TITLE: decimal read in

TYPE: closed, relocatable, mnemonic

LENGTH: 38 words

TEMPORARY STORAGE: three words at fixed memory locations 0, 1, 2

DURATION: dependent on tape read speed of 110 characters per second

FAST REGISTERS
CHANGED: none

SUBROUTINES USED: none

PARAMETERS: M15 = link

M14 = address of first storage location

USE: This subroutine accepts numbers from tape in the following format:

$$\pm \underbrace{\underbrace{xx\cdots x.x\cdots x}_{\text{fractional part}}\overline{10}\pm\underbrace{x\cdots x}_{\text{exponent}}}_{\text{first number}}\underbrace{\pm\sim\pm\sim}_{\text{second number}}\cdots\underbrace{\pm\sim\diamondsuit}_{\text{last number}}$$

where x stands for a decimal digit. These numbers are stored in successive memory locations beginning at the location specified in M14. The last number must be followed by a $\diamondsuit$ character.

RULES FOR LEGAL
INPUT:

1) All characters except decimal digits, +, -, ·, $\overline{10}$, $\diamondsuit$ are ignored, in particular CRLF and "space".

2) Within an exponent (i.e., between a "$\overline{10}$" and the second sign following it) all characters except decimal digits, +, -, $\diamondsuit$ are ignored, in particular ·.

3) Every number must be preceded by a sign + or -.

4) Every exponent must be preceded by a sign + or -.

5) Digits before the point or after the point may be missing, as well as the point itself. If the whole fractional part is missing (only $_{10}\pm xx$ present) the number is interpreted as zero.

6) The exponent may be missing (only fractional part present).

7) If both fractional part and exponent are missing (i.e., $\pm \pm$ xx···) the number is interpreted as zero.

EXAMPLES:

On Tape	Goes to Location	Interpreted as
1) +.1-15$_{10}$-003-1◇	(M14)	+.1
	(M14) + 1	-15 $_{10}$-3
	(M14) + 2	-1
2) +2.998 $_{10}$+8 m/s LIGHT VELOCITY	(M14)	2.998 $_{10}$+8
+AUGUST 1st 1291 ◇	(M14) + 1	11291
3) - .005 + $_{10}$ + 3 ◇	(M14)	-0.005
	(M14) + 1	0

NOTICE: Don't forget to put a sign before every number. A sign tells the computer when a new number begins.

Don't forget the fractional part. 10^3 must be written as +1$_{10}$+3.

SIZE OF NUMBERS: More than 37 digits in the fractional part will cause OV, regardless of the location of the decimal point. An exponent whose absolute value exceeds 37 will cause OV, unless the fractional part is zero. Finally, any number $> 4^{63}$ will cause OV.
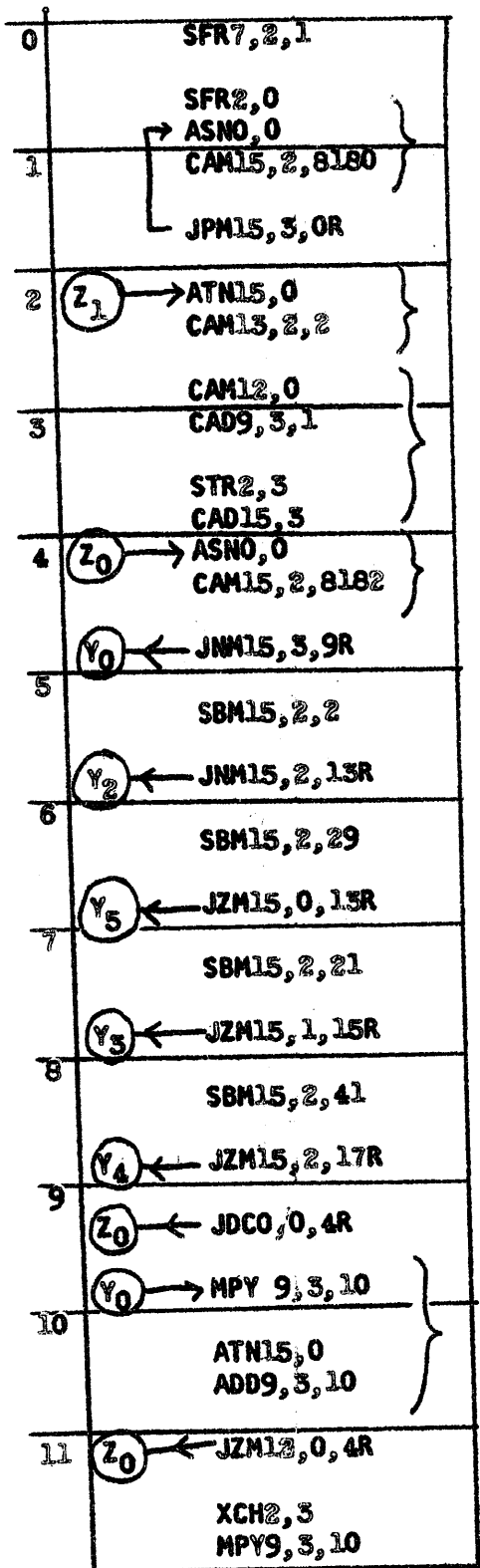
ACCURACY: Integers with at most 13 decimal digits exact.

