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AOPB SYSTEMS MANUAL
Program Description

MYSTIC TRACER

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GODDARD SPACE FLIGHT CENTER

GREENBELT, MARYLAND

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MYSTIC TRACER

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I. Program Objective and General Description

Mystic Tracer

The Mystic Tracer program is used to debug programs by tracing specified sequences of Mystic commands as they are executed. The contents of locations and results from the execution of commands are listed from tape. The Mystic Tracer uses the IBM 1401 Bumper program to prepare the program to be traced plus all of its subroutines.

The job is set up in two steps. The Tracer is set up as a subroutine which is called at the point in the sequence of commands at which the user desires tracing to begin. Thus, a function command must be inserted in the user's program at this point and the Tracer deck must be K'd and added onto the user's program. In the first step, the entire program to be traced is written on tape by the IBM 1401 Bumper program. The main program plus all subroutines that might be traced (included within the sequence of traced commands) must go onto this tape. The function command calling the Tracer must be inserted before step 1, but the Tracer (as a subroutine) need not be added to go onto this tape. In the second step, the program to be traced is compiled with the function command inserted to call the Tracer. The user's program, all subroutines to be traced, and the Tracer subroutine are compiled and execution continues until the Mystic function command calling the Tracer is executed. At this point, the Mystic Tracer takes over and continues to execute the instructions in the sequential order set by the logic of the user's program, but simultaneously records information about the execution of each command (arguments, results, et cetera). This tracing calls the tape generated in the 1401 step and continues until the Begin command specified in the function command calling the tracer is reached. At this point, control is returned to the main program and execution continues.

II. 1401 Bumper

Program Objective

This program adds the contents of the K counter to each address in a Mystic command–except those which have been Q'ed. The contents of the K counter are set to zero when a K00000 is encountered. Any other K is cumulatively added into the K counter.

In addition, this program has a feature necessary for tracing function commands with the tracing program. A record count is printed in columns 66-70 of each record containing a function command.

The 1401 bumper will accept Mystic commands from card or tape. For card input, sense switch C should be "on." For tape input, sense switch C should be "off" and the input tape is read from unit #1. This program makes a BCD tape on unit #2 which is input on B-4 for tracing.

III. Mystic Tracer

Program Objective

This program is used in debugging. It traces each command executed within bounds set by the user. All Mystic commands will be traced at present except for the following commands: Note, Load, and Execute. Also, this program can not yet trace a variable end (a transfer command that transfers to different Begin commands at successive executions of the transfer command. Example:

```
G 00100 00050 00060
E 00100
```

where the location equal to 50 plus the contents of location 60 contains a Begin command).

As each command to be traced is executed, the Mystic command (operation code, X-address, Y-address, Z-address, and any other parameters) is written on tape along with information about the contents of the locations.

The Tracer is functioned to and the program can continue after the desired commands have been traced.

Program Requirements

The Mystic Tracer is a subroutine and should be placed behind all other subroutines of the program to be traced. It uses 380 memory locations. The first Q card must be filled in by the user:

```
Q 90040 XXXXX
```

where XXXXX equals K plus 1 (one)–(equals the location of the first Begin command of the Tracer).

A BCD tape of the program to be traced (including the function command calling the Tracer) plus all subroutines used by it should be made

using the 1401 Bumper Program. This tape is input to the Tracer program on tape unit B-4 during tracing.

A blank tape on B-5 is used by the Tracer for output. This tape should be listed to follow the execution of commands after the run.

Both for making the input tape and running the program, a function command should be inserted where the user wants tracing to begin.

F XXXXX YYYYY ZZZZZ

where XXXXX = 00000
YYYYY = the location of the first Begin command of the Tracer
ZZZZZ = the Begin command (in the program to be traced) where tracing should stop. The Tracer will execute and trace all commands in the flow of command sequence until this Begin command is reached.

Example: The Tracer is K'ed to 00500 and the user wishes to trace a section of his program starting with M 00080 00081 00082 and ending with B 00005.

```
                .
                .
                .
                .
              *B 00011
               D 00040 00041 00042
  ------------>
               M 00080 00081 00082
                .
                .
                .
                .
               R 00440 00441
               G 00040 00050 00100
               C 00040 00200 00005
               E 00011
              *B 00005
```

The following function command should be inserted before the Multiply command:

F 00000 00501 00005

The program plus subroutines, but not the Tracer deck, is put on tape with the IBM 1401 Bumper program. Then the K card and Tracer are put behind this deck for the machine run.

When F 00000 00501 00005 is executed, tracing begins with M 00080 00081 00082 and continues until C 00040 00200 00005, or some other command, transfers control to B 00005.

More than one section of the program can be traced by inserting other such function commands.

