# FP11

LDD/STD EXERCISER

## MD-11-DCFPR-C

EP-DCFPR-C-DL



FICHE 1 OF 1

MAY 1978

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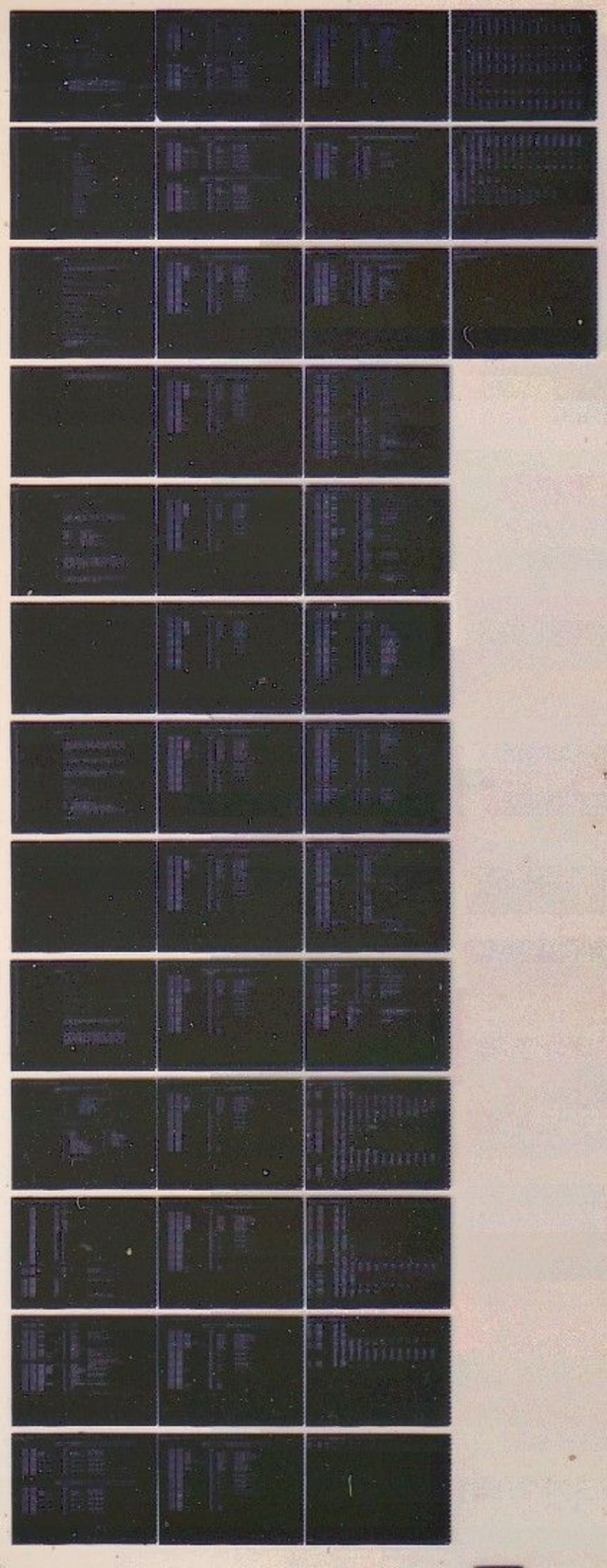
MADE IN USA



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                                        .REPT   0
```

## IDENTIFICATION

PRODUCT CODE:  MAINDEC-11-DCFPR-C-D

PRODUCT NAME:  FP11 LDD/STD EXERCISER

DATE CREATED:  NOVEMBER 1973

MAINTAINER:  DIAGNOSTIC GROUP

AUTHOR:  BOB BRAIN

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```
                                MAINDEC-11-DCFPR-C      LDD/STD EXERCISER               PAGE  3
                                DESCRIPTION


                                1.      ABSTRACT

                                        THIS PROGRAM IS AN EXERCISER OF  LDD/STD  INSTRUCTIONS,  IT
                                        USES  RANDOM  NUMBERS,  FLOATING  1'S, AND FLOATING 0'S, AND
                                        CHECKS ALL MEMORY WITH LDF/STF INTO AN AC.


                                2.      REQUIREMENTS


                                2.1     EQUIPMENT

                                        PDP11/45 STANDARD COMPUTER WITH FP11 OPTION


                                2.2     STORAGE

                                        PROGRAM STORAGE - THE ROUTINES USE MEMORY 0 - 17776


                                2.3     PRELIMINARY PROGRAMS

                                        MAINDEC-11-DCFPA TO DCFPL


                                3.      LOADING PROCEDURE

                                        USE STANDARD PROCEDURE FOR ABS TAPES.


                                4.      STARTING PROCEDURE


                                4.1     CONTROL SWITCH SETTINGS

                                        SEE 5.1.1 (ALL DOWN FOR WORST CASE TESTING)


                                4.2     STARTING ADDRESS

                                        THE PROGRAM SHOULD ALWAYS BE STARTED AT 200.


                                4.3     PROGRAM AND/OR OPERATOR ACTION

                                        1) LOAD PROGRAM INTO MEMORY USING ABS LOADER.
                                        2) LOAD ADDRESS 200.
                                        3) SET SWITCHES (SEE SEC 5.1.1) ALL DOWN FOR WORST CASE
                                        4) PRESS START.
```

```
                                        5) THE PROGRAM WILL LOOP AND BELL WILL RING ONCE EVERY PASS
                                        6) A MINIMUM OF TWO PASSES SHOULD ALWAYS BE RUN.
                                        7) THE DISPLAY ON THE 11/45 WILL SHOW THE ITERATION COUNT IN
                                        THE LEFT BYTE AND TEST NUMBER IN THE RIGHT.  TO USE, SET THE
```

DESCRIPTION

DATA DISPLAY SWITCH TO THE DISPLAY POSITION.

5.  OPERATING PROCEDURE

5.1  OPERATIONAL SWITCH SETTINGS

AT SA 200 ..  ALL SWITCHES DOWN IS WORST CASE TESTING.  IF AN ERROR OCCURS, THAT TEST WILL BE LOOPED UPON UNTIL COMPLETION OF 256 CONSECUTIVE PASSES WITH NO ERRORS OF THE SUBTEST IF SW<9> SET TO A 1.  THE BELL WILL RING UPON COMPLETION OF A PASS.

5.1.1  SWITCH SETTINGS ARE:

```
SW<15> = 1 ..... HALT ON ERROR
SW<14> = 1 ..... SCOPE LOOP
SW<13> = 1 ..... INHIBIT PRINTOUT
SW<12> = 1 ..... INHIBIT TRACE TRAPPING
SW<11> = 1 ..... INHIBIT ITERATIONS OF SUBTEST
SW<10> = 1 ..... BELL ON ERROR
         0 ..... BELL ON PASS COMPLETE
SW<09> = 1 ..... LOOP ON ERROR
SW<08> = 1 ..... LOOP ON TEST IN SW<7:0>
         0 ..... LOAD SW<7:0> INTO UB REGISTER
```

5.2  SUBROUTINE ABSTRACTS

5.2.1  SCOPE

THIS SUBROUTINE CALL IS PLACED BETWEEN EACH SUBTEST IN THE INSTRUCTION SECTION.  IT RECORDS THE STARTING ADDRESS OF EACH SUBTEST AS IT IS BEING ENTERED IN LOCATION "LAD".  IF A SCOPE LOOP IS REQUESTED, THE CURRENT SUBTEST WILL BE LOOPED UPON.  SW<11> ON A 1 INHIBITS ITERATION OF SUBTESTS.  THE CONTENTS OF LAD MAY BE USED TO DETERMINE THE LAST SUBTEST SUCCESSFULLY COMPLETED.

5.2.2  HLT

THIS ROUTINE PRINTS OUT AN ERROR MESSAGE (SEE 6.1.) IF A HLT IS EXECUTED.  THE SUBTEST WILL BE LOOPED UPON UNTIL 256 CONSECUTIVE GOOD PASSES ARE COMPLETED IF SW<9> IS ON A 1.  TO INHIBIT TYPEOUTS, PUT SW<13> ON A 1.

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DESCRIPTION

5.2.3 TRTRAP

IF SW<12> IS ON A 0, THE T BIT WILL BE SET ON ALTERNATE PASSES. WHEN SET, IT CAUSES A TRAP AFTER EACH INSTRUCTION. THE FIRST INSTRUCTION EXECUTED UPON TRAPPING IS AN "RTT" WHICH RETURNS TO THE INTERRUPTED SEQUENCE OF INSTRUCTIONS. THIS SEQUENCE IS CONTINUED UNTIL THE END OF THE PROGRAM IS REACHED.

5.2.4 TRAPCATCHER

A ".+2" - "HALT" SEQUENCE IS REPEATED FROM 0 - 776 TO CATCH ANY UNEXPECTED TRAPS. THUS ANY UNEXPECTED TRAPS OR INTERUPTS WILL HALT AT THE VECTOR + 2.

5.2.5 FLOATING POINT TRAP (TO 244)

THE FP11 INTERRUPT DISABLE BIT IS ALWAYS SET IN ALL OF THESE TESTS SO NO TRAPS TO 244 SHOULD OCCUR. IF AN INTERRUPT OCCURS, THE PROGRAM WILL HALT AT 766 IN THE ROUTINE CALLED FLTERR AND DISPLAY THE FPS REGISTER IN R3.

6. ERRORS

6.1 ERROR PRINTOUT

THE FORMAT IS AS FOLLOWS:

```
ADR  FPS  ANS1 ANS2 ANS3 ANS4 ANS5 ANS6 ANS7 ANS8
  FEC FEA
```

WHERE:

ADR = ADDRESS OF ERROR HLT
FPS = FLOATING POINT STATUS
FEC = FLOATING EXCEPTION CODES (ERROR CODES)
FEA = FLOATING EXCEPTION ADDRESS (ERROR ADDRESS)
ANS1-8 = ERROR DATA READ FROM THE FP11. FROM 2-8 OF THESE MAY BE TYPED DEPENDING ON THE NUMBER FOLLOWING THE HLT; I.E., HLT+3 WOULD TYPE ANS1-ANS3. CHECK LISTING FOR MEANING OF THE DATA.

TO FIND THE FAILING TEST, LOOK AT THE LISTING ABOVE THE ADDRESS TYPED.

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```
                                MAINDEC-11-DCFPR-C     LDD/STD EXERCISER                PAGE   6
                                DESCRIPTION


                                6.2         ERROR RECOVERY

                                            RESTART AT 200


                                7.          RESTRICTIONS

                                            NONE


                                8.          MISCELLANEOUS


                                8.1         EXECUTION TIME

                                            A BELL WILL RING WITHIN 15 SECONDS WITH ALL SWITCHES DOWN.


                                8.2         STACK POINTER

                                            STACK IS INITALLY SET TO 600


                                8.3         POWER FAIL

                                            THIS TEST CAN BE POWER FAILED WITH NO ERRORS.  TO USE, START
                                            THE  TEST  AS USUAL AND POWER DOWN THEN UP AT ANY TIME.  THE
                                            PROGRAM SHOULD TYPE "POWER" AND  CONTINUE  TO  RUN  WITH  NO
                                            OTHER TYPEOUTS.


