

ROYAL MCBEE CORPORATION
ELECTRONIC COMPUTER DEPARTMENT

DATA OUTPUT NO. 8 SUBROUTINE
(Program 12.7)

FUNCTION:

To print (or punch via the typewriter or 20 character/second punch) one or more groups of numbers in decimal form where each group may consist of one or more numbers stored in consecutive memory locations. All numbers in each group are assigned a specified binal point location (q) in the calling sequence. Spacing operations are executed in place of leading integral zeros.

INPUT:

1. One or more groups of numbers stored in memory.
2. A calling sequence consisting of pairs of instructions of the following kind:
 - a. The initial location of the group.
 - b. The number of numbers (N) and the binal point location (q) of the group.

CALLING SEQUENCE:

<u>Loc.</u>	<u>Inst.</u>	<u>Add.</u>
∞	R	Lo + 3
$\infty + 1$	U	Lo
$\infty + 2$	Z	Loc.1
$\infty + 3$	Z	$N_1 q_1$
$\infty + 4$	Z	Loc.2
$\infty + 5$	Z	$N_2 q_2$
.	.	.
.	.	.
.	.	.
$[\infty + 2 i]$	Z	Loc.1
$[(\infty + 2 i) + 1]$	Z	$N_i q_i$
$[(\infty + 2 i) + 2]$	etc.	

Loc._i = the location of the first number of group i.

N_i = number of numbers in group i. N_i is placed in the track position (in decimal). $1 \leq N_i \leq 63$. q_i = binal point location of the i'th group. q_i is placed in the sector position (in decimal). $0 \leq q_i \leq 31$.

OUTPUT:

Each output number will consist of a decimal point and eight (or more) decimal digits. The sign follows the last suppressed zero if the number is negative. A tab is executed after each number.

If output is desired through the 20 character per second punch break point switch 32 must be depressed.

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DATA OUTPUT NO. 6 SUBROUTINE
(Program 12.7)

Table of q versus Output:

<u>q</u>	<u>Output</u>
0	+XXXXXXXX
0 - 4	+X.XXXXXX
4 - 7*	+XX.XXXXXX
*7 - 10	+XXX.XXXXXX
10 - 14	+XXXX.XXXX
14 - 17	+XXXXX.XXX
17 - 20	+XXXXXX.XX
20 - 24	+XXXXXXXX.X
24 - 27	+XXXXXXXXX.
27 - 30	+XXXXXXXXXX.
30 - 31	+XXXXXXXXXXX.

*See EXAMPLE for the situation requiring the recurrence of upper limit in successive classes of q.

EXIT:

As was mentioned above under INPUT, a pair of "Z" instructions are required for defining the group of numbers to be printed. When the last such group has been printed, the routine will exit to the next instruction of the calling sequence, and this location will contain a "non - "Z" instruction.

EXAMPLE:

<u>Loc.</u>	<u>Inst.</u>	<u>Add.</u>	<u>Notes</u>
∞	xR	Lo + 3	
∞ + 1	xU	Lo	
∞ + 2	xZ	2100	(1) { Loc. 1 = 2100 N ₁ = 4; q ₁ = 7
∞ + 3	xZ	0407	
∞ + 4	xZ	2110	(2) { Loc. 2 = 2110 N ₂ = 11; q ₂ = 15
∞ + 5	xZ	1115	
∞ + 6	xB		(3)

The above calling sequence will cause this subroutine to:

1. Print the contents of locations 2100, 01, 02, and 03 as +XX.XXXXXX for those numbers numerically smaller than 100.00000 or as +XXX.XXXXXX for those numbers which exceed this number. (See q of 7 under Table of q vs. Output).
2. Print the contents of 2110 thru 2120 as + XXXXX.XXX
3. Exit to ∞ + 6 which is the "non-Z" instruction terminating the calling sequence.

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PROGRAM STOPS:

<u>Loc.</u>	<u>Meaning and Remedy</u>
Lo + 0134	N < 1. Depress the start to exit without printing.