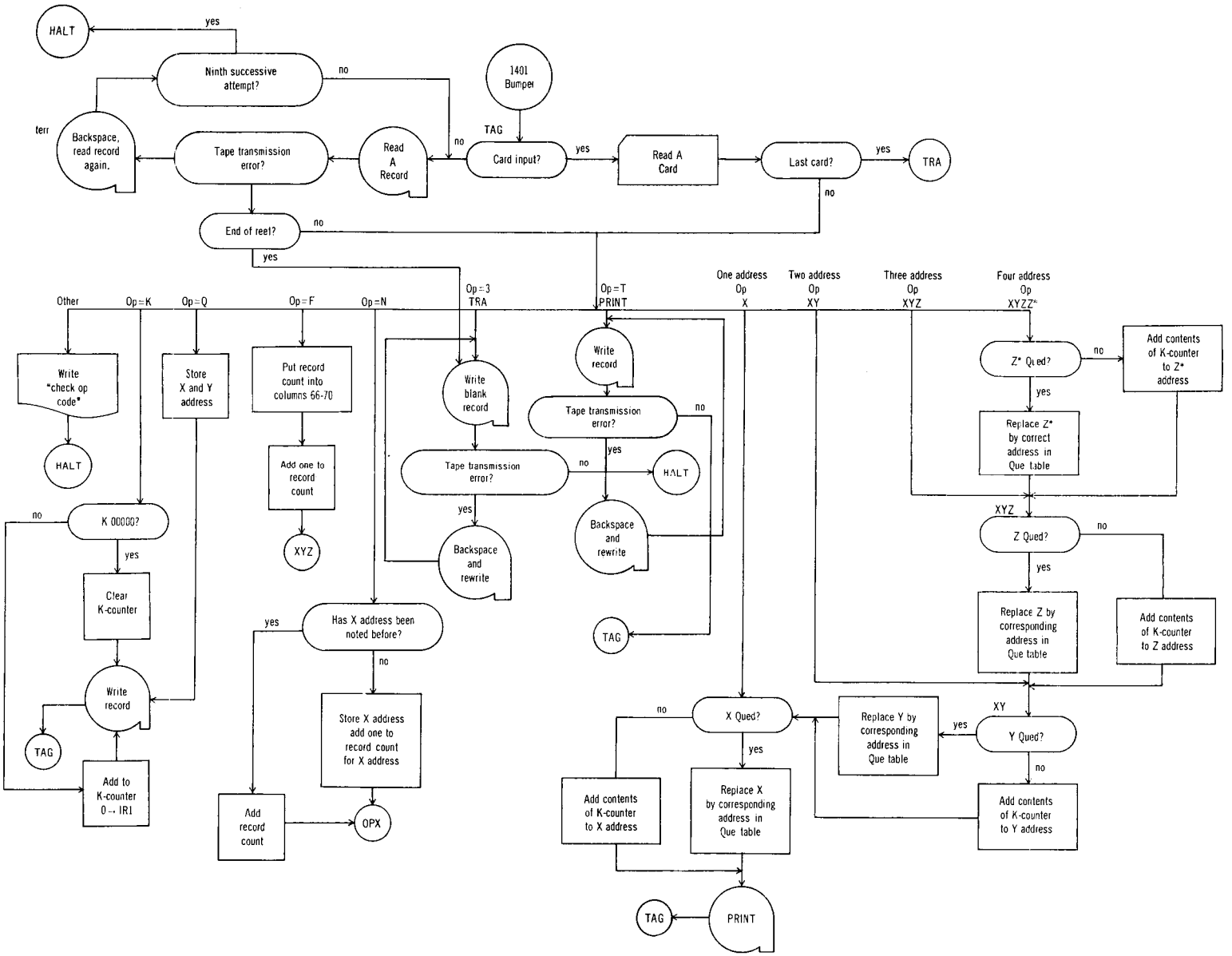
IV. Sample Output

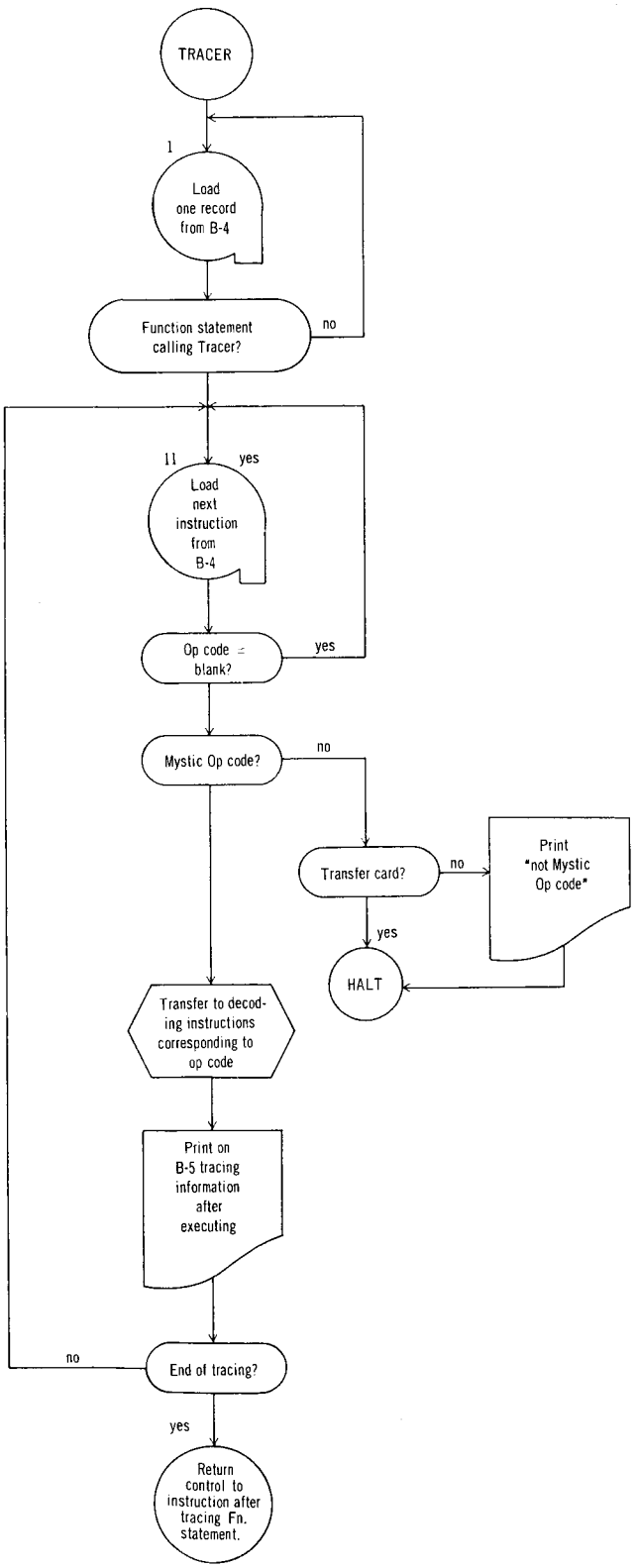
```
OP    X       Y       Z     Y+(Z)          (Y+(Z))
G 00078 00050 CC005 500C00C0 02 10C00000 01

OP    X       Y       Z     (X)            (Y)            (Z)
M 00080 C0008 CC078 300C00C0 01 30C00C00 01 10000000 01

OP    X       Y       Z     (X)            (Y)            (Z)
M 00084 00078 C0078 100C00C0 01 10000C00 01 10000000 01

OP    X       Y       Z     (X)            (Y)            (Z)
M 00085 00007 CC084 400C00CC 01 40000000 01 10000000 01

OP    X       Y       Z     (Y)+(Z)        (Y)            (Z)
A 00080 00080 CC085 700C00C0 01 30C00000 01 40000000 01

OP    X       Y       Y     (X)            (Y)            (Z)
M 00084 00078 C0084 100C0000 01 10C00000 01 10000000 01

OP    X       Y       Z     (Y)+(Z)        (Y)            (Z)
A 00080 00080 C0084 800C00C0 01 70C00C00 01 10000000 01

OP    X       Y       Z     (Y)+(Z)        (Y)            (Z)
A 00080 00080 CC006 230C00CC 02 80000000 01 15000000 02

OP    X       Y       Z     (Y)+(Z)        (Y)            (Z)
A 00082 00080 C0082 230C00C0 02 23C00000 02 00000000 00

OP    X    Y     Z       (Z)
F 00090 C9748 CC080 230C0000 02

OP    X    Y     Z       (Z)
F 00092 C9748 00082 230C0000 02

OP    X    Y     Z       (Z)
F 00088 09748 CC078 100C00CC 01

OP    X    Y    Z     CCLUMNS PER FIELD
P 00088 00009PA  C9030903 C9030000 00000000 00000000 0000
   WAY DATA IS STORED
   NNNNNN
  (Y)          (X)
 10C0CCC0 01 1CC0C000 08

OP    X       Y       Z     (Y)+(Z)        (Y)            (Z)
A 00005 00005 CC009 100C00C0 01 0CC00C00 00 10000000 01
```

```
OP    X       Y       Z         (X)           (Y)
C 00010 0C0C5 CC0C1 200C00C0 02 10C00000 01

OP     X
B  00001

OP    X       Y       Z    Y+(Z)        (Y+(Z))
G 0C078 00050 CCCC5 510C00C0 02 20C00000 01

OP    X       Y       Z     (X)           (Y)           (Z)
M 0C08C 0C008 CC078 600C00C0 01 3CC00C00 01 20000000 01

OP    X       Y       Z     (X)           (Y)           (Z)
M 00084 0C078 C0078 400C0CC0 01 20C00000 01 20000000 01

OP    X       Y       Z     (X)           (Y)           (Z)
M 00085 0C0C7 C0084 160C0CC0 02 40000C00 01 40000000 01

OP    X       Y       Z     (Y)+(Z)         (Y)           (Z)
A 0C080 00080 CC085 220C0CC0 02 60000000 01 16000000 02

OP    X       Y       Y     (X)           (Y)           (Z)
M 0C084 00078 C0084 800C0CC0 01 20C00000 01 40000000 01

OP    X       Y       Z     (Y)+(Z)         (Y)           (Z)
A 00080 0C080 C0084 300C0CC0 02 22C00C00 02 80000000 01

OP    X       Y       Z     (Y)+(Z)         (Y)           (Z)
A 00080 00080 C0C06 450C0CCC 02 30000000 02 15000000 02

OP    X       Y       Z     (Y)+(Z)         (Y)           (Z)
A 0C082 0C080 CC082 680C00C0 02 45000000 02 23000000 02

OP    X    Y     Z       (Z)
F 0CC9C 09748 C0080 450C0CC0 02

OP    X    Y     Z       (Z)
F 00092 09748 C0082 680C0CC0 02

OP    X    Y     Z       (Z)
F 00088 09748 CC078 200C00C0 01

OP    X    Y    Z     CCLUMNS PER FIELD
P 0C088 C00C9PA  C9030903 C9030000 00000000 00000000 0000
   WAY DATA IS STCRED
   NNNNNN
```