                                9.          PROGRAM DESCRIPTION

                                            THIS PROGRAM TESTS ALL THE FP11 AC'S (AC0 - AC5) WITH RANDOM
                                            NUMBERS,  FLOATING 1'S, AND FLOATING 0'S.  IT ALSO TESTS LDF
                                            AND STF IN ALL MEMORY LOCATIONS FROM THE END OF THE  PROGRAM
                                            TO  THE  BEGINNING  OF  THE  LOADER.   ONE  RANDOM NUMBER IS
                                            GENERATED PER PASS AND LOADED INTO AC0 - AC5, SO  EACH  BELL
                                            SIGNIFIES  THE  COMPLETION  OF  ONE LOAD OF A RANDOM NUMBER,
                                            FLOATING 1'S, FLOATING 0'S, AND LDF/STF THROUGHOUT MEMORY.
                                .ENDR
```

```
.TITLE  MAINDEC-11-DCFPR-C  EXERCISER OF LDD AND STD
;COPYRIGHT 1972, DIGITAL EQUIPMENT CORP., MAYNARD, MASS
;PROGRAM BY BOB BRAIN
.REM*
```

| SWITCH | USE |
|---|---|
| 8 | 0 - LOAD UB REGISTER WITH SW<7:0><br>1 - LOOP ON TEST IN SW<7:0> |
| 9 | LOOP ON ERROR |
| 10 | 0 - BELL ON PASS COMPLETE<br>1 - BELL ON ERROR |
| 11 | INHIBIT ITERATIONS |
| 12 | INHIBIT TRACE TRAP |
| 13 | INHIBIT ERROR TYPEOUTS |
| 14 | LOOP ON TEST |
| 15 | HALT ON ERROR |

OUTPUT FORM:

```
ADR  FPS  ANS1 ANS2 ANS3 ANS4 ANS5 ANS6 ANS7 ANS8
   FEC  FEA
```

FPS

| BIT | REASON |
|---|---|
| 0 | CARRY |
| 1 | OVERFLOW |
| 2 | ZERO |
| 3 | NEGATIVE |
| 4 | MAINTAINANCE MODE |
| 5 | TRUNCATE MODE |
| 6 | LONG INTEGER MODE |
| 7 | DOUBLE PRECISION MODE |
| 8 | INTERUPT ON CONVERSION ERROR |
| 9 | INTERUPT ON OVERFLOW |
| 10 | INTERUPT ON UNDERFLOW |
| 11 | INTERUPT ON UNDEFINED VARIABLE |
| 12 | |
| 13 | |
| 14 | INTERUPT DISABLE |
| 15 | ERROR FLAG* |

FEC

| CODE | ERROR |
|---|---|
| 0 | ADDRESS ERROR |
| 2 | OPCODE ERROR |
| 4 | DIVIDE BY ZERO |
| 6 | CONVERSION ERROR |
| 10 | OVERFLOW |
| 12 | UNDERFLOW |
| 14 | UNDEFINED VARIABLE (-0) |
| 16 | UBREAK TRAP |

```
                                .ENABL  ABS
                        170003  LDUB=   170003
                        000001  N=      1
                        177776  PS=     177776
                        177570  SWR=    177570
                        104400  SCOPE=  TRAP
                        104000  HLT=    EMT
                        000007  BELL=   7
                        000004  TYPE=   ICT
                        040000  SW14=   40000
                        020000  SW13=   20000
                        010000  SW12=   10000
                        004000  SW11=    4000
                        002000  SW10=    2000
                        001000  SW09=    1000
                        000400  SW08=     400
                        000000  FPS=    %0
                        000000  R0=     %0
                        000001  R1=     %1
                        000002  R2=     %2
                        000003  R3=     %3
                        000004  R4=     %4
                        000005  TTY=    %5
                        000005  R5=     %5
                        000006  SP=     %6
                        000007  PC=     %7
                        000000  AC0=    %0
                        000001  AC1=    %1
                        000002  AC2=    %2
                        000003  AC3=    %3
                        000004  AC4=    %4
                        000005  AC5=    %5
                        000000  .=      0                       ;TRAP CATCHER FROM 0 - 776
                        000200  .=      200
000200  000167  000622          JMP     BEG

                        000760  .=      760
000760  170200          FLTERR: STFPS   FPS             ;PUT FPS INTO R0
000762  170367  000034          STST    FEC             ;STORE STATUS
000766  000000                  HALT                    ;ERROR TRAP - SOULD NOT BE ENABLED
000770  000002                  RTI

                        001000  .=      1000
001000  000000          ICNT:   0                       ;PASS COUNT - LH   ITERATION COUNT - RH
001002  000000          ANS1:   0                       ;FIRST ANSWER (SEE CODE)
001004  000000          ANS2:   0
001006  000000          ANS3:   0
001010  000000          ANS4:   0
001012  000000          ANS5:   0
001014  000000          ANS6:   0
001016  000000          ANS7:   0
001020  000000          ANS8:   0
001022  000000          FEC:    0                       ;FLOATING EXCEPTION CODES
001024  000000          FEA:    0                       ;FLOATING EXECPTION ADDRESS
```

```
001026  012706  000600          BEG:    MOV     #600,SP         ;** STACK AT 600 **
001032  162701  000006                  SUB     #6,R1
001036  000425                          BR      HAVIT

001040  012737  001106  000004  1$:     MOV     #NEM,@#4
001046  013701  000042                  MOV     @#42,R1         ;GET MONITOR ADDRESS
001052  001405                          BEQ     2$              ;SKIP IF 0
001054  162701  000020                  SUB     #20,R1          ;DROP IT BACK
001060  022701  006042                  CMP     #HICORE,R1      ;IS IT WITHIN THE PROGRAM?
001064  003012                          BGT     HAVIT           ;NO - GOT THE ADDRESS
001066  012701  020000          2$:     MOV     #20000,R1
001072  005711                  TRYAGN: TST     (1)             ;FIND MAX CORE
001074  062701  020000                  ADD     #20000,R1
001100  022701  160000                  CMP     #160000,R1
001104  001372                          BNE     TRYAGN
001106  162701  000306          NEM:    SUB     #20000-17472,R1 ;MOVE IT TO EXISTANT CORE
001112  010167  004722          HAVIT:  MOV     R1,UPLIM        ;SAVE IT
001116  012767  001140  176660          MOV     #BEGIN-6,4      ;FIND OUT WHICH MACHINE THIS IS
001124  005737  177772                  TST     @#177772        ;TEST FOR PIRQ
001130  012767  000006  003316          MOV     #6,YESRT        ;FUDGE IN RTT IF  11/45
001136  000403                          BR      BEGIN
001140  016737  004642  000010          MOV     FPTADR,@#10     ;LOAD THE ILLEGAL INSTR VECTOR
                                                                ; WITH THE ADDRESS OF THE FPU.
                                                                ; THE FPU WILL HANDLE THE BAD OPCODES
001146  012706  000600          BEGIN:  MOV     #600,SP         ;** STACK AT 600 **
001152  012737  000006  000004          MOV     #6,@#4          ;RESET 4
001160  012737  004454  000014          MOV     #YESRT,@#14     ;SET TRACE TRAP VECTOR
001166  012777  005506  004620          MOV     #POWDWN,@DWNVEC ;POWER DOWN VECTOR
001174  012777  000340  004614          MOV     #340,@DWNVEC+2
001202  012737  005706  000020          MOV     #.IOT,@#20      ;SET UP VECTOR 20
001210  012700  000030                  MOV     #30,R0          ;SET R0 TO VECTOR 30
001214  012720  004616                  MOV     #.TRP,(0)+      ;SET TRAP VECTOR
001220  012720  000340                  MOV     #340,(0)+
001224  012720  004456                  MOV     #.EMT,(0)+      ;SET EMT VECTOR
001230  012710  000340                  MOV     #340,(0)
001234  012777  000760  004546          MOV     #FLTERR,@FPVECT ;LOAD INTERUPT VECTOR
001242  012777  000340  004542          MOV     #340,@FPVECT+2  ;LOCK UP PROCESSOR
001250  005067  177524                  CLR     ICNT
001254  005067  004550                  CLR     LAD
001260  170127  000000                  LDFPS   #0

001264  004767  003622                  JSR     7,RAND4         ;GET 4 RANDOM NUMBERS INTO ANS1 - ANS4
```

```
                                ;*****************************************************************************
                                ;TEST 1          USES AC0
                                ;*****************************************************************************

001270  104400                          SCOPE
001272  170011                          SETD                            ;SET DOUBLE MODE
001274  172437  001002                  LDD     @#ANS1,0                ;LOAD INTO AC2
001300  174037  001012                  STD     0,@#ANS5                ;STORE INTO ANS5
001304  023737  001002  001012          CMP     @#ANS1,@#ANS5           ;FIRST WORD OK?
001312  001401                          BEQ     .+4
001314  104010                          HLT+8.                          ;FIRST WORD WRONG
001316  023737  001004  001014          CMP     @#ANS2,@#ANS6           ;SECOND WORD OK?
001324  001401                          BEQ     .+4
001326  104010                          HLT+8.                          ;SECOND WORD WRONG
001330  023737  001006  001016          CMP     @#ANS3,@#ANS7           ;THIRD WORD OK?
001336  001401                          BEQ     .+4
001340  104010                          HLT+8.                          ;THIRD WORD WRONG
001342  023737  001010  001020          CMP     @#ANS4,@#ANS8           ;FOURTH WORD OK?
001350  001401                          BEQ     .+4
001352  104010                          HLT+8.                          ;FOURTH WORD WRONG


                                ;*****************************************************************************
                                ;TEST 2          USES AC1
                                ;*****************************************************************************

001354  104400                          SCOPE
001356  170011                          SETD                            ;SET DOUBLE MODE
001360  172537  001002                  LDD     @#ANS1,1                ;LOAD INTO AC1
001364  174137  001012                  STD     1,@#ANS5                ;STORE INTO ANS5
001370  023737  001002  001012          CMP     @#ANS1,@#ANS5           ;FIRST WORD OK?
001376  001401                          BEQ     .+4
001400  104010                          HLT+8.                          ;FIRST WORD WRONG
001402  023737  001004  001014          CMP     @#ANS2,@#ANS6           ;SECOND WORD OK?
001410  001401                          BEQ     .+4
001412  104010                          HLT+8.                          ;SECOND WORD WRONG
001414  023737  001006  001016          CMP     @#ANS3,@#ANS7           ;THIRD WORD OK?
001422  001401                          BEQ     .+4
001424  104010                          HLT+8.                          ;THIRD WORD WRONG
001426  023737  001010  001020          CMP     @#ANS4,@#ANS8           ;FOURTH WORD OK?
001434  001401                          BEQ     .+4
001436  104010                          HLT+8.                          ;FOURTH WORD WRONG
```

```
                                ;*****************************************************************************
                                ;TEST 3          USES AC2
                                ;*****************************************************************************

