3015  004554  171002                    1$:     MULF    AC2,AC0         ;EXECUTE INSTRUCTION UNDER TEST
3016  004556  170237  001202                    STFPS   $TMP1           ;GET CC'S BACK
3017  004562  170500                            TSTF    AC0             ;DST REMAIN CLEAR?
3018  004564  170000                            CFCC
3019  004566  001405                            BEQ     2$              ;BRANCH IF YES
3020  004570  174037  001204                    STF     AC0,$TMP2       ;SAVE RECEIVED DATA
3021  004574  170437  001200                    CLRF    $TMP0           ;SAVE EXPECTED DATA
3022  004600  104001                            ERROR   1               ;DATA BAD
3023  004602  173527  000000            2$:     CMPF    #0,AC1          ;ACD+1 CLEAR?
3024  004606  170000                            CFCC
3025  004610  001010                            BNE     3$              ;BRANCH IF NO
3026  004612  174137  001204                    STF     AC1,$TMP2       ;GET RECEIVED DATA
3027  004616  012737  040000  001200            MOV     #40000,$TMP0    ;SAVE EXPECTED
3028  004624  005037  001202                    CLR     $TMP1           ;VALUE
3029  004630  104002                            ERROR   2               ;4F1 BRANCH FAILED
3030                                    ;DATA OK - CHECK CC'S
3031  004632  022737  000004  001202    3$:     CMP     #FZ,$TMP1       ;CC'S OK?
3032  004640  001404                            BEQ     TST2            ;;BRANCH IF YES
3033  004642  012737  000004  001200            MOV     #FZ,$TMP0       ;SAVE EXPECTED VALUE
3034  004650  104003                            ERROR   3
3035
3036
3037                                    ;;*****************************************************************
3038                                    ;*TEST 2        MULF*-MO*-(DST=0)*(SRC=0)
3039                                    ;*
3040                                    ;*      THE ONLY THING THAT SHOULD FAIL IN THIS TEST IS THE A
3041                                    ;*      BRANCH OR THE ADX ROMS OR STATE 344.
3042                                    ;*
3043                                    ;*      FPU ROM FLOW - 11, 130, 61, 344, 351
3044                                    ;;*****************************************************************
3045  004652  000004                    TST2:   SCOPE
3046  004654  012737  000002  001240            MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
3047  004662  012737  004770  001222            MOV     #TST3,$ESCAPE   ;;ESCAPE TO TEST 3 ON ERROR
3048  004670  172427  040000                    LDF     #^O040000,AC0   ;ENSURE DST NON-ZERO
3049  004674  170437  001210                    CLRF    $TMP4           ;ENSURE SRC=0
3050  004700  012700  001210                    MOV     #$TMP4,R0       ;PUT ADDRESS OF SRC IN R0
3051  004704  170127  000013                    LDFPS   #13             ;LOAD COMPLIMENT CC'S
3052  004710  171020                    1$:     MULF    (R0)+,AC0       ;EXECUTE INSTRUCTION UNDER TEST
3053  004712  170237  001202                    STFPS   $TMP1           ;GET CC'S BACK
3054  004716  022700  001214                    CMP     #$TMP6,R0       ;ADX ROM OK?
3055  004722  001401                            BEQ     2$
3056  004724  104004                            ERROR   4               ;ADX ROM FAILED
```

```
3057  004726  173427  000000          2$:     CMPF    #0.AC0          ;DID THE DST CLEAR?
3058  004732  170000                          CFCC
3059  004734  001405                          BEQ     3$              ;BRANCH IF YES
3060  004736  170437  001200                  CLRF    $TMP0           ;SAVE EXPECTED VALUE
3061  004742  174037  001204                  STF     AC0,$TMP2       ;SAVE RECEIVED VALUE
3062  004746  104001                          ERROR   1               ;DST DID NOT CLEAR
3063                                  ;DATA OK - CHECK CC'S
3064  004750  022737  000004  001202  3$:     CMP     #FZ,$TMP1       ;CC'S OK?
3065  004756  001404                          BEQ     TST3            ;;BRANCH IF YES
3066  004760  012737  000004  001200          MOV     #FZ,$TMP0       ;SAVE EXPECTED VALUE
3067  004766  104003                          ERROR   3               ;CC'S BAD
3068
3069                                  ;;*****************************************************************
3070                                  ;*TEST 3        MULF*-MO*IMM*(DST=0)*(SRC=0)
3071                                  ;*
3072                                  ;*      THE ONLY THING THAT SHOULD FAIL IN THIS TEST IS THE ADX
3073                                  ;*      ROM OR STATE 354.
3074                                  ;*
3075                                  ;*      FPU ROM FLOW - 11, 131, 61, 354, 351
3076                                  ;*****************************************************************
3077
3078  004770  000004          TST3:   SCOPE
3079  004772  012737  000003  001240          MOV     #STN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
3080  005000  012737  005076  001222          MOV     #TST4,$ESCAPE   ;;ESCAPE TO TEST 4 ON ERROR
3081  005006  170400                          CLRF    AC0             ;CLEAR THE DST
3082  005010  170127  000013                  LDFPS   #13             ;LOAD COMPLIMENT CC'S
3083  005014  171027                  1$:     MULF    (PC)+,AC0       ;EXECUTE INSTRUCTION UNDER TEST
3084  005016  000000                          .WORD   0               ;WILL HALT HERE IF ADX ROM FAILS
3085  005020  000403                          BR      2$
3086  005022  104004                          ERROR   4               ;ADX ROM FAILED
3087  005024  104004                          ERROR   4               ;       *
3088  005026  104004                          ERROR   4               ;       *
3089  005030  170237  001202          2$:     STFPS   $TMP1           ;GET CC'S BACK
3090  005034  173427  000000                  CMPF    #0,AC0          ;DST REMAIN ZERO?
3091  005040  170000                          CFCC
3092  005042  001405                          BEQ     3$
3093  005044  174037  001204                  STF     AC0,$TMP2       ;GET RESULT
3094  005050  170437  001200                  CLRF    $TMP0           ;SAVE EXPECTED ANSWER
3095  005054  104001                          ERROR   1               ;DST DID NOT REMAIN CLEAR
3096                                  ;DATA OK - CHECK THE CC'S
3097  005056  022737  000004  001202  3$:     CMP     #FZ,$TMP1       ;CC'S OK?
3098  005064  001404                          BEQ     TST4            ;;BRANCH IF YES
3099  005066  012737  000004  001200          MOV     #FZ,$TMP0       ;SAVE EXPECTED RESULT
3100  005074  104003                          ERROR   3               ;CC'S FAILED
3101
3102
3103                                  ;;*****************************************************************
3104                                  ;*TEST 4        MULF*SWR*ADD
3105                                  ;*
3106                                  ;*      THIS TEST ENSURES THAT ROM STATES 61, 340, 233, AND 112
3107                                  ;*      SETUP THE SC AND SHIFT CONTROL PROPERLY, THAT FRHK MUL SWR
3108                                  ;*      IS NOT STUCK LOW, THAT FRHL MPY/DIV ADD(1) L IS NOT STUCK
3109                                  ;*      HIGH, AND THAT FRMH FORCE MPY/DIV ADD CAUSES THE FALU TO DO
3110                                  ;*      AN ADD.  THIS IS DONE BY FIRST SETTING A MICRO-TRAP ON
3111                                  ;*      STATE 117 TO TEST MUL SWR AND THEN A TRAP IS SET ON 112
3112                                  ;*      TO ENSURE THE OTHER FUNCTIONS ARE WORKING PROPERLY.
```

```
                                        ;*
                                        ;*      IF FRME SHFC 0(0)H AND 1(0)H ARE TIED TOGETHER, THE SHIFT
                                        ;*      CONTROL WILL BE LOADED WITH THE VALUE OF THE NORM PCS
                                        ;*      ENCODER.  THIS WILL CAUSE A LEFT SHIFT OF 7 IN THE AR
                                        ;*      AND A RIGHT SHIFT OF 8 IN THE QR.
                                        ;*
                                        ;*      IF FXPP SC00 DOES NOT GET TO FRMA AS A HIGH OR DOES NOT
                                        ;*      GET TO RAD00 AS A HIGH EXECUTION WILL GO TO STATE 112
                                        ;*      INSTEAD OF 113 IN SECTION 2.
                                        ;*
                                        ;*      IF FRHL MPY SIGN EXTEND DOES NOT GO LOW, THE AR WILL END
                                        ;*      UP WITH 0.01 IN IT INSTEAD OF 0.10.
                                        ;*
                                        ;*      NOTE: SECTION 1 OF THIS TEST DOES NOT ALLOW SWITCHES <7:0>
                                        ;*      TO BE LOADED INTO THE MICROBREAK FOR SYNC PURPOSES.
                                        ;;**************************************************************
005076  000004                          TST4:   SCOPE
005100  012737  000004  001240                  MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
005106  012737  005452  001222                  MOV     #TST5,$ESCAPE   ;;ESCAPE TO TEST 5 ON ERROR
                                        ;SECTION 1 - CHECK FRHK MUL SWR
005114  012737  040007  001160                  MOV     #40007,$REG0    ;PUT MULTIPLIER IN MEMORY
005122  012737  000044  001162                  MOV     #44,$REG1       ;TO LOAD AS THE SRC.
005130  012703  000117                          MOV     #117,R3         ;LOAD MICRO-BREAK TO CATCH
005134  170003                                  LDUB                    ;MUL SWR STUCK LOW
005136  012737  005162  000244                  MOV     #2$,FPPVEC      ;SET FP VECTOR
005144  172427  040000                          LDF     #↑040000,AC0    ;PUT MULTIPLICAND IN AC0
005150  170127  000020                          LDFPS   #FMM
005154  171037  001160                  1$:     MULF    $REG0,AC0       ;EXECUTE INSTRUCTION UNDER TEST
005160  000402                                  BR      3$              ;NO TRAP - MUL SWR OK.
                                        ;TRAP OCCURRED - FRHK MUL SWR NOT GOING HIGH
005162  022626                          2$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
005164  104005                                  ERROR   5               ;FRHK MUL SWR STUCK LOW
                                        ;;**************************************************************
                                        ;SECTION 2 - CHECK THE AR & QR AFTER THE FIRST SHIFT.
005166  032777  001000  173742          3$:     BIT     #SW9,@SWR       ;LOOP ON ERROR?
005174  001011                                  BNE     4$              ;BRANCH IF YES
005176  012703  000112                  5$:     MOV     #112,R3
005202  170003                                  LDUB
005204  170127  000020                          LDFPS   #FMM
005210  012737  005270  000244                  MOV     #7$,FPPVEC
005216  000405                                  BR      6$
005220  105737  001103                  4$:     TSTB    $ERFLG          ;ANY ERRORS?
005224  001764                                  BEQ     5$              ;BRANCH IF NO
005226  170127  000000                          LDFPS   #0              ;ENSURE FMM CLEAR
005232  012737  040000  001160          6$:     MOV     #40000,$REG0    ;RESTORE MULTIPLIER
005240  012737  005246  001110                  MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
005246  172427  040000                          LDF     #↑040000,AC0    ;LOAD THE MULTIPLICAND
005252  171037  001160                          MULF    $REG0,AC0       ;EXECUTE THE MULTIPLY
                                        ;NO TRAP OCCURRED
005256  170200                                  STFPS   R0
005260  032700  000020                          BIT     #FMM,R0         ;MAINTENANCE MODE?
005264  001762                                  BEQ     6$              ;BRANCH IF NO
005266  104006                                  ERROR   6               ;FXPP SC00 NOT GETTING TO FRMA AS A HIGH
                                        ;TRAP OCCURRED - CHECK QR AN , AR DATA
005270  022626                          7$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
005272  170007                                  STQ0                    ;GET
```

```
3169  005274  174037  001210                          STF     AC0,$TMP4       ;QR DATA
3170  005300  042737  100000  001210                  BIC     #BIT15,$TMP4    ;GET RID OF SIGN
3171  005306  012704  177776                          MOV     #-2,R4          ;PUT THE SHIFT COUNT IN R4
3172  005312  170004                                  MSN                     ;SHIFT AR TO GET 59 & 58
3173  005314  170005                                  STAC                    ;AGET
3174  005316  174037  001214                          STF     AC0,$TMP6       ;AR DATA
3175  005322  042737  100000  001214                  BIC     #BIT15,$TMP6    ;GET RID OF SIGN
3176  005330  012737  000020  001200                  MOV     #20,$TMP0       ;SAVE EXPECTED
3177  005336  005037  001202                          CLR     $TMP1           ;QR DATA
3178  005342  012737  000040  001204                  MOV     #40,$TMP2       ;SAVE EXPECTED
3179  005350  005037  001206                          CLR     $TMP3           ;AR DATA
3180  005354  022737  000020  001210                  CMP     #20,$TMP4       ;QR QUAD 3 OK?
3181  005362  001004                                  BNE     8$              ;BRANCH IF NO
3182  005364  022737  000004  001212                  CMP     #4,$TMP5        ;QR QUAD 2 OK?
3183  005372  001406                                  BEQ     9$              ;BRANCH IF YES
3184  005374  022737  100000  001212  8$:             CMP     #BIT15,$TMP5    ;DID QR SHIFT RIGHT 8?
3185  005402  001001                                  BNE     10$             ;BRANCH IF NO
3186  005404  104007                                  ERROR   7               ;FRME SHFC 0(0) NOT GOING HIGH
3187  005406  104010                          10$:    ERROR   10              ;QR DATA BAD
3188                                          ;QR OK - CHECK AR
3189  005410  022737  000040  001214  9$:             CMP     #40,$TMP6       ;AR QUAD 3 OK?
3190  005416  001003                                  BNE     11$             ;BRANCH IF NO
3191  005420  005737  001216                          TST     $TMP7           ;AR QUAD 2 OK?
3192  005424  001412                                  BEQ     TST5            ;;BRANCH IF YES
3193  005426  022737  000020  001214  11$:            CMP     #20,$TMP6       ;DID MPY SIGN EXTEND FAIL?
3194  005434  001001                                  BNE     12$             ;BRANCH IF NO
3195  005436  104011                                  ERROR   11              ;FRHL MPY SIGN EXTEND NOT GOING LOW
3196  005440  005737  001214          12$:            TST     $TMP6           ;DID ADD OCCUR AT ALL?
3197  005444  001001                                  BNE     13$             ;BRANCH IF YES
3198  005446  104012                                  ERROR   12              ;FRHL MPY/DIV ADD(1) L NOT CAUSING
3199                                                                          ;FRMH FORCE MPY/DIV ADD TO FORCE THE ADD
3200  005450  104013                          13$:    ERROR   13              ;AR DATA BAD
3201
3202
3203                                          ;;*****************************************************************
3204                                          ;*TEST 5        MULF*SWR*SUB
3205                                          ;*
3206                                          ;*      THIS TEST ENSURES THAT FRHL MPY/DIV ADD (1) L GOES HIGH
3207                                          ;*      WHEN FRHK STRING IS HIGH.  THIS SIGNAL CAUSES FRMH FORCE
3208                                          ;*      MPY/DIV SUB TO GO LOW FORCING THE FALU TO DO A SUBTRACT.
3209                                          ;*
3210                                          ;*      SECTION 2 OF THIS TEST MICRO-TRAPS ON STATE 117 TO CHECK
3211                                          ;*      THAT FRHK MPY SIGN EXTEND GOES HIGH.  IF THIS TRAP DOES
3212                                          ;*      NOT OCCUR THEN FRHK E108 PIN 1 & 13 ARE NOT GOING HIGH IN
3213                                          ;*      STATE 112.
3214                                          ;*****************************************************************
3215  005452  000004                          TST5:   SCOPE
3216  005454  012737  000005  001240                  MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
3217  005462  012737  006060  001222                  MOV     #TST6,$ESCAPE   ;;ESCAPE TO TEST 6 ON ERROR
3218  005470  012737  000015  001172                  MOV     #15,$REG5
3219  005476  032777  001000  173432                  BIT     #SW9,@SWR       ;LOOP ON ERROR?
3220  005504  001011                                  BNE     1$              ;BRANCH IF YES
3221  005506  012737  005606  000244  4$:             MOV     #2$,FPPVEC
3222  005514  012703  000112                          MOV     #112,R3
3223  005520  170003                                  LDUB
3224  005522  170127  000020                          LDFPS   #FMM
```

```
3225  005526  000405                          BR      3$
3226  005530  105737  001103          1$:     TSTB    $ERFLG          ;ANY ERRORS
3227  005534  001764                          BEQ     4$              ;BRANCH IF NO
3228  005536  170127  000000                  LDFPS   #0              ;ENSURE FMM BIT OFF
3229  005542  012737  040177  001160  3$:     MOV     #40177,$REG0    ;PUT MULTIPLIER IN
3230  005550  012737  177774  001162          MOV     #177774,$REG1   ;MEMORY
3231  005556  012737  005564  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
3232  005564  172427  040000                  LDF     #^040000,AC0    ;LOAD THE MULTIPLICAND
3233  005570  171037  001160                  MULF    $REG0,AC0       ;EXECUTE THE INSTRUCTION UNDER TES
3234                                  ;TRAP DID NOT OCCUR
3235  005574  170200                          STFPS   R0
3236  005576  032700  000020                  BIT     #FMM,R0
3237  005602  001757                          BEQ     3$
3238  005604  104014                          ERROR   14              ;MUL SHIFT ENCODER ROMOUT BAD
3239  005606  022626                  2$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
3240  005610  012704  177776                  MOV     #-2,R4          ;PUT THE SHIFT COUNT IN R4
3241  005614  170004                          MSN                     ;SHIFT AR TO GET 59 & 58
3242  005616  170005                          STA0
3243  005620  174037  001214                  STF     AC0,$TMP6       ;GET AR
3244  005624  042737  100000  001214          BIC     #BIT15,$TMP6    ;GET RID OF SIGN
3245  005632  012737  000140  001204          MOV     #140,$TMP2      ;SAVE EXPECTED
3246  005640  005037  001206                  CLR     $TMP3           ;VALUE OF AR
3247  005644  022737  000140  001214          CMP     #140,$TMP6      ;DID SUBTRACTION WORK OK?
3248  005652  001406                          BEQ     5$              ;BRANCH IF YES
3249  005654  022737  000040  001214          CMP     #40,$TMP6       ;DID ADD OCCUR?
3250  005662  001001                          BNE     6$              ;BRANCH IF NO
3251  005664  104015                          ERROR   15              ;FRHK MPY/DIV ADD (1) L NOT GOING HIGH
3252                                                                  ;OR FRMH FORCE MPY/DIV SUB NOT GOING LOW
3253  005666  104013                  6$:     ERROR   13              ;AR DATA BAD
3254                                  ;;*****************************************************************
3255                                  ;SECTION 2 - CHECK MPY SIGN EXTEND
3256  005670  032777  001000  173240  5$:     BIT     #SW9,@SWR       ;LOOP ON ERROR?
3257  005676  001011                          BNE     7$              ;BRANCH IF YES
3258  005700  012737  005764  000244  10$:    MOV     #8$,FPPVEC
3259  005706  012703  000113                  MOV     #113,R3
3260  005712  170003                          LDUB
3261  005714  170127  000020                  LDFPS   #FMM
3262  005720  000405                          BR      9$
3263  005722  105737  001103          7$:     TSTB    $ERFLG          ;ANY ERRORS YET?
3264  005726  001764                          BEQ     10$             ;BRANCH IF NO
3265  005730  170127  000000                  LDFPS   #0              ;ENSURE FMM CLEAR
3266  005734                          9$:
3267  005734  012737  005742  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
3268  005742  172427  040000                  LDF     #^040000,AC0    ;LOAD MULTIPLICAND
3269  005746  171037  001160                  MULF    $REG0,AC0       ;EXECUTE INSTRUCTION UNDER TEST
3270                                  ;TRAP DID NOT OCCUR
3271  005752  170200                          STFPS   R0
3272  005754  032700  000020                  BIT     #FMM,R0         ;FMM ON?
3273  005760  001765                          BEQ     9$              ;BRANCH IF NO
3274  005762  104016                          ERROR   16              ;FRHK MUL SWR NOT GOING LOW
3275                                                                  ;OR MUL SHF ENCODER ROM NOT OUTPUTTING
3276                                                                  ;12 IN STATE 112.
3277                                  ;TRAP OCCURRED - SEE IF SIGNEXTEND WORKED
3278  005764  022626                  8$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
3279  005766  012704  177776                  MOV     #-2,R4          ;PUT THE SHIFT COUNT IN R4
3280  005772  170004                          MSN                     ;SHIFT AR TO GET BITS 59 & 58
```

```
3281  005774  170005                          STAD
3282  005776  174037  001214                  STF     AC0,$TMP6       ;GET AR DATA
3283  006002  042737  100000  001214          BIC     #BIT15,$TMP6    ;GET RID OF SIGN
3284  006010  012737  000177  001204          MOV     #177,$TMP2      ;SAVE EXPECTED
3285  006016  012737  100000  001206          MOV     #BIT15,$TMP3    ;VALUE OF THE AR
3286  006024  022737  000177  001214          CMP     #177,$TMP6      ;AR QUAD 3 OK?
3287  006032  001004                          BNE     12$             ;BRANCH IF NO
3288  006034  022737  100000  001216          CMP     #BIT15,$TMP7    ;AR QUAD 2 OK?
3289  006042  001406                          BEQ     TST6            ;;BRANCH IF YES
3290  006044  022737  000001  001214  12$:    CMP     #1,$TMP6        ;DID SIGN EXTEND FAIL?
3291  006052  001001                          BNE     11$             ;BRANCH IF NO
3292  006054  104017                          ERROR   17              ;FRHK MPY SIGN EXTEND NOT GOING HIGH
3293  006056  104013                  11$:    ERROR   13              ;AR DATA BAD
3294
3295                                          ;;**********************************************************************
3296                                          ;*TEST 6        LOGIC TEST OF FRHK MUL SWR*FD(0)
3297                                          ;*
3298                                          ;*      THIS TEST CHECKS THE LOGIC THAT CAUSES FRHK MUL SWR TO GO
3299                                          ;*      HIGH.  THE PARTICULAR GATES BEING TESTED ARE E107, E108,
3300                                          ;*      AND E115.  THEY ARE TESTED BY SETTING A MICRO-TRAP ON THE
3301                                          ;*      -SWR ROM STATE THAT WOULD BE ENTERED IF THE LOGIC FAILS.
3302                                          ;*
3303                                          ;*      IN CERTAIN CASES THE TRAP MAY OCCUR AFTER THE FIRST TIME
3304                                          ;*      THRU THE 2F3 BRANCH.  IN THESE CASES THE QR WILL BE CHECKED
3305                                          ;*      TO ENSURE THE CORRECT DATA.
3306                                          ;*
3307                                          ;*      NOTE:   SYNC POINT NOT SELECTABLE. DEFAULT=116
3308                                          ;*
3309                                          ;;**********************************************************************
3310
3311  006060  000004                  TST6:   SCOPE
3312  006062  012737  000006  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
3313                                  ;SECTION - 1
3314                                  ;       E108(1,13(LH AND E115(5,6,4)HLL
3315  006070  012737  006144  000244          MOV     #1$,FPPVEC
3316  006076  012737  040000  001160          MOV     #40000,$REG0    ;PUT MULTIPLIER IN
3317  006104  012737  000040  001162          MOV     #BIT5,$REG1     ;MEMORY (ROM ADDR=240)
3318  006112  012737  006120  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
3319  006120  012703  000116                  MOV     #116,R3
3320  006124  170003                          LDUB
3321  006126  170127  000020                  LDFPS   #FMM
3322  006132  172427  040000                  LDF     #^O040000,AC0   ;LOAD THE MULTIPLICAND
3323  006136  171037  001160                  MULF    $REG0,AC0       ;EXECUTE INSTRUCTION
3324  006142  170000                          CFCC                    ;WAIT FOR TRAP
3325  006144  022626                  1$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
3326  006146  170007                          STQD
3327  006150  174037  001210                  STF     AC0,$TMP4       ;GET QR TO FIND OUT WHEN TRAP OCCURRED
3328  006154  042737  100000  001210          BIC     #BIT15,$TMP4    ;GET RID OF SIGN
3329  006162  022737  004000  001212          CMP     #BIT11,$TMP5    ;FIRST TIME THRU THE BRANCH?
3330  006170  001001                          BNE     2$              ;BRANCH IF NO
3331  006172  104020                          ERROR   20              ;FRHK E115(4) NOT GOING LOW
3332                                          ;;**********************************************************************
3333                                  ;SECTION - 2
3334                                  ;       E108(1,13)HH AND E115(5,6,4)LLH
3335  006174  005037  001162          2$:     CLR     $REG1           ;INITIALIZE MULTIPLIER
3336  006200  012737  006240  000244          MOV     #3$,FPPVEC
```

```
3337  006206  012737  006214  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
3338  006214  012703  000116                  MOV     #116,R3
3339  006220  170003                          LDUB
3340  006222  170127  000020                  LDFPS   #FMM
3341  006226  172427  040000                  LDF     #^O040000,AC0   ;LOAD THE MULTIPLICAND
3342  006232  171037  001160                  MULF    $REG0,AC0       ;EXECUTE THE INSTRUCTION
3343  006236  170000                          CFCC                    ;WAIT FOR TRAP
3344  006240  022626                  3$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
3345  006242  170007                          STQD
3346  006244  174037  001210                  STF     AC0,$TMP4       ;GET QR DATA
3347  006250  042737  100000  001210          BIC     #BIT15,$TMP4
3348  006256  022737  004000  001212          CMP     #BIT11,$TMP5    ;TRAP OCCUR AT CORRECT TIME?
3349  006264  001401                          BEQ     8$              ;BRANCH IF YES
3350  006266  104021                          ERROR   21              ;FRHK E115(4) NOT GOING HIGH
3351                                  ;CHECK THE AR TO ENSURE THAT MUL SWR DISABLED THE ADD
3352  006270                          8$:
3353  006270  012704  177776                  MOV     #-2,R4          ;PUT THE SHIFT COUNT IN R4
3354  006274  170004                          MSN                     ;SHIFT THE AR TO GET 59 & 58
3355  006276  170005                          STAD
3356  006300  174037  001214                  STF     AC0,$TMP6       ;GET AR DATA
3357  006304  042737  100000  001214          BIC     #BIT15,$TMP6
3358  006312  005737  001214                  TST     $TMP6           ;QUAD 3 OK?
3359  006316  001003                          BNE     9$              ;BRANCH IF NO
3360  006320  005737  001216                  TST     $TMP7           ;QUAD 2 OK?
3361  006324  001403                          BEQ     4$              ;BRANCH IF YES
3362  006326  170437  001204          9$:     CLRF    $TMP2           ;SAVE EXPECTED VALUE
3363  006332  104023                          ERROR   23              ;FRMH MPY/DIV ADD (OR SUB)
3364
3365                                  ;;*****************************************************************
3366                                  ;SECTION - 3
3367                                  ;       E107(13,1,2)HLH AND E108(13,1)LH
3368  006334  012737  000002  001162  4$:     MOV     #BIT1,$REG1     ;PUT MULTIPLIER IN MEMORY
3369  006342  012737  006406  000244          MOV     #5$,FPPVEC
3370  006350  012737  006356  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
3371  006356  012703  000116                  MOV     #116,R3
3372  006362  170003                          LDUB
3373  006364  170127  000020                  LDFPS   #FMM
3374  006370  172427  040000                  LDF     #^O040000,AC0   ;LOAD THE MULTIPLICAND
3375  006374  171037  001160                  MULF    $REG0,AC0       ;EXECUTE TEST
3376  006400  170000                          CFCC                    ;WAIT FOR TRAP
3377  006402  104022                          ERROR   22              ;FRHK E107(12) NOT GOING LOW
3378  006404  000411                          BR      6$
3379  006406  022626                  5$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
3380  006410  170007                          STQD
3381  006412  174037  001214                  STF     AC0,$TMP6       ;GET QR DATA
3382  006416  022737  001000  001216          CMP     #BIT9,$TMP7     ;DID TRAP OCCUR AT CORRECT TIME?
3383  006424  001401                          BEQ     6$              ;BRANCH IF YES
3384  006426  104022                          ERROR   22              ;FRHK E107(12) NOT GOING LOW
3385                                  ;;*****************************************************************
3386                                  ;SECTION - 4
3387                                  ;       E107(13,1,2)LHH AND E108(13,1)LH
3388  006430  012737  000060  001162  6$:     MOV     #60,$REG1       ;PUT MULTIPLIER IN MEMORY
3389  006436  012737  006476  000244          MOV     #7$,FPPVEC
3390  006444  012737  006452  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
3391  006452  012703  000117                  MOV     #117,R3
3392  006456  170003                          LDUB
```

```
3393  006460  170127  000020                  LDFPS   #FMM
3394  006464  172427  040000                  LDF     #^O040000,AC0     ;LOAD THE MULTIPLICAND
3395  006470  171037  001160                  MULF    $REG0,AC0         ;EXECUTE THE INSTRUCTION
3396  006474  170000                          CFCC                      ;WAIT FOR THE TRAP
3397  006476  022626                  7$:     CMP     (SP)+,(SP)+       ;RESTORE THE SP
3398  006500  170007                          STQD
3399  006502  174037  001214                  STF     AC0,$TMP6         ;GET THE QR DATA
3400  006506  022737  000020  001216          CMP     #20,$TMP7         ;TRAP OCCUR AT THE CORRECT TIME?
3401  006514  001401                          BEQ     TST7              ;;BRANCH IF YES
3402  006516  104022                          ERROR   22                ;FPHK E107(12) NOT GOING LOW
3403
3404
3405                                  ;;*****************************************************************
3406                                  ;*TEST 7        MULF (.5*1)
3407                                  ;*
3408                                  ;*      THIS TEST MULTIPLIES 1 BY 0.5 TO ENSURE THAT ALL THE
3409                                  ;*      ROM SIGNALS IN STATES 116, 110, AND 72 FUNCTION PROPERLY.
3410                                  ;*
3411                                  ;*      FPU ROM FLOW - 11, 131, 61, 340, 233, 112, 3(116), 110, 72, NORMALIZE
3412                                  ;*****************************************************************
3413  006520  000004                  TST7:   SCOPE
3414  006522  012737  000007  001240          MOV     #$TN-1,$TESTN     ;;SET TEST NUMBER IN  MAIL BOX
3415  006530  012737  006622  001222          MOV     #TST10,$ESCAPE    ;;ESCAPE TO TEST 10 ON ERROR
3416  006536  012737  040000  001200          MOV     #40000,$TMP0      ;SAVE EXPECTED
3417  006544  005037  001202                  CLR     $TMP1             ;RESULT
3418  006550  172427  040200                  LDF     #^O040200,AC0     ;LOAD THE MULTIPLICAND
3419  006554  170127  000017                  LDFPS   #17               ;LOAD COMPLIMENT CC'S
3420  006560  171037  001200          1$:     MULF    $TMP0,AC0         ;EXECUTE THE INSTRUCTION UNDER TEST
3421  006564  170200                          STFPS   R0                ;GET CC'S
3422  006566  174037  001204                  STF     AC0,$TMP2         ;GET RESULT BACK
3423  006572  173437  001200                  CMPF    $TMP0,AC0         ;RESULT OK?
3424  006576  170000                          CFCC
3425  006600  001401                          BEQ     2$                ;BRANCH IF YES
3426  006602  104024                          ERROR   24                ;RESULT WRONG
3427  006604  005700                  2$:     TST     R0                ;CC'S OK?
3428  006606  001405                          BEQ     TST10             ;;BRANCH IF YES
3429  006610  005037  001200                  CLR     $TMP0             ;SAVE EXPECTED VALUE
3430  006614  010037  001202                  MOV     R0,$TMP1          ;SAVE RECEIVED VALUE
3431  006620  104003                          ERROR   3                 ;CC'S BAD
3432
3433
3434                                  ;;*****************************************************************
3435                                  ;*TEST 10       MULF (.111...1*1)
3436                                  ;*
3437                                  ;*      THIS TEST CHECKS ROM STATE 111.
3438                                  ;*
3439                                  ;*      FPU ROM FLOW - 11, 130, 61, 340, 233, 112, 113, 3(117), 111, 72. NORMALIZE
3440                                  ;*****************************************************************
3441  006622  000004                  TST10:  SCOPE
3442  006624  012737  000010  001240          MOV     #$TN-1,$TESTN     ;;SET TEST NUMBER IN  MAIL BOX
3443  006632  012737  006734  001222          MOV     #TST11,$ESCAPE    ;;ESCAPE TO TEST 11 ON ERROR
3444  006640  012737  040177  001200          MOV     #40177,$TMP0      ;PUT MULTIPLIER
3445  006646  012737  177777  001202          MOV     #-1,$TMP1         ;IN MEMORY
3446  006654  172427  140200                  LDF     #^O140200,AC0     ;LOAD THE MULTIPLICAND
3447  006660  170127  000007                  LDFPS   #7                ;LOAD COMPLIMENT CC'S
3448  006664  171037  001200          1$:     MULF    $TMP0,AC0         ;EXECUTE INSTRUCTION UNDER TEST
```

```
3449  006670  170200                          STFPS   R0              ;GET CC'S BACK
3450  006672  052737  100000  001200          BIS     #BIT15,$TMP0
3451  006700  173437  001200                  CMPF    $TMP0,AC0       ;RESULT OK?
3452  006704  170000                          CFCC
3453  006706  001401                          BEQ     2$              ;BRANCH IF YES
3454  006710  104024                          ERROR   24              ;RESULT BAD
3455  006712  022700  000010          2$:     CMP     #FN,R0          ;CC'S OK?
3456  006716  001406                          BEQ     TST11           ;;BRANCH IF YES
3457  006720  012737  000010  001200          MOV     #FN,$TMP0       ;SAVE EXPECTED VALUE
3458  006726  010037  001202                  MOV     R0,$TMP1        ;SAVE RECEIVED VALUE
3459  006732  104003                          ERROR   3               ;CC'S BAD
3460
3461
3462                                  ;;*****************************************************************
3463                                  ;*TEST 11       HIGH ORDER MUL SHIFT ENCODER ROM
3464                                  ;*
3465                                  ;*      THIS TEST CHECKS EVERY ADDRESS ON THE HIGH ORDER MUL SHIFT
3466                                  ;*      ENCODER.  THIS IS DONE IN TWO SECTIONS.  THE FIRST SECTION
3467                                  ;*      RUNS A COUNT PATTERN THROUGH QR BITS <41:35>.  THE SECOND
3468                                  ;*      SECTION STARTS EACH MULTIPLY WITH QR BITS <41:35> ALL ONE'S
3469                                  ;*      AND RUNS A COUNT PATTERN THRU QR BITS <48:42>.
3470                                  ;*
3471                                  ;*      SINCE THE MULCIPLICAND IS "1.0" THE RESULT SHOULD BE IDENTICAL
3472                                  ;*      TO THE MULTIPLIER.
3473                                  ;*
3474                                  ;*      IF AN ERROR OCCURS THE TYPEOUT INDICATES THE ROM ADDRESS
3475                                  ;*      AND THE EXPECTED OUTPUT OF THE ROM FOR EACH SHIFT OF THAT
3476                                  ;*      PARTICULAR MULTIPLY.
3477                                  ;;*****************************************************************
3478  006734  000004                  TST11:  SCOPE
3479  006736  012737  000011  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
3480  006744  012737  007144  001222          MOV     #TST12,$ESCAPE  ;;ESCAPE TO TEST 12 ON ERROR
3481                                  ;SECTION - 1
3482  006752  105037  001276                  CLRB    $FD             ;ENSURE $FD CLEAR INCASE OF ERROR
3483  006756  012737  040000  001160          MOV     #40000,$REG0    ;INITIALIZE THE
3484  006764  005037  001162                  CLR     $REG1           ;MULTIPLIER
3485  006770  012737  006776  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
3486  006776  172427  040200          1$:     LDF     #^O40200,AC0    ;INITIALIZE THE MULTIPLICAND
3487  007002  171037  001160                  MULF    $REG0,AC0       ;EXECUTE THE MULTIPLY
3488  007006  173437  001160                  CMPF    $REG0,AC0       ;RESULT OK?
3489  007012  170000                          CFCC
3490  007014  001013                          BNE     2$              ;BRANCH IF NO
3491  007016  032777  001000  172112          BIT     #SW9,@SWR       ;LOOP ON ERROR?
3492  007024  001403                          BEQ     3$              ;BRANCH IF NO
3493  007026  105737  001103                  TSTB    $ERFLG          ;ANY ERRORS YET?
3494  007032  001361                          BNE     1$              ;BRANCH IF YES
3495  007034  105237  001162          3$:     INCB    $REG1           ;SELECT THE NEXT MULTIPLIER
3496  007040  100356                          BPL     1$              ;BRANCH IF NOT FINISHED
3497  007042  000401                          BR      4$              ;GO TO NEXT SECTION
3498                                  ;;*****************************************************************
3499  007044  104025                  2$:     ERROR   25              ;MUL SHIFT ENCODER ROM FAILED
3500                                  ;;*****************************************************************
3501                                  ;SECTION - 2
3502  007046  012737  040000  001160  4$:     MOV     #40000,$REG0    ;INITIALIZE THE
3503  007054  012737  000177  001162          MOV     #177,$REG1      ;MULTIPLIER
3504  007062  012737  007070  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
```

```
3505  007070  172427  040200          6$:     LDF     #↑040200,AC0    ;INITIALIZE THE MULTIPLICAND
3506  007074  171037  001160                  MULF    $REG0,AC0       ;EXECUTE THE MULTIPLY
3507  007100  173437  001160                  CMPF    $REG0,AC0       ;RESULT OK?
3508  007104  170000                          CFCC
3509  007106  001356                          BNE     2$              ;BRANCH IF NO
3510  007110  032777  001000  172020          BIT     #SW9,@SWR       ;LOOP ON ERROR?
3511  007116  001403                          BEQ     5$              ;BRANCH IF NO
3512  007120  105737  001103                  TSTB    $ERFLG          ;ANY ERRORS YET?
3513  007124  001361                          BNE     6$              ;BRANCH IF YES
3514  007126  062737  000200  001162  5$:     ADD     #BIT7,$REG1     ;SELECT NEXT MULTIPLIER
3515  007134  032737  040000  001162          BIT     #BIT14,$REG1    ;DONE YET?
3516  007142  001752                          BEQ     6$              ;BRANCH IF NO
3517
3518
3519                                  ;;*****************************************************************
3520                                  ;*TEST 12       LOGIC TESTS OF FRHK MUL SWR*FD(1)
3521                                  ;*
3522                                  ;*      THIS TEST CHECKS THE A-BRANCH AND ADX ROMS FOR MULD AND
3523                                  ;*      THE GATES THAT DRIVE FRHK MUL SWR WITH FD(1).  IN PARTICULAR
3524                                  ;*      FRLH E1, FRHK E107, AND E108.
3525                                  ;*
3526                                  ;*      THIS LOGIC TEST IS PERFORMED BY SETTING A MICRO-TRAP OFF
3527                                  ;*      THE 2F3 BRANCH TO ENSURE THAT FRHK MUL SWR GOES HIGH.
3528                                  ;*
3529                                  ;*      NOTE:   SYNC POINT NOT SELECTABLE. DEFAULT=116
3530                                  ;;*****************************************************************
3531  007144  000004          ↑ST12:  SCOPE
3532  007146  012737  000012  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
3533  007154  012737  010166  001222          MOV     #TST13,$ESCAPE  ;;ESCAPE TO TEST 13 ON ERROR
3534  007162  005037  00120C                  CLR     $TMP0
3535  007166  012737  004000  001202          MOV     #BIT11,$TMP1
3536  007174  005037  001204                  CLR     $TMP2
3537  007200  005037  001206                  CLR     $TMP3
3538  007204  012737  040000  001160          MOV     #40000,$REG0    ;PUT THE
3539  007212  012737  000040  001162          MOV     #BIT5,$REG1     ;MULTIPLIER IN
3540  007220  005037  001164                  CLR     $REG2           ;MEMORY
3541  007224  005037  001166                  CLR     $REG3           ;       *
3542  007230  012737  007272  000244          MOV     #2$,FPPVEC
3543  007236  012737  007244  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
3544  007244  012703  000116                  MOV     #116,R3         ;SET MICRO-TRAP
3545  007250  170003                          LDUB
3546  007252  170127  000220                  LDFPS   #FMM+FD
3547  007256  172427  040000                  LDD     #↑040000,AC0    ;LOAD THE MULTIPLICAND
3548  007262  012700  001160                  MOV     #$REG0,R0
3549  007266  171020          1$:     MULD    (R0)+,AC0       ;EXECUTE TEST
3550  007270  170000                          CFCC                    ;WAIT FOR TRAP
3551  007272  012706  001100          2$:     MOV     #1100,SP        ;RESTORE THE SP
3552  007276  022700  001170                  CMP     #$REG4,R0       ;ADX ROM OK?
3553  007302  001401                          BEQ     100$            ;BRANCH IF YES
3554  007304  104004                          ERROR   4               ;ADX ROM FAILED
3555  007306  170007          100$:   STQD
3556  007310  174037  001210                  STD     AC0,$TMP4       ;GET QR
3557  007314  042737  100000  001210          BIC     #BIT15,$TMP4    ;GET RID OF SIGN
3558  007322  022737  004000  001212          CMP     #BIT11,$TMP5    ;QR OK?
3559  007330  001401                          BEQ     3$              ;BRANCH IF YES
3560  007332  104026                          ERROR   26              ;FRHK MUL SWR NOT GOING LOW
```

```
                                                                ;WITH PIN 9 AND 10 ON A HIGH.
                                        ;;**************************************************************
                                        ;SECTION - 2
                                        ;
                                                FRHK E108(9,10,13,1)H,L,L,L, AND FRLH E1(12,13)H,L
007334  012737  000040  001166  3$:     MOV     #40,$REG3       ;SET THE MULTIPLIER
007342  012737  007402  000244          MOV     #4$,FPPVEC
007350  012737  007356  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
007356  012703  000116                  MOV     #116,R3
007362  170003                          LDUB
007364  170127  000220                  LDFPS   #FD+FMM
007370  172427  040000                  LDD     #^O040000,AC0   ;LOAD THE MULTIPLICAND
007374  171037  001160                  MULD    $REG0,AC0       ;EXECUTE THE TEST
007400  170000                          CFCC                    ;WAIT FOR TRAP
007402  012706  001100          4$:     MOV     #1100,SP        ;RESTORE THE SP
007406  170007                          STQD
007410  174037  001210                  STD     AC0,$TMP4       ;GET THE QR
007414  042737  100000  001210          BIC     #BIT15,$TMP4    ;GET RID OF SIGN
007422  022737  000040  001212          CMP     #BIT5,$TMP5     ;TRAP OCCUR AT CORRECT TIME?
007430  001411                          BEQ     5$              ;BRANCH IF YES
007432  012737  000040  001202          MOV     #BIT5,$TMP1
007440  012737  000010  001204          MOV     #10,$TMP2
007446  005037  001200                  CLR     $TMP0
007452  104027                          ERROR   27              ;FRLH E1(11) DID NOT GO LOW
                                        ;;**************************************************************
                                        ;SECTION - 3
                                        ;
                                                FRHK E108(9,10,13,1)L,H,L,L
007454  012737  000060  001166  5$:     MOV     #60,$REG3       ;SET THE MULTIPLIER
007462  012737  007522  000244          MOV     #6$,FPPVEC
007470  012737  007476  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
007476  012703  000117                  MOV     #117,R3
007502  170003                          LDUB
007504  170127  000220                  LDFPS   #FD+FMM
007510  172427  040000                  LDD     #^O040000,AC0   ;LOAD THE MULTIPLICAND
007514  171037  001160                  MULD    $REG0,AC0       ;EXECUTE THE TEST
007520  170000                          CFCC                    ;WAIT FOR THE TRAP
007522  012706  001100          6$:     MOV     #1100,SP        ;RESTORE THE SP
007526  170007                          STQD
007530  174037  001210                  STD     AC0,$TMP4       ;GET THE QR
007534  042737  100000  001210          BIC     #BIT15,$TMP4    ;GET RID OF THE SIGN
007542  022737  000020  001212          CMP     #BIT4,$TMP5     ;TRAP OCCUR AT THE CORRECT TIME?
007550  001411                          BEQ     7$              ;BRANCH IF YES
007552  005037  001200                  CLR     $TMP0           ;SAVE EXPECTED
007556  012737  000020  001202          MOV     #BIT4,$TMP1     ;DATA
007564  012737  000010  001204          MOV     #10,$TMP2       ;       *
007572  104030                          ERROR   30              ;FRHK E107 NOT GOING LOW WITH
                                                                ;MUL SHF 0 ON A HIGH
                                        ;;**************************************************************
                                        ;SECTION - 4
                                        ;
                                                FRLH E1(12,13)H,H AND FRHK E107(3,4,5)H,H,H
007574  012737  000377  001166  7$:     MOV     #377,$REG3      ;LOAD THE MULTIPLIER
007602  012737  007642  000244          MOV     #8$,FPPVEC
007610  012737  007616  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
007616  012703  000117                  MOV     #117,R3
007622  170003                          LDUB
007624  170127  000220                  LDFPS   #FD+FMM
007630  172427  040000                  LDD     #^O040000,AC0   ;LOAD THE MULTIPLICAND
```

```
3617  007634  171037  001160                  *ULD    $REG0,AC0       ;EXECUTE THE TEST
3618  007640  170000                          CFCC                    ;WAIT FOR THE TRAP
3619  007642  012706  001100          8$:     MOV     #1100,SP        ;RESTORE THE SP
3620  007646  170007                          STQ0
3621  007650  174037  001210                  STD     AC0,$TMP4       ;GET THE QR
3622  007654  042737  100000  001210          BIC     #BIT15,$TMP4    ;GET RID OF SIGN
3623  007662  022737  040000  001212          CMP     #BIT14,$TMP5    ;QR DATA OK?
3624  007670  001411                          BEQ     9$              ;BRANCH IF YES
3625  007672  012737  040000  001202          MOV     #BIT14,$TMP1    ;SAVE EXPECTED
3626  007700  005037  001200                  CLR     $TMP0           ;DATA
3627  007704  012737  010000  001204          MOV     #BIT12,$TMP2    ;     *
3628  007712  104031                          ERROR   31              ;FRLH E1 NOT GOING HIGH WITH BOTH
3629                                                                  ;INPUTS ON A HIGH
3630                                  ;;**************************************************************
3631                                  ;SECTION - 5
3632                                  ;       FRHK E107(3,4,5)H,L,H
3633  007714  012737  000002  001166  9$:     MOV     #2,$REG3        ;LOAD MULTIPLIER
3634  007722  012737  007762  000244          MOV     #10$,FPPVEC
3635  007730  012737  007736  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
3636  007736  012703  000116                  MOV     #116,R3
3637  007742  170003                          LDUB
3638  007744  170127  000220                  LDFPS   #FD+FMM
3639  007750  172427  040000                  LDD     #^O040000,AC0   ;LOAD THE MULTIPLICAND
3640  007754  171037  001160                  MULD    $REG0,AC0       ;EXECUTE THE TEST
3641  007760  170000                          CFCC                    ;WAIT FOR THE TRAP
3642  007762  012706  001100          10$:    MOV     #1100,SP        ;RESTORE THE SP
3643  007766  170007                          STQ0
3644  007770  174037  001210                  STD     AC0,$TMP4       ;GET THE QR
3645  007774  042737  100000  001210          BIC     #BIT15,$TMP4    ;GET RID OF SIGN
3646  010002  022737  001000  001212          CMP     #BIT9,$TMP5     ;TRAP AT CORRECT TIME?
3647  010010  001413                          BEQ     11$             ;BRANCH IF YES
3648  010012  012737  001000  001202          MOV     #BIT9,$TMP1
3649  010020  012737  000200  001204          MOV     #BIT7,$TMP2
3650  010026  005037  001206                  CLR     $TMP3
3651  010032  005037  001200                  CLR     $TMP0
3652  010036  104032                          ERROR   32              ;FRHK E107(6) NOT GOING LOW WITH
3653                                                                  ;H,L,H INPUT
3654                                  ;;**************************************************************
3655                                  ;SECTION - 6
3656                                  ;       FRHK E107(13,1,2)H,H,L
3657  010040  005037  001162          11$:    CLR     $REG1           ;LOAD THE
3658  010044  012737  000040  001166          MOV     #BIT5,$REG3     ;MULTIPLIER
3659  010052  012737  010112  000244          MOV     #12$,FPPVEC
3660  010060  012737  010066  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
3661  010066  012703  000116                  MOV     #116,R3
3662  010072  170003                          LDUB
3663  010074  170127  000220                  LDFPS   #FD+FMM
3664  010100  172427  040000                  LDD     #^O040000,AC0   ;LOAD THE MULTIPLICAND
3665  010104  171037  001160                  MULD    $REG0,AC0       ;EXECUTE THE TEST
3666  010110  170000                          CFCC                    ;WAIT FOR TRAP
3667  010112  012706  001100          12$:    MOV     #1100,SP        ;RESTORE THE SP
3668  010116  170007                          STQ0
3669  010120  174037  001210                  STD     AC0,$TMP4       ;GET QR
3670  010124  042737  100000  001210          BIC     #BIT15,$TMP4    ;GET RID OF SIGN
3671  010132  022737  000040  001212          CMP     #BIT5,$TMP5     ;TRAP OCCUR AT CORRECT TIME?
3672  010140  001412                          BEQ     TST13           ;;BRANCH IF YES
```

```
3673  010142  005037  001200                  CLR     $TMP0
3674  010146  012737  000040  001202          MOV     #BITS,$TMP1
3675  010154  005037  001204                  CLR     $TMP2
3676  010160  005037  001206                  CLR     $TMP3
3677  010164  104032                          ERROR   32              ;FRHK E107(12) NOT GOING LOW
                                                                      ;WITH H,H,L INPUT.
3678
3679
3680
3681                                  ;;*****************************************************************
3682                                  ;*TEST 13       LOW ORDER MUL SHIFT ENCODER ROM
3683                                  ;*
3684                                  ;*      THIS TEST CHECKS EVERY ADDRESS ON THE LOW ORDER MUL SHIFT
3685                                  ;*      ENCODER ROM.  THIS IS DONE IN TWO SECTIONS, THE FIRST
3686                                  ;*      SECTION RUNS A COUNT PATTERN THRU QR BITS <9:3>.  THE
3687                                  ;*      SECOND SECTION STARTS EACH MULTIPLY WITH QR BITS<9:3>
3688                                  ;*      ALL ONE'S AND RUNS A COUNT PATTERN THRU QR BITS <16:10>.
3689                                  ;*
3690                                  ;*      SINCE THE MULTIPLICAND IS "1.0" THE RESULT SHOULD BE
3691                                  ;*      IDENTICAL TO THE MULTIPLIER.
3692                                  ;*
3693                                  ;*      IF AN ERROR OCCURS THE TYPEOUT INDICATES THE ROM ADDRESS
3694                                  ;*      AND THE EXPECTED OUTPUT OF THE ROM FOR EACH SHIFT OF THE
3695                                  ;*      LOWER 24 BITS OF THAT PARTICULAR MULTIPLY.
3696                                  ;;*****************************************************************
3697  010166  000004                  TST13:  SCOPE
3698  010170  012737  000013  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
3699  010176  112737  000001  001276          MOVB    #1,$FD          ;SET SOFTWARE FD INDICATOR
3700                                  ;SECTION - 1
3701  010204  012737  040000  001160          MOV     #40000,$REG0    ;INITIALIZE
3702  010212  005037  001162                  CLR     $REG1           ;THE MULTIPLIER
3703  010216  005037  001164                  CLR     $REG2           ;       *
3704  010222  005037  001166                  CLR     $REG3           ;       *
3705  010226  012737  010234  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
3706  010234  170127  000200          1$:     LDFPS   #FD
3707  010240  172427  040200                  LDD     #^O40200,AC0    ;INITIALIZE THE MULTIPLICAND
3708  010244  171037  001160                  MULD    $REG0,AC0       ;EXECUTE THE MULTIPLY
3709  010250  173437  001160                  CMPD    $REG0,AC0       ;RESULT OK?
3710  010254  170000                          CFCC
3711  010256  001013                          BNE     2$              ;BRANCH IF NO
3712  010260  032777  001000  170650          BIT     #SW9,@SWR       ;LOOP ON ERROR?
3713  010266  001403                          BEQ     3$              ;BRANCH IF NO
3714  010270  105737  001103                  TSTB    $ERFLG          ;ANY ERRORS?
3715  010274  001357                          BNE     1$              ;BRANCH IF YES
3716  010276  105237  001166          3$:     INCB    $REG3           ;SELECT THE NEXT MULTIPLIER
3717  010302  100354                          BPL     1$              ;BRANCH IF NOT FINISHED
3718  010304  000401                          BR      4$              ;GO TO SECTION 2
3719                                  ;;*****************************************************************
3720  010306  104025                  2$:     ERROR   25              ;MUL SHIFT ENCODER ROM FAILED
3721                                  ;;*****************************************************************
3722                                  ;SECTION - 2
3723  010310  012737  000177  001166  4$:     MOV     #177,$REG3      ;INIT THE MULTIPLIER
3724  010316  012737  010324  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
3725  010324  170011                  6$:     SETD
3726  010326  172427  040200                  LDD     #^O40200,AC0    ;LOAD THE MULTIPLICAND
3727  010332  171037  001160                  MULD    $REG0,AC0       ;EXECUTE THE MULTIPLY
3728  010336  173437  001160                  CMPD    $REG0,AC0       ;RESULT OK?
```

