

Program Description I

Program Title	PDP - 11 OCT - TO - DEC CONVERSIONS FOR INTEGER & FLOATING PT		
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Program Description, Equations, Variables THIS PROGRAM CONVERTS PDP-11 SINGLE-WORD INTEGER OR DOUBLE-WORD FLOATING POINT DATA TO THEIR DECIMAL EQUIVALENT. EACH WORD OF DATA IS ENTERED AS ONE BINARY DIGITS AND 5 OCTAL DIGITS; IN THE CASE OF A DOUBLE-WORD ENTER THE HIGH-ORDER WORD INTO R_y AND THE LOW-ORDER WORD INTO R_x . THUS, TO INPUT 125434 144442 PRESS...

1 2 5 4 3 4 ↑ 1 4 4 4 4 2

INTEGERS ARE ASSUMED TO BE IN 16-BIT TWOS-COMPLEMENT NOTATION. FLOATING POINT NUMBERS ARE ASSUMED TO BE IN THE STANDARD PDP-11 FORM SHOWN IN THE SKETCH ON PAGE 2. THE PROGRAM WILL ALSO 1^S-COMPLEMENT OR 2^S-COMPLEMENT AN OCTAL SINGLE-WORD WHEN INPUT AS DESCRIBED ABOVE. OUTPUT IN THIS CASE WILL BE IN THE SAME FORM.

Operating Limits and Warnings NO CHECK IS MADE FOR...

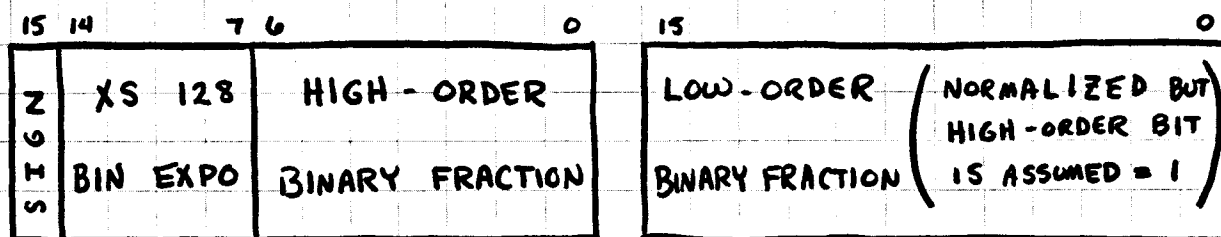
- 1) INVALID FLOATING POINT FORMATS
- 2) INVALID BINARY OR OCTAL DIGITS
- 3) INVALID NEGATIVE SIGNS ON INPUT OCTAL DATA

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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Program Description II

Sketch(es)



Sample Problem(s)

1) 1^s COMPLEMENT 1236622) 2^s COMPLEMENT 1236623) FIND THE DECIMAL EQUIVALENT FOR THE OCTAL INTEGER
1777344) FIND THE DECIMAL EQUIVALENT FOR THE FLOATING POINT
OCTAL NUMBER 157010 043406

Solution(s)

1) 123662 A $\rightarrow$ 541152) 123662 B $\rightarrow$ 541163) 177734 C $\rightarrow$ -364) 157010 $\uparrow$ 043406 $\rightarrow$ -6.1373901 17 ***

Reference(s)

PDP-11/70 PROCESSOR HANDBOOK, DIGITAL
EQUIPMENT CORP, pg 8-3

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	LBL A	31 25 11	1 st COMPLEMENT		F?1	35 71 01	
	SFO	35 51 00			GSB B	31 22 12	
	GTO 0	22 00	2 nd COMPLEMENT		STO A	33 11	
	LBL B	31 25 12		060	6	06	
	CFO	35 61 00	INIT COMP TO 0		STO I	35 33	SUM ALL
	LBL 0	31 25 00			0	00	
	STO A	33 11			LBL 3	31 25 03	BINARY/OCTAL
	0	00			8	08	
	STO B	33 12			RCL I	35 34	DIGITS
010	5	05			1	01	
	STO I	35 33	CALCULATE		-	51	
	LBL 1	31 25 01			Y*	35 63	
	7	07	COMPLEMENT		RCL A	34 11	
	RCL A	34 11		070	RCL I	35 34	
	6	06	OF 1 OCTAL		GSB a	32 22 11	
	RCL I	35 34			*	71	
	-	51	DIGIT		+	61	
	↑	41			DSZ	31 33	
	R↓	35 53			GTO 3	22 03	
020	GSB a	32 22 11			F?1	35 71 01	
	-	51			CHS	42	ADD SIGN
	F?0	35 71 00			RTN	35 22	
	GTO 2	22 02	CARRY		LBL D	31 25 14	CONV FLOAT OCT TO DEC
	1	01		080	STO B	33 12	
	+	61	OUT?		X= Y	35 52	
	8	08			STO A	33 11	
	X= Y	35 52			+	61	CHECK FOR
	SFO	35 51 00			X=0	31 51	
	X≠ Y	32 61			RTN	35 22	FLOAT 0
030	GTO 2	22 02			RCL B	34 12	
	-	51			5	05	CHECK HIGH-
	CFO	35 61 00			10 ^x	32 53	
	LBL 2	31 25 02	STORE DIGIT		÷	81	ORDER BIT
	R1	35 54		090	INT	31 83	
	1	01	IN COMPLEMENT		CFO	35 61 00	OF LOW-
	-	51			X=0	31 51	
	GSB c	32 22 13			SFO	35 51 00	ORDER WORD
	DSZ	31 33			LST X	35 82	
	GTO 1	22 01	CALC COMP		FRAC	32 83	
040	1	01			5	05	
	RCL A	34 11	OF 1 BINARY		10 ^x	32 53	
	6	06			*	71	
	GSB a	32 22 11	DIGIT +		STO B	33 12	
	F?0	35 71 00		100	RCL A	34 11	
	-	51	STORE		1	01	CALC 6 th OCT
	5	05			GSB a	32 22 11	
	GSB c	32 22 13			GSB b	32 22 12	DIGIT OF
	RTN	35 22			5	05	
	LBL C	31 25 13			GSB c	32 22 13	FRACTION
050	STO A	33 11			RCL A	34 11	
	6	06	CONV INT OCT TO DEC		2	02	CALC 7 th OCT
	GSB a	32 22 11			GSB a	32 22 11	
	CFI	35 61 01	CHECK SIGN		GSB b	32 22 12	DIGIT OF
	X≠ 0	31 61		110	6	06	
	SFI	35 51 01	+ COMPLEMENT		GSB c	32 22 13	FRACTION
	RCL A	34 11			RCL A	34 11	