001440  104400                          SCOPE
001442  170011                          SETD                            ;SET DOUBLE MODE
001444  172637  001002                  LDD     @#ANS1,2                ;LOAD INTO AC2
001450  174237  001012                  STD     2,@#ANS5                ;STORE INTO ANS5
001454  023737  001002  001012          CMP     @#ANS1,@#ANS5           ;FIRST WORD OK?
001462  001401                          BEQ     .+4
001464  104010                          HLT+8.                          ;FIRST WORD WRONG
001466  023737  001004  001014          CMP     @#ANS2,@#ANS6           ;SECOND WORD OK?
001474  001401                          BEQ     .+4
001476  104010                          HLT+8.                          ;SECOND WORD WRONG
001500  023737  001006  001016          CMP     @#ANS3,@#ANS7           ;THIRD WORD OK?
001506  001401                          BEQ     .+4
001510  104010                          HLT+8.                          ;THIRD WORD WRONG
001512  023737  001010  001020          CMP     @#ANS4,@#ANS8           ;FOURTH WORD OK?
001520  001401                          BEQ     .+4
001522  104010                          HLT+8.                          ;FOURTH WORD WRONG


                                ;*****************************************************************************
                                ;TEST 4          USES AC3
                                ;*****************************************************************************

001524  104400                          SCOPE
001526  170011                          SETD                            ;SET DOUBLE MODE
001530  172737  001002                  LDD     @#ANS1,3                ;LOAD INTO AC3
001534  174337  001012                  STD     3,@#ANS5                ;STORE INTO ANS5
001540  023737  001002  001012          CMP     @#ANS1,@#ANS5           ;FIRST WORD OK?
001546  001401                          BEQ     .+4
001550  104010                          HLT+8.                          ;FIRST WORD WRONG
001552  023737  001004  001014          CMP     @#ANS2,@#ANS6           ;SECOND WORD OK?
001560  001401                          BEQ     .+4
001562  104010                          HLT+8.                          ;SECOND WORD WRONG
001564  023737  001006  001016          CMP     @#ANS3,@#ANS7           ;THIRD WORD OK?
001572  001401                          BEQ     .+4
001574  104010                          HLT+8.                          ;THIRD WORD WRONG
001576  023737  001010  001020          CMP     @#ANS4,@#ANS8           ;FOURTH WORD OK?
001604  001401                          BEQ     .+4
001606  104010                          HLT+8.                          ;FOURTH WORD WRONG
```

```
                                ;*****************************************************************************
                                ;TEST 5          USES AC4
                                ;*****************************************************************************

001610  104400                          SCOPE
001612  170011                          SETD                            ;SET DOUBLE MODE
001614  174004                          STD     0,AC4                   ;PUT INTO AC4
001616  172404                          LDD     AC4,0                   ;BACK INTO AC0
001620  174037  001012                   STD     0,@#ANS5                ;NOW INTI ANS5
001624  023737  001002  001012           CMP     @#ANS1,@#ANS5           ;FIRST WORD OK?
001632  001401                          BEQ     .+4
001634  104010                          HLT+8.                          ;FIRST WORD WRONG
001636  023737  001004  001014           CMP     @#ANS2,@#ANS6           ;SECOND WORD OK?
001644  001401                          BEQ     .+4
001646  104010                          HLT+8.                          ;SECOND WORD WRONG
001650  023737  001006  001016           CMP     @#ANS3,@#ANS7           ;THIRD WORD OK?
001656  001401                          BEQ     .+4
001660  104010                          HLT+8.                          ;THIRD WORD WRONG
001662  023737  001010  001020           CMP     @#ANS4,@#ANS8           ;FOURTH WORD OK?
001670  001401                          BEQ     .+4
001672  104010                          HLT+8.                          ;FOURTH WORD WRONG


                                ;*****************************************************************************
                                ;TEST 6          USES AC5
                                ;*****************************************************************************

001674  104400                          SCOPE
001676  170011                          SETD                            ;SET DOUBLE MODE
001700  174005                          STD     0,AC5                   ;PUT INTO AC5
001702  172405                          LDD     AC5,0                   ;BACK INTO AC0
001704  174037  001012                   STD     0,@#ANS5                ;NOW INTI ANS5
001710  023737  001002  001012           CMP     @#ANS1,@#ANS5           ;FIRST WORD OK?
001716  001401                          BEQ     .+4
001720  104010                          HLT+8.                          ;FIRST WORD WRONG
001722  023737  001004  001014           CMP     @#ANS2,@#ANS6           ;SECOND WORD OK?
001730  001401                          BEQ     .+4
001732  104010                          HLT+8.                          ;SECOND WORD WRONG
001734  023737  001006  001016           CMP     @#ANS3,@#ANS7           ;THIRD WORD OK?
001742  001401                          BEQ     .+4
001744  104010                          HLT+8.                          ;THIRD WORD WRONG
001746  023737  001010  001020           CMP     @#ANS4,@#ANS8           ;FOURTH WORD OK?
001754  001401                          BEQ     .+4
001756  104010                          HLT+8.                          ;FOURTH WORD WRONG
```

```
                                ;*****************************************************************
                                ;TEST 7          FLOATING 1'S TEST IN AC0
                                ;*****************************************************************

 001760  104400                         SCOPE
 001762  170011                         SETD
 001764  012701  001002                 MOV     #ANS1,R1        ;LOAD FIRST WORD
 001770  012721  000001                 MOV     #1,(1)+         ;INITIALIZE TO 1
 001774  012721  000001                 MOV     #1,(1)+         ;INITIALIZE TO 1
 002000  012721  000001                 MOV     #1,(1)+         ;INITIALIZE TO 1
 002004  012721  000001                 MOV     #1,(1)+         ;INITIALIZE TO 1
 002010  012767  000020  004020         MOV     #16.,COUNT      ;SET UP COUNT
 002016  172467  176760         LP7:    LDD     ANS1,0          ;LOAD AC0
 002022  174067  176764                 STD     0,ANS5          ;STORE RESULTS
 002026  012702  001002                 MOV     #ANS1,R2        ;SET UP FIRST WORD
 002032  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 002034  001401                         BEQ     .+4
 002036  104010                         HLT+8.                  ;FIRST WORD IS WRONG
 002040  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 002042  001401                         BEQ     .+4
 002044  104010                         HLT+8.                  ;SECOND WORD IS WRONG
 002046  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 002050  001401                         BEQ     .+4
 002052  104010                         HLT+8.                  ;THIRD WORD IS WRONG
 002054  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 002056  001401                         BEQ     .+4
 002060  104010                         HLT+8.                  ;LAST WORD IS WRONG
 002062  012701  001002                 MOV     #ANS1,R1
 002066  006321                         ASL     (1)+            ;SHIFT ALL BY 1
 002070  006321                         ASL     (1)+
 002072  006321                         ASL     (1)+
 002074  006321                         ASL     (1)+
 002076  005367  003734                 DEC     COUNT
 002102  001345                         BNE     LP7
 002104  105067  176671                 CLRB    ICNT+1
```

```
                        ;*****************************************************************
                        ;TEST 10                FLOATING 1'S TEST IN AC1
                        ;*****************************************************************

 002110  104400                 SCOPE
 002112  170011                 SETD
 002114  012701  001002         MOV     #ANS1,R1        ;LOAD FIRST WORD
 002120  012721  000001         MOV     #1,(1)+         ;INITIALIZE TO 1
 002124  012721  000001         MOV     #1,(1)+         ;INITIALIZE TO 1
 002130  012721  000001         MOV     #1,(1)+         ;INITIALIZE TO 1
 002134  012721  000001         MOV     #1,(1)+         ;INITIALIZE TO 1
 002140  012767  000020  003670 MOV     #16.,COUNT      ;SET UP COUNT
 002146  172567  176630  LP10:  LDD     ANS1,1          ;LOAD AC1
 002152  174167  176634         STD     1,ANS5          ;STORE RESULTS
 002156  012702  001002         MOV     #ANS1,R2        ;SET UP FIRST WORD
 002162  022122                 CMP     (1)+,(2)+       ;IS DATA OK?
 002164  001401                 BEQ     .+4
 002166  104010                 HLT+8.                  ;FIRST WORD IS WRONG
 002170  022122                 CMP     (1)+,(2)+       ;IS DATA OK?
 002172  001401                 BEQ     .+4
 002174  104010                 HLT+8.                  ;SECOND WORD IS WRONG
 002176  022122                 CMP     (1)+,(2)+       ;IS DATA OK?
 002200  001401                 BEQ     .+4
 002202  104010                 HLT+8.                  ;THIRD WORD IS WRONG
 002204  022122                 CMP     (1)+,(2)+       ;IS DATA OK?
 002206  001401                 BEQ     .+4
 002210  104010                 HLT+8.                  ;LAST WORD IS WRONG
 002212  012701  001002         MOV     #ANS1,R1
 002216  006321                 ASL     (1)+            ;SHIFT ALL BY 1
 002220  006321                 ASL     (1)+
 002222  006321                 ASL     (1)+
 002224  006321                 ASL     (1)+
 002226  005367  003604         DEC     COUNT
 002232  001345                 BNE     LP10
 002234  105067  176541         CLRB    ICNT+1
```

```
                        ;*****************************************************************
                        ;TEST 11                    FLOATING 1'S TEST IN AC2
                        ;*****************************************************************

002240  104400                      SCOPE
002242  170011                      SETD
002244  012701  001002              MOV     #ANS1,R1        ;LOAD FIRST WORD
002250  012721  000001              MOV     #1,(1)+         ;INITIALIZE TO 1
002254  012721  000001              MOV     #1,(1)+         ;INITIALIZE TO 1
002260  012721  000001              MOV     #1,(1)+         ;INITIALIZE TO 1
002264  012721  000001              MOV     #1,(1)+         ;INITIALIZE TO 1
002270  012767  000020  003540      MOV     #16.,COUNT      ;SET UP COUNT
002276  172667  176500        LP11: LDD     ANS1,2          ;LOAD AC2
002302  174267  176504              STD     2,ANS5          ;STORE RESULTS
002306  012702  001002              MOV     #ANS1,R2        ;SET UP FIRST WORD
002312  022122                      CMP     (1)+,(2)+       ;IS DATA OK?
002314  001401                      BEQ     .+4
002316  104010                      HLT+8.                  ;FIRST WORD IS WRONG
002320  022122                      CMP     (1)+,(2)+       ;IS DATA OK?
002322  001401                      BEQ     .+4
002324  104010                      HLT+8.                  ;SECOND WORD IS WRONG
002326  022122                      CMP     (1)+,(2)+       ;IS DATA OK?
002330  001401                      BEQ     .+4
002332  104010                      HLT+8.                  ;THIRD WORD IS WRONG
002334  022122                      CMP     (1)+,(2)+       ;IS DATA OK?
002336  001401                      BEQ     .+4
002340  104010                      HLT+8.                  ;LAST WORD IS WRONG
002342  012701  001002              MOV     #ANS1,R1
002346  006321                      ASL     (1)+            ;SHIFT ALL BY 1
002350  006321                      ASL     (1)+
002352  006321                      ASL     (1)+
002354  006321                      ASL     (1)+
002356  005367  003454              DEC     COUNT
002362  001345                      BNE     LP11
002364  105067  176411              CLRB    ICNT+1
```

