

TITLE: Anti-log Printout Subroutine

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DATE: March 16, 1959

ABSTRACT:

DISCLAIMER:

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FUNCTION: Given log N (base 2, e or 10), print out N provided
 $2^{-16} < N < 2^{17}$. If N is not in these limits, print x and
 tab.

INPUT: One word in the accumulator @ 7.

OUTPUT: One word printed at the appropriate q(15 plus the
 characteristic of $\log_2 N$). N is stored in $(Lo + 27)_{10}$
 with its q in the sector portion of $(Lo + 24)_{10}$.

CALLING SEQUENCE:

<u>Location</u>	<u>Order</u>	<u>Address</u>
$\alpha - 1$	B	L(log N)
α	R	(Lo + 2)
$\alpha + 1$	U	Lo 0000
$\alpha + 2$	Z	K K=0 if log is base 2 0001 " " " " e 0002 " " " " 10
$\alpha + 3$	etc.	

$\alpha - 1$ need not be a B order. Any order that leaves log N
 in the accumulator is permissible.

ACCURACY: 4 or 5 significant digits.

STORAGE: 52 locations of instruction, constants and temporary
 storage.

SUBROUTINES REQUIRED:

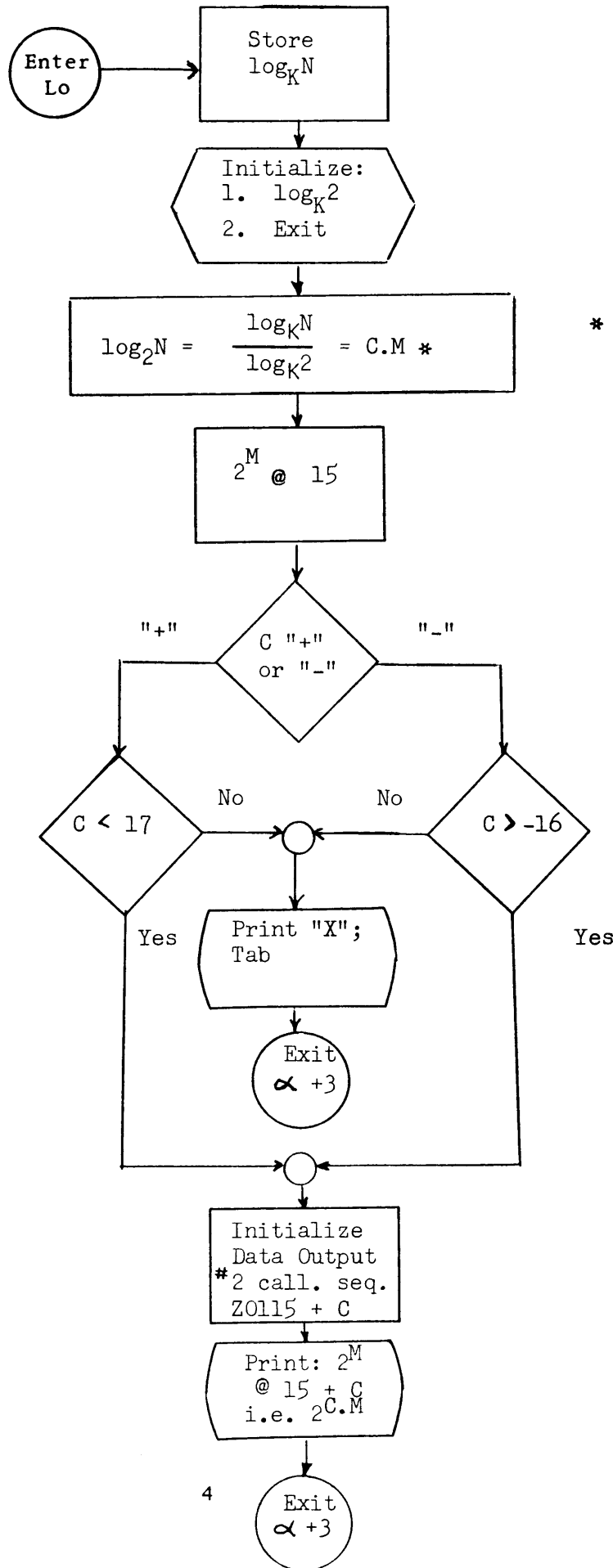
Exponential (17.0) with Lo at 2300_{10} .
 Data Output 2 (12.1) with Lo at 1300_{10} .

NOTE: If $2^{-5} < N < 2^{28}$ for all N to be computed, greater accuracy
 and range may be obtained by changing:

0014 to U0015
 0023 to xZ0023
 0025 to xZ0004
 0042 to xZ0104

METHOD:

The logarithm base K is converted to base 2 by dividing $\log_K N$ by $\log_K 2$. The resulting $\log_2 N$ is subdivided by extraction into its characteristic, C and its mantissa, M. The mantissa is "antilogged" by the exponential subroutine and held @ 15. Rather than shift this result C binal bits to the left (right if C is negative) the result is retained at 15, but printed out at 15 plus C.