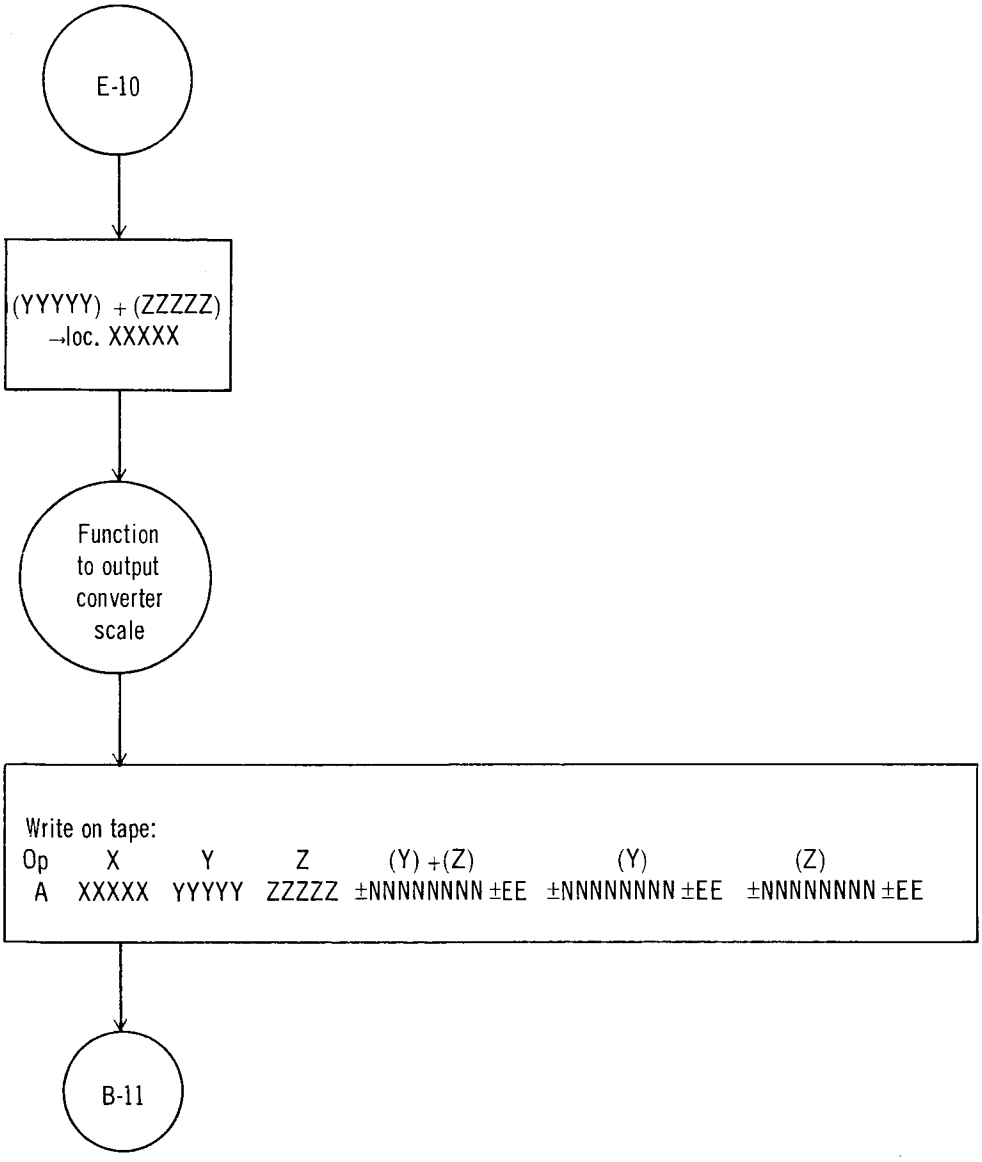
```
 (Y)          (X)
 10000000 01 2CC00000 08

OP    X       Y       Z      (Y)+(Z)          (Y)            (Z)
A 00005 00005 00009 20000000 01 10000000 01 10000000 01

OP    X       Y       Z        (X)            (Y)
C 00010 00005 00001 20000000 02 20000000 01

OP     X
B  00001

OP    X       Y       Z     Y+(Z)          (Y+(Z))
G 00078 00050 00005 52000000 02 30000000 01

OP    X       Y       Z      (X)            (Y)            (Z)
M 0008C 00008 00078 90000000 01 30000000 01 30000000 01

OP    X       Y       Z      (X)            (Y)            (Z)
M 00084 00078 00078 90000000 01 30000000 01 30000000 01

OP    X       Y       Z      (X)            (Y)            (Z)
M 00085 00007 00084 36000000 02 40000000 01 90000000 01

OP    X       Y       Z      (Y)+(Z)          (Y)            (Z)
A 00080 00080 00085 45000000 02 90000000 01 36000000 02

OP    X       Y       Y      (X)            (Y)            (Z)
M 00084 00078 00084 27000000 02 30000000 01 90000000 01

OP    X       Y       Z      (Y)+(Z)          (Y)            (Z)
A 00080 00080 00084 72000000 02 45000000 02 27000000 02

OP    X       Y       Z      (Y)+(Z)          (Y)            (Z)
A 00080 00080 00006 87000000 02 72000000 02 15000000 02

OP    X       Y       Z      (Y)+(Z)          (Y)            (Z)
A 00082 00080 00082 15500000 03 87000000 02 68000000 02

OP    X    Y     Z       (Z)
F 0009C 09748 00080 87000000 02

OP    X    Y     Z       (Z)
F 00092 09748 00082 15500000 03

OP    X    Y     Z       (Z)
F 00088 09748 00078 30000000 01
```

```
OP    X    Y    Z     COLUMNS PER FIELD
P 00088 00CC9PA  09030903 C9C30000 00000000 00000000 0000
   WAY DATA IS STCRED
   NNNNNN
  (Y)         (X)
 10000000 01 3CC00000 08

OP    X      Y      Z     (Y)+(Z)         (Y)           (Z)
A OCCC5 00005 CCCC9 300C0000 01 2CC00C00 01 10000000 01

OP    X      Y      Z       (X)           (Y)
C 0001C 0C0C5 CC0C1 200C0CC0 02 3CC00000 01

OP     X
B  00001

OP    X      Y      Z    Y+(Z)        (Y+(Z))
G 00078 00050 CCC05 530C00C0 02 4C000000 01

OP    X      Y      z     (X)           (Y)           (Z)
M 0C080 00008 CC078 12000000 02 30000000 01 40000000 01

OP    X      Y      z     (X)           (Y)           (Z)
M 0C084 00078 CC078 160C0000 02 4C000000 01 40000000 01

OP    X      Y      z     (X)           (Y)           (Z)
M 00085 000C7 C0084 640C0CC0 02 40C00C00 01 16000000 02

OP    X      Y      Z     (Y)+(Z)         (Y)           (Z)
A 00080 0C080 CC085 760C00C0 02 12000000 02 64000000 02

OP    X      Y      Y     (X)           (Y)           (Z)
M 00084 00078 C0084 640C0000 02 4CC00C00 01 16000000 02

OP    X      Y      Z     (Y)+(Z)         (Y)           (Z)
A 00080 0C080 CC084 140C0000 03 76C00C00 02 64000000 02

OP    X      Y      Z     (Y)+(Z)         (Y)           (Z)
A 00080 0C080 C0006 155C00C0 03 14000000 03 15000000 02

OP    X      Y      Z     (Y)+(Z)         (Y)           (Z)
A 00082 0C080 C0082 31000000 03 155C0000 03 15500000 03

OP    X    Y     Z       (Z)
F 0CC9C 09748 CC080 155C0CC0 03

OP    X    Y     Z       (Z)
```


