

DATA OUTPUT NO. 2 SUBROUTINE  
(Program 12.1)

FUNCTION:

To print one or more groups of numbers in decimal form. Each group has the same binal point location ( $q$ ), and all numbers are printed from consecutive memory locations.

INPUT:

One or more groups of numbers to be printed, the initial location, the number of numbers in each group, and the binal point location ( $q$ ) of each group.

CALLING SEQUENCE:

<u>Location</u>	<u>Order</u>	<u>Address</u>
$\alpha - 1$	B	L(1st. No.)
$\alpha$	R	Lo + 5
$\alpha + 1$	U	Lo
$\alpha + 2$	Z	$N_1 q_1$
$\alpha + 3$	Z	$N_2 q_2$
.	.	.
.	.	.
.	.	.
$[(\alpha + 1) + i]$	Z	$N_i q_i$
$[(\alpha + 1) + (i+1)]$	etc.	

$N_i$  = number of words in group  $i$ .  $N_i$  is placed in the track position (in decimal).  $1 \leq N_i \leq 63$ .  $\alpha - 1$  must contain the address of the first number to be printed.

$q_i$  = 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:

Printed decimal representations of the numbers specified. Each output number will consist of a sign (space or minus), eight (or more) decimal digits and the decimal point. A tab is given after each number. There will be  $q/4$  (rounded) =  $J$  printed integers unless the number to be printed will not fit at that  $J$ . If the number is too large,  $J$  is increased by enough to accommodate the number. The number of decimal places will be  $8 - J$  ( $\geq 0$ ). If more than eight integers are needed to express the number,  $J$  will be increased and no decimal places will be printed.

EXIT:

The routine exits to the first "non - Z" instruction.

EXAMPLE:

<u>Location</u>	<u>Order</u>	<u>Address</u>	
$\alpha - 1$	xB	2100	
$\alpha$	xR	Lo + 5	
$\alpha + 1$	xU	Lo	
$\alpha + 2$	xZ	0407	(1)
$\alpha + 3$	xZ	1015	(2)
$\alpha + 4$	xB	etc.	(3)

The above calling sequence will cause this subroutine to:

1. Print the contents of 2100, 01, 02, and 03 as +XX.XXXXXX or +XXX.XXXXX.  $J = 7/4$  (rounded) = 2. If one or more of these numbers is too large, J will be increased to 3 for that number.
2. Print the contents of 2104, 05.....13 as +XXXX.XXXX unless one or more of these numbers is too large. The number(s) which overflow  $J = 4$  will be printed as +XXXXX.XXX.
3. Exit to  $\alpha + 4$ , which is the first "non-Z" order following the calling sequence.

PROGRAM STOPS:

None.

ACCURACY:

Output is exact (and rounded) for eight printed digits. When nine digits are printed, the output will be in error by 5 or 6 in the ninth place.

STORAGE:

160 locations of instructions and constants (2 1/2 tracks).  
No temporary storage.

TIME:

Approximately 30 words per minute.

RANGE:

The number to be printed must be within the range  $-10^9 < N < 10^9$ .  $q$  must be within the range  $0 \leq q \leq 31$ .

Job No. \_\_\_\_\_ Prog. No. 12.1 Prep. by *MK*

Problem DATA OUTPUT #2 SUBROUTINE

Trock

Program Input Codes	Stop	Location	Instruction Op.	Address	Stop	Contents of Address	Notes
5000							
1000		<input checked="" type="checkbox"/>					
		00.00	B	00.05			ENTER HERE
		01	S	01.23		XZ0003	
		02	Y	00.03			
		03	BL	J	<input checked="" type="checkbox"/>		
		04	Y	01.47			LO WORD TO PRINT
		05	BL	J			"R" TO HERE
		06	E	01.49		XS6331	TRIM WORD
		07	S	01.43	<input checked="" type="checkbox"/>	1@15	
		08	T	00.16			
		09	V	02.28			
		10	A	01.53		N-1	
		11	E	01.40	<input checked="" type="checkbox"/>	XZ0060	
		12	M	00.62		1@2	
		13	A	01.56		LO (10C TABLE)	
		14	H	02.00		LOC (10C PERM)	
		15	V	01.44	<input checked="" type="checkbox"/>		
		16	A	02.31		1@15-1@23	
		17	H	01.53		N-1 and 9.	
		18	E	00.61		XZ0003	
		19	A	01.55	<input checked="" type="checkbox"/>	LO (SHIFT TABLE)	
		20	Y	00.55		SHIFT	
		21	B	00.57		3@29	
		22	V	00.10			
		23	B	01.59	<input checked="" type="checkbox"/>		
		24	V	00.32			
		25	X.P	23.04		DEC. PT.	
		26	B	00.48		T0130	} SWITCH → B POS.
		27	H	01.25	<input checked="" type="checkbox"/>		
		28	B	02.07		7@29	
		29	S	02.13		PRINT STROKE CTR #2	
		30	T	02.07			
		31	V	02.16	<input checked="" type="checkbox"/>		