```
                        ;*****************************************************************
                        ;TEST 12                FLOATING 1'S TEST IN AC3
                        ;*****************************************************************

002370  104400                    SCOPE
002372  173011                    SETD
002374  012701  001002            MOV     #ANS1,R1        ;LOAD FIRST WORD
002400  012721  000001            MOV     #1,(1)+         ;INITIALIZE TO 1
002404  012721  000001            MOV     #1,(1)+         ;INITIALIZE TO 1
002410  012721  000001            MOV     #1,(1)+         ;INITIALIZE TO 1
002414  012721  000001            MOV     #1,(1)+         ;INITIALIZE TO 1
002420  012767  000020  003410    MOV     #16.,COUNT      ;SET UP COUNT
002426  172767  176350    LP12:   LDD     ANS1,3          ;LOAD AC3
002432  174367  176354            STD     3,ANS3          ;STORE RESULTS
002436  012702  001002            MOV     #ANS1,R2        ;SET UP FIRST WORD
002442  022122                    CMP     (1)+,(2)+       ;IS DATA OK?
002444  001401                    BEQ     .+4
002446  104010                    HLT+8.                  ;FIRST WORD IS WRONG
002450  022122                    CMP     (1)+,(2)+       ;IS DATA OK?
002452  001401                    BEQ     .+4
002454  104010                    HLT+8.                  ;SECOND WORD IS WRONG
002456  022122                    CMP     (1)+,(2)+       ;IS DATA OK?
002460  001401                    BEQ     .+4
002462  104010                    HLT+8.                  ;THIRD WORD IS WRONG
002464  022122                    CMP     (1)+,(2)+       ;IS DATA OK?
002466  001401                    BEQ     .+4
002470  104010                    HLT+8.                  ;LAST WORD IS WRONG
002472  012701  001002            MOV     #ANS1,R1
002476  006321                    ASL     (1)+            ;SHIFT ALL BY 1
002500  006321                    ASL     (1)+
002502  006321                    ASL     (1)+
002504  006321                    ASL     (1)+
002506  005367  003324            DEC     COUNT
002512  001345                    BNE     LP12
002514  105067  176261            CLRB    ICNT+1
```

```
                                ;*****************************************************************
                                ;TEST 13                FLOATING 1'S TEST IN AC4
                                ;*****************************************************************

 002520  104400                         SCOPE
 002522  170011                         SETD
 002524  012701  001002                 MOV     #ANS1,R1        ;LOAD FIRST WORD
 002530  012721  000001                 MOV     #1,(1)+         ;INITIALIZE TO 1
 002534  012721  000001                 MOV     #1,(1)+         ;INITIALIZE TO 1
 002540  012721  000001                 MOV     #1,(1)+         ;INITIALIZE TO 1
 002544  012721  000001                 MOV     #1,(1)+         ;INITIALIZE TO 1
 002550  012767  000020  003260         MOV     #16.,COUNT      ;SET UP COUNT
 002556  172437  001002         LP13:   LDD     @#ANS1,0        ;LOAD AC0
 002562  174004                         STD     0,AC4           ;PUT INTO AC4
 002564  172404                         LDD     AC4,0           ;BACK INTO AC0
 002566  174037  001012                 STD     0,@#ANS5        ;NOW INTO ANS5
 002572  012702  001002                 MOV     #ANS1,R2        ;SET UP FIRST WORD
 002576  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 002600  001401                         BEQ     .+4
 002602  104010                         HLT+8.                  ;FIRST WORD IS WRONG
 002604  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 002606  001401                         BEQ     .+4
 002610  104010                         HLT+8.                  ;SECOND WORD IS WRONG
 002612  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 002614  001401                         BEQ     .+4
 002616  104010                         HLT+8.                  ;THIRD WORD IS WRONG
 002620  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 002622  001401                         BEQ     .+4
 002624  104010                         HLT+8.                  ;LAST WORD IS WRONG
 002626  012701  001002                 MOV     #ANS1,R1
 002632  006321                         ASL     (1)+            ;SHIFT ALL BY 1
 002634  006321                         ASL     (1)+
 002636  006321                         ASL     (1)+
 002640  006321                         ASL     (1)+
 002642  005367  003170                 DEC     COUNT
 002646  001343                         BNE     LP13
 002650  105067  176125                 CLRB    ICNT+1
```

```
                                ;*****************************************************************
                                ;TEST 14                  FLOATING 1'S TEST IN AC5
                                ;*****************************************************************

 002654  104400                         SCOPE
 002656  170011                         SETD
 002660  012701  001002                 MOV     #ANS1,R1        ;LOAD FIRST WORD
 002664  012721  000001                 MOV     #1,(1)+         ;INITIALIZE TO 1
 002670  012721  000001                 MOV     #1,(1)+         ;INITIALIZE TO 1
 002674  012721  000001                 MOV     #1,(1)+         ;INITIALIZE TO 1
 002700  012721  000001                 MOV     #1,(1)+         ;INITIALIZE TO 1
 002704  012767  000020  003124         MOV     #16.,COUNT      ;SET UP COUNT
 002712  172437  001002         LP14:   LDD     @#ANS1,0        ;LOAD AC0
 002716  174005                         STD     0,AC5           ;PUT INTO AC5
 002720  172405                         LDD     AC5,0           ;BACK INTO AC0
 002722  174037  001012                 STD     0,@#ANS5        ;NOW INTO ANS5
 002726  012702  001002                 MOV     #ANS1,R2        ;SET UP FIRST WORD
 002732  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 002734  001401                         BEQ     .+4
 002736  104010                         HLT+8.                  ;FIRST WORD IS WRONG
 002740  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 002742  001401                         BEQ     .+4
 002744  104010                         HLT+8.                  ;SECOND WORD IS WRONG
 002746  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 002750  001401                         BEQ     .+4
 002752  104010                         HLT+8.                  ;THIRD WORD IS WRONG
 002754  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 002756  001401                         BEQ     .+4
 002760  104010                         HLT+8.                  ;LAST WORD IS WRONG
 002762  012701  001002                 MOV     @ANS1,R1
 002766  006321                         ASL     (1)+            ;SHIFT ALL BY 1
 002770  006321                         ASL     (1)+
 002772  006321                         ASL     (1)+
 002774  006321                         ASL     (1)+
 002776  005367  003034                 DEC     COUNT
 003002  001343                         BNE     LP14
 003004  105067  175771                 CLRB    ICNT+1
```

```
                        ;*****************************************************************
                        ;TEST 15                FLOATING 0'S TEST IN AC0
                        ;*****************************************************************

003010  104400                          SCOPE
003012  170011                          SETD
003014  012701  001002                  MOV     #ANS1,R1        ;LOAD FIRST WORD
003020  012721  177776                  MOV     #-2,(1)+        ;INITIALIZE TO 177776
003024  012721  177776                  MOV     #-2,(1)+        ;INITIALIZE TO 177776
003030  012721  177776                  MOV     #-2,(1)+        ;INITIALIZE TO 177776
003034  012721  177776                  MOV     #-2,(1)+        ;INITIALIZE TO 177776
003040  012767  000020  002770          MOV     #16.,COUNT      ;SET UP COUNT
003046  172467  175730          LP15:   LDD     ANS1,0          ;LOAD AC0
003052  174067  175734                  STD     0,ANS5          ;STORE RESULTS
003056  012702  001002                  MOV     #ANS1,R2        ;SET UP FIRST WORD
003062  022122                          CMP     (1)+,(2)+       ;IS DATA OK?
003064  001401                          BEQ     .+4
003066  104010                          HLT+8.                  ;FIRST WORD IS WRONG
003070  022122                          CMP     (1)+,(2)+       ;IS DATA OK?
003072  001401                          BEQ     .+4
003074  104010                          HLT+8.                  ;SECOND WORD IS WRONG
003076  022122                          CMP     (1)+,(2)+       ;IS DATA OK?
003100  001401                          BEQ     .+4
003102  104010                          HLT+8.                  ;THIRD WORD IS WRONG
003104  022122                          CMP     (1)+,(2)+       ;IS DATA OK?
003106  001401                          BEQ     .+4
003110  104010                          HLT+8.                  ;LAST WORD IS WRONG
003112  012701  001002                  MOV     #ANS1,R1
003116  000241                          CLC                     ;SHIFT ALL BY 1 (FLOAT 2)
003120  006121                          ROL     (1)+
003122  000241                          CLC
003124  006121                          ROL     (1)+
003126  000241                          CLC
003130  006121                          ROL     (1)+
003132  000241                          CLC
003134  006121                          ROL     (1)+
003136  005367  002674                  DEC     COUNT
003142  001341                          BNE     LP15
003144  105067  175631                  CLRB    ICNT+1
```

```
                        ;*****************************************************************
                        ;TEST 16                FLOATING 0'S TEST IN AC1
                        ;*****************************************************************

 003150  104400                        SCOPE
 003152  170011                        SETD
 003154  012701  001002                MOV     #ANS1,R1        ;LOAD FIRST WORD
 003160  012721  177776                MOV     #-2,(1)+        ;INITIALIZE TO 177776
 003164  012721  177776                MOV     #-2,(1)+        ;INITIALIZE TO 177776
 003170  012721  177776                MOV     #-2,(1)+        ;INITIALIZE TO 177776
 003174  012721  177776                MOV     #-2,(1)+        ;INITIALIZE TO 177776
 003200  012767  000020  002630        MOV     #16.,COUNT      ;SET UP COUNT
 003206  172567  175570        LP16:   LDD     ANS1,1          ;LOAD AC1
 003212  174167  175574                STD     1,ANS5          ;STORE RESULTS
 003216  012702  001002                MOV     #ANS1,R2        ;SET UP FIRST WORD
 003222  022122                        CMP     (1)+,(2)+       ;IS DATA OK?
 003224  001401                        BEQ     .+4
 003226  104010                        HLT+8.                  ;FIRST WORD IS WRONG
 003230  022122                        CMP     (1)+,(2)+       ;IS DATA OK?
 003232  001401                        BEQ     .+4
 003234  104010                        HLT+8.                  ;SECOND WORD IS WRONG
 003236  022122                        CMP     (1)+,(2)+       ;IS DATA OK?
 003240  001401                        BEQ     .+4
 003242  104010                        HLT+8.                  ;THIRD WORD IS WRONG
 003244  022122                        CMP     (1)+,(2)+       ;IS DATA OK?
 003246  001401                        BEQ     .+4
 003250  104010                        HLT+8.                  ;LAST WORD IS WRONG
 003252  012701  001002                MOV     #ANS1,R1
 003256  000241                        CLC                     ;SHIFT ALL BY 1 (FLOAT 0)
 003260  006121                        ROL     (1)+
 003262  000241                        CLC
 003264  006121                        ROL     (1)+
 003266  000241                        CLC
 003270  006121                        ROL     (1)+
 003272  000241                        CLC
 003274  006121                        ROL     (1)+
 003276  005367  002534                DEC     COUNT
 003302  001341                        BNE     LP16
 003304  105067  175471                CLRB    ICNT+1
```

```
                                ;*****************************************************************
                                ;TEST 17                FLOATING 0'S TEST IN AC2
                                ;*****************************************************************

