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IDENTIFICATION

PRODUCT CODE: AC-E742G-MC

PRODUCT NAME: CXFPAG0 DEC/X11 FP11 (11/40 & 45) MODULE

DATE: SEPTEMBER 1978

MAINTAINER: DEC/X11 SUPPORT GROUP

1. ABSTRACT:

FPA IS A BKMOD THAT EXERCISES THE FP11-C
AND THE FIS OPTION IN THE 11/40 OR LSI-11.

2. REQUIREMENTS:

HARDWARE: PDP11/45 WITH THE FPP INSTRUCTION SET, OR AN 11/40 WITH FIS.
STORAGE:: FPA REQUIRES:
1. DECIMAL WORDS: 360
2. OCTAL WORDS: 0550
3. OCTAL BYTES: 1320

3. PASS DEFINITION:

ONE PASS OF THE FPA MODULE CONSISTS OF EXECUTING EACH
INSTRUCTION 25,000 TIMES.

4. EXECUTION TIME:

FPA MODULE RUNNING ALONE ON A PDP11 PROCESSOR TAKES
APPROXIMATELY 30 SECONDS.

5. CONFIGURATION REQUIREMENTS:

SET SR1 EQUAL TO A 1 IF AN 11/40 IS USED OR EQUAL TO 0
IF AN 11/45 IS USED.

6. DEVICE/OPTION SETUP:

MAKE SURE FP11-C OR FIS IS INSTALLED.

7. MODULE OPERATION:

A. SETUP CYCLE COUNTER.
B. TEST SR1,IF EQUAL TO 1 GO TO D.
C. ELSE TEST ALL FPP INSTRUCTIONS, GO TO E.
D. TEST ALL FIS INSTRUCTIONS.
E. IF NOT EOP, GO TO B.
F. ELSE DO EOP, GO TO A.