```
3729  010342  170000                          CFCC
3730  010344  001360                          BNE     2$              ;BRANCH IF NO
3731  010346  032777  001000  170562          BIT     #SW9,@SWR       ;LOOP ON ERROR?
3732  010354  001403                          BEQ     5$              ;BRANCH IF NO
3733  010356  105737  001103                  TSTB    $ERFLG          ;ANY ERRORS?
3734  010362  001360                          BNE     6$              ;BRANCH IF YES
3735  010364  062737  000200  001166  5$:     ADD     #BIT7,$REG3     ;SELECT THE NEXT MULTIPLIER
3736  010372  032737  040000  001166          BIT     #BIT14,$REG3    ;DONE YET?
3737  010400  001751                          BEQ     6$              ;BRANCH IF NO
3738
3739                                  ;;*****************************************************************
3740                                  ;*TEST 14       MODF*M0*(SRC=0)*(DST=0)
3741                                  ;*
3742                                  ;*      THIS TEST ENSURES THAT FXPC FIR808(1) GETS TO FRMA
3743                                  ;*      AS A HIGH AND THAT THE A BRANCH AND NO-MEM ROMS
3744                                  ;*      FUNCTION PROPERLY.
3745                                  ;*
3746                                  ;*      FPU ROM FLOW-30,61,354,355
3747                                  ;;*****************************************************************
3748  010402  000004                  TST14:  SCOPE
3749  010404  012737  000014  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
3750  010412  012737  010454  001222          MOV     #TST15,$ESCAPE  ;;ESCAPE TO TEST 15 ON ERROR
3751  010420  170400                          CLRF    AC0             ;ENSURE DST ZERO
3752  010422  172527  040000                  LDF     #^O040000,AC1   ;ENSURE DST+1 NON-ZERO
3753  010426  170402                          CLRF    AC2             ;ENSURE SRC=0
3754  010430  171402                  1$:     MODF    AC2,AC0         ;EXECUTE INSTRUCTION UNDER TEST
3755  010432  173527  000000                  CMPF    #0,AC1          ;DID DST+1 GET CLEARED?
3756  010436  170000                          CFCC
3757  010440  001405                          BEQ     TST15           ;;BRANCH IF YES
3758  010442  174137  001204                  STF     AC1,$TMP2       ;GET DST+1
3759  010446  170437  001200                  CLRF    $TMP0           ;SAVE EXPECTED DATA
3760  010452  104034                          ERROR   34              ;MODF DID NOT CLEAR DST+1
3761
3762                                  ;;*****************************************************************
3763                                  ;*TEST 15       MODF*-M0*(INT=0)
3764                                  ;*
3765                                  ;*      THIS TEST ENSURES THAT AN INTEGER RESULT OF ZERO CAUSES
3766                                  ;*      ZERO TO BE STORED IN THE DST ACC+1 AND THE FRACTION IN
3767                                  ;*      THE DST ACCUMULATOR.
3768                                  ;*
3769                                  ;*      FPU ROM FLOW-MULTIPLY,76,266,327,305,325,NORMALIZE
3770                                  ;;*****************************************************************
3771  010454  000004                  TST15:  SCOPE
3772  010456  012737  000015  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
3773  010464  012737  010632  001222          MOV     #TST16,$ESCAPE  ;;ESCAPE TO TEST 16 ON ERROR
3774  010472  012737  040007  001160          MOV     #40007,$REG0    ;PUT THE SRC
3775  010500  005037  001162                  CLR     $REG1           ;DATA IN MEMORY
3776  010504  012703  000307                  MOV     #307,R3         ;SET MICRO-BREAK TO
3777  010510  170003                          LDUB                    ;LATCH 3F2 BRANCH FAILURE
3778  010512  170127  000020                  LDFPS   #FMM
3779  010516  012737  010626  000244          MOV     #2$,FPPVEC
3780  010524  012737  010532  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
3781  010532  172427  140200                  LDF     #^O140200,AC0   ;LOAD THE DST
3782  010536  172537  001160                  LDF     $REG0,AC1       ;ENSURE ACD+1 IS NON ZERO
3783  010542  012700  001160                  MOV     #$REG0,R0       ;PUT ADDRESS OF SRC IN R0
3784  010546  171420                  1$:     MODF    (R0)+,AC0       ;EXECUTE INSTRUCTION UNDER TEST
```

```
3785  010550  022700  001164                  CMP     #$REG2,R0       ;ADX ROM OK?
3786  010554  001401                          BEQ     3$              ;BRANCH IF YES
3787  010556  104004                          ERROR   4               ;ADX ROM FAILED
3788  010560  174137  001204          3$:     STF     AC1,$TMP2       ;GET DST ACC+1
3789  010564  005737  001204                  TST     $TMP2           ;DID IT GET CLEARED?
3790  010570  001403                          BEQ     4$              ;BRANCH IF YES
3791  010572  170437  001200                  CLRF    $TMP0           ;SAVE EXPECTED VALUE
3792  010576  104035                          ERROR   35              ;STATE 305 DID NOT CLEAR DST ACC+1
3793  010600  173427  140007          4$:     CMPF    #^O140007,AC0   ;IS FRACTION OK?
3794  010604  001412                          BEQ     TST16           ;;BRANCH IF YES
3795  010606  174037  001204                  STF     AC0,$TMP2       ;SAVE RECEIVED DATA
3796  010612  012737  014007  001200          MOV     #14007,$TMP0    ;SAVE EXPECTED
3797  010620  005037  001202                  CLR     $TMP1           ;DATA
3798  010624  104036                          ERROR   36              ;FRACTION IS WRONG
3799                                  ;ERROR - 3F2 BRANCH FAILED
3800  010626  022626                  2$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
3801  010630  104037                          ERROR   37              ;STATE 266 DID NOT CAUSE BN TO SET
3802
3803                                  ;;*****************************************************************
3804                                  ;*TEST 16       MODF*(INT=2**25)*-BOU
3805                                  ;*
3806                                  ;*      THIS TEST GENERATES A NUMBER WHO'S FRACTIONAL
3807                                  ;*      PART IS ZERO.
3808                                  ;*
3809                                  ;*      FPU ROM FLOW-MULTIPLY,76,266,327,307,7,341
3810                                  ;;*****************************************************************
3811  010632  000004                  TST16:  SCOPE
3812  010634  012737  000016  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
3813  010642  012737  011052  001222          MOV     #TST17,$ESCAPE  ;;ESCAPE TO TEST 17 ON ERROR
3814  010650  012737  046207  001160          MOV     #46207,$REG0    ;PUT THE SRC
3815  010656  005037  001162                  CLR     $REG1           ;IN MEMORY
3816  010662  012703  000005                  MOV     #5,R3
3817  010666  170003                          LDUB
3818  010670  012737  011046  000244          MOV     #2$,FPPVEC
3819  010676  012737  010704  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
3820  010704  172427  040200                  LDF     #^O40200,AC0    ;LOAD THE DST
3821  010710  032777  001000  170220          BIT     #SW9,@SWR       ;LOOP ON ERROR?
3822  010716  001406                          BEQ     3$              ;BRANCH IF NO
3823  010720  105737  001103                  TSTB    $ERFLG          ;ANY ERRORS?
3824  010724  001403                          BEQ     3$              ;BRANCH IF NO
3825  010726  170127  000013                  LDFPS   #13             ;LOAD COMPLIMENT CC'S
3826  010732  000402                          BR      4$
3827  010734  170127  000033          3$:     LDFPS   #FMM+13         ;LOAD COMPLIMENT CC'S
3828  010740  171437  001160          4$:     MODF    $REG0,AC0       ;EXECUTE INSTRUCTION UNDER TEST
3829  010744  170200                          STFPS   R0              ;GET CC'S
3830  010746  173427  000000                  CMPF    #0,AC0          ;FRACTION PART ZERO?
3831  010752  ^O00000                         CFCC
3832  010754  001405                          BEQ     5$              ;BRANCH IF YES
3833  010756  174037  001204                  STF     AC0,$TMP2       ;GET DATA
3834  010762  170437  001200                  CLRF    $TMP0           ;SAVE EXPECTED VALUE
3835  010766  104040                          ERROR   40              ;FRACTION DID NOT CLEAR
3836  010770  173527  046207          5$:     CMPF    #^O046207,AC1   ;INTEGER PORTION CORRECT?
3837  010774  170000                          CFCC
3838  010776  001410                          BEQ     6$              ;BRANCH IF YES
3839  011000  174137  001204                  STF     AC1,$TMP2       ;GET RESULT
3840  011004  012737  046207  001200          MOV     #46207,$TMP0    ;SAVE
```

```
 3841  011012  005037  001202                 CLR     $TMP1           ;EXPECTED VALUE
 3842  011016  104041                         ERROR   41              ;INTEGER PORTION WRONG
 3843                                 ;DATA OK - CHECK CC'S
 3844  011020  042700  000020         6$:     BIC     #FMM,R0         ;GET RID OF FMM BIT
 3845  011024  022700  000004                 CMP     #FZ,R0          ;CC'S OK?
 3846  011030  001410                         BEQ     TST17           ;;BRANCH IF YES
 3847  011032  010037  001202                 MOV     R0,$TMP1        ;SAVE RECEIVED VALUE
 3848  011036  012737  000004  001200         MOV     #FZ,$TMP0       ;SAVE EXPECTED  VALUE
 3849  011044  104003                         ERROR   3               ;CC'S BAD
 3850  011046  022626                 2$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
 3851  011050  104000                         ERROR                   ;STATE 327 DID NOT CAUSE BN TO CLEAR
 3852
 3853                                 ;;*****************************************************************
 3854                                 ;*TEST 17       MODF*-(INT=0)*-(FRAC=0)
 3855                                 ;*
 3856                                 ;*      THIS TEST CHECKS THE FLOWS THAT GET EXECUTED WHEN THE
 3857                                 ;*      RESULT CONTAINS AN INTEGER AND A FRACTION.
 3858                                 ;*
 3859                                 ;*      FPU ROM FLOW-MULTIPLY,76,266,327,307,5,2(332),336,170,105,172,NORMALIZE
 3860                                 ;;*****************************************************************
 3861  011052  000004                 TST17:  SCOPE
 3862  011054  012737  000017  001240         MOV     #STN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
 3863  011062  012737  011174  001222         MOV     #TST20,$ESCAPE  ;;ESCAPE TO TEST 20 ON ERROR
 3864  011070  170127  000000                 LDFPS   #0
 3865  011074  005037  001202                 CLR     $TMP1
 3866  011100  012737  042001  001160         MOV     #42001,$REG0    ;PUT SRC DATA IN MEMORY
 3867  011106  012737  100000  001162         MOV     #BIT15,$REG1    ;INT=200 AND FRAC=0.1
 3868  011114  172627  040200                 LDF     #^O040200,AC2   ;LOAD THE DST
 3869  011120  171637  001160         1$:     MODF    $REG0,AC2       ;EXECUTE INSTRUCTION UNDER TEST
 3870  011124  173627  040000                 CMPF    #^O040000,AC2   ;FRACTION OK?
 3871  011130  170000                         CFCC
 3872  011132  001406                         BEQ     2$              ;BRANCH IF YES
 3873  011134  174237  001204                 STF     AC2,$TMP2       ;GET RECEIVED FRACTION
 3874  011140  012737  040000  001200         MOV     #40000,$TMP0    ;SAVE EXPECTED FRACTION
 3875  011146  104042                         ERROR   42              ;FRACTION WRONG
 3876  011150  173727  042001          2$:     CMPF    #^O042001,AC3   ;INTEGER PORTION OK?
 3877  011154  170000                         CFCC
 3878  011156  001406                         BEQ     TST20           ;;BRANCH IF YES
 3879  011160  174337  001204                 STF     AC3,$TMP2       ;GET RECEIVED INTEGER
 3880  011164  012737  042001  001200         MOV     #42001,$TMP0    ;SAVE EXPECTED INTEGER
 3881  011172  104043                         ERROR   43              ;INTEGER WRONG
 3882
 3883                                 ;;*****************************************************************
 3884                                 ;*TEST 20       MODF*BOU*-(FV*FIV)
 3885                                 ;*
 3886                                 ;*      THIS TEST ENSURES THAT AN INTEGER OVERFLOW ON MODF CAUSES
 3887                                 ;*      THE INTEGER TO BE CLEARED.
 3888                                 ;*
 3889                                 ;*      FPU ROM FLOW-MULTIPLY,76,266,327,307,7,341,102,242,107
 3890                                 ;;*****************************************************************
 3891  011174  000004                 TST20:  SCOPE
 3892  011176  012737  000020  001240         MOV     #STN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
 3893  011204  012737  011306  001222         MOV     #TST21,$ESCAPE  ;;ESCAPE TO TEST 21 ON ERROR
 3894  011212  012737  011220  001110         MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 3895  011220  172527  040000                 LDF     #^O040000,AC1   ;ENSURE ACC+1 NOT ALREADY ZERO
 3896  011224  172427  060000                 LDF     #^O060000,AC0   ;LOAD THE DST
```

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003897  011230  170127  000011                  LDFPS   #11             ;LOAD COMPLEMENT CC'S
003898  011234  171427  060400          1$:     MODF    #^O060400,AC0   ;EXECUTE INSTRUCTION UNDER TEST
003899  011240  170200                          STFPS   R0              ;GET CC'S
003900  011242  173527  000000                  CMPF    #0,AC1          ;INTEGER CLEAR?
003901  011246  170000                          CFCC
003902  011250  001405                          BEQ     2$              ;BRANCH IF YES
003903  011252  174137  001204                  STF     AC1,$TMP2       ;SAVE RECEIVED VALUE
003904  011256  170437  001200                  CLRF    $TMP0           ;SAVE EXPECTED VALUE
003905  011262  104044                          ERROR   44              ;INTEGER DID NOT CLEAR ON OVERFLOW
003906  011264  022700  000006          2$:     CMP     #FZ+FV,R0       ;CC'S OK?
003907  011270  001406                          BEQ     TST21           ;;BRANCH IF YES
003908  011272  010037  001202                  MOV     R0,$TMP1        ;SAVE RECEIVED CC'S
003909  011276  012737  000006  001200          MOV     #FZ+FV,$TMP0    ;SAVE EXPECTED VALUE
003910  011304  104003                          ERROR   3               ;CC'S BAD
003911
003912                                  ;;*****************************************************************
003913                                  ;*TEST 21       MODF*-(INT=0)*(FRAC=0)
003914                                  ;*
003915                                  ;*      THIS TEST ENSURES THAT ROM STATE 105 DETECTS A ZERO FRACTION.
003916                                  ;*      A MICRO TRAP IS SET ON STATE 343 (NORMALIZE) IN CASE
003917                                  ;*      THIS FAILS.  IF THIS FAILS, THE MICRO-BREAK REGISTER CANNOT BE
003918                                  ;*      LOADED FROM THE SWITCHES SINCE THE FPU WILL HANG IF IT GETS INTO
003919                                  ;*      THE NORMALIZE FLOWS.
003920                                  ;*
003921                                  ;*      NOTE:   SYNC POINT NOT SELECTABLE. DEFAULT=343
003922                                  ;*
003923                                  ;*      FPU ROM FLOW-MULTIPLY,76,266,327,307,5,332,336,170,105,172,341
003924                                  ;*****************************************************************
003925  011306  000004          TST21:  SCOPE
003926  011310  012737  000021  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
003927  011316  012737  011422  001222          MOV     #TST22,$ESCAPE  ;;ESCAPE TO TEST 22 ON ERROR
003928  011324  012737  040200  001160          MOV     #40200,$REG0    ;PUT THE SRC
003929  011332  005037  001162                  CLR     $REG1           ;DATA IN MEMORY
003930  011336  012737  011416  000244          MOV     #2$,FPPVEC
003931  011344  012737  011352  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
003932  011352  012703  000343                  MOV     #343,R3
003933  011356  170003                          LDUB
003934  011360  170127  000020                  LDFPS   #FMM
003935  011364  172427  040200                  LDF     #^O040200,AC0   ;LOAD THE DST
003936  011370  171437  001160          1$:     MODF    $REG0,AC0       ;EXECUTE INSTRUCTION UNDER TEST
003937  011374  173427  000000                  CMPF    #0,AC0          ;DID FRACTION CLEAR?
003938  011400  170000                          CFCC
003939  011402  001407                          BEQ     TST22           ;;BRANCH IF YES
003940  011404  174037  001204                  STF     AC0,$TMP2
003941  011410  170437  001200                  CLRF    $TMP0
003942  011414  104042                          ERROR   42              ;FRACTION DID NOT CLEAR
003943  011416  022626                  2$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
003944  011420  104045                          ERROR   45              ;STATE 105 NOT DETECTING ZERO FRACTION
003945
003946                                  ;;*****************************************************************
003947                                  ;*TEST 22       MODD*(INT=0)
003948                                  ;*
003949                                  ;*      THIS TEST ENSURES STATE 365 STORES ZERO IN THE
003950                                  ;*      DST ACC+1 AND THAT STATE 325 ROUNDS THE FRACTION.
003951                                  ;*
003952                                  ;*      FPU ROM FLOW-MULTIPLY,76,266,326,365,325,NORMALIZE
```

```
                                        ;;**********************************************************************
011422  000004                  TST22:  SCOPE
011424  012737  000022  001240          MOV     #STN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
011432  012737  011636  001222          MOV     #TST23,$ESCAPE  ;;ESCAPE TO TEST 23 ON ERROR
011440  012737  040177  001160          MOV     #40177,$REG0    ;PUT MULTIPLICAND
011446  012737  177777  001162          MOV     #-1,$REG1       ;IN MEMORY
011454  012737  177777  001164          MOV     #-1,$REG2       ;    *
011462  012737  177776  001166          MOV     #-2,$REG3       ;    *
011470  012737  140000  001170          MOV     #140000,$REG4   ;PUT MULTIPLIER
011476  005037  001172                  CLR     $REG5           ;IN MEMORY
011502  005037  001174                  CLR     $REG6           ;    *
011506  012737  000040  001176          MOV     #40,$REG7       ;    *
011514  012737  011522  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
011522  170011                          SETD
011524  172437  001160                  LDD     $REG0,AC0       ;LOAD THE MULTIPLICAND
011530  012700  001170                  MOV     #$REG4,R0       ;PUT ADDRESS OF MULTIPLIER IN R0
011534  172527  044034                  LDD     #40000,AC1      ;ENSURE ACC+1 NON ZERO
011540  171420                  1$:     MODD    (R0)+,AC0       ;EXECUTE INSTRUCTION UNDER TEST
011542  022700  001200                  CMP     #$REG7+2,R0     ;ADX ROM OK?
011546  001401                          BEQ     2$              ;BRANCH IF YES
011550  104004                          ERROR   4               ;ADX ROM FAILED
011552  012737  140000  001200  2$:     MOV     #140000,$TMP0   ;SAVE
011560  005037  001202                  CLR     $TMP1           ;EXPECTED VALUE
011564  005037  001204                  CLR     $TMP2           ;OF DATA
011570  012737  000037  001206          MOV     #37,$TMP3       ;    *
011576  173437  001200                  CMPD    $TMP0,AC0       ;FRACTION OK?
011602  170000                          CFCC
011604  001403                          BEQ     3$              ;BRANCH IF YES
011606  174037  001210                  STD     AC0,$TMP4       ;GET DATA
011612  104046                          ERROR   46              ;FRACTION WRONG ON MODD
011614  173527  000000          3$:     CMPD    #0,AC1          ;INTEGER 0?
011620  170000                          CFCC
011622  001405                          BEQ     TST23           ;;BRANCH IF YES
011624  174137  001210                  STD     AC1,$TMP4       ;SAVE RECEIVED VALUE
011630  170437  001200                  CLRD    $TMP0           ;SAVE EXPECTED VALUE
011634  104047                          ERROR   47              ;INTEGER DID NOT CLEAR ON MODD
                                        ;;**********************************************************************
                                        ;*TEST 23       MODD*-(INT=0)*-(FRAC=0)
                                        ;*
                                        ;*      THIS TEST ENSURES THAT ROM STATES 326 AND 327 ARE WORKING
                                        ;*      PROPERLY
                                        ;*
                                        ;*      FPU ROM FLOW-MULTIPLY,76,266,326,367,5,332,336,170,105,172,NORM
                                        ;;**********************************************************************
011636  000004                  TST23:  SCOPE
011640  012737  000023  001240          MOV     #STN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
011646  012737  012034  001222          MOV     #TST24,$ESCAPE  ;;ESCAPE TO TEST 24 ON ERROR
011654  012737  142177  001160          MOV     #142177,$REG0   ;PUT
011662  012737  177777  001162          MOV     #-1,$REG1       ;MULTIPLIER
011670  012737  177777  001164          MOV     #-1,$REG2       ;IN
011676  012737  177777  001166          MOV     #-1,$REG3       ;MEMORY
011704  012737  011712  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
011712  170127  000200                  LDFPS   #FD
011716  172427  040200                  LDD     #^O040200,AC0   ;LOAD THE MULTIPLICAND
011722  171437  001160          1$:     MODD    $REG0,AC0       ;EXECUTE INSTRUCTION UNDER TEST
```

```
4009  011726  173527  142177                          CMPD    #^O10142177,AC1   ;INTEGER OK?
4010  011732  170000                                  CFCC
4011  011734  001414                                  BEQ     2$                ;BRANCH IF YES
4012  011736  012737  142177  001200                  MOV     #142177,$TMP0     ;SAVE
4013  011744  005037  001202                          CLR     $TMP1             ;EXPECTED
4014  011750  005037  001204                          CLR     $TMP2             ;VALUE
4015  011754  005037  001206                          CLR     $TMP3             ;     *
4016  011760  174137  001210                          STD     AC1,$TMP4         ;GET RECEIVED VALUE
4017  011764  104047                                  ERROR   47                ;INTEGER WRONG
4018  011766  012737  140177  001200  2$:             MOV     #140177,$TMP0     ;SAVE
4019  011774  012737  177777  001202                  MOV     #-1,$TMP1         ;EXPECTED
4020  012002  012737  177777  001204                  MOV     #-1,$TMP2         ;VALUE OF
4021  012010  012737  177400  001206                  MOV     #177400,$TMP3     ;FRACTION
4022  012016  173437  001200                          CMPD    $TMP0,AC0         ;FRACTION OK?
4023  012022  170000                                  CFCC
4024  012024  001403                                  BEQ     TST24             ;;BRANCH IF YES
4025  012026  174037  001210                          STD     AC0,$TMP4         ;SAVE RECEIVED DATA
4026  012032  104046                                  ERROR   46                ;FRACTION WRONG
4027
4028                                        ;;*****************************************************************
4029                                        ;*TEST 24       FALU LOGICAL "AND" TEST
4030                                        ;*
4031                                        ;*      THIS TEST CHECKS THE LOGICAL AND FUNCTION OF THE FALU.
4032                                        ;*      THIS IS DONE BY FLOATING A ONE THRU AR<57:3), THUS
4033                                        ;*      MAKING THE RESULT OF THE MULTIPLY HAVE AN INTEGER OF 1.0
4034                                        ;*      (201*0.1) AND THE FRACTION WILL BE .5+PATTERN (200*0.1+PATTERN)
4035                                        ;*      WHERE PATTERN IS THE VALUE OF AR <56:3> FOR THE PARTICULAR LOOP.
4036                                        ;*
4037                                        ;*      THE SECOND SECTION ALSO FLOATS A ONE THRU AR<57:3>
4038                                        ;*      BUT, IN THIS TEST THE INTEGER WILL BE 1.0+COUNT (270*0.1+COUNT)
4039                                        ;*      AND THE FRACTION WILL BE ZERO.
4040                                        ;*****************************************************************
4041  012034  000004                        TST24:  SCOPE
4042  012036  012737  000024  001240                MOV     #$TN-1,$TESTN     ;;SET TEST NUMBER IN  MAIL BOX
4043  012044  012737  012512  001222                MOV     #TST25,$ESCAPE    ;;ESCAPE TO TEST 25 ON ERROR
4044  012052  012737  040300  001160                MOV     #40300,$REG0      ;INITIALIZE
4045  012060  005037  001162                       CLR     $REG1             ;THE
4046  012064  005037  001164                       CLR     $REG2             ;MULTIPLICAND
4047  012070  012737  000001  001166                MOV     #1,$REG3          ;     *
4048  012076  012737  040000  001200                MOV     #40000,$TMP0      ;INITIALIZE
4049  012104  005037  001202                       CLR     $TMP1             ;CHECK DATA
4050  012110  005037  001204                       CLR     $TMP2             ;FOR FRACTION
4051  012114  012737  000002  001206                MOV     #2,$TMP3          ;     *
4052  012122  012737  040200  001170                MOV     #40200,$REG4      ;INITIALIZE
4053  012130  005037  001172                       CLR     $REG5             ;CHECK DATA
4054  012134  005037  001174                       CLR     $REG6             ;FOR INTEGER
4055  012140  005037  001176                       CLR     $REG7             ;   *
4056  012144  012737  012152  001110                MOV     #.+6,@#$LPERR     ;SET ERROR LOOP
4057  012152  170011                        1$:     SETD
4058  012154  172437  001160                       LDD     $REG0,AC0         ;LOAD THE MULTIPLICAND
4059  012160  171427  040200                       MODD    #^O040200,AC0     ;EXECUTE TEST
4060  012164  173437  001200                       CMPD    $TMP0,AC0         ;FRACTION OK?
4061  012170  170000                                CFCC
4062  012172  001403                                BEQ     2$                ;BRANCH IF YES
4063  012174  174037  001210                       STD     AC0,$TMP4         ;GET RECEIVED DATA
4064  012200  104046                                ERROR   46                ;LOGICAL "AND" FAILED IN FALU ON FRACTION
```

```
4065  012202  173527  040200          2$:     CMPD    #^O040200,AC1   ;INTEGER OK?
4066  012206  170000                          CFCC
4067  012210  001403                          BEQ     3$              ;BRANCH IF YES
4068  012212  174137  001210                  STD     AC1,$TMP4       ;GET RECEIVED DATA
4069  012216  104047                          ERROR   47              ;LOGICAL "AND" FAILED IN FALU ON INTEGER
4070  012220  032777  001000  166710  3$:     BIT     #SW9,@SWR       ;LOOP ON ERROR?
4071  012226  001403                          BEQ     4$              ;BRANCH IF NO
4072  012230  105737  001103                  TSTB    $ERFLG          ;ANY ERRORS YET?
4073  012234  001346                          BNE     1$              ;BRANCH IF YES
4074  012236  006137  001166          4$:     ROL     $REG3           ;SELECT
4075  012242  006137  001164                  ROL     $REG2           ;NEXT
4076  012246  006137  001162                  ROL     $REG1           ;MULTIPLICAND
4077  012252  106137  001160                  ROLB    $REG0           ;    *
4078  012256  052737  000100  001160          BIS     #BIT6,$REG0
4079  012264  000241                          CLC
4080  012266  006137  001206                  ROL     $TMP3           ;SELECT
4081  012272  006137  001204                  ROL     $TMP2           ;NEXT
4082  012276  006137  001202                  ROL     $TMP1           ;CHECK FRACTION
4083  012302  106137  001200                  ROLB    $TMP0           ;    *
4084  012306  100321                          BPL     1$              ;BRANCH IF NOT FINISHED
4085                                  ;;*****************************************************************
4086                                  ;SECTION - 2
4087  012310  012700  001160                  MOV     #$REG0,R0
4088  012314  012720  056000                  MOV     #56000,(R0)+    ;INITIALIZE
4089  012320  005020                          CLR     (R0)+           ;MULTIPLICAND
4090  012322  005020                          CLR     (R0)+           ;    *
4091  012324  012720  000001                  MOV     #1,(R0)+        ;        *
4092  012330  012720  056000                  MOV     #56000,(R0)+    ;INITIALIZE
4093  012334  005020                          CLR     (R0)+           ;INTEGER
4094  012336  005020                          CLR     (R0)+           ;CHECK
4095  012340  012710  000001                  MOV     #1,(R0)         ;DATA
4096  012344  005037  001200                  CLR     $TMP0           ;INITIALIZE
4097  012350  005037  001202                  CLR     $TMP1           ;FRACTION
4098  012354  005037  001204                  CLR     $TMP2           ;CHECK DATA
4099  012360  005037  001206                  CLR     $TMP3           ;    *
4100  012364  005001                          CLR     R1
4101  012366  012737  012374  001110          MOV     #.+6,@#$'PERR   ;SET ERROR LOOP
4102  012374  170011                  5$:     SETD
4103  012376  172437  001160                  LDD     $REG0,AC0       ;LOAD THE MULTIPLICAND
4104  012402  171427  040200                  MODD    #^O040200,AC0   ;EXECUTE THE TEST
4105  012406  173537  001170                  CMPD    $REG4,AC1       ;INTEGER OK?
4106  012412  170000                          CFCC
4107  012414  001403                          BEQ     6$              ;BRANCH IF YES
4108  012416  174137  001210                  STD     AC1,$TMP4       ;SAVE RECEIVED VALUE
4109  012422  104047                          ERROR   47              ;LOGICAL "AND" FAILED
4110  012424  173437  001200          6$:     CMPD    $TMP0,AC0       ;FRACTION OK?
4111  012430  170000                          CFCC
4112  012432  001403                          BEQ     7$              ;BRANCH IF YES
4113  012434  174037  001210                  STD     AC0,$TMP4       ;SAVE EXPECTED VALUE
4114  012440  104046                          ERROR   46              ;LOGICAL "AND" FAILED
4115  012442  032777  001000  166466  7$:     BIT     #SW9,@SWR       ;LOOP ON ERROR?
4116  012450  001403                          BEQ     8$              ;BRANCH IF NO
4117  012452  105737  001103                  TSTB    $ERFLG          ;ANY ERRORS?
4118  012456  001346                          BNE     5$              ;BRANCH IF YES
4119  012460  012700  001200          8$:     MOV     #$REG7+2,R0
4120  012464  006140                          ROL     -(R0)           ;SELECT NEXT
```

```
                                        ROL     -(R0)           ;CHECK
                                        ROL     -(R0)           ;INTEGER
                                        XOR     R1,-(R0)        ;DECREMENT R0
                                        ROLB    (R0)            ;    *
                                        ROL     -(R0)           ;SELECT
                                        ROL     -(R0)           ;NEXT
                                        ROL     -(R0)           ;MULTIPLICAND
                                        XOR     R1,-(R0)        ;DECREMENT R0 WITHOUT AFFECTING CARRY BIT
                                        ROLB    (R0)            ;
                                        BPL     5$              ;BRANCH IF NOT FINISHED

                                ;;*****************************************************************
                                ;*TEST 25       DIVF*-M0*(DST=0)*-(SRC=0)
                                ;*
                                ;*      THIS TEST ENSURES THAT STATE 352 STORES ZERO IN THE RESULT AND THAT
                                ;*      THE A-BRANCH AND ADX ROMS ARE OK.
                                ;*
                                ;*      FPU ROM FLOW-11,130,73,352
                                ;;*****************************************************************
012512  000004          TST25:  SCOPE
012514  012737  000025  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
012522  012737  012646  001222          MOV     #TST26,$ESCAPE  ;;ESCAPE TO TEST 26 ON ERROR
                                ;;*****************************************************************
012530  012737  040000  001160          MOV     #40000,$REG0    ;PUT THE
012536  005037  001162                  CLR     $REG1           ;SRC IN MEMORY
012542  012737  012550  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
012550  170400                          CLRF    AC0             ;ENSURE DST ZERO
012552  012700  001160                  MOV     #$REG0,R0       ;PUT ADDRESS OF SRC IN R0
012556  170127  000013                  LDFPS   #13             ;LOAD COMPLIMENT CC'S
012562  174420                  1$:     DIVF    (R0)+,AC0       ;EXECUTE INSTRUCTION UNDER TEST
012564  170201                          STFPS   R1              ;GET CC'S
012566  022700  001164                  CMP     #$REG2,R0       ;ADX ROM OK?
012572  001401                          BEQ     2$              ;BRANCH IF YES
012574  104004                          ERROR   4               ;ADX ROM FAILED
012576  174037  001204          2$:     STF     AC0,$TMP2       ;GET RESULT
012602  005737  001204                  TST     $TMP2           ;QUAD 3 OK?
012606  001003                          BNE     3$              ;BRANCH IF NO
012610  005737  001206                  TST     $TMP3           ;QUAD 2 OK?
012614  001403                          BEQ     4$              ;BRANCH IF YES
012616  170437  001200          3$:     CLRF    $TMP0           ;SAVE EXPECTED VALUE
012622  104050                          ERROR   50              ;DST DID NOT CLEAR
012624  022701  000004          4$:     CMP     #FZ,R1          ;CC'S OK?
012630  001406                          BEQ     TST26           ;;BRANCH IF YES
012632  010137  001202                  MOV     R1,$TMP1        ;SAVE RECEIVED DATA
012636  012737  000004  001200          MOV     #FZ,$TMP0       ;SAVE EXPECTED DATA
012644  104003                          ERROR   3               ;CC'S BAD

                                ;;*****************************************************************
                                ;*TEST 26       INITIAL TESTS OF DIVF
                                ;*
                                ;*      THIS TEST ENSURE THAT SPECIFIC SIGNALS REQUIRED FOR THE DIV ARE
                                ;*      FUNCTIONING PROPERLY. EACH SECTION DESCRIBES THE SIGNAL(S) BEING
                                ;*      TESTED. A MICRO-TRAP IS SET ON STATE 14 TO TEST THESE SIGNALS.
                                ;*
                                ;*      NOTE:   SYNC POINT NOT SELECTABLE. DEFAULT=14
                                ;;*****************************************************************
```

```
 4177  012646  000004                        TST26:  SCOPE
 4178  012650  012737  000026  001240                MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
 4179  012656  012737  013442  001222                MOV     #TST27,$ESCAPE  ;;ESCAPE TO TEST 27 ON ERROR
 4180                                          ;;**********************************************************************
 4181                                          ;SECTION 1
 4182                                          ;       TEST THAT FRLH HI QUOT GEN BIT GOES HIGH & GETS INSERTED INTO QP31.
 4183                                          ;;**********************************************************************
 4184  012664  012737  040000  001160                MOV     #40000,$REG0    ;INITIALIZE
 4185  012672  005037  001162                        CLR     $REG1           ;THE SRC (DENOMINATOR)
 4186  012676  012737  012736  000244                MOV     #2$,FPPVEC
 4187  012704  012737  012712  001110                MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4188  012712  012703  000014                        MOV     #14,R3
 4189  012716  170003                                LDUB
 4190  012720  170127  000020                        LDFPS   #FMM
 4191  012724  172427  040000                        LDF     #^O040000,AC0   ;INITIALIZE THE DST (NUMERATOR)
 4192  012730  174437  001160            1$:         DIVF    $REG0,AC0       ;EXECUTE TEST INSTRUCTION
 4193  012734  170000                                CFCC                    ;WAIT FOR TRAP
 4194  012736  022626                    2$:         CMP     (SP)+,(SP)+     ;RESTORE THE SP
 4195  012740  170007                                STQD                    ;
 4196  012742  174037  001204                        STF     AC0,$TMP2       ;GET THE QR
 4197  012746  042737  177600  001204                BIC     #177600,$TMP2
 4198  012754  005037  001200                        CLR     $TMP0           ;SAVE EXPECTED
 4199  012760  012737  000010  001202                MOV     #BIT3,$TMP1     ;VALUE OF QR
 4200  012766  022737  000010  001206                CMP     #BIT3,$TMP3     ;DID QUOT BIT GET INSERTED?
 4201  012774  001430                                BEQ     4$              ;BRANCH IF YES
 4202  012776  022737  000017  001204                CMP     #17,$TMP2       ;DID FRHC FALU59 FAIL TO GET
 4203  013004  001001                                BNE     3$              ;TO FRLF AS A HIGH?
 4204  013006  104051                                ERROR   51              ;YES
 4205  013010                                3$:
 4206  013010  012704  000004                        MOV     #+4,R4          ;PUT THE SHIFT COUNT IN R4
 4207  013014  170004                                MSN                     ;SHIFT QR TO GET BIT 31
 4208  013016  170007                                STQD
 4209  013020  174037  001210                        STF     AC0,$TMP4       ;GET QR
 4210  013024  022737  000001  001210                CMP     #1,$TMP4        ;DID FRHL DIV SHF SELECT WRONG?
 4211  013032  001004                                BNE     5$              ;BRANCH IF NO
 4212  013034  012737  000200  001202                MOV     #BIT7,$TMP1     ;SAVE EXPECTED DATA
 4213  013042  104052                                ERROR   52              ;FRHK DIV DONE STUCK LOW OR FRHC
 4214                                                                        ;FALU59 NOT GETTING TO FRHL DIV
 4215                                                                        ;NORM MUX AS A LOW
 4216  013044  005737  001206            5$:         TST     $TMP3           ;DID FRLF HI QUOT GEN BIT FAIL TO GO HI?
 4217  013050  001001                                BNE     .+4             ;BRANCH IF NO
 4218  013052  104062                                ERROR   52              ;FRLF HI QUOT GEN BIT NOT GOING HIGH
 4219  013054  104053                                ERROR   53              ;QR DATA BAD
 4220                                          ;;**********************************************************************
 4221                                          ;SECTION - 2
 4222                                          ;       TEST FRHL MPY/DIV ADD(1)L GOING LOW, FRHC FALU59 GETTING TO FRHL AS A
 4223                                          ;       HIGH AND TO FRLH AS A LOW.
 4224                                          ;;**********************************************************************
 4225  013056  012737  040100  001160            4$:         MOV     #40100,$REG0    ;INITIALIZE THE DENOMINATOR
 4226  013064  012737  013124  000244                        MOV     #6$,FPPVEC
 4227  013072  012737  013100  001110                        MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4228  013100  012703  000014                        MOV     #14,R3
 4229  013104  170003                                LDUB
 4230  013106  170127  000020                        LDFPS   #FMM
 4231  013112  172427  040000                        LDF     #^O040000,AC0   ;LOAD THE NUMERATOR
 4232  013116  174437  001160                        DIVF    $REG0,AC0       ;EXECUTE TEST INSTRUCTION
```

```
4233  013122  170000                          CFCC                    ;WAIT FOR TRAP
4234  013124  022626                  6$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
4235  013126  012704  177776                  MOV     #-2.R4          ;PUT THE SHIFT COUNT IN R4
4236  013132  170004                          MSN                     ;SHIFT AR TO GET 59 & 58
4237  013134  170005                          STAD                    ;GET
4238  013136  174037  001214                  STF     AC0,$TMP6       ;AR DATA
4239  013142  042737  177600  001214          BIC     #177600,$TMP6
4240  013150  012704  000007                  MOV     #7.R4           ;PUT THE SHIFT COUNT IN R4
4241  013154  170004                          MSN                     ;SHIFT QR TO GET
4242  013156  012704  000004                  MOV     #4,R4           ;PUT THE SHIFT COUNT IN R4
4243  013162  170004                          MSN                     ;BIT 26
4244  013164  170007                          STQD                    ;GET QR
4245  013166  174037  001210                  STF     AC0,$TMP4       ;DATA
4246  013172  042737  177600  001210          BIC     #177600,$TMP4
4247  013200  022737  000137  001212          CMP     #137,$TMP5      ;QR OK?
4248  013206  001424                          BEQ     7$              ;BRANCH IF YES
4249  013210  005037  001200                  CLR     $TMP0           ;SAVE EXPECTED
4250  013214  012737  000137  001202          MOV     #137,$TMP1      ;QR DATA
4251  013222  022737  000377  001212          CMP     #377,$TMP5      ;FRLH HI QUOT GEN BIT FAIL TO GO LOW?
4252  013230  001001                          BNE     8$              ;BRANCH IF NO
4253  013232  104054                          ERROR   54              ;FRLH HI QUOT GEN BIT DID NOT GO LOW
4254  013234  005737  001212          8$:     TST     $TMP5
4255  013240  001001                          BNE     9$
4256  013242  104055                          ERROR   55              ;FRHC FALU59 NOT GETTING TO FRLF AS A LOW
4257  013244  022737  000057  001212  9$:     CMP     #57,$TMP5       ;DID FRHL DIV NORM MUX SELECT WRONG?
4258  013252  001001                          BNE     10$             ;BRANCH IF NO
4259  013254  104056                          ERROR   56              ;FRHC FALU59 NOT GETTING TO FRHL
4260                                                                  ;DIV NORM MUX AS A HIGH
4261  013256  104057                  10$:    ERROR   57              ;QR DATA BAD
4262                                  ;QR OK - CHECK THE AR
4263  013260  022737  000160  001214  7$:     CMP     #160,$TMP6      ;AR DATA OK?
4264  013266  001413                          BEQ     12$             ;BRANCH IF YES
4265  013270  012737  000160  001204          MOV     #160,$TMP2      ;SAVE EXPECTED
4266  013276  005037  001206                  CLR     $TMP3           ;DATA
4267  013302  022737  000020  001214          CMP     #20,$TMP6       ;DID FRHL MPY/DIV ADD(1) FAIL TO GO LOW?
4268  013310  001001                          BNE     11$             ;BRANCH IF NO
4269  013312  104060                          ERROR   60              ;FRHL MPY/DIV ADD(1)L DID NOT GO LOW
4270  013314  104013                  11$:    ERROR   13              ;AR DATA BAD
4271                                  ;;*****************************************************************
4272                                  ;SECTION - 3
4273                                  ;       CHECK THAT FRHL MPY/DIV ADD(1)L GOES HIGH WITH FALU59L ON A HIGH
4274                                  ;;*****************************************************************
4275  013316  012737  040000  001160  12$:    MOV     #40000,$REG0    ;INIT THE DENOMINATOR
4276  013324  012737  013364  000244          MOV     #13$,FPPVEC
4277  013332  012737  013340  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
4278  013340  012703  000014                  MOV     #14,R3
4279  013344  170003                          LDUB
4280  013346  170127  000020                  LDFPS   #FMM
4281  013352  172427  040100                  LDF     #^O040100,AC0   ;LOAD THE NUMERATOR
4282  013356  174437  001160                  DIVF    $REG0,AC0       ;EXECUTE THE TEST INSTRUCTION
4283  013362  170000                          CFCC                    ;WAIT FOR TRAP
4284  013364  022626                  13$:    CMP     (SP)+,(SP)+     ;RESTORE THE SP
4285  013366  012704  177776                  MOV     #-2,R4          ;PUT THE SHIFT COUNT IN R4
4286  013372  170004                          MSN                     ;GET AR BITS 59 & 58
4287  013374  170005                          STAD
4288  013376  174037  001214                  STF     AC0,$TMP6       ;GET AR DATA
```

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 4289  013402  042737  177600  001214          BIC     #177600,$TMP6
 4290  013410  005037  001206                  CLR     $TMP3           ;SAVE EXPECTED
 4291  013414  005037  001204                  CLR     $TMP2           ;RESULT
 4292  013420  005737  001214                  TST     $TMP6           ;AR DATA OK?
 4293  013424  001406                          BEQ     TST27           ;;BRANCH IF YES
 4294  013426  022737  000100  001214          CMP     #100,$TMP6      ;DID SUBTRACT OCCUR INSTEAD OF ADD?
 4295  013434  001001                          BNE     14$             ;BRANCH IF NO
 4296  013436  104063                          ERROR   63              ;FRHL MPY/DIV ADD(1)L NOT GOING HIGH
 4297  013440  104013                  14$:    ERROR   13              ;AR DATA BAD
 4298
 4299                                  ;;*****************************************************************
 4300                                  ;*TEST 27       NORM NEG ENCODER
 4301                                  ;*
 4302                                  ;*      THIS TEST RUNS A COUNT PATTERN ACROSS THE INPUTS TO THE
 4303                                  ;*      NORM NEG ENCODED ON FRHK.
 4304                                  ;*
 4305                                  ;*      THIS IS DONE BY USING A NUMERATOR OF 0.1 AND DENOMINATOR
 4306                                  ;*      THAT COUNTS BETWEEN 0.10000001 AND 0.11111111.  THE EXECUTION
 4307                                  ;*      IS INTERRUPTED AT STATE 14 AND THE QR CHECKED FOR THE CORRECT
 4308                                  ;*      AMOUNT OF SHIFTS
 4309                                  ;*
 4310                                  ;*      THE PATTERNS FROM 1.00000000 TO 1.11111111 ARE NOT CHECKED BECAUSE
 4311                                  ;*      THEY ARE IMPOSSIBLE TO GENERATE.
 4312                                  ;*
 4313                                  ;*      NOTE:   SYNC POINT NOT SELECTABLE. DEFAULT=14
 4314                                  ;;*****************************************************************
 4315  013442  000004                  TST27:  SCOPE
 4316  013444  012737  000027  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
 4317  013452  012737  014120  001222          MOV     #TST30,$ESCAPE  ;;ESCAPE TO TEST 30 ON ERROR
 4318  013460  012737  040001  001160          MOV     #40001,$REG0    ;INITIALIZE THE
 4319  013466  005037  001162                  CLR     $REG1           ;DENOMINATOR
 4320  013472  012737  000377  001172          MOV     #377,$REG5
 4321  013500  012737  037777  001202          MOV     #37777,$TMP1    ;INITIALIZE
 4322  013506  005037  001200                  CLR     $TMP0           ;CHECK DATA
 4323  013512  012702  000002                  MOV     #2,R2           ;SET LOOP COUNT
 4324  013516  012700  000003                  MOV     #3,R0           ;INITIALIZE CHANGE CHECK DATA WORD
 4325  013522  012701  000177                  MOV     #127.,R1        ;SET SOB LOOP COUNT
 4326  013526  012737  013566  000244          MOV     #1$,FPPVEC
 4327  013534  012737  013542  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4328  013542  012703  000014                  MOV     #14,R3
 4329  013546  170003                          LDUB
 4330  013550  170127  000020                  LDFPS   #FMM
 4331  013554  172427  040000          4$:     LDF     #1040000,AC0    ;LOAD THE NUMERATOR
 4332  013560  174437  001160                  DIVF    $REG0,AC0       ;EXECUTE INSTRUCTION
 4333  013564  170000                          CFCC                    ;WAIT FOR TRAP
 4334  013566  022626                  1$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
 4335  013570  012704  000007                  MOV     #7,R4           ;PUT THE SHIFT COUNT IN R4
 4336  013574  170004                          MSN                     ;SHIFT QR TO PUT
 4337  013576  012704  000004                  MOV     #4,R4           ;PUT THE SHIFT COUNT IN R4
 4338  013602  170004                          MSN                     ;BIT 26 INTO BIT 35
 4339  013604  170007                          STQD
 4340  013606  174037  001204                  STF     AC0,$TMP2       ;GET QR DATA
 4341  013612  042737  177600  001204          BIC     #177600,$TMP2   ;GET RID OF EXPONENT
 4342  013620  023737  001202  001206          CMP     $TMP1,$TMP3     ;SHIFT OK?
 4343  013626  001133                          BNE     2$              ;BRANCH IF NO
 4344  013630  032777  001000  165300          BIT     #SW9,@SWR       ;LOOP ON ERROR?
```

```
4345  013636  001403                          BEQ     3$              ;BRANCH IF NO
4346  013640  105737  001103                  TSTB    $ERFLG          ;ANY ERRORS?
4347  013644  001343                          BNE     4$              ;BRANCH IF YES
4348  013646  005237  001160          3$:     INC     $REGO           ;SELECT NEXT DENOMINATOR
4349  013652  022737  040023  001160          CMP     #40023,$REGO    ;TIME TO CHANGE CHECK DATA
4350  013660  001003                          BNE     12$             ;BRANCH IF NO
4351  013662  012737  001577  001202          MOV     #1577,$TMP1     ;CHANGE CHECK DATA
4352  013670  022737  037777  001202  12$:    CMP     #37777,$TMP1
4353  013676  001003                          BNE     20$
4354  013700  042737  000200  001202          BIC     #BIT7,$TMP1
4355  013706  022737  040053  001160  20$:    CMP     #40053,$REGO    ;TIME TO CHANGE CHECK DATA?
4356  013714  001003                          BNE     8$              ;BRANCH IF NO
4357  013716  012737  000577  001202          MOV     #577,$TMP1      ;CHANGE IT
4358  013724  120037  001160          8$:     CMPB    R0,$REGO        ;
4359  013730  001045                          BNE     5$
4360  013732  022737  003577  001202          CMP     #3577,$TMP1
4361  013740  001421                          BEQ     7$
4362  013742  022737  001577  001202          CMP     #1577,$TMP1
4363  013750  001421                          BEQ     9$
4364  013752  022737  000577  001202          CMP     #577,$TMP1
4365  013760  001421                          BEQ     10$
4366  013762  052737  000200  001202          BIS     #BIT7,$TMP1
4367  013770  006237  001202                  ASR     $TMP1           ;SELECT NEXT CHECK DATA
4368  013774  042737  000200  001202          BIC     #BIT7,$TMP1
4369  014002  000413                          BR      11$
4370  014004  012737  001600  001202  7$:     MOV     #1600,$TMP1
4371  014012  000407                          BR      11$
4372  014014  012737  000600  001202  9$:     MOV     #600,$TMP1
4373  014022  000403                          BR      11$
4374  014024  012737  000200  001202  10$:    MOV     #200,$TMP1
4375  014032  042700  000001          11$:    BIC     #BIT0,R0        ;SELECT NEXT
4376  014036  006300                          ASL     R0              ;CHANGE CHECK DATA
4377  014040  052700  000001                  BIS     #BIT0,R0        ;VALUE
4378  014044  005337  001172          5$:     DEC     $REG5
4379  014050  005301                          DEC     R1              ;CONTINUE
4380  014052  001240                          BNE     4$
4381                                  ;       CHECK LAST PATTERN OF 1.10000000
4382  014054  012737  040177  001160  6$:     MOV     #40177,$REGO
4383  014062  012737  100000  001162          MOV     #BIT15,$REG1
4384  014070  012737  000200  001202          MOV     #200,$TMP1
4385  014076  012701  000001                  MOV     #1,R1
4386  014102  012737  000200  001172          MOV     #200,$REG5
4387  014110  005302                          DEC     R2
4388  014112  001220                          BNE     4$              ;CONTINUE
4389  014114  000401                          BR      TST30           ;;GO TO NEXT TEST
4390  014116  104064                  2$:     ERROR   64              ;FRHK NORM NEG ENCODER FAILED
4391
4392                                  ;;**************************************************************
4393                                  ;*TEST 30       Q REG NORM SHIFT COUNT LOOK UP
4394                                  ;*
4395                                  ;*      THIS TEST FIRST CHECKS ROM STATE 4 AND ADDRESS 4 OF THE
4396                                  ;*      NORM SHIFT COUNT LOOK-UP ROM. IF FRHK DIV DONE
4397                                  ;*      IS STUCK HIGH THE FPP WILL HANG IN ROM STATE 14.
4398                                  ;*
4399                                  ;*      A COUNT PATTERN IS THEN RUN THRU BITS <57:50> OF THE QR TO
4400                                  ;*      CHECK ALL LOCATIONS IN THE ROM.
```

```
                                        ;*
                                        ;*      IF AN ERROR OCCURS, THE TYPEOUT INDICATES THE ROM ADDRESS
                                        ;*      AND ROMOUT DATA THAT WAS BEING TESTED.
                                        ;*
                                        ;*      FPU ROM FLOW-11,130,73,342,X(14),4,NORMALIZE
                                        ;;*****************************************************************
014120  000004                        TST30:  SCOPE
014122  012737  000030  001240                MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
014130  012737  140200  001200                MOV     #140200,$TMP0   ;INITIALIZE THE
014136  170127  000000                        LDFPS   #0
014142  005037  001202                        CLR     $TMP1           ;NUMERATOR
014146  012737  014154  001110                MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
014154  172427  040200                        LDF     #^040200,AC0    ;INITIALIZE THE NUMERATOR
014160  174437  001200              1$:       DIVF    $TMP0,AC0       ;EXECUTE INSTRUCTION UNDER TEST
014164  173427  140200                        CMPF    #^0140200,AC0   ;RESULT OK?
014170  170000                        CFCC
014172  001403                        BEQ     2$                      ;BRANCH IF YES
014174  174037  001204                        STF     AC0,$TMP2       ;GET RESULT
014200  104065                        ERROR   65                      ;RESULT WRONG
                                        ;;*****************************************************************
014202  012737  040004  001200      2$:       MOV     #40004,$TMP0    ;INITIALIZE THE
014210  005037  001202                        CLR     $TMP1           ;DENOMINATOR
014214  012701  000200                        MOV     #BIT7,R1        ;INITIALIZE COUNT BIT
014220  012737  000010  001174                MOV     #10,$REG6
014226  012700  000377                        MOV     #255.,R0        ;SET LOOP COUNT
014232  012737  000001  001172                MOV     #1,$REG5
014240  012737  014246  001110                MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
014246  172437  001200              3$:       LDF     $TMP0,AC0       ;LOAD THE NUMERATOR
014252  174427  040200                        DIVF    #^040200,AC0    ;EXECUTE INSTRUCTION UNDER TEST
014256  173437  001200                        CMPF    $TMP0,AC0       ;RESULT OK?
014262  170000                        CFCC
014264  001032                        BNE     4$                      ;BRANCH IF NO
014266  032777  001000  164642                BIT     #SW9,@SWR       ;LOOP ON ERROR?
014274  001403                        BEQ     5$                      ;BRANCH IF NO
014276  105737  001103                        TSTB    $ERFLG          ;ANY ERRORS?
014302  001361                        BNE     3$                      ;BRANCH IF YES
014304  005237  001172              5$:       INC     $REG5
014310  060137  001200                        ADD     R1,$TMP0        ;SELECT NEXT NUMERATOR
014314  105737  001200                        TSTB    $TMP0           ;DID FRACTION CHANGE SIGN?
014320  100012                        BPL     6$                      ;BRANCH IF NO
014322  042737  000200  001200                BIC     #BIT7,$TMP0     ;GET RID OF OVERFLOW BIT
014330  106037  001200                        RORB    $TMP0           ;SELECT NEXT
014334  006037  001202                        ROR     $TMP1           ;FRACTION
014340  006001                        ROR     R1                      ;SELECT NEXT COUNT BIT
014342  005337  001174                        DEC     $REG6
014346  077041                      6$:       SOB     R0,3$
014350  000404                        BR      TST31                   ;;GO TO NEXT TEST
014352  174037  001204              4$:       STF     AC0,$TMP2       ;SAVE RECEIVED DATA
014356  104066                        ERROR   66                      ;NORMALIZE ROM FAILED
014360  000751                        BR      5$

                                        ;;*****************************************************************
                                        ;*TEST 31       DIVD INITIAL TESTS
                                        ;*
                                        ;*      THIS TEST ENSURES THAT FRLH DLE PREC QT HI B(1) AND LO B(1)
                                        ;*      ARE FUNCTIONING PROPERLY.
```