003310  104400                          SCOPE
003312  170011                          SETD
003314  012701  001002                  MOV     #ANS1,R1        ;LOAD FIRST WORD
003320  012721  177776                  MOV     #-2,(1)+        ;INITIALIZE TO 177776
003324  012721  177776                  MOV     #-2,(1)+        ;INITIALIZE TO 177776
003330  012721  177776                  MOV     #-2,(1)+        ;INITIALIZE TO 177776
003334  012721  177776                  MOV     #-2,(1)+        ;INITIALIZE TO 177776
003340  012767  000020  002470          MOV     #16.,COUNT      ;SET UP COUNT
003346  172667  175430          LP17:   LDD     ANS1,2          ;LOAD AC2
003352  174267  175434                  STD     2,ANS5          ;STORE RESULTS
003356  012702  001002                  MOV     #ANS1,R2        ;SET UP FIRST WORD
003362  022122                          CMP     (1)+,(2)+       ;IS DATA OK?
003364  001401                          BEQ     .+4
003366  104010                          HLT+8.                  ;FIRST WORD IS WRONG
003370  022122                          CMP     (1)+,(2)+       ;IS DATA OK?
003372  001401                          BEQ     .+4
003374  104010                          HLT+8.                  ;SECOND WORD IS WRONG
003376  022122                          CMP     (1)+,(2)+       ;IS DATA OK?
003400  001401                          BEQ     .+4
003402  104010                          HLT+8.                  ;THIRD WORD IS WRONG
003404  022122                          CMP     (1)+,(2)+       ;IS DATA OK?
003406  001401                          BEQ     .+4
003410  104010                          HLT+8.                  ;LAST WORD IS WRONG
003412  012701  001002                  MOV     #ANS1,R1
003416  000241                          CLC                     ;SHIFT ALL BY 1 (FLOAT 0)
003420  006121                          ROL     (1)+
003422  000241                          CLC
003424  006121                          ROL     (1)+
003426  000241                          CLC
003430  006121                          ROL     (1)+
003432  000241                          CLC
003434  006121                          ROL     (1)+
003436  005367  002374                  DEC     COUNT
003442  001341                          BNE     LP17
003444  105067  175331                  CLRB    ICNT+1
```

K1

K2

```
                                ;*****************************************************************
                                ;TEST 20                FLOATING 0'S TEST IN AC3
                                ;*****************************************************************

 003450  104400                         SCOPE
 003452  170011                         SETD
 003454  012701  001002                 MOV     #ANS1,R1        ;LOAD FIRST WORD
 003460  012721  177776                 MOV     #-2,(1)+        ;INITIALIZE TO 177776
 003464  012721  177776                 MOV     #-2,(1)+        ;INITIALIZE TO 177776
 003470  012721  177776                 MOV     #-2,(1)+        ;INITIALIZE TO 177776
 003474  012721  177776                 MOV     #-2,(1)+        ;INITIALIZE TO 177776
 003500  012767  000020  002330         MOV     #16.,COUNT      ;SET UP COUNT
 003506  172767  175270         LP20:   LDD     ANS1,3          ;LOAD AC3
 003512  174367  175274                 STD     3,ANS3          ;STORE RESULTS
 003516  012702  001002                 MOV     #ANS1,R2        ;SET UP FIRST WORD
 003522  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 003524  001401                         BEQ     .+4
 003526  104010                         HLT+8.                  ;FIRST WORD IS WRONG
 003530  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 003532  001401                         BEQ     .+4
 003534  104010                         HLT+8.                  ;SECOND WORD IS WRONG
 003536  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 003540  001401                         BEQ     .+4
 003542  104010                         HLT+8.                  ;THIRD WORD IS WRONG
 003544  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 003546  001401                         BEQ     .+4
 003550  104010                         HLT+8.                  ;LAST WORD IS WRONG
 003552  012701  001002                 MOV     #ANS1,R1
 003556  000241                         CLC                     ;SHIFT ALL BY 1 (FLOAT 0)
 003560  006121                         ROL     (1)+
 003562  000241                         CLC
 003564  006121                         ROL     (1)+
 003566  000241                         CLC
 003570  006121                         ROL     (1)+
 003572  000241                         CLC
 003574  006121                         ROL     (1)+
 003576  005367  002234                 DEC     COUNT
 003602  001341                         BNE     LP20
 003604  105067  175171                 CLRB    ICNT+1
```

```
                                ;**********************************************************************
                                ;TEST 21                    FLOATING 0'S TEST IN AC4
                                ;**********************************************************************

 003610  104400                         SCOPE
 003612  174011                         SETD
 003614  012701  001002                 MOV     #ANS1,R1        ;LOAD FIRST WORD
 003620  012721  177776                 MOV     #-2,(1)+        ;INITIALIZE TO 177776
 003624  012721  177776                 MOV     #-2,(1)+        ;INITIALIZE TO 177776
 003630  012721  177776                 MOV     #-2,(1)+        ;INITIALIZE TO 177776
 003634  012721  177776                 MOV     #-2,(1)+        ;INITIALIZE TO 177776
 003640  012767  000020  002170         MOV     #16.,COUNT      ;SET UP COUNT
 003646  172437  001002          LP21:  LDD     @#ANS1,0        ;LOAD AC0
 003652  174004                         STD     0,AC4           ;PUT INTO AC4
 003654  172404                         LDD     AC4,0           ;BACK INTO AC0
 003656  174037  001012                 STD     0,@#ANS5        ;NOW INTO ANS5
 003662  012702  001002                 MOV     #ANS1,R2        ;SET UP FIRST WORD
 003666  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 003670  001401                         BEQ     .+4
 003672  104010                         HLT+8.                  ;FIRST WORD IS WRONG
 003674  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 003676  001401                         BEQ     .+4
 003700  104010                         HLT+8.                  ;SECOND WORD IS WRONG
 003702  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 003704  001401                         BEQ     .+4
 003706  104010                         HLT+8.                  ;THIRD WORD IS WRONG
 003710  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 003712  001401                         BEQ     .+4
 003714  104010                         HLT+8.                  ;LAST WORD IS WRONG
 003716  012701  001002                 MOV     #ANS1,R1
 003722  000241                         CLC                     ;SHIFT ALL BY 1 (FLOAT 0)
 003724  006121                         ROL     (1)+
 003726  000241                         CLC
 003730  006121                         ROL     (1)+
 003732  000241                         CLC
 003734  006121                         ROL     (1)+
 003736  000241                         CLC
 003740  006121                         ROL     (1)+
 003742  005367  002070                 DEC     COUNT
 003746  001337                         BNE     LP21
 003750  105067  175025                 CLRB    ICNT+1
```

```
                                ;*****************************************************************
                                ;TEST 22                  FLOATING 0'S TEST IN AC5
                                ;*****************************************************************

 003754  104400                         SCOPE
 003756  170011                         SETD
 003760  012701  001002                 MOV     #ANS1,R1        ;LOAD FIRST WORD
 003764  012721  177776                 MOV     #-2.,(1)+       ;INITIALIZE TO 177776
 003770  012721  177776                 MOV     #-2,(1)+        ;INITIALIZE TO 177776
 003774  012721  177776                 MOV     #-2,(1)+        ;INITIALIZE TO 177776
 004000  012721  177776                 MOV     #-2,(1)+        ;INITIALIZE TO 177776
 004004  012767  000020  002024         MOV     #16.,COUNT      ;SET UP COUNT
 004012  172437  001002         LP22:   LDD     @#ANS1,0        ;LOAD AC0
 004016  174005                         STD     0,AC5           ;PUT INTO AC5
 004020  172405                         LDD     AC5,0           ;BACK INTO AC0
 004022  174037  001012                 STD     0,@#ANS5        ;NOW INTO ANS5
 004026  012702  001002                 MOV     #ANS1,R2        ;SET UP FIRST WORD
 004032  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 004034  001401                         BEQ     .+4
 004036  104010                         HLT+8.                  ;FIRST WORD IS WRONG
 004040  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 004042  001401                         BEQ     .+4
 004044  104010                         HLT+8.                  ;SECOND WORD IS WRONG
 004046  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 004050  001401                         BEQ     .+4
 004052  104010                         HLT+8.                  ;THIRD WORD IS WRONG
 004054  022122                         CMP     (1)+,(2)+       ;IS DATA OK?
 004056  001401                         BEQ     .+4
 004060  104010                         HLT+8.                  ;LAST WORD IS WRONG
 004062  012701  001002                 MOV     #ANS1,R1
 004066  000241                         CLC                     ;SHIFT ALL BY 1 (FLOAT 0)
 004070  006121                         ROL     (1)+
 004072  000241                         CLC
 004074  006121                         ROL     (1)+
 004076  000241                         CLC
 004100  006121                         ROL     (1)+
 004102  000241                         CLC
 004104  006121                         ROL     (1)+
 004106  005367  001724                 DEC     COUNT
 004112  001337                         BNE     LP22
 004114  105067  174661                 CLRB    ICNT+1
```

```
                                ;*****************************************************************************
                                ;TEST 23        MEMORY TEST 1 (MEMORY INTO ITSELF) USING STF (1)+
                                ;*****************************************************************************

 004120  104400                         SCOPE
 004122  170001                         SETF
 004124  012701  006042                 MOV     #HICORE,R1      ;GET END OF PROGRAM
 004130  010167  174646         LP23:   MOV     R1,ANS1
 004134  010167  174644                 MOV     R1,ANS2
 004140  062767  000002  174636         ADD     #2,ANS2
 004146  172467  174630                 LDF     ANS1,AC0        ;GET THE DATA
 004152  174021                         STF     AC0,(1)+        ;STORE INTO MEMORY
 004154  026701  001660                 CMP     UPLIM,R1        ;END YET?
 004160  101363                         BHI     LP23
 004162  012701  006042                 MOV     #HICORE,%1
 004166  020111                 LP23A:  CMP     %1,(1)          ;CHECK THE RESULTS
 004170  001005                         BNE     NG23
 004172  005721                 LP23B:  TST     (1)+            ;GO TO THE NEXT
 004174  026701  001640                 CMP     UPLIM,R1        ;CHECK FOR END
 004200  101372                         BHI     LP23A
 004202  000406                         BR      NXT23
 004204  010167  174572         NG23:   MOV     %1,ANS1
 004210  011167  174570                 MOV     (1),ANS2
 004214  104002                         HLT+2                   ;DATA WRONG
 004216  000765                         BR      LP23B
 004220  105067  174555         NXT23:  CLRB    ICNT+1          ;ONLY ONCE
```

```
                                ;*****************************************************************
                                ;TEST 24        MEMORY TEST 2 USING LDF (1)
                                ;*****************************************************************