8. OPERATING OPTIONS:

SR1=0 11/45,11/70 FP11-C OPTION INSTRUCTIONS
SR1=1 11/40 OR LSI ,FIS OPTION INSTRUCTIONS

9. NON-STANDARD PRINTOUTS:

NONE

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                        .MCALL  FKMOD <FPAG >,,,,25000,16
                        MODULE  40020,FPAG ,,,,25000,16
                        .TITLE  FPAG DEC/X11 SYSTEM EXERCISER MODULE
                ;       DDXCOM  VERSION  6      23-MAY-78
                                .LIST   BIN
                                ;*****************************************************************
000000'                         BEGIN:
000000' 050106  043501      040 MODNAM: .ASCII  /FPAG / ;MODULE NAME.
000005'    000                  KFLAG:  .BYTE   OPEN        ;USED TO KEEP TRACK OF WBUFF USAGE
000006' 000000                  ADDR:   +0                  ;1ST DEVICE ADDR.
000010' 000000                  VECTOR: +0                  ;1ST DEVICE VECTOR.
000012'    000                  BR1:    .BYTE   PRTY+0      ;1ST BR LEVEL.
000013'    000                  BR2:    .BYTE   PRTY+0      ;2ND BR LEVEL.
000014' 000001                  DVID1:  +1                  ;DEVICE INDICATOR 1.
000016' 000000                  SR1:    OPEN                ;SWITCH REGISTER 1
000020' 000000                  SR2:    OPEN                ;SWITCH REGISTER 2
000022' 000000                  SR3:    OPEN                ;SWITCH REGISTER 3
000024' 000000                  SR4:    OPEN                ;SWITCH REGISTER 4
                                ;*****************************************************************
000026' 040020                  STAT:   40020               ;STATUS WORD.
000030' 000224'                 INIT:   START               ;MODULE START ADDR.
000032' 000224'                 SPOINT: MODSP               ;MODULE STACK POINTER.
000034' 000000                  PASCNT: 0                   ;PASS COUNTER.
000036' 025000                  ICONT:  25000               ;# OF ITERATIONS PER PASS=25000
000040' 000000                  ICOUNT: 0                   ;LOC TO COUNT ITERATIONS
000042' 000000                  SOFCNT: 0                   ;LOC TO SAVE TOTAL SOFT ERRORS
000044' 000000                  HRDCNT: 0                   ;LOC TO SAVE TOTAL HARD ERRORS
000046' 000000                  SOFPAS: 0                   ;LOC TO SAVE SOFT ERRORS PER PASS
000050' 000000                  HRDPAS: 0                   ;LOC TO SAVE HARD ERRORS PER PASS
000052' 000000                  SYSCNT: 0                   ;# OF SYS ERRORS ACCUMULATED
000054' 000000                  RANNUM: 0                   ;HOLDS RANDOM # WHEN RAND MACRO IS CALLED
000056'                         CONFIG:                     ;RESERVED FOR MONITOR USE
000056' 000000                  RES1:   0                   ;RESERVED FOR MONITOR USE
000060' 000000                  RES2:   0                   ;RESERVED FOR MONITOR USE
000062' 000000                  SVR0:   OPEN                ;LOC TO SAVE R0.
000064' 000000                  SVR1:   OPEN                ;LOC TO SAVE R1.
000066' 000000                  SVR2:   OPEN                ;LOC TO SAVE R2.
000070' 000000                  SVR3:   OPEN                ;LOC TO SAVE R3.
000072' 000000                  SVR4:   OPEN                ;LOC TO SAVE R4.
000074' 000000                  SVR5:   OPEN                ;LOC TO SAVE R5.
000076' 000000                  SVR6:   OPEN                ;LOC TO SAVE R6.
000100' 000000                  CSRA:   OPEN                ;ADDR OF CURRENT CSR.
000102'                         SBADR:                      ;ADDR OF GOOD DATA, OR
000102' 000000                  ACSR:   OPEN                ;CONTENTS OF CSR.
000104'                         WASADR:                     ;ADDR OF BAD DATA, OR
000104' 000000                  ASTAT:  OPEN                ;STATUS REG CONTENTS.
000106'                         ERRTYP:                     ;TYPE OF ERROR
000106' 000000                  ASR:    OPEN                ;EXPECTED DATA.
000110' 000000                  AWAS:   OPEN                ;ACTUAL DATA.
000112' 000224'                 RSTRT:  RESTRT              ;RESTART ADDRESS AFTER END OF PASS
000114' 000000                  WDTO:   OPEN                ;WORDS TO MEMORY PER ITERATION
000116' 000000                  WDFR:   OPEN                ;WORDS FROM MEMORY PER ITERATION
000120' 000000                  INTR:   OPEN                ;# OF INTERRUPTS PER ITERATION