```
                                        ;*      THIS IS DONE BY TRAPPING ON STATE 14 AND LOOKING AT THE QR
                                        ;*
                                        ;*      NOTE:   SYNC POINT NOT SELECTABLE. DEFAULT=14
                                        ;;**************************************************************
014262  000004                  TST31:  SCOPE
014364  012737  000031  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
014372  012737  014724  001222          MOV     #TST32,$ESCAPE  ;;ESCAPE TO TEST 32 ON ERROR
014400  012737  040000  001160          MOV     #40000,$REG0    ;INITIALIZE
014406  005037  001162                  CLR     $REG1           ;THE DENOMINATOR
014412  005037  001164                  CLR     $REG2           ;    *
014416  005037  001166                  CLR     $REG3           ;    *
014422  012737  014464  000244          MOV     #2$,FPPVEC
014430  012737  014436  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
014436  012703  000014                  MOV     #14,R3
014442  170003                          LDUB
014444  012700  001160                  MOV     #$REG0,R0       ;PUT ADDRESS OF DENOM IN R0
014450  170127  000220                  LDFPS   #FD+FMM
014454  172427  040000                  LDD     #^O040000,AC0   ;LOAD THE NUMERATOR
014460  174420                  1$:     DIVD    (R0)+,AC0       ;EXECUTE INSTRUCTION UNDER TEST
014462  170000                          CFCC                    ;WAIT FOR TRAP
014464  022626                  2$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
014466  022700  001170                  CMP     #$REG4,R0       ;ADX ROM OK?
014472  001401                          BEQ     3$              ;BRANCH IF YES
014474  104004                          ERROR   4               ;ADX ROM FAILED
014476  170007                  3$:     STQ0
014500  174037  001210                  STD     AC0,$TMP4       ;GET QR DATA
014504  042737  177600  001210          BIC     #177600,$TMP4
014512  005037  001200                  CLR     $TMP0           ;SAVE EXPECTED
014516  005037  001202                  CLR     $TMP1           ;VALUE OF DATA
014522  005037  001204                  CLR     $TMP2           ;    *
014526  012737  000010  001206          MOV     #10,$TMP3       ;    *
014534  022737  000010  001216          CMP     #10,$TMP7       ;DID HI BIT GET INSERTED?
014542  001406                          BEQ     4$              ;BRANCH IF YES
014544  022737  000017  001216          CMP     #17,$TMP7       ;DID FRLF DLE PREC QT LO GO LOW?
014552  001001                          BNE     6$              ;BRANCH IF YES
014554  104067                          ERROR   67              ;FRLF DLE PREC QT LO DID NOT GO LOW
014556  104070                  6$:     ERROR   70              ;FRLH DLE PREC QT HI B(1) NOT GOING HIGH
014560  005737  001212          4$:     TST     $TMP5           ;DID SINGLE PREC LOGIC DISABLE>
014564  001401                          BEQ     5$              ;BRANCH IF YES
014566  104071                          ERROR   71              ;FRLF E21(12) NOT GOING HIGH
                                ;NOW CHECK FRLH DLE PREC QT LO
014570  012737  040177  001160  5$:     MOV     #40177,$REG0    ;INIT THE DENOMINATOR
014576  012737  014636  000244          MOV     #7$,FPPVEC
014604  012737  014612  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
014612  012703  000014                  MOV     #14,R3
014616  170003                          LDUB
014620  170127  000220                  LDFPS   #FD+FMM
014624  172427  040176                  LDD     #^O040176,AC0   ;LOAD THE NUMERATOR
014630  174437  001160                  DIVD    $REG0,AC0       ;EXECUTE INSTRUCTION UNDER TEST
014634  170000                          CFCC                    ;WAIT FOR TRAP
014636  022626                  7$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
014640  012704  000003                  MOV     #3,R4           ;PUT THE SHIFT COUNT IN R4
014644  170004                          MSN                     ;GET QR BITS <2:0>
014646  170007                          STQ0
014650  174037  001210                  STD     AC0,$TMP4       ;GET QR DATA
014654  042737  177600  001210          BIC     #177600,$TMP4
```

```
 4513  014662  012737  000077  001206          MOV     #77,$TMP3
 4514  014670  022737  000077  001216          CMP     #77,$TMP7       ;QR DATA OK?
 4515  014676  001412                          BEQ     TST32           ;;BRANCH IF YES
 4516  014700  022737  000177  001216          CMP     #177,$TMP7      ;DID HI BIT FAIL TO GO LO?
 4517  014706  001001                          BNE     8$              ;BRANCH IF NO
 4518  014710  104072                          ERROR   72              ;FRLH DOUBLE PREC QUOT HI BIT NOT GOING L
 4519  014712  005737  001216          8$:     TST     $TMP7           ;DID LOW BIT GO HIGH?
 4520  014716  001001                          BNE     9$              ;BRANCH IF YES
 4521  014720  104073                          ERROR   73              ;FRLH DLE PREC QT LO DID NOT GO HIGH
 4522  014722  104074                  9$:     ERROR   74              ;QR DATA BAD
 4523
 4524                                  ;;*****************************************************************
 4525                                  ;*TEST 32       FRLJ QSI -1,-2, & -3
 4526                                  ;*
 4527                                  ;*      THIS TEST CHECKS THE QSI -1,-2, & -3 MUX ON FRLH WITH
 4528                                  ;*      THE DIVIDE FUNCTION. THERE ARE FOUR CONDITIONS THAT
 4529                                  ;*      ARE CHECKED: 1) LEFT SHIFT 7*FALU59; 2) LEFT SHIFT 7*-FALU53;
 4530                                  ;*      3) LEFT SHIFT 3*FALU59;AND 4) LEFT SHIFT 3*-FALU59.
 4531                                  ;*      CONDITION 1 WAS TESTED IN THE PREVIOUS TEST.
 4532                                  ;*
 4533                                  ;*      NOTE:   SYNC POINT NOT SELECTABLE. DEFAULT=14
 4534                                  ;;*****************************************************************
 4535  014724  000004                  TST32:  SCOPE
 4536  014726  012737  000032  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
 4537  014734  012737  015320  001222          MOV     #TST33,$ESCAPE  ;;ESCAPE TO TEST 33 ON ERROR
 4538                                  ;SECTION - 1
 4539                                  ;LEFT SHIFT 7*-FALU59
 4540  014742  012703  000014                  MOV     #14,R3
 4541  014746  170003                          LDUB
 4542  014750  012737  014774  000244          MOV     #1$,FPPVEC
 4543  014756  170127  000220                  LDFPS   #FD+FMM
 4544  014762  172427  040000                  LDD     #^O040000,AC0   ;LOAD THE NUMERATOR
 4545  014766  174427  040000                  DIVD    #^O040000,AC0   ;EXECUTE INSTRUCTION UNDER TEST
 4546  014772  170000                          CFCC                    ;WAIT FOR TRAP
 4547  014774  022626                  1$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
 4548  014776  012704  000003                  MOV     #3,R4           ;PUT THE SHIFT COUNT IN R4
 4549  015002  170004                          MSN                     ;GET QR BITS 2:0
 4550  015004  170007                          STQD
 4551  015006  174037  001210                  STD     AC0,$TMP4       ;GET QR DATA
 4552  015012  042737  177600  001210          BIC     #177600,$TMP4   ;GET RID OF EXPONENT
 4553  015020  005037  001200                  CLR     $TMP0           ;SAVE EXPECTED
 4554  015024  005037  001202                  CLR     $TMP1           ;VALUE OF QR
 4555  015030  005037  001204                  CLR     $TMP2           ;    *
 4556  015034  012737  000100  001206          MOV     #100,$TMP3      ;    *
 4557  015042  022737  000100  001216          CMP     #100,$TMP7      ;QR DATA OK?
 4558  015050  001406                          BEQ     2$              ;BRANCH IF YES
 4559  015052  022737  000104  001216          CMP     #104,$TMP7      ;DID QSI-1 FAIL?
 4560  015060  001001                          BNE     3$              ;BRANCH IF NO
 4561  015062  104075                          ERROR   75              ;FRLJ QSI-1 DID NOT GO LOW WHEN SELECTING C1
 4562  015064  104074                  3$:     ERROR   74              ;QR DATA BAD
 4563                                  ;;*****************************************************************
 4564                                  ;SECTION - 2
 4565                                  ;LEFT SHIFT 3*FALU59
 4566  015066  012737  000003  001206  2$:     MOV     #3,$TMP3        ;SAVE EXPECTED DATA
 4567  015074  012737  015134  000244          MOV     #4$,FPPVEC
 4568  015102  012737  015110  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
```

```
 4569  015110  012703  000014                        MOV     #14,R3
 4570  015114  170003                                LDUB
 4571  015116  170127  000220                        LDFPS   #FD+FMM
 4572  015122  172427  040100                        LDD     #^O040100,AC0   ;LOAD THE NUMERATOR
 4573  015126  174427  040140                        DIVD    #^O040140,AC0   ;EXECUTE THE TEST
 4574  015132  170000                                CFCC                    ;WAIT FOR TRAP
 4575  015134  022626                        4$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
 4576  015136  012704  000003                        MOV     #3,R4           ;PUT THE SHIFT COUNT IN R4
 4577  015142  170004                                MSN                     ;GET QR BITS 2:0
 4578  015144  170007                                STQD
 4579  015146  174037  001210                        STD     AC0,$TMP4       ;GET QR DATA
 4580  015152  042737  177600  001210                BIC     #177600,$TMP4   ;GET RID OF EXPONENT
 4581  015160  022737  000003  001216                CMP     #3,$TMP7        ;QR DATA OK?
 4582  015166  001406                                BEQ     5$              ;BRANCH IF YES
 4583  015170  022737  000007  001216                CMP     #7,$TMP7        ;DID QSI-1 FAIL?
 4584  015176  001001                                BNE     6$              ;BRANCH IF NO
 4585  015200  104076                                ERROR   76              ;FRLJ QSI-1 NOT GOING LOW WHEN SELECTING A1
 4586  015202  104074                        6$:     ERROR   74
 4587                                        ;;*****************************************************************
 4588                                        ;SECTION - 3
 4589                                        ;LEFT SHIFT 3*-FALU59
 4590  015204  012737  000004  001206        5$:     MOV     #4,$TMP3        ;SAVE EXPECTED VALUE OF QR DATA
 4591  015212  012737  015252  000244                MOV     #7$,FPPVEC
 4592  015220  012737  015226  001110                MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4593  015226  012703  000014                        MOV     #14,R3
 4594  015232  170003                                LDUB
 4595  015234  170127  000220                        LDFPS   #FD+FMM
 4596  015240  172427  040160                        LDD     #^O040160,AC0   ;LOAD THE NUMERATOR
 4597  015244  174427  040140                        DIVD    #^O040140,AC0   ;EXECUTE TEST INSTRUCTION
 4598  015250  170000                                CFCC                    ;WAIT FOR TRAP
 4599  015252  022626                        7$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
 4600  015254  012704  000003                        MOV     #3,R4           ;PUT THE SHIFT COUNT IN R4
 4601  015260  170004                                MSN                     ;GET QR BITS 2:0
 4602  015262  170007                                STQD
 4603  015264  174037  001210                        STD     AC0,$TMP4       ;GET QR DATA
 4604  015270  042737  177600  001210                BIC     #177600,$TMP4   ;GET RID OF EXPONENT
 4605  015276  022737  000004  001216                CMP     #4,$TMP7        ;QR DATA OK?
 4606  015304  001405                                BEQ     TST33           ;;BRANCH IF YES
 4607  015306  005737  001216                        TST     $TMP7           ;DID QSI-1 FAIL?
 4608  015312  001001                                BNE     8$              ;BRANCH IF NO
 4609  015314  104077                                ERROR   77              ;FRLJ QSI-1 NOT GOING HIGH WHEN SELECTING A1
 4610  015316  104074                        8$:     ERROR   74              ;QR DATA BAD
 4611
 4612                                        ;;*****************************************************************
 4613                                        ;*TEST 33       DIVD*-MO*IMM
 4614                                        ;*
 4615                                        ;*      THIS TEST DIVIDES 127(10) BY 255(10) TO ENSURE THAT STATE
 4616                                        ;*      246 IS FUNCTIONING PROPERLY.
 4617                                        ;*
 4618                                        ;*      FPU ROM FLOW-20,141,73,342,14,4,246,NORMALIZE
 4619                                        ;;*****************************************************************
 4620  015320  000004                        TST33:  SCOPE
 4621  015322  012737  000033  001240                MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
 4622  015330  012737  015450  001222                MOV     #TST34,$ESCAPE  ;;ESCAPE TO TEST 34 ON ERROR
 4623  015336  012737  015444  000004                MOV     #2$,ERRVEC      ;SET ERRVEC TO CATCH ADX ROM FAILURE
 4624  015344  012737  037776  001200                MOV     #37776,$TMP0    ;SAVE EXPECTED
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 4625  015352  012737  177376  001202          MOV     #177376,$TMP1   ;VALUE OF RESULT
 4626  015360  012737  177376  001204          MOV     #177376,$TMP2   ;    *
 4627  015366  012737  177377  001206          MOV     #177377,$TMP3   ;    *
 4628  015374  012737  015402  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4629  015402  170127  000200                  LDFPS   #FD
 4630  015406  172427  041776                  LDD     #^D41776,AC0    ;LOAD THE NUMERATOR
 4631  015412  174427                  1$:     DIVD    (PC)+,AC0       ;EXECUTE INSTRUCTION UNDER TEST
 4632  015414  042177                          .WORD   42177           ;WILL EXECUTE THIS IF ADX ROM FAILS
 4633  015416  000403                          .WORD   403             ;THIS WILL CAUSE THE PREVIOUS WORD
 4634                                                                  ;TO ODD ADDRESS TRAP IF IT GETS EXEC.
 4635  015420  104004                          ERROR   4               ;ADX ROM FAILED
 4636  015422  104004                          ERROR   4               ;       *
 4637  015424  104004                          ERROR   4               ;       *
 4638  015426  173437  001200                  CMPD    $TMP0,AC0       ;RESULT OK?
 4639  015432  170000                          CFCC
 4640  015434  001405                          BEQ     TST34           ;;BRANCH IF YES
 4641  015436  174037  001210                  STD     AC0,$TMP4       ;GET RESULT
 4642  015442  104100                          ERROR   100             ;ROM STATE 246 FAILED.
 4643  015444  022626                  2$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
 4644  015446  104004                          ERROR   4               ;ADX ROM FAILED
 4645
 4646                                  ;;**********************************************************************
 4647                                  ;*TEST 34       STST
 4648                                  ;*
 4649                                  ;*      THIS TEST USES THE MICRO-BREAK TRAP TO CHECK THE
 4650                                  ;*      STST INSTRUCTION.  EACH SECTION OF THIS TEST CHECKS
 4651                                  ;*      A DIFFERENT MODE OF THE INSTRUCTION.
 4652                                  ;;**********************************************************************
 4653  015450  000004                  TST34:  SCOPE
 4654  015452  012737  000034  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
 4655  015460  012737  015666  001222          MOV     #TST35,$ESCAPE  ;;ESCAPE TO TEST 35 ON ERROR
 4656                                  ;;**********************************************************************
 4657                                  ;SECTION - 1 STST*-MD-IMM
 4658                                  ;FPU ROM FLOW-24,175,212
 4659  015466  012737  015474  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4660  015474  004737  034716                  JSR     PC,CHGFEC
 4661  015500  012700  001204                  MOV     #$TMP2,R0       ;PUT ADDRESS OF DST IN R0
 4662  015504  170320                          STST    (R0)+           ;EXECUTE INSTRUCTION UNDER TEST
 4663  015506  022700  001210                  CMP     #$TMP4,R0       ;ADX ROM OK?
 4664  015512  001401                          BEQ     3$              ;BRANCH IF YES
 4665  015514  104004                          ERROR   4               ;ADX ROM FAILED
 4666  015516  012737  000016  001200  3$:     MOV     #MT,$TMP0       ;SAVE EXPECTED FEC
 4667  015524  012737  034742  001202          MOV     #$$FEA,$TMP1    ;SAVE EXPECTED FEA
 4668  015532  022737  000016  001204          CMP     #MT,$TMP2       ;FEC OK?
 4669  015540  001401                          BEQ     4$              ;BRANCH IF YES
 4670  015542  104101                          ERROR   101             ;FEC WRONG
 4671  015544  022737  034742  001206  4$:     CMP     #$$FEA,$TMP3    ;FEA OK?
 4672  015552  001401                          BEQ     5$              ;BRANCH IF YES
 4673  015554  104102                          ERROR   102             ;FEA WRONG.
 4674                                  ;;**********************************************************************
 4675                                  ;SECTION - 2 STST*-MD*IMM
 4676                                  ;FPU ROM FLOW-24,175
 4677  015556  012737  015630  000010  5$:     MOV     #6$,RESVEC      ;SET RESVEC TO CATCH ADX ROM FAILURE
 4678  015564  012737  015572  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4679  015572  004737  034716                  JSR     PC,CHGFEC
 4680  015576  005037  015604                  CLR     7$
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 4681  015602  170327                        STST    (PC)+           ;EXECUTE INSTRUCTION UNDER TEST
 4682  015604  000000              7$:       .WORD   0               ;WILL STORE 16 HERE & TRY AND EXEC IF ADX ROM FAILS
 4683  015606  000403                        BR      8$
 4684  015610  104004                        ERROR   4               ;ADX ROM FAILED
 4685  015612  104004                        ERROR   4               ;       *
 4686  015614  104004                        ERROR   4               ;       *
 4687  015616  022737  000016  015604  8$:   CMP     #MT,7$          ;INSTRUCTION OK?
 4688  015624  001403                        BEQ     9$              ;BRANCH IF YES
 4689  015626  104101                        ERROR   101
 4690  015630  022626              6$:       CMP     (SP)+,(SP)+     ;RESTORE THE SP
 4691  015632  104004                        ERROR   4               ;ADX ROM FAILED
 4692                                ;;**********************************************************************
 4693                                ;SECTION - 3 STST*MD
 4694                                ;FPU ROM FLOW-30,54,126
 4695  015634                        9$:
 4696  015634  012737  015642  001110        MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4697  015642  004737  034716                JSR     PC,CHGFEC
 4698  015646  005000                        CLR     R0              ;INIT R0
 4699  015650  170300                        STST    R0              ;EXECUTE ISTRUCTION UNDER TEST
 4700  015652  022700  000016                CMP     #MT,R0          ;INSTRUCTION OK?
 4701  015656  001403                        BEQ     TST35           ;;BRANCH IF YES
 4702  015660  010037  001204                MOV     R0,$TMP2        ;SACE RECEIVED DATA
 4703  015664  104101                        ERROR   101
 4704
 4705                                ;;**********************************************************************
 4706                                ;*TEST 35        FIUV
 4707                                ;*
 4708                                ;*      THIS TEST CHECKS THE 9 CONDITIONS THAT CAN CAUSE AN
 4709                                ;*      INTERRUPT ON A MINUS ZERO
 4710                                ;*      IF SECTION ONE FAILS TO INTERRUPT THE PROBLEM IS MOST
 4711                                ;*      LIKELY ON FRMB.  ALL OTHER FAILURES SHOULD BE DUE TO THE
 4712                                ;*      CONTROL STORE.
 4713                                ;;**********************************************************************
 4714  015666  000004                TST35:  SCOPE
 4715  015670  012737  000035  001240        MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
 4716  015676  012737  016542  001222        MOV     #TST36,$ESCAPE  ;;ESCAPE TO TEST 36 ON ERROR
 4717                                ;SECTION - 1
 4718                                ;LDAC6*FD(0)
 4719  015704  012737  100177  001160        MOV     #100177,$REG0   ;PUT MINUS ZERO IN MEMORY
 4720  015712  012737  015756  000244        MOV     #1$,FPPVEC
 4721  015720  012737  015726  001110        MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4722  015726  004737  034716                JSR     PC,CHGFEC
 4723  015732  172527  040000                LDF     #1040000,AC1    ;INIT AC1
 4724  015736  172701                        LDF     AC1,AC3         ;INIT AC3
 4725  015740  174105                        STF     AC1,AC5         ;INIT AC5
 4726  015742  170127  004000                LDFPS   #FIUV
 4727  015746  172037  001160        2$:     ADDF    $REG0,AC0       ;EXECUTE INSTRUCTION THAT SHOULD TRAP
 4728  015752  170000                        CFCC                    ;WAIT FOR TRAP
 4729                                ;FAILURE-NO TRAP OCCURRED
 4730  015754  104103                        ERROR   103
 4731  015756  022626                1$:     CMP     (SP)+,(SP)+    ;RESTORE THE SP
 4732  015760  170337  001204                STST    $TMP2           ;GET STATUS
 4733  015764  022737  000014  001204        CMP     #FUV,$TMP2      ;FEC OK?
 4734  015772  001404                        BEQ     3$              ;BRANCH IF YES
 4735  015774  012737  000014  001200        MOV     #FUV,$TMPO
 4736  016002  104104                        ERROR   104
```

```
 4737  016004  022737  015746  001206  3$:     CMP     #2$,STMP3       ;FEA OK?
 4738  016012  001404                          BEQ     17$             ;BRANCH IF YES
 4739  016014  012737  015746  001202          MOV     #2$,STMP1
 4740  016022  104105                          ERROR   105
 4741  016024  173527  040000          17$:    CMPF    #^O040000,AC1   ;AC1 REMAIN UNCHANGED?
 4742  016030  170000                          CFCC
 4743  016032  001010                          BNE     20$             ;BRANCH IF NO
 4744  016034  173701                          CMPF    AC1,AC3         ;AC3 REMAIN UNCHANGED?
 4745  016036  170000                          CFCC
 4746  016040  001004                          BNE     21$             ;BRANCH IF NO
 4747  016042  173505                          CMPF    AC5,AC1         ;AC5 REMAIN UNCHANGED?
 4748  016044  170000                          CFCC
 4749  016046  001403                          BEQ     4$              ;BRANCH IF YES
 4750  016050  104154          22$:    ERROR   154             ;FXPN ACD1 DID NOT GO HIGH
 4751  016052  104155          21$:    ERROR   155             ;FXPN ACD2 DID NOT GO HIGH
 4752  016054  104156          20$:    ERROR   156             ;FXPN ACF1*ACF2 DID NOT GO LOW
 4753                          ;;*****************************************************************
 4754                          ;SECTION - 2
 4755                          ;LDF*-MD
 4756  016056  012737  016112  000244  4$:     MOV     #5$,FPPVEC
 4757  016064  012737  016072  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4758  016072  004737  034716                  JSR     PC,CHGFEC
 4759  016076  170127  004000                  LDFPS   #FIUV
 4760  016102  172437  001160                  LDF     $REG0,AC0       ;EXECUTE INSTRUCTION THAT SHOULD TRAP
 4761  016106  170000                          CFCC
 4762                          ;FAILURE-NO TRAP
 4763  016110  104106                          ERROR   106
 4764  016112  022626          5$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
 4765                          ;;*****************************************************************
 4766                          ;SECTION - 3
 4767                          ;LDAC6*FD(1)
 4768  016114  012737  016150  000244          MOV     #6$,FPPVEC
 4769  016122  012737  016130  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4770  016130  004737  034716                  JSR     PC,CHGFEC
 4771  016134  170127  004200                  LDFPS   #FIUV+FD
 4772  016140  172437  001160                  LDD     $REG0,AC0       ;EXECUTE INSTRUCTION THAT SHOULD TRAP
 4773  016144  170000                          CFCC
 4774                          ;FAILURE-NO TRAP
 4775  016146  104106                          ERROR   106
 4776  016150  022626          6$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
 4777                          ;;*****************************************************************
 4778                          ;SECTION - 4
 4779                          ;LDD*-MD
 4780  016152  012737  016206  000244          MOV     #7$,FPPVEC
 4781  016160  012737  016166  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4782  016166  004737  034716                  JSR     PC,CHGFEC
 4783  016172  170127  004200                  LDFPS   #FIUV+FD
 4784  016176  172437  001160                  LDD     $REG0,AC0       ;EXECUTE INSTRUCTION THAT SHOULD TRAP
 4785  016202  170000                          CFCC
 4786                          ;FAILURE-NO TRAP
 4787  016204  104106                          ERROR   106
 4788  016206  022626          7$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
 4789                          ;;*****************************************************************
 4790                          ;SECTION - 5
 4791                          ;LDCF*-MD
 4792  016210  012737  016244  000244          MOV     #8$,FPPVEC
```

```
 4793  016216  012737  016224  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4794  016224  004737  034716                  JSR     PC,CHGFEC
 4795  016230  170127  004000                  LDFPS   #FIUV
 4796  016234  177437  001160                  LDCDF   $REGO,AC0       ;EXECUTE INSTRUCTION THAT SHOULD TRAP
 4797  016240  170000                          CFCC
 4798                                  ;FAILURE-NO TRAP
 4799  016242  104106                          ERROR   106
 4800  016244  022626                  8$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
 4801                                  ;;*****************************************************************
 4802                                  ;SECTION - 6
 4803                                  ;TSTX*-MD
 4804  016246  012737  016302  000244          MOV     #9$,FPPVEC
 4805  016254  012737  016262  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4806  016262  004737  034716                  JSR     PC,CHGFEC
 4807  016266  170127  004000                  LDFPS   #FIUV
 4808  016272  170537  001160                  TSTF    $REGO           ;EXECUTE THE INSTRUCTION THAT SHOULD TRAP
 4809  016276  170000                          CFCC
 4810                                  ;FAILURE-NO TRAP
 4811  016300  104106                          ERROR   106
 4812  016302  022626                  9$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
 4813                                  ;;*****************************************************************
 4814                                  ;SECTION - 7
 4815                                  ;NEGF*-MD
 4816  016304  012737  016346  000244          MOV     #10$,FPPVEC
 4817  016312  012737  016320  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4818  016320  004737  034716                  JSR     PC,CHGFEC
 4819  016324  012737  100177  001160          MOV     #100177,$REGO   ;INIT $REGO WITH MINUS ZERO
 4820  016332  170127  004000                  LDFPS   #FIUV
 4821  016336  170737  001160                  NEGF    $REGO
 4822  016342  170000                          CFCC
 4823                                  ;FAILURE-TRAP DID NOT OCCUR
 4824  016344  104106                          ERROR   106
 4825  016346  022626                  10$:    CMP     (SP)+,(SP)+
 4826  016350  005737  001160                  TST     $REGO           ;DID DST GET NEGATTED?
 4827  016354  001403                          BEQ     12$             ;BRANCH IF YES
 4828  016356  005037  001200                  CLR     $TMP0
 4829  016362  104140                          ERROR   140             ;DON'T KNOW WHAT HAPPENED
 4830                                  ;;*****************************************************************
 4831                                  ;SECTION - 8
 4832                                  ;NEGF*-MD*IMM
 4833  016364  012737  016430  000244  12$:    MOV     #11$,FPPVEC
 4834  016372  012737  016400  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4835  016400  004737  034716                  JSR     PC,CHGFEC
 4836  016404  012737  100177  016420          MOV     #100177,13$     ;MAKE DATA A MINUS ZERO
 4837  016412  170127  004000                  LDFPS   #FIUV
 4838  016416  170727                          NEGF    (PC)+           ;EXECUTE INSTRUCTION
 4839  016420  100177                  13$:    .WORD   100177
 4840  016422  170000                          CFCC
 4841                                  ;FAILURE-NO TRAP
 4842  016424  170000                          CFCC
 4843  016426  104141                          ERROR   141             ;FRMB IMMEDIATE*REG WRITE NOT GOING LOW
 4844  016430  022626                  11$:    CMP     (SP)+,(SP)+     ;RESTORE THE SP
 4845  016432  005737  016420                  TST     13$             ;DATA OK?
 4846  016436  001406                          BEQ     14$             ;BRANCH IF YES
 4847  016440  005037  001200                  CLR     $TMP0           ;SAVE EXPECTED VALUE
 4848  016444  012737  016004  001160          MOV     #3$,$REGO       ;SAVE RECEIVED VALUE
```

```
                                                ERROR   140             ;DATA BAD
                                ;:**************************************************************
                                ;SECTION - 9
                                ;ABSF*-MO*IMM
                                14$:    MOV     #15$,FPPVEC     ;SET FP VECTOR
                                        MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
                                        JSR     PC,CHGFEC
                                        MOV     #100177,16$     ;INIT DATA
                                        LDFPS   #FIUV
                                        ABSF    (PC)+           ;EXECUTE INSTRUCTION UNDER TEST
                                16$:    .WORD   100177
                                        CFCC                    ;WAIT FOR TRAP
                                ;FAILURE NO TRAP
                                        ERROR   106             ;NO TRAP
                                15$:    CMP     (SP)+,(SP)+     ;RESTORE THE SP
                                        TST     16$             ;DATA GET CLEARED?
                                        BEQ     TST36           ;;BRANCH IF YES
                                        MOV     16$,$REGO       ;SAVE RECEIVED DATA
                                        CLR     $TMP0           ;SAVE EXPECTED DATA
                                        ERROR   140             ;ABSF DID NOT CLEAR DATA

                                ;;**************************************************************
                                ;*TEST 36        FIU
                                ;*
                                ;*      THIS TEST CHECKS THE 4 PLACES WHERE AN UNDERFLOW TRAP
                                ;*      CAN OCCUR.
                                ;:**************************************************************
                                TST36:  SCOPE
                                        MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
                                        MOV     #TST37,$ESCAPE  ;;ESCAPE TO TEST 37 ON ERROR
                                ;SECTION - 1
                                ;LDEXP*DIMUX<15>=1*DIMUX<14:7>=0
                                        MOV     #1$,FPPVEC
                                        MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
                                        JSR     PC,CHGFEC
                                        LDF     #^O40077,AC0    ;INITIALIZE AC0
                                        LDFPS   #FIU+17         ;LOAD COMPLIMENT CC'S
                                2$:     LDEXP   #100177,AC0     ;EXECUTE INSTRUCTION TO CAUSE TRAP
                                        CFCC
                                ;FAILURE-NO TRAP
                                        ERROR   107             ;UNDERFLOW DID NOT TRAP
                                1$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
                                        STFPS   R0              ;GET CC'S
                                        STST    $TMP2           ;GET FEC & FEA
                                        MOV     #FU,$TMP0       ;SAVE EXPECTED
                                        MOV     #2$,$TMP1       ;VALUE OF FEC & FEA
                                        CMP     #FU,$TMP2       ;FEC OK?
                                        BEQ     3$              ;BRANCH IF YES
                                        ERROR   110             ;FEC WRONG ON UNDERFLOW
                                3$:     CMP     #2$,$TMP3       ;FEA OK?
                                        BEQ     4$              ;BRANCH IF YES
                                        ERROR   111             ;FEA WRONG ON UNDERFLOW
                                4$:     STF     AC0,$TMP2       ;GET RESULT
                                        CMP     #37677,$TMP2    ;DID EXPONENT LOAD CORRECTLY?
                                        BEQ     5$              ;BRANCH IF YES
                                        MOV     #37677,$TMP0    ;SAVE EXPECTED
```

```
 4905  016712  005037  001202                 CLR     $TMP1           ;VALUE OF RESULT
 4906  016716  104112                         ERROR   112             ;EXPONENT WRONG
 4907  016720  042700  102000         5$:     BIC     #FER+FIU,R0
 4908  016724  005700                         TST     R0              ;CC'S OK?
 4909  016726  001405                         BEQ     6$              ;BRANCH IF YES
 4910  016730  005037  001200                 CLR     $TMP0           ;SAVE EXPECTED CC'S
 4911  016734  010037  001202                 MOV     R0,$TMP1        ;SAVE RECEIVED CC'S
 4912  016740  104003                         ERROR   3               ;CC'S BAD
 4913                                 ;;*****************************************************************
 4914                                 ;SECTION - 2
 4915                                 ;LDEXP*(EXP=-200)
 4916  016742  012737  017002  000244 6$:     MOV     #7$,FPPVEC
 4917  016750  012737  016756  001110         MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4918  016756  004737  034716                 JSR     PC,CHGFEC
 4919  016762  172427  037677                 LDF     #^O37677,AC0    ;INITIALIZE AC0
 4920  016766  170127  002013                 LDFPS   #FIU+13         ;LOAD COMPLIMENT CC'S
 4921  016772  176427  177600                 LDEXP   #177600,AC0     ;EXECUTE INSTRUCTION TO CAUSE TRAP
 4922  016776  170000                         CFCC
 4923                                 ;FAILURE-NO TRAP
 4924  017000  104107                         ERROR   107
 4925  017002  022626                 7$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
 4926  017004  170200                         STFPS   R0              ;GET CC'S BACK
 4927  017006  174037  001204                 STF     AC0,$TMP2       ;GET DATA
 4928  017012  022737  000077  001204         CMP     #77,$TMP2       ;EXPONENT OK?
 4929  017020  001406                         BEQ     8$              ;BRANCH IF YES
 4930  017022  012737  000077  001200         MOV     #77,$TMP0       ;SAVE EXPECTED
 4931  017030  005037  001202                 CLR     $TMP1           ;VALUE FO DATA
 4932  017034  104112                         ERROR   112             ;EXPONENT WRONG
 4933  017036  042700  102000         8$:     BIC     #FER+FIU,R0
 4934  017042  022700  000004                 CMP     #FZ,R0          ;CC'S OK?
 4935  017046  001406                         BEQ     9$              ;BRANCH IF YES
 4936  017050  010037  001202                 MOV     R0,$TMP1        ;SAVE RECEIVED VALUE
 4937  017054  012737  000004  001200         MOV     #FZ,$TMP0       ;SAVE EXPECTED VALUE
 4938  017062  104003                         ERROR   3               ;CC'S WRONG
 4939                                 ;;*****************************************************************
 4940                                 ;SECTION - 3
 4941                                 ;LDEXP*(EXP<-200)
 4942  017064  012737  017124  000244 9$:     MOV     #10$,FPPVEC
 4943  017072  012737  017100  001110         MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 4944  017100  004737  034716                 JSR     PC,CHGFEC
 4945  017104  172427  137677                 LDF     #^O137677,AC0   ;INITIALIZE AC0
 4946  017110  170127  002007                 LDFPS   #FIU+7          ;LOAD COMPLIMENT CC'S
 4947  017114  176427  177577                 LDEXP   #177577,AC0     ;EXECUTE INSTRUCTION TO CAUSE TRAP
 4948  017120  170000                         CFCC
 4949                                 ;FAILURE-NO TRAP
 4950  017122  104107                         ERROR   107
 4951  017124  022626                 10$:    CMP     (SP)+,(SP)+     ;RESTORE THE SP
 4952  017126  170200                         STFPS   R0              ;SAVE CC'S
 4953  017130  174037  001204                 STF     AC0,$TMP2       ;GET DATA
 4954  017134  022737  137677  001204         CMP     #137677,$TMP2   ;EXPONENT OK?
 4955  017142  001406                         BEQ     11$             ;BRANCH IF YES
 4956  017144  012737  137677  001200         MOV     #137677,$TMP0   ;SAVE EXPECTED
 4957  017152  005037  001202                 CLR     $TMP1           ;VALUE OF RESULT
 4958  017156  104112                         ERROR   112             ;RESULT WRONG
 4959  017160  042700  102000         11$:    BIC     #FER+FIU,R0
 4960  017164  022700  000010                 CMP     #FN,R0          ;CC'S OK?
```

```
017170  001406                          BEQ     12$             ;BRANCH IF YES
017172  010037  001202                  MOV     R0,$TMP1        ;SAVE RECEIVED
017176  012737  000010  001200          MOV     #FN,$TMP0       ;SAVE EXPECTED VALUE
017204  104003                          ERROR   3               ;CC'S BAD
                                ;;**************************************************************
                                ;SECTION - 4
                                ;NORMALIZATION FLOW*EXP<-129
017206  012737  017246  000244  12$:    MOV     #13$,FPPVEC
017214  012737  017222  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
017222  004737  034716                  JSR     PC,CHGFEC
017226  172427  000377                  LDF     #^O377,AC0      ;INIT THE DST
017232  170127  002000                  LDFPS   #FIU
017236  171027  000377                  MULF    #^O377,AC0      ;EXECUTE INSTRUCTION TO CAUSE UNDERFLOW
017242  170000                          CFCC
                                ;FAILURE-NO TRAP
017244  104107                          ERROR   107
017246  022626                  13$:    CMP     (SP)+,(SP)+     ;RESTORE THE SP
                                ;;**************************************************************
                                ;SECTION - 5
                                ;NORMALIZATION FLOW*EXP=-129
017250  012737  017310  000244          MOV     #14$,FPPVEC
017256  012737  017264  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
017264  004737  034716                  JSR     PC,CHGFEC
017270  172427  000400                  LDF     #^O400,AC0      ;INITIALIZE THE DST
017274  170127  002000                  LDFPS   #FIU
017300  173027  000300                  SUBF    #^O300,AC0      ;EXECUTE INSTRUCTION TO CAUSE TRAP
017304  170000                          CFCC
                                ;FAILURE-NO TRAP
017306  104107                          ERROR   107
017310  022626                  14$:    CMP     (SP)+,(SP)+     ;RESTORE THE SP

                                ;;**************************************************************
                                ;*TEST 37        FIV
                                ;*
                                ;*      THIS TEST CHECKS THE 5 POSSIBLE OVERFLOW CONDITIONS.  IT
                                ;*      ALSO INCLUDES 3 ADDITIONAL CHECKS OF THE STCF TO ENSURE THE
                                ;*      CONTROL STORE IS FUNCTIONING PROPERLY.
                                ;**************************************************************
017312  000004                  TST37:  SCOPE
017314  012737  000037  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
017322  012737  020036  001222          MOV     #TST40,$ESCAPE  ;;ESCAPE TO TEST 40 ON ERROR
                                ;SECTION - 1
                                ;LDEXP*(EXP > 177)
017330  004737  034716                  JSR     PC,CHGFEC
017334  012737  017362  000244          MOV     #1$,FPPVEC
017342  172427  040177                  LDF     #^O40177,AC0    ;INIT AC0
017346  170127  001017                  LDFPS   #FIV+17         ;LOAD COMPLIMENT CC'S
017352  176427  000377          4$:     LDEXP   #377,AC0        ;EXECUTE INSTRUCTION TO CAUSE TRAP
017356  170000                          CFCC
                                ;FAILURE-NO TRAP
017360  104113                          ERROR   113
017362  022626                  1$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
017364  170237  001202                  STFPS   $TMP1           ;GET CC'S
017370  174037  001204                  STF     AC0,$TMP2       ;GET DATA
017374  022737  037777  001204          CMP     #37777,$TMP2    ;EXP OK?
017402  001406                          BEQ     2$              ;BRANCH IF YES
```

```
5017  017404  012737  037777  001200          MOV     #37777,$TMP0    ;SAVE EXPECTED
5018  017412  005037  001202                  CLR     $TMP1           ;VALUE OF DATA
5019  017416  104114                          ERROR   114             ;EXPONENT WRONG
5020  017420  170337  001204          2$:     STST    $TMP2           ;GET FEC & FEA
5021  017424  022737  000010  001204          CMP     #F0,$TMP2       ;FEC OK?
5022  017432  001404                          BEQ     3$              ;BRANCH IF YES
5023  017434  012737  000010  001200          MOV     #F0,$TMP0       ;SAVE EXPECTED VALUE
5024  017442  104115                          ERROR   115             ;FEC WRONG ON OVERFLOW
5025  017444  022737  017352  001206  3$:     CMP     #4$,$TMP3       ;FEA OK?
5026  017452  001404                          BEQ     5$              ;BRANCH IF YES
5027  017454  012737  017352  001202          MOV     #4$,$TMP1       ;SAVE EXPECTED VALUE
5028  017462  104116                          ERROR   116             ;FEA WRONG ON OVERFLOW
5029  017464  042737  001000  001202  5$:     BIC     #FIV,$TMP1
5030  017472  022737  100002  001202          CMP     #FER+FV,$TMP1   ;CC'S OK?
5031  017500  001404                          BEQ     6$              ;BRANCH IF YES
5032  017502  012737  100002  001200          MOV     #FER+FV,$TMP0   ;SAVE EXPECTED RESULT
5033  017510  104003                          ERROR   3               ;CC'S BAD
5034                                  ;;**********************************************************************
5035                                  ;SECTION - 2
5036                                  ;MOD*(INTG>2**127)
5037  017512  012737  017552  000244  6$:     MOV     #7$,FPPVEC
5038  017520  012737  017526  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
5039  017526  004737  034716                  JSR     PC,CHGFEC
5040  017532  172427  077777                  LDF     #^D077777,AC0   ;LOAD THE DEST
5041  017536  170127  001000                  LDFPS   #FIV
5042  017542  171427  077777                  MODF    #^D077777,AC0   ;EXECUTE INSTRUCTION TO CAUSE TRAP
5043  017546  170000                          CFCC
5044                                  ;FAILURE-NO TRAP
5045  017550  104113                          ERROR   113             ;NO TRAP
5046  017552  022626                  7$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5047  017554  170337  001204                  STST    $TMP2
5048  017560  022737  000010  001204          CMP     #F0,$TMP2       ;STATE 105 WORK OK?
5049  017566  001404                          BEQ     8$              ;BRANCH IF YES
5050  017570  012737  000010  001200          MOV     #F0,$TMP0       ;SAVE EXPECTED FEC
5051  017576  104117                          ERROR   117             ;FEC WRONG IN STATE 105
5052                                  ;;**********************************************************************
5053                                  ;SECTION - 3
5054                                  ;NORMALIZATION FLOW
5055  017600  012737  017640  000244  8$:     MOV     #9$,FPPVEC
5056  017606  012737  017614  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
5057  017614  004737  034716                  JSR     PC,CHGFEC
5058  017620  172427  077600                  LDF     #^D077600,AC0   ;LOAD THE DST
5059  017624  170127  001000                  LDFPS   #FIV
5060  017630  172027  077600                  ADDF    #^D077600,AC0   ;EXECUTE INSTRUCTION TO CAUSE TRAP
5061  017634  170000                          CFCC
5062                                  ;FAILURE-NO TRAP
5063  017636  104113                          ERROR   113             ;NO TRAP
5064  017640  022626                  9$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5065                                  ;;**********************************************************************
5066                                  ;SECTION - 4
5067                                  ;STCF*MD
5068  017642  012737  017724  000244          MOV     #10$,FPPVEC
5069  017650  012737  077777  001160          MOV     #77777,$REG0    ;PUT # IN MEMORY
5070  017656  012737  177777  001162          MOV     #-1,$REG1       ;TO CAUSE OVERFLOW
5071  017664  012737  177777  001164          MOV     #-1,$REG2       ;WHEN CONVERTING
5072  017672  170011                          SETD
```

```
 5073  017674  172437  001160                  LDD     $REG0,AC0       ;LOAD THE SRC ACC.
 5074  017700  012737  017706  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 5075  017706  004737  034716                  JSR     PC,CHGFEC
 5076  017712  170127  001200                  LDFPS   #FIV+FD
 5077  017716  176001                          STCDF   AC0,AC1         ;EXECUTE INSTRUCTION TO CAUSE TRAP
 5078  017720  170000                          CFCC                    ;WAIT FOR TRAP
 5079                                  ;FAILURE, NO TRAP
 5080  017722  104113                          ERROR   113             ;NO TRAP
 5081  017724  022626                  10$:    CMP     (SP)+,(SP)+     ;RESTORE THE SP
 5082                                  ;;**************************************************************
 5083                                  ;SECTION - 5
 5084                                  ;STCF*IMMEDIATE
 5085  017726  012737  017770  000244          MOV     #11$,FPPVEC
 5086  017734  170011                          SETD
 5087  017736  172437  001160                  LDD     $REG0,AC0       ;LOAD THE SRC
 5088  017742  012737  017750  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 5089  017750  004737  034716                  JSR     PC,CHGFEC
 5090  017754  170127  001200                  LDFPS   #FIV+FD
 5091  017760  176027                          STCDF   AC0,(PC)+       ;EXECUTE INSTRUCTION TO CAUSE TRAP
 5092  017762  000000                          .WORD
 5093  017764  170000                          CFCC
 5094                                  ;FAILURE-NO TRAP
 5095  017766  104113                          ERROR   113             ;NO TRAP
 5096  017770  022626                  11$:    CMP     (SP)+,(SP)+     ;RESTORE THE SP
 5097                                  ;;**************************************************************
 5098                                  ;SECTION - 6
 5099                                  ;STCF*-MO
 5100  017772  012737  020034  000244          MOV     #12$,FPPVEC
 5101  020000  170011                          SETD
 5102  020002  172437  001160                  LDD     $REG0,AC0       ;LOAD THE SRC
 5103  020006  012737  020014  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 5104  020014  004737  034716                  JSR     PC,CHGFEC
 5105  020020  170127  001200                  LDFPS   #FIV+FD
 5106  020024  176037  001204                  STCDF   AC0,$TMP2       ;EXECUTE INSTRUCTION TO CAUSE TRAP
 5107  020030  170000                          CFCC
 5108                                  ;FAILURE-NO TRAP
 5109  020032  104113                          ERROR   113             ;NO TRAP
 5110  020034  022626                  12$:    CMP     (SP)+,(SP)+     ;RESTORE THE SP
 5111
 5112                                  ;;**************************************************************
 5113                                  ;*TEST 40        FIC
 5114                                  ;*
 5115                                  ;*      THIS TEST ENSURES THAT THE INTEGER CONVERSION
 5116                                  ;*      INTERRUPT OCCURS FROM ALL 3 POSSIBLE ROM STATES.
 5117                                  ;;**************************************************************
 5118  020036  000004                  TST40:  SCOPE
 5119  020040  012737  000040  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
 5120  020046  012737  020244  001222          MOV     #TST41,$ESCAPE  ;;ESCAPE TO TEST 41 ON ERROR
 5121                                  ;SECTION - 1
 5122                                  ;STCI*MO*IL(0)
 5123  020054  004737  034716                  JSR     PC,CHGFEC
 5124  020060  012737  020104  000244          MOV     #1$,FPPVEC
 5125  020066  172427  060000                  LDF     #^O60000,AC0    ;INIT THE SRC
 5126  020072  170127  000400                  LDFPS   #FIC
 5127  020076  175400                  3$:     STCFI   AC0,R0          ;EXECUTE INSTRUCTION TO CAUSE TRAP
 5128  020100  170000                          CFCC
```

```
5129                                            ;FAILURE-NO TRAP
5130  020102  104120                                    ERROR   120             ;NO TRAP ON CONVERSION ERROR
5131  020104  022626                            1$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5132  020106  170337  001204                             STST    $TMP2
5133  020112  022737  000006  001204                     CMP     #FICE,$TMP2     ;FEC OK?
5134  020120  001404                                    BEQ     2$              ;BRANCH IF YES
5135  020122  012737  000006  001200                     MOV     #FICE,$TMP0     ;SAVE EXPECTED VALUE
5136  020130  104121                                    ERROR   121             ;FEC WRONG
5137  020132  022737  020076  001206            2$:     CMP     #3$,$TMP3       ;FEA OK?
5138  020140  001404                                    BEQ     4$              ;BRANCH IF YES
5139  020142  012737  020076  001202                     MOV     #3$,$TMP1       ;SAVE EXPECTED RESULT
5140  020150  104122                                    ERROR   122             ;FEA WRONG
5141                                            ;;**************************************************************
5142                                            ;SECTION - 2
5143                                            ;STCI*M0*IL(1)
5144  020152  012737  020204  000244            4$:     MOV     #5$,FPPVEC
5145  020160  012737  020166  001110                     MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
5146  020166  004737  034716                             JSR     PC,CHGFEC
5147  020172  170127  000500                             LDFPS   #FIC+FL
5148  020176  175400                                     STCFI   AC0,R0          ;EXECUTE INSTRUCTION TO CAUSE TRAP
5149  020200  170000                                     CFCC
5150                                            ;FAILURE-NO TRAP
5151  020202  104120                                    ERROR   120             ;NO TRAP
5152  020204  022626                            5$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5153                                            ;;**************************************************************
5154                                            ;SECTION - 3
5155                                            ;STCFI*-M0
5156  020206  012737  020242  000244                     MOV     #6$,FPPVEC
5157  020214  012737  020222  001110                     MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
5158  020222  004737  034716                             JSR     PC,CHGFEC
5159  020226  170127  000400                             LDFPS   #FIC
5160  020232  175437  001200                             STCFI   AC0,$TMP0       ;EXECUTE INSTRUCTION TO CAUSE TRAP
5161  020236  170000                                     CFCC
5162                                            ;FAILURE-NO TRAP
5163  020240  104120                                    ERROR 120               ;NO TRAP
5164  020242  022626                            6$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5165
5166                                            ;;**************************************************************
5167                                            ;*TEST 41        DIVIDE BY ZERO
5168                                            ;*
5169                                            ;*      THIS TEST CHECKS THE TWO ROM STATES THAT CAN BE USED WHEN
5170                                            ;*      AN ATTEMPT TO DIVIDE BY ZERO IS MADE.
5171                                            ;;**************************************************************
5172  020244  000004                            TST41:  SCOPE
5173  020246  012737  000041  001240                     MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
5174  020254  012737  020464  001222                     MOV     #TST42,$ESCAPE  ;;ESCAPE TO TEST 42 ON ERROR
5175  020262  012737  020314  000244                     MOV     #1$,FPPVEC
5176  020270  172427  000000                             LDF     #0,AC0          ;LOAD THE NUMERATOR WITH ZERO
5177  020274  012737  020302  001110                     MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
5178  020302  004737  034716                             JSR     PC,CHGFEC
5179  020306  174427  000000                    3$:     DIVF    #0,AC0          ;EXECUTE INSTRUCTION UNDER TEST
5180  020312  170000                                     CFCC                    ;WAIT FOR TRAP
5181  020314  022626                            1$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5182  020316  170337  001204                             STST    $TMP2           ;GET THE FP STATUS
5183  020322  022737  000004  001204                     CMP     #4,$TMP2        ;FEC OK?
5184  020330  001404                                    BEQ     2$              ;BRANCH IF YES
```

```
5185  020332  012737  000004  001200          MOV     #4,$TMP0        ;SAVE EXPECTED VALUE
5186  020340  104134                          ERROR   134             ;FEC WRONG
5187  020342  022737  020306  001206  2$:     CMP     #3$,$TMP3       ;FEA OK?
5188  020350  001404                          BEQ     4$              ;BRANCH IF YES
5189  020352  012737  020306  001202          MOV     #3$,$TMP1       ;SAVE EXPECTED VALUE
5190  020360  104135                          ERROR   135             ;FEA WRONG
5191                                  ;;**********************************************************************
5192  020362  012737  020402  000244  4$:     MOV     #5$,FPPVEC
5193  020370  170127  004000                  LDFPS   #FIUV
5194  020374  172427  100000                  LDF     #^O100000,AC0   ;CHANGE FEC
5195  020400  170000                          CFCC                    ;WAIT FOR TRAP
5196  020402  022626                  5$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5197  020404  172427  040000                  LDF     #^O40000,AC0    ;ENSURE AC0 NON-ZERO
5198  020410  012737  020436  000244          MOV     #6$,FPPVEC
5199  020416  012737  020424  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
5200  020424  004737  034716                  JSR     PC,CHGFEC
5201  020430  174427  000000                  DIVF    #0,AC0          ;EXECUTE INSTRUCTION UNDER TEST
5202  020434  170000                          CFCC                    ;WAIT FOR TRAP
5203  020436  022626                  6$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5204  020440  170337  001204                  STST    $TMP2           ;GET FEC
5205  020444  022737  000004  001204          CMP     #4,$TMP2        ;FEC OK?
5206  020452  001404                          BEQ     TST42           ;;BRANCH IF YES
5207  020454  012737  000004  001200          MOV     #4,$TMP0        ;SAVE EXPECTED VALUE
5208  020462  104136                          ERROR   136             ;FEC WRONG
5209
5210                                  ;;**********************************************************************
5211                                  ;*TEST 42        ILLEGAL OP-CODES
5212                                  ;*
5213                                  ;*      THIS TEST FIRST ENSURES THAT THE ILLEGAL OP-CODE TRAP FUNCTIONS
5214                                  ;*      PROPERLY.  IT THEN CHECKS ALL THE POSSIBLE ADDRESSES OF THE
5215                                  ;*      NO-MEM ROM THAT FORCE AN ILLEGAL OP CODE TRAP.
5216                                  ;*
5217                                  ;*      LAST, IT CHECKS THE FID BIT TO ENSURE IT FUNCTIONS PROPERLY.
5218                                  ;;**********************************************************************
5219  020464  000004                  TST42:  SCOPE
5220  020466  012737  000042  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
5221  020474  012737  020736  001222          MOV     #TST43,$ESCAPE  ;;ESCAPE TO TEST 43 ON ERROR
5222  020502  004737  034716                  JSR     PC,CHGFEC
5223  020506  012737  020530  000244          MOV     #1$,FPPVEC
5224  020514  170006                  2$:     .WORD   170006          ;EXECUTE THE ILL-OP CODE
5225  020516  000240                          NOP
5226                                  ;FAILURE-NO TRAP
5227  020520  012737  170006  001200          MOV     #170006,$TMP0   ;SAVE OP CODE THAT FAILED
5228  020526  104123                          ERROR   123             ;NO-MEM ROM FAILED
5229  020530  022626                  1$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5230  020532  170337  001204                  STST    $TMP2           ;GET STATUS
5231  020536  022737  000002  001204          CMP     #2,$TMP2        ;FEC OK?
5232  020544  001404                          BEQ     3$              ;BRANCH IF YES
5233  020546  012737  000002  001200          MOV     #2,$TMP0        ;SAVE EXPECTED VALUE
5234  020554  104124                          ERROR   124             ;FEC WRONG ON ILLEGAL OP-CODE
5235  020556  022737  020514  001206  3$:     CMP     #2$,$TMP3       ;FEA OK?
5236  020564  001404                          BEQ     4$              ;BRANCH IF YES
5237  020566  012737  020514  001202          MOV     #2$,$TMP1       ;SAVE EXPECTED FEA
5238  020574  104125                          ERROR   125             ;FEA WRONG ON ILL OP CODE
5239                                  ;;**********************************************************************
5240                                  ;CHECK THE NO-MEM ROM
```