 004224  104400                         SCOPE
 004226  170001                         SETF
 004230  012701  006042                 MOV     #HICORE,%1      ;GET END OF PROGRAM
 004234  011101                 LP24:   MOV     (1),%1          ;PUT ADDRESS INTO ITSELF
 004236  005721                         TST     (1)+            ;KLUDGE IT FOR 11/20
 004240  026701  001574                 CMP     UPLIM,R1        ;END?
 004244  101373                         BHI     LP24
 004246  012701  006042                 MOV     #HICORE,%1
 004252  016702  001562                 MOV     UPLIM,%2
 004256  011167  174520         LP24A:  MOV     (1),ANS1        ;GET FOR
 004262  016167  000002  174514         MOV     2(1),ANS2       ;TYPING
 004270  172411                         LDF     (1),AC0         ;LOAD FROM CORE
 004272  174067  174510                 STF     AC0,ANS3        ;GET IT BACK
 004276  021167  174504                 CMP     (1),ANS3        ;FIRST WORD RIGHT
 004302  001011                         BNE     NG24            ;NO
 004304  026167  000002  174476         CMP     2(1),ANS4       ;SECOND WORD RIGHT
 004312  001005                         BNE     NG24            ;NO
 004314  022121                         CMP     (1)+,(1)+       ;GET TO NEXT
 004316  026701  001516         LP24B:  CMP     UPLIM,R1        ;END?
 004322  101355                         BHI     LP24A           ;NO
 004324  000406                         BR      NXT24           ;YES
 004326  012167  174454         NG24:   MOV     (1)+,ANS3       ;ERROR
 004332  012167  174452                 MOV     (1)+,ANS4
 004336  104004                         HLT+4                   ;DATA WRONG
 004340  000766                         BR      LP24B
 004342  105067  174433         NXT24:  CLRB    ICNT+1          ;ONLY ONCE
```

```
 004346  104400                     DONE:   SCOPE
 004350  032737  002000  177570             BIT     #SW12,@#SWR     ;RING THE BELL?
 004356  001005                             BNE     1$              ;NO!
 004360  012767  000007  001436             MOV     #BELL,,TYPE     ;TYPE A BELL
 004366  000004  006024                     TYPE    ,,TYPE

 004372  005046                     1$:     CLR     -(6)            ;CLEAR TRACE TRAP
 004374  032737  010000  177570             BIT     #SW12,@#SWR     ;RUN WITH TRT?
 004402  001010                             BNE     2$
 004404  005167  001416                     COM     TRPB
 004410  100005                             BPL     2$
 004412  052716  000020                     BIS     #20,(6)         ;SET TRACE TRAP
 004416  012746  001146                     MOV     #BEGIN,-(6)
 004422  000414                             BR      YESRT
 004424  012746  004432             2$:     MOV     #4$,-(6)        ;JUMP TO 4$
 004430  000002                             RTI
 004432  013700  000042             4$:     MOV     @#42,R0         ;GET MONITOR ADDRESS
 004436  001404                             BEQ     3$              ;NONE
 004440  004710                             JSR     7,(0)           ;GO TO IT
 004442  000240                             NOP
 004444  000240                             NOP
 004446  000240                             NOP
 004450  000167  174472             3$:     JMP     BEGIN
 004454  000002                     YESRT:  RTI                     ;RETURN TO PROGRAM FROM TRAP

 004456  032737  000400  177570     .EMT:   BIT     #SW08,@#SWR     ;KILL LOOP OR LOOP ON SPEC. TEST
 004464  001404                             BEQ     1$
 004466  123767  177570  174304             CMPB    @#SWR,ICNT      ;ON RIGHT TEST?
 004474  001437                             BEQ     OVER
 004476  113703  177570             1$:     MOVB    @#SWR,R3        ;GET UB BITS
 004502  170003                             LDUB
 004504  032737  040000  177570             BIT     #SW14,@#SWR     ;LOOP ON TEST
 004512  001026                             BNE     KIT
 004514  032737  004000  177570             BIT     #SW11,@#SWR     ;KILL ITERATIONS
 004522  001012                             BNE     SAVLAD
 004524  105767  174251                     TSTB    ICNT+1
 004530  001404                             BEQ     2$              ;BRANCH IF FIRST
 004532  126767  001276  174241             CMPB    TIMES,ICNT+1    ;DONE?
 004540  001013                             BNE     KIT             ;BRANCH IF NOT
 004542  112767  000001  174231     2$:     MOVB    #1,ICNT+1       ;FIRST ITERATION
 004550  105267  174224             SAVLAD: INCB    ICNT            ;COUNT TEST NUMBERS
 004554  011667  001250                     MOV     (6),LAD         ;SAVE LOOP ADDRESS
 004560  016737  174214  177570             MOV     ICNT,@#SWR      ;DESPLAY TEST NO. AND ITERATION COUNT
 004566  000002                             RTI                     ;RETURN

 004570  105267  174205             KIT:    INCB    ICNT+1
 004574  016737  174200  177570     OVER:   MOV     ICNT,@#SWR      ;SET UP DISPLAY
 004602  005767  001222                     TST     LAD             ;FIRST ONE?
 004606  001760                             BEQ     SAVLAD
 004610  016716  001214                     MOV     LAD,(6)         ;FUDGE RETURN ADDRESS
 004614  000002                             RTI                     ;FIXES PS
```

```
004616  032737  002000  177570  .TRP:   BIT     #SW13,@#SWR
004624  001405                          BEQ     1$
004626  012767  000007  001170          MOV     #BELL,,TYPE     ;TYPE A BELL
004634  000004  006024                  TYPE    ,,TYPE
004640  004767  000600          1$:     JSR     PC,ERROR        ;COUNT THE NUMBER OF ERRORS
004644  010446                          MOV     R4,-(6)
004646  032737  020000  177570          BIT     #SW13,@#SWR     ;SKIP TYPEOUT IF SET
004654  001072                          BNE     4$
004656  000004  005772                  TYPE    ,RETURN
004662  016646  000002                  MOV     2(6),-(6)       ;PUT ADDRESS OF INSTRUCTION ON STACK
004666  162716  000002                  SUB     #2,(6)
004672  011605                          MOV     (6),TTY         ;TYPE (6) IN OCTAL
004674  004767  000404                  JSR     %7,PRINTR       ;TYPE LEADING ZERO'S
004700  000004  006000                  TYPE    ,SPACE+3
004704  010005                          MOV     %0,TTY          ;TYPE %0 IN OCTAL
004706  004767  000372                  JSR     %7,PRINTR       ;TYPE LEADING ZERO'S
004712  000004  006001                  TYPE    ,SPACE+4
004716  012703  001002                  MOV     #ANS1,%3        ;ADDRESS OF DATA
004722  113604                          MOVB    @(6)+,R4        ;AMOUNT OF DATA IN TABLE
004724  001426                          BEQ     3$
004726  100016                          BPL     2$              ;TYPE STACK?
004730  016667  000006  174044          MOV     6(6),ANS1
004736  016667  000010  174040          MOV     10(6),ANS2
004744  016667  000012  174034          MOV     12(6),ANS3
004752  016667  000014  174030          MOV     14(6),ANS4
004760  042704  177600                  BIC     #177600,R4      ;CLEAR SIGN
004764  000004  006001          2$:     TYPE    ,SPACE+4
004770  012305                          MOV     (3)+,TTY        ;TYPE (3)+ IN OCTAL
004772  004767  000306                  JSR     %7,PRINTR       ;TYPE LEADING ZERO'S
004776  005304                          DEC     R4
005000  001371                          BNE     2$
005002  005700                  3$:     TST     FPS
005004  100016                          BPL     4$
005006  000004  005775                  TYPE    ,SPACE
005012  170367  174004                  STST    FEC
005016  016705  174000                  MOV     FEC,TTY         ;TYPE FEC IN OCTAL
005022  004767  000256                  JSR     %7,PRINTR       ;TYPE LEADING ZERO'S
005026  000004  006000                  TYPE    ,SPACE+3
005032  016705  173766                  MOV     FEA,TTY         ;TYPE FEA IN OCTAL
005036  004767  000242                  JSR     %7,PRINTR       ;TYPE LEADING ZERO'S
005042  012604                  4$:     MOV     (6)+,R4
005044  005737  177570                  TST     @#SWR
005050  100001                          BPL     .+4
005052  000000                          HALT
005054  032737  001000  177570          BIT     #SW09,@#SWR     ;CHECK FOR INHIBIT LOOP ON ERROR
005062  001001                          BNE     .+4
005064  000002                          RTI
005066  105067  173707                  CLRB    ICNT+1
005072  032737  000400  177570          BIT     #SW08,@#SWR     ;CHECK FOR LOAD MICROBREAK
005100  001233                          BNE     KIT             ;BRANCH IF NOT
005102  113703  177570                  MOVB    @#SWR,%3        ;PUT MICROBREAK ADDRESS IN R3
005106  170003                          LDUB                    ;LOAD MICROBREAK
005110  000627                          BR      KIT             ;LOOP ON TEST UNTIL NO ERRORS
```

```
005112  004767  000036          RAND4:  JSR     7,RANDOM
005116  016767  000160  173656          MOV     HINUM,ANS1
005124  016767  000150  173652          MOV     LONUM,ANS2
005132  004767  000016                  JSR     7,RANDOM
005136  016767  000140  173642          MOV     HINUM,ANS3
005144  016767  000130  173636          MOV     LONUM,ANS4
005152  000207                          RTS     7

005154  010046                  RANDOM: MOV     %0,-(6)         ;SAVE R0
005156  010146                          MOV     %1,-(6)         ;SAVE R1
005160  010246                          MOV     %2,-(6)         ;SAVE R2
005162  010446                          MOV     R4,-(6)         ;SAVE R4
005164  016700  000110                  MOV     LONUM,%0        ;SET R0 WITH LOW
005170  016701  000106                  MOV     HINUM,%1        ;SET R1 WITH HIGH
005174  012704  177771                  MOV     #-7,R4          ;SET SHIFT COUNT
005200  005002                          CLR     %2
005202  006300                  SHIFT:  ASL     %0              ;SHIFT R0 LEFT AND
005204  006101                          ROL     %1              ;ROTATE CARRY INTO R1 AND
005206  006102                          ROL     %2              ;ROTATE CARRY INTO R2
005210  005204                          INC     R4              ;CHECK FOR DONE
005212  001373                          BNE     SHIFT           ;CONTINUE SHIFT LOOP
005214  066702  000060                  ADD     LONUM,%2        ;ADD NUMBER TO MAKE X 129
005220  005501                          ADC     %1              ;PROPOGATE CARRY
005222  066701  000054                  ADD     HINUM,%1        ;ADD NUMBER TO MAKE X 129
005226  005502                          ADC     %2              ;PROPOGATE CARRY
005230  062700  001057                  ADD     #1057,%0        ;ADD LOW CONSTANT
005234  005501                          ADC     %1              ;PROPOGATE CARRY
005236  005502                          ADC     %2              ;PROPOGATE CARRY
005240  062701  047401                  ADD     #47401,%1       ;ADD HIGH CONSTANT
005244  005502                          ADC     %2              ;PROPOGATE CARRY
005246  062702  000006                  ADD     #6,%2           ;ADD HIGHEST CONSTANT
005252  060200                          ADD     %2,%0           ;REPRIME R0 WITH HIGHEST DIGIT
005254  005501                          ADC     %1              ;PROPOGATE CARRY
005256  010067  000016                  MOV     %0,LONUM        ;SAVE R0
005262  010167  000014                  MOV     %1,HINUM        ;SAVE R1
005266  012604                          MOV     (6)+,R4         ;RESTORE R4
005270  012602                          MOV     (6)+,%2         ;RESTORE R2
005272  012601                          MOV     (6)+,%1         ;RESTORE R1
005274  012600                          MOV     (6)+,%0         ;RESTORE R0
005276  000207                          RTS     PC              ;RETURN

