

Tape T-2134-m8 (plus)
 correction tape P-2134-10

FILE 2100
 J.H. Laning Jr.

PREPARED BY: J.H. Laning Jr.
 DATE: 3/53

a1 (Read-in)

START	→ 0	si 128	
NORMAL	16M → 1	ao 36M	
RE ENTRY	→ 2	rd 2M	
	(104) 3	ao (a3/103)	(l.c. or u.c.)
	4	td 8M	
	5	td 4004	
	6	td 14M	
	7	td 22M	
	(4M) 8	ca (-)	
	9	su 4a3	] Is symbol a number?
	10	cp 12M	
	11	sp (3804/5804)	
10M	→ 12	ca (3303/3103)	(3103 is the normal mode)
	13	td 11M	
	(6M) 14	ca (-)	
	15	su 0	(Is symbol a period?)
	16	cp 1M	
	17	su 54a3	] l.c. no. or exponent?
	18	cp 45a4	
	19	ca 43a3	] set to interpret digit as an exponent
	20	td 60a4	
	21	cs 62a4	
4804	(17M) → 22	ad (-)	
	23	cp 39M	→ if digit is zero
	24	sf 51a3	] Form (24,6) version of digit as an integer in (43M, 44M)
	25	ts 43M	
	26	ca 11a4	
	27	su 51a3	
	28	sl 9	
	29	ts 44M	
	30	ca 25M	
	31	td 34M	

(T 2134-m 8)
 P 2134-10

PREPARED BY: J. H. Z. Jr.

DATE: 3/53

a1

42r →	32	sp 852	(programmed arithmetic)
	33	|| mr 497	(i.e., by 10)
(31r, 41r)	34	|| ad (-)	either 43r or 0.0
	35	|| sp 852	
(16ab)	(1r) 36	ao (37r)	(reset to 38r)
	37	sp 2r	
43ab (36r)	38	(/0)	(counter for digits before decimal/pt)
44ab (37r) (10r)	39	(/0)	(" " " after " ")
23r →	40	ca 1096	special routine to convert "0" to floaty point code.
	41	td 34r	
	42	sp 32r	
(25r)	43	(/0)	] temporary storage for integer during read-in
(29r)	44	(/0)	

(T-2134-118)
 (P-2134-10)

PREPARED BY: J. H. J. Jr.

DATE: 3/53

AZ (PRINT)

(P) 4404	→ 0	rd	sp 016	
	1		sp 28010	
4404	→ 2	ca	11016	] store "sp to print control"
	3	sp	908	
	4	rd	4r	] read in "RINT"
	5	ao	13r	
	6	cp	4r	
	7	sp	201	
(period after print instr.)	1703 → 8	cs	1503	] rest counter
	9	ts	13r	
	10	sp	016	
	11	sp	23010	
(9all)	12	||	(sp 8r / ao)	
(5r, 9r)	13	(-3)		(counter)
53010	→ 14	ao	2503	] part of SP routine
	15	sp	1906	
10r →	16	ad	56010	"sp 5004"
	17	sp	806	
46010	→ 18	sp	852	] START
	19	||	sp 32	

by ignoring the first 4 symbols.

(T-2134-m8
 P-2134-10)

PREPARED BY:

J. H. Z. Jr.

SHEET 4
 OF 20

DATE:

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a3 (Lower case symbols)

Symbol

	0	pa3	
	1	pa4	
	2	sp50a4	e
	3	pa9	8
	4	sp0	
	5		l
	6	sp50a4	a
	7	pa4	3
	8	sp2a1	space
	9	sp10a10	=
	10	sp50a4	s
	11	pa5	4
	12	sp50a4	i
	13	sp52a4	+
	14	sp50a4	u
	15	pa3	2
	16		shift ribbon
	(8a16) 17	(pa0/sp8a2)	.
	18	sp50a4	d
	19	pa6	5
	20	sp50a4	r
	21	pa2	1
	22	sp50a4	j
	23	pa8	7
	24	sp50a4	n
14a2 4a10 2a16	25	sp14a10 (53a10) 2a1	9
	26	sp50a4	f
	27	pa7	6
	28	sp50a4	c
	29	sp55a4	-
	30	sp50a4	k
11a1	31	pa58a4	
	32	sp50a4	t
11a1	33	pa38a4	

(T-2134-m8
 P-2134-10)

PREPARED BY: J. H. J. Jr.

