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DECUS NO. 8-169K

TITLE ADDITION TO F. P. PACKAGE

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SOURCE LANGUAGE

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## 1. IDENTIFICATION

- 1.1 Number: SYS-8-2 (A-03-02)
- 1.2 Title: ADDITION TO F.P. PACKAGE
- 1.3 Date: May 1968
- 1.4 Computer: PDP-8
- 1.5 Language: PAL III

## 2. ABSTRACT

The program consists of a number of subroutines to be added to the F.P. Package to expand the instruction list.

## 3. REQUIREMENTS

- 3.1 Storage: 5350 - 5375, 5775 - 5776, 6171 - 6177, 6573 - 6577, 7172 - 7177, 7600 - 7605, 7617 - 7623.

## 4. USAGE

- 4.1 Loading: The Binary loader (Digital 8-2-U) is used to load the program after the F.P. Package has been loaded.

## 5. RESTRICTIONS N/A

## 6. DESCRIPTION

- 6.1 Discussion: The F.P. Package for the PDP-8 is written in such a manner that it is possible to add new instructions which actually appear as subroutines within the package itself. There is a table in the package which contains the starting address of each of the subroutines, so that when adding new subroutines, it is necessary to add the starting address to the table. The interpreter subroutine of the F.P. Package takes bits 8 to 11 of the instruction to represent the position of the starting address in the table. The table consists of 15 locations (17 octal). The following are the new instructions:

FREAD: code = 10<sub>8</sub>, this instruction reads the first valid F.P. number and stores it in the F.P. accumulator.

FSPA N: code = 11<sub>8</sub>, and  
 $N = M * 2^4$  to jump forward  
 or  $N = M * 2^4 + 400$  to jump backwards where the maximum value for M is 31.  
 This instruction checks the value of the F.P. accumulator. If negative the F.P. interpreter reads the next instruction at  $P + 1$  where P is the address of the FSPA N instruction. If the F.P. accumulator is zero or positive the next instruction is read at  $P \pm M$  (sign depending on status of bit 3).

FSZA N: code = 12<sub>8</sub> and N is as defined above. This instruction checks the value of the F.P. accumulator. If zero, the F.P. interpreter reads the instruction at  $P + M$ . If other than zero, the next instruction is read at  $P + 1$ .

FNOP: code = 13<sub>g</sub>, this instruction is the same as the NOP instruction in PAL III.  
FCLA: code = 14<sub>g</sub>, this instruction clears the F.P. accumulator. Note: The instruction FCLA.  
FJMP N: code = 15<sub>g</sub>, and N is as defined above. This instruction causes the F.P. interpreter to read the next instruction at P + M.  
FNEG: code = 16<sub>g</sub> This instruction will negate the F.P. accumulator.  
FHLT: code = 17<sub>g</sub>. This instruction causes the computer to halt displaying the address of the FHLT instruction in the accumulator.

7. METHOD N/A
8. FORMAT N/A
9. EXECUTION TIME N/A
10. PROGRAM
  - 10.1 Core Map: N/A
  - 10.2 Dimension List: N/A
  - 10.3 Macro, Parameter, and Variable Lists: This is included with the listing of the program.
  - 10.4 Program Listing: Attached at the end of the program write-up
11. DIAGRAMS N/A
12. REFERENCES
  - 12.1 Other Library Programs
    - 12.1.1 F.P. Package (Digital 8-5-S)
  - 12.2 Digital Manuals
    - 12.2.1 F.P. Manuals (Digital 8-5-S)

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/***** SYS-8-2 *****/
/
/ ADDITION TO F.P. PACKAGE
/
/***** A-03-02 *****/
/
/ ADDITION OF NEW SUBROUTINES TO THE F.P. PACKAGE
/ FHLT, FNEG, FJMP, FCLA, FNOP, FSZA, FSPA,
*6547
5775 EXIT6
5775 FPREAD
5775 FSPZA
5775 FCLT
5775 FJMP
5775 FNEG
7172 FREAD
4506 FSPA
4501 FSZA
5775 FCLT
5775 FJMP
5775 FNEG
6000 FJMP
6171 FHLT

/ SUR TO CLEAR F.P. ACCUMULATOR
*6573
FPCLA, C
DCA 44
DCA 45
DCA 46
JMP I FPCLA

/ SUR TO SIMULATE A JMP N IN THE F.P. PACKAGE.
/ WHERE N=402004 AND M IS NUMBER OF LOC TO JMP, IF -VE NUMBER N=400+M*2004
*5350
FPJMP, C
TAD I INST
AND MASKI
SVA CLA
C4A
DCA SWITCH
TAD I INST
CLL RTR
AND MASK
ISZ SWITCH

/ TABLE OF ADDRESSES IN F.P. PACKAGE
/ FREAD=10
/ FSPA=11
/ FSZA=12
/ FNOP=13
/ FCLA=14
/ FJMP=15
/ FNEG=16
/ FHLT=17

/ CHECK IF +VE OR -VE JUMP.

/ THE NUMBER OF LOC TO JUMP

```

5363	7041	CIA		
5364	1771	TAD I RETADD		/THE ADDRESS+1 OF THE INST. CURRENTLY WORKING / ON
5365	1374	TAD MONE		
5366	3771	DCA I RETADD		/NEW RETURN JUMP ADDRESS.
5367	5750	J1P I FPJMP		
5370	5653	5653		/LOC WHERE CURRENT INST. STORED.
5371	5655	RETADD,		/LOC FOR RETURN ADDRESS
5372	0017	MASK,		
5373	0400	MASK1,		
5374	7777	MONE,		
5375	0000	SWITCH,		
		0		
		/SUR TO HALT THE COMPUTER		
		/ADDRESS OF CURRENT INSTRUCTION IS SHOWN IN THE A.C.		
6171		06171		
6171	0000	FPHLT,		
5172	7040	0		
6173	1777	CMA		
6174	7402	TAD I LOCAT		/ADDRESS OF CURRENT INST.
6175	7300	HLT		/HLT
6176	5771	CLA CLL		
6177	5655	J1P I FPHLT		
		5655		
5775		LOCAT,		
5775	0000	/SUR TO SIMULATE A NOP		
5776	5775	05775		
		EXIT6,		
		0		
		J1P I EXIT6		
		/SUR TO SIMULATE SZA N, I.E. JUMP N LOCATIONS IF F.P. A.C. IS =0		
		/N IS DEFINED IN THE SAME MANNER AS IN THE SUB F.P. JMP.		
4500		04500		
4500	5350	RUFFER,		
4501	0000	FPJMP		
4502	1045	0		
4503	7650	TAD 45		
4504	4700	SMA CLA		
4505	5701	J15 I RUFFER		/JUMP N LOCATIONS
		J1P I FPSZA		
		0		
		/SUR TO SIMULATE SPA N		
4506	0000	FPSPA,		
4507	1045	0		
4510	7700	TAD 45		
4511	4700	SMA CLA		
4512	5705	J15 I RUFFER		/JUMP N LOCATIONS
		J1P I FPSPA		
		0		
		/SUR TO READ F.P. NUMBER		
7172		07172		

7172  
7173  
7174  
7175  
7176  
7177

FPREAD,

J/S I 5  
TAD 69  
S/A CLA  
JVB FPREAD+1  
JIP I FPREAD

/CHECK IF LEGAL INPUT

RUFFER	4500
EXIT6	5775
FPCLA	6573
FPHLT	6171
FPJMP	5350
FPREAD	7172
FPSPA	4506
FPSSA	4501
INST	5370
LOCAT	6177
MASK1	5373
MASK	5372
MOVE	5374
RETADD	5371
SWITCH	5375