ACCURACY:

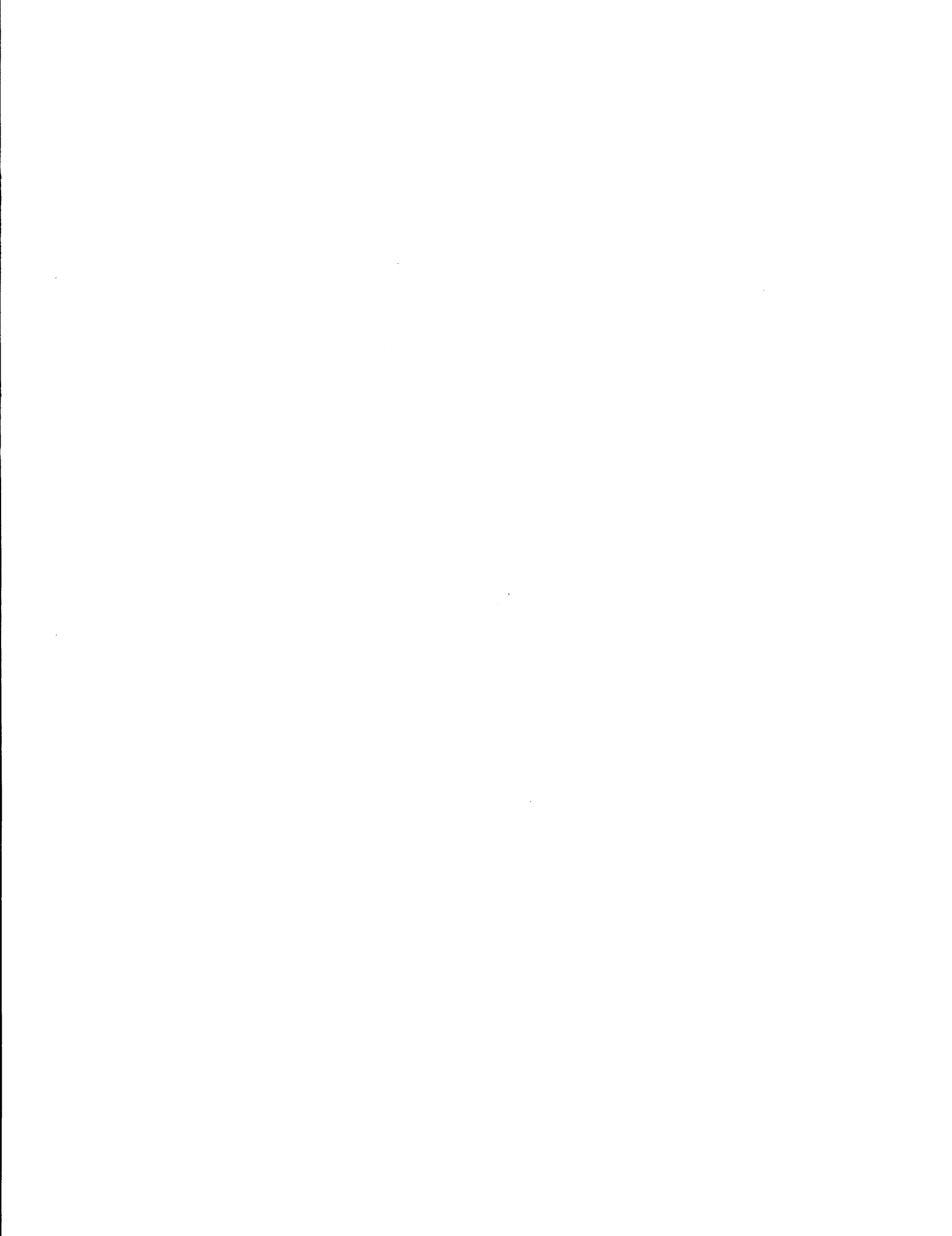
Output is exact (and rounded) for eight printed digits. When more digits are printed, the ninth printed digit may be high by one or two.

STORAGE:

320 locations of instructions and constants (5 tracks). Ten locations of temporary storage (track 63, sectors 03, 05, 06, 11, 32, 33, 43, 54, 56, 59).

TIME:

Approximately 30 words per minute via typewriter.
Approximately 60 words per minute via 20 character/second punch.



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Job No. _____ Prog. No. 1217 Prep. by H. WILLIAMS Ck'd. by _____ Page 1 of 10
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Problem Direct Output No. 6 Subroutine Track 00