DEC READ IN

0	SFR7,2,1	
	SFR2,0	read first character,
	→ ASN0,0	d - 12 in M15
1	CAM15,2,8180	
	└ JPM15,3,0R	ignore if not +, -, digit
2	(Z₁) → ATN15,0	sign of number in M13 0 = +
	CAM13,2,2	1 = -
	CAM12,0	Set initial values
3	CAD9,3,1	(M12) = 0 point not yet shown up
		Denominator (F2) = 1
	STR2,3	Numerator Acc = 0
	CAD15,3	
4	(Z₀) → ASN0,0	read next character
	CAM15,2,8182	d - 10 in M15
	(Y₀) ← JNM15,3,9R	jump if digit
5	SBM15,2,2	d - 12
	(Y₂) ← JNM15,2,13R	jump if +, -
6	SBM15,2,29	d - 41
	(Y₅) ← JZM15,0,13R	jump if point
7	SBM15,2,21	d - 62
	(Y₃) ← JZM15,1,15R	jump if ◊
8	SBM15,2,41	d - 103
	(Y₄) ← JZM15,2,17R	jump if ∞
9	(Z₀) ← JDC0,0,4R	ignore all other characters
	(Y₀) → MPY 9,3,10	
10		10a + d
	ATN15,0	(M15 combined d - 10)
	ADD9,3,10	
11	(Z₀) ← JZM13,0,4R	jump if point not yet punched
	XCH2,3	multiply denominator by 10 for
	MPY9,3,10	every digit after point
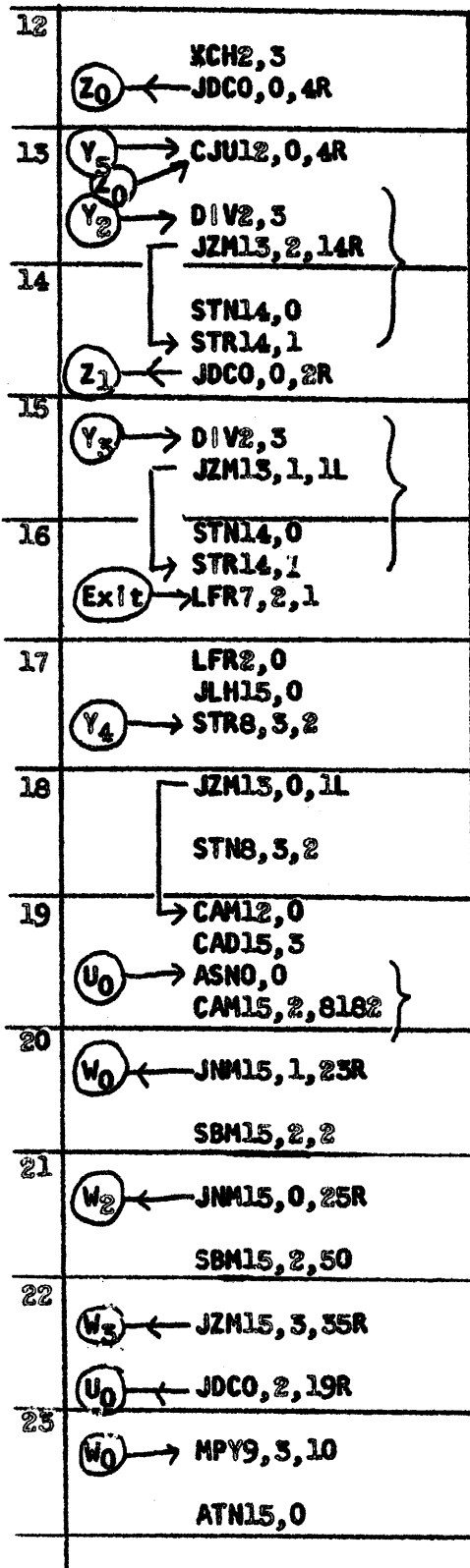
12	XCH2,3 (Z₀) ← JDC0,0,4R	
13	(Y₅) → CJU12,0,4R (Z₀) (Y₂) → DIV2,3 JZM13,2,14R	(M12) + 1 when point comes up, end of number store considering sign,
14	STN14,0 → STR14,1 (Z₁) ← JDC0,0,2R	(M14) + 1 read new number
15	(Y₃) → DIV2,3 JZM13,1,11	end of number, store considering sign
16	STN14,0 → STR14,1 (Exit) → LFR7,2,1	reset fast registers
17	LFR2,0 JLH15,0 (Y₄) → STR8,3,2	store numerator in memory, considering sign