000122' 000016                  IDNUM:  16                  ;MODULE IDENTIFICATION NUMBER=16
        000040                          .REPT   SPSIZ       ;MODULE STACK STARTS HERE.
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```
                                .NLIST
                                .WORD   0
                                .LIST
                                .ENDR
000224'                         MODSP:
                                ;*****************************************************************
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```
                        000000                  FPS=    %0
                        000000                  AC0=    %0
                        000001                  AC1=    %1
                        000002                  AC2=    %2
                        000003                  AC3=    %3
                        000004                  AC4=    %4
                        000005                  AC5=    %5
000224'                                         START:
000224'                                         RESTRT:
000224' 005767  177566                          TST     SR1             ;TEST FOR AN 11/40, OR 11/45
000230' 001402                                  BEQ     START1          ;11/45
000232' 000167  000552                          JMP     START2          ;11/40
000236' 170127  047400                  START1: LDFPS   #47400
000242' 170011                                  SETD                    ;SET DOUBLE MODE
000244' 177027  077777                          LDCID   #77777,AC0              ;LOAD AC0 WITH 77777
000250' 177127  002525                          LDCID   #2525,AC1               ;LOAD AC1 WITH 2525
000254' 012702  000012                          MOV     #12,R2                  ;SET STEP COUNTER
000260' 174401                  EXLOP:  DIVD    AC1,AC0                 ;DIVIDE 2525 INTO 77777
000262' 171001                          MULD    AC1,AC0                 ;MULTIPLY 2525 BY ANSWER
000264' 172001                          ADDD    AC1,AC0                 ;ADD 2525 TO ANSWER
000266' 173001                          SUBD    AC1,AC0                 ;SUBTRACT 2525 FROM ANSWER
000270' 005302                          DEC     R2                      ;DO 10 (DECIMAL) TIMES
000272' 001372                          BNE     EXLOP
000274' 175467  000776                  STCDI   AC0,ANS1                ;SAVE ANSWER
000300' 170200                          STFPS   FPS             ;SAVE FPS
000302' 022767  077777  000766          CMP     #77777,ANS1             ;IS RESULT CORRECT
000310' 001403                          BEQ     EX4
                                        ;*****************************************************************
000312' 104405  000000' 000000          ARDERS,BEGIN,NULL       ;
                                        ;*****************************************************************
000320' 172467  000242          EX4:    LDD     D1010,AC0
000324' 012702  001276'                 MOV     #ANS1,R2
000330' 174022                          STD     AC0,(R2)+
000332' 172567  000230                  LDD     D1010,AC1
000336' 174122                          STD     AC1,(R2)+
000340' 172767  000742                  LDD     ANS5,AC3
000344' 170200                          STFPS   FPS
000346' 173767  000724                  CMPD    ANS1,AC3
000352' 170000                          CFCC
000354' 001403                          BEQ     1$
                                        ;*****************************************************************
000356' 104405  000000' 000000          ARDERS,BEGIN,NULL       ;
                                        ;*****************************************************************
000364' 172567  000200          1$:     LDD     D0101,AC1
000370' 174142                          STD     AC1,-(R2)
000372' 172012                          ADDD    (R2),AC0
000374' 173042                          SUBD    -(R2),AC0
000376' 173001                          SUBD    AC1,AC0
000400' 175467  000672                  STCDI   AC0,ANS1
000404' 022767  000000  000664          CMP     #0,ANS1
000412' 170200                          STFPS   FPS
000414' 001403                          BEQ     MORE
                                        ;*****************************************************************