* C = Characteristic
 M = Mantissa

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PROBLEM: ANTILOG - PRINTOUT			DATE 3-16-59
			TRACK 00

PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION		STOP	CONTENTS OF ADDRESS	NOTES
			OPERATION	ADDRESS			
	/						
	/	<input checked="" type="checkbox"/>					
		0 0 0 0	C	0 0 3 9	/		Store log _K N
		0 1	B	0 0 4 1	/		log ₂ 2 @ 1
		0 2	A	[α + 2]	/		
		0 3	Y	0 0 0 8	/	<input checked="" type="checkbox"/>	
		0 4	B	0 0 0 2	/		α + 2
		0 5	A	0 0 4 4	/		1 @ 29
		0 6	Y	0 0 3 6	/		
		0 7	B	0 0 3 9	/	<input checked="" type="checkbox"/>	log _K N @ 7
		0 8	D	[, ,]	/		log _K 2 @ 1
		0 9	H	0 0 3 9	/		→ Log ₂ N @ 6
		1 0	E	0 0 4 9	/		Fraction extract mask
		1 1	D	0 0 5 0	/	<input checked="" type="checkbox"/>	1 @ 5
		1 2	X R	2 3 0 9	/		} Exponential Routine
		1 3	X U	2 3 0 0	/		
		1 4	M	0 0 5 1	/		1 @ 11
		1 5	C	0 0 4 0	/	<input checked="" type="checkbox"/>	2 ^{Frac(log N)} @ 15
		1 6	B	0 0 3 9	/		log ₂ N @ 6
		1 7	E	0 0 4 8	/		WQ000000 Integral log N Mask
		1 8	M	0 0 4 3	/		1 @ 23
		1 9	T	0 0 2 7	/	<input checked="" type="checkbox"/>	
		2 0	S	0 0 2 3	/		Z0017
		2 1	T	0 0 3 7	/		→ Number < 2 ¹⁷ → : Print
		2 2	X P	3 9 0 0	/		} Print "X"
		2 3	X Z	0 0 1 7	/	<input checked="" type="checkbox"/>	
		2 4	X P	2 4 0 0	/		} Tab
		2 5	X Z	0 0 1 5	/		
		2 6	U	0 0 3 6	/		→ Exit
		2 7	A	0 0 2 5	/	<input checked="" type="checkbox"/>	Z0015
		2 8	T	0 0 2 2	/		→ Number < 2 ⁻¹⁶ → Print "X"
		2 9	S	0 0 2 5	/		
		3 0	A	0 0 4 2	/		Z0115
		3 1	Y	0 0 3 5	/	<input checked="" type="checkbox"/>	

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 PORT CHESTER, NEW YORK

CARRIAGE RETURN
 / = CONDITIONAL STOP CODE

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PROGRAM INPUT CODES	STOP	LOCATION	INSTRUCTION		STATUS	CONTENTS OF ADDRESS	NOTES
			OPERATION	ADDRESS			
	/						
	/	0,0,3,2	B	0,0,4,0	/		
		3,3	X,R	1,3,0,5	/	} Data Output 2	
		3,4	X,U	1,3,0,0	/		
		3,5	Z	[]	/	<input checked="" type="checkbox"/> (0115 + Characteristic	
		3,6	U	[α+3]	/	<input checked="" type="checkbox"/> Exit of log ₂ N	
		3,7	A	0,0,2,3	/	Z0017	
		3,8	U	0,0,3,0	/		
		3,9	[]	[]	/	<input checked="" type="checkbox"/> Storage of Log N	
		4,0	[]	[]	/	Storage of N @ 15 + Charact. base 2	
		4,1	Z	0,0,4,5	/		Loc (log ₂ 2)
		4,2	X,Z	0,1,1,5	/		
		4,3	X,Z	0,1,0,0	/	<input checked="" type="checkbox"/> 1 @ 23	
		4,4	X,Z	0,0,0,1	/	1 @ 29	
0,0,0,0	/	4,5	4,0,0,0	0,0,0,0	/	log ₂ 2 = 1 @ 1	
		4,6	2,J,5,J	8,6,0,8	/	log _e 2 @ 1	
		4,7	1,3,4,4	1,3,5,4	/	<input checked="" type="checkbox"/> log ₁₀ 2 @ 1	
		4,8	W,Q,0,0	0,0,0,0	/	Log ₂ N	} Characteristic Mask Mantissa Mask
		4,9	1,W,W	W,W,W,Q	/		
		5,0	4,0,0	0,0,0,0	/	1 @ 5	
		5,1	1,0	0,0,0,0	/	<input checked="" type="checkbox"/> 1 @ 11	
0,0,0,0	/	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"/>	