Program Input Codes	Stop	Location	Instruction Op.	Address	Stop	Contents of Address	Notes
	<input checked="" type="checkbox"/>						
		C0.0.0	B	0.0.3			
		0.1	A	0.1.2.3			
		0.2	Y	0.3.4.5			
		0.3	B	0.3.4.5	<input checked="" type="checkbox"/>	"R" To Here	
		0.4	U	0.1.4.0			
		0.5	A	0.1.2.7		1@4	
		0.6	XZ	3.2.4.2		Delay	
		0.7	X	0.2.2.9	<input checked="" type="checkbox"/>	"0"	
		0.8	U	0.2.4.4			
		0.9	C	0.4.5.9			
		1.0	U	0.2.2.6			
		1.1	X	B.6.3.0.5	<input checked="" type="checkbox"/>		
		1.2	U	0.0.4.3			
		1.3	XZ	0.0.0.1		1@29	
		1.4	B	0.4.5.0		40338 A	
		1.5	Y	0.3.9.4	<input checked="" type="checkbox"/>	set A-B TRANSFER	
		1.6	U	0.0.2.5			
		1.7	X	B.6.3.0.3		*	
		1.8	E	0.3.0.7		XZ 0063	
		1.9	S	0.4.0.5	<input checked="" type="checkbox"/>	1@30	
		2.0	T	0.3.5.6			
		2.1	B	0.7.0.7		1@3	
		2.2	U	0.1.3.0			
0.0.0.0.0.2		2.3		1.0.0	<input checked="" type="checkbox"/>		
		2.4	Z	0.0.2.0.0.3		Delay 1@6	
		2.5	X	B.6.3.1.1		Permanent P.S.C.	
		2.6	X	H.6.3.0.5		TEMP. P.S.C.	
		2.7	B	0.3.1.3	<input checked="" type="checkbox"/>	set switch A	
		2.8	U	0.0.0.9			
		2.9	XZ	0.0.0.2		2@29	
		3.0	U	0.2.1.6		TRANSFER B	
0.0.0.0.0.1		3.1		F	<input checked="" type="checkbox"/>	1@31	

Conditional Stop Code Carriage Return

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Problem Data Control No. 6 Subroutine

Track 01

Program Input Codes	Stop	Location	Instruction Op. Address	Stop	Contents of Address	Notes
		<input checked="" type="checkbox"/>				
		0100	S0250		5 @ 29	
		01	T0459		→ Print DECIMAL	
		02	B0031		10 @ 31	
		03	XN6332	<input checked="" type="checkbox"/>	No.	
		04	U0105			
		05	R0120			
		06	U0300			
		07	S0122	<input checked="" type="checkbox"/>	6 @ 29	
		08	T0459		→ Print DECIMAL	
		09	B0031		10 @ 31	
		10	XN6332		No.	
		11	U0148	<input checked="" type="checkbox"/>		
		12	R0127		1 @ 4	
		13	XZ3263		Delay	
		14	XP1829		"4"	
		15	U0244	<input checked="" type="checkbox"/>		
		16	R0359		1 @ 4	
		17	U0246			
		18	M0460		1 @ 2	
		19	XB6305	<input checked="" type="checkbox"/>	P.S.C.	
		20	U L J			
<u>0.000.0.0.3</u>		21	8.000000		1 @ 4	
		22	18		6 @ 29	1 @ 23
		23	4	<input checked="" type="checkbox"/>	1 @ 29	
		24	XZ3259		Delay	
		25	XP2461		"TAB"	
		26	U0248			
<u>0.000.0.0.3</u>		27	8.000000	<input checked="" type="checkbox"/>	1 @ 4	
		28	4J		13 @ 23	
		29	1J		7 @ 29	
		30	XM6359		No.	
		31	U L J	<input checked="" type="checkbox"/>		

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Problem Data Output No 6 Subroutine Track 02

Program Input Codes	Stop	Location	Instruction Op.	Address	Stop	Contents of Address	Notes
		<input checked="" type="checkbox"/>					
		02 3 2	B	0461		XP0701	" - "
		3 3	Y	0036			
		3 4	X	B6356		No.	
		3 5	U	0344		<input checked="" type="checkbox"/>	
		3 6	X	Z0003		3 @ 29	
		3 7	A	0252		4 @ 4	
		3 8	T	0210		→ 0, 1, 2, 3	
		3 9	S	0225		<input checked="" type="checkbox"/> 2 @ 4	
		4 0	T	0112		→ 4, 5	
		4 1	S	0127		1 @ 4	
		4 2	X	Z3214		Delay	
		4 3	X	P2629		<input checked="" type="checkbox"/> "6"	
		4 4	T	0116		→ 0, 2, 4, 6, 8	
		4 5	X	P0631		"1"	
		4 6	X	H6332		No.	
		4 7	U	0119		<input checked="" type="checkbox"/>	
		4 8	X	B6306		(2 -1) CTR	
		4 9	U	0360			
		5 0	X	Z0005		5 @ 29	
		5 1	X	P0311		<input checked="" type="checkbox"/> SP.	
<u>1.000.00.01</u>		5 2	2	0000000		4 @ 4	
		5 3	X	H6311		Permanent P.S.C.	
		5 4	H	0013		1 @ 29	
		5 5	X	H6354		<input checked="" type="checkbox"/> PSC + 1	
		5 6	A	0035		Lo (10° Table - 1)	
		5 7	Y	0217			
		5 8	Y	0339			
		5 9	B	0123		<input checked="" type="checkbox"/> 1 @ 29	
		6 0	Y	0131			
		6 1	U	0323			
		6 2	B	0030		U(0216)	B
		6 3	U	0015		<input checked="" type="checkbox"/>	