HALT
yes
Ninth successive attempt?
no
1401 Bumper
TAG
terr
Backspace, read record again.
Tape transmission error?
Read A Record
no
Card input?
yes
Read A Card
Last card?
yes
TRA
no
End of reel?
no
yes
Other
Op=K
Op=Q
Op=F
Op=N
Op=3 TRA
Op=T PRINT
One address Op X
Two address Op XY
Three address Op XYZ
Four address Op XYZZ'
Write "check op code"
HALT
Store X and Y address
Put record count into columns 66-70
Add one to record count
XYZ
Write blank record
Tape transmission error?
yes
no
HALT
Backspace and rewrite
Write record
Tape transmission error?
yes
no
HALT
Backspace and rewrite
TAG
Z* Qued?
no
Add contents of K-counter to Z* address
yes
Replace Z* by correct address in Que table
XYZ
Z Qued?
no
yes
Replace Z by corresponding address in Que table
Add contents of K-counter to Z address
XY
Y Qued?
yes
no
Replace Y by corresponding address in Que table
Add contents of K-counter to Y address
X Qued?
no
yes
Add contents of K-counter to X address
Replace X by corresponding address in Que table
TAG
PRINT
no
K 00000?
yes
Clear K-counter
Write record
TAG
Add to K-counter 0 → IR1
yes
Has X address been noted before?
no
Store X address add one to record count for X address
Add record count
OPX


TRACER
1
Load one record from B-4
Function statement calling Tracer?
no
11
yes
Load next instruction from B-4
Op code = blank?
yes
Mystic Op code?
no
Transfer card?
no
Print "not Mystic Op code"
yes
HALT
Transfer to decoding instructions corresponding to op code
Print on B-5 tracing information after executing
no
End of tracing?
yes
Return control to instruction after tracing Fn. statement.

Sample Decoding Instructions: Add Op (A XXXXX YYYYY ZZZZZ)



MYSTIC STORAGE MAP

MYSTIC PROGRAM NO. _____ PAGE 1 OF 4

DESCRIPTION: Tracing Program

Uses Locations 1 to 379

PROGRAMMER: Patricia Brown Savage

00	00	01 B	02 Transfer to Next Instruction	03 [Z – Y]	04 [X – Y]	
05	05 (Z)	06 –2	07 B	08 B	09 B	
10	10 Variable End	11 B	12 B	13 B	14 B	
15	15 B	16 B	17 B	18 B	19	
20	20 B	21 B	22	23	24	
25	25 B	26 B	27 B	28	29 B	
30	30 ϕ	31 89	32 The Letter B	33 The Letter N	34 61	
35	35	36 30,000	37 Return From Tracer	38	39 61,000,000	
40	40 B	41 B	42 B	43 B	44 B	
45	45 B	46	47 B	48	49	
50	50 OP	51 X	52 Y	53 Z	54	
55	55	56	57	58	59	
60	60	61	62	63	64	
65	65 –1	66 +1	67 160	68 3	69 700,000	
70	70 63,000	71 6,400	72 7,800	73 9,000	74	
75	75 75	76 90	77 8,300	78 10,000	79 80	
80	80 2	81 4	82 5	83 6	84 3	
85	85 100	86 Note Counter	87 Counter	88 9,748	89	
90	90	91	92	93	94	
95	95 The Letter F	96	97	98 Working Storage	99	

NOTES:

MYSTIC STORAGE MAP

MYSTIC PROGRAM NO. _____ PAGE 2 OF 4

DESCRIPTION: Tracing Program
Uses Locations 1 to 379

PROGRAMMER: Patricia Brown Savage

1,00	00	01	02	03	04
1,05	05	06	07	08	09
1,10	10	11	12	13	14
1,15	15	16	17	18	19
1,20	20	21	22	23	24
1,25	25	26	27	28	29
1,30	30	31	32	33	34
1,35	35	36	37	38	39
1,40	40	41	42	43	44
1,45	45	46	47	48	49
1,50	50	51	52	53	54
1,55	55	56	57	58	59
1,60	60	61	62	63	64
1,65	65	66	67	68	69
1,70	B 70	B_A 71	B_B 72	B_C 73	B_D 74
1,75	B_E 75	B_F 76	B_G 77	B_H 78	B_I 79
1,80	B 80	B_J 81	B_K 82	B_L 83	B_M 84
1,85	B_N 85	B_O 86	B_P 87	B_Q 88	B_R 89
1,90	Z 90	1050 91	B_S 92	B_T 93	B_U 94
1,95	B_V 95	B_W 96	B_X 97	B_Y 98	B_Z 99

NOTES:

MYSTIC STORAGE MAP

MYSTIC PROGRAM NO. _____ PAGE 3 OF 4

DESCRIPTION: Tracing Program
Uses Locations 1 to 379

PROGRAMMER: Patricia Brown Savage

2,00	B 00	B 01	Variable End To Zero 02	Storing Notes 03	Storing Notes 04
2,05	Storing Notes 05	Storing Notes 06	Storing Notes 07	Storing Notes 08	Storing Notes 09
2,10	Storing Notes 10	B 11	B 12	Working Storage 13	B 14
2,15	B 15	B 16	B 17	B 18	B 19
2,20	B 20	B 21	B 22	B 23	B 24
2,25	B 25	B 26	B 27	B 28	B 29
2,30	B 30	B 31	B 32	B 33	34
2,35	35	36	37	38	39
2,40	40	41	42	43	44
2,45	45	46	47	48	49
2,50	OUTPUT SCALE CONVERTER → 50	51	52	53	54
2,55	55	56	57	58	59
2,60	60	61	62	63	64
2,65	65	66	67	68	69
2,70	70	71	72	73	74
2,75	75	76	77	78	79
2,80	80	81	82	83	84
2,85	85	86	87	88	89
2,90	90	91	92	93	94
2,95	95	96	97	98	99

NOTES:

MYSTIC STORAGE MAP

MYSTIC PROGRAM NO. _____ PAGE 4 OF 4

DESCRIPTION: Tracing Program

Uses Locations 1 to 379

PROGRAMMER: Patricia Brown Savage

3,00	OUTPUT SCALE CONVERTER →	01	02	03	04
3,05	05	06	07	08	09
3,10	10	11	12	13	14
3,15	15	16	17	18	19
3,20	20	21	22	23	24
3,25	25	26	27	28	29
3,30	30	31	32	33	34
3,35	35	36	37	38	39
3,40	40	41	42	43	44
3,45	45	46	47	48	49
3,50	50	51	52	53	54
3,55	55	56	57	58	59
3,60	60	61	62	63	64
3,65	65	66	67	68	69
3,70	70	71	72	73	74
3,75	↓ 75	76	77	78	79
,80	80	81	82	83	84
,85	85	86	87	88	89
,90	90	91	92	93	94
,95	95	96	97	98	99