000416' 104405  000000' 000000          ARDERS,BEGIN,NULL       ;
                                        ;*****************************************************************
000424' 170001                  MORE:   SETF
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000426' 177027  000525                          LDCIF   #525,AC0
000432' 177127  000252                          LDCIF   #252,AC1
000436' 174104                                  STF     AC1,AC4
000440' 172104                                  ADDF    AC4,AC1
000442' 172701                                  LDF     AC1,AC3
000444' 173003                                  SUBF    AC3,AC0
000446' 175067  000624                          STEXP   AC0,ANS1
000452' 170200                                  STFPS   FPS
000454' 022767  000001  000614                  CMP     #1,ANS1
000462' 001403                                  BEQ     1$
                                                ;*****************************************************************
000464' 104405  000000' 000000                  ARDERS,BEGIN,NULL       ;
                                                ;*****************************************************************
000472' 177027  000021                  1$:     LDCIF   #21,AC0
000476' 171000                                  MULF    AC0,AC0
000500' 174427  040400                          DIVF    #2,AC0
000504' 171427  040200                          MODF    #1,AC0
000510' 170200                                  STFPS   FPS
000512' 175567  000560                          STCFI   AC1,ANS1
000516' 022767  000220  000552                  CMP     #220,ANS1
000524' 001403                                  BEQ     2$
                                                ;*****************************************************************
000526' 104405  000000' 000000                  ARDERS,BEGIN,NULL       ;
                                                ;*****************************************************************
000534' 171427  041040                  2$:     MODF    #10.,AC0
000540' 175567  000532                          STCFI   AC1,ANS1
000544' 022767  000005  000524                  CMP     #5,ANS1
000552' 001403                                  BEQ     3$
                                                ;*****************************************************************
000554' 104405  000000' 000000                  ARDERS,BEGIN,NULL       ;
                                                ;*****************************************************************
000562' 000167  000436                  3$:     JMP     CYCLE
000566' 177777                          D1010:  -1
000570' 000000  177777  000000          D0101:  0,-1,0
000576' 177777  000000  000000          D1001:  -1,0,0
000604'                                 DSMALL:
000604' 177777  000001  000000          WEIRD:  -1,1,0,-1
000612' 177777
000614' 000570'                         AD0101: D0101
000616' 000576'                         AD1001: D1001
000620' 000736'                         AD1000: D1000
000622' 077777  000000  177777          DBIG:   77777,0,-1,0
000630' 000000
000632' 100000  000000  000000          DMZERO: 100000,0,0,0
000640' 000000
000642' 001276'                         AANS1:  ANS1
000644' 040252  125252  125252          DALTA:  40252,125252,125252,125252
000652' 125252
000654' 040325  052525  052525          DALTB:  40325,52525,52525,52525
000662' 052525
000664' 040325  052525  052525          DALTC:  40325,52525,52525,52526
000672' 052526
000674' 040000  000000  000000          D40:    40000,0,0,0
000702' 000000
000704' 037400  000000  000000          D37:    37400,0,0,0
000712' 000000
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000714' 040600  000000  000000  D46:    40600,0,0,0
000722' 000000
000724' 020000  000000  000000  D20:    20000,0,0,0
000732' 000000
000734' 000000                  D0100:  0
000736' 177777  000000  000000  D1000:  -1,0,0,0
000744' 000000
000746' 000100  000000  000000  D0100X: 100,0,0
000754' 000000  177777  177777  D0111:  0,-1,-1,-1
000762' 177777
000764' 000000  054321          D5TO1:  0,54321
000770' 000764'                 AD5TO1: D5TO1
000772' 043661  121000  000000  F5TO1:  43661,121000,0,0
001000' 000000
001002' 000000                  SAVADR: 0
001004' 000000                  SAVSTS: 0
001006' 170200                  FLTERR: STFPS   FPS