```
5241  020576  012737  020630  000244  4$:     MOV     #5$,FPPVEC
5242  020604  012700  002000                  MOV     #ILLOP,R0       ;PUT ADDRESS OF TBL OF OP-CODES IN R0
5243  020610  012737  020616  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
5244  020616  011037  020622          8$:     MOV     (R0),6$         ;LOAD THE ILLEGAL OP CODE
5245  020622  000000                  6$:     .WORD                   ;EXECUTE THE OP-CODE
5246  020624  000240                          NOP
5247  020626  000412                          BR      7$              ;DID NOT TRAP
5248  020630  022626                  5$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5249  020632  105737  001103                  TSTB    $ERFLG          ;ANY ERRORS?
5250  020636  001371                          BNE     6$              ;BRANCH IF YES
5251  020640  062700  000002                  ADD     #2,R0           ;SELECT NEXT OP-CODE
5252  020644  022700  002112                  CMP     #ILLEND,R0      ;DONE?
5253  020650  001362                          BNE     8$              ;BRANCH IF NO
5254  020652  000406                          BR      9$
5255  020654  012706  001100          7$:     MOV     #1100,SP
5256  020660  013737  020622  001200          MOV     6$,$TMP0        ;SAVE OP-CODE THAT FAILED
5257  020666  104123                          ERROR   123             ;NO TRAP
5258  020670  012737  020710  000244  9$:     MOV     #10$,FPPVEC
5259  020676  012737  020704  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
5260  020704  176006                          STCFD   AC0,AC6         ;EXECUTE ILLEGAL INSTRUCTION
5261  020706  170000                          CFCC                    ;WAIT FOR TRAP
5262  020710  022626                  10$:    CMP     (SP)+,(SP)+     ;RESTORE THE SP
5263  020712  170337  001204                  STST    $TMP2           ;CHECK ROM STATE 32
5264  020716  022737  000002  001204          CMP     #2,$TMP2        ;IS IT OK?
5265  020724  001404                          BEQ     TST43           ;;BRANCH IF YES
5266  020726  012737  000002  001200          MOV     #2,$TMP0
5267  020734  104130                          ERROR   130             ;STATE 32 DID NOT LOAD FEC
5268
5269                                  ;;**************************************************************
5270                                  ;*TEST 43        NO-MEM ROM
5271                                  ;*
5272                                  ;*      THIS TEST COMPLETES THE TEST OF THE NO-MEM ROM.  IT
5273                                  ;*      CONSISTS OF TESTING THOSE OP-CODES THAT CAN USE R6 OR R7
5274                                  ;*      AS LEGAL REGISTERS.
5275                                  ;;**************************************************************
5276  020736  000004                  TST43:  SCOPE
5277  020740  012737  000043  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
5278  020746  012737  021304  001222          MOV     #TST44,$ESCAPE  ;;ESCAPE TO TEST 44 ON ERROR
5279  020754  012737  021264  000244          MOV     #1$,FPPVEC
5280                                  ;SECTION - 1
5281                                  ;LDFPS
5282  020762  012706  001100                  MOV     #STACK,SP       ;INITIALIZE THE SP
5283  020766  170106                          LDFPS   R6              ;EXECUTE INSTRUCTION UNDER TEST
5284  020770  170237  001202                  STFPS   $TMP1           ;GET DATA BACK
5285  020774  022737  001100  001202          CMP     #1100,$TMP1     ;DATA OK?
5286  021002  001404                          BEQ     2$              ;BRANCH IF YES
5287  021004  012737  001100  001200          MOV     #1100,$TMP0     ;SAVE EXPECTED VALUE
5288  021012  104126                          ERROR   126             ;LEGAL OP-CODE FAILED
5289                                  ;;**************************************************************
5290                                  ;SECTION - 2
5291                                  ;STFPS
5292  021014                          2$:
5293  021014  012737  021022  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
5294  021022  170127  001056                  LDFPS   #1056           ;INITIALIZE FPS
5295  021026  170206                          STFPS   R6              ;EXECUTE INSTRUCTION
5296  021030  022706  001056                  CMP     #1056,R6        ;WORK OK?
```

```
5297  021034  001410                          BEQ     3$                      ;BRANCH IF YES
5298  021036  010637  001202                  MOV     R6,$TMP1                ;SAVE RECEIVED VALUE
5299  021042  012737  001056  001200          MOV     #1056,$TMP0             ;SAVE EXPECTED VALUE
5300  021050  012706  001100                  MOV     #STACK,SP
5301  021054  104126                          ERROR   126                     ;LEGAL OP-CODE FAILED
5302                                  ;;**********************************************************************
5303                                  ;SECTION - 3
5304                                  ;STST
5305  021056                          3$:
5306  021056  012737  021064  001110          MOV     #.+6,@#$LPERR           ;SET ERROR LOOP
5307  021064  170306                          STST    R6                      ;EXECUTE INSTRUCTION FEC=2
5308  021066  010637  001202                  MOV     R6,$TMP1                ;SAVE DATA
5309  021072  012706  001100                  MOV     #STACK,R6               ;RESTORE R6
5310  021076  022737  000002  001202          CMP     #2,$TMP1                ;DATA OK?
5311  021104  001404                          BEQ     4$                      ;BRANCH IF YES
5312  021106  012737  000002  001200          MOV     #2,$TMPO                ;SAVE EXPECTED VALUE
5313  021114  104126                          ERROR   126                     ;LEGAL OP CODE FAILED
5314                                  ;;**********************************************************************
5315                                  ;SECTION - 4
5316                                  ;STCFI
5317  021116                          4$:
5318  021116  012737  021124  001110          MOV     #.+6,@#$LPERR           ;SET ERROR LOOP
5319  021124  177027  001076                  LDCIF   #1076,AC0               ;INITIALIZE AC0
5320  021130  175406                          STCFI   AC0,R6                  ;EXECUTE INSTRUCTION
5321  021132  022706  001076                  CMP     #1076,SP                ;DATA OK?
5322  021136  001410                          BEQ     5$                      ;BRANCH IF YES
5323  021140  010637  001202                  MOV     R6,$TMP1                ;SAVE RECEIVED DATA
5324  021144  012737  001076  001200          MOV     #1076,$TMPO             ;SAVE EXPECTED DATA
5325  021152  012706  001100                  MOV     #STACK,SP               ;RESTORE SP
5326  021156  104126                          ERROR   126                     ;LEGAL OP CODE FAILED
5327                                  ;;**********************************************************************
5328                                  ;SECTION - 5
5329                                  ;LDEXP
5330  021160                          5$:
5331  021160  012737  021166  001110          MOV     #.+6,@#$LPERR           ;SET ERROR LOOP
5332  021166  012706  177776                  MOV     #177776,SP              ;PUT EXPONENT TO LOAD IN SP
5333  021172  176406                          LDEXP   R6,AC0                  ;EXECUTE INSTRUCTION
5334  021174  012706  001100                  MOV     #STACK,SP               ;RESTORE THE SP
5335  021200  175037  001202                  STEXP   AC0,$TMP1               ;GET EXPONENT BACK
5336  021204  022737  177776  001202          CMP     #-2,$TMP1               ;DATA OK?
5337  021212  001404                          BEQ     6$                      ;BRANCH IF YES
5338  021214  012737  177776  001200          MOV     #-2,$TMPO               ;SAVE EXPECTED VALUE
5339  021222  104126                          ERROR   126                     ;LEGAL OP-CODE FAILED
5340                                  ;;**********************************************************************
5341                                  ;SECTION-6
5342                                  ;LDCIF
5343  021224                          6$:
5344  021224  012737  021232  001110          MOV     #.+6,@#$LPERR           ;SET ERROR LOOP
5345  021232  012706  001100                  MOV     #STACK,SP               ;INITIALIZE THE SP
5346  021236  177006                          LDCIF   R6,AC0                  ;EXECUTE INSTRUCTION
5347  021240  175437  001202                  STCFI   AC0,$TMP1               ;GET DATA BACK
5348  021244  022737  001100  001202          CMP     #1100,$TMP1             ;DATA OK?
5349  021252  001414                          BEQ     TST44                   ;;BRANCH IF YES
5350  021254  012737  001100  001200          MOV     #1100,$TMPO             ;SAVE EXPECTED VALUE
5351  021262  104126                          ERROR   126                     ;LEGAL OP-CODE FAILED
5352  021264  011646                  1$:     MOV     (SP),-(SP)
```

```
5353  021266  162716  000002                  SUB     #2,(SP)
5354  021272  013637  001200                  MOV     @(SP)+,$TMP0
5355  021276  012706  001100                  MOV     #STACK,SP
5356  021302  104127                          ERROR   127             ;LEGAL OP CODE TRAPPED
5357
5358                                  ;;*****************************************************************
5359                                  ;*TEST 44       FP PRIORITY ARBITRATION
5360                                  ;*
5361                                  ;*      THIS TEST CHECKS THE FLOATING POINT TRAP PRIORITY ARBITRATION
5362                                  ;*      LOGIC ON TMCA FOR PIR7 AND STACK LIMIT YELLOW.  THE
5363                                  ;*      MEMORY MANAGEMENT ARBITRATION IS PERFORMED LATER.
5364                                  ;;*****************************************************************
5365  021304  000004                  TST44:  SCOPE
5366  021306  012737  000044  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
5367  021314  012737  021532  001222          MOV     #TST45,$ESCAPE  ;;ESCAPE TO TEST 45 ON ERROR
5368                                  ;SECTION - 1 --- PIR 7
5369  021322  012737  021366  000244          MOV     #2$,FPPVEC      ;SETUP
5370  021330  012737  021366  000240          MOV     #2$,PIRQVEC     ;VECTORS
5371  021336  012706  001100                  MOV     #1100,SP        ;MAKE SURE SP=1100
5372  021342  012737  021350  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
5373  021350  000237                          SPL     7               ;SET CPU AT LEVEL 7
5374  021352  012737  100000  177772          MOV     #BIT15,PIRQ     ;SET PIR 7
5375  021360  170016                          .WORD   170016          ;EXECUTE ILLEGAL OP CODE
5376  021362  000230                          SPL     0               ;LOWER PRIORITY
5377  021364  000240                          NOP                     ;WAIT FOR TRAP
5378  021366  022706  001074          2$:     CMP     #1074,SP        ;DID ONLY ONE TRAP OCCUR?
5379  021372  001405                          BEQ     1$              ;BRANCH IF YES
5380  021374  012706  001100                  MOV     #1100,SP        ;RESTORE THE SP
5381  021400  005037  177772                  CLR     PIRQ            ;ENSURE PIRQ OFF
5382  021404  104131                          ERROR   131             ;FP TRAP DID NOT DISABLE
5383                                                                  ;PIR7 ON TMCA.
5384                                  ;SECTION - 2
5385                                  ;STACK LIMIT YELLOW
5386  021406  012706  001100          1$:     MOV     #1100,SP        ;RESTORE THE SP
5387  021412  005037  177772                  CLR     PIRQ            ;ENSURE PIRQ REG CLEAR
5388  021416  012737  021452  000244          MOV     #3$,FPPVEC      ;SETUP
5389  021424  012737  021452  000004          MOV     #3$,ERRVEC      ;VECTORS
5390  021432  012737  021440  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
5391  021440  012706  000400                  MOV     #400,SP         ;SET SP TO YELLOW ZONE BOUNDRY
5392  021444  170016                          .WORD   170016          ;EXECUTE INSTR TO CAUSE FP TRAP
5393  021446  005046                          CLR     -(SP)           ;EXECUTE INSTR TO CAUSE YEL ZONE TRAP
5394  021450  000240                          NOP
5395  021452  022706  000362          3$:     CMP     #362,SP         ;DID CORRECT NO. OF TRAPS OCCUR?
5396  021456  001416                  6$:     BEQ     4$              ;BRANCH IF YES
5397  021460  022706  000372                  CMP     #372,SP         ;DID FLOATING POINT FAIL TO TRAP?
5398  021464  001003                          BNE     5$              ;BRANCH IF NO
5399  021466  012706  001100                  MOV     #STACK,SP
5400  021472  104132                          ERROR   132             ;YELLOW ZONE DID NOT DISABLE
5401                                                                  ;TMCA HONOR FP
5402  021474  010637  001202          5$:     MOV     SP,$TMP1        ;SAVE SP
5403  021500  012737  000362  001200          MOV     #362,$TMP0      ;SAVE EXPECTED VALUE
5404  021506  012706  001100                  MOV     #STACK,SP       ;RESTORE THE SP
5405  021512  104142                          ERROR   142             ;THE SP IS NOT WHAT I EXPECTED
5406  021514  012706  001100          4$:     MOV     #STACK,SP
5407  021520  022737  021456  000366          CMP     #6$,@#366       ;DID TRAPS OCCUR IN CORRECT SEQ?
5408  021526  001401                          BEQ     TST45           ;:BRANCH IF YES
```

```
                                        ERROR   143             ;TRAPS DID NOT OCCUR IN SEQUENCE

                                ;*****************************************************************
                                ;*TEST 45       MEMORY MANAGEMENT FUNCTIONS
                                ;*
                                ;*      THIS TEST ENSURES THAT THE SIGNAL SAPK I SPACEA (D) IS
                                ;*      ENABLED DURING THE TWO FLOATING POINT "BUST" CYCLES.
                                ;*
                                ;*      THIS IS DONE BY MAKING THE D SPACE PAR, THAT WOULD BE
                                ;*      REFERENCED BY THE FP INSTRUCTION, NON-RESIDENT.  SINCE
                                ;*      THE INSTRUCTION IS IMMEDIATE MODE, I SPACE SHOULD BE FORCED
                                ;*      AND THE TRAP SHOULD NOT OCCUR.
                                ;*
                                ;*      NOTE: THIS TEST CAN BE DISABLED BY SWITCH 12.
                                ;*****************************************************************
021532  000004                TST45:  SCOPE
021534  012737  000045  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
021542  012737  022046  001222          MOV     #TST46,$ESCAPE  ;;ESCAPE TO TEST 46 ON ERROR
021550  012737  021564  000004          MOV     #4$,ERRVEC      ;SET ERRVEC
021556  005737  177572                  TST     MMR0            ;IS MEMORY MGMT THERE?
021562  000403                          BR      5$              ;BRANCH IF YES
021564  012706  001100          4$:     MOV     #STACK,SP
021570  000526                          BR      TST46           ;;MGMT NOT AVAILABLE
021572  032777  010000  157336  5$:     BIT     #SW12,@SWR      ;INHIBIT THIS TEST?
021600  001122                          BNE     TST46           ;;BRANCH IF YES
                                ;SETUP MEMORY MANAGEMENT
021602  012700  172340                  MOV     #KIPAR0,R0
021606  005020                          CLR     (R0)+           ;SETUP THE PAR'S (KERNEL I,
021610  012720  000200                  MOV     #200,(R0)+      ;       *
021614  012720  000400                  MOV     #400,(R0)+      ;       *
021620  012720  000600                  MOV     #600,(R0)+      ;       *
021624  012720  001000                  MOV     #1000,(R0)+     ;       *
021630  012720  001200                  MOV     #1200,(R0)+     ;       *
021634  012720  001400                  MOV     #1400,(R0)+     ;       *
021640  012720  177600                  MOV     #177600,(R0)+   ;       *
021644  005020                          CLR     (R0)+           ;SETUP KERNEL D PAR'S
021646  012720  000200                  MOV     #200,(R0)+      ;       *
021652  012720  000400                  MOV     #400,(R0)+      ;       *
021656  012720  000600                  MOV     #600,(R0)+      ;       *
021662  012720  001000                  MOV     #1000,(R0)+     ;       *
021666  012720  001200                  MOV     #1200,(R0)+     ;       *
021672  012720  001400                  MOV     #1400,(R0)+     ;       *
021676  012720  177600                  MOV     #177600,(R0)+   ;       *
021702  012700  172300                  MOV     #KIPDR0,R0
021706  012701  077406                  MOV     #77406,R1
021712  012702  000010                  MOV     #10,R2
021716  010120                  1$:     MOV     R1,(R0)+        ;SETUP KERNEL PDR'S (I SPACE)
021720  077202                          SOB     R2,1$
021722  012702  000010                  MOV     #10,R2
021726  012701  077400                  MOV     #77400,R1
021732  010120                  2$:     MOV     R1,(R0)+        ;SETUP KERNEL D PDR'S (NON-RESIDENT)
021734  077202                          SOB     R2,2$
021736  012737  077406  172320          MOV     #77406,KDPDR0   ;MAKE TRAP VECTORS RESIDENT
021744  012737  077406  172336          MOV     #77406,KDPDR7   ;MAKE I/O PAGE RESIDENT
021752  012737  022032  000250          MOV     #3$,MMVEC       ;SETUP MEMORY MANAGEMENT VECTOR
021760  012737  021774  001106          MOV     #6$,$LPADR
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 5465  021766  012737  021774  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 5466  021774  012737  000001  177572  6$:     MOV     #BIT0,MMR0      ;TURN ON MEMORY MGMT
 5467  022002  012737  000004  172516          MOV     #BIT2,MMR3      ;ENABLE KERNEL D SPACE
 5468  022010  170727                          NEGF    (PC)+           ;EXECUTE TEST INSTRUCTION
 5469  022012  040000                          .WORD   40000
 5470  022014  000240                          NOP
 5471  022016  000240                          NOP
 5472  022020  005037  172516                  CLR     MMR3            ;TURN OFF D SPACE
 5473  022024  005037  177572                  CLR     MMR0
 5474  022030  000406                          BR      TST46           ;;GO TO NEXT TEST
 5475  022032  005037  172516          3$:     CLR     MMR3
 5476  022036  005037  177572                  CLR     MMR0
 5477  022042  022626                          CMP     (SP)+,(SP)+     ;RESTORE THE SP
 5478  022044  104133                          ERROR   133             ;EITHER SAPK I SPACEA (0) NOT GOING
 5479                                                                  ;LOW OR MB138-YA
 5480                                                                  ;NOT INSTALLED.
 5481
 5482                                  ;;*****************************************************************
 5483                                  ;*TEST 46       FP AND MGMT TRAP ARBITRATION
 5484                                  ;*
 5485                                  ;*      THIS TEST ENSURES THAT TMCA HONOR SEGT CAUSES TMCA HONOR
 5486                                  ;*      FP TRAP TO GO HIGH.
 5487                                  ;*      THIS IS DONE BY SETTING THE FP TRAP WITH A MINUS ZERO TRAP AND
 5488                                  ;*      THEN CAUSING A MEMORY MANAGEMENT TRAP.
 5489                                  ;*
 5490                                  ;*      NOTE: SWITCH 12 SKIPS THIS TEST
 5491                                  ;;*****************************************************************
 5492  022046  000004                  TST46:  SCOPE
 5493  022050  012737  000046  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
 5494  022056  012737  022252  001222          MOV     #TST47,$ESCAPE  ;;ESCAPE TO TEST 47 ON ERROR
 5495  022064  032777  010000  157044          BIT     #SW12,@SWR      ;DISABLE THIS TEST?
 5496  022072  001067                          BNE     TST47           ;;BRANCH IF YES
 5497  022074  012737  022110  000004          MOV     #3$,ERRVEC      ;SET ERRVEC
 5498  022102  005737  177572                  TST     MMR0            ;MEMORY MANAGEMENT AVAILBLE?
 5499  022106  000402                          BR      4$              ;BRANCH IF YES
 5500  022110  022626                  3$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
 5501  022112  000457                          BR      TST47           ;;GO TO NEXT TEST
 5502  022114  012737  022206  000250  4$:     MOV     #1$,MMVEC       ;SET UP
 5503  022122  012737  022216  000244          MOV     #2$,FPPVEC      ;VECTORS
 5504  022130  012706  001100                  MOV     #STACK,SP
 5505  022134  012737  100000  077776          MOV     #100000,@#77776 ;PU DATA IN TEST ADDRESS
 5506  022142  012737  077404  172326          MOV     #77404,KDPDR3   ;MAKE PAGE 3 TRAP
 5507  022150  012737  022156  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 5508  022156  052737  000004  172516          BIS     #BIT2,MMR3      ;ENABLE D SPACE
 5509  022164  012737  001001  177572          MOV     #1001,MMR0      ;TURN ON MEMORY MGMT
 5510  022172  170127  004000                  LDFPS   #FIUV
 5511  022176  170537  077776                  TSTF    @#77776         ;EXECUTE FP INSTRUCTION TO CAUSE
 5512                                                                  ;MGMT & FP TRAP.
 5513  022202  000240                  NOP
 5514  022204  000240                  6$:     NOP                     ;WAIT FOR TRAP
 5515  022206  005037  177572          1$:     CLR     MMR0
 5516  022212  022626                          CMP     (SP)+,(SP)+     ;RESTORE THE SP
 5517  022214  104137                          ERROR   137             ;TMCA HONOR FP TRAP NOT GOING HIGH
 5518  022216  005037  177572          2$:     CLR     MMR0
 5519  022222  005037  172516                  CLR     MMR3
 5520  022226  022716  022206                  CMP     #1$,(SP)        ;DID MGMT TRAP OCCUR FIRST?
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```
5521  022232  001405                          BEQ     5$              ;BRANCH IF YES
5522  022234  012706  001100                  MOV     #STACK,SP       ;RESTORE THE SP
5523  022240  005037  177572                  CLR     MMR0
5524  022244  104144                          ERROR   144             ;OUT OF SEQUENCE
5525  022246  012706  001100          5$:     MOV     #STACK,SP       ;RESTORE THE SP
5526
5527                                  ;;**********************************************************************
5528                                  ;*TEST 47       FPA AND FEA
5529                                  ;*
5530                                  ;*      THIS TEST EXECUTES TWO PIECES OF CODE IN DIFFERENT PARTS OF
5531                                  ;*      THE PROGRAM TO TEST THE FPA AND FEA REGISTERS.  THIS TEST
5532                                  ;*      SETS UP THE DATA AND FP VECTOR AND THEN JUMPS TO
5533                                  ;*      THE APPROPRIATE LOCATIONS.  THESE TWO PARTICULAR LOCATIONS CONTAIN
5534                                  ;*      CODE TO CAUSE A 25252 (125252 IF MORE THAN 16K OF MEMORY IS AVAILABLE)
5535                                  ;*      AND 52524 PATTERN TO PLACED IN THE FPA AND THE INSTRUCTION
5536                                  ;*      WILL CAUSE THIS PATTERN TO BE PUT IN THE FEA.
5537                                  ;;**********************************************************************
5538  022252  000004                  TST47:  SCOPE
5539  022254  012737  000047  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
5540  022262  012737  022504  001222          MOV     #TST50,$ESCAPE  ;;ESCAPE TO TEST 50 ON ERROR
5541  022270  012737  022406  000244          MOV     #1$,FPPVEC      ;SETUP FP VECTOR
5542  022276  012737  022356  000004          MOV     #4$,ERRVEC      ;SETUP ERROR VEC
5543  022304  005737  125252                  TST     @#125252        ;16K AVAILABLE?
5544  022310  012737  125252  022404          MOV     #125252,5$      ;YES
5545  022316  012737  125252  022420          MOV     #125252,6$
5546  022324  012737  125252  022426          MOV     #125252,7$
5547  022332  012737  170016  125252          MOV     #170016,@#125252;PUT ILLEGAL INSTRUCTION AT ADDRESS
5548  022340  012737  000240  125254          MOV     #240,@#125254
5549  022346  012737  000240  125256          MOV     #240,@#125256
5550  022354  000412                          BR      8$
5551  022356  022626                  4$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5552  022360  012737  025252  022404          MOV     #25252,5$
5553  022366  012737  025252  022420          MOV     #25252,6$
5554  022374  012737  025252  022426          MOV     #25252,7$
5555  022402  000137                  8$:     JMP     @(PC)+          ;GO EXECUTE ILLEGAL INSTRUCTION
5556  022404  125252                  5$:     .WORD   125252          ;MIGHT GET CHANGED
5557  022406  022626                  1$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5558  022410  170337  001204                  STST    $TMP2           ;GET FEA
5559  022414  023727  001206                  CMP     $TMP3,(PC)+     ;FEA OK?
5560  022420  125252                  6$:     .WORD   125252
5561  022422  001405                          BEQ     2$              ;BRANCH IF YES
5562  022424  012700                          MOV     (PC)+,R0        ;
5563  022426  125252                  7$:     .WORD   125252
5564  022430  010037  001200                  MOV     R0,$TMP0
5565  022434  104145                          ERROR   145             ;BIT STUCK IN FPA OR FEA REGISTER
5566  022436  012737  022456  000244  2$:     MOV     #3$,FPPVEC
5567  022444  012737  022452  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
5568  022452  000137  052524                  JMP     @#52524         ;GO EXECUTE INSTRUCTION TO LOAD FEA
5569  022456  022626                  3$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5570  022460  170337  001204                  STST    $TMP2           ;GET THE FEA
5571  022464  022737  052524  001206          CMP     #52524,$TMP3    ;FEA OK?
5572  022472  001404                          BEQ     TST50           ;;BRANCH IF YES
5573  022474  012737  052524  001200          MOV     #52524,$TMP0    ;SAVE EXPECTED VALUE
5574  022502  104145                          ERROR   145             ;BIT STUCK IN FEA
5575
5576                                  ;;**********************************************************************
```

```
                                        ;*TEST 50       FXPB IMMEDIATE (MODE 1 & 4)
                                        ;*
                                        ;*      THIS TEST ENSURES THAT FXPB IMMEDIATE GOES HIGH FOR
                                        ;*      ADDRESS MODE 1 AND 4.
                                        ;;************************************************************
022504  000004                          TST50:  SCOPE
022506  012737  000200  001220                  MOV     #200,$TIMES             ;;DO 200 ITERATIONS
022514  012737  000050  001240                  MOV     #$TN-1,$TESTN           ;;SET TEST NUMBER IN  MAIL BOX
022522  012737  022560  001222                  MOV     #TST51,$ESCAPE          ;;ESCAPE TO TEST 51 ON ERROR
022530  012737  174037  001200                  MOV     #174037,$TMP0           ;SAVE EXPECTED VALUE
022536  005037  001202                          CLR     $TMP1                   ;OF RESULT
022542  012737  022550  001110                  MOV     #.+6,@#$LPERR           ;SET ERROR LOOP
022550  170400                                  CLRF    AC0                     ;INITIALIZE AC0
022552  172417                          1$:     LDF     (PC),AC0                ;EXECUTE INSTRUCTION UNDER TEST
022554  174037  001204                          STF     AC0,$TMP2               ;GET DATA BACK
022560  173437  001200                          CMPF    $TMP0,AC0               ;RESULT OK?
022564  170000                                  CFCC
022566  001401                                  BEQ     2$                      ;BRANCH IF YES
022570  104146                                  ERROR   146                     ;MODE 1 DID NOT CAUSE FXPB IMMEDIATE
                                                                                ;TO GO TRUE

                                        ;MODE 1 OK-NOW CHECK MODE4
022572  012737  172447  001200          2$:     MOV     #172447,$TMP0           ;SAVE EXPECTED
022600  012737  022632  000100                  MOV     #3$,LKVEC
022606  005037  001202                          CLR     $TMP1                   ;VALUE OF DATA
022612  012737  022620  001110                  MOV     #.+6,@#$LPERR           ;SET ERROR LOOP
022620  170400                                  CLRF    AC0                     ;INITIALIZE AC0
022622  000230                                  SPL     0                       ;ENSURE PRIORITY AT 0
022624  004737  034324                          JSR     PC,GETTIK               ;START CLOCK
022630  172447                                  LDF     -(PC),AC0               ;EXECUTE INSTRUCTION UNDER TEST
022632  022626                          3$:     CMP     (SP)+,(SP)+             ;RESTORE THE SP
022634  042737  000100  177546                  BIC     #BIT6,LKSTAT            ;CLEAR I.E. BIT IN CLOCK STATUS
022642  174037  001204                          STD     AC0,$TMP2               ;GET DATA BACK
022646  173437  001200                          CMPF    $TMP0,AC0               ;RESULT OK?
022652  170000                                  CFCC
022654  001401                                  BEQ     TST51                   ;;BRANCH IF YES
022656  104147                                  ERROR   147                     ;MODE 4 DID NOT CAUSE FXPB
                                                                                ;IMMEDIATE TO GO TRUE.


                                        ;;************************************************************
                                        ;*TEST 51       FMM *USER MODE
                                        ;*
                                        ;*      THIS TEST ENSURES THAT FRLN FMM(1) DOES NOT GO HIGH IN
                                        ;*      SUPERVISOR OR USER MODE.
                                        ;;************************************************************
022660  000004                          TST51:  SCOPE
022662  012737  000051  001240                  MOV     #$TN-1,$TESTN           ;;SET TEST NUMBER IN  MAIL BOX
022670  012737  022740  001222                  MOV     #TST52,$ESCAPE          ;;ESCAPE TO TEST 52 ON ERROR
022676  012737  147757  001200                  MOV     #147757,$TMP0           ;SAVE EXPECTED VALUE
022704  012737  140000  177776                  MOV     #140000,PSW             ;PUT PROCESSOR IN USER MODE
022712  170127  177777                          LDFPS   #-1                     ;TRY AND LOAD FMM BIT
022716  170237  001202                          STFPS   $TMP1                   ;GET FPS BACK
022722  005037  177776                          CLR     PSW                     ;GO BACK TO KERNEL MODE
022726  022737  147757  001202                  CMP     #147757,$TMP1           ;FPS LOAD OK?
022734  001401                                  BEQ     TST52                   ;;BRANCH IF YES
022736  104150                                  ERROR   150                     ;PDRD PS14 NOT DISABLING FXPN
                                                                                ;FMM(1) H
```

```
                                        ;;*****************************************************************
                                        ;*TEST 52        ACCUMULATOR ADDRESSING
                                        ;*
                                        ;*      THIS TEST CHECKS THE LOGIC THAT DRIVES THE ACCUMULATOR ADDRESS
                                        ;*      LINES ON FXPN THAT HAVE NOT ALREADY BEEN TESTED.
                                        ;*****************************************************************
022740  000004                          TST52:  SCOPE
022742  012737  000052  001240                  MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
022750  012737  023034  001222                  MOV     #TST53,$ESCAPE  ;;ESCAPE TO TEST 53 ON ERROR
                                        ;SECTION 1
                                        ;FXPN ACS1=ACF0(1)H *FIRB07(1)H
                                        ;FXPN ACS0=ACF0(1)H *FIRB06(1)H
022756  172727  037600                          LDF     #^037600,AC3    ;INITIALIZE AC3
022762  172627  040000                          LDF     #^040000,AC2    ;INITIALIZE AC2
022766  172527  040200                          LDF     #^040200,AC1    ;INITIALIZE AC1
022772  012737  023000  001110                  MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
023000  005000                                  CLR     R0              ;INIT R0
023002  175300                          1$:     STEXP   AC3,R0          ;EXECUTE INSTRUCTION UNDER TEST
023004  022700  177777                          CMP     #-1,R0          ;RESULT OK?
023010  001411                                  BEQ     TST53           ;;BRANCH IF YES
023012  012737  177777  001200                  MOV     #-1,$TMP0       ;SAVE EXPECTED VALUE
023020  010037  001202                          MOV     R0,$TMP1        ;SAVE RECEIVED VALUE
023024  005700                                  TST     R0              ;DID R0 GET EXP OF AC2?
023026  001001                                  BNE     2$              ;BRANCH IF NO
023030  104151                                  ERROR   151             ;FXPN ACS0 NOT GOING HIGH
023032  104152                          2$:     ERROR   152             ;FXPN ACS1 NOT GOING HIGH

                                        ;;*****************************************************************
                                        ;*TEST 53        ACCUMULATOR VOLATILITY
                                        ;*
                                        ;*      THIS TEST EXECUTES THE WALKING ONE'S AND ZERO'S ALGORITHM
                                        ;*      ON THE FLOATING POINT ACCUMULATORS.
                                        ;*****************************************************************
023034  000004                          TST53:  SCOPE
023036  012737  000053  001240                  MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
023044  012737  023524  001222                  MOV     #TST54,$ESCAPE  ;;ESCAPE TO TEST 54 ON ERROR
                                        ;INITIALIZE THE BUFFER
023052  012700  002112                          MOV     #WALKBUF,R0     ;PUT ADDRESS OF BUFFER IN R0
023056  012701  000006                          MOV     #6,R1           ;SET LOOP COUNT
023062  170011                                  SETD
023064  172427  040000                          LDD     #^040000,AC0    ;PUT INITAIL DATA IN R0
023070  174020                          12$:    STD     AC0,(R0)+       ;INITAILIZE BUFFER
023072  077102                                  SOB     R1,12$          ;CONTINUE
023074  012700  002112                          MOV     #WALKBUF,R0
023100  010002                                  MOV     R0,R2           ;SAVE ADDRESS OF ONE'S
023102  012720  077777                          MOV     #77777,(R0)+    ;INITIALIZE
023106  012720  177777                          MOV     #-1,(R0)+       ;THE DATA
023112  012720  177777                          MOV     #-1,(R0)+       ;FOR AC5
023116  012720  177777                          MOV     #-1,(R0)+       ;   *
023122  012737  023130  001110                  MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
                                        ;LOAD THE ACCUMULATORS
023130  012700  002112                  5$:     MOV     #WALKBUF,R0
023134  172420                                  LDD     (R0)+,AC0
023136  174005                                  STD     AC0,AC5
023140  172420                                  LDD     (R0)+,AC0
```

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5689  023142  174004                          STD     AC0,AC4
5690  023144  172720                          LDD     (R0)+,AC3
5691  023146  172620                          LDD     (R0)+,AC2
5692  023150  172520                          LDD     (R0)+,AC1
5693  023152  172420                          LDD     (R0)+,AC0
5694                                  ;NOW CHECK THE DATA IN THE ACCUMULATORS
5695  023154  173440                          CMPD    -(R0),AC0
5696  023156  170000                          CFCC
5697  023160  001064                          BNE     6$
5698  023162  173540                          CMPD    -(R0),AC1
5699  023164  170000                          CFCC
5700  023166  001061                          BNE     6$
5701  023170  173640                          CMPD    -(R0),AC2
5702  023172  170000                          CFCC
5703  023174  001056                          BNE     6$
5704  023176  173740                          CMPD    -(R0),AC3
5705  023200  170000                          CFCC
5706  023202  001053                          BNE     6$
5707  023204  172404                          LDD     AC4,AC0
5708  023206  173440                          CMPD    -(R0),AC0
5709  023210  170000                          CFCC
5710  023212  001047                          BNE     6$
5711  023214  172405                          LDD     AC5,AC0
5712  023216  173440                          CMPD    -(R0),AC0
5713  023220  170000                          CFCC
5714  023222  001043                          BNE     6$
5715                                  ;NOW CHANGE THE DATA PATTERN
5716  023224  032777  001000  155704          BIT     #BIT9,@SWR      ;LOOP ON ERROR?
5717  023232  001403                          BEQ     1$              ;BRANCH IF NO
5718  023234  105737  001103                  TSTB    $ERFLG          ;ANY ERRORS?
5719  023240  001333                          BNE     5$              ;BRANCH IF YES
5720  023242  012700  002112          1$:     MOV     #WALKBUF,R0
5721  023246  020002                  3$:     CMP     R0,R2           ;IS THIS WORD THE TEST PATTERN?
5722  023250  001403                          BEQ     2$              ;BRANCH IF YES
5723  023252  062700  000010                  ADD     #10,R0
5724  023256  000773                          BR      3$
5725  023260  022700  002162          2$:     CMP     #$AC0,R0        ;LAST ACCUMULATOR?
5726  023264  001465                          BEQ     4$              ;BRANCH IF YES
5727  023266  172422                          LDD     (R2)+,AC0       ;SAVE THIS PATTERN
5728  023270  174012                          STD     AC0,(R2)        ;MOVE TO NEXT WORD
5729  023272  005760  000002                  TST     2(R0)           ;IS BACKGROUND ONE'S OR ZERO'S?
5730  023276  001404                          BEQ     7$              ;BRANCH IF ONE'S;PATTERN IS ZERO)
5731  023300  170410                          CLRD    (R0)            ;BACKGROUND IS ZERO
5732  023302  052710  040000                  BIS     #BIT14,(R0)     ;MAKE EXPONENT NOW ZERO
5733  023306  000710                          BR      5$              ;CONTINUE
5734  023310  012720  077777          7$:     MOV     #77777,(R0)+    ;BACKGROUND IS
5735  023314  012720  177777                  MOV     #-1,(R0)+       ;ALL ONE'S
5736  023320  012720  177777                  MOV     #-1,(R0)+       ;    *
5737  023324  012720  177777                  MOV     #-1,(R0)+       ;    *
5738  023330  000677                          BR      5$              ;CONTINUE
5739                                  ;;*****************************************************************
5740                                  ;THIS ROUTINE DETERMINES WHICH ACCUMULATOR FAILED
5741                                  ;AND SAVES THE CONTENTS OF THAT ACCUMULATOR IN $TMP4
5742                                  ;AND SAVES THE EXPECTED VALUE IN $TMP0.
5743  023332  010003                  6$:     MOV     R0,R3           ;SAVE R0
5744  023334  042737  000300  023424          BIC     #300,8$         ;INSURE SRC FIELD OF STD INSTRUCTION = AC0
```

```
5745  023342  042737  000007  023422          BIC     #7,9$           ;INSURE SRC FIELD OF LDD INSTR = ACC
5746  023350  162700  002172                  SUB     #WALKBUF+60,R0  ;CALCULATE THE
5747  023354  005400                          NEG     R0              ;ACC NUMBER THAT
5748  023356  072027  177775                  ASH     #-3,R0          ;FAILED
5749  023362  010037  001172                  MOV     R0,$REG5        ;SAVE FOR TYPEOUT
5750  023366  000337  001172                  SWAB    $REG5           ;PUT IN HIGH
5751  023372  006337  001172                  ASL     $REG5           ;BYTE OF REG5
5752  023376  022700  000003                  CMP     #3,R0           ;IS IT GREATER THAN 3?
5753  023402  002405                          BLT     10$             ;BRANCH IF YES
5754  023404  072027  000006                  ASH     #6,R0           ;SHIFT TO SRC FIELD OF STD INSTR.
5755  023410  050037  023424                  BIS     R0,8$           ;INSERT INTO SRC FIELD
5756  023414  000403                          BR      8$              ;GO SAVE IT
5757  023416  050037  023422          10$:    BIS     R0,9$           ;INSERT INTO SRC FIELD OF LDD INSTR
5758  023422  172400                  9$:     LDD     AC0,AC0         ;SRC GETS CHANGED
5759  023424  174037  001210          8$:     STD     AC0,$TMP4       ;SRC GETS CHANGED
5760  023430  172440                          LDD     -(R0),AC0       ;GET EXPECTED DATA
5761  023432  174037  001200                  STD     AC0,$TMP0       ;SAVE FOR TYPEOUT
5762  023436  104153                          ERROR   153             ;ACCUMULATOR CHIP FAILED
5763                                  ;;**************************************************************
5764  023440  012700  002112          4$:     MOV     #WALKBU,R0
5765  023444  022710  077777                  CMP     #77777,(R0)     ;DONE WITH TEST?
5766  023450  001425                          BEQ     TST54           ;;BRANCH IF YES
5767                                  ;CHANGE TO A BACKGROUND OF ALL ONE'S
5768  023452  012701  000006                  MOV     #6,R1           ;SET LOOP COUNT
5769  023456  012720  077777                  MOV     #77777,(R0)+
5770  023462  012720  177777                  MOV     #-1,(R0)+
5771  023466  012720  177777                  MOV     #-1,(R0)+
5772  023472  012720  177777                  MOV     #-1,(R0)+
5773  023476  172440                          LDD     -(R0),AC0
5774  023500  174020                  11$:    STD     AC0,(R0)+       ;INITIALIZE BUFFER
5775  023502  077102                          SOB     R1,11$          ;CONTINUE
5776  023504  012700  002112                  MOV     #WALKBU,R0      ;
5777  023510  010002                          MOV     R0,R2           ;
5778  023512  170410                          CLRD    (R0)            ;PUT ZERO PATTERN IN FIRST WORD
5779  023514  052710  040000                  BIS     #BIT14,(R0)     ;INSURE EXPONENT NON-ZERO
5780  023520  000137  023130                  JMP     5$              ;GO EXECUTE TEST
5781                                  .SBTTL
5782                                  ;;**************************************************************
5783                                  .SBTTL  A-BRANCH AND ADX ROM EXERCISER
5784                                  ;*      THE REMAINING SUBTESTS IN THIS PROGRAM TEST ALL THE
5785                                  ;*      LOCATIONS IN THE A-BRANCH AND ADX ROMS THAT HAVE NOT
5786                                  ;*      ALREADY BEEN TESTED.
5787                                  ;*      THE ENTIRE SEQUENCE IS FIRST EXECUTED ONCE. THEN, THE
5788                                  ;*      LINE (OR PROGRAMMABLE) CLOCK IS TURNED ON AND THIS SEQUENCE
5789                                  ;*      IS LOOPED ON FOR APPROXIMATELY 30 SECONDS. THE PURPOSE
5790                                  ;*      OF THIS IS TRY AND ENSURE THAT THE DSI BIT IN THE CONTROL
5791                                  ;*      STORE IS FUNCTIONAL IN ALL THE APPROPRIATE ROM STATES.
5792                                  ;;**************************************************************
5793                                  .SBTTL
5794
5795                                  ;;**************************************************************
5796                                  ;*TEST 54       A-BRANCH*ADX ROM EXERCISER
5797                                  ;;**************************************************************
5798  023524  000004                  TST54:  SCOPE
5799  023526  012737  000001  001220          MOV     #1,$TIMES       ;;DO 1 ITERATION
5800  023534  012737  000054  001240          MOV     #$TN-1,$TESTN   ;;SET TEST NUMBER IN  MAIL BOX
```

```
5801                                            ;FLOATING*INTEGER*MODE 0 INSTRUCTIONS
5802  023542  012737  032712  001222            MOV     #$EOP,$ESCAPE   ;;ESCAPE TO $EOP ON ERROR
5803  023550  170011                            SETD
5804  023552  170400                            CLRD    AC0
5805  023554  170401                            CLRD    AC1
5806  023556  170402                            CLRD    AC2
5807  023560  170403                            CLRD    AC3
5808  023562  170404                            CLRD    AC4
5809  023564  170405                            CLRD    AC5
5810  023566  170001                            SETF
5811  023570  005037  001366                    CLR     TICKS
5812  023574  005037  032606                    CLR     OUT
5813  023600  012737  023624  000244            MOV     #1$,FPPVEC      ;SET FPPVEC TO INSURE
5814  023606  012703  000042                    MOV     #42,R3          ;FEC CONTAINS A 16
5815  023612  170003                            LDUB
5816  023614  170127  000020                    LDFPS   #FMM
5817  023620  172500                            LDF     AC0,AC1
5818  023622  170000                            CFCC
5819  023624  012706  001100            1$:     MOV     #STACK,SP       ;RESTORE THE SP
5820  023630  012737  040200  001200  LOOP0:   MOV     #40200,$TMP0    ;INITIALIZE
5821  023636  005037  001202                    CLR     $TMP1           ;DATA IN MEMORY
5822  023642  170127  000000                    LDFPS   #0
5823  023646  172627  040000                    LDF     #^O040000,AC2   ;LOAD THE SRC
5824  023652  172702                            LDF     AC2,AC3         ;LOAD THE DST
5825  023654  174702                    1$:     DIVF    AC2,AC3         ;EXECUTE TEST
5826  023656  173737  001200                    CMPF    $TMP0,AC3       ;RESULT OK?
5827  023662  170000                            CFCC
5828  023664  001403                            BEQ     100$            ;BRANCH IF YES
5829  023666  174337  001204                    STF     AC3,$TMP2       ;SAVE RECEIVED DATA
5830  023672  104024                            ERROR   24              ;RESULT WRONG
5831
5832                                            ;;*****************************************************************
5833                                            ;FLOATING*INTEGER*NOT MODE 0*NOT IMMEDIATE INSTRUCTIONS
5834  023674  012700  001200            100$:   MOV     #$TMP0,R0       ;PUT ADDRESS OF DATA IN R0
5835  023700                            LABLE1:
5836  023700  170127  000017                    LDFPS   #17             ;LOAD COMPLIMENT CC'S
5837  023704  170520                    1$:     TSTF    (R0)+           ;EXECUTE TEST
5838  023706  170237  001202                    STFPS   $TMP1           ;SAVE CC'S
5839  023712  022700  001204                    CMP     #$TMP2,R0       ;ADX ROM OK?
5840  023716  001401                            BEQ     2$              ;BRANCH IF YES
5841  023720  104004                            ERROR   4               ;ADX ROM FAILED
5842  023722  005737  001202            2$:     TST     $TMP1           ;CC'S OK?
5843  023726  001403                            BEQ     99$             ;BRANCH IF YES
5844  023730  005037  001200                    CLR     $TMP0           ;SAVE EXPECTED VALUE
5845  023734  104003                            ERROR   3               ;CC'S BAD
5846
5847                                            ;;*****************************************************************
5848                                            ;FLOATING*INTEGER*NOT MODE ZERO*IMMEDIATE
5849  023736  012737  023722  000010    99$:    MOV     #2$,RESVEC      ;SET RESVEC
5850  023744                            LABLE2:
5851  023744  170127  000017                    LDFPS   #17             ;LOAD COMPLIMENT CC'S
5852  023750  170527                    1$:     TSTF    (PC)+           ;EXECUTE TEST
5853  023752  076777                            .WORD   76777
5854  023754  000405                            BR      3$
5855  023756  104004                            ERROR   4               ;ADX ROM FAILED
5856  023760  104004                            ERROR   4               ;       *
```

```
5857  023762  104004                          ERROR   4               ;       *
5858  023764  022626                  2$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5859  023766  104004                          ERROR   4               ;ADX ROM FAILED
5860  023770  012737  024016  000010  3$:     MOV     #4$,RESVEC      ;SET RESVEC
5861  023776  172627  040000                  LDF     #^O040000,AC2   ;LOAD THE DST
5862  024002  171627                          MODF    (PC)+,AC2       ;EXECUTE THE TEST
5863  024004  076777                          .WORD   76777
5864  024006  000405                          BR      5$
5865  024010  104004                          ERROR   4               ;ADX ROM FAILED
5866  024012  104004                          ERROR   4               ;       *
5867  024014  104004                          ERROR   4               ;       *
5868  024016  022626                  4$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5869  024020  104004                          ERROR   4               ;ADX ROM FAILED
5870  024022  012737  024054  000010  5$:     MOV     #6$,RESVEC
5871  024030  005037  024042                  CLR     8$
5872  024034  172727  041600                  LDF     #^O041600,AC3   ;INIT THE SRC
5873  024040  175327                          STEXP   AC3,(PC)+       ;EXECUTE THE TEST
5874  024042  000000                  8$:     .WORD   0
5875  024044  000405                          BR      7$
5876  024046  104004                          ERROR   4               ;ADX ROM FAILED
5877  024050  104004                          ERROR   4               ;       *
5878  024052  104004                          ERROR   4               ;       *
5879  024054  022626                  6$:     CMP     (SP)+,(SP)+     ;RESTORE THE SP
5880  024056  104004                          ERROR   4               ;ADX ROM FAILED
5881  024060  022737  000007  024042  7$:     CMP     #7,8$           ;DATA OK?
5882  024066  001407                          BEQ     9$              ;BRANCH IF YES
5883  024070  012737  000007  001200          MOV     #7,$TMP0
5884  024076  013737  024042  001202          MOV     8$,$TMP1
5885  024104  104162                          ERROR   162             ;DATA BAD
5886  024106  012737  024140  000010  9$:     MOV     #10$,RESVEC
5887  024114  005037  024126                  CLR     11$
5888  024120  177227  000007                  LDCIF   #7,AC2          ;INIT AC2
5889  024124  175627                          STCFI   AC2,(PC)+       ;EXECUTE TEST
5890  024126  000000                  11$:    .WORD   0
5891  024130  000405                          BR      12$
5892  024132  104004                          ERROR   4               ;ADX ROM FAILED
5893  024134  104004                          ERROR   4               ;       *
5894  024136  104004                          ERROR   4               ;       *
5895  024140  022626                  10$:    CMP     (SP)+,(SP)+     ;RESTORE THE SP
5896  024142  104004                          ERROR   4               ;ADX ROM FAILED
5897  024144  022737  000007  024126  12$:    CMP     #7,11$          ;RESULT OK?
5898  024152  001407                          BEQ     13$             ;BRANCH IF YES
5899  024154  012737  000007  001200          MOV     #7,$TMP0
5900  024162  013737  024126  001202          MOV     11$,$TMP1
5901  024170  104162                          ERROR   162             ;RESULT WRONG
5902  024172  012737  024216  000010  13$:    MOV     #14$,RESVEC
5903  024200  170401                          CLRF    AC1             ;INIT AC1
5904  024202  177527                          LDCDF   (PC)+,AC1       ;EXECUTE TEST
5905  024204  076777                          .WORD   76777
5906  024206  000405                          BR      15$
5907  024210  104004                          ERROR   4               ;ADX ROM FAILED
5908  024212  104004                          ERROR   4               ;       *
5909  024214  104004                          ERROR   4               ;       *
5910  024216  022626                  14$:    CMP     (SP)+,(SP)+     ;RESTORE THE SP
5911  024220  104004                          ERROR   4               ;ADX ROM FAILED
5912  024222  173527  076777          15$:    CMPF    #^O076777,AC1   ;RESULT OK?
```

```
5913  024226  170000                          CFCC
5914  024230  001406                          BEQ     98$                 ;BRANCH IF YES
5915  024232  012737  076777  001200          MOV     #76777,$TMP0
5916  024240  174137  001204                  STF     AC1,$TMP2
5917  024244  104024                          ERROR   24                  ;RESULT WRONG
5918
5919                                  ;;*****************************************************************
5920                                  ;MODE 0 INSTRUCTIONS
5921  024246  012737  000140  001364  98$:    MOV     #140,$FPS           ;INIT TEST FPS
5922  024254                          LABLE3:
5923  024254  005004                  LOOP1:  CLR     R4                  ;INIT R4
5924  024256  052737  000017  001364          BIS     #17,$FPS            ;SET CC'S IN FPS
5925  024264  013737  001364  001200          MOV     $FPS,$TMP0
5926  024272  042737  000300  001200          BIC     #FL+FD,$TMP0
5927  024300  012737  024306  001110          MOV     #.+6,@#$LPERR       ;SET ERROR LOOP
5928  024306  170137  001364                  LDFPS   $FPS                ;SET FPS
5929  024312  170001                          SETF
5930  024314  170002                          SETI                        ;EXECUTE TEST
5931  024316  170237  001202                  STFPS   $TMP1               ;GET FPS BACK
5932  024322  023737  001200  001202          CMP     $TMP0,$TMP1         ;FPS OK?
5933  024330  001401                          BEQ     1$                  ;BRANCH IF YES
5934  024332  104003                          ERROR   3                   ;DATA WRONG
5935  024334  013700  001364          1$:     MOV     $FPS,R0
5936  024340  170100                          LDFPS   R0
5937  024342  170201                          STFPS   R1                  ;EXECUTE TEST
5938  024344  023701  001364                  CMP     $FPS,R1             ;RESULT OK?
5939  024350  001406                          BEQ     2$                  ;BRANCH IF YES
5940  024352  010137  001202                  MOV     R1,$TMP1            ;SAVE RECEIVED DATA
5941  024356  013737  001364  001200          MOV     $FPS,$TMP0          ;SAVE EXPECTED DATA
5942  024364  104162                          ERROR   162                 ;DATA WRONG
5943  024366                          2$:
5944  024366  012737  024374  001110          MOV     #.+6,@#$LPERR       ;SET ERROR LOOP
5945  024374  005000                          CLR     R0                  ;INIT R0
5946  024376  170104                          LDFPS   R4                  ;CLEAR FPS
5947  024400  170137  001364                  LDFPS   $FPS
5948  024404  170300                          STST    R0                  ;EXECUTE TEST
5949  024406  022700  000016                  CMP     #16,R0              ;FEC OK?
5950  024412  001406                          BEQ     3$                  ;BRANCH IF YES
5951  024414  010037  001204                  MOV     R0,$TMP2            ;SAVE RECEIVED VALUE
5952  024420  012737  000016  001200          MOV     #16,$TMP0           ;SAVE EXPECTED VALUE
5953  024426  104101                          ERROR   101                 ;FEC WRONG
5954  024430                          3$:
5955  024430  012737  024436  001110          MOV     #.+6,@#$LPERR       ;SET ERROR LOOP
5956  024436  170104                          LDFPS   R4                  ;CLEAR FPS
5957  024440  005037  001200                  CLR     $TMP0               ;INIT $TEMP0
5958  024444  172727  040000                  LDF     #^O40000,AC3        ;INIT AC3
5959  024450  170137  001364                  LDFPS   $FPS
5960  024454  170403                          CLRF    AC3                 ;EXECUTE TEST
5961  024456  170104                          LDFPS   R4                  ;CLEAR FPS
5962  024460  170503                          TSTF    AC3                 ;RESULT OK?
5963  024462  170000                          CFCC
5964  024464  001405                          BEQ     4$                  ;BRANCH IF YES
5965  024466  170437  001200                  CLRF    $TMP0               ;SAVE EXPECTED VALUE
5966  024472  174337  001204                  STF     AC3,$TMP2           ;SAVE RECEIVED VALUE
5967  024476  104024                          ERROR   24                  ;RESULT WRONG
5968  024500                          4$:
```

```
 5969  024500  012737  024506  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 5970  024506  172627  040000                  LDF     #^O040000,AC2   ;INIT AC2
 5971  024512  170137  001364                  LDFPS   $FPS
 5972  024516  170502                          TSTF    AC2             ;EXECUTE TEST
 5973  024520  170200                          STFPS   R0              ;GET CC'S BACK
 5974  024522  042700  177760                  BIC     #177760,R0
 5975  024526  170104                          LDFPS   R4
 5976  024530  005700                          TST     R0              ;CC'S OK?
 5977  024532  001405                          BEQ     5$              ;BRANCH IF YES
 5978  024534  005037  001200                  CLR     $TMP0           ;SAVE EXPECTED VALUE
 5979  024540  010037  001202                  MOV     R0,$TMP1        ;SAVE RECEIVED VALUE
 5980  024544  104003                          ERROR   3               ;CC'S BAD
 5981  024546                          5$:
 5982  024546  012737  024554  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 5983  024554  172427  140000                  LDF     #^O0140000,AC0  ;INIT AC0
 5984  024560  170137  001364                  LDFPS   $FPS
 5985  024564  170600                          ABSF    AC0             ;EXECUTE TEST
 5986  024566  170104                          LDFPS   R4
 5987  024570  170500                          TSTF    AC0             ;RESULT OK?
 5988  024572  170000                          CFCC
 5989  024574  100006                          BPL     6$              ;BRANCH IF YES
 5990  024576  174037  001204                  STF     AC0,$TMP2       ;SAVE RECEIVED VALUE
 5991  024602  012737  040000  001200          MOV     #40000,$TMP0
 5992  024610  104024                          ERROR   24              ;DATA WRONG
 5993  024612                          6$:
 5994  024612  012737  024620  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 5995  024620  172527  140000                  LDF     #^O0140000,AC1  ;INIT AC1
 5996  024624  170137  001364                  LDFPS   $FPS
 5997  024630  170701                          NEGF    AC1             ;EXECUTE TEST
 5998  024632  170104                          LDFPS   R4
 5999  024634  170501                          TSTF    AC1             ;RESULT OK?
 6000  024636  170000                          CFCC
 6001  024640  100006                          BPL     7$              ;BRANCH IF YES
 6002  024642  174137  001204                  STF     AC1,$TMP2       ;SAVE RECEIVED VALUE
 6003  024646  012737  040000  001200          MOV     #40000,$TMP0
 6004  024654  104024                          ERROR   24
 6005  024656                          7$:
 6006  024656  012737  024664  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 6007  024664  172727  140177                  LDF     #^O0140177,AC3  ;INIT AC3
 6008  024670  012737  040200  001200          MOV     #40200,$TMP0
 6009  024676  005037  001202                  CLR     $TMP1
 6010  024702  172637  001200                  LDF     $TMP0,AC2       ;INIT AC2
 6011  024706  170137  001364                  LDFPS   $FPS
 6012  024712  171203                          MULF    AC3,AC2         ;EXECUTE TEST
 6013  024714  170104                          LDFPS   R4
 6014  024716  173627  140177                  CMPF    #^O0140177,AC2  ;RESULT OK?
 6015  024722  170000                          CFCC
 6016  024724  001406                          BEQ     8$              ;BRANCH IF YES
 6017  024726  174237  001204                  STF     AC2,$TMP2       ;SAVE RESULT
 6018  024732  012737  140177  001200          MOV     #140177,$TMP0
 6019  024740  104024                          ERROR   24              ;RESULT WRONG
 6020  024742                          8$:
 6021  024742  012737  024750  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 6022  024750  172627  142177                  LDF     #^O0142177,AC2  ;INIT AC2
 6023  024754  172537  001200                  LDF     $TMP0,AC1       ;INIT AC1
 6024  024760  170137  001364                  LDFPS   $FPS
```

```
 6025  024764  171601                          MODF    AC1,AC2         ;EXECUTE TEST
 6026  024766  170104                          LDFPS   R4
 6027  024770  170502                          TSTF    AC2             ;FRACTION ZERO?
 6028  024772  170000                          CFCC
 6029  024774  001531                          BEQ     9$              ;BRANCH IF YES
 6030  024776  174237  001204                  STF     AC2,$TMP2       ;SAVE RESULT
 6031  025002  005037  001200                  CLR     $TMP0
 6032  025006  104024                          ERROR   24              ;RESULT WRONG
 6033          025010                  X14=.
 6034                                  ;;**********************************************************************
 6035                                  ;;**********************************************************************
 6036                                  ;;**********************************************************************
 6037                                  ;;**********************************************************************
 6038                                  ;THIS WORD IS USED TO TEST THE FPC AND FEA REGISTERS.
 6039                                  ;IT MUST BE ASSEMBLED PRIOR TO THE PREVIOUS CODE REACHING
 6040                                  ;ADDRESS 25252. IF NOT, AN ERROR MESSAGE IS TYPED DURING
 6041                                  ;THE ASSEMBLY.
 6042
 6043
 6044
 6045
 6046          025252                  .=25252
 6047  025252  170016                          .WORD   170016
 6048  025254  000240                          NOP
 6049  025256  000240                          NOP
 6050
 6051
 6052
 6053                                  ;;**********************************************************************
 6054                                  ;;**********************************************************************
 6055  025260                          9$:
 6056  025260  012737  025266  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 6057  025266  170011                          SETD
 6058  025270  170403                          CLRD    AC3
 6059  025272  170001                          SETF
 6060  025274  170401                          CLRF    AC1             ;INIT AC1
 6061  025276  172727  040200                  LDF     #↑O40200,AC3    ;INIT AC3
 6062  025302  170137  001364                  LDFPS   $FPS
 6063  025306  172503                          LDF     AC3,AC1         ;EXECUTE TEST
 6064  025310  170104                          LDFPS   R4
 6065  025312  173527  040200                  CMPF    #↑O40200,AC1    ;RESULT OK?
 6066  025316  170000                          CFCC
 6067  025320  001403                          BEQ     10$             ;BRANCH IF YES
 6068  025322  174137  001204                  STF     AC1,$TMP2       ;SAVE RESULT
 6069  025326  104024                          ERROR   24              ;RESULT WRONG
 6070  025330                          10$:
 6071  025330  012737  025336  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 6072  025336  172627  040400                  LDF     #↑O40400,AC2    ;INIT AC2
 6073  025342  172727  040200                  LDF     #↑O40200,AC3    ;INIT AC3
 6074  025346  170137  001364                  LDFPS   $FPS
 6075  025352  173203                          SUBF    AC3,AC2         ;EXECUTE TEST
 6076  025354  170104                          LDFPS   R4
 6077  025356  173627  040200                  CMPF    #↑O40200,AC2    ;RESULT OK?
 6078  025362  170000                          CFCC
 6079  025364  001403                          BEQ     11$             ;BRANCH IF YES
 6080  025366  174237  001204                  STF     AC2,$TMP2       ;SAVE RESULT
```

```
 6081  025372  104024                                 ERROR   24              ;RESULT WRONG
 6082  025374                                 11$:
 6083  025374  012737  025402  001110                 MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 6084  025402  172727  040200                         LDF     #^O040200,AC3   ;INIT AC3
 6085  025406  172403                                 LDF     AC3,AC0         ;INIT AC0
 6086  025410  042737  000004  001364                 BIC     #BIT2,$FPS
 6087  025416  170137  001364                         LDFPS   $FPS
 6088  025422  173403                                 CMPF    AC3,AC0         ;EXECUTE TEST
 6089  025424  170000                                 CFCC
 6090  025426  001411                                 BEQ     12$             ;BRANCH IF RESULT OK
 6091  025430  170200                                 STFPS   R0
 6092  025432  042700  177760                         BIC     #177760,R0
 6093  025436  010037  001202                         MOV     R0,$TMP1
 6094  025442  012737  000004  001200                 MOV     #F2,$TMP0
 6095  025450  104003                                 ERROR   3               ;CC'S BAD
 6096  025452                                 12$:
 6097  025452  012737  025460  001110                 MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 6098  025460  170104                                 LDFPS   R4
 6099  025462  170401                                 CLRF    AC1             ;INIT AC1
 6100  025464  172627  040200                         LDF     #^O040200,AC2   ;INIT AC2
 6101  025470  170137  001364                         LDFPS   $FPS
 6102  025474  174201                                 STF     AC2,AC1         ;EXECUTE TEST
 6103  025476  173502                                 CMPF    AC2,AC1         ;RESULT OK?
 6104  025500  170000                                 CFCC
 6105  025502  001404                                 BEQ     13$             ;BRANCH IF YES
 6106  025504  170104                                 LDFPS   R4
 6107  025506  174137  001204                         STF     AC1,$TMP2       ;SAVE RESULT
 6108  025512  104024                                 ERROR   24              ;RESULT WRONG
 6109  025514                                 13$:
 6110  025514  012737  025522  001110                 MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 6111  025522  170104                                 LDFPS   R4
 6112  025524  172627  040400                         LDF     #^O040400,AC2   ;INIT AC2
 6113  025530  172702                                 LDF     AC2,AC3         ;INITAC3
 6114  025532  170137  001364                         LDFPS   $FPS
 6115  025536  174603                                 DIVF    AC3,AC2         ;EXECUTE TEST
 6116  025540  170104                                 LDFPS   R4
 6117  025542  173637  001200                         CMPF    $TMP0,AC2       ;RESULT OK?
 6118  025546  170000                                 CFCC
 6119  025550  001403                                 BEQ     14$             ;BRANCH IF YES
 6120  025552  174237  001204                         STF     AC2,$TMP2       ;SAVE RESULT
 6121  025556  104024                                 ERROR   24              ;RESULT WRONG
 6122  025560                                 14$:
 6123  025560  012737  025566  001110                 MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 6124  025566  005000                                 CLR     R0              ;INIT R0
 6125  025570  172727  077777                         LDF     #^O077777,AC3   ;INIT AC3
 6126  025574  170137  001364                         LDFPS   $FPS
 6127  025600  175300                                 STEXP   AC3,R0          ;EXECUTE TEST
 6128  025602  022700  000177                         CMP     #177,R0         ;RESULT OK?
 6129  025606  001406                                 BEQ     15$             ;BRANCH IF YES
 6130  025610  012737  000177  001200                 MOV     #177,$TMP0
 6131  025616  010037  001202                         MOV     R0,$TMP1
 6132  025622  104162                                 ERROR   162             ;RESULT WRONG
 6133                         ;;*************************************************************
 6134  025624                                 15$:
 6135  025624  012737  025632  001110                 MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 6136  025632  170104                                 LDFPS   R4
```

```
6137  025634  172627  040200                    LDF     #↑040200,AC2    ;INIT AC2
6138  025640  172427  077600                    LDF     #↑077600,AC0    ;INIT AC0
6139  025644  170137  001364                    LDFPS   $FPS
6140  025650  176200                           STCFD   AC2,AC0         ;EXECUTE TEST
6141  025652  173402                           CMPF    AC2,AC0         ;RESULT OK?
6142  025654  170000                           CFCC
6143  025656  001404                           BEQ     16$             ;BRANCH IF YES
6144  025660  170104                           LDFPS   R4
6145  025662  174037  001204                  STF     AC0,$TMP2       ;SAVE RESULT
6146  025666  104024                           ERROR   24              ;RESULT WRONG
6147  025670                            16$:
6148  025670  012737  025676  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6149  025676  170104                           LDFPS   R4
6150  025700  172727  077600                  LDF     #↑077600,AC3    ;INIT AC3
6151  025704  012704  000001                  MOV     #1,R4           ;INIT R4
6152  025710  170137  001364                  LDFPS   $FPS
6153  025714  176704                           LDEXP   R4,AC3          ;EXECUTE TEST
6154  025716  173702                           CMPF    AC2,AC3         ;RESULT OK?
6155  025720  170000                           CFCC
6156  025722  001406                           BEQ     17$             ;BRANCH IF YES
6157  025724  170104                           LDFPS   R4
6158  025726  174337  001204                  STF     AC3,$TMP2       ;SAVE RESULT
6159  025732  174237  001200                  STF     AC2,$TMP0
6160  025736  104024                           ERROR   24              ;RESULT WRONG
6161  025740                            17$:
6162  025740  012737  025746  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6163  025746  170104                           LDFPS   R4
6164  025750  032737  000100  001364          BIT     #FL,$FPS        ;FL BIT ON?
6165  025756  001403                           BEQ     127$            ;BRANCH IF NO
6166  025760  172627  044200                  LDF     #↑044200,AC2
6167  025764  000402                           BR      126$
6168  025766  172627  040200            127$:  LDF     #↑040200,AC2
6169  025772  170403                    126$:  CLRF    AC3             ;INIT AC3
6170  025774  012703  000001                  MOV     #1,R3           ;INIT R3
6171  026000  170137  001364                  LDFPS   $FPS
6172  026004  177303                           LDCLF   R3,AC3          ;EXECUTE TEST
6173  026006  173702                           CMPF    AC2,AC3         ;RESULT OK?
6174  026010  170000                           CFCC
6175  026012  001406                           BEQ     20$             ;BRANCH IF YES
6176  026014  170104                           LDFPS   R4
6177  026016  174337  001204                  STF     AC3,$TMP2       ;SAVE RESULT
6178  026022  174237  001200                  STF     AC2,$TMP0
6179  026026  104024                           ERROR   24              ;RESULT WRONG
6180  026030                            20$:
6181  026030  012737  026036  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6182  026036  170104                           LDFPS   R4
6183  026040  172527  140200                  LDF     #↑0140200,AC1   ;INIT AC1
6184  026044  005002                           CLR     R2              ;INIT R2
6185  026046  170137  001364                  LDFPS   $FPS
6186  026052  175502                           STCFI   AC1,R2          ;EXECUTE TEST
6187  026054  170104                           LDFPS   R4
6188  026056  022702  177777                  CMP     #-1,R2          ;RESULT OK?
6189  026062  001406                           BEQ     21$             ;BRANCH IF YES
6190  026064  012737  177777  001200          MOV     #-1,$TMP0
6191  026072  010237  001202                  MOV     R2,$TMP1
6192  026076  104162                           ERROR   162             ;RESULT WRONG
```

```
6193  026100                          21$:
6194  026100  012737  026106  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6195  026106  170400                          CLRF    AC0             ;INIT AC0
6196  026110  170137  001364                  LDFPS   $FPS
6197  026114  177401                          LDCFD   AC1,AC0         ;EXECUTE TEST
6198  026116  173401                          CMPF    AC1,AC0         ;RESULT OK?
6199  026120  170000                          CFCC
6200  026122  001406                          BEQ     22$             ;BRANCH IF YES
6201  026124  170104                          LDFPS   R4
6202  026126  174137  001200                  STF     AC1,$TMP0
6203  026132  174037  001204                  STF     AC0,$TMP2
6204  026136  104024                          ERROR   24              ;RESULT WRONG
6205  026140  022737  000353  001364  22$:    CMP     #353,$FPS       ;DONE?
6206  026146  001405                          BEQ     97$             ;BRANCH IF YES
6207  026150  062737  000100  001364          ADD     #BIT6,$FPS
6208  026156  000137  024254                  JMP     LOOP1           ;CONTINUE
6209
6210                                  ;;*****************************************************************
6211                                  ;NOT MODE 0 AND IMMEDIATE INSTRUCTIONS
6212  026162  012737  000100  001364  97$:    MOV     #100,$FPS       ;INIT $FPS
6213  026170                          LABLE4:
6214  026170  005004                          CLR     R4
6215  026172  170104                          LDFPS   R4
6216  026174  012737  030360  000010  LOOP2:  MOV     #63$,RESVEC     ;SETUP RESVEC
6217  026202  012737  026210  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6218  026210  170137  001364                  LDFPS   $FPS
6219  026214  170127                          LDFPS   (PC)+           ;EXECUTE TEST
6220  026216  000017                          .WORD   17
6221  026220  000403                          BR      1$
6222  026222  104004                          ERROR   4               ;ADX ROM FAILED
6223  026224  104004                          ERROR   4               ;       *
6224  026226  104004                          ERROR   4               ;       *
6225  026230  170200                  1$:     STFPS   R0
6226  026232  022700  000017                  CMP     #17,R0          ;DATA OK?
6227  026236  001407                          BEQ     2$              ;BRANCH IF YES
6228  026240  170104                          LDFPS   R4
6229  026242  010037  001202                  MOV     R0,$TMP1
6230  026246  012737  000017  001200          MOV     #17,$TMP0
6231  026254  104003                          ERROR   3
6232  026256  052737  007000  001364  2$:     BIS     #7000,$FPS      ;MAKE $FPS LOOK LIKE ILLEGAL INSTR
6233  026264  012737  026272  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6234  026272  005037  026304                  CLR     3$
6235  026276  170137  001364                  LDFPS   $FPS
6236  026302  170227                          STFPS   (PC)+           ;EXECUTE TEST
6237  026304  000000                  3$:     .WORD   0
6238  026306  000403                          BR      4$
6239  026310  104004                          ERROR   4               ;ADX ROM FAILED
6240  026312  104004                          ERROR   4               ;       *
6241  026314  104004                          ERROR   4               ;       *
6242  026316  170104                  4$:     LDFPS   R4
6243  026320  023737  001364  026304          CMP     $FPS,3$         ;DATA OK?
6244  026326  001407                          BEQ     5$              ;BRANCH IF YES
6245  026330  013737  026304  001202          MOV     3$,$TMP1
6246  026336  013737  001364  001200          MOV     $FPS,$TMP0
6247  026344  104003                          ERROR   3               ;FPS BAD
6248  026346  042737  007000  001364  5$:     BIC     #7000,$FPS
```

```
6249  026354  012737  026362  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6250  026362  005037  026374                  CLR     6$
6251  026366  170137  001364                  LDFPS   $FPS
6252  026372  170327                          STST    (PC)+           ;EXECUTE TEST
6253  026374  000000                  6$:     .WORD   0
6254  026376  000403                          BR      7$
6255  026400  104004                          ERROR   4               ;ADX ROM FAILED
6256  026402  104004                          ERROR   4               ;       *
6257  026404  104004                          ERROR   4               ;       *
6258  026406  170104                  7$:     LDFPS   R4
6259  026410  022737  000016  026374          CMP     #16,6$          ;FEC OK?
6260  026416  001407                          BEQ     8$              ;BRANCH IF YES
6261  026420  012737  000016  001200          MOV     #16,$TMP0
6262  026426  013737  026374  001204          MOV     6$,$TMP2
6263  026434  104101                          ERROR   101             ;FEC WRONG
6264  026436                          8$:
6265  026436  012737  026444  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6266  026444  012737  007000  026460          MOV     #7000,9$
6267  026452  170137  001364                  LDFPS   $FPS
6268  026456  170427                          CLRF    (PC)+           ;EXECUTE TEST
6269  026460  007000                  9$:     .WORD   7000
6270  026462  000403                          BR      10$
6271  026464  104004                          ERROR   4               ;ADX ROM FAILED
6272  026466  104004                          ERROR   4               ;       *
6273  026470  104004                          ERROR   4               ;       *
6274  026472  170104                  10$:    LDFPS   R4
6275  026474  005737  026460                  TST     9$              ;DATA OK?
6276  026500  001406                          BEQ     11$             ;BRANCH IF YES
6277  026502  005037  001200                  CLR     $TMP0
6278  026506  013737  026460  001202          MOV     9$,$TMP1
6279  026514  104162                          ERROR   162             ;DATA WRONG
6280  026516                          11$:
6281  026516  012737  026524  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6282  026524  170137  001364                  LDFPS   $FPS
6283  026530  170527                          TSTF    (PC)+           ;EXECUTE TEST
6284  026532  106700                  12$:    .WORD   106700
6285  026534  000403                          BR      13$
6286  026536  104004                          ERROR   4               ;ADX ROM FAILED
6287  026540  104004                          ERROR   4               ;       *
6288  026542  104004                          ERROR   4               ;       *
6289  026544  170200                  13$:    STFPS   R0
6290  026546  170104                          LDFPS   R4
6291  026550  042700  177760                  BIC     #177760,R0
6292  026554  022700  000010                  CMP     #FN,R0          ;CC'S OK?
6293  026560  001406                          BEQ     14$             ;BRANCH IF YES
6294  026562  010037  001202                  MOV     R0,$TMP1
6295  026566  012737  000010  001200          MOV     #FN,$TMP0
6296  026574  104003                          ERROR   3               ;CC'S BAD
6297  026576                          14$:
6298  026576  012737  026604  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6299  026604  012737  106400  026620          MOV     #106400,15$
6300  026612  170137  001364                  LDFPS   $FPS
6301  026616  170627                          ABSF    (PC)+           ;EXECUTE TEST
6302  026620  106400                  15$:    .WORD   106400
6303  026622  000403                          BR      16$
6304  026624  104004                          ERROR   4               ;ADX ROM FAILED
```

```
6305  026626  104004                          ERROR   4               ;       *
6306  026630  104004                          ERROR   4               ;       *
6307  026632  170104                  16$:    LDFPS   R4
6308  026634  022737  006400  026620          CMP     #6400,15$       ;DATA OK?
6309  026642  001407                          BEQ     17$             ;BRANCH IF YES
6310  026644  013737  026620  001202          MOV     15$,$TMP1
6311  026652  012737  006400  001200          MOV     #6400,$TMP0
6312  026660  104162                          ERROR   162             ;DATA BAD
6313  026662                          17$:
6314  026662  012737  026670  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6315  026670  012737  006400  026704          MOV     #6400,18$
6316  026676  170137  001364                  LDFPS   $FPS
6317  026702  170727                          NEGF    (PC)+           ;EXECUTE TEST
6318  026704  006400                  18$:    .WORD   6400
6319  026706  000403                          BR      19$
6320  026710  104004                          ERROR   4               ;ADX ROM FAILED
6321  026712  104004                          ERROR   4               ;       *
6322  026714  104004                          ERROR   4               ;       *
6323  026716  170104                  19$:    LDFPS   R4
6324  026720  022737  106400  026704          CMP     #106400,18$     ;DATA OK?
6325  026726  001407                          BEQ     20$             ;BRANCH IF YES
6326  026730  012737  106400  001200          MOV     #106400,$TMP0
6327  026736  013737  026704  001202          MOV     18$,$TMP1
6328  026744  104162                          ERROR   162             ;DATA BAD
6329  026746                          20$:
6330  026746  012737  026754  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6331  026754  012737  040200  001200          MOV     #40200,$TMP0
6332  026762  005037  001202                  CLR     $TMP1
6333  026766  172737  001200                  LDF     $TMP0,AC3
6334  026772  170137  001364                  LDFPS   $FPS
6335  026776  171327                          MULF    (PC)+,AC3       ;EXECUTE TEST
6336  027000  007000                          .WORD   7000
6337  027002  000403                          BR      21$
6338  027004  104004                          ERROR   4               ;ADX ROM FAILED
6339  027006  104004                          ERROR   4               ;       *
6340  027010  104004                          ERROR   4               ;       *
6341  027012  170104                  21$:    LDFPS   R4
6342  027014  173727  007000                  CMPF    #^O07000,AC3    ;DATA OK?
6343  027020  170000                          CFCC
6344  027022  001406                          BEQ     22$             ;BRANCH IF YES
6345  027024  174337  001204                  STF     AC3,$TMP2
6346  027030  012737  007000  001200          MOV     #7000,$TMP0
6347  027036  104024                          ERROR   24              ;DATA BAD
6348  027040                          22$:
6349  027040  012737  027046  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6350  027046  172637  001200                  LDF     $TMP0,AC2       ;INIT AC2
6351  027052  170137  001364                  LDFPS   $FPS
6352  027056  171627                          MODF    (PC)+,AC2       ;EXECUTE TEST
6353  027060  106700                          .WORD   106700
6354  027062  000403                          BR      23$
6355  027064  104004                          ERROR   4               ;ADX ROM FAILED
6356  027066  104004                          ERROR   4               ;       *
6357  027070  104004                          ERROR   4               ;       *
6358  027072  170104                  23$:    LDFPS   R4
6359  027074  173627  106700                  CMPF    #^O0106700,AC2  ;RESULT OK?
6360  027100  170000                          CFCC
```