NOTES:

```
CLEAR STORAGE 1     ,008015,022026,030034,041,045,053,0570731026
CLEAR STORAGE 2     L072116,110106,1051178101/199,027A074078)027B0010270BC26/0991,001/00111710
BOOTSTRAP CARD      ,008015,022029,056063/056029                              ,0240671056
```



```
PG LIN  CT  LABEL   OP    A OPERAND        B OPERAND      D     LOC   INSTRUCTION COMMENTS
 1 010          CTL   331
 1 020          ORG   3C00
 1 150   7      SW    0801             0802                   3000  , 801 802
 1 152   4      SW    NCTECT+002                              3007  , I97
 1 160   4      SW    0340                                    3011  , 340
 1 170   7      SW    0087             0092                   3015  , 087 092
 1 180   4      SW    CC01                                    3022  , 001
 2 060   4  TAG A      READ                                    3026  B B50
 2 070   8      B     CPK              0801           K       3030  B C46 801 K
 2 080   8      B     CPQ              0801           Q       3038  B D03 801 Q
 2 090   8      B     XYZ              0801           C       3046  B D58 801 C
 2 100   8      B     CPF              0801           F       3054  B H13 801 F
 2 110   8      B     XYZ              0801           G       3062  B D58 801 G
 2 120   8      B     XYZ              0801           H       3070  B D58 801 H
 2 130   8      B     X                0801           B       3078  B E18 801 B
 2 140   8      B     X                0801           E       3086  B E18 801 E
 2 150   8      B     XY               0801           L       3094  B D88 801 L
 2 160   8      B     XY               0801           P       3102  B D88 801 P
 2 170   8      B     XYZZ             0801           C       3110  B D28 801 C
 2 180   8      B     XYZ              0801           A       3118  B D58 801 A
 2 190   8      B     XYZ              0801           D       3126  B D58 801 D
 2 200   8      B     XYZ              0801           M       3134  B D58 801 M
 2 210   8      B     XYZ              0801           S       3142  B D58 801 S
 2 220   8      B     CPN              0801           N       3150  B H48 801 N
 2 230   8      B     X                0801           V       3158  B E18 801 V
 2 240   8      B     X                0801           I       3166  B E18 801 I
 2 250   8      B     X                0801           W       3174  B E18 801 W
 2 260   8      B     PRINT            0801           T       3182  B G25 801 T
 2 270   8      B     XY               0801           R       3190  B D88 801 R
 2 280   8      B     PRINT            0801           O       3198  B G25 801 O
 2 290   8      B     X                0801           J       3206  B E18 801 J
 2 300   8      B     X                0801           X       3214  B E18 801 X
 2 310   8      B     TRA              0801           3       3222  B F72 801 3
 2 320   8      B     PRINT            0801                   3230  B G25 801
 2 322   8      B     PRINT            0801           .       3238  B G25 801 .
 2 325   4      B     OTHER                                   3246  B H31
 2 330   4  READ SBR  EXIT + 3                                3250  H B87
 3 020   5  RETURN B  READC                           C       3254  B C12 C
 3 030   7  READ1 LCA ZERO -003        BSPK                   3259  L I62 I76
 3 040   8  READT MCW (L1             0801           R       3266  M (U1 801 R
 3 050   5      B     TERR                           L       3274  B B88 L
 3 060   5      B     TRA                            K       3279  B F72 K
 3 120   4  EXIT B    0000                                    3284  B 000
 3 130   5  TERR CC    (L1                            B       3288  U (U1 B
 3 140   7      A     CNE              BSPK                   3293  A I71 I76
 3 150   8      B     PRINT            BSPK           9       3300  B G25 I76 9
 3 160   4      B     READT                                   3308  H H66
 3 170   1  READC R                                          3312  1
 3 190   7      MCM   CC01             0801                   3313  P 001 801
 3 185   5      B     TRA                            A       3320  B F72 A
 3 190   4      B     EXIT                                    3325  B B94
```

```
PG LIN  CT  LABEL   OP    A OPERAND          B OPERAND          D    LOC   INSTRUCTION COMMENTS
 4 010   4  PRINTE  CS    0332                                     3329  / 332
 4 015   4          CS    0300                                     3333  / 300
 4 020   7          LCA   0918               0201                3337  L 918 201
 4 030   1          W                                              3344  2
 4 040   1          H                                              3345  .
 4 045   4  OPK     CS    0799                                     3346  / 799
 4 050   1          CS                                             3350  /
 4 060   7          C     ZERO               0806                3351  C 165 806
 4 065   4          CS    1109                                     3358  / 109
 4 070   5          B     KNZ                              /       3362  B C95 /
 4 080   7          LCA   ZERO  -002         0089                3367  L 163 089
 4 090   7          ZA    0806               0344                3374  + 806 344
 4 130   4          B     PRINT                                  3381  B G25
 4 150   7  KNZ     A     0806               0344                3385  A 806 344
 4 155   7          LCA   ZERO  -002         0089                3392  L 163 089
 4 190   4          B     PRINT                                  3399  B G25
 4 200   7  OPW     LCA   0806               1104       1        3403  L 806 /44
 4 210   7          LCA   0811               1109       1        3410  L 811 /49
 4 220   7          A     TEN                0089                3417  A 174 089
 4 260   4          B     PRINT                                  3424  B G25
 4 265   7  XYZZ    LCA   ZERO  -002         0094                3428  L 163 094
 5 010   4          SW    0817                                     3435  , 817
 5 030   7  COMPQ1  C     0821               1104       2        3439  C 821 /-4
 5 040   5          B     NXTQ1                            /       3446  B E52 /
 5 050   7          MCW   1109        2      0821                3451  M /-9 821
 5 055   7  XYZ     LCA   ZERO  -002         0094                3458  L 163 094
 5 060   4          SW    0812                                     3465  , 812
 5 070   7  COMPQ2  C     0816               1104       2        3469  C 816 /-4
 5 080   5          B     NXTQ2                            /       3476  B E92 /
 5 090   7          MCW   1109        2      0816                3481  M /-9 816
 5 095   7  XY      LCA   ZERO  -002         0094                3488  L 163 094
 5 100   4          SW    0807                                     3495  , 807
 5 110   7  COMPQ3  C     0811               1104       2        3499  C 811 /-4
 5 120   5          B     NXTQ3                            /       3506  B F12 /
 5 130   7          MCW   1109        2      0811                3511  M /-9 811
 5 135   7  X       LCA   ZERO  -002         0094                3518  L 163 094
 5 140   4          SW    0802                                     3525  , 802
 5 150   7  COMPQ4  C     0806               1104       2        3529  C 806 /-4
 5 160   5          B     NXTQ4                            /       3536  B F42 /
 5 170   7          MCW   1109        2      0806                3541  M /-9 806
 5 190   4          B     PRINT                                  3548  B G25
 6 010   7  NXTQ1   A     TEN                0094                3552  A 174 094