        075000                          FADD=75000              ;11/40 FIS FLOATING ADD
        075010                          FSUB=75010              ;11/40 FIS FLOATING SUBTRACT
        075020                          FMUL=75020              ;11/40 FIS FLOATING MULTIPLY
        075030                          FDIV=75030              ;11/40 FIS FLOATING DIVIDE
                                ; FIS MODULE TEST


001010' 012704  001274'         START2: MOV     #FISSTK,R4              ;SET STACK POINTER
001014' 012744  107070                  MOV     #107070,-(R4)           ;LOAD DATA ONTO STACK
001020' 012744  134343                  MOV     #134343,-(R4)
001024' 012744  065432                  MOV     #065432,-(R4)
001030' 012744  032107                  MOV     #032107,-(R4)
001034' 012744  123456                  MOV     #123456,-(R4)
001040' 012744  045670                  MOV     #045670,-(R4)
001044' 012744  125252                  MOV     #125252,-(R4)
001050' 012744  135252                  MOV     #135252,-(R4)
001054' 012744  016161                  MOV     #016161,-(R4)
001060' 012744  040616                  MOV     #040616,-(R4)
001064' 000240                          NOP
001066' 005067  000210                  CLR     ANS3            ;CLEAR A LOCATION FOR PSW
001072' 075014                          FSUB+   R4
001074' 075034                          FDIV+   R4
001076' 075024                          FMUL+   R4
001100' 075004                          FADD+   R4
001102' 103406                          BCS     10$             ;IF C SET,LEAVE ANS3=0
001104' 102405                          BVS     10$             ;IF V SET,LEAVE ANS3=0
001106' 001404                          BEQ     10$             ;IF Z SET,LEAVE ANS3=0
001110' 100003                          BPL     10$             ;IF N = 0,LEAVE ANS3=0
001112' 012767  000010  000162          MOV     #10,ANS3        ;IF ABOVE NOT TRUE,THEN PS=10
                                                                ;AND N=1,Z=V=C=0,SO MAKE ANS3=10
001120'                         10$:
001120' 012467  000152                  MOV     (R4)+,ANS1              ;SAVE FIRST HALF OF ANSWER
001124' 012467  000150                  MOV     (R4)+,ANS2              ;SAVE SECOND HALF OF ANSWER
001130' 010467  000150                  MOV     R4,ANS4                 ;SAVE FINAL STACK POINTER
001134' 122767  000010  000140          CMPB    #10,ANS3                ;CHECK FINAL PSW
001142' 001403                          BEQ 1$
```



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                                ;*****************************************************************
001144' 104405  000000' 000000          ARDER$,BEGIN,NULL       ;CONDITION CODES INCORRECT
                                ;*****************************************************************
001152' 022767  001274' 000124  1$:     CMP     #FISSTK,ANS4            ;CHECK STACKPOINTER POSITION
001160' 001403                          BEQ     2$
                                ;*****************************************************************
001162' 104405  000000' 000000          ARDER$,BEGIN,NULL       ;
                                ;*****************************************************************
001170' 022767  137201  000100  2$:     CMP     #137201,ANS1            ;CHECK FIRST HALF OF ANSWER
001176' 001403                          BEQ     3$
                                ;*****************************************************************
001200' 104405  000000' 000000          ARDER$,BEGIN,NULL       ;
                                ;*****************************************************************
001206' 022767  115230  000064  3$:     CMP     #115230,ANS2            ;CHECK SECOND HALF OF ANSWER
001214' 001403                          BEQ     4$
                                ;*****************************************************************
001216' 104405  000000' 000000          ARDER$,BEGIN,NULL       ;
                                ;*****************************************************************
001224'                         4$:

                                ;+
                                ; CHECK FOR END OF PASS
                                ;-

001224'                         CYCLE:
001224' 104413  000000'                 ENDIT$,BEGIN            ;SIGNAL END OF ITERATION.
                                                                ;MONITOR SHALL TEST END OF PASS
001230' 000167  176770                  JMP     RESTRT          ;CONTINUE TESTING



        001274'                 .=.+40
001274' 000000                  FISSTK: 0
001276' 000000                  ANS1:   0                       ;FIRST ANSWER (SEE CODE)
001300' 000000                  ANS2:   0
001302' 000000                  ANS3:   0
001304' 000000                  ANS4:   0
001306' 000000                  ANS5:   0
001310' 000000                  ANS6:   0
001312' 000000                  ANS7:   0
001314' 000000                  ANS8:   0
001316' 000000                  CNT: 0