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6361  027102  001406                          BEQ     24$             ;BRANCH IF YES
6362  027104  012737  106700  001200          MOV     #106700,$TMP0
6363  027112  174237  001204                  STF     AC2,$TMP2
6364  027116  104024                          ERROR   24              ;DATA BAD
6365  027120                          24$:
6366  027120  012737  027126  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6367  027126  012737  106400  001200          MOV     #106400,$TMP0
6368  027134  172737  001200                  LDF     $TMP0,AC3
6369  027140  170137  001364                  LDFPS   $FPS
6370  027144  172327                          ADDF    (PC)+,AC3       ;EXECUTE TEST
6371  027146  106400                          .WORD   106400
6372  027150  000403                          BR      25$
6373  027152  104004                          ERROR   4               ;ADX ROM FAILED
6374  027154  104004                          ERROR   4               ;       *
6375  027156  104004                          ERROR   4               ;       *
6376  027160  170104                  25$:    LDFPS   R4
6377  027162  173727  106600                  CMPF    #^O106600,AC3   ;RESULT OK?
6378  027166  170000                          CFCC
6379  027170  001406                          BEQ     26$             ;BRANCH IF YES
6380  027172  174337  001204                  STF     AC3,$TMP2
6381  027176  012737  106600  001200          MOV     #106600,$TMP0
6382  027204  104024                          ERROR   24              ;RESULT WRONG
6383  027206                          26$:
6384  027206  012737  027214  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6385  027214  170401                          CLRF    AC1             ;INIT AC1
6386  027216  170137  001364                  LDFPS   $FPS
6387  027222  172527                          LDF     (PC)+,AC1       ;EXECUTE TEST
6388  027224  107777                          .WORD   107777
6389  027226  000403                          BR      27$
6390  027230  104004                          ERROR   4               ;ADX ROM FAILED
6391  027232  104004                          ERROR   4               ;       *
6392  027234  104004                          ERROR   4               ;       *
6393  027236  170104                  27$:    LDFPS   R4
6394  027240  173527  107777                  CMPF    #^O107777,AC1   ;RESULT OK?
6395  027244  170000                          CFCC
6396  027246  001406                          BEQ     28$             ;BRANCH IF YES
6397  027250  012737  107777  001200          MOV     #107777,$TMP0
6398  027256  174137  001204                  STF     AC1,$TMP2
6399  027262  104024                          ERROR   24              ;RESULT WRONG
6400  027264                          28$:
6401  027264  012737  027272  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6402  027272  012737  107100  001200          MOV     #107100,$TMP0
6403  027300  172637  001200                  LDF     $TMP0,AC2
6404  027304  170137  001364                  LDFPS   $FPS
6405  027310  173227                          SUBF    (PC)+,AC2       ;EXECUTE TEST
6406  027312  106700                          .WORD   106700
6407  027314  000403                          BR      29$
6408  027316  104004                          ERROR   4               ;ADX ROM FAILED
6409  027320  104004                          ERROR   4               ;       *
6410  027322  104004                          ERROR   4               ;       *
6411  027324  170104                  29$:    LDFPS   R4
6412  027326  173627  106700                  CMPF    #^O106700,AC2   ;RESULT OK?
6413  027332  170000                          CFCC
6414  027334  001406                          BEQ     30$             ;BRANCH IF YES
6415  027336  174237  001204                  STF     AC2,$TMP2
6416  027342  012737  106700  001200          MOV     #106700,$TMP0
```

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 6417  027350  104024                          ERROR   24              ;RESULT WRONG
 6418  027352                          30$:
 6419  027352  012737  027360  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 6420  027360  172427  107777                  LDF     #^O107777,AC0   ;INIT AC0
 6421  027364  170137  001364                  LDFPS   $FPS
 6422  027370  173427                          CMPF    (PC)+,AC0       ;EXECUTE TEST
 6423  027372  107777                          .WORD   107777
 6424  027374  000403                          BR      31$
 6425  027376  104004                          ERROR   4               ;ADX ROM FAILED
 6426  027400  104004                          ERROR   4               ;       *
 6427  027402  104004                          ERROR   4               ;       *
 6428  027404  170200                  31$:    STFPS   R0
 6429  027406  170104                          LDFPS   R4
 6430  027410  042700  177760                  BIC     #177760,R0
 6431  027414  022700  000004                  CMP     #FZ,R0          ;CC'S OK?
 6432  027420  001406                          BEQ     32$             ;BRANCH IF YES
 6433  027422  010037  001202                  MOV     R0,$TMP1
 6434  027426  012737  000004  001200          MOV     #FZ,$TMP0
 6435  027434  104003                          ERROR   3               ;CC'S BAD
 6436  027436                          32$:
 6437  027436  012737  027444  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 6438  027444  005037  027462                  CLR     33$
 6439  027450  172727  106700                  LDF     #^O106700,AC3   ;INIT AC3
 6440  027454  170137  001364                  LDFPS   $FPS
 6441  027460  174327                          STF     AC3,(PC)+       ;EXECUTE TEST
 6442  027462  000000                  33$:    .WORD   0
 6443  027464  000403                          BR      34$
 6444  027466  104004                          ERROR   4               ;ADX ROM FAILED
 6445  027470  104004                          ERROR   4               ;       *
 6446  027472  104004                          ERROR   4               ;       *
 6447  027474  170104                  34$:    LDFPS   R4
 6448  027476  022737  106700  027462          CMP     #106700,33$     ;DATA OK?
 6449  027504  001407                          BEQ     35$             ;BRANCH IF YES
 6450  027506  012737  106700  001200          MOV     #106700,$TMP0
 6451  027514  013737  027462  001202          MOV     33$,$TMP1
 6452  027522  104162                          ERROR   162             ;DATA WRONG
 6453  027524                          35$:
 6454  027524  012737  027532  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 6455  027532  012737  106700  001200          MOV     #106700,$TMP0
 6456  027540  172637  001200                  LDF     $TMP0,AC2       ;INIT AC2
 6457  027544  170137  001364                  LDFPS   $FPS
 6458  027550  174627                          DIVF    (PC)+,AC2       ;EXECUTE TEST
 6459  027552  106700                          .WORD   106700
 6460  027554  000403                          BR      36$
 6461  027556  104004                          ERROR   4               ;ADX ROM FAILED
 6462  027560  104004                          ERROR   4               ;       *
 6463  027562  104004                          ERROR   4               ;       *
 6464  027564  170104                  36$:    LDFPS   R4
 6465  027566  173527  040200                  CMPF    #^O040200,AC2   ;RESULT OK?
 6466  027572  170000                          CFCC
 6467  027574  001406                          BEQ     37$             ;BRANCH IF YES
 6468  027576  174237  001204                  STF     AC2,$TMP2
 6469  027602  012737  040200  001200          MOV     #40200,$TMP0
 6470  027610  104024                          ERROR   24              ;RESULT WRONG
 6471  027612                          37$:
 6472  027612  012737  027620  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
```

```
6473  027620  005037  027636                    CLR     38$
6474  027624  172727  043600                    LDF     #↑043600,AC3    ;INIT AC3
6475  027630  170137  001364                    LDFPS   $FPS
6476  027634  175327                            STEXP   AC3,(PC)+       ;EXECUTE TEST
6477  027636  000000                  38$:      .WORD   0
6478  027640  000403                            BR      39$
6479  027642  104004                            ERROR   4               ;ADX ROM FAILED
6480  027644  104004                            ERROR   4               ;       *
6481  027646  104004                            ERROR   4               ;       *
6482  027650  170104                  39$:      LDFPS   R4
6483  027652  022737  000017  027636            CMP     #17,38$         ;RESULT OK?
6484  027660  001407                            BEQ     40$             ;BRANCH IF YES
6485  027662  012737  000017  001200            MOV     #17,$TMP0
6486  027670  013737  027636  001202            MOV     38$,$TMP1
6487  027676  104162                            ERROR   162             ;RESULT WRONG
6488  027700                  40$:
6489  027700  012737  027706  001110            MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6490  027706  032737  000100  001364            BIT     #FL,$FPS        ;FL BIT SET?
6491  027714  001403                            BEQ     127$            ;BRANCH IF NO
6492  027716  172527  045160                    LDF     #↑045160,AC1
6493  027722  000402                            BR      126$
6494  027724  172527  041160          127$:     LDF     #↑041160,AC1
6495  027730  005037  027742          126$:     CLR     41$
6496  027734  170137  001364                    LDFPS   $FPS
6497  027740  175527                            STCFI   AC1,(PC)+       ;EXECUTE TEST
6498  027742  000000                  41$:      .WORD   0
6499  027744  000403                            BR      42$
6500  027746  104004                            ERROR   4               ;ADX ROM FAILED
6501  027750  104004                            ERROR   4               ;       *
6502  027752  104004                            ERROR   4               ;       *
6503  027754  170104                  42$:      LDFPS   R4
6504  027756  022737  000017  027742            CMP     #17,41$         ;RESULT OK?
6505  027764  001407                            BEQ     43$             ;BRANCH IF YES
6506  027766  012737  000017  001200            MOV     #17,$TMP0
6507  027774  013737  027742  001202            MOV     41$,$TMP1
6508  030002  104162                            ERROR   162             ;RESULT WRONG
6509  030004                  43$:
6510  030004  012737  030012  001110            MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6511  030012  172727  106700                    LDF     #↑0106700,AC3   ;INIT AC3
6512  030016  005037  030030                    CLR     44$
6513  030022  170137  001364                    LDFPS   $FPS
6514  030026  176327                            STCFD   AC3,(PC)+       ;EXECUTE TEST
6515  030030  000000                  44$:      .WORD   0
6516  030032  000403                            BR      45$
6517  030034  104004                            ERROR   4               ;ADX ROM FAILED
6518  030036  104004                            ERROR   4               ;       *
6519  030040  104004                            ERROR   4               ;       *
6520  030042  170104                  45$:      LDFPS   R4
6521  030044  022737  106700  030030            CMP     #106700.44$     ;RESULT OK?
6522  030052  001407                            BEQ     46$             ;BRANCH IF YES
6523  030054  012737  106700  001200            MOV     #106700,$TMP0
6524  030062  013737  030030  001202            MOV     44$,$TMP1
6525  030070  104162                            ERROR   162             ;RESULT WRONG
6526  030072                  46$:
6527  030072  012737  030100  001110            MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6528  030100  170402                            CLRF    AC2             ;INIT AC2
```

```
6529  030102  170137  001364                  LDFPS   $FPS
6530  030106  176627                          LDEXP   (PC)+,AC2       ;EXECUTE TEST
6531  030110  000017                          .WORD   17
6532  030112  000403                          BR      47$
6533  030114  104004                          ERROR   4               ;ADX ROM FAILED
6534  030116  104004                          ERROR   4               ;       *
6535  030120  104004                          ERROR   4               ;       *
6536  030122  170104              47$:        LDFPS   R4
6537  030124  173627  043600                  CMPF    #^043600,AC2    ;RESULT OK?
6538  030130  170000                          CFCC
6539  030132  001406                          BEQ     48$             ;BRANCH IF YES
6540  030134  012737  043600  001200          MOV     #43600,$TMP0
6541  030142  174237  001204                  STF     AC2,$TMP2
6542  030146  104024                          ERROR   24              ;RESULT WRONG
6543  030150              48$:
6544  030150  012737  030156  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6545  030156  170403                          CLRF    AC3             ;INIT AC3
6546  030160  032737  000100  001364          BIT     #FL,$FPS        ;IL BIT ON?
6547  030166  001403                          BEQ     125$            ;BRANCH IF NO
6548  030170  172427  147746                  LDF     #^0147746,AC0
6549  030174  000402                          BR      124$
6550  030176  1724..  143746          125$:   LDF     #^0143746,AC0
6551  030202  17013.  001364          124$:   LDFPS   $FPS
6552  030206  17732?                          LDCIF   (PC)+,AC3       ;EXECUTE TEST
6553  030210  106400                          .WORD   106400
6554  030212  000403                          BR      49$
6555  030214  104004                          ERROR   4               ;ADX ROM FAILED
6556  030216  104004                          ERROR   4               ;       *
6557  030220  104004                          ERROR   4               ;       *
6558  030222  170104              49$:        LDFPS   R4
6559  030224  173700                          CMPF    AC0,AC3         ;RESULT OK?
6560  030226  170000                          CFCC
6561  030230  001405                          BEQ     50$             ;BRANCH IF YES
6562  030232  174037  001200                  STF     AC0,$TMP0
6563  030236  174337  001204                  STF     AC3,$TMP2
6564  030242  104024                          ERROR   24              ;RESULT WRONG
6565  030244              50$:
6566  030244  012737  030252  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6567  030252  170401                          CLRF    AC1             ;INIT AC1
6568  030254  170137  001364                  LDFPS   $FPS
6569  030260  177527                          LDCFD   (PC)+,AC1       ;EXECUTE TEST
6570  030262  107777                          .WORD   107777
6571  030264  000403                          BR      51$
6572  030266  104004                          ERROR   4               ;ADX ROM FAILED
6573  030270  104004                          ERROR   4               ;       *
6574  030272  104004                          ERROR   4               ;       *
6575  030274  170104              51$:        LDFPS   R4
6576  030276  173527  107777                  CMPF    #^0107777,AC1   ;RESULT OK?
6577  030302  170000                          CFCC
6578  030304  001406                          BEQ     52$             ;BRANCH IF YES
6579  030306  012737  107777  001200          MOV     #107777,$TMP0
6580  030314  174137  001204                  STF     AC1,$TMP2
6581  030320  104024                          ERROR   24              ;RESULT WRONG
6582  030322              52$:
6583  030322  012737  030330  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6584  030330  042737  177077  001364          BIC     #177077,$FPS
```

```
 6585  030336  022737  000300  001364          CMP     #300,$FPS       ;DONE YET?
 6586  030344  001412                          BEQ     96$             ;BRANCH IF YES
 6587  030346  062737  000100  001364          ADD     #BIT6,$FPS
 6588  030354  000137  026174                  JMP     LOOP2           ;CONTINUE
 6589  030360  022626                  63$:    CMP     (SP)+,(SP)+     ;RESTORE THE SP
 6590  030362  016637  177774  001200          MOV     -4(SP),$TMP0
 6591  030370  104163                          ERROR   163             ;ADX ROM FAILED
 6592
 6593                                  ;;**************************************************************
 6594                                  ;NOT MODE 0*NOT IMMEDIATE INSTRUCTIONS
 6595  030372  012737  000017  001364  96$:    MOV     #17,$FPS        ;INIT $FPS
 6596  030400                          LABLES:
 6597  030400  012737  047000  001200          MOV     #47000,$TMP0    ;INIT $TMP0
 6598  030406  005037  001202                  CLR     $TMP1
 6599  030412  005037  001204                  CLR     $TMP2
 6600  030416  005037  001206                  CLR     $TMP3
 6601  030422  012737  001204  001160          MOV     #$TMP2,$REG0    ;PUT ADR OF $TMP2 IN $REG0
 6602  030430  012737  001210  001162          MOV     #$TMP4,$REG1
 6603  030436  012737  001214  001164          MOV     #$TMP6,$REG2
 6604  030444  012737  001220  001166          MOV     #$TMP7+2,$REG3
 6605  030452  012737  001212  001170          MOV     #$TMP5,$REG4
 6606  030460  012737  001214  001172          MOV     #$TMP6,$REG5
 6607  030466  005005                          CLR     R5              ;INIT R5
 6608  030470  012703  000002                  MOV     #2,R3
 6609  030474  005001                          CLR     R1              ;INIT R1
 6610  030476                          LOOP3:
 6611  030476  012737  030504  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 6612  030504  012700  001204                  MOV     #$TMP2,R0
 6613  030510  013702  001364                  MOV     $FPS,R2
 6614  030514  170102                          LDFPS   R2
 6615  030516  170120                          LDFPS   (R0)+           ;EXECUTE TEST
 6616  030520  170102                          LDFPS   R2
 6617  030522  170220                          STFPS   (R0)+           ;EXECUTE TEST
 6618  030524  170104                          LDFPS   R4
 6619  030526  022700  001210                  CMP     #$TMP4,R0       ;ADX ROM OK?
 6620  030532  001401                          BEQ     1$              ;BRANCH IF YES
 6621  030534  104004                          ERROR   4               ;ADX ROM FAILED
 6622  030536                          1$:
 6623  030536  012737  030544  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 6624  030544  012700  001210                  MOV     #$TMP4,R0
 6625  030550  170137  001364                  LDFPS   $FPS
 6626  030554  170320                          STST    (R0)+           ;EXECUTE TEST
 6627  030556  170104                          LDFPS   R4
 6628  030560  022700  001214                  CMP     #$TMP6,R0       ;ADX ROM OK?
 6629  030564  001401                          BEQ     2$              ;BRANCH IF YES
 6630  030566  104004                          ERROR   4               ;ADX ROM FAILED
 6631  030570  022737  000016  001210  2$:     CMP     #16,$TMP4       ;DATA OK?
 6632  030576  001407                          BEQ     3$              ;BRANCH IF YES
 6633  030600  012737  000016  001200          MOV     #16,$TMP0
 6634  030606  013737  001210  001204          MOV     $TMP4,$TMP2
 6635  030614  104101                          ERROR   101             ;FEC WRONG
 6636  030616                          3$:
 6637  030616  012737  030634  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
 6638  030624  012737  040000  001210          MOV     #40000,$TMP4
 6639  030632  012700  001210                  MOV     #$TMP4,R0
 6640  030636  170137  001364                  LDFPS   $FPS
```

```
6641  030642  170420                          CLRF    (R0)+           ;EXECUTE TEST
6642  030644  026100  001164                  CMP     $REG2(R1),R0    ;ADX ROM OK?
6643  030650  001401                          BEQ     4$              ;BRANCH IF YES
6644  030652  104004                          ERROR   4               ;ADX ROM FAILED
6645  030654  170104              4$:         LDFPS   R4
6646  030656  005737  001210                  TST     $TMP4           ;RESULT OK?
6647  030662  001401                          BEQ     5$              ;BRANCH IF YES
6648  030664  104061                          ERROR   61              ;RESULT WRONG
6649  030666                    5$:
6650  030666  012737  030674  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6651  030674  012700  001200                  MOV     #$TMP0,R0
6652  030700  170137  001364                  LDFPS   $FPS
6653  030704  170520                          TSTF    (R0)+           ;EXECUTE TEST
6654  030706  170202                          STFPS   R2
6655  030710  026100  001160                  CMP     $REG0(R1),R0    ;ADX ROM OK?
6656  030714  001401                          BEQ     6$              ;BRANCH IF YES
6657  030716  104004                          ERROR   4               ;ADX ROM FAILED
6658  030720  170104              6$:         LDFPS   R4
6659  030722  042702  177760                  BIC     #177760,R2
6660  030726  001405                          BEQ     7$              ;BRANCH IF CC'S OK
6661  030730  010237  001202                  MOV     R2,$TMP1
6662  030734  005037  001200                  CLR     $TMP0
6663  030740  104003                          ERROR   3               ;CC'S BAD
6664  030742                    7$:
6665  030742  012737  030750  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6666  030750  012700  001210                  MOV     #$TMP4,R0
6667  030754  012710  140000                  MOV     #140000,(R0)
6668  030760  170137  001364                  LDFPS   $FPS
6669  030764  170620                          ABSF    (R0)+           ;EXECUTE TEST
6670  030766  170104                          LDFPS   R4
6671  030770  026100  001164                  CMP     $REG2(R1),R0    ;ADX ROM OK?
6672  030774  001401                          BEQ     8$              ;BRANCH IF YES
6673  030776  104004                          ERROR   4               ;ADX ROM FAILED
6674  031000  022737  040000  001210  8$:     CMP     #40000,$TMP4    ;DATA OK?
6675  031006  001401                          BEQ     9$              ;BRANCH IF YES
6676  031010  104061                          ERROR   61              ;DATA BAD
6677  031012                    9$:
6678  031012  012737  031020  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6679  031020  170104                          LDFPS   R4
6680  031022  012700  001210                  MOV     #$TMP4,R0
6681  031026  012710  140000                  MOV     #140000,(R0)
6682  031032  170137  001364                  LDFPS   $FPS
6683  031036  170720                          NEGF    (R0)+           ;EXECUTE TEST
6684  031040  170104                          LDFPS   R4
6685  031042  026100  001164                  CMP     $REG2(R1),R0    ;ADX ROM OK?
6686  031046  001401                          BEQ     10$             ;BRANCH IF YES
6687  031050  104004                          ERROR   4               ;ADX ROM FAILED
6688  031052  022737  040000  001210  10$:    CMP     #40000,$TMP4    ;RESULT OK?
6689  031060  001401                          BEQ     11$             ;BRANCH IF YES
6690  031062  104061                          ERROR   61              ;RESULT WRONG
6691  031064                    11$:
6692  031064  012737  031072  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6693  031072  012737  040400  001200          MOV     #40400,$TMP0
6694  031100  012700  001200                  MOV     #$TMP0,R0
6695  031104  172727  040400                  LDF     #^O040400,AC3
6696  031110  170137  001364                  LDFPS   $FPS
```

```
6697  031114  171320                          MULF    (R0)+,AC3       ;EXECUTE TEST
6698  031116  170104                          LDFPS   R4
6699  031120  026100  001160                  CMP     $REG0(R1),R0    ;ADX ROM OK?
6700  031124  001401                          BEQ     12$             ;BRANCH IF YES
6701  031126  104004                          ERROR   4               ;ADX ROM FAILED
6702  031130  173727  040600          12$:    CMPF    #^O040600,AC3   ;RESULT OK?
6703  031134  170000                          CFCC
6704  031136  001406                          BEQ     13$             ;BRANCH IF YES
6705  031140  012737  040600  001200          MOV     #40600,$TMP0
6706  031146  174337  001210                  STF     AC3,$TMP4
6707  031152  104061                          ERROR   61              ;RESULT WRONG
6708  031154                          13$:
6709  031154  012737  031162  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6710  031162  012700  001200                  MOV     #$TMP0,R0
6711  031166  005037  001206                  CLR     $TMP3
6712  031172  172427  040400                  LDF     #^O040400,AC0   ;INIT AC0
6713  031176  170137  001364                  LDFPS   $FPS
6714  031202  171420                          MODF    (R0)+,AC0       ;EXECUTE TEST
6715  031204  026100  001160                  CMP     $REG0(R1),R0    ;ADX ROM OK?
6716  031210  001401                          BEQ     14$             ;BRANCH IF YES
6717  031212  104004                          ERROR   4               ;ADX ROM FAILED
6718  031214  170500                  14$:    TSTF    AC0             ;RESULT OK?
6719  031216  170000                          CFCC
6720  031220  001405                          BEQ     15$             ;BRANCH IF YES
6721  031222  005037  001200                  CLR     $TMP0
6722  031226  174037  001210                  STF     AC0,$TMP4
6723  031232  104061                          ERROR   61              ;RESULT WRONG
6724  031234                          15$:
6725  031234  012737  031242  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6726  031242  012737  040200  001200          MOV     #40200,$TMP0
6727  031250  012700  001200                  MOV     #$TMP0,R0
6728  031254  172627  040400                  LDF     #^O040400,AC2   ;INIT AC2
6729  031260  170137  001364                  LDFPS   $FPS
6730  031264  173220                          SUBF    (R0)+,AC2       ;EXECUTE TEST
6731  031266  026100  001160                  CMP     $REG0(R1),R0    ;ADX ROM OK?
6732  031272  001401                          BEQ     16$             ;BRANCH IF YES
6733  031274  104004                          ERROR   4               ;ADX ROM FAILED
6734  031276  173627  040200          16$:    CMPF    #^O040200,AC2   ;RESULT OK?
6735  031302  170000                          CFCC
6736  031304  001403                          BEQ     17$             ;BRANCH IF YES
6737  031306  174237  001210                  STF     AC2,$TMP4
6738  031312  104061                          ERROR   61              ;RESULT WRONG
6739  031314                          17$:
6740  031314  012737  031322  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6741  031322  012700  001200                  MOV     #$TMP0,R0
6742  031326  172737  001200                  LDF     $TMP0,AC3
6743  031332  170137  001364                  LDFPS   $FPS
6744  031336  173720                          CMPF    (R0)+,AC3       ;EXECUTE TEST
6745  031340  026100  001160                  CMP     $REG0(R1),R0    ;ADX ROM OK?
6746  031344  001401                          BEQ     18$             ;BRANCH IF YES
6747  031346  104004                          ERROR   4               ;ADX ROM FAILED
6748  031350  170200                  18$:    STFPS   R0
6749  031352  042700  177760                  BIC     #177760,R0
6750  031356  022700  000004                  CMP     #FZ,R0          ;CC'S OK?
6751  031362  001406                          BEQ     19$             ;BRANCH IF YES
6752  031364  010037  001202                  MOV     R0,$TMP1
```

```
6753  031370  012737  000004  001200          MOV     #FZ,$TMP0
6754  031376  104003                          ERROR   3               ;CC'S BAD
6755  031400                          19$:
6756  031400  012737  031406  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6757  031406  012700  001210                  MOV     #$TMP4,R0
6758  031412  005010                          CLR     (R0)
6759  031414  172637  001200                  LDF     $TMP0,AC2       ;INIT AC2
6760  031420  170137  001364                  LDFPS   $FPS
6761  031424  174220                          STF     AC2,(R0)+       ;EXECUTE TEST
6762  031426  026100  001164                  CMP     $REG2(R1),R0    ;ADX ROM OK?
6763  031432  001401                          BEQ     20$             ;BRANCH IF YES
6764  031434  104004                          ERROR   4               ;ADX ROM FAILED
6765  031436  173637  001210          20$:    CMPF    $TMP4,AC2       ;RESULT OK?
6766  031442  170000                          CFCC
6767  031444  001401                          BEQ     21$             ;BRANCH IF YES
6768  031446  104061                          ERROR   61              ;RESULT WRONG
6769  031450                          21$:
6770  031450  012737  031456  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6771  031456  012700  001200                  MOV     #$TMP0,R0
6772  031462  012710  040400                  MOV     #40400,(R0)
6773  031466  172727  040200                  LDF     #^O040200,AC3
6774  031472  170137  001364                  LDFPS   $FPS
6775  031476  174720                          DIVF    (R0)+,AC3       ;EXECUTE TEST
6776  031500  026100  001160                  CMP     $REG0(R1),R0    ;ADX ROM OK?
6777  031504  001401                          BEQ     22$             ;BRANCH IF YES
6778  031506  104004                          ERROR   4               ;ADX ROM FAILED
6779  031510  173727  040000          22$:    CMPF    #^O040000,AC3   ;RESULT OK?
6780  031514  170000                          CFCC
6781  031516  001406                          BEQ     23$             ;BRANCH IF YES
6782  031520  174337  001210                  STF     AC3,$TMP4
6783  031524  012737  040000  001200          MOV     #40000,$TMP0
6784  031532  104061                          ERROR   61              ;RESULT WRONG
6785  031534                          23$:
6786  031534  012737  031542  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6787  031542  012700  001210                  MOV     #$TMP4,R0
6788  031546  172727  077777                  LDF     #^O077777,AC3
6789  031552  170137  001364                  LDFPS   $FPS
6790  031556  175320                          STEXP   AC3,(R0)+       ;EXECUTE TEST
6791  031560  022700  001212                  CMP     #$TMP5,R0       ;ADX ROM OK?
6792  031564  001401                          BEQ     24$             ;BRANCH IF YES
6793  031566  104004                          ERROR   4               ;ADX ROM FAILED
6794  031570  022737  000177  001210  24$:    CMP     #177,$TMP4      ;RESULT OK?
6795  031576  001407                          BEQ     25$             ;BRANCH IF YES
6796  031600  012737  000177  001200          MOV     #177,$TMP0
6797  031606  013737  001210  001202          MOV     $TMP4,$TMP1
6798  031614  104162                          ERROR   162             ;RESULT WRONG
6799  031616                          25$:
6800  031616  012737  031624  001110          MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6801  031624  012700  001210                  MOV     #$TMP4,R0
6802  031630  005010                          CLR     (R0)
6803  031632  005060  000002                  CLR     2(R0)
6804  031636  172527  041777                  LDF     #^O041777,AC1   ;INIT AC1
6805  031642  170137  001364                  LDFPS   $FPS
6806  031646  175520                          STCFI   AC1,(R0)+       ;EXECUTE TEST
6807  031650  026500  001170                  CMP     $REG4(R5),R0    ;ADX ROM OK?
6808  031654  001401                          BEQ     26$             ;BRANCH IF YES
```

```
6809  031656  104004                                    ERROR   4               ;ADX ROM FAILED
6810  031660  022765  000177  001210  26$:              CMP     #177,$TMP4(R5)  ;RESULT OK?
6811  031666  001410                                    BEQ     27$             ;BRANCH IF YES
6812  031670  005037  001202                            CLR     $TMP1
6813  031674  005037  001200                            CLR     $TMP0
6814  031700  012765  000177  001200                    MOV     #177,$TMP0(R5)
6815  031706  104161                                    ERROR   161             ;RESULT WRONG
6816  031710                                27$:
6817  031710  012737  031716  001110                    MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6818  031716  012700  001210                            MOV     #$TMP4,R0
6819  031722  172627  040200                            LDF     #^O40200,AC2    ;INIT AC2
6820  031726  005010                                    CLR     (R0)
6821  031730  170137  001364                            LDFPS   $FPS
6822  031734  176220                                    STCFD   AC2,(R0)+       ;EXECUTE TEST
6823  031736  026300  001164                            CMP     $REG2(R3),R0    ;ADX ROM OK?
6824  031742  001401                                    BEQ     28$             ;BRANCH IF YES
6825  031744  104004                                    ERROR   4               ;ADX ROM FAILED
6826  031746  022737  040200  001210  28$:              CMP     #40200,$TMP4    ;RESULT OK?
6827  031754  001401                                    BEQ     29$             ;BRANCH IF YES
6828  031756  104061                                    ERROR   61              ;RESULT WRONG
6829  031760                                29$:
6830  031760  012737  031766  001110                    MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6831  031766  012700  001210                            MOV     #$TMP4,R0
6832  031772  012710  000077                            MOV     #77,(R0)
6833  031776  170401                                    CLRF    AC1
6834  032000  170137  001364                            LDFPS   $FPS
6835  032004  176520                                    LDEXP   (R0)+,AC1       ;EXECUTE TEST
6836  032006  022700  001212                            CMP     #$TMP5,R0       ;ADX ROM OK?
6837  032012  001401                                    BEQ     30$             ;BRANCH IF YES
6838  032014  104004                                    ERROR   4               ;ADX ROM FAILED
6839  032016  173527  057600              30$:          CMPF    #^O057600,AC1   ;RESULT OK?
6840  032022  170000                                    CFCC
6841  032024  001406                                    BEQ     31$             ;BRANCH IF YES
6842  032026  174137  001210                            STF     AC1,$TMP4
6843  032032  012737  057600  001200                    MOV     #5760  ,$TMP0
6844  032040  104061                                    ERROR   61              ;RESLT WRONG
6845  032042                                31$:
6846  032042  012737  032050  001110                    MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
6847  032050  012700  001210                            MOV     #$TMP4,R0
6848  032054  005037  001210                            CLR     $TMP4
6849  032060  012765  000017  001210                    MOV     #17,$TMP4(R5)   ;
6850  032066  170403                                    CLRF    AC3
6851  032070  170137  001364                            LDFPS   $FPS
6852  032074  177320                                    LDCIF   (R0)+,AC3       ;EXECUTE TEST
6853  032076  005065  001210                            CLR     $TMP4(R5)
6854  032102  026500  001170                            CMP     $REG4(R5),R0    ;ADX ROM OK?
6855  032106  001401                                    BEQ     32$             ;BRANCH IF YES
6856  032110  104004                                    ERROR   4               ;ADX ROM FAILED
6857  032112  173727  041160              32$:          CMPF    #^O041160,AC3   ;RESULT OK?
6858  032116  170000                                    CFCC
6859  032120  001406                                    BEQ     33$             ;BRANCH IF YES
6860  032122  174337  001210                            STF     AC3,$TMP4
6861  032126  012737  041160  001200                    MOV     #41160,$TMP0
6862  032134  104061                                    ERROR   61              ;RESULT WRONG
6863  032136                                33$:
6864  032136  012737  032144  001110                    MOV     #.+6,@#$LPERR   ;SET ERROR LOOP
```

```
6865  032144  012700  001210              MOV     #$TMP4,R0
6866  032150  170402                      CLRF    AC2
6867  032152  012710  040000              MOV     #40000,(R0)
6868  032156  170137  001364              LDFPS   $FPS
6869  032162  177620                      LDCFD   (R0)+,AC2       ;EXECUTE TEST
6870  032164  026300  001164              CMP     $REG2(R3),R0    ;ADX ROM OK?
6871  032170  001401                      BEQ     34$             ;BRANCH IF YES
6872  032172  104004                      ERROR   4               ;ADX ROM FAILED
6873  032174  173637  001210      34$:    CMPF    $TMP4,AC2       ;RESULT OK?
6874  032200  170000                      CFCC
6875  032202  001406                      BEQ     35$             ;BRANCH IF YES
6876  032204  174237  001210              STF     AC2,$TMP4
6877  032210  012737  040000  001200      MOV     #40000,$TMP0
6878  032216  104061                      ERROR   61              ;RESULT WRONG
6879  032220  013700  001364      35$:    MOV     $FPS,R0
6880  032224  042700  177477              BIC     #177477,R0
6881  032230  022700  000300              CMP     #300,R0         ;DONE YET?
6882  032234  001426                      BEQ     STARTCL         ;BRANCH IF YES
6883  032236  062737  000100  001364      ADD     #BIT6,$FPS
6884  032244  005005                      CLR     R5
6885  032246  032737  000100  001364      BIT     #BIT6,$FPS
6886  032254  001402                      BEQ     36$
6887  032256  012705  000002              MOV     #2,R5
6888  032262  005001              36$:    CLR     R1
6889  032264  012703  000002              MOV     #2,R3
6890  032270  032737  000200  001364      BIT     #BIT7,$FPS
6891  032276  001403                      BEQ     37$
6892  032300  012701  000002              MOV     #2,R1
6893  032304  005003                      CLR     R3
6894  032306  000137  030476      37$:    JMP     LOOP3
6895
6896                                      ;;*****************************************************************
6897                                      .SBTTL  CLOCK HANDLER
6898                                      ;*      THIS CODE CONTROLS THE CLOCK AND THE LOOPING ON THE
6899                                      ;*      PREVIOUS TESTS WHILE THE CLOCK IS RUNNING.
6900                                      ;*      A TICK COUNT IS KEPT IN THE LOCATION CALLED "TICKS".
6901                                      ;*      THE LOCATION CALLED "TIME" CONTROLS THE NUMBER OF SECONDS
6902                                      ;*      BEFORE END OF PASS IS REPORTED.
6903                                      ;*
6904                                      ;*      WHILE THIS TEST IS BEING PERFORMED, THE HIGH BYTE OF THE
6905                                      ;*      DATA LIGHTS WILL INCREMENT APPROXIMATELY ONCE PER SECOND.
6906                                      ;;*****************************************************************
6907
6908  032312  012737  000054  001102  STARTCL:MOV     #54,$TSTNM      ;RESET THE TEST NUMBER
6909  032320  005737  001366              TST     TICKS           ;STARTED CLOCK YET?
6910  032324  001402                      BEQ     1$              ;BRANCH IF NO
6911  032326  000137  023630              JMP     LOOP0           ;CONTINUE TEST
6912  032332  012737  032352  000004  1$: MOV     #2$,ERRVEC      ;SET ERROR VEC
6913  032340  005737  172540              TST     PCLKST          ;P CLOCK AVAILABLE?
6914  032344  005237  001366              INC     TICKS
6915  032350  000430                      BR      PCLK            ;BRANCH IF YES
6916  032352  012737  032376  000004  2$: MOV     #3$,ERRVEC
6917  032360  012706  001100              MOV     #STACK,SP
6918  032364  005737  177546              TST     LKSTAT          ;LINE CLOCK AVAILABLE?
6919  032370  005237  001366              INC     TICKS
6920  032374  000402                      BR      LCLK            ;BRANCH IF YES
```

```
6921  032376  000137  032712          3$:     JMP     $EOP            ;END TEST
6922
6923                                  ;;*****************************************************************
6924                                  ;THIS ROUTINE STARS THE LINE CLOCK
6925  032402  000230                  LCLK:   SPL     0
6926  032404  012737  032476  000100          MOV     #LKSRV,LKVEC    ;SET INTERRUPT VECTOR
6927  032412  012737  000340  000102          MOV     #PR7,LKVEC+2
6928  032420  112737  000100  177546          MOVB    #BIT6,LKSTAT    ;START CLOCK
6929  032426  000137  023630                  JMP     LOOPD           ;START TEST
6930
6931                                  ;;*****************************************************************
6932                                  ;THIS ROUTINE STARTS THE PROGRAMMABLE CLOCK
6933  032432  000230                  PCLK:   SPL     0
6934  032434  012737  032610  000104          MOV     #PKSRV,PKVEC    ;SET INTERRUPT VECTOR
6935  032442  012737  000340  000106          MOV     #PR7,PKVEC+2
6936  032450  012737  000004  172542          MOV     #4,COSETB       ;SET COUNT BUFFER
6937  032456  012737  000004  172544          MOV     #4,COUNTER      ;INIT THE COUNTER
6938  032464  012737  000111  172540          MOV     #111,PCLKST     ;START THE CLOCK
6939  032472  000137  023630                  JMP     LOOPD           ;STARS TEST
6940
6941                                  ;;*****************************************************************
6942                                  ;THIS ROUTINE SERVICES THE LINE CLOCK INTERRUPT
6943  032476  005237  001366          LKSRV:  INC     TICKS
6944  032502  022737  000075  001366          CMP     #61.,TICKS      ;ONE SECOND YET?
6945  032510  001032                          BNE     3$              ;BRANCH IF NO
6946  032512  012737  000001  001366          MOV     #1,TICKS        ;INIT TICKS
6947  032520  105237  032607                  INCB    OUT+1           ;INCREMENT DISPLAY
6948  032524  123737  001370  032607          CMPB    TIMES,OUT+1     ;DONE?
6949  032532  003010                          BGT     1$              ;BRANCH IF NO
6950  032534  005037  177546                  CLR     LKSTAT          ;TURN CLOCK OFF
6951  032540  005037  032606                  CLR     OUT
6952  032544  005037  001366                  CLR     TICKS
6953  032550  000137  032712                  JMP     $EOP            ;END TEST
6954  032554  113737  001102  032606  1$:     MOVB    $TSTNM,OUT
6955  032562  105737  001103                  TSTB    $ERFLG          ;ANY ERRORS?
6956  032566  001003                          BNE     3$              ;BRANCH IF YES
6957  032570  013777  032606  146340          MOV     OUT,@SWR        ;DISPLAY SECONDS
6958  032576  012737  000100  177546  3$:     MOV     #BIT6,LKSTAT    ;START CLOCK
6959  032604  000002                          RTI                     ;CONTINUE TEST
6960  032606  000000                  OUT:    .WORD
6961
6962                                  ;;*****************************************************************
6963                                  ;THIS ROUTINE SERVICES THE PROGRAMMABLE CLOCK INTERRUPT
6964  032610  005237  001366          PKSRV:  INC     TICKS
6965  032614  022737  060650  001366          CMP     #25000.,TICKS   ;ONE SECOND YET?
6966  032622  001032                          BNE     2$              ;BRANCH IF NO
6967  032624  012737  000001  001366          MOV     #1,TICKS        ;INIT TICKS
6968  032632  105237  032607                  INCB    OUT+1           ;INCREMENT SECOND DISPLAY
6969  032636  123737  001370  032607          CMPB    TIMES,OUT+1     ;DONE YET?
6970  032644  003010                          BGT     1$              ;BRANCH IF NO
6971  032646  005037  172540                  CLR     PCLKST          ;TURN OFF CLOCK
6972  032652  005037  032606                  CLR     OUT
6973  032656  005037  001366                  CLR     TICKS
6974  032662  000137  032712                  JMP     $EOP            ;END TEST
6975  032666  113737  001102  032606  1$:     MOVB    $TSTNM,OUT
6976  032674  105737  001103                  TSTB    $ERFLG          ;ANY ERRORS?
```

```
 6977  032700  001003                        BNE     2$              ;BRANCH IF YES
 6978  032702  013777  032606  146226        MOV     OUT,@SWR        ;DISPLAY SECONDS
 6979  032710  000002                2$:     RTI                     ;CONTINUE TEST
 6980
 6981                                        .SBTTL  END OF PASS ROUTINE
 6982
 6983                                        ;;**********************************************************************
 6984                                        ;*INCREMENT THE PASS NUMBER ($PASS)
 6985                                        ;*TYPE "END PASS #XXXXX TOTAL NUMBER OF ERRORS SINCE LAST REPORT YYYYY"
 6986                                        ;*WHERE XXXXX AND YYYYY ARE DECIMAL NUMBERS
 6987                                        ;*IF THERES A MONITOR GO TO IT
 6988                                        ;*IF THERE ISN'T JUMP TO LOOP
 6989
 6990  032712                        $EOP:
 6991  032712  000004                        SCOPE
 6992  032714  005037  001102                CLR     $TSTNM          ;;ZERO THE TEST NUMBER
 6993  032720  005037  001220                CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
 6994  032724  005237  001242                INC     $PASS           ;;INCREMENT THE PASS NUMBER
 6995  032730  042737  100000  001242        BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
 6996  032736  005327                        DEC     (PC)+           ;;LOOP?
 6997  032740  000001              $ECPCT:   .WORD   1
 6998  032742  003063                        BGT     $DOAGN          ;;YES
 6999  032744  012737                        MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
 7000  032746  000001              $ENDCT:   .WORD   1
 7001  032750  032740                        $EOPCT
 7002  032752  104400  032760                TYPE    ,65$            ;;TYPE ASCIZ STRING
 7003  032756  000407                        BR      64$             ;;GET OVER THE ASCIZ
 7004                              ;;65$:    .ASCIZ  <12><15>/END PASS #/
 7005  032776                        64$:
 7006  032776  013746  001242                MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
 7007                                                                ;;TYPE PASS NUMBER
 7008  033002  104404                        TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
 7009  033004  104400  033012                TYPE    ,67$            ;;TYPE ASCIZ STRING
 7010  033010  000421                        BR      66$             ;;GET OVER THE ASCIZ
 7011                              ;;67$:    .ASCIZ  /  TOTAL ERRORS SINCE LAST REPORT /
 7012  033054                        66$:
 7013  033054  013746  001112                MOV     $ERTTL,-(SP)    ;;SAVE $ERTTL FOR TYPEOUT
 7014                                                                ;;TOTAL NUMBER OF ERRORS
 7015  033060  104404                        TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
 7016  033062  104400  001231                TYPE    ,$CRLF          ;;TYPE CARRIAGE RETURN, LINE FEED
 7017  033066  005037  001112                CLR     $ERTTL          ;;CLEAR ERROR TOTAL
 7018  033072  013700  000042      $GET42:   MOV     @#42,R0         ;;GET MONITOR ADDRESS
 7019  033076  001405                        BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
 7020  033100  000005                        RESET                   ;;CLEAR THE WORLD
 7021  033102  004710              $ENDAD:   JSR     PC,(R0)         ;;GO TO MONITOR
 7022  033104  000240                        NOP                     ;;SAVE ROOM
 7023  033106  000240                        NOP                     ;;FOR
 7024  033110  000240                        NOP                     ;;ACT11
 7025  033112                        $DOAGN:
 7026  033112  000137  004456                JMP     @#LOOP          ;;RETURN
 7027  033116     377     377     000 $ENULL:.BYTE   -1,-1,0         ;;NULL CHARACTER STRING
 7028           033122                       .EVEN
 7029
 7030                                        .SBTTL  SCOPE HANDLER ROUTINE
 7031
 7032                                        ;;**********************************************************************
```

```
                                        ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
                                        ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>.
                                        ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
                                        ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                        ;*SW14=1         LOOP ON TEST
                                        ;*SW11=1         INHIBIT ITERATIONS
                                        ;*SW09=1         LOOP ON ERROR
                                        ;*SW08=1         LOOP ON TEST IN SWR<7:0>
                                        ;*CALL
                                        ;*      SCOPE            ;;SCOPE=IOT

033122                                  $SCOPE:
033122  170127  000000                          LDFPS   #0
033126  032777  000400  146002                  BIT     #SW8,@SWR       ;SWITCH 8 ON?
033134  001013                                  BNE     1$              ;BRANCH IF YES
033136  010346                                  MOV     R3,-(SP)        ;SAVE R3
033140  117703  145772                          MOVB    @SWR,R3         ;GET  LOWER SWITCHES
033144  170003                                  LDUB                    ;PUT IN MICRO-BREAK REGISTER
033146  012603                                  MOV     (SP)+,R3        ;RESTORE  R3
033150  012737  037156  000004                  MOV     #CPSPUR,ERRVEC
033156  012737  037276  000244                  MOV     #FPSPUR,FPPVEC
033164  032777  040000  145744  1$:             BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
033172  001114                                  BNE     $OVER           ;;YES IF SW14=1
                                        ;*****START OF CODE FOR THE XOR TESTER*****
033174  000416                        $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
                                                                        ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
033176  013746  000004                          MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
033202  012737  033222  000004                  MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
033210  005737  177060                          TST     @#177060        ;;TIME OUT ON XOR?
033214  012637  000004                          MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
033220  000463                                  BR      $SVLAD          ;;GO TO THE NEXT TEST
033222  022626                          5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
033224  012637  000004                          MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
033230  000423                                  BR      7$              ;;LOOP ON THE PRESENT TEST
033232                                  6$:;*****END OF CODE FOR THE XOR TESTER*****
033232  032777  000400  145676                  BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
033240  001404                                  BEQ     2$              ;;BR IF NO
033242  127737  145670  001102                  CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
033250  001465                                  BEQ     $OVER           ;;BR IF YES
033252  105737  001103          2$:             TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
033256  001421                                  BEQ     3$              ;;BR IF NO
033260  123737  001115  001103                  CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
033266  101015                                  BHI     3$              ;;BR IF NO
033270  032777  001000  145640                  BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
033276  001404                                  BEQ     4$              ;;BR IF NO
033300  013737  001110  001106  7$:             MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
033306  000446                                  BR      $OVER
033310  105037  001103          4$:             CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
033314  005037  001220                          CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
033320  000415                                  BR      1$              ;;ESCAPE TO THE NEXT TEST
033322  032777  004000  145606  3$:             BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
033330  001011                                  BNE     1$              ;;BR IF YES
033332  005737  001242                          TST     $PASS           ;;IF FIRST PASS OF PROGRAM
033336  001406                                  BEQ     1$              ;;      INHIBIT ITERATIONS
033340  005237  001104                          INC     $ICNT           ;;INCREMENT ITERATION COUNT
033344  023737  001220  001104                  CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
```

```
 7089  033352  002024                          BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
 7090  033354  012737  000001  001104  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
 7091  033362  013737  033440  001220          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
 7092  033370  105237  001102          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
 7093  033374  113737  001102  001240          MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
 7094  033402  011637  001106                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
 7095  033406  011637  001110                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
 7096  033412  005037  001222                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
 7097  033416  112737  000001  001115          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
 7098  033424  013777  001102  145506  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
 7099  033432  013716  001106                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
 7100  033436  000002                          RTI                     ;;FIXES PS
 7101  033440  003720                  $MXCNT: 2000.                   ;;MAX. NUMBER OF ITERATIONS
 7102
 7103                                  .SBTTL  ERROR HANDLER ROUTINE
 7104
 7105                                  ;;**************************************************************
 7106                                  ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
 7107                                  ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
 7108                                  ;*AND GO TO $ERRTYP ON ERROR
 7109                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
 7110                                  ;*SW15=1         HALT ON ERROR
 7111                                  ;*SW13=1         INHIBIT ERROR TYPEOUTS
 7112                                  ;*SW10=1         BELL ON ERROR
 7113                                  ;*SW09=1         LOOP ON ERROR
 7114                                  ;*CALL
 7115                                  ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
 7116
 7117  033442                  $ERROR:
 7118  033442  032777  000400  145466          BIT     #SW8,@SWR       ;SWITCH 8 ON?
 7119  033450  001007                          BNE     7$              ;BRANCH IF YES
 7120  033452  010346                          MOV     R3,-(SP)        ;SAVE R3
 7121  033454  005003                          CLR     R3
 7122  033456  170103                          LDFPS   R3              ;CLEAR THE FPS REGISTER
 7123  033460  117703  145452                  MOVB    @SWR,R3         ;GET LOWER  SWITCHES
 7124  033464  170003                          LDUB                    ;PUT IN MICRO-BREAK REG
 7125  033466  012603                          MOV     (SP)+,R3        ;RESTORE  R3
 7126  033470  105237  001103          7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
 7127  033474  001775                          BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
 7128  033476  013777  001102  145434          MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
 7129  033504  032777  002000  145424          BIT     #BIT10,@SWR     ;;BELL ON ERROR?
 7130  033512  001402                          BEQ     1$              ;;NO - SKIP
 7131  033514  104400  001224                  TYPE    ,$BELL          ;;RING BELL
 7132  033520  005237  001112          1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
 7133  033524  011637  001116                  MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
 7134  033530  162737  000002  001116          SUB     #2,$ERRPC
 7135  033536  117737  145354  001114          MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
 7136  033544  032777  020000  145364          BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
 7137  033552  001004                          BNE     20$             ;;SKIP TYPEOUTS
 7138  033554  004737  035604                  JSR     PC,$ERRTYP      ;;GO TO USER ERROR ROUTINE
 7139  033560  104400  001231                  TYPE    ,$CRLF
 7140  033564                          20$:
 7141  033564  122737  000001  001254          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 7142  033572  001007                          BNE     2$              ;;NO,SKIP APT ERROR REPORT
 7143  033574  113737  001114  033606          MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
 7144  033602  004737  035354                  JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
```

```
7145  033606  000                     21$:    .BYTE   0
7146  033607  000                             .BYTE   0
7147  033610  000777                  22$:    BR      22$             ;;APT ERROR LOOP
7148  033612  005777  145320          2$:     TST     @SWR            ;;HALT ON ERROR
7149  033616  100001                          BPL     3$              ;;SKIP IF CONTINUE
7150  033620  000000                          HALT                    ;;HALT ON ERROR!
7151  033622  032777  001000  145306  3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
7152  033630  001402                          BEQ     4$              ;;BR IF NO
7153  033632  013716  001110                  MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
7154  033636  005737  001222          4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
7155  033642  001402                          BEQ     5$              ;;BR IF NONE
7156  033644  013716  001222                  MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
7157  033650                          5$:
7158  033650  022737  033102  000042          CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
7159  033656  001001                          BNE     6$              ;;BRANCH IF NO
7160  033660  000000                          HALT                    ;;YES
7161  033662                          6$:
7162  033662  000002                          RTI                     ;;RETURN
7163
7164                                  ;;*****************************************************************
7165                                  .SBTTL  CONVERT FLOATING BINARY TO OCTAL ASCIZ
7166                                  ;*
7167                                  ;*THIS ROUTINE CONVERTS A 32 BIT FLOATING NUMBER TO AN OCTAL
7168                                  ;*ASCIZ STRING IN THE FOLLOWING FORMAT:
7169                                  ;*
7170                                  ;*              W  XXX  YYY ZZZZZZ
7171                                  ;*
7172                                  ;*      WHERE   W = SIGN BIT
7173                                  ;*              X = 8-BIT EXPONENT (RIGHT JUSTIFIED)
7174                                  ;*              Y = FRACTION BITS <57:51> (RIGHT JUSTIFIED)
7175                                  ;*              Z = FRACTION BITS <50:35>
7176                                  ;*
7177                                  ;*IT IS ENTERED BY A TRAP CALL WITH THE ADDRESS OF THE FLOATING
7178                                  ;*NUMBER IN THE WORD FOLLOWING THE CALL.
7179                                  ;*IT RETURNS WITH THE ADDRESS OF THE ASCIZ STRING ON THE STACK.
7180                                  ;*****************************************************************
7181  033664  104405                  $FL20:  SAVREG
7182  033666  017600  000000                  MOV     @(SP),R0        ;GET ADDRESS OF DATA
7183  033672  062716  000002                  ADD     #2,(SP)         ;ADJUST RETURN PC
7184  033676  016001  000002                  MOV     2(R0),R1        ;PUT SECOND DATA WORD IN R1
7185  033702  011000                          MOV     (R0),R0         ;PUT FIRST DATA WORD IN R0
7186  033704  012704  001333                  MOV     #$FLBUFF+23,R4  ;GET ADDRESS OF BUFFER END IN R4
7187  033710  112744  000000                  MOVB    #0,-(R4)        ;PUT TERMINATOR IN BUFFER
7188  033714  012705  000005                  MOV     #5,R5           ;SET SOB COUNT FOR FRACTION DIGITS
7189  033720  010103                  1$:     MOV     R1,R3           ;GET LSB'S OF FRACTION
7190  033722  042703  177770                  BIC     #^C7,R3         ;SAVE LS 3 BITS
7191  033726  062703  000060                  ADD     #60,R3          ;MAKE THEM ASCII
7192  033732  110344                          MOVB    R3,-(R4)        ;STORE IN BUFFER
7193  033734  073027  177775                  ASHC    #-3,R0          ;SHIFT NUMBER TO NEXT 3 BITS
7194  033740  077511                          SOB     R5,1$           ;CONTINUE FOR 7 DIGITS
7195  033742  010103                          MOV     R1,R3           ;GET NEXT DIGITS
7196  033744  042703  177776                  BIC     #^C1,R3         ;ONLY WANT 1 BIT
7197  033750  062703  000060                  ADD     #60,R3          ;MAKE THEM ASCII
7198  033754  110344                          MOVB    R3,-(R4)        ;STORE IN BUFFER
7199  033756  112744  000040                  MOVB    #40,-(R4)       ;PUT SPACE IN BUFFER
7200  033762  073027  177777                  ASHC    #-1,R0
```

```
7201  033766  012705  000002                  MOV     #2,R5           ;SET SOB COUNT
7202  033772  010103                  3$:     MOV     R1,R3           ;GET LOW WORD
7203  033774  042703  177770                  BIC     #^C7,R3         ;MASK 3 BITS
7204  034000  062703  000060                  ADD     #60,R3          ;MAKE THEM ASCII
7205  034004  110344                          MOVB    R3,-(R4)        ;PUT IN BUFFER
7206  034006  073027  177775                  ASHC    #-3,R0          ;GET NEXT 3 BITS
7207  034012  077511                          SOB     R5,3$           ;CONVERT THEM
7208  034014  010103                          MOV     R1,R3           ;
7209  034016  042703  177776                  BIC     #^C1,R3         ;ONLY WANT 1 BIT
7210  034022  062703  000060                  ADD     #60,R3          ;MAKE IT ASCII
7211  034026  110344                          MOVB    R3,-(R4)        ;PUT IN BUFFER
7212  034030  112744  000040                  MOVB    #40,-(R4)       ;PUT SPACE IN BUFFER
7213  034034  112744  000040                  MOVB    #40,-(R4)
7214  034040  072127  177777                  ASH     #-1,R1          ;GET FIRST 3 BITS OF EXPONENT
7215  034044  012705  000002                  MOV     #2,R5           ;SET SOB COUNT FOR 2 DIGITS
7216  034050  010103                  2$:     MOV     R1,R3           ;GET LSB'S OF EXPONENT
7217  034052  042703  177770                  BIC     #^C7,R3         ;SAVE 3 BITS
7218  034056  062703  000060                  ADD     #60,R3          ;MAKE THEM ASCII
7219  034062  110344                          MOVB    R3,-(R4)        ;STORE IN BUFFER
7220  034064  072127  177775                  ASH     #-3,R1          ;GET NEXT 3 BITS
7221  034070  077511                          SOB     R5,2$           ;CONTINUE
7222  034072  010103                          MOV     R1,R3           ;GET LAST 2 BITS OF EXPONENT
7223  034074  042703  177774                  BIC     #^C3,R3         ;MAKE SURE ONLY 2 BITS
7224  034100  062703  000060                  ADD     #60,R3          ;MAKE THEM ASCII
7225  034104  110344                          MOVB    R3,-(R4)        ;STORE IN BUFFER
7226  034106  112744  000040                  MOVB    #40,-(R4)       ;PUT SPACE IN BUFFER
7227  034112  112744  000040                  MOVB    #40,-(R4)
7228  034116  042700  177776                  BIC     #^C1,R0         ;GET SIGN BIT (IT WAS EXTENDED)
7229  034122  062700  000060                  ADD     #60,R0          ;MAKE IT ASCII
7230  034126  110044                          MOVB    R0,-(R4)        ;PUT IT IN THE BUFFER
7231  034130  104406                          RESREG
7232  034132  011646                          MOV     (SP),-(SP)      ;SAVE RETURN PC
7233  034134  016666  000004  000002          MOV     4(SP),2(SP)     ;AND RETURN PSW
7234  034142  012766  001310  000004          MOV     #$FLBUFF,4(SP)  ;PUT BUFFER ADDRESS ON STACK
7235  034150  000006                          RTT                     ;RETURN
7236                          ;*****************************************************************
7237                          .SBTTL  CONVERT FLOATING DOUBLE BINARY TO OCTAL ASCIZ
7238                          ;*
7239                          ;*THIS ROUTINE CONVERTS A 64 BIT FLOATING NUMBER TO AN OCTAL
7240                          ;*ASCIZ STRING IN THE FOLLOWING FORMAT:
7241                          ;*
7242                          ;*              U  VVV  WWW XXXXXX YYYYYY ZZZZZZ
7243                          ;*
7244                          ;*      WHERE   U = SIGN BIT
7245                          ;*              V = 8-BIT EXPONENT (RIGHT JUSTIFIED)
7246                          ;*              W = FRACTION BITS <57:51> (RIGHT JUSTIFIED)
7247                          ;*              X = FRACTION BITS <50:35>
7248                          ;*              Y = FRACTION BITS <34:19>
7249                          ;*              Z = FRACTION BITS <18:03>
7250                          ;*
7251                          ;*IT IS ENTERED BY A TRAP CALL WITH THE ADDRESS OF THE FLOATING
7252                          ;*NUMBER IN THE WORD FOLLOWING THE CALL.
7253                          ;*IT RETURNS WITH THE ADDRESS OF THE ASCIZ STRING ON THE STACK.
7254                          ;*****************************************************************
7255  034152  104405          $FLD20: SAVREG
7256  034154  017637  000000  034170          MOV     @(SP),1$        ;GET ADDRESS OF DATA TO CONVERT
```

```
7257  034162  062716  000002                  ADD     #2,(SP)         ;ADJUST RETURN PC
7258  034166  104407                          FL2O                    ;CONVERT MS 32 BITS
7259  034170  000000                  1$:     .WORD
7260  034172  012600                          MOV     (SP)+,R0        ;GET ADDRESS OF CONVERTED DATA
7261  034174  010037  001352                  MOV     R0,$BUFF        ;SAVE IT
7262  034200  062700  000041                  ADD     #41,R0          ;ADJUST TO END OF BUFFER
7263  034204  105040                          CLRB    -(R0)           ;PUT TERMINATOR IN BUFFER
7264  034206  013701  034170                  MOV     1$,R1           ;GET ADDRESS OF DATA TO CONVERT
7265  034212  062701  000004                  ADD     #4,R1           ;ADJUST TO LOWER 32 BITS
7266  034216  012102                          MOV     (R1)+,R2        ;SAVE THE DATA
7267  034220  012103                          MOV     (R1)+,R3
7268  034222  012701  000002                  MOV     #2,R1           ;SET LOOP COUNT
7269  034226  012704  000005          3$:     MOV     #5,R4           ;SET LOOP COUNT
7270  034232  010305                  4$:     MOV     R3,R5           ;GET LS 32 BITS OF DATA
7271  034234  042705  177770                  BIC     #^C7,R5         ;MASK 3 BITS
7272  034240  062705  000060                  ADD     #60,R5          ;MAKE THEM ASCII
7273  034244  110540                          MOVB    R5,-(R0)        ;PUT IN BUFFER
7274  034246  073227  177775                  ASHC    #-3,R2          ;GET NEXT 3 BITS
7275  034252  077411                          SOB     R4,4$           ;CONTINUE
7276  034254  010305                          MOV     R3,R5           ;GET LS 32 BITS
7277  034256  042705  177776                  BIC     #^C1,R5         ;ONLY WANT 1 BIT
7278  034262  062705  000060                  ADD     #60,R5          ;MAKE IT ASCII
7279  034266  110540                          MOVB    R5,-(R0)        ;PUT IN TABLE
7280  034270  112740  000040                  MOVB    #40,-(R0)       ;PUT SPACE IN TABLE
7281  034274  073227  177777                  ASHC    #-1,R2
7282  034300  077126                          SOB     R1,3$           ;CONVERT NEXT 16 BITS
7283  034302  104406                          RESREG
7284  034304  011646                          MOV     (SP),-(SP)      ;ADJUST STACK
7285  034306  016666  000004  000002          MOV     4(SP),2(SP)     ;TO RETURN WITH ADDRESS
7286  034314  013766  001352  000004          MOV     $BUFF,4(SP)     ;OF BUFFER ON STACK
7287  034322  000006                          RTT                     ;RETURN
7288                          ;;*****************************************************************
7289                          .SBTTL  ROUTINE TO START THE LINE CLOCK
7290                          ;*THIS ROUTINE SETS UP THE LINE CLOCK TO GUARANTEE THE
7291                          ;*MAXIMUM DELAY BEFORE IT WILL INTERRUPT.
7292                          ;;*****************************************************************
7293  034324  012737  034340  000004  GETTIK: MOV     #2$,ERRVEC
7294  034332  005737  177546                  TST     LKSTAT          ;LINE CLOCK THERE?
7295  034336  000441                          BR      3$              ;BRANCH IF YES
7296  034340  012706  001100          2$:     MOV     #STACK,SP
7297  034344  005737  001242                  TST     $PASS           ;FIRST PASS?
7298  034350  001032                          BNE     4$              ;BRANCH IF NO
7299  034352  005227  177777                  INC     #-1
7300  034356  001027                          BNE     4$
7301  034360  104400  034366                  TYPE    ,65$            ;;TYPE ASCIZ STRING
7302  034364  000424                          BR      64$             ;;GET OVER THE ASCIZ
7303                          ;;65$:  .ASCIZ  "SHOULD HAVE LINE CLOCK INSTALLED!!!!!!!"
7304  034436                  64$:
7305  034436  000177  144560          4$:     JMP     @$ESCAPE
7306  034442  013746  000100          3$:     MOV     LKVEC,-(SP)     ;SAVE CONTENTS OF VECTOR
7307  034446  013746  177776                  MOV     PSW,-(SP)       ;SAVE PSW
7308  034452  005037  177776                  CLR     PSW
7309  034456  012737  034474  000100          MOV     #1$,LKVEC       ;SETUP THE VECTOR
7310  034464  012737  000100  177546          MOV     #BIT6,LKSTAT    ;START THE INTERRUPT
7311  034472  000001                          WAIT                    ;WAIT FOR IT TO HAPPEN
7312  034474  022626                  1$:     CMP     (SP)+,(SP)+     ;RESTORE THE STACK
```