18	JZM13,0,11 STN8,3,2	
19	→ CAM12,0 CAD15,5 (U₀) → ASN0,0 CAM15,2,8182	(M12) = 0 next ± is interpreted as exponent's sign Acc = 0 read next character d - 10 in M15
20	(W₀) ← JNM15,1,23R SBM15,2,2	jump if digit d - 12
21	(W₂) ← JNM15,0,23R SBM15,2,50	jump if ÷, ∞ d - 62
22	(W₃) ← JZM15,3,33R (U₀) ← JDC0,2,19R	jump if ◊ ignore all other characters
23	(W₀) → MPY9,3,10 ATN15,0	
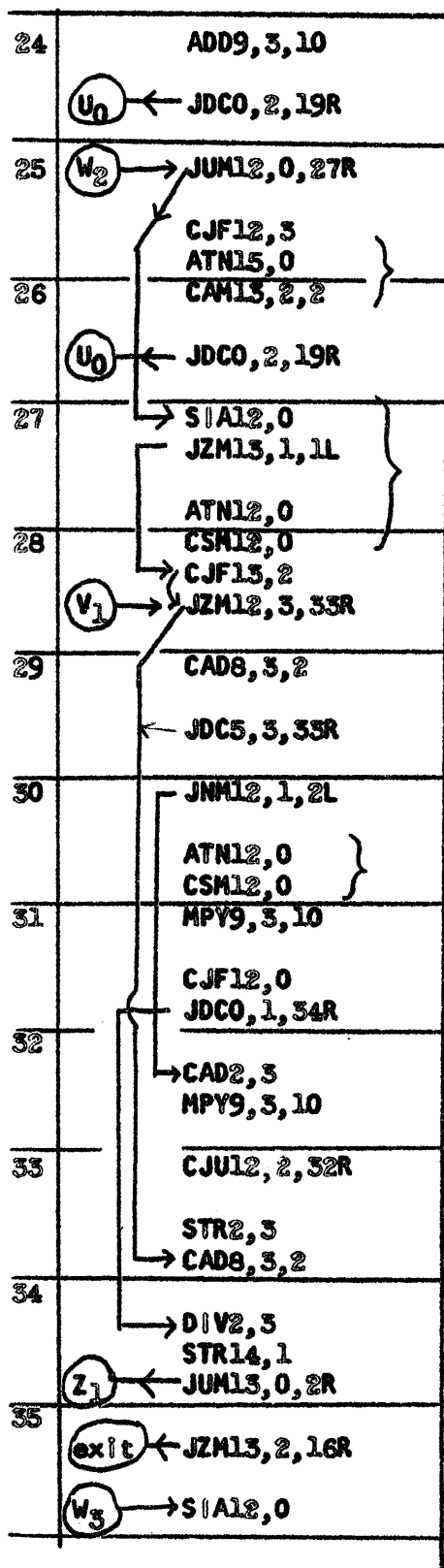
	Code	Comment
24	ADD9,3,10	10a + d
(U₀)	JDC0,2,19R	
25 (W₂)	JUM12,0,27R	jump if it is sign of a new number
	CJF12,3	(M12) + 1
	ATN15,0	sign of exp in M13
26	CAM13,2,2	
(U₀)	JDC0,2,19R	
27	SIA12,0	
	JZM13,1,11	exponent in M12,
	ATN12,0	considering sign
28	CSM12,0	
	CJF13,2	(M13) + 1, hence in this branch (M13) ≠ 0
(V₁)	JZM12,3,33R	jump if exponent = 0
29	CAD8,3,2	numerator
	JDC5,3,33R	jump if numerator = 0
30	JNM12,1,2L	jump if exp < 0
	ATN12,0	if exp > 0, change sign
	CSM12,0	
31	MPY9,3,10	numerator x 10 if exp > 0
	CJF12,0	
	JDC0,1,34R	
32	CAD2,3	
	MPY9,3,10	
		denominator x 10 if exp < 0
33	CJU12,2,32R	
	STR2,3	
	CAD8,3,2	numerator
34	DIV2,3	denominator
	STR14,1	
(Z₁)	JUM13,0,2R	jump to read new number
35 (exit)	JZM13,2,16R	
(W₃)	SIA12,0	|exponent| → M12

36	JZM13,0,37R
	ATN12,0
	CSM12,0
37	CAM13,0
	V_1 ← JDC0,2,28R
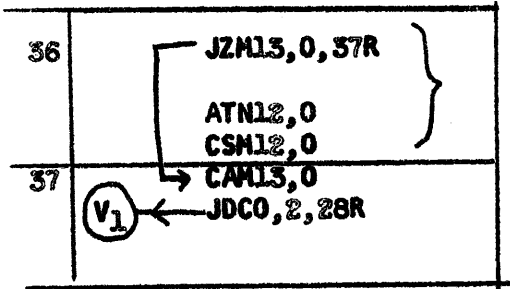
consider sign of exponent

remember: ◊ has shown up