Conditional Stop Code



Carriage Return

Job No. \_\_\_\_\_ Prog. No. 12.1 Prep. by MK Ck'd. by R.R.M. Date 4-15-57

Problem DATA OUTPUT #2 SUBROUTINE Track \_\_\_\_\_

Program Input Codes	STOP	Location	Instruction Op.	Address	STOP	Contents of Address	Notes
		0032	V	0054			
			S	0212		5 (LO OF 10 <sup>c</sup> )	
			H	0213		PRINT STROKE CTR. #2	
			V	0052			
			A	0159			
			V	0159			
			B	0060		1@4	
			M	0111		1 NO.1	
			V	0158			
			[				
			H	0100		PRINT STROKE CTR #1	
			B	0129		1 NO.1 TO PRINT	
			M	0216		10@31	
			V	0049			
			XZ	6000		MASK	
			XP	0220		DUMMY PRINT ORDER	
			T	0130			
			E	0128		TWWWWWWW DROP SIGN	
			H	0129		1 NO.1 TO PRINT	
			V	0116			
			H	0100		PRINT STROKE CTR. #1	
			B	0111		1 NO.1	
			D	[		10 <sup>c</sup> @40	
			M	[		SHIFT	
			V	0222			
00000231			J			3@29	
			Q			6@31	
			H			1@29	
			P	000000		1@4	
			J			3@29	
			P	000000		1@2	
			H			1@29	

Conditional Stop Code



Carriage Return

Job No. \_\_\_\_\_ Prog. No. 12.1 Prep. by JMK Ck'd. by BRM Date 11-5-57

Problem DATA OUTPUT #2 SUBROUTINE Track \_\_\_\_\_

Program Input Codes	Stop	Location	Instruction Op.	Address	Stop	Contents of Address	Notes
	<input checked="" type="checkbox"/>						
		0100	[				PRINT STROKE CTR #1
		01	T	WWW			≈ 10°@0 TABLE OF 10°@4
		02	5	000000			10°@4
		03	3	2000000	<input checked="" type="checkbox"/>		102@8
		04	1	W400000			103@12
		05	1	3880000			104@16
		06	T	350000			105@20
		07	7	F12000	<input checked="" type="checkbox"/>		106@24
		08	4	J46400			107@28
		09	2	WFW080			108@32
		10	1	KJK650			109@36
		11	[				<input checked="" type="checkbox"/> TEMP.
		12	T	WWW			≈ 100 TABLE OF SHIFTS
		13	1	0000000			1@1
		14	2	0000000			1@2
		15	4	0000000	<input checked="" type="checkbox"/>		1@3
		16	M	0202			10@21
		17	E	0.046		XZ6000	TRIM TO TRACK BITS
		18	A	0047		XP0220	
		19	C	0041	<input checked="" type="checkbox"/>		
		20	S	0063			1@29
		21	A	0100			PRINT STROKE CTR #1
		22	U	0124			
		23	X	Z00.03	<input checked="" type="checkbox"/>		3@29
		24	X	Z00.03			DELAY
		25	T	[			SWITCH A-T0025 B-T0130
		26	U	0041			
200000004		27		4	<input checked="" type="checkbox"/>		1@29
		28	T	WWW			EXTRACTOR
		29	[				IND. 1 TO PRINT
		30	S	18.08			TAB. <del>4-11</del> *p 0302
		31	B	02.03	<input checked="" type="checkbox"/>		1@29

Conditional Stop Code



Carriage Return

Program Input Codes	Stop	Location	Instruction Op. Address	Stop	Contents of Address	Notes
				<input checked="" type="checkbox"/>		
		01 3 2	A 0147			
		3 3	Y 0147			
		3 4	B 0153		NCTR @23	
		3 5	X Z 0001		<input checked="" type="checkbox"/> 1 @29 AND DELAY	
		3 6	S 0201		1 @23	
		3 7	T 0141			→ FINISHED WITH GROUP
		3 8	H 0153		NCTR @23	
		3 9	U 0214		<input checked="" type="checkbox"/>	
		4 0	X Z 0060		EXTRACTOR	
		4 1	B 0005			
		4 2	U 0209			
		4 3	X B 0000		<input checked="" type="checkbox"/> 1 @15	
		4 4	Y 0159		LO (10° TEMP)	
		4 5	B 0224		T 0025	(SWITCH → A POSITION)
		4 6	C 0125			
		4 7	B [ ]		<input checked="" type="checkbox"/> NO. TO PRINT	
		4 8	U 0150			
		4 9	X S 6331		EXTRACTOR	
		5 0	H 0129			
		5 1	T 0218		<input checked="" type="checkbox"/>	
		5 2	U 0225			
		5 3	[ ]		NCTR @23	
		5 4	X P 0748		PRINT "MINUS"	
		5 5	Z 0112		<input checked="" type="checkbox"/> LO (SHIFT TABLE)	
		5 6	Z 0101		LO (10° TABLE)	
		5 7	B 0129			
		5 8	H 0111		1 NO. 1	
		5 9	S [ ]		<input checked="" type="checkbox"/> 10°	
		6 0	A 0058		14 @31	
		6 1	T 0023			→ 1 NO. 1 O.K. TO PRINT
		6 2	B 0127		1 @29	HERE: 1 NO. 1 TOO LARGE
		6 3	U 0036		<input checked="" type="checkbox"/>	