DATE: 3/53 a 3 (continued)

		Symbol
34	sp 50 a 4	z
35	sp 2 a 1	back space
36	sp 50 a 4	l
37	sp 2 a 1	tabulate
38	sp 50 a 4	w
39	p a 5	
40	sp 50 a 4	h
41	sp 2 a 1	corr. returns
42	sp 50 a 4	y
43	p a 6	
44	sp 50 a 4	p
45	cs 2 a x (2 a x = 854)	
46	sp 50 a 4	q
47	ts 0	
48	sp 50 a 4	o (letter)
49	sp 2 a 1	stop
50	sp 50 a 4	b
(24a)(4a6)	51 (p 0)	
	52 sp 50 a 4	g
42 a 4	53 (p 1 a 3)	
	54 p 1 0	q
50 a 4	55 || mr 0	
	56 sp 50 a 4	m
	57 sp 42 a 4	shift to u.c.
	58 sp 50 a 4	x
	59 || dv 0	
	60 sp 50 a 4	n
	61 sp a 4	shift to l.c.
	62 p 1	0 (zero)
	63 sp 2 a 1	nullify

(T-2134-m8)
 (P-2134-10)

PREPARED BY: J. H. I. Jr.

DATE: 3/53 a 4 (upper case symbols & misc. / program) OF 20

		Symbol
612 → 0	ca a3	
1	td 3a1	} set lower case
2	sp 2a1	
3	p 19	
4	p 55 a3	E (not used)
5	0,22000	8 (exp.)
6	p 59 a3 @ dw	A (not used)
7	p 14	3 (exp.)
8	sp 2a1	space
9	sp 2a1	• (see note)
10	sp 40 a10	S
11	p 15	4 (exp.)
02a9 (2a9) (2ba9)	12 || ad (59 a3) dw	I (not used)
13	sp a9	/
14	p 14 a9	U (not used)
15	p 13	2 (exp.)
16		shift ribbon
17	sp a12)
18 ||	sp a13	D (not used)
19	p 16	5 (exp.)
(11 a10)	20 || ts (-) l	R (not used)
21	p 12	1 (exp.)
22 ||	ad 41 a13	J (not used)
23	p 18	7 (exp.)
7a9 2a9	24 || (cs 2ax / ca 2ax) not (eflag)	N (not used)
25	sp a11	(
26		F
27	p 17	6 (exp.)
28	sp 46 a10 sp 50 a10	C
29	sp 10 a9	- (exp.)

used

note: The symbol • can be at the programmer's discretion to denote multiplication, where convenient typographically.

(T-2134-M8)
 (P-2134-10)

PREPARED BY: J.H.V.Jr.

DATE: 3/53 a4 (continued)

			Symbol
52r, 55r →	30	td 32r	K (not used)
	31	sp 18a9	
(30a) 32		ca (-)	T (not used)
51r →	33	sp 9a8	
	34	sp 2a1	Z (not used)
	35	sp 2a1	backspace
	36	ca 2ax	L (not used)
	37	sp 2a1	tabulate
17a9, 17a6, 10a1 →	38	ca 40r	W (not used)
	39	su 4a3	
(4a1) 40		sp (-)	H (not used)
	41	sp 2a1	corr. return
57a3 →	42	ca 53a3	Y (not used)
	43	sp 1r	
(5a6)	44	(sp a2 / sp 2a2)	P
17a1 →	45	ca 39a3	
	46	td 60r	Q (not used)
	47	cs 62a3	
	48	sp 22a1	O (letter) (not used)
	49	sp 2a1	stop
all letters	50	ad (55a3) ^{OP}	B (not used)
13a9 (1a9/2a9)	51	sp (33a) sp (28a10/33a)	
24ab 29a10	52	sp 30r	G (not used)
	53	sp 5a13	
	54	sp 20	Q (exp.)
29a3 →	55	sp 30r	
	56	sp 10a13	M (not used)
	57	sp 42r	shift to u.c.
10a1 →	58	ca 33a3	X (not used)
	59	td 10a1	
(19a1, 46r)	60	sp (-)	V (not used)
	61	sp 0r	shift to l.c.
	62	sp 11	O (zero exp.)
	63	sp 2a1	nullify

compile last
 return to main

sp 0 - } ac not contains
 11a3 or not

shift to upper case

= a5 (number)

→ 2
 - 1

OP "no 0" initials

↑
 normal mode

need switch to 38a4
 re init c. false

2 (number of exponent)

(T-2134-M8)
 (P-2134-10)

PREPARED BY:

A.H.Z.