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7313  034476  012637  177776          MOV     (SP)+,PSW       ;RESTORE THE PSW
7314  034502  012637  000100          MOV     (SP)+,LKVEC     ;RESTORE THE VECTOR
7315  034506  012737  000100  177546  MOV     #BIT6,LKSTAT    ;START THE CLOCK AGAIN
7316  034514  000207                  RTS     PC              ;RETURN
7317
7318                          ;;*****************************************************************
7319                          .SBTTL  MUL SHIFT ENCODER ROM CONVERT ROUTINE
7320                          ;*
7321                          ;*      THIS ROUTINE TAKES THE CONTENTS OF $REG0 AND $REG1 AS A
7322                          ;*      MULTIPLIER AND GENERATES THE ROM ADDRESSES AND OUTPUT
7323                          ;*      DATA OF THE MUL SHIFT ENCODER ROM FOR THE ENTIRE MULTI-
7324                          ;*      PLICATION.
7325                          ;;*****************************************************************
7326  034516  012737  054532  001376  MULSHF: MOV     #OUTTBL,OUTPTR  ;INITIALIZE ROMOUT TABLE POINTER
7327  034524  012737  052532  001374          MOV     #ADRTBL,ADRPTR  ;INITIALIZE ADDRESS TABLE POINTER
7328  034532  012705  000030                  MOV     #30,R5          ;SET LOOP COUNT
7329  034536  105737  001276                  TSTB    $FD             ;MULD ERROR?
7330  034542  001406                          BEQ     5$              ;BRANCH IF NO
7331  034544  013700  001164                  MOV     $REG2,R0        ;GET THE
7332  034550  013701  001166                  MOV     $REG3,R1        ;MULTIPLIER
7333  034554  005004                          CLR     R4              ;INITIALIZE STRING
7334  034556  000411                          BR      4$
7335  034560  013700  001160          5$:     MOV     $REG0,R0        ;GET THE
7336  034564  013701  001162                  MOV     $REG1,R1        ;MULTIPLIER
7337  034570  005004                          CLR     R4              ;INITIALIZE STRING
7338  034572  042700  177600                  BIC     #177600,R0      ;GET RID OF EXPONENT
7339  034576  052700  000200                  BIS     #BIT7,R0        ;INSERT HIDDEN BIT
7340  034602  010102          4$:     MOV     R1,R2           ;GET LOW ORDER WORD
7341  034604  042702  177600                  BIC     #177600,R2      ;GET CURRENT ROM ADDRESS
7342  034610  005704                          TST     R4              ;STRING SET?
7343  034612  001002                          BNE     1$              ;BRANCH IF YES
7344  034614  052702  000200                  BIS     #BIT7,R2        ;SET ADDRESS BIT7
7345  034620  110277  144550          1$:     MOVB    R2,@ADRPTR      ;PUT ADDRESS IN TABLE
7346  034624  005237  001374                  INC     ADRPTR          ;INCREMENT POINTER
7347  034630  062702  001400                  ADD     #MULTBL,R2      ;GENERATE POINTER TO SHIFT COUNT
7348  034634  111202                          MOVB    (R2),R2         ;GET SHIFT COUNT
7349  034636  032702  000010                  BIT     #BIT3,R2        ;STRING ON?
7350  034642  001402                          BEQ     2$              ;BRANCH IF NO
7351  034644  010204                          MOV     R2,R4           ;SET STRING
7352  034646  000401                          BR      3$
7353  034650  005004          2$:     CLR     R4              ;CLEAR STRING
7354  034652  110277  144520          3$:     MOVB    R2,@OUTPTR      ;PUT ROMOUT DATA IN TABLE
7355  034656  142777  000360  144512          BICB    #360,@OUTPTR    ;GET RID OF UPPER BITS
7356  034664  005237  001376                  INC     OUTPTR          ;INCREMENT TABLE PTR
7357  034670  052702  000010                  BIS     #BIT3,R2        ;MAKE R2 THE SHIFT COUNT (2'S COMPLIMENT)
7358  034674  073002                          ASHC    R2,R0           ;SHIFT THE MULTIPLIER BY THE SHIFT COUNT
7359  034676  052702  177400                  BIS     #177400,R2      ;SIGN EXTEND R2
7360  034702  060205                          ADD     R2,R5           ;DECREMENT LOOP COUNT BY SHIFT COUNT
7361  034704  100401                          BMI     6$
7362  034706  001335                          BNE     4$              ;CONTINUE
7363  034710  105077  144462          6$:     CLRB    @OUTPTR         ;TERMINATE THE ROMOUT TABLE
7364  034714  000207                          RTS     PC
7365
7366                          ;;*****************************************************************
7367                          ;.SBTTL ROUTINE TO PUT 2 INTO FEC REGISTER
7368                          ;*      THIS ROUTINE DOES A MAINTENANCE TRAP TO LOAD THE FEC
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                                        ;*      REGISTER WITH 2.
                                        ;;*****************************************************************
034716  013700  000244          CHGFEC: MOV     FPPVEC,R0
034722  012737  034750  000244          MOV     #TEMP,FPPVEC
034730  012703  000010                  MOV     #10,R3          ;SET  MICRO-TRAP TO PUT
034734  170003                          LDUB                    ;KNOWN CONDITIONS IN FEC & FEA
034736  170127  000020                  LDFPS   #FMM
034742  176427  000000          $$FEA:  LDEXP   #0,AC0          ;TRAP ON THIS INSTRUCTION
034746  170000                          CFCC                    ;WAIT FOR TRAP
034750  022626                  TEMP:   CMP     (SP)+,(SP)+     ;RESTORE THE SP
034752  010037  000244                  MOV     R0,FPPVEC
034756  000207                          RTS     PC              ;RETURN

                                        .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES

                                        ;;*****************************************************************
                                        ;*SAVE R0-R5
                                        ;*CALL:
                                        ;*      SAVREG
                                        ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
                                        ;*
                                        ;*TOP---(+16)
                                        ;* +2---(+18)
                                        ;* +4---R5
                                        ;* +6---R4
                                        ;* +8---R3
                                        ;*+10---R2
                                        ;*+12---R1
                                        ;*+14---R0

034760                          $SAVREG:
034760  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
034762  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
034764  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
034766  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
034770  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
034772  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
034774  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
035000  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
035004  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
035010  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
035014  000002                          RTI

                                        ;*RESTORE R0-R5
                                        ;*CALL:
                                        ;*      RESREG
035016                          $RESREG:
035016  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
035022  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
035026  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
035032  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
035036  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
035040  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
035042  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
035044  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
035046  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
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7425  035050  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
7426  035052  000002                          RTI
7427
7428                                  .SBTTL  TYPE ROUTINE
7429
7430                                  ;;**************************************************************
7431                                  ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
7432                                  ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
7433                                  ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
7434                                  ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
7435                                  ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
7436                                  ;*
7437                                  ;*CALL:
7438                                  ;*1) USING A TRAP INSTRUCTION
7439                                  ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
7440                                  ;*OR
7441                                  ;*      TYPE
7442                                  ;*      MESADR
7443                                  ;*
7444
7445  035054  105737  001155          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
7446  035060  100002                          BPL     1$              ;;BR IF YES
7447  035062  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
7448  035064  000430                          BR      3$              ;;LEAVE
7449  035066  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
7450  035070  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
7451  035074  122737  000001  001254          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
7452  035102  001011                          BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
7453  035104  132737  000100  001255          BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
7454  035112  001405                          BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
7455  035114  010037  035124                  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
7456  035120  004737  035344                  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
7457  035124  000000                  61$:    .WORD   0               ;;MESSAGE ADDRESS
7458  035126  132737  000040  001255  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
7459  035134  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
7460  035136  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
7461  035140  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
7462  035142  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
7463  035144  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
7464  035146  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
7465  035152  000002                          RTI                     ;;RETURN
7466  035154  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
7467  035160  001430                          BEQ     8$
7468  035162  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
7469  035166  001006                          BNE     5$
7470  035170  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
7471  035172  104400                          TYPE                    ;;TYPE A CR AND LF
7472  035174  001231                          $CRLF
7473  035176  105037  035332                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
7474  035202  000755                          BR      2$              ;;GET NEXT CHARACTER
7475  035204  004737  035266          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
7476  035210  123726  001154          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
7477  035214  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
7478  035216  013746  001152                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
7479                                                                  ;;AND THE NULL CHAR.
7480  035222  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
```