005300  123456          LONUM:  123456
005302  176543          HINUM:  176543
```

```
005304  112767  000001  000130  PRINTR: MOVB    #1,PRS          ;SET ZERO FILL SWITCH
005312  000402                          BR      .+6
005314  005067  000122          PRINTS: CLR     PRS             ;SUPRESS LEADING ZERO'S
005320  112767  177772  000115          MOVB    #-6,PRS+1       ;SET COUNT
005326  010446                          MOV     R4,-(6)         ;SAVE R4
005330  012704  005432                  MOV     #3$,R4          ;SET POINTER TO FIRST ASCII CHAR.
005334  105014                          CLRB    (4)             ;CLEAR FIRST BYTE
005336  000405                          BR      2$              ;ROTATE FIRST BIT
005340  105014                  1$:     CLRB    (4)             ;CLEAR BYTE OF CHARACTER
005342  006105                          ROL     TTY             ;ROTATE BIT INTO C
005344  106114                          ROLB    (4)             ;PACK IT
005346  006105                          ROL     TTY             ;ROTATE BIT INTO C
005350  106114                          ROLB    (4)             ;PACK IT
005352  006105                  2$:     ROL     TTY             ;ROTATE BIT INTO C
005354  106114                          ROLB    (4)             ;PACK IT
005356  105714                          TSTB    (4)
005360  001402                          BEQ     .+6
005362  105267  000054                  INCB    PRS
005366  105767  000050                  TSTB    PRS             ;CHECK FILL SWITCH
005372  001402                          BEQ     .+6
005374  152724  000060                  BISB    #'0,(4)+        ;MAKE INTO ASCII CHAR
005400  105267  000037                  INCB    PRS+1
005404  001355                          BNE     1$              ;REPEAT
005406  022704  005432                  CMP     #3$,R4
005412  001002                          BNE     .+6
005414  112724  000060                  MOVB    #'0,(4)+
005420  105014                          CLRB    (4)
005422  000004  005432                  TYPE    ,3$             ;TYPE IT
005426  012604                          MOV     (6)+,R4         ;RESTORE R4
005430  000207                          RTS     PC

005432  000004                  3$:     .BLKW   4
005442  000000                  PRS:    0

005444  005267  000362          ERROR:  INC     ERRORS          ;COUNT ERRORS
005450  132737  000001  000041          BITB    #1,@#41         ;AUTO MODE?
005456  001412                          BEQ     1$              ;NO!
005460  022767  000010  000344          CMP     #10,ERRORS      ;TOO MANY?
005466  001006                          BNE     1$              ;NOT YET
005470  013700  000042                  MOV     @#42,R0         ;GET ADDRESS
005474  001403                          BEQ     1$              ;FORGET IT IF ZERO
005476  005037  000042                  CLR     @#42            ;ZAP 42
005502  004710                          JSR     PC,(7)          ;CALL THE MONITOR
005504  000207                  1$:     RTS     PC              ;RETURN
```

```
 005506  012777  005702  000304  POWDWN: MOV     #ILLUP,@UPVEC   ;SET FOR FAST UP
 005514  012777  000340  000300          MOV     #340,@UPVEC+2   ;PRIO:7
 005522  170246                          STFPS   -(6)            ;GET THE FPS
 005524  170011                          SETD
 005526  174046                          STD     AC0,-(6)        ;SAVE AC'S
 005530  174146                          STD     AC1,-(6)
 005532  174246                          STD     AC2,-(6)
 005534  174346                          STD     AC3,-(6)
 005536  172404                          LDD     AC4,AC0
 005540  174046                          STD     AC0,-(6)
 005542  172405                          LDD     AC5,AC0
 005544  174046                          STD     AC0,-(6)
 005546  010046                          MOV     R0,-(6)         ;SAVE REGISTERS
 005550  010146                          MOV     R1,-(6)
 005552  010246                          MOV     R2,-(6)
 005554  010346                          MOV     R3,-(6)
 005556  010446                          MOV     R4,-(6)
 005560  010546                          MOV     R5,-(6)
 005562  010667  000216                  MOV     SP,SAVE6        ;SAVE SP
 005566  012777  005576  000224          MOV     #POWUP,@UPVEC   ;SET UP VECTOR
 005574  000000                          HALT

 005576  016706  000202          POWUP:  MOV     SAVE6,SP        ;GET SP
 005602  005001                          CLR     R1              ;WAIT LOOP FOR THE TTY
 005604  005201                  1$:     INC     R1
 005606  001376                          BNE     1$
 005610  012605                          MOV     (6)+,R5         ;GET THE REGISTERS
 005612  012604                          MOV     (6)+,R4
 005614  012603                          MOV     (6)+,R3
 005616  012602                          MOV     (6)+,R2
 005620  012601                          MOV     (6)+,R1
 005622  012600                          MOV     (6)+,R0
 005624  170011                          SETD
 005626  172426                          LDD     (6)+,AC0        ;RESTORE THE AC'S
 005630  174005                          STD     AC0,AC5
 005632  172426                          LDD     (6)+,AC0
 005634  174004                          STD     AC0,AC4
 005636  172726                          LDD     (6)+,AC3
 005640  172626                          LDD     (6)+,AC2
 005642  172526                          LDD     (6)+,AC1
 005644  172426                          LDD     (6)+,AC0
 005646  170126                          LDFPS   (6)+            ;RESTORE FPS
 005650  012777  005506  000136          MOV     #POWDWN,@DWNVEC ;SET UP THE POWER DOWN VECTOR
 005656  012777  000340  000132          MOV     #340,@DWNVEC+2
 005664  000004  005670                  TYPE    ,.+2            ;.ASCIZ <15><12>"POWER"
 005670  000002                          RTI

 005672  000000                  ILLUP:  HALT                    ;THE POWER UP SEQUENCE WAS STARTED
 005674  000776                          BR      .-2             ; BEFORE THE POWER DOWN WAS COMPLETE
```

```
005706  010546                  .IOT:   MOV     TTY,-(6)        ;SAVE TTY
005710  017605  000002                  MOV     @2(6),TTY       ;GET ADDRESS TO BE TYPED
005714  105715                  1$:     TSTB    (TTY)           ;TERMINATOR?
005716  001406                          BEQ     2$
005720  112537  177566                  MOVB    (TTY)+,@#177566 ;LOAD AND TYPE THE CHARACTER
005724  105737  177564                  TSTB    @#177564        ;IS THE PRINTER READY
005730  100375                          BPL     .-4
005732  000770                          BR      1$              ;GET THE NEXT CHARACTER

005734  017646  000002          2$:     MOV     @2(6),-(6)      ;GET ADDRESS TO BE TYPED
005740  062766  000002  000004          ADD     #2,4(6)         ;ADD 2 TO THE ADDRESS
005746  022666  000002                  CMP     (6)+,2(6)       ;IS IT .+2?
005752  001005                          BNE     3$              ;NO
005754  005725                          TST     (TTY)+          ;ADD 2 TO THE ADDRESS
005756  042705  000001                  BIC     #1,TTY          ;BACK UP TO AN EVEN BYTE
005762  010566  000002                  MOV     TTY,2(6)        ;RESTORE ADDRESS
005766  012605                  3$:     MOV     (6)+,TTY        ;RESTORE TTY
005770  000002                          RTI                     ;RETURN

005772  005015      000         RETURN: .ASCIZ  <15><12>
005775     015  020012  020040  SPACE:  .ASCIZ  <15><12>"   "
006002     000
           006004                  .EVEN
006004  000000                  SAVE6:  0
006006  172160                  FPTADR: 172160                  ;FLOATING POINT ADDRESS ON THE 11/20
006010  000244  000246          FPVECT: 244,246                 ;FLOATING POINT VECTOR ADDRESS
006014  000024  000026          DWNVEC: 24,26                   ;POWER DOWN VECTOR ADDRESS
006020  000024  000026          UPVEC:  24,26                   ;POWER UP VECTOR ADDRESS
006024  000000                  .TYPE:  0
006026  000000                  TRPB:   0

006030  000000                  LAD:    0                       ;LOOP ADDRESS
006032  000000                  ERRORS: 0                       ;ERROR COUNT
006034  000377                  TIMES:  377                     ;ITERATION COUNT
006036  000000                  COUNT:  0
006040  000000                  UPLIM:  0
006042  000000                  HICORE: 0

           000001                  .END
```

```
AC0     =%000000        379#  1042*  1043   1073*  1074   1283   1287*  1288   1289*  1297   1312*  1313   1314*
                       1315   1319*
AC1     =%000001        380#  1284   1318*
AC2     =%000002        381#  1285   1317*
AC3     =%000003        382#  1286   1316*
AC4     =%000004        383#   541*   542    733*   734    963*   964   1287   1315*
AC5     =%000005        384#   565*   566    770*   771   1004*  1005   1289   1313*
ANS1      001002        397#   455    457    478    482    498    502    521    523    544    568    586    592
                        594    607    621    627    629    642    656    662    664    677    691    697    699
                        712    726    732    736    749    763    769    773    786    802    806    828    821
                        839    845    847    860    878    884    886    899    917    923    925    938    956
                        962    966    979    997   1003   1007   1020   1039*  1042   1053*  1071*  1156   1160*
                       1193*
ANS2      001004        398#   460    483    523    526    547    571   1048*  1041*  1054*  1072*  1161*  1154*
ANS3      001006        399#   463    486    526    529    550    574   1074*  1075   1083*  1162*  1196*
ANS4      001010        400#   466    489    529    532    553    577   1077   1084*  1163*  1197*
ANS5      001012        401#   456*   457    479*   482    499*   502    522*   523    543*   544    567*   568
                        593*   628*   663*   698*   735*   772*   807*   846*   885*   924*   965*  1026*
ANS6      001014        402#   460    483    523    526    547    571
ANS7      001016        403#   463    486    526    529    550    574
ANS8      001020        404#   466    489    529    532    553    577
BEG       001026        387    407#
BEGIN     001146        424    427    431#  1120   1110
BELL    = 000007        360#  1091   1141
COUNT     006036        591*   612*   626*   647*   661*   682*   696*   717*   731*   754*   768*   791*   805*
                        830*   844*   869*   883*   908*   922*   947*   961*   988*  1002*  1029*  1361#
DONE      004346       1088#
DWNVEC    006014        434*   435*  1321*  1322*  1354#
ERROR     005444       1143   1269#
ERRORS    006032       1269*  1272   1359#
FEA       001024        406#  1177
FEC       001022        391*   405#  1173*  1174
FLTERR    000760        390#   442
FPS     =%000000        369#   390*  1170
FPTADR    006006        428   1352#
FPVECT    006010        442*   443*  1353#
WAVIT     001112        409    416    423#
HICORE    006042        415   1038   1046   1064   1069   1363#
HINUM     005302       1193   1196   1205   1215   1226*  1234#
HLT     = 104000        359#   459    462    465    468    482    485    488    491    502    505    508    511
                        525    528    531    534    546    549    552    555    570    573    576    579    597
                        600    603    606    632    635    638    641    667    670    673    676    702    705
                        708    711    739    742    745    748    776    779    782    785    811    814    817
                        820    850    853    856    859    889    892    895    898    928    931    934    937
                        969    972    975    978   1010   1013   1016   1019   1055   1085
ICNT      001000        396#   444*   614*   649*   684*   719*   756*   793*   832*   871*   910*   949*   950*
                       1031*  1057*  1087*  1115   1123   1125   1127*  1128*  1130   1133*  1134   1186*
ILLUP     005702       1279   1326#
KIT       004570       1120   1126   1133#  1188   1191
LAD       006030        445*  1129*  1135   1137   1358#
LDUB    = 170003        354#
LONUM     005300       1194   1197   1204   1213   1225*  1233#
LP10      002146        627#   648
LP11      002276        662#   683
```