SHEET 8
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DATE:

3/53

a5 (Interpret MRA as lower case number)

60a4	→ 0	cs	38a1	39a1	
	1	ts	38a1	39a1	
18r	→ 2	ao	38a1	39a1	
	3	cp	15r		
	4	sp	a8		(select new address K)
	5	td	7r		
	6	sp	ax	(= sp 852)	] store number in(K, K+1)
(5r)	7	ts	(-)		
	8	sp	ax		
	9	ca	50a4		] form symbol ^{instr} mr K or ^{dr} at K, where K is address at which number has just been stored
	10	td	13r		
	11	ca	7r		
	12	su	47a3		
(10r)	13	ad	(-)		
	14	sp	8a6		
3r	→ 15	sp	ax		
	16	dv	4a7		(divide by 10)
	17	sp	ax		
	18	sp	2r		

(T-2134-118)
 (P-2134-10)

PREPARED BY: J.H.F.

DATE: 3/53 a6 (Interpret MRA as exponent)

60a4 → 0	ca 18a8	} store "sp exp" in place of last-stored symbol (mr x or dv x)
1	td 3r	
2	ca 18r	
(1r) 3	ex (-)	} store "+ x"
4	td 51a3	
5	ca 51a3	
6	sp 9a8	} compute and store the exponent ± n
7	sp 19r	
14a5 → 8	sp 9a8	
39a10 → 9	sp ax	} reset MRA and various counters
10	ca a7	
11	sp ax	
12	ca 0	
13	ts 37a1 38a1	
14	ts 38a1 39a1	
15	ca 13r	
16	td 35a1 36a1	} "sp exp"
(12a9, 16a9) 17	sp (38a4 / 14a9)	
18	sp 15a13	} Form ± n, where n is in MRA in (24, 6) form
15a2, 7r, 32a10 → 19	td 25r	
20	ca 4ax	
21	td 24r	
(20a) (8a9) 22	(ca 2ax / cs 2ax)	
23	sr * 15	
(21r) 24	sl (-)	
(19r) 25	sp (-)	

MRA = fl account

(T-2134-118)
(P-2134-10)

PREPARED BY: J.H.F.

DATE: 3/53 . 97 (Numerical storage)

0	0.00000	}	0
1	1.47777		
2	0.40000	}	1
3	0.01000		
4	0.50000	}	10
5	0.04000		

(T-2134-178)
 (P-2134-10)

PREPARED BY: J.H.F.

DATE: 3/53 a8 (Address selection)

4911, 4a5	→ 0	td 7r	
	1	ca 8r	
	2	su 21a3	= 2
	3	ts 8r	
	4	su 18r	
	5	cp 15r	now if <
	6	ca 8r	answer returned in bc
(0r)	7	sp (-)	
	8	+ 197	(last address used)
various points	→ 9	td 17r	
(11r)	10	ts (32)	
	11	ao 10r	
	12	su 47a3	= ts 0
	13	su 8r	
	14	cp 16r	
5r	→ 15	ck 0	(alarm) stop checked
14r	→ 16	ao 18r	
(9r)	17	sp (-)	[returns new value of addr]
	18	(1/2 31)	(last occupied program address) add-1

Select new address for storage of numerical quantity.

Store C(AC) in next available program address.

(T-2134-118)
 (P-2134-10)

PREPARED BY: J.H. Fisher

DATE: 3/53 a9 (division, etc.)

13a4 → 0	ca 12a4	(divide)
1	ex 50a4	
2	ex 12a4	
3	sp 5r	
3a16 4	sp(2a1/14a10)	(the 14a10 mode is never used)
3r, 10r, 14r, 30r → 5	td 9r	just hold for comma switch
6	ca 22a6	} eflag negated
7	ex 24a4	
8	ex 22a6	
(5r) 9	sp(-)	
29a4 → 10	sp 5r	could say this (upper case minus)
11	ca 14a4	"14a4" true
12	td 17a6	rflag
13	sp 2a1	(insert to 3r here)
17a6 → 14	sp 5r	
15	ca 17r	false
16	td 17a6	
17	sp 38a4	
3a1 22a10 23r, 12a10 → 18	td 27r	(reset div + exp to normal)
19	ca 36a4	"ca 2ax" false
20	ts 22a6	← eflag
21	ca 45a3	"cs 2ax" true
22	ts 24a4	← not (eflag)
23	ca 4a4	"55a3" = @ Mr
24	td 50a4	op
25	ca 6a4	adv.
26	td 12a4	opl
(18r) 27	sp(-)	
8a12 → 28	sp 18r	(reset div + exp to non-normal)
29	sp 5r	
30 31	ca 12a4	
31 32	ex 50a4	
32 33	ex 12a4	
33 34	sp 9a12	