REGISTERS

0	1	2	3	4	5	6	7	8	9
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A OCT INPUT / HIGH-ORDER OCT INPUT		B COMP OUTPUT / LOW-ORDER OCT INPUT		C		D		E USED	
								I USED	

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
	3	03	CALC 8 TH OCT		8	08	
	GSB a	32 22 11	DIGIT OF	170	-	51	CALCULATE
	GSB b	32 22 12	FRACTION		CFI	35 61 01	SIGN OF
	4	04	(HIGH-ORDER BIT		X>0	31 81	EXPONENT
	X<Y	35 52	IS ASSUMED =1)		GTO 6	22 06	
	X=Y	32 51			SFI	35 51 01	
120	GTO 4	22 04			CHS	42	
	X<Y	32 71			LBL 6	31 25 06	
	+	61			2	02	
	LBL 4	31 25 04			X<Y	35 52	CALCULATE
	7	07			YX	35 63	DECIMAL
	GSB c	32 22 13		180	F? 1	35 71 01	EQUIVALENT
	1	01			1/X	35 62	
	STO E	33 15	CONVERT		RCL E	34 15	
	8	08			*	71	
	STO I	35 33	FLOATING POINT		F? 0	35 71 00	
	0	00			CHS	42	
130	LBL 5	31 25 05	FRACTION		SCI	32 23	DISPLAY
	RCL B	34 12			DSP 7	23 07	IN FLOAT
	RCL I	35 34			-X-	31 84	FORMAT
	GSB a	32 22 11		190	FIX	31 23	
	RCL E	34 15			DSP 0	23 00	
	8	08			RTN	35 22	
	*	71			LBL a	32 25 11	
	STO E	33 15			10 ^x	32 53	CALCULATE R _x TH
	÷	81			÷	81	DIGIT OF
	+	61			FRAC	32 83	OCTAL WORD
140	DSZ	31 33			1	01	IN R _y
	GTO 5	22 05			0	00	
	STO E	33 15			*	71	
	RCL A	34 11	CALCULATE		INT	31 83	
	6	06	SIGN OF	200	RTN	35 22	
	GSB a	32 22 11	FRACTION		LBL b	32 25 12	
	SFO	35 51 00			2	02	SHIFT LOW-ORDER
	X=0	31 51			*	71	2 BITS OF OCTAL
	CF 0	35 61 00			1	01	DIGIT IN R _x +
	RCL A	34 11			F? 0	35 71 00	HIGH-ORDER BIT
150	5	05	CONVERT		CLX	44	OF LAST OCT DIGIT
	GSB a	32 22 11	FLOATING POINT		+	61	(i.e., $\neg$ FLAG 0)
	8	08			SFO	35 51 00	INTO 1
	*	71			8	08	OCTAL DIGIT
	RCL A	34 11		210	X>Y	32 81	
	4	04			GTO 8	22 08	
	GSB a	32 22 11	EXPONENT		CF 0	35 61 00	
	+	61	OF 2		-	51	
	8	08			RTN	35 22	
	*	71			LBL 8	31 25 08	
160	RCL A	34 11	(EXCESS 128)		X<Y	35 52	
	3	03			RTN	35 22	
	GSB a	32 22 11			LBL c	32 25 13	
	+	61			10 ^x	32 53	
	2	02		220	*	71	
	÷	81			RCL B	34 12	
	INT	31 83			+	61	
	1	01			STO B	33 12	
	2	02			RTN	35 22	

LABELS					FLAGS	SET STATUS		
A 0 → 1 ST C	B 0 → 2 ND C	C 0 → D ₁	D 0, 1, 2 → D ₂	E	0 USED	FLAGS		
a OCT DIGIT	b BIT SHIFT	c	d	e	1 USED	ON	TRIG	DISP
0 COMPLEMENT	1 COMP LOOP	2 END COMP LOOP	3 INT DIGIT LOOP	4 8 TH OCT DIGIT	2	OFF		
5 FRAC LOOP	6 POSITIVE EXPO	7	8 SHIFT OUT	9	3	0 ☐	DEG ☒	FIX ☒
						1 ☐	GRAD ☐	SCI ☐
						2 ☐	RAD ☐	ENG ☐
						3 ☐		n ☐