```
LP12      002426          697#    718
LP13      002556          732#    755
LP14      002712          769#    792
LP15      003046          806#    831
LP16      003206          845#    870
LP17      003346          884#    909
LP20      003506          923#    948
LP21      003646          962#    989
LP22      004012         1003#   1030
LP23      004130         1039#   1045
LP23A     004166         1047#   1051
LP23B     004172         1049#   1056
LP24      004234         1065#   1068
LP24A     004256         1071#   1081
LP24B     004316         1080#   1086
LP7       002016          592#    613
N       = 000001          355#
NEM       001106          411     422#
NG23      004204         1048    1053#
NG24      004326         1076    1078    1083#
NXT23     004220         1052    1057#
NXT24     004342         1082    1087#
OVER      004574         1116    1134#
PC      =%000007          378#   1143*   1231*   1264*   1277*   1278*
POWDWN    005506          434    1279#   1321
POWUP     005576         1298    1301#
PRINTR    005304         1151    1154    1167    1175    1178    1235#
PRINTS    005314         1237#
PRS       005442         1235*   1237*   1238*   1252*   1253    1256*   1267#
PS      = 177776          356#
RANDOM    005154         1192    1195    1200#
RAND4     005112          448    1192#
RETURN    005772         1147    1347#
R0      =%000000          370#    437*   1274*   1291    1310*
R1      =%000001          371#    408*    412*    414*    415     417*    419*    420     422*    423     586*    607*    621*
                          642*    656*    677*    691*    712*    726*    749*    763*    786*    807*    821*    839*    860*
                          878*    899*    917*    938*    956*    979*    997*   1020*   1038*   1039    1041    1044    1050
                         1067    1080    1292    1302*   1303*   1309*
R2      =%000002          372#    594*    629*    664*    699*    736*    773*    808*    847*    886*    925*    966*   1007*
                         1293    1308*
R3      =%000003          373#    1294    1307*
R4      =%000004          374#    1144    1157*   1164*   1168*   1179*   1203    1206*   1211*   1227*   1239    1240*   1258
                         1263*   1295    1306*
R5      =%000005          376#    1296    1305*
SAVE6     006004         1297*   1301    1351#
SAVLAD    004550         1122    1128#   1136
SCOPE   = 104400          358#    453     476     496     519     539     563     584     619     654     689     724     761
                          798     837     876     915     954     995    1036    1062    1088
SHIFT     005202         1208#   1212
SP      =%000006          377#    407*    431*   1297    1301*
SPACE     005775         1152    1155    1165    1172    1176    1348#
SWR     = 177570          357#   1089    1095    1113    1115    1117    1119    1121    1130*   1134*   1139    1145    1180
                         1183    1187    1189
SW08    = 000400          368#   1113    1187
```

```
SW09    = 001000          367#   1183
SW10    = 002000          366#   1089   1139
SW11    = 004000          365#   1121
SW12    = 010000          364#   1095
SW13    = 020000          363#   1145
SW14    = 040000          362#   1119
TIMES     006034         1125   1360#
TRPA      006026         1097*  1357#
TRYAGN    001072          418#    421
TTY     =%000005          375#   1150*  1153*  1166*  1174*  1177*  1244*  1246*  1248*  1328   1329*  1330   1332
                         1341   1342*  1343   1344*
TYPE    = 000004          361#   1092   1142   1147   1152   1155   1165   1172   1176   1202   1323
UPLIM     006040          423*   1044   1050   1067   1070   1080   1362#
UPVEC     006020         1279*  1288*  1298*  1355#
YESRT     004454          426*    433   1101   1111#
.       = 006044          385#   386#   389#   395#    458    461    464    467    481    484    487    490    501
                          504    507    510    524    527    530    533    545    548    551    554    569    572
                          575    578    596    599    602    605    631    634    637    642    666    669    672
                          675    701    704    707    710    738    741    744    747    775    778    781    784
                          810    813    816    819    849    852    855    858    888    891    894    897    927
                          930    933    936    968    971    974    977   1009   1012   1015   1018   1181   1184
                         1236   1251   1254   1259   1266#  1323   1327   1334   1350#
.EMT      004456          440   1113#
.IOT      005706          436   1328#
.TRP      004616          438   1139#
.TYPE     006024         1091*  1092   1141*  1142   1356#
```

```
DUMP      353#   1150    1153    1166    1174    1177
PRINT     353#   1323
SDUMP     353#
TYPEM     353#   1091    1141
```

ADC  1214 1216 1218 1219 1221 1224
ADD  419 1041 1213 1215 1217 1222 1223 1338
ASL  608 609 610 611 643 644 645 646 678 679 680 681 713 714 715
     716 750 751 752 753 787 788 789 790 1228
BED  413 458 461 464 467 481 484 487 490 521 524 527 51 924 927
     530 533 545 548 551 554 569 572 575 578 596 599 622 625 631
     634 637 640 666 669 672 675 701 704 707 710 738 741 744 747
     775 778 781 784 810 813 816 819 840 852 855 858 880 891 894
     897 927 930 933 936 968 971 974 977 1009 1012 1015 1018 1125 1114
     1116 1124 1136 1140 1158 1251 1254 1271 1275 1331
BGT  416
BHI  1045 1051 1068 1081
BIC  1164 1342
BIS  1099
BISB 1255
BIT  1089 1095 1113 1119 1121 1139 1145 1183 1187
BITB 1270
BNE  421 613 648 683 718 755 792 831 870 909 948 989 103. 1048 1276
     1278 1090 1096 1120 1122 1126 1146 1169 1184 1188 1212 1257 1259 1273 1324
     1340
BPL  1098 1159 1171 1181 1334
BR   409 427 1052 1056 1082 1086 1101 1191 1236 1242 1327 1335
CLC  822 824 826 828 861 863 865 867 900 922 934 936 939 941 943
     945 980 982 984 986 1021 1023 1025 1027
CLR  444 445 1094 1207 1237 1276 1302
CLRB 614 649 684 719 756 793 832 871 910 949 990 1031 1057 1087 1166
     1241 1243 1261
CMP  415 420 457 460 463 466 482 483 486 489 503 503 506 529 523
     526 529 532 544 547 550 553 568 571 574 577 595 598 621 624
     630 633 636 639 665 668 671 674 700 703 706 709 737 740 743
     746 774 777 780 783 809 812 815 818 848 851 854 857 887 890
     893 896 926 929 932 935 967 970 973 976 1008 1011 1014 1017 1044
     1047 1050 1067 1075 1077 1079 1082 1258 1272 1339
CMPB 1115 1125
COM  1097
DEC  612 647 682 717 754 791 832 869 908 947 989 1029 1168
EMT  359
HALT 386 392 1182 1299 1326
INC  1211 1269 1303
INCB 1128 1133 1252 1256
IOT  361
JMP  387 1110
JSR  448 1106 1143 1151 1154 1167 1175 1178 1192 1195 1277
LDD  455 476 498 521 542 566 592 627 662 697 732 734 769 771 806
     845 884 923 962 964 1003 1005 1287 1289 1312 1314 1316 1317 1318 1319
LDF  1242 1273
LDFPS 446 1320
LDUB 1118 1190
MOV  407 411 412 417 423 424 426 428 431 432 433 434 435 436 437
     438 439 440 441 442 443 586 587 588 589 590 591 594 607 621
     622 623 624 625 626 629 642 656 657 658 659 660 661 664 677
     691 692 693 694 695 696 699 712 726 727 728 729 73. 731 736
     749 763 764 765 766 767 768 773 786 800 801 802 803 804 805
     808 821 839 840 841 842 843 844 847 860 878 879 88. 881 882


A4

DCFPR.P11  CROSS REFERENCE TABLE


```
          883   886   899   917   918   919   920   921   922   925   938   956   957   958   959
          960   961   966   979   997   998   999  1000  1001  1002  1007  1020  1038  1039  1040
         1046  1053  1054  1064  1065  1069  1070  1071  1072  1083  1084  1091  1101  1102  1104
         1129  1130  1134  1137  1141  1144  1148  1150  1153  1156  1160  1161  1162  1163  1166
         1174  1177  1179  1193  1194  1196  1197  1200  1201  1202  1203  1204  1205  1206  1225
         1226  1227  1228  1229  1230  1239  1240  1263  1274  1279  1280  1291  1292  1293  1294
         1295  1296  1297  1298  1301  1305  1306  1307  1308  1309  1310  1321  1322  1328  1329
         1337  1343  1344
MOVB     1117  1127  1157  1189  1235  1238  1260  1332
NOP      1107  1108  1109
ROL       823   825   827   829   862   864   866   868   901   923   985   987   94.   942   944
          946   981   983   985   987  1022  1024  1026  1028  1209  1210  1244  1246  1248
ROLB     1245  1247  1249
RTI       393  1103  1111  1131  1138  1185  1324  1345
RTS      1198  1231  1264  1278
SETD      454   477   497   520   540   564   585   620   655   690   725   762   799   838   877
          916   955   996  1282  1311
SETF     1037  1063
STD       456   479   499   522   541   543   565   567   593   628   663   698   733   735   770
          772   807   846   885   924   963   965  1004  1006  1283  1284  1285  1286  1288  1290
         1313  1315
STF      1043  1074
STFPS     390  1281
STST      391  1173
SUB       408   414   422  1149
TRAP      358
TST       418   425  1049  1066  1135  1170  1180  1341
TSTB     1123  1250  1253  1330  1333
.ASCIZ   1324  1347  1348
.BLKW    1266
.ENABL    353
.END     1365
.EVEN    1324  1350
.LIST     309   353   386   407   449  1088  1139  1192  1235  1279  1324  1328
.MACR     353
.MACRO    353
.NLIST    309   353   386   407   449  1088  1139  1192  1235  1279  1324  1328
.REM      312
.REPT       2   386
.SBTTL    309   353   407   449  1088  1139  1192  1235  1279  1328
.TITLE    309
```


ERRORS DETECTED:  0

```
.DCFPR,DCFPR/SOL/CRF=DCFPR,P11
RUN-TIME:  5  9  1 SECONDS
CORE USED:  7K
```