PREPARED BY: *A.H.J. Jr.*

(T-2134-128)
 (P-2134-10)

DATE: 3/53 a 10 (Equals, comma, SP, CP)

10r, 3a11 → 0 | tq 9r
 1 | ca 18a4 = sp a 13
 2 | sp 9a8
 3 | td (68r)
 4 | su 62a3 = 1
 5 | ts (63r)
 6 | td 8r
 7 | ca 9r
 (6r) 8 | ex (-)
 (0r) 9 | sp (-)

9a3 → 10 | sp 0r (equals)
 11 | td 20a4
 17a11 → 12 | sp 18a9
 13 | sp 2a1

25a3 → 14 | ca 22a4 "ad 41a13" (comma)
 15 | sp 9a8
 16 | ca 20a4
 17 | sp 9a8
 18 | ca 63r
 19 | td 21r
 20 | ca 68r
 (19r) 21 | td (-)

Ha2 → 23 | ca 58r = 28a10 = fage
 24 | td 51a4 +flag
 25 | ca 58a4 = 33a3 = false
 26 | td 12a1 nflag
 27 | sp (2a1 / 49r) = 49r is just sp 2a1; this switch no lag allowed

51a4 → 28 | ca 59r = 33a4 = true
 29 | td 51a4 +flag
 30 | ca 60r = 31a3 = true
 31 | td 12a1 nflag
 32 | sp 19a6 convert to fixed point
 33 | ad 57r

(T-2134-118)
 (P-2134-10)

PREPARED BY: A.H.Z.A.
 DATE: 3/53

a10 (continued)

	34	td	38r	
	35	ca	10a8	ts (next inst add)
	36	su	47a3	ts 0
	37	ad	4a3	sp 0
	(34r) 38	ts	(-)	all + n. ← sp loc of next inst
	39	sp	9a6	
10a4 →	40	ca	52r	(SP)
51r →	41	ts	56r	
	42	rd	42r	
	43	su	54a4	=20 (the code for R)
	44	cp	0	(provision for future)
	45	su	21a4	(SR, CR instructions)
	46	cp	18a2	(START)
	47	ca	61r	(SP)
	48	td	25a3	
	49	sp	2a1	
28a4 →	50	ca	57r	(CP)
	51	sp	41r	
	52	sp	a14	
comes after 25a3 →	53	sp	14a2	
25a3 →	54	ca	62r	
	55	sp	48r	
41r	56	||	(sp a14 / cp a14)	
	57	||	cp a14	
	58	+	28r	
	59	+	33a4	
	60	+	31a3	
	61	+	53r	
	62	+	14r	
	63-67	+	0	] storage for addresses used by parenthesis routines in forming and storing sp orders
	68-72	+	0	
	73-77	+	0	

(T-2134-M8)
(P-2134-10)

PREPARED BY: J.H.F.Jr.

DATE: 3/53 a11 (left parenthesis)

25a4	→ 0	sp 9a8	(store dummy symbol)
	1	ao 3a10	
	2	ao 5a10	
	3	sp a10	
	4	sp a8	
6r 16r	5	td (73a10)	
	6	ao 5r	
	7	ca 12a4	op1
	8	su 50a4	op
	9	cp 11r	
	10	sp 2a1	
9r	→ 11	ca 5a10	loc. of stack [a]
	12	td 14r	
	13	td 16r	
(12r)	14	ca (-)	
	15	ad 18r	
not worked	(13r)	16	ts (-)
	17	sp 12a10	
	18	0.04000	(5a7)

(T-2134-M8)
 (P-2134-10)

PREPARED BY: J.H.F.