```
7481  035226  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
7482  035230  004737  035266                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
7483  035234  105337  035332                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
7484  035240  000770                          BR      7$              ;;LOOP
7485
7486                                  ;HORIZONTAL TAB PROCESSOR
7487
7488  035242  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
7489  035246  004737  035266          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
7490  035252  132737  000007  035332          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
7491  035260  001372                          BNE     9$              ;;TAB STOP
7492  035262  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
7493  035264  000724                          BR      2$              ;;GET NEXT CHARACTER
7494  035266  105777  143654          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
7495  035272  100375                          BPL     $TYPEC
7496  035274  116677  000002  143646          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
7497  035302  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
7498  035310  001003                          BNE     1$              ;;BRANCH IF NO
7499  035312  105037  035332                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
7500  035316  000406                          BR      $TYPEX          ;;EXIT
7501  035320  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
7502  035326  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
7503  035330  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
7504  035332  000000          $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
7505  035334  000207          $TYPEX: RTS     PC
7506
7507
7508                                  .SBTTL  APT COMMUNICATIONS ROUTINE
7509
7510                                  ;;**************************************************************
7511  035336  112737  000001  035602  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
7512  035344  112737  000001  035600  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
7513  035352  000403                          BR      $ATYC
7514  035354  112737  000001  035602  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
7515  035362                          $ATYC:
7516  035362  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
7517  035364  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
7518  035366  105737  035600                  TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
7519  035372  001450                          BEQ     5$              ;;IF NOT:  BR
7520  035374  122737  000001  001254          CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
7521  035402  001031                          BNE     3$              ;;IF NOT:  BR
7522  035404  132737  000100  001255          BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
7523  035412  001425                          BEQ     3$              ;;IF NOT:  BR
7524  035414  017600  000004                  MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
7525  035420  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
7526  035426  005737  001234          1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
7527  035432  001375                          BNE     1$              ;;IF NOT:  WAIT
7528  035434  010037  001250                  MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
7529  035440  105720                  2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
7530  035442  001376                          BNE     2$
7531  035444  163700  001250                  SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
7532  035450  006200                          ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
7533  035452  010037  001252                  MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
7534  035456  012737  000004  001234          MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
7535  035464  000413                          BR      5$
7536  035466  017637  000004  035512  3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
```

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7537  035474  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
7538  035502  013746  177776                  MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
7539  035506  004737  035054                  JSR     PC,$TYPE        ;;CALL TYPE MACRO
7540  035512  000000                  4$:     .WORD   0
7541  035514                          5$:
7542  035514  105737  035602          10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
7543  035520  001416                          BEQ     12$             ;;IF NOT:  BR
7544  035522  005737  001254                  TST     $ENV            ;;RUNNING UNDER APT?
7545  035526  001413                          BEQ     12$             ;;IF NOT:  BR
7546  035530  005737  001234          11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
7547  035534  001375                          BNE     11$             ;;IF NOT:  WAIT
7548  035536  017637  000004  001236          MOV     @4(SP),$FATAL   ;;GET ERROR #
7549  035544  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
7550  035552  005237  001234                  INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
7551  035556  105037  035602          12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
7552  035562  105037  035601                  CLRB    $LFLG           ;;CLEAR LOG FLAG
7553  035566  105037  035600                  CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
7554  035572  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
7555  035574  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
7556  035576  000207                          RTS     PC              ;;RETURN
7557  035600     000          $MFLG:  .BYTE   0               ;;MESSG. FLAG
7558  035601     000          $LFLG:  .BYTE   0               ;;LOG FLAG
7559  035602     000          $FFLG:  .BYTE   0               ;;FATAL FLAG
7560             035604                  .EVEN
7561             000200          APTSIZE=200
7562             000001          APTENV=001
7563             000100          APTSPOOL=100
7564             000040          APTCSUP=040
7565                             ;;**************************************************************************
7566
7567                             .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE
7568
7569                             ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
7570                             ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
7571                             ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
7572
7573  035604  113737  001102  001266  $ERRTYP:MOVB    $TSTNM,$$TSTNM
7574  035612  104400  001231                  TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
7575  035616  010046                          MOV     R0,-(SP)        ;;SAVE R0
7576  035620  005000                          CLR     R0              ;;PICKUP THE ITEM INDEX
7577  035622  153700  001114                  BISB    @#$ITEMB,R0
7578  035626  001005                          BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
                                                                        ;;TYPE THE PC OF THE ERROR
7579
7580  035630  013746  001116                  MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
                                                                        ;;ERROR ADDRESS
7581
7582  035634  104401                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
7583  035636  000137  036346                  JMP     10$             ;;GET OUT
7584  035642  005300          1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
7585  035644  006300                  ASL     R0              ;;      WORK FOR THE ERROR TABLE
7586  035646  006300                  ASL     R0
7587  035650  006300                  ASL     R0
7588  035652  062700  002172                  ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
7589  035656  012037  035666                  MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
7590  035662  001404                          BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
7591  035664  104400                          TYPE                    ;;TYPE THE "ERROR MESSAGE"
7592  035666  000000          2$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
```

```
7593  035670  104400  001231                TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
7594  035674  012037  035752        3$:     MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
7595  035700  001427                        BEQ     5$              ;;SKIP TYPEOUT IF 0
7596  035702  010146                        MOV     R1,-(SP)        ;SAVE R1
7597  035704  016001  000002                MOV     2(R0),R1        ;GET DATA FORMAT POINTER
7598  035710  001416                        BEQ     12?$            ;BRANCH IF ZERO
7599  035712  105711                        TSTB    (R1)            ;IS FORMAT TYPE ZERO?
7600  035714  001414                        BEQ     12?$            ;BRANCH IF YES
7601  035716  104400  037614                TYPE    ,MSG1
7602  035722  013746  001116                MOV     $ERRPC,-(SP)    ;PUT ERROR PC ON STACK
7603  035726  104401                        TYPOC                   ;TYPE IT
7604  035730  104400  036360                TYPE    ,11$            ;TYPE 2 SPACES
7605  035734  013746  001266                MOV     $$TSTNM,-(SP)   ;PUT TEST NUMBER ON STACK
7606  035740  104401                        TYPOC                   ;TYPE IT
7607  035742  104400  001231                TYPE    ,$CRLF
7608  035746  012601                12?$:   MOV     (SP)+,R1        ;RESTORE R1
7609  035750  104400                        TYPE                    ;;TYPE THE "DATA HEADER"
7610  035752  000000                4$:     .WORD   0               ;;"DATA HEADER" POINTER GOES HERE
7611  035754  104400  001231                TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
7612  035760  010146                5$:     MOV     R1,-(SP)        ;;SAVE R1
7613  035762  012001                        MOV     (R0)+,R1        ;;PICKUP "DATA TABLE" POINTER
7614  035764  001563                        BEQ     9$              ;;BR IF NO DATA TO BE TYPED
7615  035766  012000                        MOV     (R0)+,R0        ;;PICKUP "DATA FORMAT" POINTER
7616  035770  005700                6$:     TST     R0              ;IS FORMAT POINTER 0?
7617  035772  001410                        BEQ     12$             ;BRANCH IF YES
7618  035774  122710  000001                CMPB    #1,(R0)         ;IS IT 0, 1, OR >1?
7619  036000  003004                        BGT     20$             ;BRANCH IF ZERO
7620  036002  001407                        BEQ     30$             ;BRANCH IF 1
7621  036004  122710  000003                CMPB    #3,(R0)         ;IS IT 2, 3, OR >3?
7622  036010  003016                        BGT     40$             ;BRANCH IF 2
7623
7624                                ;DATA FORMAT 0-6 DIGIT OCTAL
7625  036012  005200                20$:    INC     R0              ;ADJUST FORMAT POINTER
7626  036014                        12$:
7627  036014  013146                        MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
7628  036016  104401                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
7629  036020  000537                        BR      8$
7630
7631                                ;DATA FORMAT 1-TYPE A FLOATING NUMBER
7632  036022  005200                30$:    INC     R0              ;ADJUST FORMAT POINTER
7633  036024  012137  036032                MOV     (R1)+,31$       ;GET ADDRESS OF NUMBER
7634  036030  104407                        FL2O                    ;CONVERT IT TO OCTAL
7635  036032  000000                31$:    .WORD
7636  036034  012637  036042                MOV     (SP)+,32$       ;GET ADDRESS OF ASCIZ
7637  036040  104400                        TYPE                    ;TYPE THE NUMBER
7638  036042  000000                32$:    .WORD
7639  036044  000525                        BR      8$
7640
7641                                ;DATA FORMAT 2-TYPE A FLOATING DOUBLE NUMBER
7642  036046  005200                40$:    INC     R0              ;ADJUST FORMAT POINTER
7643  036050  012137  036056                MOV     (R1)+,41$       ;GET ADDRESS OF NUMBER
7644  036054  104410                        FLD2O                   ;CONVERT IT TO ASCII
7645  036056  000000                41$:    .WORD
7646  036060  012637  036066                MOV     (SP)+,42$       ;GET ADDRESS OF ASCII
7647  036064  104400                        TYPE                    ;TYPE THE NUMBER
7648  036066  000000                42$:    .WORD
```

```
7649  036070  000513                        BR      8$
7650
7651                                  ;ERROR 25 HANDLER
7652  036072  104400  001231        60$:    TYPE    ,$CRLF          ;TYPE CARRIAGE RETURN LINE FEED
7653  036076  104400  041736              TYPE    ,EM25A          ;TYPE "MULTIPLIER"
7654  036102  104400  036360              TYPE    ,11$            ;TYPE TWO SPACES
7655  036106  105737  001276              TSTB    $FD
7656  036112  001403                      BEQ     66$
7657  036114  104410  001160              FLD20   ,$REG0
7658  036120  000402                      BR      67$
7659  036122  104407  001160        66$:    FL20    ,$REG0          ;CONVERT MULTIPLIER TO ASCIZ
7660  036126  012637  036134        67$:    MOV     (SP)+,61$
7661  036132  104400                      TYPE                    ;TYPE THE MULTIPLIER
7662  036134  000000              61$:    .WORD
7663  036136  104400  001231              TYPE    ,$CRLF
7664  036142  104400  041751              TYPE    ,EM25B
7665  036146  104405                      SAVREG
7666  036150  004737  034516              JSR     PC,MULSHF       ;GO CONVERT MULTIPLIER
7667  036154  104406                      RESREG
7668  036156  012700  052532              MOV     #ADRTBL,R0      ;GET ADDRESS OF ADDRESS TABLE
7669  036162  012701  054533              MOV     #OUTTBL+1,R1    ;GET ADDRESS OF ROMOUT TABLE
7670  036166  005037  001200              CLR     $TMP0           ;INITIALIZE
7671  036172  005037  001202              CLR     $TMP1           ;DATA BUFFER
7672  036176  104400  036360        62$:    TYPE    ,11$            ;TYPE TWO SPACES
7673  036202  112037  001200              MOVB    (R0)+,$TMP0     ;GET ADDRESS
7674  036206  012746  001200              MOV     #$TMP0,-(SP)
7675  036212  004737  037036              JSR     PC,$DB20        ;CONVERT TO ASCIZ
7676  036216  062716  000010              ADD     #10,(SP)        ;ONLY WANT 3 DIGITS
7677  036222  012637  036230              MOV     (SP)+,63$       ;GET ADDRESS OF ASCIZ
7678  036226  104400                      TYPE                    ;TYPE THE ROM ADDRESS
7679  036230  000000              63$:    .WORD                   ;
7680  036232  105721                      TSTB    (R1)+           ;DONE?
7681  036234  001360                      BNE     62$             ;BRANCH IF NO
7682  036236  104400  001231              TYPE    ,$CRLF
7683  036242  104400  041765              TYPE    ,EM25C
7684  036246  012700  054532              MOV     #OUTTBL,R0      ;GET ADDRESS OF ROMOUT DATA
7685  036252  104400  036360        64$:    TYPE    ,11$            ;TYPE TWO SPACES
7686  036256  112037  001200              MOVB    (R0)+,$TMP0     ;GET DATA
7687  036262  012746  001200              MOV     #$TMP0,-(SP)
7688  036266  004737  037036              JSR     PC,$DB20        ;CONVERT TO ASCIZ
7689  036272  062716  000010              ADD     #10,(SP)        ;ONLY WANT 3 DIGITS
7690  036276  012637  036304              MOV     (SP)+,65$
7691  036302  104400                      TYPE                    ;TYPE THE ROM OUT DATA
7692  036304  000000              65$:    .WORD
7693  036306  105710                      TSTB    (R0)            ;DONE?
7694  036310  001360                      BNE     64$             ;BRANCH IF NO
7695  036312  104400  001231              TYPE    ,$CRLF
7696  036316  000412                      BR      100$            ;EXIT
7697  036320  005711              8$:     TST     (R1)            ;;IS THERE ANOTHER NUMBER?
7698  036322  001404                      BEQ     9$              ;;BR IF NO
7699  036324  104400  036360              TYPE    ,11$            ;;TYPE TWO(2) SPACES
7700  036330  000137  035770              JMP     6$              ;;LOOP
7701
7702  036334  122737  000025  001114  9$:     CMPB    #25,$ITEMB      ;ERROR 25?
7703  036342  001653                      BEQ     60$             ;BRANCH IF YES
7704  036344  012601              100$:   MOV     (SP)+,R1        ;;RESTORE R1
```

```
 7705  036346  012600                    10$:    MOV     (SP)+,R0        ;;RESTORE R0
 7706  036350  104400  001231                    TYPE    $CRLF           ;;"CARRIAGE RETURN" & "LINE FEED"
 7707  036354  000207                            RTS     PC              ;;RETURN
 7708  036356  000040                    13$:    .ASCIZ  / /
 7709  036360  020040      000           11$:    .ASCIZ  /  /            ;;TWO(2) SPACES
 7710          036364                            .EVEN
 7711
 7712                                    .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
 7713
 7714                                    ;;**************************************,*********************
 7715                                    ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
 7716                                    ;*OCTAL (ASCII) NUMBER AND TYPE IT.
 7717                                    ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
 7718                                    ;*CALL:
 7719                                    ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 7720                                    ;*      TYPOS                   ;;CALL FOR TYPEOUT
 7721                                    ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
 7722                                    ;*      .BYTE   M               ;;M=1 OR 0
 7723                                    ;*                                      ;;1=TYPE LEADING ZEROS
 7724                                    ;*                                      ;;0=SUPPRESS LEADING ZEROS
 7725                                    ;*
 7726                                    ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
 7727                                    ;*$TYPOS OR $TYPOC
 7728                                    ;*CALL:
 7729                                    ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 7730                                    ;*      TYPON                   ;;CALL FOR TYPEOUT
 7731                                    ;*
 7732                                    ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
 7733                                    ;*CALL:
 7734                                    ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 7735                                    ;*      TYPOC                   ;;CALL FOR TYPEOUT
 7736
 7737  036364  017646  000000            $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
 7738  036370  116637  000001  036607            MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
 7739  036376  112637  036611                    MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
 7740  036402  062716  000002                    ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
 7741  036406  000406                            BR      $TYPON
 7742  036410  112737  000001  036607  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
 7743  036416  112737  000006  036611          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
 7744  036424  112737  000005  036606  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
 7745  036432  010346                            MOV     R3,-(SP)        ;;SAVE R3
 7746  036434  010446                            MOV     R4,-(SP)        ;;SAVE R4
 7747  036436  010546                            MOV     R5,-(SP)        ;;SAVE R5
 7748  036440  113704  036611                    MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
 7749  036444  005404                            NEG     R4
 7750  036446  062704  000006                    ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
 7751  036452  110437  036610                    MOVB    R4,$OMODE       ;;SAVE IT FOR USE
 7752  036456  113704  036607                    MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
 7753  036462  016605  000012                    MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
 7754  036466  005003                            CLR     R3              ;;CLEAR THE OUTPUT WORD
 7755  036470  006105                    1$:     ROL     R5              ;;ROTATE MSB INTO "C"
 7756  036472  000404                            BR      3$              ;;GO DO MSB
 7757  036474  006105                    2$:     ROL     R5              ;;FORM THIS DIGIT
 7758  036476  006105                            ROL     R5
 7759  036500  006105                            ROL     R5
 7760  036502  010503                            MOV     R5,R3
```

```
7761  036504  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
7762  036506  105337  036610                  DECB    $OMODE          ;;TYPE THIS DIGIT?
7763  036512  100016                          BPL     7$              ;;BR IF NO
7764  036514  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
7765  036520  001002                          BNE     4$              ;;TEST FOR 0
7766  036522  005704                          TST     R4              ;;SUPPRESS THIS 0?
7767  036524  001403                          BEQ     5$              ;;BR IF YES
7770  036526  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
7771  036530  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
7772  036534  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
7773  036540  110337  036604                  MOVB    R3,8$           ;;SAVE FOR TYPING
7774  036544  104400  036604                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
7775  036550  105337  036606          7$:     DECB    $OCNT           ;;COUNT BY 1
7776  036554  003347                          BGT     2$              ;;BR IF MORE TO DO
7777  036556  002402                          BLT     6$              ;;BR IF DONE
7778  036560  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
7779  036562  000744                          BR      2$              ;;GO DO THE LAST DIGIT
7780  036564  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
7781  036566  012604                          MOV     (SP)+,R4        ;;RESTORE R4
7782  036570  012603                          MOV     (SP)+,R3        ;;RESTORE R3
7783  036572  016666  000002  000004         MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
7784  036600  012616                          MOV     (SP)+,(SP)
7785  036602  000002                          RTI                     ;;RETURN
7786  036604     000          8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
7787  036605     000                  .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
7788  036606     000          $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
7789  036607     000          $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
7790  036610  000000          $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
7791
7792                          .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
7793
7794                          ;;**********************************************************************
7795                          ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
7796                          ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
7797                          ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
7798                          ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
7799                          ;*REPLACED WITH SPACES.
7800                          ;*CALL:
7801                          ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
7802                          ;*      TYPDS                   ;;GO TO THE ROUTINE
7803
7804  036612                  $TYPDS:
7805  036612  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
7806  036614  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
7807  036616  010246                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
7810  036620  010346                  MOV     R3,-(SP)        ;;PUSH R3 ON STACK
7811  036622  010546                  MOV     R5,-(SP)        ;;PUSH R5 ON STACK
7812  036624  012746  020200          MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
7813  036630  016605  000020          MOV     20(SP),R5       ;;GET THE INPUT NUMBER
7814  036634  100004                  BPL     1$              ;;BR IF INPUT IS POS.
7815  036636  005405                  NEG     R5              ;;MAKE THE BINARY NUMBER POS.
7816  036640  112766  000055  000001 MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
7817  036646  005000          1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
7820  036650  012703  037026          MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
7821  036654  112723  000040          MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
7822  036660  005002          2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
```

```
7817  036662  016001  037016                  MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
7818  036666  160105                  3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
7819  036670  002402                          BLT     4$              ;;BR IF DONE
7820  036672  005202                          INC     R2              ;;INCREASE THE BCD DIGIT BY 1
7821  036674  000774                          BR      3$
7822  036676  060105                  4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
7823  036700  005702                          TST     R2              ;;CHECK IF BCD DIGIT=0
7824  036702  001002                          BNE     5$              ;;FALL THROUGH IF 0
7825  036704  105716                          TSTB    (SP)            ;;STILL DOING LEADING 0'S?
7826  036706  100407                          BMI     7$              ;;BR IF YES
7827  036710  106316                  5$:     ASLB    (SP)            ;;MSD?
7828  036712  103003                          BCC     6$              ;;BR IF NO
7829  036714  116663  000001  177777          MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
7830  036722  052702  000060          6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
7831  036726  052702  000040          7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
7832  036732  110223                          MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
7833  036734  005720                          TST     (R0)+           ;;JUST INCREMENTING
7834  036736  020027  000010                  CMP     R0,#10          ;;CHECK THE TABLE INDEX
7835  036742  002746                          BLT     2$              ;;GO DO THE NEXT DIGIT
7836  036744  003002                          BGT     8$              ;;GO TO EXIT
7837  036746  010502                          MOV     R5,R2           ;;GET THE LSD
7838  036750  000764                          BR      6$              ;;GO CHANGE TO ASCII
7839  036752  105726                  8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
7840  036754  100003                          BPL     9$              ;;BR IF NO
7841  036756  116663  177777  177776          MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
7842  036764  105013                  9$:     CLRB    (R3)            ;;SET THE TERMINATOR
7843  036766  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
7844  036770  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
7845  036772  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
7846  036774  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
7847  036776  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
7848  037000  104400  037026                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
7849  037004  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
7850  037012  012616                          MOV     (SP)+,(SP)
7851  037014  000002                          RTI                     ;;RETURN TO USER
7852  037016  023420                  $DTBL:  10000.
7853  037020  001750                          1000.
7854  037022  000144                          100.
7855  037024  000012                          10.
7856  037026  000004                  $DBLK:  .BLKW   4
7857
7858                                  .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
7859
7860                                  ;;**************************************************************
7861                                  ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
7862                                  ;*UNSIGNED OCTAL ASCIZ NUMBER.
7863                                  ;*CALL
7864                                  ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
7865                                  ;*      JSR     PC,@#$DB20      ;;CALL THE ROUTINE
7866                                  ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
7867
7868
7869  037036  104405                  $DB20:  SAVREG                  ;;SAVE ALL REGISTERS
7870  037040  016601  000002                  MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
7871  037044  012705  037155                  MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
7872  037050  012704  000014                  MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
```

```
 7873  037054  012703  177770                MOV     #^C7,R3         ;;MASK
 7874  037060  012100                        MOV     (R1)+,R0        ;;LOWER WORD
 7875  037062  012101                        MOV     (R1)+,R1        ;;HIGH WORD
 7876  037064  005002                        CLR     R2              ;;TERMINATOR
 7877  037066  110245              1$:       MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
 7878  037070  010002                        MOV     R0,R2           ;;GET THIS DIGIT
 7879  037072  305304                        DEC     R4              ;;COUNT THIS CHARACTER
 7880  037074  003007                        BGT     3$              ;;BR IF NOT THE LAST DIGIT
 7881  037076  001405                        BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
 7882  037100  005205                        INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
 7883  037102  010566  000002                MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
 7884  037106  104406                        RESREG                  ;;RESTORE ALL REGISTERS
 7885  037110  000207                        RTS     PC              ;;RETURN TO USER
 7886  037112  006203              2$:       ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
 7887  037114  006001              3$:       ROR     R1              ;;POSITION THE BINARY NUMBER FOR
 7888  037116  006000                        ROR     R0              ;;      THE NEXT OCTAL DIGIT
 7889  037120  006001                        ROR     R1
 7890  037122  006000                        ROR     R0
 7891  037124  006001                        ROR     R1
 7892  037126  006000                        ROR     R0
 7893  037130  040302                        BIC     R3,R2           ;;MASK OUT ALL JUNK
 7894  037132  062702  000060                ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
 7895  037136  000753                        BR      1$              ;;GO PUT IT IN THE DATA TABLE
 7896  037140  000016              $OCTVL: .BLKB   14.              ;;RESERVE DATA TABLE
 7897                                ;;**************************************************************
 7898                                .SBTTL  UNEXPECTED TRAP TO 4 ROUTINE
 7899
 7900  037156  011637  001200        CPSPUR: MOV     (SP),$TMP0      ;SAVE PC OF TRAP
 7901  037162  012706  001100                MOV     #STACK,SP       ;RESTORE THE SP
 7902  037166  005737  001372                TST     $CPUER          ;11/70?
 7903  037172  001410                        BEQ     1$              ;BRANCH IF NO
 7904  037174  013737  177766  001202        MOV     CPUERR,$TMP1    ;SAVE ERROR REG
 7905  037202  005037  177766                CLR     CPUERR          ;CLEAR THE ERROR
 7906  037206  104154                        ERROR   154             ;UNEXPECTED TRAP TO 4
 7907  037210  000137  004456                JMP     LOOP            ;RESTART
 7908  037214  104155              1$:       ERROR   155             ;UNEXPECTED TRAP TO 4
 7909  037216  000137  004456                JMP     LOOP            ;RESTART
 7910
 7911                                ;;**************************************************************
 7912                                .SBTTL  UNEXPECTED TRAP TO 114 ROUTINE
 7913
 7914  037222  011637  001200        CACHSPU:MOV     (SP),$TMP0      ;SAVE PC OF TRAP
 7915  037226  012706  001100                MOV     #STACK,SP       ;INIT THE SP
 7916  037232  005737  001372                TST     $CPUERR         ;11/70?
 7917  037236  001414                        BEQ     1$              ;BRANCH IF NO
 7918  037240  013737  177744  001202        MOV     MEMERR,$TMP1    ;SAVE ERROR REGISTER
 7919  037246  013737  177740  001204        MOV     LOADRS,$TMP2    ;SAVE ERROR
 7920  037254  013737  177742  001206        MOV     HIADRS,$TMP3    ;ADDRESS REGISTER
 7921  037262  104156                        ERROR   156             ;UNEXPECTED TRAP TO 114
 7922  037264  000137  004456                JMP     LOOP            ;RESTART
 7923  037270  104157              1$:       ERROR   157             ;UNEXPECTED TRAP TO 114
 7924  037272  000137  004456                JMP     LOOP            ;RESTART
 7925
 7926                                ;;**************************************************************
 7927                                .SBTTL  UNEXPECTED TRAP TO 244 ROUTINE
 7928
```

```
 7929  037276  011637  001200          FPSPUR: MOV     (SP),$TMP0      ;SAVE ADDRESS OF TRAP
 7930  037302  012706  001100                  MOV     #STACK,SP       ;RESTORE THE SP
 7931  037306  170337  001202                  STST    $TMP1           ;GET FEC AND FEA
 7932  037312  104160                          ERROR   160             ;UNEXPECTED TRAP TO 244
 7933  037314  000137  004456                  JMP     LOOP            ;RESTART
 7934
 7935                                  .SBTTL  TRAP DECODER
 7936
 7937                                  ;;******************************************************************
 7938                                  ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
 7939                                  ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
 7940                                  ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
 7941                                  ;*GO TO THAT ROUTINE.
 7942
 7943  037320  010046                  $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
 7944  037322  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
 7945  037326  005740                          TST     -(R0)           ;;BACKUP BY 2
 7946  037330  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
 7947  037332  006300                          ASL     R0              ;;POSITION FOR INDEXING
 7948  037334  016000  037342                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
 7949  037340  000200                          RTS     R0              ;;GO TO ROUTINE
 7950
 7951
 7952                                  .SBTTL  TRAP TABLE
 7953
 7954                                  ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
 7955                                  ;*BY THE "TRAP" INSTRUCTION.
 7956
 7957                                  ;       ROUTINE
 7958                                  ;       -------
 7959  037342                          $TRPAD:
 7960  037342  035054                          $TYPE   ;;CALL=TYPE     TRAP+0(104400)  TTY TYPEOUT ROUTINE
 7961  037344  036410                          $TYPOC  ;;CALL=TYPOC    TRAP+1(104401)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
 7962  037346  036364                          $TYPOS  ;;CALL=TYPOS    TRAP+2(104402)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
 7963  037350  036424                          $TYPON  ;;CALL=TYPON    TRAP+3(104403)  TYPE OCTAL NUMBER (AS PER LAST CALL)
 7964  037352  036612                          $TYPDS  ;;CALL=TYPDS    TRAP+4(104404)  TYPE DECIMAL NUMBER (WITH SIGN)
 7965  037354  034760                          $SAVREG ;;CALL=SAVREG   TRAP+5(104405)  SAVE R0-R5 ROUTINE
 7966  037356  035016                          $RESREG ;;CALL=RESREG   TRAP+6(104406)  RESTORE R0-R5 ROUTINE
 7967  037360  033664                          $FL20   ;;CALL=FL20     TRAP+7(104407)
 7968  037362  034152                          $FLD20  ;;CALL=FLD20    TRAP+10(104410)
 7969
 7970                                  .SBTTL  POWER DOWN AND UP ROUTINES
 7971
 7972                                  ;;******************************************************************
 7973                                  ;POWER DOWN ROUTINE
 7974  037364  012737  037576  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
 7975  037372  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
 7976  037400  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 7977  037402  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 7978  037404  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 7979  037406  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 7980  037410  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
 7981  037412  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 7982  037414  170200                          STFPS   R0              ;GET FPS
 7983  037416  170127  000200                  LDFPS   #FD
 7984  037422  010046                          MOV     R0,-(SP)        ;PUSH ON STACK
```

```
 7985  037424  174046                          STD     AC0,-(SP)
 7986  037426  174146                          STD     AC1,-(SP)
 7987  037430  174246                          STD     AC2,-(SP)
 7988  037432  174346                          STD     AC3,-(SP)
 7989  037434  172404                          LDD     AC4,AC0
 7990  037436  174046                          STD     AC0,-(SP)
 7991  037440  172405                          LDD     AC5,AC0
 7992  037442  174046                          STD     AC0,-(SP)
 7993  037444  010637  037602                  MOV     SP,$SAVR6       ;;SAVE SP
 7994  037450  012737  037462  000024          MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
 7995  037456  000000                          HALT
 7996  037460  000776                          BR      .-2             ;;HANG UP
 7997
 7998                                  ;;*****************************************************
 7999                                  ;POWER UP ROUTINE
 8000  037462  012737  037576  000024  $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
 8001  037470  013706  037602                  MOV     $SAVR6,SP       ;;GET SP
 8002  037474  005037  037602                  CLR     $SAVR6          ;;WAIT LOOP FOR THE TT
 8003  037500  005237  037602          1$:     INC     $SAVR6          ;;WAIT FOR THE INC
 8004  037504  001375                          BNE     1$              ;;OF  WORD
 8005  037506  170127  000200                  LDFPS   #FD
 8006  037512  172426                          LDD     (SP)+,AC0
 8007  037514  174005                          STD     AC0,AC5
 8008  037516  172426                          LDD     (SP)+,AC0
 8009  037520  174004                          STD     AC0,AC4
 8010  037522  172726                          LDD     (SP)+,AC3
 8011  037524  172626                          LDD     (SP)+,AC2
 8012  037526  172526                          LDD     (SP)+,AC1
 8013  037530  172426                          LDD     (SP)+,AC0
 8014  037532  170126                          LDFPS   (SP)+
 8015  037534  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
 8016  037536  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
 8017  037540  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
 8018  037542  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
 8019  037544  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
 8020  037546  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
 8021  037550  012737  037364  000024          MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
 8022  037556  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
 8023  037564  104400                          TYPE                    ;REPORT THE POWER FAILURE
 8024  037566  037604                  $PWRMG: .WORD   $POWER          ;;POWER FAIL MESSAGE POINTER
 8025  037570  013716                          MOV     @(PC)+,(SP)     ;;RESTART AT $ESCAPE
 8026  037572  001222                  $PWRAD: .WORD   $ESCAPE         ;;RESTART ADDRESS
 8027  037574  000002                          RTI
 8028  037576  000000                  $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
 8029  037600  000776                          BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
 8030  037602  000000                  $SAVR6: 0                       ;;PUT THE SP HERE
 8031  037604  005015  047520  042527  $POWER: .ASCIZ  <15><12>"POWER"
 8032  037612  000122
 8033                                          .EVEN
 8034
 8035  037614  051105  050122  004503  MSG1:   .ASCIZ  /ERRPC  TEST NO/<CRLF>
 8036  037622  042524  052123  047040
 8037  037630  100117     000
 8038  037633     104  052123  042040  EM1:    .ASCIZ  /DST DID NOT CLEAR ON MULF/
 8039  037640  042111  047040  052117
 8040  037646  041440  042514  051101
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8041  037654  047440  020116  052515
8042  037662  043114     000
8043  037665     105  051122  041520  DH1:    .ASCII  /ERRPC                   DATA                    TEST NO/<CRLF>
8044  037672  004411  020040  020040
8045  037700  020040  020040  040504
8046  037706  040524  004411  052011
8047  037714  051505  020124  047516
8048  037722     200
8049  037723     011  020040  020040          .ASCIZ  /           EXPECT                  ACTUAL/
8050  037730  054105  042520  052103
8051  037736  004411  020040  040440
8052  037744  052103  040525  000114
8053                                          .EVEN
8054  037752  001116  001200  001204  DT1:    .WORD   $ERRPC,$TMP0,$TMP2,$$TSTNM,0
8055  037760  001266  000000
8056  037764     000     001     001  DF1:    .BYTE   0,1,1,0,0
8057  037767     000     000
8058  037771     106  050130  020103  EM2:    .ASCIZ  /FXPC FIRB08(1) NOT GETTING TO FRMA AS A LOW OR NOT GETTING TO RAD02 AS
8059  037776  044506  041122  034060
8060  040004  030450  020051  047516
8061  040012  020124  042507  052124
8062  040020  047111  020107  047524
8063  040026  043040  046522  020101
8064  040034  051501  040440  046040
8065  040042  053517  047440  020122
8066  040050  047516  020124  042507
8067  040056  052124  047111  020107
8068  040064  047524  051040  042101
8069  040072  031060  040440  020123
8070  040100  020101  000110
8071  040104  047503  042116  052111  EM3:    .ASCIZ  /CONDITION CODES BAD/
8072  040112  047511  020116  047503
8073  040120  042504  020123  040502
8074  040126  000104
8075  040130  051105  050122  004503  DH3:    .ASCII  /ERRPC        FPS       TEST NO/<CRLF>
8076  040136  020040  020040  020040
8077  040144  050106  004523  042524
8078  040152  052123  047040  100117
8079  040160  042411  050130  041505          .ASCIZ  /       EXPECT  ACTUAL/
8080  040166  004524  041501  052524
8081  040174  046101     000
8082          040200                          .EVEN
8083  040200  001116  001200  001202  DT3:    .WORD   $ERRPC,$TMP0,$TMP1,$$TSTNM,0
8084  040206  001266  000000
8085  040212  042101  020130  047522  EM4:    .ASCIZ  /ADX ROM FAILED/
8086  040220  020115  040506  046111
8087  040226  042105     000
8088  040231     105  051122  041520  DH4:    .ASCIZ  /ERRPC  TEST NO/
8089  040236  052011  051505  020124
8090  040244  047516     000
8091          040250                          .EVEN
8092  040250  001116  001266  000000  DT4:    .WORD   $ERRPC,$$TSTNM,0
8093  040256  051106  045510  046440  EM5:    .ASCIZ  /FRHK MUL SWR STUCK LOW/
8094  040264  046125  051440  051127
8095  040272  051440  052524  045503
8096  040300  046040  053517     000
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 8097  040305     106  050130  020120  EM6:    .ASCIZ  /FXPP SCOO NOT GETTING TO FRMA AS A HIGH/
 8098  040312  041523  030060  047040
 8099  040320  052117  043440  052105
 8100  040326  044524  043516  052040
 8101  040334  020117  051106  040515
 8102  040342  040440  020123  020101
 8103  040350  044510  044107     000
 8104  040355     106  046522  020105  EM7:    .ASCIZ  /FRME SHFC 0(0)H NOT GOING HIGH WHEN 1(0)H IS LOW/
 8105  040362  044123  041506  030040
 8106  040370  030050  044051  047040
 8107  040376  052117  043440  044517
 8108  040404  043516  044040  043511
 8109  040412  020110  044127  047105
 8110  040420  030440  030050  044051
 8111  040426  044440  020123  047514
 8112  040434  000127
 8113                                  .EVEN
 8114  040436  001116  001200  001210  DT7:    .WORD   $ERRPC,$TMP0,$TMP4,$$TSTNM,0
 8115  040444  001266  000000
 8116  040450  051121  042040  052101  EM10:   .ASCIZ  /QR DATA BAD, CHECK MUL SHIFT ENCODER ROM OUT IN STATE 233/
 8117  040456  020101  040502  026104
 8118  040464  041440  042510  045503
 8119  040472  046440  046125  051440
 8120  040500  044510  052106  042440
 8121  040506  041516  042117  051105
 8122  040514  051040  046517  047440
 8123  040522  052125  044440  020116
 8124  040530  052123  052101  020105
 8125  040536  031462  000063
 8126  040544  051105  050122  004503  DH10:   .ASCII  /ERRPC                    DATA                                    ROMOUT  TEST NO/
 8127  040550  004411  040504  040524
 8128  040556  004411  004411  047522
 8129  040564  047515  052125  052011
 8130  040572  051505  020124  047516
 8131  040600     200
 8132  040601     011  042411  050130          .ASCIZ  /                EXPECT          ACTUAL/
 8133  040606  041505  004524  040411
 8134  040614  052103  040525  000114
 8135                                  .EVEN
 8136  040622  001116  001200  001210  DT10:   .WORD   $ERRPC,$TMP0,$TMP4,$$TSTNM,0
 8137  040630  001266  000000
 8138  040634  051106  046110  046440  EM11:   .ASCIZ  /FRHL MPY SIGN EXTEND NOT GOING LOW/
 8139  040642  054520  051440  043511
 8140  040650  020116  054105  042524
 8141  040656  042116  047040  052117
 8142  040664  043440  044517  043516
 8143  040672  046040  053517     000
 8144  040677     106  044122  020114  EM12:   .ASCII  "FRHL MPY/DIV ADD(1)L NOT GOING LOW OR NOT CAUSING"<CRLF>
 8145  040704  050115  027531  044504
 8146  040712  020126  042101  024104
 8147  040720  024461  020114  047516
 8148  040726  020124  047507  047111
 8149  040734  020107  047514  020127
 8150  040742  051117  047040  052117
 8151  040750  041440  052501  044523
 8152  040756  043516     200
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8153  040761     106  046522  020110          .ASCIZ  "FRMH FORCE MPY/DIV ADD TO FORCE THE ADD"
8154  040766  047506  041522  020105
8155  040774  050115  027531  044504
8156  041002  020126  042101  020104
8157  041010  047524  043040  051117
8158  041016  042503  052040  042510
8159  041024  040440  042104     000
8160  041031     101  020122  040504  EM13:   .ASCIZ  /AR DATA BAD/
8161  041036  040524  041040  042101
8162  041044     000
8163            041046                  .EVEN
8164  041046  001116  001204  001214  DT13:   .WORD   $ERRPC,$TMP2,$TMP6,$STSTNM,0
8165  041054  001266  000000
8166  041060  052515  020114  044123  EM14:   .ASCIZ  /MUL SHIFT ENCODER ROMOUT BAD/
8167  041066  043111  020124  047105
8168  041074  047503  042504  020122
8169  041102  047522  047515  052125
8170  041110  041040  042101     000
8171  041115     105  051122  041520  DH14:   .ASCIZ  /ERRPC  ROMOUT  TEST NO/
8172  041122  051011  046517  052517
8173  041130  004524  042524  052123
8174  041136  047040  000117
8175                            .EVEN
8176  041142  001116  001172  001266  DT14:   .WORD   $ERRPC,$REG5,$STSTNM,0
8177  041150  000000
8178  041152  051106  045510  046440  EM15:   .ASCII  "FRHK MPY/DIV ADD(1)L NOT GOING HIGH OR" <CRLF>
8179  041160  054520  042057  053111
8180  041166  040440  042104  030450
8181  041174  046051  047040  052117
8182  041202  043440  044517  043516
8183  041210  044040  043511  020110
8184  041216  051117     200
8185  041221     106  046522  020110          .ASCIZ  "FRMH FORCE MPY/DIV SUB NOT GOING LOW"
8186  041226  047506  041522  020105
8187  041234  050115  027531  044504
8188  041242  020126  052523  020102
8189  041250  047516  020124  047507
8190  041256  047111  020107  047514
8191  041264  000127
8192  041266  051106  045510  046440  EM16:   .ASCII  /FRHK MU. SWR NOT GOING LOW OR MUL SHF ENCODER ROM/<CRLF>
8193  041274  046125  051440  051127
8194  041302  047040  052117  043440
8195  041310  044517  043516  046040
8196  041316  053517  047440  020122
8197  041324  052515  020114  044123
8198  041332  020106  047105  047503
8199  041340  042504  020122  047522
8200  041346  100115
8201  041350  047516  020124  052517          .ASCIZ  /NOT OUTPUTTING 12 IN STATE 112/
8202  041356  050124  052125  044524
8203  041364  043516  030440  020062
8204  041372  047111  051440  040524
8205  041400  042524  030440  031061
8206  041406     000
8207  041407     106  044122  020113  EM17:   .ASCIZ  /FRHK MPY SIGN EXTEND NOT GOING HIGH/
8208  041414  050115  020131  044523
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041422  047107  042440  052130
041430  047105  020104  047516
041436  020124  047507  047111
041444  020107  044510  044107
041452     000
041453     106  044122  020113  EM20:   .ASCIZ  /FRHK E115(4) NOT GOING LOW/
041460  030505  032461  032050
041466  020051  047516  020124
041474  047507  047111  020107
041502  047514  000127
041506  051106  045510  042440  EM21:   .ASCIZ  /FRHK E115(4) NOT GOING HIGH/
041514  030461  024065  024464
041522  047040  052117  043440
041530  044517  043516  044040
041536  043511  000110
041542  051106  045510  042440  EM22:   .ASCIZ  /FRHK E107(12) NOT GOING LOW/
041550  030061  024067  031061
041556  020051  047516  020124
041564  047507  047111  020107
041572  047514  000127
041576  051106  045510  046440  EM23:   .ASCIZ  /FRHK MUL SWR DID NOT ENABLE FRMH FORCE A/
041604  046125  051440  051127
041612  042040  042111  047040
041620  052117  042440  040516
041626  046102  020105  051106
041634  044115  043040  051117
041642  042503  040440     000
041647     122  051505  046125  EM24:   .ASCIZ  /RESULT WRONG/
041654  020124  051127  047117
041662  000107
041664  051106  045510  047440  EM25:   .ASCIZ  /FRHK OR FRLH MUL SHIFT ENCODER ROM FAILED/
041672  020122  051106  044114
041700  046440  046125  051440
041706  044510  052106  042440
041714  041516  042117  051105
041722  051040  046517  043040
041730  044501  042514  000104
041736  052515  052114  050111  EM25A:  .ASCIZ  /MULTIPLIER/
041744  044514  051105     000
041751     122  046517  040440  EM25B:  .ASCIZ  /ROM ADDRESS/
041756  042104  042522  051523
041764     000
041765     122  046517  052517  EM25C:  .ASCIZ  /ROMOUT DATA/
041772  020124  040504  040524
042000     000
042001     106  044122  020113  EM26:   .ASCIZ  /FRHK MUL SWR NOT GOING HIGH WITH PIN 9 & 10 ON A HIGH/
042006  052515  020114  053523
042014  020122  047516  020124
042022  047507  047111  020107
042030  044510  044107  053440
042036  052111  020110  044520
042044  020116  020071  020046
042052  030061  047440  020116
042060  020101  044510  044107
042066     000
042067     011  004411  042011  DH26:   .ASCII  /                                DATA/<CRLF>
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 8265  042074  052101  100101
 8266  042100  020011  020040  054105          .ASCIZ  /          EXPECT                                ACTUAL/
 8267  042106  042520  052103  004411
 8268  042114  020011  020040  020011
 8269  042122  020040  041501  052524
 8270  042130  046101     000
 8271          042134                          .EVEN
 8272  042134  001200  001210  000000  DT26:   .WORD  $TMP0,$TMP4,0
 8273  042142     002     002          DF26:   .BYTE  2,2
 8274  042144  051106  044114  042440  EM27:   .ASCIZ  /FRLH E1(11) DID NOT GO LOW WITH H,L INPUT/
 8275  042152  024061  030461  020051
 8276  042160  044504  020104  047516
 8277  042166  020124  047507  046040
 8278  042174  053517  053440  052111
 8279  042202  020110  026110  020114
 8280  042210  047111  052520  000124
 8281  042216  051106  045510  042440  EM30:   .ASCIZ  /FRHK E107 NOT GOING LOW WITH MUL SHF 0 ON A H/
 8282  042224  030061  020067  047516
 8283  042232  020124  047507  047111
 8284  042240  020107  047514  020127
 8285  042246  044527  044124  046440
 8286  042254  046125  051440  043110
 8287  042262  030040  047440  020116
 8288  042270  020101  000110
 8289  042274  051106  044114  042440  EM31:   .ASCIZ  /FRLH E1(11) DID NOT GO HIGH WITH BOTH INPUTS ON A HIGH/
 8290  042302  024061  030461  020051
 8291  042310  044504  020104  047516
 8292  042316  020124  047507  044040
 8293  042324  043511  020110  044527
 8294  042332  044124  041040  052117
 8295  042340  020110  047111  052520
 8296  042346  051524  047440  020116
 8297  042354  020101  044510  044107
 8298  042362     000
 8299  042363     106  044122  020113  EM32:   .ASCIZ  /FRHK E107(6) NOT GOING LOW WITH H,L,H INPUT/
 8300  042370  030505  033460  033050
 8301  042376  020051  047516  020124
 8302  042404  047507  047111  020107
 8303  042412  047514  020127  044527
 8304  042420  044124  044040  046054
 8305  042426  044054  044440  050116
 8306  042434  052125     000
 8307  042437     106  044122  020113  EM33:   .ASCIZ  /FRHK E107(12) NOT GOING LOW WITH H,H,L INPUT/
 8308  042444  030505  033460  030450
 8309  042452  024462  047040  052117
 8310  042460  043440  044517  043516
 8311  042466  046040  053517  053440
 8312  042474  052111  020110  026110
 8313  042502  026110  020114  047111
 8314  042510  052520  000124
 8315
 8316  042514  052123  052101  020105  EM34:   .ASCIZ  /STATE 355 DID NOT CLEAR DST+1 OR FXPC FIR808 NOT GETTING TO FRMA AS A H
 8317  042522  032463  020065  044504
 8318  042530  020104  047516  020124
 8319  042536  046103  040505  020122
 8320  042544  051504  025524  020061
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8321  042552  051117  043040  050130
8322  042560  020103  044506  041122
8323  042566  034060  047040  052117
8324  042574  043440  052105  044524
8325  042602  043516  052040  020117
8326  042610  051106  040515  040440
8327  042616  020123  020101  044510
8328  042624  044107     000
8329  042627     123  040524  042524  EM35:   .ASCIZ  /STATE 305 DID NOT CLEAR DST+1/
8330  042634  031440  032460  042040
8331  042642  042111  047040  052117
8332  042650  041440  042514  051101
8333  042656  042040  052123  030453
8334  042664     000
8335  042665     106  040522  052103  EM36:   .ASCIZ  /FRACTION IS WRONG ON MODF*INT=0/
8336  042672  047511  020116  051511
8337  042700  053440  047522  043516
8338  042706  047440  020116  047515
8339  042714  043104  044452  052116
8340  042722  030075     000
8341  042725     123  040524  042524  EM37:   .ASCIZ  /STATE 266 DID NOT SET BN/
8342  042732  031040  033066  042040
8343  042740  042111  047040  052117
8344  042746  051440  052105  041040
8345  042754  000116
8346  042756  051106  041501  044524  EM40:   .ASCIZ  /FRACTION ACC DID NOT CLEAR IN STATE 341/
8347  042764  047117  040440  041503
8348  042772  042040  042111  047040
8349  043000  052117  041440  042514
8350  043006  051101  044440  020116
8351  043014  052123  052101  020105
8352  043022  032063  000061
8353  043026  047111  042524  042507  EM41:   .ASCIZ  /INTEGER PORTION WRONG IN STATE 7/
8354  043034  020122  047520  052122
8355  043042  047511  020116  051127
8356  043050  047117  020107  047111
8357  043056  051440  040524  042524
8358  043064  033440     000
8359  043067     106  040522  052103  EM42:   .ASCIZ  /FRACTION WRONG ON MOD/
8360  043074  040111  020116  051127
8361  043102  047117  020107  047117
8362  043110  046440  042117     000
8363  043115     111  052116  043505  EM43:   .ASCIZ  /INTEGER WRONG ON MOD/
8364  043122  051105  053440  047522
8365  043130  043516  047440  020116
8366  043136  047515  000104
8367  043142  047111  042524  042507  EM44:   .ASCIZ  /INTEGER DID NOT CLEAR ON OVERFLOW/
8368  043150  020122  044504  020104
8369  043156  047516  020124  046103
8370  043164  040505  020122  047117
8371  043172  047440  042526  043122
8372  043200  047514  000127
8373  043204  052123  052101  020105  EM45:   .ASCIZ  /STATE 105 NOT DETECTING ZERO FRACTION/
8374  043212  030061  020065  047516
8375  043220  020124  042504  042524
8376  043226  052103  047111  020107
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 8377  043234  042532  047522  043040
 8378  043242  040522  052103  047511
 8379  043250  000116
 8380  043252  047514  044507  040503  EM46:   .ASCIZ  /LOGICAL "AND" FAILED ON FRACTION/
 8381  043260  020114  040442  042116
 8382  043266  020042  040506  046111
 8383  043274  042105  047440  020116
 8384  043302  051106  041501  044524
 8385  043310  047117     000
 8386  043313     114  043517  041511  EM47:   .ASCIZ  /LOGICAL "AND" FAILED ON INTEGER/
 8387  043320  046101  021040  047101
 8388  043326  021104  043040  044501
 8389  043334  042514  020104  047117
 8390  043342  044440  052116  043505
 8391  043350  051105     000
 8392          043354                          .EVEN
 8393  043354  001170  001210  000000  DT47:   .WORD   $REG4,$TMP4,0
 8394  043362  044504  043126  042052  EM50:   .ASCIZ  /DIVF*DST=0 DID NOT CLR DST/
 8395  043370  052123  030075  042040
 8396  043376  042111  047040  052117
 8397  043404  041440  051114  042040
 8398  043412  052123     000
 8399  043415     106  044122  020103  EM51:   .ASCIZ  /FRHC FALU59 NOT GETTING TO FRLF AS A HIGH/
 8400  043422  040506  052514  034465
 8401  043430  047040  052117  043440
 8402  043436  052105  044524  043516
 8403  043444  052040  020117  051106
 8404  043452  043114  040440  020123
 8405  043460  020101  044510  044107
 8406  043466     000
 8407  043467     106  044122  020113  EM52:   .ASCII  /FRHK DIV DONE STUCK LOW OR FRHC FALU59 NOT/<CRLF>
 8408  043474  044504  020126  047504
 8409  043502  042516  051440  052524
 8410  043510  045503  046040  053517
 8411  043516  047440  020122  051106
 8412  043524  041510  043040  046101
 8413  043532  032525  020071  047516
 8414  043540  100124
 8415  043542  042507  052124  047111          .ASCIZ  /GETTING TO FRHL AS A HIGH/
 8416  043550  020107  047524  043040
 8417  043556  044122  020114  051501
 8418  043564  040440  044040  043511
 8419  043572  000110
 8420  043574  051121  042040  052101  EM53:   .ASCIZ  /QR DATA BAD/
 8421  043602  020101  040502  000104
 8422  043610  051106  044114  044040  EM54:   .ASCIZ  /FRLH HI QUOT GEN BIT DID NOT GO LOW/
 8423  043616  020111  052521  052117
 8424  043624  043440  047105  041040
 8425  043632  052111  042040  042111
 8426  043640  047040  052117  043440
 8427  043646  020117  047514  000127
 8428  043654  051106  041510  043040  EM55:   .ASCIZ  /FRHC FALU59 NOT GETTING TO FRLF AS A LOW/
 8429  043662  046101  032525  020071
 8430  043670  047516  020124  042507
 8431  043676  052124  047111  020107
 8432  043704  047524  043040  046122
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8433  043712  020106  051501  040440
8434  043720  046040  053517     000
8435  043725     106  044122  020103  EM56:   .ASCIZ  FRHC FAILS3 NOT GETTING TO FRHL DIV NORM MSB AS A HIGH
8436  043732  040506  052514  034465
8437  043740  047040  052117  043440
8438  043746  052105  044524  043516
8439  043754  052040  020117  051106
8440  043762  046110  042040  053111
8441  043770  047040  051117  020115
8442  043776  052515  020130  051501
8443  044004  040440  044040  043511
8444  044012  000110
8445  044014  051106  046110  046440  EM60:   .ASCIZ  "FRHL MPY/DIV ADD(1)L DID NOT GO LOW WITH FALUS9 L ON A LOW"
8446  044022  054520  042057  053111
8447  044030  040440  042104  030450
8448  044036  046051  042040  042111
8449  044044  047040  052117  043440
8450  044052  020117  047514  020127
8451  044060  044527  044124  043040
8452  044066  046101  032525  020071
8453  044074  020114  047117  040440
8454  044102  046040  053517     000
8455  044107     106  046122  020106  EM62:   .ASCIZ  /FRLF HI QUOT GEN BIT NOT GOING HIGH/
8456  044114  044510  050440  047525
8457  044122  020124  042507  020116
8458  044130  044502  020124  047516
8459  044136  020124  047507  047111
8460  044144  020107  044510  044107
8461  044152     000
8462  044153     106  044122  020114  EM63:   .ASCIZ  "FRHL MPY/DIV ADD(1)L NOT GOING HIGH WITH FALUS9 L ON A HIGH"
8463  044160  050115  027531  044504
8464  044166  020126  042101  024104
8465  044174  024461  020114  047516
8466  044202  020124  047507  047111
8467  044210  020107  044510  044107
8468  044216  053440  052111  020110
8469  044224  040506  052514  034465
8470  044232  046040  047440  020116
8471  044240  020101  044510  044107
8472  044246     000
8473  044247     106  044122  020113  EM64:   .ASCIZ  /FRHK NORM NEG ENCODER FAILED/
8474  044254  047516  046522  047040
8475  044262  043505  042440  041516
8476  044270  042117  051105  043040
8477  044276  044501  042514  000104
8478  044304  004411  040504  040524  DH64:   .ASCII  /                DATA                    FALU<58:51>/<CRLF>
8479  044312  004411  043011  046101
8480  044320  036125  034065  032472
8481  044326  037061     200
8482  044331     040  020040  020040          .ASCIZ  /        EXPECT            ACTUAL/
8483  044336  020040  042440  050130
8484  044344  041505  004524  020011
8485  044352  020040  041501  052524
8486  044360  046101     000
8487          044364          .EVEN
8488  044364  001200  001204  001172  DT64:   .WORD   $TMP0,$TMP2,$REG5,0
```

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8489  044372  000000
8490  044374     001     001     000  DF64:   .BYTE   1,1,0,0
8491  044377     000
8492  044400  042522  052523  052114  EM65:   .ASCIZ  /RESULT WRONG ON DIV/
8493  044406  053440  047522  043516
8494  044414  047440  020116  044504
8495  044422  000126
8496  044424  051106  045510  047040  EM66:   .ASCIZ  /FRHK NORM SHIFT COUNT LOOKUP ROM FAILED/
8497  044432  051117  020115  044123
8498  044440  043111  020124  047503
8499  044446  047125  020124  047514
8500  044454  045517  050125  051040
8501  044462  046517  043040  044501
8502  044470  042514  000104
8503  044474  004411  042040  052101  DH66:   .ASCII  /                DATA                        NORM ROM/<CRLF>
8504  044502  004501  004411  020040
8505  044510  047040  051117  020115
8506  044516  047522  100115
8507  044522  020040  020040  020040          .ASCIZ  /      EXPECT              ACTUAL            ADDRESS ROMOUT/
8508  044530  054105  042520  052103
8509  044536  004411  020040  041501
8510  044544  052524  046101  020011
8511  044552  020040  042101  051104
8512  044560  051505  020123  047522
8513  044566  047515  052125     000
8514          044574                  .EVEN
8515  044574  001200  001204  001172  DT66:   .WORD   $TMP0,$TMP2,$REG5,$REG6,0
8516  044602  001174  000000
8517  044606  051106  043114  042040  EM67:   .ASCIZ  /FRLF DLE PREC QT LO DID NOT GO LOW/
8518  044614  042514  050040  042522
8519  044622  020103  052121  046040
8520  044630  020117  044504  020104
8521  044636  047516  020124  047507
8522  044644  046040  053517     000
8523  044651     106  046122  020110  EM70:   .ASCIZ  /FRLH DLE PREC QT HI B(1) NOT GOING HIGH/
8524  044656  046104  020105  051120
8525  044664  041505  050440  020124
8526  044672  044510  041040  030450
8527  044700  020051  047516  020124
8528  044706  047507  047111  020107
8529  044714  044510  044107     000
8530  044721     106  046122  020106  EM71:   .ASCIZ  /FRLF E21(12) NOT GOING HIGH/
8531  044726  031105  024061  031061
8532  044734  020051  047516  020124
8533  044742  047507  047111  020107
8534  044750  044510  044107     000
8535  044755     106  046122  020110  EM72:   .ASCIZ  /FRLH DLE PREC QT HI NOT GOING LOW/
8536  044762  046104  020105  051120
8537  044770  041505  050440  020124
8538  044776  044510  047040  052117
8539  045004  043440  044517  043516
8540  045012  046040  053517     000
8541  045017     106  046122  020110  EM73:   .ASCIZ  /FRLH DLE PREC QT LO DID NOT GO HI/
8542  045024  046104  020105  051120
8543  045032  041505  050440  020124
8544  045040  047514  042040  042111
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8545  045046  047040  052117  043440
8546  045054  020117  044510     000
8547  045061     106  046122  020112  EM75:   .ASCIZ  /FRLJ QSI-1 DID NOT GO LOW WHEN SELECTING C1 INPUT/
8548  045066  051521  026511  020061
8549  045074  044504  020104  047516
8550  045102  020124  047507  046040
8551  045110  053517  053440  042510
8552  045116  020116  042523  042514
8553  045124  052103  047111  020107
8554  045132  030503  044440  050116
8555  045140  052125     000
8556  045143     106  046122  020112  EM76:   .ASCIZ  /FRLJ QSI-1 DID NOT GO LOW WHEN SELECTING A1 INPUT/
8557  045150  051521  026511  020061
8558  045156  044504  020104  047516
8559  045164  020124  047507  046040
8560  045172  053517  053440  042510
8561  045200  020116  042523  042514
8562  045206  052103  047111  020107
8563  045214  030501  044440  050116
8564  045222  052125     000
8565  045225     106  046122  020112  EM77:   .ASCIZ  /FRLJ QSI-1 DID NOT GO HIGH WHEN SELECTING A1 INPUT/
8566  045232  051521  026511  020061
8567  045240  044504  020104  047516
8568  045246  020124  047507  044040
8569  045254  043511  020110  044127
8570  045262  047105  051440  046105
8571  045270  041505  044524  043516
8572  045276  040440  020061  047111
8573  045304  052520  000124
8574  045310  047522  020115  052123  EM100:  .ASCIZ  /ROM STATE 246 FAILED/
8575  045316  052101  020105  032062
8576  045324  020066  040506  046111
8577  045332  042105     000
8578  045335     106  041505  053440  EM101:  .ASCIZ  /FEC WRONG ON STST/
8579  045342  047522  043516  047440
8580  045350  020116  052123  052123
8581  045356     000
8582  045357     106  040505  053440  EM102:  .ASCIZ  /FEA WRONG ON STST/
8583  045364  047522  043516  047440
8584  045372  020116  052123  052123
8585  045400     000
8586  045401     105  051122  041520  DH101:  .ASCII  /ERRPC        FEC        TEST NO/<CRLF>
8587  045406  020011  020040  020040
8588  045414  043040  041505  052011
8589  045422  051505  020124  047516
8590  045430     200
8591  045431     011  054105  042520          .ASCIZ  /       EXPECT  ACTUAL/
8592  045436  052103  040411  052103
8593  045444  040525  000114
8594                                  .EVEN
8595  045450  001116  001200  001204  DT101:  .WORD   $ERRPC,$TMP0,$TMP2,$STSTNM,0
8596  045456  001266  000000
8597  045462  051105  050122  004503  DH102:  .ASCII  /ERRPC        FEA        TEST NO/<CRLF>
8598  045470  020040  020040  020040
8599  045476  042506  004501  042524
8600  045504  052123  047040  100117
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8601  045512  042411  050130  041505          .ASCIZ  /       EXPECT  ACTUAL/
8602  045520  004524  041501  052524
8603  045526  046101     000
8604          045532                  .EVEN
8605  045532  001116  001202  001206  DT102:  .WORD   $ERRPC,$TMP1,$TMP3,$STSTNM,0
8606  045540  001266  000000
8607  045544  046506  020060  051124  EM103:  .ASCIZ  /FMO TRAP FAILED-CHECK FRMB FMO/
8608  045552  050101  043040  044501
8609  045560  042514  026504  044103
8610  045566  041505  020113  051106
8611  045574  041115  043040  030115
8612  045602     000
8613  045603     106  041505  053440  EM104:  .ASCIZ  /FEC WRONG ON FMO TRAP-CHECK ROM STATE 1/
8614  045610  047522  043516  047440
8615  045616  020116  046506  020060
8616  045624  051124  050101  041455
8617  045632  042510  045503  051040
8618  045640  046517  051440  040524
8619  045646  042524  030440     000
8620  045653     106  040505  053440  EM105:  .ASCIZ  /FEA WRONG ON FMO TRAP /
8621  045660  047522  043516  047440
8622  045666  020116  046506  020060
8623  045674  051124  050101  000040
8624  045702  046506  020060  040506  EM106:  .ASCIZ  /FMO FAILED-CHECK APPROPRIATE ROM STATE/
8625  045710  046111  042105  041455
8626  045716  042510  045503  040440
8627  045724  050120  047522  051120
8628  045732  040511  042524  051040
8629  045740  046517  051440  040524
8630  045746  042524     000
8631  045751     125  042116  051105  EM107:  .ASCIZ  /UNDERFLOW DID NOT TRAP-CHECK FRMA FIU(0)/
8632  045756  046106  053517  042040
8633  045764  042111  047040  052117
8634  045772  052040  040522  026520
8635  046000  044103  041505  020113
8636  046006  051106  040515  043040
8637  046014  052511  030050  000051
8638  046022  042506  020103  051127  EM110:  .ASCIZ  /FEC WRONG ON UNDERFLOW-CHECK ROM STATE 205/
8639  046030  047117  020107  047117
8640  046036  052440  042116  051105
8641  046044  046106  053517  041455
8642  046052  042510  045503  051040
8643  046060  046517  051440  040524
8644  046066  042524  031040  032460
8645  046074     000
8646  046075     106  040505  053440  EM111:  .ASCIZ  /FEA WRONG ON UNDERFLOW/
8647  046102  047522  043516  047440
8648  046110  020116  047125  042504
8649  046116  043122  047514  000127
8650  046124  054105  047520  042516  EM112:  .ASCIZ  /EXPONENT WRONG ON UNDERFLOW/
8651  046132  052116  053440  047522
8652  046140  043516  047440  020116
8653  046146  047125  042504  043122
8654  046154  047514  000127
8655  046160  053117  051105  046106  EM113:  .ASCIZ  /OVERFLOW DID NOT TRAP-CHECK FRLN FVINT GETTING TO FRMA/
8656  046166  053517  042040  042111
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 8657  046174  047040  052117  052040
 8658  046202  040522  026520  044103
 8659  046210  041505  020113  051106
 8660  046216  047114  043040  044526
 8661  046224  052116  043440  052105
 8662  046232  044524  043516  052040
 8663  046240  020117  051106  040515
 8664  046246     000
 8665  046247     105  050130  047117  EM114:  .ASCIZ  /EXPONENT WRONG ON OVERFLOW/
 8666  046254  047105  020124  051127
 8667  046262  047117  020107  047117
 8668  046270  047440  042526  043122
 8669  046276  047514  000127
 8670  046302  042506  020103  051127  EM115:  .ASCIZ  /FEC WRONG ON OVERFLOW-CHECK STATE 171/
 8671  046310  047117  020107  047117
 8672  046316  047440  042526  043122
 8673  046324  047514  026527  044103
 8674  046332  041505  020113  052123
 8675  046340  052101  020105  033461
 8676  046346  000061
 8677  046350  042506  020101  051127  EM116:  .ASCIZ  /FEA WRONG ON OVERFLOW/
 8678  046356  047117  020107  047117
 8679  046364  047440  042526  043122
 8680  046372  047514  000127
 8681  046376  042506  020103  051127  EM117:  .ASCIZ  /FEC WRONG ON OVERFLOW-CHECK STATE 105/
 8682  046404  047117  020107  047117
 8683  046412  047440  042526  043122
 8684  046420  047514  026527  044103
 8685  046426  041505  020113  052123
 8686  046434  052101  020105  030061
 8687  046442  000065
 8688  046444  047503  053116  051105  EM120:  .ASCIZ  /CONVERSION ERROR DID NOT TRAP-CHECK FRLN FCINT GETTING TO FRMA/
 8689  046452  044523  047117  042440
 8690  046460  051122  051117  042040
 8691  046466  042111  047040  052117
 8692  046474  052040  040522  026520
 8693  046502  044103  041505  020113
 8694  046510  051106  047114  043040
 8695  046516  044503  052116  043440
 8696  046524  052105  044524  043516
 8697  046532  052040  020117  051106
 8698  046540  040515     000
 8699  046543     106  041505  053440  EM121:  .ASCIZ  /FEC WRONG ON CONVERSION ERROR/
 8700  046550  047522  043516  047440
 8701  046556  020116  047503  053116
 8702  046564  051105  044523  047117
 8703  046572  042440  051122  051117
 8704  046600     000
 8705  046601     106  040505  053440  EM122:  .ASCIZ  /FEA WRONG ON CONVERSION ERROR/
 8706  046606  047522  043516  047440
 8707  046614  020116  047503  053116
 8708  046622  051105  044523  047117
 8709  046630  042440  051122  051117
 8710  046636     000
 8711  046637     111  046114  043505  EM123:  .ASCIZ  /ILLEGAL OP-CODE DID NOT TRAP-CHECK NO-MEM ROM/
 8712  046644  046101  047440  026520
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8713  046652  047503  042504  042040
8714  046660  042111  047040  052117
8715  046666  052040  040522  026520
8716  046674  044103  041505  020113
8717  046702  047516  046455  046505
8718  046710  051040  046517     000
8719  046715     105  051122  041520  DH123:  .ASCIZ  /ERRPC  OPCODE  TEST NO/
8720  046722  047411  041520  042117
8721  046730  004505  042524  052123
8722  046736  047040  000117
8723                                  .EVEN
8724  046742  001116  001200  001266  DT123:  .WORD   $ERRPC,$TMPD,$STSTNM,0
8725  046750  000000
8726  046752  042506  020103  051127  EM124:  .ASCIZ  /FEC WRONG ON ILLEGAL OP-CODE/
8727  046760  047117  020107  047117
8728  046766  044440  046114  043505
8729  046774  046101  047440  026520
8730  047002  047503  042504     000
8731  047007     106  040505  053440  EM125:  .ASCIZ  /FEA WRONG ON ILLEGAL OP CODE/
8732  047014  047522  043516  047440
8733  047022  020116  046111  042514
8734  047030  040507  020114  050117
8735  047036  041440  042117  000105
8736  047044  042514  040507  020114  EM126:  .ASCIZ  /LEGAL OP CODE FAILED (LDCIF*R6)/
8737  047052  050117  041440  042117
8738  047060  020105  040506  046111
8739  047066  042105  024040  042114
8740  047074  044503  025106  033122
8741  047102  000051
8742  047104  051105  050122  004503  DH126:  .ASCII  /ERRPC          DATA    TEST NO/<CRLF>
8743  047112  042011  052101  004501
8744  047120  042524  052123  047040
8745  047126  100117
8746  047130  042411  050130  041505          .ASCIZ  /       EXPECT  ACTUAL/
8747  047136  004524  041501  052524
8748  047144  046101     000
8749  047147     114  043505  046101  EM127:  .ASCIZ  /LEGAL OP-CODE TRAPPED (LDCIF*R6)(NO-MEM ROM)/
8750  047154  047440  026520  047503
8751  047162  042504  052040  040522
8752  047170  050120  042105  024040
8753  047176  042114  044503  025106
8754  047204  033122  024051  047516
8755  047212  046455  046505  051040
8756  047220  046517  000051
8757  047224  051105  050122  004503  DH127:  .ASCIZ  /ERRPC  OPCODE  TEST NO/
8758  047232  050117  047503  042504
8759  047240  052011  051505  020124
8760  047246  047516     000
8761  047251     122  046517  051440  EM130:  .ASCIZ  /ROM STATE 32 DID NOT LOAD FEC/
8762  047256  040524  042524  031440
8763  047264  020062  044504  020104
8764  047272  047516  020124  047514
8765  047300  042101  043040  041505
8766  047306     000
8767  047307     124  041515  020101  EM131:  .ASCIZ  /TMCA HONOR PIR7 DID NOT GO HIGH WHEN FP TRAP PRESENT/
8768  047314  047510  047516  020122
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8769  047322  044520  033522  042040
8770  047330  042111  047040  052117
8771  047336  043440  020117  044510
8772  047344  044107  053440  042510
8773  047352  020116  050106  052040
8774  047360  040522  020120  051120
8775  047366  051505  047105  000124
8776  047374  046524  040503  044040  EM132:  .ASCIZ  /TMCA HONOR FP TRAP DID NOT GO HIGH WHEN SL YELLOW PRESENT/
8777  047402  047117  051117  043040
8778  047410  020120  051124  050101
8779  047416  042040  042111  047040
8780  047424  052117  043440  020117
8781  047432  044510  044107  053440
8782  047440  042510  020116  046123
8783  047446  054440  046105  047514
8784  047454  020127  051120  051505
8785  047462  047105  000124
8786  047466  044505  044124  051105  EM133:  .ASCIZ  /EITHER SAPK I SPACEA(0) NOT GOING LOW OR "M8138-YA" NOT INSTALLED/
8787  047474  051440  050101  020113
8788  047502  020111  050123  041501
8789  047510  040505  030050  020051
8790  047516  047516  020124  047507
8791  047524  047111  020107  047514
8792  047532  020127  051117  021040
8793  047540  034115  031461  026470
8794  047546  040531  020042  047516
8795  047554  020124  047111  052123
8796  047562  046101  042514  000104
8797  047570  042506  020103  051127  EM134:  .ASCIZ  /FEC WRONG IN STATE 356 (DIV BY ZERO)/
8798  047576  047117  020107  047111
8799  047604  051440  040524  042524
8800  047612  031440  033065  024040
8801  047620  044504  020126  054502
8802  047626  055040  051105  024517
8803  047634     000
8804  047635     106  040505  053440  EM135:  .ASCIZ  /FEA WRONG ON DIV BY ZERO/
8805  047642  047522  043516  047440
8806  047650  020116  044504  020126
8807  047656  054502  055040  051105
8808  047664  000117
8809  047666  042506  020103  051127  EM136:  .ASCIZ  /FEC WRONG IN STATE 346 (DIV BY ZERO)/
8810  047674  047117  020107  047111
8811  047702  051440  040524  042524
8812  047710  031440  033064  024040
8813  047716  044504  020126  054502
8814  047724  055040  051105  024517
8815  047732     000
8816  047733     124  041515  020101  EM137:  .ASCIZ  /TMCA HONOR SEGT NOT DISABLING FP TRAP/
8817  047740  047510  047516  020122
8818  047746  042523  052107  047040
8819  047754  052117  042040  051511
8820  047762  041101  044514  043516
8821  047770  043040  020120  051124
8822  047776  050101     000
8823  050001     116  043505  020106  EM140:  .ASCIZ  /NEGF AND FMO FAILED/
8824  050006  047101  020104  046506
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 8825  050014  020060  040506  046111
 8826  050022  042105     000
 8827  050025     105  051122  041520  DH140:  .ASCII  /ERRPC       DATA       TEST NO/<CRLF>
 8828  050032  020011  020040  020040
 8829  050040  040504  040524  052011
 8830  050046  051505  020124  047516
 8831  050054     200
 8832  050055     011  054105  042520          .ASCIZ  /       EXPECT  ACTUAL/
 8833  050062  052103  020040  041501
 8834  050070  052524  046101     000
 8835          050076                          .EVEN
 8836  050076  001116  001200  001160  DT140:  .WORD   $ERRPC,$TMP0,$REG0,$$TSTNM,0
 8837  050104  001266  000000
 8838  050110  051106  041115  044440  EM141:  .ASCIZ  /FRMB IMMEDIATE*REG WT NOT GOING LOW/
 8839  050116  046515  042105  040511
 8840  050124  042524  051052  043505
 8841  050132  053440  020124  047516
 8842  050140  020124  047507  047111
 8843  050146  020107  047514  000127
 8844  050154  044124  020105  050123  EM142:  .ASCIZ  /THE SP IS WRONG/
 8845  050162  044440  020123  051127
 8846  050170  047117  000107
 8847  050174  051105  050122  004503  DH142:  .ASCII  /ERRPC       SP         TEST NO/<CRLF>
 8848  050202  020040  020040  020040
 8849  050210  050123  052011  051505
 8850  050216  020124  047516     200
 8851  050223     011  054105  042520          .ASCIZ  /       EXPECT  ACTUAL/
 8852  050230  052103  020040  041501
 8853  050236  052524  046101     000
 8854  050243     131  046105  047514  EM143:  .ASCIZ  /YELLOW ZONE AND FP TRAP DID NOT OCCUR IN CORRECT SEQUENCE/
 8855  050250  020127  047532  042516
 8856  050256  040440  042116  043040
 8857  050264  020120  051124  050101
 8858  050272  042040  042111  047040
 8859  050300  052117  047440  041503
 8860  050306  051125  044440  020116
 8861  050314  047503  051122  041505
 8862  050322  020124  042523  052521
 8863  050330  047105  042503     000
 8864  050335     115  046507  020124  EM144:  .ASCIZ  /MGMT AND FP TRAP OUT OF SEQUENCE/
 8865  050342  047101  020104  050106
 8866  050350  052040  040522  020120
 8867  050356  052517  020124  043117
 8868  050364  051440  050505  042525
 8869  050372  041516  000105
 8870  050376  044502  020124  052123  EM145:  .ASCIZ  /BIT STUCK IN FPA OR FEA/
 8871  050404  041525  020113  047111
 8872  050412  043040  040520  047440
 8873  050420  020122  042506  000101
 8874  050426  047515  042504  030440  EM146:  .ASCIZ  /MODE 1 DID NOT CAUSE FXPB IMMEDIATE TO GO TRUE/
 8875  050434  042040  042111  047040
 8876  050442  052117  041440  052501
 8877  050450  042523  043040  050130
 8878  050456  020102  046511  042515
 8879  050464  044504  052101  020105
 8880  050472  047524  043440  020117
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 8881  050500  051124  042525     000
 8882  050505     115  042117  020105  EM147:  .ASCIZ  /MODE 4 DID NOT CAUSE FXPB IMMEDIATE TO GO TRUE/
 8883  050512  020064  044504  020104
 8884  050520  047516  020124  040503
 8885  050526  051525  020105  054106
 8886  050534  041120  044440  046515
 8887  050542  042105  040511  042524
 8888  050550  052040  020117  047507
 8889  050556  052040  052522  000105
 8890  050564  042120  042122  050040  EM150:  .ASCIZ  /PDRD PS14 NOT DISABLING FXPN FMM(1)H/
 8891  050572  030523  020064  047516
 8892  050600  020124  044504  040523
 8893  050606  046102  047111  020107
 8894  050614  054106  047120  043040
 8895  050622  046515  030450  044051
 8896  050630     000
 8897  050631     106  050130  020116  EM151:  .ASCIZ  /FXPN ACS0 DID NOT GO HIGH WITH ACF0(1)H*FIRB06(1)H/
 8898  050636  041501  030123  042040
 8899  050644  042111  047040  052117
 8900  050652  043440  020117  044510
 8901  050660  044107  053440  052111
 8902  050666  020110  041501  030106
 8903  050674  030450  044051  043052
 8904  050702  051111  030102  024066
 8905  050710  024461  000110
 8906  050714  054106  047120  040440  EM152:  .ASCIZ  /FXPN ACS1 DID NOT GO HIGH WITH ACF0(1)H*FIRB07(1)H/
 8907  050722  051503  020061  044504
 8908  050730  020104  047516  020124
 8909  050736  047507  044040  043511
 8910  050744  020110  044527  044124
 8911  050752  040440  043103  024060
 8912  050760  024461  025110  044506
 8913  050766  041122  033460  030450
 8914  050774  044051     000
 8915  050777     123  051103  052101  EM153:  .ASCIZ  /SCRATCH PAD CHIP FAILED/
 8916  051004  044103  050040  042101
 8917  051012  041440  044510  020120
 8918  051020  040506  046111  042105
 8919  051026     000
 8920  051027     011  004411  020040  DH153:  .ASCII  /                                DATA                                ACC#
 8921  051034  020040  020040  042040
 8922  051042  052101  004501  004411
 8923  051050  020011  020040  040440
 8924  051056  041503  100043
 8925  051062  004411  054105  042520          .ASCIZ  /                EXPECT                  ACTUAL/
 8926  051070  052103  004411  040411
 8927  051076  052103  040525  000114
 8928                                  .EVEN
 8929  051104  001200  001210  001172  DT153:  .WORD   $TMP0,$TMP4,$REG5,0
 8930  051112  000000
 8931  051114  047125  054105  042520  EM154:  .ASCIZ  /UNEXPECTED TRAP TO 4/
 8932  051122  052103  042105  052040
 8933  051130  040522  020120  047524
 8934  051136  032040     000
 8935  051141     105  051122  041520  DH154:  .ASCIZ  /ERRPC  PCOFTRP ERRREG  TEST NO/
 8936  051146  050011  047503  052106
```