 6 030   7          C     0094               0089                3559  C 094 089
 6 040   5          B     COMPQ1                           U       3566  B D39 U
 6 045   7          A     0344               0821                3571  A 344 821
 6 050   4          B     XYZ                                    3578  B D58
 6 060   7  NXTQ2   A     TEN                0094                3582  A 174 094
 6 080   7          C     0094               0089                3589  C 094 089
 6 090   5          B     COMPQ2                           U       3596  B D69 U
 6 095   7          A     0344               0816                3601  A 344 816
 6 100   4          B     XY                                     3608  B D88
 6 110   7  NXTQ3   A     TEN                0094                3612  A 174 094
 6 130   7          C     0094               0089                3619  C 094 089
 6 140   5          B     COMPQ3                           U       3626  B D99 U
 6 145   7          A     0344               0811                3631  A 344 811
 6 150   4          B     X                                      3638  B E18
```

```
PG LIN  CT  LABEL   OP    A OPERAND          B OPERAND          D      LOC   INSTRUCTION COMMENTS
 6 170   7  NXTQ4   A     TEN                0094                      3642  A I74 094
 6 190   7          C     CC94               0089                      3649  C 094 089
 6 200   5          B     COMPQ4                                 U     3656  B E29 U
 6 205   7          A     C344               0806                      3661  A 344 806
 6 210   4          B     PRINT                                        3668  B G25
 7 100   7  TRA     LCA   GPMK               0875                      3672  L I77 875
 7 110   8  ALPHAT  MCW   (L2                0801               W      3679  M (U2 801 W
 7 120   5          B     WERRT                                  L     3687  B G73 L
 7 121   4          CS    0880                                         3692  / 880
 7 122   7          LCA   GPMK               0875                      3696  L I77 875
 7 123   8          MCW   (L2                0801               W      3703  M (U2 801 W
 7 125   5          CL    (L2                                    M     3711  U (U2 M
 7 127   5          CL    (L2                                    M     3716  U (U2 M
 7 130   4  HALT    H     HALT                                         3721  . G21
 7 210   7  PRINT   LCA   GPMK               0875                      3725  L I77 875
 7 220   8  ALPHA   MCW   (L2                0801               W      3732  M (U2 801 W
 7 230   5          B     WERR                                   L     3740  B G49 L
 7 240   4          B     TAG                                          3745  B +26
 8 010   5  WERR    CL    (U2                                    B     3749  U (U2 B
 8 020   7          A     CNE                BSPKW                     3754  A I71 I79
 8 030   8          B     PRINTW             BSPKW              5      3761  B G97 I79 5
 8 040   4          B     ALPHA                                        3769  B G32
 8 070   5  WERRT   CL    (L2                                    B     3773  U (U2 B
 8 080   7          A     CNE                BSPKWT                    3778  A I71 I81
 8 090   8          B     PRINTW             BSPKWT             5      3785  B G97 I81 5
 8 100   4          B     ALPHAT                                       3793  B E79
 8 120   7  PRINTW  LCA   GPMK               1020                      3797  L I77 +20
 8 130   8          MCW   (L2                1000               W      3804  M (U2 +00 W
 8 140   1          H                                                  3812  .
 8 142   7  UPF     A     CNE                RCT                       3813  A I71 I70
 8 143   7          LCA   RCT                0870                      3820  L I70 870
 8 144   4          H     XYZ                                          3827  B D58
 8 150   4  OTHER   CS    0332                                         3831  / 332
 8 160   4          CS    0300                                         3835  / 300
 8 170   7          LCA   1013               0201                      3839  L +13 201
 8 180   1          W                                                  3846  2
 8 190   1          H                                                  3847  .
 8 192   7  OPN     SW    0802               0600                      3848  , 802 600
 8 195   7          LCA   ZERO  -002         0094                      3855  L I63 094
 8 210   7  OPN2    C     CC94               0099                      3862  C 094 099
 8 220   7          A     EIGHT              0094                      3869  A I89 094
 8 223   5          B     STOREN                                 S     3876  B I22 S
 8 225   7          C     C596          2    0806                      3881  C 5R6 806
 8 230   5          B     OPN2                                   /     3888  B H62 /
 8 231   4          SW    0605                                         3893  , 605
 8 233   7          A     NOTECT             0599          2          3897  A I95 5R9
 8 235   7          LCA   C596          2    0867                      3904  L 5R6 867
 8 240   7          LCA   C599          2    0870                      3911  L 5R9 870
 8 245   4          B     PRINT                                        3918  B G25
 8 255   7  STOREN  LCA   0806               0604          3          3922  L 806 6+4
 8 260   7          LCA   NOTECT             0607          3          3929  L I95 6+7
 8 270   7          LCA   C604          3    0867                      3936  L 6+4 867
 8 280   7          LCA   C607          3    0870                      3943  L 6+7 870
 8 285   7          A     EIGHT              0099                      3950  A I89 099
 8 290   4          B     PRINT                                        3957  B G25
 9 030   5  ZERO    DCW   *                                      00000 3965
 9 035   5  RCT     DCW   *                                      00000 3970
```

```
PG LIN  CT  LABEL    OP    A OPERAND      B OPERAND          D        LOC   INSTRUCTION COMMENTS
 9 040   1  ONE      DCW   *                                    1   3971
 9 050   3  TEN      DCW   *                                  010   3974
 9 060   2  BSPK     DCW   *                                   00   3976
 9 070  19           DCW   C918          BAD RECORD ON TAPE      0918
 9 080   1  BPMK     DCW   *                                      3977
 9 090   2  BSPKW    DCW   *                                   00   3979
 9 100   2  BSPKRT   DCW   *                                   00   3981
 9 110   9           DCW   1C09                    BAD WRITE      1000
 9 190   1           DCW   0400                            K      0400
 9 200   1           DCW   0401                            Q      0401
 9 210  13           DCW   1C13                CHECK OP CODE      1013
 9 215   5  BTABLE   DCW   1100                                   1100
 9 220   1  SHDS     DCW   CC81                                   0081
 9 222   5  NRCT     DCW   *                               00000   3986
 9 223   3  EIGHT    DCW   *                                 008   3989
 9 224   3  UNENTY   DCW   *                                 190   3992
 9 225   3  NCTECT   DCW   *                                 001   3995
10 010   3           DCW   CC89                             000   0089
10 020   3           DCW   CC94                             000   0094
10 030   3           DCW   C099                             000   0099
99 999               END   3C00                                   / +00 080

         185 CARDS
```