DATE: 3/53 a12 (Right parenthesis)

17a4 → 0	ca 5a10	loc of stack 1 [67]
1	td 4r	
2	su 62a3 = 1	
3	td 5a10	
(17) 4	ca (-)	stack 1 [67]
5	td 29r	
6	su 18a11	tag bit.
7	cp 36r	
8	sp 28a9	
37r → 9	ca 5a11	loc of stack 2 [67]
10	su 62a3	
11	td 5a11	
12	td 16r	
13	td 32r	
14	ca 22a4	
15	sp 9a8	
(12r) 16	ca (-)	stack 1 [67]
17	ad 47a3	ts 0
18	sp 9a8	
19	ca 3a10	loc of stack 2 [67]
20	td 24r	
21	su 62a3	
22	td 3a10	
23	td 25r	
(20r) 24	ca (-)	stack 2 [67]
(23r) 25	ex (-)	stack 2 [67]
26	ad 4a3	
27	sp 9a8	
28	ad 62a3 = 1	
(5r) 29	td (-)	
30	ca 50a4	
31	td 33r	

(T-2134-1M 8)
P-2134-10

PREPARED BY J.H.J.A.

DATE: 3/53 a 12 (continued)

(13r)	32	ca(-)
(31r)	33	ad(-)
	34	sp 9a8
	35	sp 2a1
7r →	36	sp 18a9
	37	sp 9r

(13-1) (7-2134-118)
 P-2134-10

PREPARED BY J.H. Fisher

DATE: 3/53 a 13 (Interpretive routines)

→ 0	ta 4n	equals
1	ca 07	
2	ts 41n	
3	ca 2a7	
4	sp (-)	
→ 5	ta 9n	plus
6	ad 41n	
7	ts 41n	
8	ca 207	
9	sp (-)	
→ 10	ta 14n	minus
11	ad 41n	
12	ts 41n	
13	cs 2a7	
14	sp (-)	
→ 15	ta 21n	exponent
16	ta 27n	
17	sp ax	
18	ao 21n	
19	td 32n	
20	ao 32n	
21	cs (-)	add parameter
22	cp 37n	when it > 0?
23	ts 40n	
24	cs 40n	
25	ts 40n	
26	ca 210	= dv. 0
27	ad (-)	3rd parameter
28	ts 34n	
29	ao 40n	
30	cp 33n	
31	sp ax	
32	sp (-)	return to caller
33	sp ax	
34	(mv(-)/dv(-))	
35	sp ax	
36	sp 29n	
37	ts 40n	
38	ca 55a3	= mv
39	sp 27n	
40	+0	-141 counter
41	+0	{ temporary sum
42	+0	{ stored in
		arithmetic

(T-2134-118)
 (P-2134-10)

PREPARED BY: J.H.Z. Jr.

DATE: 3/53

a15 (Print control)

0 || ta 3r] plant address of 1st
 1 || sp ax] character to be printed

2 || si 14r

(or) 3 || ca (-)

4 || td 16r

5 || td 8r

6 || cp 9r

7 || sp ax

(or) 8 || sp (-)

9 || su a3

10 || clc 10

11 || rc 11r

12 || ao 3r

13 || ca 594 (0.22000 - "=")

14 || rc 14r

15 || sp ax

(or) 16 || ca (-)

17 || sp 222 (24,6) print

18 || sp 1r routine

If next symbol is an sp order
 carry it out. Since symbols
 to be printed are stored as
 form "mrX, mry," etc.
 and print the "mr" actuates the
 1st letter

print
 number

(T-2134-1m8)
(P-2134-10)

PREPARED BY: J. H. Z. Jr.

DATE: 3/53

a16 (used in a2)

- 0 ta 10r
 - 1 ca 409
 - 2 ex 2503
 - 3 ex 409
 - 4 ca 12r
 - 5 ex 4404
 - 6 ex 12r
 - 7 ca 1202
 - 8 ex 1703
 - 9 ex 1202
 - 10 sp (-)
 - 11 || sp 015
 - 12 || (sp202/sp02)
- act, to sp201 and reset
- set P to sp202 (and reset)
- set. to sp802 (and reset)

Miscellaneous

210 dv 0

211 = 0014 and also "1t" in print routine. Equations are not allowed 0 as a number, thus 0014 is not used in a meaningful way.

212-221 = 1014 - 10014 : storage for sp orders to initial address of numbered equations (a maximum of 10 allowed)

222 (24,6) print routine

852 = "ax" = (24,6) programmed arithmetic