```
 8937  051154  050122  042411  051122
 8938  051162  042522  004507  042524
 8939  051170  052123  047040  000117
 8940                                                .EVEN
 8941  051176  001116  001200  001202  DT154:       .WORD   SERRPC,STMPO,STMP1,SSTSTNM,0
 8942  051204  001266  000000
 8943  051210  051105  050122  004503  DH155:       .ASCIZ  /ERRPC  PCOFTRP TEST NO/
 8944  051216  041520  043117  051124
 8945  051224  004520  042524  052123
 8946  051232  047040  000117
 8947                                                .EVEN
 8948  051236  001116  001200  001266  DT155:       .WORD   SERRPC,STMPO,SSTSTNM,0
 8949  051244  000000
 8950  051246  047125  054105  042520  EM156:       .ASCIZ  /UNEXPECTED TRAP TO 114/
 8951  051254  052103  042105  052040
 8952  051262  040522  020120  047524
 8953  051270  030440  032061     000
 8954  051275     105  051122  041520  DH156:       .ASCIZ  /ERRPC  PCOFTRP ERRREG  LOADRS  HIADRS  TEST NO/
 8955  051302  050011  047503  052106
 8956  051310  050122  042411  051122
 8957  051316  042522  004507  047514
 8958  051324  042101  051522  044011
 8959  051332  040511  051104  004523
 8960  051340  042524  052123  047040
 8961  051346  000117
 8962                                                .EVEN
 8963  051350  001116  001200  001202  DT156:       .WORD   SERRPC,STMPO,STMP1,STMP2,STMP3,SSTSTNM,0
 8964  051356  001204  001206  001266
 8965  051364  000000
 8966  051366  047125  054105  042520  EM160:       .ASCIZ  /UNEXPECTED TRAP TO 244/
 8967  051374  052103  042105  052040
 8968  051402  040522  020120  047524
 8969  051410  031040  032064     000
 8970  051415     105  051122  041520  DH160:       .ASCIZ  /ERRPC  PCOFTRP   FEC     FEA   TEST NO/
 8971  051422  050011  047503  052106
 8972  051430  050122  020011  043040
 8973  051436  041505  020011  043040
 8974  051444  040505  052011  051505
 8975  051452  020124  047516     000
 8976          051460                                .EVEN
 8977  051460  001116  001200  001202  DT160:       .WORD   SERRPC,STMPO,STMP1,STMP2,SSTSTNM,0
 8978  051466  001204  001266  000000
 8979  051474  051105  050122  004503  DH161:       .ASCII  /ERRPC                  DATA                    TEST NO/<CRLF>
 8980  051502  020011  020040  020040
 8981  051510  040504  040524  004411
 8982  051516  042524  052123  047040
 8983  051524  100117
 8984  051526  020011  020040  054105               .ASCIZ  /           EXPECT          ACTUAL/
 8985  051534  042520  052103  020011
 8986  051542  020040  041501  052524
 8987  051550  046101     000
 8988          051554                                .EVEN
 8989  051554  001116  001200  001202  DT161:       .WORD   SERRPC,STMPO,STMP1,STMP4,STMP5,SSTSTNM,0
 8990  051562  001210  001212  001266
 8991  051570  000000
 8992  051572  051105  050122  004503  DH162:       .ASCII  /ERRPC       DATA       TEST NO/<CRLF>
```

```
051600  020040  020040  042040
051606  052101  004501  042524
051614  052123  047040  100117
051622  042411  050130  041505          .ASCIZ  /       EXPECT  ACTUAL/
051630  004524  041501  052524
051636  046101     000
        051641                  X14=.
                                ;;*******************************************************
                                ;;*******************************************************
                                ;;*******************************************************
                                ;THIS WORD IS USED TO TEST THE FPC AND FEA REGISTERS.
                                ;IT MUST BE ASSEMBLED PRIOR TO THE PREVIOUS CODE REACHING
                                ;ADDRESS 52524. IF NOT, AN ERROR MESSAGE IS TYPED DURING
                                ;THE ASSEMBLY.



        052524                  .=52524
052524  170016                          .WORD   170016
052526  000240                          NOP
052530  000240                          NOP


                                ;;*******************************************************
                                ;;*******************************************************
                                ;;*******************************************************
052532  001000                  ADRTBL: .BLKW   1000
054532  000000                  OUTTBL: .WORD
        000001                          .END
```

```
ABASE = 000000          2020
ACDW1 = 000000          2020
ACDW2 = 000000          2020
ACPUOP= 000000          2020    2035
AC0   =%000000          1885#   3011*   3015*   3017    3020    3048*   3052*   3057    3061    3081*   3083*   3090    3093
                        3138*   3140*   3159*   3160*   3169    3174    3232*   3233*   3243    3268*   3269*   3282    3322*
                        3323*   3327    3341*   3342*   3346    3356    3374*   3375*   3381    3394*   3395*   3399    3418*
                        3420*   3422    3423    3446*   3448*   3451    3486*   3487*   3488    3505*   3506*   3507    3547*
                        3549*   3[illegible]6   3571*   3572*   3576    3593*   3594*   3598    3616*   3617*   3621    3639*   3640*
                        3644    3[illegible]4*  3665*   3669    3707*   3708*   3709    3726*   3727*   3728    3751*   3754*   3781*
                        3784*   3[illegible]3   3795    3820*   3828*   3830    3833    3896*   3898*   3935*   3936*   3937    3940
                        3967*   3[illegible]0*  3978    3981    4007*   4008*   4022    4025    4058*   4059*   4060    4063    4103*
                        4104*   4110    4113    4147*   4150*   4155    4191*   4192*   4196    4209    4231*   4232*   4238
                        4245    4281*   4282*   4288    4331*   4332*   4340    4413*   4414*   4415    4418    4428*   4429*
                        4430    4448    4474*   4475*   4482    4504*   4505*   4511    4544*   4545*   4551    4572*   4573*
                        4579    4596*   4597*   4603    4630*   4631*   4638    4641    4727*   4760*   4772*   4784*   4796*
                        4884*   4886*   4901    4919*   4921*   4927    4945*   4947*   4953    4971*   4973*   4984*   4986*
                        5006*   5008*   5014    5040*   5042*   5058*   5060*   5073*   5077    5087*   5091    5102*   5106
                        5125*   5127    5148    5160    5176*   5179*   5194*   5197*   5201*   5260    5319*   5320    5333*
                        5335    5346*   5347    5589*   5590*   5591    5592    5602*   5605*   5608    5609    5674*   5675
                        5686*   5687    5686*   5689    5693*   5695    5707*   5708    5711*   5712    5727*   5728    5758*
                        5759    5760*   5761    5773*   5774    5804*   5817    5983*   5985*   5987    5990    6085*   6088
                        6138*   6140*   6141    6145    6195*   6197*   6198    6203    6420*   6422    6548*   6550*   6559
                        6562    6712*   6714*   6718    6722    7376*   7985    7989*   7990    7991*   7992    8006*   8007
                        8008*   8009    8013*
AC1   =%000001          1886#   3012*   3013    3023    3026    3752*   3755    3758    3782*   3788    3836    3839    3895*
                        3900    3903    3969*   3983    3986    4009    4016    4065    4068    4105    4108    4723*   4724
                        4725    4741    4744    4747    5077*   5648*   5692*   5698    5805*   5817*   5903*   5904*   5912
                        5916    5995*   5997*   5999    6002    6023*   6025    6060*   6063*   6065    6068    6099*   6102*
                        6103    6107    6183*   6186    6197    6198    6202    6385*   6387*   6394    6398    6492*   6494*
                        6497    6567*   6569*   6576    6580    6804*   6806    6833*   6835*   6839    6842    7986    8012*
AC2   =%000002          1887#   3013*   3015    3753*   3754    3868*   3869*   3870    3873    5647*   5691*   5701    5806*
                        5823*   5824    5825    5861*   5862*   5888*   5889    5970*   5972    6010*   6012*   6014    6017
                        6022*   6025*   6027    6030    6072*   6075*   6077    6080    6100*   6102    6103    6112*   6113
                        6115*   6117    6120    6137*   6140    6141    6154    6159    6166*   6168*   6173    6178    6350*
                        6352*   5359    6363    6403*   6405*   6412    6415    6456*   6458*   6465    6468    6528*   6530*
                        6537    6541    6728*   6730*   6734    6737    6759*   6761    6765    6819*   6822    6866*   6869*
                        6873    6876    7987    8011*
AC3   =%000003          1888#   3876    3879    4724*   4744    5646*   5651    5690*   5704    5807*   5824*   5825*   5826
                        5829    5872*   5873    5958*   5960*   5962    5966    6007*   6012    6058*   6061*   6063    6073*
                        6075    6084*   6085    6088    6113*   6115    6125*   6127    6150*   6153*   6154    6158    6169*
                        6172*   6173    6177    6333*   6335*   6342    6345    6368*   6370*   6377    6380    6439*   6441
                        6474*   6476    6511*   6514    6545*   6552*   6559    6563    6695*   6697*   6702    6706    6742*
                        6744    6773*   6775*   6779    6782    6788*   6790    6850*   6852*   6857    6860    7988    8010*
AC4   =%000004          1889#   5689*   5707    5808*   7989    8009*
AC5   =%000005          1890#   4725*   4747    5687*   5711    5809*   7991    8007*
AC6   =%000006          1891#   5260*
AC7   =%000007          1892#
ADDW0 = 000000          2020
ADDW1 = 000000          2020
ADDW10= 000000          2020
ADDW11= 000000          2020
ADDW12= 000000          2020
ADDW13= 000000          2020
ADDW14= 000000          2020
ADDW15= 000000          2020
```

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ADDW2 = 000000          2020
ADDW3 = 000000          2020
ADDW4 = 000000          2020
ADDW5 = 000000          2020
ADDW6 = 000000          2020
ADDW7 = 000000          2020
ADDW8 = 000000          2020
ADDW9 = 000000          2020
ADEVCT= 000000          2020    2026
ADEVM = 000000          2020
ADRPTR  001374          2058#   7327*   7345*   7346*
ADRTBL  052532          2058    7327    7669    9020#
AENV  = 000000          2020    2031
AENVM = 000000          2020    2032
AFATAL= 000000          2020    2023
AMADR1= 000000          2020
AMADR2= 000000          2020
AMADR3= 000000          2020
AMADR4= 000000          2020
AMAMS1= 000000          2020
AMAMS2= 000000          2020
AMAMS3= 000000          2020
AMAMS4= 000000          2020
AMSGAD= 000000          2020    2028
AMSGLG= 000000          2020    2029
AMSGTY= 000000          2020    2022
AMTYP1= 000000          2020
AMTYP2= 000000          2020
AMTYP3= 000000          2020
AMTYP4= 000000          2020
APASS = 000000          2020    2025
APRIOR= 000000          2020
APTCSU= 000040          7458    7564#
APTENV= 000001          7141    7451    7520    7562#
APTSIZ= 000200          2973    7561#
APTSPO= 000100          7453    7522    7563#
ASWREG= 000000          2020    2033
ATESTN= 000000          2020    2024
AUNIT = 000000          2020    2027
AUSWR = 000000          2020    2034
AVECT1= 000000          2020
AVECT2= 000000          2020
BIT0  = 000001          1604#   1899    4375    4377    5466
BIT00 = 000001          1594#   1604
BIT01 = 000002          1593#   1603
BIT02 = 000004          1592#   1602
BIT03 = 000010          1591#   1601
BIT04 = 000020          1590#   1600
BIT05 = 000040          1589#   1599
BIT06 = 000100          1588#   1598
BIT07 = 000200          1587#   1597
BIT08 = 000400          1586#   1596    7068
BIT09 = 001000          1585#   1595    7076    7151
BIT1  = 000002          1603#   1900    1915    3368
BIT10 = 002000          1584#   1909    7129
BIT11 = 004000          1583#   1910    3329    3348    3535    3558    7083
```

```
BIT12 = 010000          1582#   3627
BIT13 = 020000          1581#   7136
BIT14 = 040000          1580#   1911    3515    3623    3625    3736    5732    5779    7054
BIT15 = 100000          1579#   1912    3170    3175    3184    3244    3283    3285    3288    3328    3347    3357    3450
                        3557    3577    3599    3622    3645    3670    3867    4383    5374
BIT2  = 000004          1602#   1901    1916    5467    5508    6086
BIT3  = 000010          1601#   1902    4199    4200    7349    7357
BIT4  = 000020          1600#   1903    3600    3603
BIT5  = 000040          1599#   1904    3317    3539    3578    3580    3658    3671    3674
BIT6  = 000100          1598#   1905    4078    5607    6207    6587    6883    6885    6928    6958    7310    7315
BIT7  = 000200          1597#   1906    3514    3649    3735    4212    4354    4366    4368    4423    4441    6890    7339
                        7344
BIT8  = 000400          1596#   1907
BIT9  = 001000          1595#   1908    3382    3646    3648    5716
BPTVEC= 000014          1611#
CACHSP  037222          2993    7914#
CACHVE= 000114          1619#   2993*   2994*
CHGFEC  034716          4660    4679    4697    4722    4758    4770    4782    4794    4806    4818    4835    4855    4883
                        4918    4944    4970    4983    5004    5039    5057    5075    5089    5104    5123    5146    5158
                        5178    5200    5222    7371#
CONTRL= 177746          1629#
COSETB= 172542          1928#   6936*
COUNT = 001160          1894#
COUNTE= 172544          1929#   6937*
CPSPUR  037156          2991    7052    7900#
CPUERR= 177766          1642#   2987    2988    7904    7905*
CR    = 000015          1516#   7497    7507
CRLF  = 000200          1517#   2985    7468    7507    8035    8043    8075    8126    8144    8178    8192    8264    8407
                        8478    8503    8586    8597    8742    8827    8847    8920    8979    8992
DCISP = 177570          1510#   1982    2962
DF1     037764          2223    2229    2260    2267    2273    2279    2285    2297    2309    2333    2339    2388    2394
                        2400    2406    2412    2418    2424    2430    2436    2460    2466    2472    2478    2484    2490
                        2496    2502    2508    2514    2520    2526    2538    2665    2677    2833    2839    8056#
DF26    042142          2352    2358    2364    2370    2376    2382    2448    2454    2551    2557    2563    2569    2575
                        2581    2587    2593    2599    2605    2863    8273#
DF64    044374          2532    2545    8490#
DH1     037665          2220    2227    2258    2265    2271    2277    2283    2295    2307    2331    2337    2386    2392
                        2398    2404    2410    2416    2422    2428    2434    2458    2464    2470    2476    2482    2488
                        2494    2500    2506    2512    2518    2524    2536    2663    2675    2831    2837    8043#
DH10    040542          8126#
DH101   045401          2609    2627    2651    2681    2693    2705    2723    2747    2771    2783    8586#
DH102   045462          2615    2633    2657    2687    2711    2729    2777    2825    8597#
DH123   046715          2717    8719#
DH126   047104          2735    2849    2855    8742#
DH127   047224          2741    8757#
DH14    041115          2289    8171#
DH140   050025          2795    8827#
DH142   050174          2807    8847#
DH153   051027          2861    8920#
DH154   051141          2867    8935#
DH155   051210          2873    2885    2909    8943#
DH156   051275          2879    8954#
DH160   051415          2891    8970#
DH161   051474          2897    8979#
DH162   051572          2903    8992#
DH26    042067          2349    2356    2362    2368    2374    2380    2446    2452    2549    2555    2561    2567    2573
```

```
EM122   046601          2710    8705#
EM123   046637          2716    8711#
EM124   046752          2722    8726#
EM125   047007          2728    8731#
EM126   047044          2734    8736#
EM127   047147          2740    8749#
EM13    041031          2282    8160#
EM130   047251          2746    8761#
EM131   047307          2752    8767#
EM132   047374          2758    8776#
EM133   047466          2764    8786#
EM134   047570          2770    8797#
EM135   047635          2776    8804#
EM136   047666          2782    8809#
EM137   047733          2788    8816#
EM14    041060          2288    8166#
EM140   050001          2794    8823#
EM141   050110          2800    8838#
EM142   050154          2806    8844#
EM143   050243          2812    8854#
EM144   050335          2818    8864#
EM145   050376          2824    8870#
EM146   050426          2830    8874#
EM147   050505          2836    8882#
EM15    041152          2294    8178#
EM150   050564          2842    8890#
EM151   050631          2848    8897#
EM152   050714          2854    8906#
EM153   050777          2860    8915#
EM154   051114          2866    2872    8931#
EM156   051246          2878    2884    8950#
EM16    041266          2300    8192#
EM160   051366          2890    8966#
EM17    041407          2306    8207#
EM2     037771          2226    8058#
EM20    041453          2312    8214#
EM21    041506          2318    8219#
EM22    041542          2324    8224#
EM23    041576          2330    8229#
EM24    041647          2336    2896    2902    8236#
EM25    041664          2342    8239#
EM25A   041736          7653    8246#
EM25B   041751          7664    8248#
EM25C   041765          7683    8251#
EM26    042001          2348    8254#
EM27    042144          2355    8274#
EM3     040104          2232    8071#
EM30    042216          2361    8281#
EM31    042274          2367    8289#
EM32    042363          2373    8299#
EM33    042437          2379    8307#
EM34    042514          2385    8316#
EM35    042627          2391    8329#
EM36    042665          2397    8335#
EM37    042725          2403    8341#
EM4     040212          2239    2908    8085#
```

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EM40    042756          2409    8346*
EM41    043026          2415    8353*
EM42    043067          2421    8359*
EM43    043115          2427    8363*
EM44    043142          2433    8367*
EM45    043204          2439    8373*
EM46    043252          2445    8380*
EM47    043313          2451    8386*
EM5     040256          2245    8093*
EM50    043362          2457    8394*
EM51    043415          2463    8399*
EM52    043467          2469    8407*
EM53    043574          2475    2499    2578    8420*
EM54    043610          2481    8422*
EM55    043654          2487    8428*
EM56    043725          2493    8435*
EM6     040305          2251    8097*
EM60    044014          2505    8445*
EM62    044107          2517    8455*
EM63    044153          2523    8462*
EM64    044247          2529    8473*
EM65    044400          2535    8492*
EM66    044424          2541    8496*
EM67    044606          2548    8517*
EM7     040355          2257    8104*
EM70    044651          2554    8523*
EM71    044721          2560    8530*
EM72    044755          2566    8535*
EM73    045017          2572    8541*
EM75    045061          2584    8547*
EM76    045143          2590    8556*
EM77    045225          2596    8565*
ERRVEC= 000004          1607*   2959    2960*   2971*   2986*   2991*   2992*   4623*   5389*   5427*   5497*   5542*   6912*
                        6916*   7052*   7059    7060*   7062*   7065*   7293*

FC    = 000001          1899*
FD    = 000200          1906*   3546    3570    3592    3615    3638    3663    3706    4006    4473    4503    4543    4571
                        4595    4629    4771    4783    5076    5090    5105    5926    7983    8005

FDZ   = 000004          1916*
FER   = 100000          1912*   4907    4933    4959    5030    5032
FIC   = 000400          1907*   5126    5147    5159
FICE  = 000006          1917*   5133    5135
FID   = 040000          1911*
FIU   = 002000          1909*   4885    4907    4920    4933    4946    4959    4972    4985
FIUV  = 004000          1910*   4726    4759    4771    4783    4795    4807    4820    4837    4857    5193    5510
FIV   = 001000          1908*   5007    5029    5041    5059    5076    5090    5105
FL    = 000100          1905*   5147    5926    6164    6490    6546
FLD20 = 104410          7644    7657    7968*
FL20  = 104407          7258    7634    7659    7967*
FMM   = 000020          1903*   3139    3151    3163    3224    3236    3261    3272    3321    3340    3373    3393    3546
                        3570    3592    3615    3638    3663    3778    3827    3844    3934    4190    4230    4280    4330
                        4473    4503    4543    4571    4595    5816    7375

FN    = 000010          1902*   3455    3457    4960    4963    6292    6295
FO    = 000010          1918*   5021    5023    5048    5050
FOCE  = 000002          1915*
FPPVEC= 000244          1924*   2989*   2990*   3137*   3152*   3221*   3258*   3315*   3336*   3369*   3389*   3542*   3566*
                        3588*   3611*   3634*   3659*   3779*   3818*   3930*   4186*   4226*   4276*   4326*   4468*   4499*
```

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                        4542*  4567*  4591*  4720*  4756*  4766*  4780*  4792*  4804*  4816*  4833*  4853*  4881*
                        4916*  4942*  4968*  4981*  5005*  5037*  5055*  5068*  5085*  5100*  5124*  5144*  5156*
                        5175*  5192*  5198*  5223*  5241*  5258*  5279*  5369*  5388*  5503*  5541*  5566*  5813*
                        7053*  7371   7372*  7379*
FPSPUR  037276          2989   7053   7929*
FT    = 000040          1904*
FU    = 000012          1919*  4893   4895
FUV   = 000014          1920*  4733   4735
FV    = 000002          1900*  3906   3909   5030   5032
FZ    = 000004          1901*  3031   3033   3064   3066   3097   3099   3845   3848   3906   3909   4162   4165
                        4934   4937   6094   6431   6434   6750   6753
GETTIK  034324          5604   7293*
GNS   = ****** U        1938   2984   7004   7011   7303   7960   7961   7962   7963   7964   7965   7966   7967
                        7968
HIADRS= 177742          1627*  7920
HITMIS= 177752          1631*
HT    = 000011          1514*  7466   7507
ILLEND  002112          2193*  5252
ILLOP   002000          2156*  5242
IOTVEC= 000020          1612*  2943*  2944*
KDPAR0= 172360          1785*
KDPAR1= 172362          1786*
KDPAR2= 172364          1787*
KDPAR3= 172366          1788*
KDPAR4= 172370          1789*
KDPAR5= 172372          1790*
KDPAR6= 172374          1791*
KDPAR7= 172376          1792*
KDPDR0= 172320          1763*  5461*
KDPDR1= 172322          1764*
KDPDR2= 172324          1765*
KDPDR3= 172326          1766*  5506*
KDPDR4= 172330          1767*
KDPDR5= 172332          1768*
KDPDR6= 172334          1769*
KDPDR7= 172336          1770*  5462*
KERSTK= 001100          1500*
KIPAR0= 172340          1774*  5435
KIPAR1= 172342          1775*
KIPAR2= 172344          1776*
KIPAR3= 172346          1777*
KIPAR4= 172350          1778*
KIPAR5= 172352          1779*
KIPAR6= 172354          1780*
KIPAR7= 172356          1781*
KIPDR0= 172300          1752*  5452
KIPDR1= 172302          1753*
KIPDR2= 172304          1754*
KIPDR3= 172306          1755*
KIPDR4= 172310          1756*
KIPDR5= 172312          1757*
KIPDR6= 172314          1758*
KIPDR7= 172316          1759*
KSP   =%000006          1535*
LABLE1  023700          5835*
LABLE2  023744          5850*
```

```
LABLE3  024254          5922#
LABLE4  026170          6213#
LABLE5  030400          6596#
LCLK    032402          6920    6925#
LF    = 000012          1515#   7501    7507
LKS   = 177546          1511#
LKSRV   032476          6926    6943#
LKSTAT= 177546          1926#   5607*   6918    6928*   6950*   6958*   7294    7310*   7315*
LKVEC = 000100          1618#   1925#   5599*   6926*   6927*   7306    7309*   7314*
LOADRS= 177740          1626#   7919
LOOP    004456          2986    2989#   7026    7907    7909    7922    7924    7933
LOOP0   023630          5820#   6911    6929    6939
LOOP1   024254          5923#   6208
LOOP2   026174          6216#   6588
LOOP3   030476          6610#   6894
MAINT = 177750          1630#
MAPH0 = 170202          1869#
MAPH00= 170202          1805#   1869
MAPH01= 170206          1807#   1671
MAPH02= 170212          1809#   1873
MAPH03= 170216          1811#   1875
MAPH04= 170222          1813#   1877
MAPH05= 170226          1815#   1879
MAPH06= 170232          1817#   1881
MAPH07= 170236          1819#   1883
MAPH1 = 170206          1871#
MAPH10= 170242          1821#
MAPH11= 170246          1823#
MAPH12= 170252          1825#
MAPH13= 170256          1827#
MAPH14= 170262          1829#
MAPH15= 170266          1831#
MAPH16= 170272          1833#
MAPH17= 170276          1835#
MAPH2 = 170212          1873#
MAPH20= 170302          1837#
MAPH21= 170306          1839#
MAPH22= 170312          1841#
MAPH23= 170316          1843#
MAPH24= 170320          1845#
MAPH25= 170326          1847#
MAPH26= 170332          1849#
MAPH27= 170336          1851#
MAPH3 = 170216          1875#
MAPH30= 170342          1853#
MAPH31= 170346          1855#
MAPH32= 170352          1857#
MAPH33= 170356          1859#
MAPH34= 170362          1861#
MAPH35= 170366          1863#
MAPH36= 170372          1865#
MAPH37= 170376          1867#
MAPH4 = 170222          1877#
MAPH5 = 170226          1879#
MAPH6 = 170232          1881#
MAPH7 = 170236          1883#
```

```
MAPL0 = 170200          1868#
MAPL00= 170200          1804#   1868
MAPL01= 170204          1806#   1870
MAPL02= 170210          1808#   1872
MAPL03= 170214          1810#   1874
MAPL04= 170220          1812#   1876
MAPL05= 170224          1814#   1878
MAPL06= 170230          1816#   1880
MAPL07= 170234          1818#   1882
MAPL1 = 170204          1870#
MAPL10= 170240          1820#
MAPL11= 170244          1822#
MAPL12= 170250          1824#
MAPL13= 170254          1826#
MAPL14= 170260          1828#
MAPL15= 170264          1830#
MAPL16= 170270          1832#
MAPL17= 170274          1834#
MAPL2 = 170210          1872#
MAPL20= 170300          1836#
MAPL21= 170304          1838#
MAPL22= 170310          1840#
MAPL23= 170314          1842#
MAPL24= 170320          1844#
MAPL25= 170324          1846#
MAPL26= 170330          1848#
MAPL27= 170334          1850#
MAPL3 = 170214          1874#
MAPL30= 170340          1852#
MAPL31= 170344          1854#
MAPL32= 170350          1856#
MAPL33= 170354          1858#
MAPL34= 170360          1860#
MAPL35= 170364          1862#
MAPL36= 170370          1864#
MAPL37= 170374          1866#
MAPL4 = 170220          1876#
MAPL5 = 170224          1878#
MAPL6 = 170230          1880#
MAPL7 = 170234          1882#
MEMERR= 177744          1628#   7918
MMR0  = 177572          1653#   1657    5428    5466*   5473*   5476*   5498    5509*   5515*   5518*   5523*
MMR1  = 177574          1654#   1658
MMR2  = 177576          1655#   1659
MMR3  = 172516          1656#   1660    5467*   5472*   5475*   5508*   5519*
MMVEC = 000250          1621#   5463*   5502*
MSGI    037614          7601    8035#
MSN   = 170004          1893#   3172    3241    3280    3354    4207    4236    4241    4243    4286    4336    4338    4509
                        4549    4577    4601
MT    = 000016          1921#   4666    4668    4687    4700
MULSHF  034516          7326#   7666
MULTBL  001400          2060#   7347
OFFSET= 001164          1896#
OUT     032606          5812*   6947*   6948    6951*   6954*   6957    6960#   6968*   6969    6972*   6975*   6978
OUTPTR  001376          2059#   7326*   7354*   7355*   7356*   7363*
OUTTBL  054532          2059    7326    7669    7684    9021#
```

```
PC     =%000007          1538#  3083   4631   4660*  4679*  4681*  4697*  4722*  4758*  4770*  4782*  4794*  4806*
                         4818*  4835*  4838*  4855*  4858*  4883*  4918*  4944*  4970*  4983*  5004*  5039*  5057*
                         5075*  5089*  5091*  5104*  5123*  5146*  5158*  5178*  5200*  5222*  5468*  5555   5559
                         5562   5590   5604*  5605   5852   5862   5873*  5889*  5904   6219   6236*  6252*  6268*
                         6283   6301*  6317*  6335   6352   6370   6387   6405   6422   6441*  6458   6476*  6497*
                         6514*  6530   6552   6569   6996*  6999*  7021*  7138*  7144*  7316*  7364*  7380*  7456*
                         7475*  7482*  7489*  7503*  7505*  7539*  7556*  7666*  7675*  7688*  7707*  7885*  8025
PCLK     032432          6915   6933#
PCLKST=  172540          1927#  6913   6938*  6971*
PIRQ   = 177772          1508#  5374*  5381*  5387*
PIRQVE=  000240          1620#  5370*
PKSRV    032610          6934   6964#
PKVEC  = 000104          1930#  6934*  6935*
PR0    = 000000          1541#
PR1    = 000040          1542#
PR2    = 000100          1543#
PR3    = 000140          1544#
PR4    = 000200          1545#
PR5    = 000240          1546#
PR6    = 000300          1547#
PR7    = 000340          1548#  2990   2992   2994   6927   6935
PS     = 177776          1505#  1506
PSW    = 177776          1506#  5625*  5628*  7307   7308*  7313*
PWRVEC=  000024          1613#  2949*  2950*  7974*  7975*  7994*  8000*  8021*  8022*
RESREG=  104406          7231   7283   7667   7884   7966#
RESVEC=  000010          1608#  4677*  5849*  5860*  5870*  5886*  5902*  6216*
R0     =%000000          1520#  1528   3050*  3052   3054   3162*  3163   3235*  3236   3271*  3272   3421*  3427
                         3430   3449*  3455   3458   3548*  3549   3552   3783*  3784   3785   3829*  3844*  3845
                         3847   3899*  3906   3908   3968*  3970   3971   4087*  4088*  4089*  4090*  4091*  4092*
                         4093*  4094*  4095*  4119*  4120*  4121*  4122*  4123*  4124*  4125*  4126*  4127*  4128*
                         4129*  4148*  4150   4152   4324*  4358   4375*  4376*  4377*  4425*  4446*  4472*  4475
                         4478   4661*  4662*  4663   4698*  4699*  4700   4702   4891*  4907*  4908   4911   4926*
                         4933*  4934   4936   4952*  4959*  4960   4962   5127*  5148*  5242*  5244   5251*  5252
                         5435*  5436*  5437*  5438*  5439*  5440*  5441*  5442*  5443*  5444*  5445*  5446*  5447*
                         5448*  5449*  5450*  5451*  5452*  5455*  5459*  5562*  5564   5650*  5651*  5652   5655
                         5656   5671*  5675*  5677*  5678   5679*  5680*  5681*  5682*  5685*  5686   5688   5690
                         5691   5692   5693   5695   5698   5701   5704   5708   5712   5720*  5721   5723*  5725
                         5729   5731*  5732*  5734*  5735*  5736*  5737*  5743   5746*  5747*  5748*  5749   5752
                         5754*  5755   5757   5760   5764*  5765   5769*  5770*  5771*  5772*  5773   5774*  5776*
                         5777   5778*  5779*  5834*  5837   5839   5935*  5936   5945*  5948*  5949   5951   5973*
                         5974*  5976   5979   6091*  6092*  6093   6124*  6127*  6128   6131   6225*  6226   6229
                         6289*  6291*  6292   6294   6428*  6430*  6431   6433   6612*  6615   6617*  6619   6624*
                         6626*  6628   6639*  6641*  6642   6651*  6653   6655   6666*  6667*  6669*  6671   6680*
                         6681*  6683*  6685   6694*  6697   6699   6710*  6714   6715   6727*  6730   6731   6741*
                         6744   6745   6748*  6749*  6750   6752   6757*  6758*  6761*  6762   6771*  6772*  6775
                         6776   6787*  6790*  6791   6801*  6802*  6803*  6806*  6807   6818*  6820*  6822*  6823
                         6831*  6832*  6835   6836   6847*  6852   6854   6865*  6867*  6869   6870   6879*  6880*
                         6881   7018*  7021   7182*  7184   7185*  7193*  7200*  7206*  7228*  7229*  7230   7260*
                         7261   7262*  7263*  7273*  7279*  7280*  7331*  7335*  7338*  7339*  7358*  7371*  7379
                         7400   7425*  7449   7450*  7455   7460   7463*  7516   7524*  7528   7529   7531*  7532*
                         7533   7555*  7575   7576*  7577*  7584*  7585*  7586*  7587*  7588*  7589   7594   7597
                         7613   7615*  7616   7618   7621   7625*  7632*  7642*  7668*  7673   7684*  7686   7693
                         7705*  7803   7813*  7817   7833   7834   7847*  7874*  7878   7888*  7890*  7892*  7943
                         7944*  7945   7946*  7947*  7948*  7949*  7976   7982*  7984   8020*
R1     =%000001          1521#  1529   4100*  4123   4128   4151*  4162   4164   4325*  4379*  4385*  4423*  4438
                         4444*  5453*  5455   5458*  5459   5672*  5676*  5768*  5775*  5937*  5938   5940   6609*
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                    6642    6655    6671    6685    6699    6715    6731    6745    6762    6776    6888*   6892*   7184*
                    7189    7195    7202    7208    7214*   7216    7220*   7222    7264*   7265*   7266    7267    7268*
                    7282*   7332*   7336*   7340    7401    7424*   7517    7554*   7596    7597*   7599    7608*   7612
                    7613*   7627    7633    7643    7669*   7680    7697    7704*   7804    7817*   7818    7822    7846*
                    7870*   7874    7875*   7887*   7889*   7891*   7977    8019*
R10     =%000000    1528#
R11     =%000001    1529#
R12     =%000002    1530#
R13     =%000003    1531#
R14     =%000004    1532#
R15     =%000005    1533#
R2      =%000002    1522#   1530    4323*   4387*   5454*   5456*   5457*   5460*   5678*   5721    5727    5728*   5777*
                    6184*   6186*   6188    6191    6613*   6614    6616    6654*   6659*   6661    7266*   7274*   7281*
                    7340*   7341*   7344*   7345    7347*   7348*   7349    7351    7354    7357*   7358    7359*   7360
                    7402    7423*   7805    7816*   7820*   7823    7830*   7831*   7832    7837*   7845*   7876*   7877
                    7878*   7893*   7894*   7978    8018*
R3      =%000003    1523#   1531    3135*   3149*   3222*   3259*   3319*   3338*   3371*   3391*   3544*   3568*   3590*
                    3613*   3636*   3661*   3776*   3816*   3932*   4188*   4228*   4278*   4328*   4470*   4501*   4540*
                    4569*   4593*   5743*   5814*   6170*   6172    6608*   6823    6870    6889*   6893*   7048    7049*
                    7051*   7120    7121*   7122    7123*   7125*   7189*   7190*   7191*   7192    7195*   7196*   7197*
                    7198    7202*   7203*   7204*   7205    7208*   7209*   7210*   7211    7216*   7217*   7218*   7219
                    7222*   7223*   7224*   7225    7267*   7270    7276    7373*   7403    7422*   7745    7754*   7760*
                    7761*   7764*   7769*   7770*   7771    7780*   7806    7814*   7815*   7829*   7832*   7841*   7842*
                    7844*   7873*   7886*   7893    7979    8017*
R4      =%000004    1524#   1532    3171*   3240*   3279*   3353*   4206*   4235*   4240*   4242*   4285*   4335*   4337*
                    4508*   4548*   4576*   4600*   5923*   5946    5956    5961    5975    5986    5998    6013    6026
                    6064    6076    6098    6106    6111    6116    6136    6144    6149    6151*   6153    6157    6163
                    6176    6182    6187    6201    6214*   6215    6228    6242    6258    6274    6290    6307    6323
                    6341    6358    6376    6393    6411    6429    6447    6464    6482    6503    6520    6536    6558
                    6575    6618    6627    6645    6658    6670    6679    6684    6698    7186*   7187*   7192*   7198*
                    7199*   7205*   7211*   7212*   7213*   7219*   7225*   7226*   7227*   7230*   7269*   7275*   7333*
                    7337*   7342    7351*   7353*   7404    7421*   7746    7748*   7749*   7750*   7751    7752*   7766
                    7768*   7776*   7779*   7872*   7879*   7980    8016*
R5      =%000005    1525#   1533    6607*   6807    6810    6814*   6849*   6853*   6854    6884*   6687*   7188*   7194*
                    7201*   7207*   7215*   7221*   7270*   7271*   7272*   7273    7276*   7277*   7278*   7279    7328*
                    7360*   7405    7420*   7747    7753*   7755*   7757*   7758*   7759*   7760    7778*   7807    7809*
                    7811*   7818*   7822*   7837    7843*   7871*   7877*   7882*   7883    7981    8015*
R6      =%000006    1526#   1534    2937*   2938*   2939    5283    5295*   5296    5298    5307*   5308    5309*   5320*
                    5323    5333    5346
R7      =%000007    1527#   1538
SAVREG= 104405      7181    7255    7665    7869    7965#
SDPAR0= 172260      1741#
SDPAR1= 172262      1742#
SDPAR2= 172264      1743#
SDPAR3= 172266      1744#
SDPAR4= 172270      1745#
SDPAR5= 172272      1746#
SDPAR6= 172274      1747#
SDPAR7= 172276      1748#
SDPDR0= 172220      1719#
SDPDR1= 172222      1720#
SDPDR2= 172224      1721#
SDPDR3= 172226      1722#
SDPDR4= 172230      1723#
SDPDR5= 172232      1724#
SDPDR6= 172234      1725#
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SOPDR7= 172236          1726#
SIPAR0= 172240          1730#
SIPAR1= 172242          1731#
SIPAR2= 172244          1732#
SIPAR3= 172246          1733#
SIPAR4= 172250          1734#
SIPAR5= 172252          1735#
SIPAR6= 172254          1736#
SIPAR7= 172256          1737#
SIPDR0= 172200          1708#
SIPDR1= 172202          1709#
SIPDR2= 172204          1710#
SIPDR3= 172206          1711#
SIPDR4= 172210          1712#
SIPDR5= 172212          1713#
SIPDR6= 172214          1714#
SIPDR7= 172216          1715#
SIZEHI= 177762          1639#
SIZELO= 177760          1637#
SP     =%000006         1534#  1535   1536   1537   2941*  2959*  2969*  2971   3143   3167   3239   3278   3325
                        3344   3379   3397   3551*  3574*  3596*  3619*  3642*  3667*  3800   3850   3943   4194
                        4234   4284   4334   4477   4507   4547   4575   4599   4643   4690   4731   4764   4776
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                        5378   5380*  5386*  5391*  5393*  5395   5397   5399*  5402   5404*  5406*  5430*  5477
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                        5879   5895   5910   6589   6590   6917*  7006*  7013*  7048*  7051   7059*  7062   7064
                        7065   7094   7095   7099*  7120*  7125   7133   7153*  7156*  7182   7183*  7232*  7233*
                        7234*  7256   7257*  7260   7284*  7285*  7286*  7296*  7306*  7307*  7312   7313   7314
                        7378   7400*  7401*  7402*  7403*  7404*  7405*  7406*  7407*  7408*  7409*  7415*  7417*
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                        7517*  7524   7525*  7536   7537*  7538*  7548   7549*  7554   7555   7575*  7580*  7596*
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                        7690   7704   7705   7737*  7738   7739   7740*  7745*  7746*  7747*  7753   7778   7779
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SR1    = 177574         1658#
SR2    = 177576         1659#
SR3    = 172516         1660#
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STEP   = 001162         1895#
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SUPSTK= 000700          1501#
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SW00  = 000001          1566#  1576
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SW02  = 000004          1564#  1574
SW03  = 000010          1563#  1573
SW04  = 000020          1562#  1572
SW05  = 000040          1561#  1571
SW06  = 000100          1560#  1570
SW07  = 000200          1559#  1569
SW08  = 000400          1558#  1568
SW09  = 001000          1557#  1567
SW1   = 000002          1575#
SW10  = 002000          1556#
SW11  = 004000          1555#
SW12  = 010000          1554#  5432   5495
SW13  = 020000          1553#
SW14  = 040000          1552#
SW15  = 100000          1551#
SW2   = 000004          1574#
SW3   = 000010          1573#
SW4   = 000020          1572#
SW5   = 000040          1571#
SW6   = 000100          1570#
SW7   = 000200          1569#
SW8   = 000400          1568#  7046   7118
SW9   = 001000          1567#  3147   3219   3256   3491   3510   3712   3731   3821   4070   4115   4344   4433
SYSTID= 177764          1641#
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TIMES   001370          2056#  6948   6969
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TST13   010166          3533   3672   3697#
TST14   010402          3748#
TST15   010454          3750   3757   3771#
TST16   010632          3773   3794   3811#
TST17   011052          3813   3846   3861#
TST2    004652          3010   3032   3045#
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TST22   011422          3927   3939   3954#
TST23   011636          3956   3985   3998#
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TST42   020464          5174    5206    5219#
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TST44   021304          5278    5349    5365#
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TST46   022046          5426    5431    5433    5474    5492#
TST47   022252          5494    5496    5501    5538#
TST5    005452          3131    3192    3215#
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TST52   022740          5623    5630    5640#
TST53   023034          5642    5653    5667#
TST54   023524          5669    5766    5798#
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TST7    006520          3401    3413#
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                        7682    7683    7685    7691    7695    7699    7706    7772    7848    7960#   8023
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TYPON = 104403          7963#
TYPOS = 104402          7962#
UDPAR0= 177660          1697#
UDPAR1= 177662          1698#
UDPAR2= 177664          1699#
UDPAR3= 177666          1700#
UDPAR4= 177670          1701#
UDPAR5= 177672          1702#
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UDPAR7= 177676          1704#
UDPDR0= 177620          1675#
UDPDR1= 177622          1676#
UDPDR2= 177624          1677#
UDPDR3= 177626          1678#
UDPDR4= 177630          1679#
UDPDR5= 177632          1680#
UDPDR6= 177634          1681#
UDPDR7= 177636          1682#
UIPAR0= 177640          1686#
UIPAR1= 177642          1687#
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UIPAR3= 177646          1689#
UIPAR4= 177650          1690#
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UIPDR0= 177600          1664#
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$SAVR6  037602          7993#   8001    8002#   8003#   8030#
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$SWR  = 167777          1437#   1466    1486    1487    1488    1489    1490    1491    1492    1493    2009    2010    2011
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		3532 3698 3749 3772 3812 3862 3892 3926 3955 3999 4042 4141 4178
		4316 4408 4462 4536 4621 4654 4715 4877 5000 5119 5173 5220 5277
		5366 5425 5493 5539 5583 5622 5641 5668 5799 6987 6993 7020 7026
		7027 7036 7037 7038 7039 7040 7054 7066 7068 7069 7072 7073 7074
		7081 7082 7083 7095 7098 7101 7109 7110 7111 7112 7113 7129 7136
		7148 7151 7163 8027
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$TYPEX  035334   7500  7502  7505*
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$TYPON  036424   7741  7744* 7963
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DEFPBA.CMB CROSS REFERENCE TABLE -- USER SYMBOLS

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.$X   = 004022          2918#   2923
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COM11 3461# 3464
COM12 3518# 3521
COM13 3680# 3683
COM14 3738# 3741
COM15 3761# 3764
COM16 3802# 3805
COM17 3852# 3855
COM2 3036# 3039
COM20 3882# 3885
COM21 3911# 3914
COM22 3945# 3948
COM23 3989# 3992
COM24 4027# 4030
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COM26 4167# 4170
COM27 4298# 4301
COM3 3069# 3072
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COM31 4451# 4454
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COM36 4869# 4872
COM37 4991# 4994
COM4 3102# 3105
COM40 5111# 5114
COM40A 5165# 5168
COM41 5209# 5212
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COM5 3202# 3205
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COM6 3295# 3298
COM7 3404# 3407
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FPDWN           7969#   7982
FPUP            7969#   8005
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PUSH               1#  1884#   7400    7515    7517    7538    7802    7976
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SPACE           1884#
STARS              1#  1884#   1947    1958    2015    2019    2915    2917    2924    2998    3007    3037    3044    3070    3077
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.HEADE            1#    1437#   1456
.KT11             1#
.SETUP            1#    1437#   2215
.SWRHI            1#    1437#   1481
.SWRLO          1494#
.$ACTI            1#    1437#   1944
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DEFPBA.CMB CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

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.REM       1
.REPT   1938    1993    2001
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        2200    2913    2998    3037    3070    3103    3203    3296    3405    3434    3462    3519    3681    3739    3762
        3803    3853    3883    3912    3946    3990    4028    4132    4168    4299    4392    4452    4524    4612    4646
        4705    4870    4992    5112    5166    5210    5269    5358    5411    5482    5527    5576    5615    5634    5661
        5781    5783    5793    5795    6897    6981    7030    7103    7165    7237    7289    7319    7382    7428    7508
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.TITLE  1456
.WORD   1938    1939    1940    1953    1964    1967    1968    1969    1970    1973    1974    1975    1976    1977    1978
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        2003    2004    2005    2006    2007    2008    2022    2023    2024    2025    2026    2027    2028    2029    2033
        2034    2035    2044    2045    2046    2047    2050    2054    2055    2056    2057    2058    2059    2156    2157
        2158    2159    2160    2161    2162    2163    2164    2165    2166    2167    2168    2169    2170    2171    2172
        2173    2174    2175    2176    2177    2178    2179    2180    2181    2182    2183    2184    2165    2186    2187
        2188    2189    2190    2191    2192    2195    2196    2197    2198    2929    2930    2931    2932    2933    2934
        3084    4632    4633    4682    4839    4859    5092    5224    5245    5375    5392    5469    5556    5560    5563
        5853    5863    5974    5890    5905    6047    6220    6237    6253    6269    6284    6302    6318    6336    6353
        6371    6388    6406    6423    6442    6459    6477    6498    6515    6531    6553    6570    6960    6997    7000
        7259    7457    7504    7540    7592    7610    7635    7638    7645    7648    7662    7679    7692    7788    8024
        8026    8054    8083    8092    8114    8136    8164    8176    8272    8393    8488    8515    8595    8605    8724
        8936    8929    8941    8948    8963    8977    8989    9011    9021
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ERRORS DETECTED:  0
DEFAULT GLOBALS GENERATED:  0

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RUN-TIME RATIO: 361/173=2.0
CORE USED:  39K  (77 PAGES)
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