Conditional Stop Code



Carriage Return

Program Input Codes	Stop	Location	Instruction Op.	Address	Stop	Contents of Address	Notes
		<input checked="" type="checkbox"/>					
		03.0.0	S	0.322		3@4	
		0.1	T	0.237		0, 1, 2, 3, 4, 5, 6, 7	
		0.2	U	0.305			
,0.0.0.0.0.1	'	0.3		2.6	<input checked="" type="checkbox"/>	9@29	+1@30
		0.4	XZ	0.063		MASK	
		0.5	S	0.127		1@4	
		0.6	XZ	3.24.2		Delay	
		0.7	X.P	3.4.2.9	<input checked="" type="checkbox"/>	"8"	
		0.8	U	0.244			
		0.9	X.B	6.35.9			
		1.0	U	0.339			
,0.0.0.0.0.2	'	1.1		3.4.4.4	<input checked="" type="checkbox"/>	MASK	
		1.2		8.0.0.0.0.0		1@4	
		1.3	U	0.4.3.1		Switch A	
		1.4	X.H	6.34.3		NO.	
		1.5	S	0.35.8	<input checked="" type="checkbox"/>	1@4	
		1.6	T	0.4.2.6		→ ZERO SUPPRESSION	
		1.7	X.H	6.33.2		NO. -1@4	
		1.8	U	0.31.9			
		1.9	X.B	6.30.5	<input checked="" type="checkbox"/>	PSC	
		2.0	U	0.0.3.6			
		2.1	U	0.1.2.4		Switch B	
,0.0.0.0.0.1	'	2.2		4.0.0.0.0.0		8@4	
		2.3	B	0.4.5.2	<input checked="" type="checkbox"/>	XZ 0063	
		2.4	X.E	6.30.3		*	
		2.5	S	0.1.2.8		13@23	
		2.6	T	0.2.6.2		→ 0 SHIFT	
		2.7	S	0.1.2.2	<input checked="" type="checkbox"/>	1@23	
		2.8	T	0.3.3.4		→ SHIFT 3	
		2.9	S	0.1.2.8		13@23	
		3.0	T	0.3.3.2		→ SHIFT 2	
		3.1	U	0.4.0.8	<input checked="" type="checkbox"/>	→ SHIFT 1	

Conditional Stop Code



Carriage Return

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Problem Data Output No 6 Subroutine Track 03

Program Input Codes	Stop	Location	Instruction Op.	Address	Contents of Address	Notes
	<input checked="" type="checkbox"/>					
		0.3.3.2	B.0.1.1.8		M(0460)	1@2
		3.3	U.0.4.0.9			
		3.4	B.0.4.6.3		M(0424)	1@3
		3.5	U.0.4.0.9		<input checked="" type="checkbox"/>	
		3.6	X.Z.0.0.7		7@29	
		3.7	X.Z.0.0.3.1		MASK	
		3.8	M.			
		3.9	D.		<input checked="" type="checkbox"/>	
		4.0	M.0.4.6.2		10@4	
		4.1	A.0.1.3.3		1@30	
		4.2	U.0.3.1.4			
		4.3	X.Z.0.0.7		<input checked="" type="checkbox"/> 4@29	
		4.4	U.		A ₃₃₈	B ₀₂₁₆
		4.5	B.L. . . .		Code word	#2
		4.6	E.0.3.1.1		X.Z.6363	
		4.7	S.0.0.2.3		<input checked="" type="checkbox"/> 1@23	
		4.8	X.H.6.3.0.6		(n-1)	Counter
		4.9	T.0.1.3.4		→ ERROR	
		5.0	E.0.3.3.7		X.Z.0031	
		5.1	D.0.4.0.4		<input checked="" type="checkbox"/> 3 1/3 @6	
		5.2	X.H.6.3.0.3		*	
		5.3	A.0.4.0.6		.75@23	
		5.4	M.0.0.2.4		1@6	
		5.5	U.0.2.5.3		<input checked="" type="checkbox"/>	
		5.6	B.0.1.2.1		1@4	
		5.7	U.0.1.3.0			
1.0.0.0.0.0.2		5.8	8.0.0.0.0.0		1@4	
		5.9	8.0.0.0.0.0		<input checked="" type="checkbox"/> 1@4	
		6.0	S.0.0.2.3		1@23	
		6.1	X.H.6.3.0.6		(n-1) CTR	
		6.2	T.0.1.3.7			
		6.3	U.0.2.2.1		<input checked="" type="checkbox"/>	