        000001                  .END
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```
AANS1   000642R  261#
ACSR    000102R  142#
ADDR    000006R  108#
ADDR22= 001000   160#
AD0101  000614R  254#
AD1000  000620R  256#
AD1001  000616R  255#
AD5T01  000770R  283#
ANS1    001276R  183*  185  191  197  208*  209  222*  224  234*  235  241*  242  261
                 322*  337  364#
ANS2    001300R  323*  342  365#
ANS3    001302R  310*  319*  325  366#
ANS4    001304R  324*  331  367#
ANS5    001306R  195  368#
ANS6    001310R  369#
ANS7    001312R  370#
ANS8    001314R  371#
ASB     000106R  146#
ASTAT   000104R  144#
AWAS    000110R  147#
BEGIN   000000R  105#  188  201  213  227  238  245  329  334  340  345  354
BIT0  = 000001   160#
BIT1  = 000002   160#
BIT10 = 002000   160#
BIT11 = 004000   160#
BIT12 = 010000   160#
BIT13 = 020000   160#
BIT14 = 040000   160#
BIT15 = 100000   160#
BIT2  = 000004   160#
BIT3  = 000010   160#
BIT4  = 000020   160#
BIT5  = 000040   160#
BIT6  = 000100   160#
BIT7  = 000200   160#
BIT8  = 000400   160#
BIT9  = 001000   160#
BREAK$= 104407   160#
BR1     000012R  110#
BR2     000013R  111#
BTOD$ = 104421   160#
CDATA$= 104412   160#
CNT     001316R  372#
CONFIG  000056R  130#
CSRA    000100R  140#
CYCLE   001224R  247  353#
DALTA   000644R  262#
DALTB   000654R  264#
DALTC   000664R  266#
DATCK$= 104411   160#
DATER$= 104404   160#
DBIG    000622R  257#
DMZERO  000632R  259#
DSMALL  000604R  251#
DVID1   000014R  112#
D0100   000734R  276#
```



```
D0100X  000746R  279#
D0101   000570R  203  249#  254
D0111   000754R  280#
D1000   000736R  256  277#
D1001   000576R  255
D1010   000566R  190  193  248#
D20     000724R  274#
D37     000704R  270#
D40     000674R  268#
D46     000714R  272#
D5T01   000764R  282#  283
ENDIT$= 104413   160#  354
END$  = 104410   160#
ERRTYP  000106R  145#
EXIT$ = 104400   160#
EXLOP   000260R  177#  182
EX4     000320R  186  190#
FADD  = 075000   291#
FDIV  = 075030   294#
FISSTK  001274R  298  331  363#
FLTERR  001006R  288#
FMUL  = 075020   293#
FSUB  = 075010   292#
F5T01   000772R  284#
GETPA$= 104415   160#
GWBUF$= 104414   160#
HRDCNT  000044R  125#
HRDER$= 104405   160#  188  201  213  227  238  245  329  334  340  345
HRDPAS  000050R  127#
ICONT   000036R  122#
ICOUNT  000040R  123#
IDNUM   000122R  152#
INIT    000030R  119#
INTR    000120R  151#
MAP22$= 104416   160#
MODNAM  000000R  106#
MODSP   000224R  120  158#
MORE    000424R  211  215#
MSGN$ = 104403   160#
MSGS$ = 104402   160#
MSG$  = 104401   160#
NULL  = 000000   160#  188  201  213  227  238  245  329  334  340  345
OPEN  = 000000   107  113  114  115  116  133  134  135  136  137  138  139  140
                 142  144  146  147  149  150  151  160#
OTOA$ = 104420   160#
PASCNT  000034R  121#
PIRQ$ = 000004   160#
POPSP = 005726   160#
POPSP2= 022626   160#
PRTY  = 000000   110  111  160#
PRTY0 = 000000   160#
PRTY1 = 000040   160#
PRTY2 = 000100   160#
PRTY3 = 000140   160#
PRTY4 = 000200   160#
PRTY5 = 000240   160#
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```
PRTY6  = 000300                 160#
PRTY7  = 000340                 160#
PS     = 177776                 160#
PSW    = 177776                 160#
PUSH   = 005746                 160#
PUSH2  = 024646                 160#
RAND$  = 104417                 160#
RANNUM  000054R                 129#
RESTRT  000224R                 148      168#    356
RES1    000056R                 131#
RES2    000060R                 132#
RSTRT   000112R                 148#
SAVADR  001002R                 286#
SAVSTS  001004R                 287#
SBADR   000102R                 141#
SOFCNT  000042R                 124#
SOFERS= 104406                  160#
SOFPAS  000046R                 126#
SPOINT  000032R                 120#
SPSIZ  = 000040                   1#    153
SR1     000016R                 113#    169
SR2     000020R                 114#
SR3     000022R                 115#
SR4     000024R                 116#
START   000224R                 119     167#
START1  000236R                 170     172#
START2  001010R                 171     298#
STAT    000026R                 118#
SVR0    000062R                 133#
SVR1    000064R                 134#
SVR2    000066R                 135#
SVR3    000070R                 136#
SVR4    000072R                 137#
SVR5    000074R                 138#
SVR6    000076R                 139#
SYSCNT  000052R                 128#
TRPDFD= 000022                  160#
VECTOR  000010R                 109#
WASADR  000104R                 143#
WDFR    000116R                 150#
WDTO    000114R                 149#
WEIRD   000604R                 252#
XFLAG   000005R                 107#
.      = 001320R                362#

. ABS.  000000      000
        001320      001

 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 XFPAG0,XFPAG0/SQL/CRF:SYM=DDXCOM,XFPAG0
 RUN-TIME: 1 1 .2 SECONDS
 RUN-TIME RATIO: 19/3=6.3
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```
 CORE USED:  7K  (13 PAGES)
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