Conditional Stop Code

Carriage Return

Job No. \_\_\_\_\_ Prog. No. 12.1 Prep. by INK

d. by R.R.M. Date 4-15-57

Problem DATA OUTPUT #2 SUBROUTINE

Track \_\_\_\_\_

Program Input Codes	Stop	Location	Instruction Op.	Address	Stop	Contents of Address	Notes
		<input checked="" type="checkbox"/>					
0.000.0.006		02.0.0	[			LOC (10 <sup>C</sup> PERM.)	
		0.1		1.00		1@23	
		0.2		2.8.00		10@21	
		0.3		4	<input checked="" type="checkbox"/>	1@29	
		0.4		8.03.00		DUMMY ORDER-PRINT "SPACE"	
		0.5	[			PRINT SIGN "SPACE" or "MINUS"	
		0.6		4.00.50			
		0.7		X.7.00.07	<input checked="" type="checkbox"/>	7@294 DELAY	
		0.8		4.01.30			
		0.9		A.00.59		1@29	
		1.0		Y.00.05			
		1.1		U.0.0.05	<input checked="" type="checkbox"/>		
		1.2		S.0.1.0.1		DUMMY ORDER	
		1.3	[			PRINT STROKE CTR #2	
		1.4		B.0.2.0.0		LOG (10 <sup>C</sup> PERM.)	
		1.5		U.0.1.4.4	<input checked="" type="checkbox"/>		
0.000.0.001		1.6		F		10@31 & DELAY	
		1.7		U.0.0.4.1			
		1.8		B.0.1.5.4		"MINUS" HERE: NO. TO PRINT	20
		1.9		C.0.2.0.5	<input checked="" type="checkbox"/>		
		2.0		S.0.1.2.9		COMPLEMENT NO.	
		2.1		U.0.1.5.8			
		2.2		A.0.0.5.8		14@31 TO ROUND NO. TO	PRINT
		2.3		U.0.2.0.5	<input checked="" type="checkbox"/>		
		2.4		T.0.0.2.5			
		2.5		B.0.2.0.4		"SPACE" HERE: NO. TO PRINT	20
		2.6		C.0.2.0.5			
		2.7		U.0.1.5.7	<input checked="" type="checkbox"/>		
		2.8		B.0.0.0.5		HERE TO EXIT	
		2.9		Y.0.2.3.0			
		3.0		U. [			
0.000.0.001		3.1		W.W.0.0	<input checked="" type="checkbox"/>	1@15-1@23	

Conditional Stop Code



Carriage Return

Problem ZERO SUPPRESSION FOR DATA OUTPUT # 2 Track \_\_\_\_\_

Program Input Codes	Stop	Location	Instruction Op.	Address	Stop	Contents of Address	Notes
		02 23	U	02 32			
		<input checked="" type="checkbox"/>					
		0.2 <sup>3</sup> 2	H	0.1.1.1		1 No. 1	
		3 3	S	0.2.4.8		1 @ 0	
		3 4	T	0.2.4.9			
		3 5	U	0.2.4.6		<input checked="" type="checkbox"/>	
		3 6					
		3 7	S	0.0.5.9		1 @ 29	
		3 8	T	0.2.4.6			
		3 9	X.P	0.3.0.4		<input checked="" type="checkbox"/> SPACE	
		4 0	H	0.1.0.0			
		4 1	B	0.1.1.1		1 No. 1	
		4 2	N	0.2.1.6		10 @ 31	
		4 3	H	0.1.1.1		<input checked="" type="checkbox"/>	
		4 4	X.Z	0.0.1.6			
		4 5	U	0.2.3.3			
		4 6	B	0.1.1.1			
		4 7	U	0.2.0.5		<input checked="" type="checkbox"/>	
2.0.0.0.0.0.0.1		4 8	J.J.J.J.J.J.J.J			.1 @ 0	
		4 9	B	0.1.0.0			
		5 0	U	0.2.3.7			
		5 1				<input checked="" type="checkbox"/>	
		5 2					
		5 3					
		5 4					
		5 5				<input checked="" type="checkbox"/>	
		5 6					
		5 7					
		5 8					
		5 9				<input checked="" type="checkbox"/>	
		6 0					
		6 1					
		6 2					
		6 3				<input checked="" type="checkbox"/>	

Conditional Stop Code       Carriage Return