Conditional Stop Code



Carriage Return

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Problem Data Output No. 6 Subroutine Track 09

Program Input Codes	STOP	Location	Instruction Op. Address	STOP	Contents of Address	Notes
				<input checked="" type="checkbox"/>		
		0400	XB6343		No.	
		01	S0430		1@4	
		02	U0317			
<u>0.0000.0.5</u>		03	4000.0000	<input checked="" type="checkbox"/>	1@1	
		04	6FF.FFFF		3 1/3 @ 6	
		05			2	1@30
		06			J.O.	175 @ 23
		07	1.000.0000	<input checked="" type="checkbox"/>	1@3	
		08	B0413		M(0402)	1@1
		09	Y0.338			set shift constant
		10	U0014			
		11	Y00.03	<input checked="" type="checkbox"/>		
		12	U0146			
		13	M04.03			1@1
		14	XH6343		No.	
		15	S0358	<input checked="" type="checkbox"/>	1@4	
		16	T0425			→ another zero
		17	U02.08			→ Begin Integer Print
		18	XP0.360			"SPICE"
		19	XH6.305	<input checked="" type="checkbox"/>		P.S.C.
		20	U04.21			
		21	XB6343		No.	
		22	N0451			10 @ 31
		23	U04.14	<input checked="" type="checkbox"/>		
<u>1.0.000.0.0.1</u>		24	1.000.0000			1@3
		25	XZ32.54			Delay
		26	XB6305			P.S.C.
		27	S0013	<input checked="" type="checkbox"/>		1@29
		28	T0400			→ END zero suppression
		29	U04.18			
<u>0.0000.0.1</u>		30	8.000.0000			1@4
		31	B0303	<input checked="" type="checkbox"/>		4 @ 29 + 1 @ 30

Conditional Stop Code



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Problem Data Output No. 6 Subroutine Track 07

Program Input Codes	Stop	Location	Instruction Op.	Address	Stop	Contents of Address	Notes
		<input checked="" type="checkbox"/>					
		07	XS	6.3.1.1		Permanent	P.S.C
		3	XH	6.3.0.5		P.S.C.	
		3	XZ	3.2.0.6		Delay	
		3	B	0.3.2.1	<input checked="" type="checkbox"/>	Set switch B	
		3	XP	2.3.0.1		"."	
		3	C	0.4.5.9			
		3	U	0.0.1.1			
1.0.0.0.0.1.1		3	7	4.4.4.4.4.4.4.4	<input checked="" type="checkbox"/>	10°@0	
		4	5	0.0.0.0.0.0.0.0		10'@4	
		4	6	4.0.0.0.0.0.0.0		10²@7	
		4	7	K.0.0.0.0.0.0.0		10³@10	
		4	4	0.2.0.0.0.0.0.0	<input checked="" type="checkbox"/>	10⁴@14	
		4	6	1.F.8.0.0.0.0.0		10⁵@17	
		4	7	F.1.2.0.0.0.0.0		10⁶@20	
		4	4	J.4.E.4.0.0.0.0		10⁷@24	
		4	5	W.5.Q.1.0.0.0.0	<input checked="" type="checkbox"/>	10⁸@27	
		4	7	7.3.5.9.4.0.0.0		10⁹@30	
		4	9	F.8.1.7.J.8.0.0.0		10°@34	
		5	U	0.3.3.8		TRANSFER	A
1.0.0.0.0.0.2		5	F		<input checked="" type="checkbox"/>	10@31	
		5	W	J		MASK	
		5	XB	6.3.3.2		No.	
		5	H	0.3.1.2		1@4	
		5	M	0.2.0.3	<input checked="" type="checkbox"/>	1/10 @0	
		5	XH	6.3.3.2			
		5	U	0.4.5.9			
		5	XZ	0.0.0.1		1@29	
		5	U	L	<input checked="" type="checkbox"/>	SWITCH A U0431	SWITCH B U0124
1.0.0.0.0.0.1		6	2	0.0.0.0.0.0.0.0		1@2	
		6	XP	0.7.0.1		"."	
1.0.0.0.0.0.1		6	5	0.0.0.0.0.0.0.0		10@4	
		6	M	0.4.2.4	<input checked="" type="checkbox"/>	1@3	

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