K= 00000

MYSTIC TRACER SEPTEMBER, 1962

TRACER USES 380 MEMORY LOCATIONS

```
Q 90041 09748
Q 90040 01001
Q 90043 02651
Q 90047 00001
Q 90045 00002
Q 90046 00003
Q 90050 00000
Q 90042 00000
W 00032     B
W 00033     N
W 00095     F
V 00006 -20000000+01
V 00030 +00000000+00
V 00031 +89000000+02
V 00034 +61000000+02
V 00036 +30000000+05
V 00039 +61000000+08
V 00065 -10000000+01
V 00066 +10000000+01
V 00067 +16000000+03
V 00068 +30000000+01
V 00069 +70000000+06
V 00070 +63000000+05
V 00071 +64000000+04
V 00072 +78000000+04
V 00073 +90000000+04
V 00075 +75000000+02
V 00076 +90000000+02
V 00077 +83000000+04
V 00078 +10000000+05
V 00079 +80000000+02
V 00080 +20000000+01
V 00081 +40000000+01
```

LOC OUTPUT CONVERTER OF USER
TO BE FILLED IN BY USER (K + 1)

(THE LETTER F)

```
                                    K=    00000

 V 00082 +50000000+01
 V 00083 +60000000+01
 V 00084 +30000000+01
 V 00085 +10000000+03
 V 00086 +00000000+00
 V 00087 +00000000+00
 V 00088 +97480000+04
 V 00191 +24900000+03
*B 00001
 L 00050 00066 TF     01050505                                  ANNN
 C 00050 00095 00001 00001          IS ⊙P = F
 G 00098 90042 00052
 C 00098 90040 00001 00001
 G 00005 90040 00003                YES
 G 00054 90042 00053
 C 00005 00054 00001 00001          DOES Z ⊙N TAPE = Z ⊙F FN STATEMENT
 A 00191 00191 00052
 R 00190 00053
*B 00011                            LOAD NEXT INSTRUCTION AFTER TRACER FN STATEMENT
 L 00050 00066 TF     0105050505                                ANNNN
 C 00050 00030 00014 00014          IS ⊙P EQUAL TO BLANK
 F 00011
*B 00014
 C 00050 00031 00012                IS ⊙P CODE = LETTER
 C 00034 00050 00012                IS ⊙P CODE = LETTER
 G 00010 00110 00050
 F 00010                            VARIABLE END
*B 00171                            ⊙P = A
 G 00058 90042 00053
 G 00056 90042 00052
 A 00054 00056 00058
 H 90042 00051 00054
 F 00054 90041 00054
 F 00056 90041 00056
 F 00058 90041 00058
    T⊙P   X     Y     Z    (Y)+(Z)        (Y)          (Z)
 P 00030 00066 TG
    T
 P 00050 00066 TG     01060606090309030903                      ANNNNNNNNN
 F 00011
*B 00018
    T⊙P DOES N⊙T EQUAL A MYSTIC ⊙P CODE    LIST ⊙UTPUT TAPE
 P 00000 00066 PA
```

```
                                    K=    00000

     T@P D@ES N@T EQUAL A MYSTIC @P C@DE
 P 00000 00066 TG
 F 00030
*B 00012
 C 00050 00084 00018 00018
     TTRANSFER CARD     HALT
 P 00030 00066 PA
 F 00030
*B 00173
 C 00054 00030 00009 00009          C @R C STAR
 G 00054 90042 00051
 G 00056 90042 00052
 C 00054 00056 00015
*B 00016
 F 00054 90041 00054
 F 00056 90041 00056
     T@P   X      Y      Z       (X)          (Y)
*B 00228
 P 00030 00066 TG
     T
 P 00050 00066 TG     0106060609030903                    ANNNNNNN
 F 00011
*B 00015                                GREATER THAN
 F 00056 90041 00056
 F 00054 90041 00054
     T@P   X      Y      Z       (X)          (Y)
 P 00030 00066 TG
     T
 P 00050 00066 TG     0106060609030903                    ANNNNNNN
 P 00030 00065 TF                     REWIND TAPE
*B 00047
 C 00066 00087 00007                                ANY FUNCTI@NS STATEMENTS YET
 G 00098 00110 00087
 C 00098 00053 00007 00007
 G 00098 00111 00087
 S 00087 00087 00080
*B 00045
 L 00050 00066 TF     151515150505                       SSSSSN
 C 00050 00098 00045 00045
     TRETURN FR@M FUNCTI@N RECORD MARK EQUALS
 P 00050 00066 TG     15151105                           SSSN
 F 00011
```

```
                                K=    00000

*B 00007
 G 00098 90042 00053
 R 00055 00030
 C 00098 00030 00201 00201
 G 00202 90042 00053
     THALT TRANSFER TO A LOCATION THAT CONTAINS ZERO
 P 00000 00066 TG
 P 00000 00066 PA
 F 00202
*B 00223
     TOP      X
 P 00030 00066 TG
*B 00180
     T
 P 00050 00066 TG     0106                                          AN
 F 00011
*B 00008
 L 00000 00098 TF                    BACKSPACE N RECORDS
 F 00223
*B 00217                             SEARCH FOR NEXT BEGIN
 L 00058 00066 TF     0105                                          AN
 A 00098 00065 00098
 C 90050 00006 00224 00224
 L 00000 00098 TF                              BACKSPACE N RECORDS
 F 00223
*B 00009                             C STAR
 G 00055 90042 00051
 G 00057 90042 00052
 C 00055 00057 00013 00021
 F 00055 90041 00055
 F 00057 90041 00057
     TOP   X      Y      Z  Z STAR     (X)          (Y)
 P 00030 00066 TG
     T
 P 00050 00066 TG     010606060609030903                            ANNNNNNNN
 F 00011
*B 00013                             GREATER THAN
 F 00055 90041 00055
 F 00057 90041 00057
     TOP   X      Y      Z  Z STAR     (X)          (Y)
 P 00030 00066 TG
     T
 P 00050 00066 TG     010606060609030903                            ANNNNNNNN
```

```
                                    K=   00000

 P 00030 00065 TF                        REWIND TAPE
 F 00047
*B 00021                                 LESS THAN
 R 00053 00054
 F 00013
*B 00174
 G 00058 90042 00053
 G 00056 90042 00052
 D 00054 00056 00058
 H 90042 00051 00054
*B 00025
 F 00054 90041 00054
 F 00056 90041 00056
 F 00058 90041 00058
     T@P   X      Y      Z     (X)          (Y)          (Z)
*B 00229
 P 00030 00066 TG
     T
 P 00050 00066 TG     0106060609030903 0                    ANNNNNNNNN
 F 00011
*B 00177
 G 00056 90042 00053
 A 00054 00056 00052
 G 00056 90042 00054
 H 90042 00051 00056
 F 00054 90041 00054
 F 00056 90041 00056
 F 00058 90041 00058
     T@P   X      Y      Z    Y+(Z)        (Y+(Z))
 F 00228
*B 00178
 G 00056 90042 00052
 G 00058 90042 00053
 A 00054 00051 00056
 H 90042 00054 00058
 F 00054 90041 00054
 F 00056 90041 00056
 F 00058 90041 00058
     T@P   X      Y      Z    X+(Y)        (Y)          (Z)
 F 00229
*B 00192
 G 00056 90042 00052
```

```
 G 00058 90042 00053
 S 00054 00056 00058
 H 90042 00051 00054
 F 00025
*B 00184
 G 00056 90042 00052
 G 00058 90042 00053
 M 00054 00056 00058
 H 90042 00051 00054
 E 00025
*B 00175
     T@P   X
 P 00030 00066 TG
     T
 P 00050 00066 TG    0106                                          AN
 P 00030 00065 TF                      REWIND TAPE
 R 00053 00051
 F 00047
*B 00172
     T@P   X
 P 00030 00066 TG
     T
 P 00050 00066 TG    0106                                          AN
 C 00051 00190 00011 00011                    IS IT TIME T@ ST@P TRACING
    TEND @F TRACING RETURN T@ PR@GRAM AT THIS BEGIN
 P 00030 00066 TG
 G 00037 90042 00051
 F 00037
*B 00182
     T@P   X    ALL ADDRESSES HAVE BEEN KED AND QED BY 1401 PR@GRAM
 P 00030 00066 TG
 F 00180
*B 00179
 L 00030 00065 TF                      REWIND @NE REC@RD
 L 00050 00066 TF    01050903                                      ANNN
 F 00055 90043 00052
 H 00000 00051 00055
     T@P   X    VALUE
*B 00230
 P 00030 00066 TG
     T
 P 00050 00066 TG    01060903                                      ANNN
 F 00011
```

```
                                K=    00000

*B 00188
     T@P   X      Y    ALL ADDRESSES HAVE BEEN KED AND QED BY 1401 PR@GRAM
 P 00030 00066 TG
     T
 P 00050 00066 TG     010606                                    ANN
 F 00011
*B 00189
 G 00053 90042 00052
 G 00055 90042 00051
 H 90042 00051 00053
 F 00053 90041 00053
 F 00055 90041 00055
 E 00027
*B 00193
     TTITLE C@MMAND
 P 00030 00066 TG
 F 00011
*B 00194                              UNPACK
 G 00057 90042 00052
 U 00057 00057
 H 90042 00051 00057
 F 00055 90041 00057
 F 00053 90041 00052
*B 00027
     T@P  X      Y    (Y) BEF@RE    (X) AFTER
 P 00030 00066 TG
     T
 P 00050 00066 TG     01060609030903                            ANNNNNN
 F 00011
*B 00195
 F 00011
*B 00196
 F 00011
*B 00185
     TN@TE C@MMAND     TH E TRACER WILL N@T TRACE  N@TE
 P 00000 00066 TG
     T
 P 00050 00066 TG     0106                                      AN
 F 00011
*B 00187
 L 00030 00065 TF
 L 00053 00066 TF     1103020808080804                          SASNNNNN
```

```
K=    00000

     TOP   X    Y    Z     COLUMNS PER FIELD
 P 00030 00066 TG
     T
 P 00050 00066 TG     010606030909090905                          ANNANNNNN
 L 00030 00065 TF                    BACKSPACE ONE RECORD
 L 00055 00066 TF     151515070404040402                          SSSSAAAAA
     T    WAY DATA IS STORED
 P 00030 00066 TG
     T
 P 00055 00066 TG     030404040402                                SAAAAA
 G 00050 90042 00052
 C 00066 00050 00040
     T  (Y)          (X)
 C 00055 00039 00029
 G 00052 90042 00051
 F 00050 90041 00050
*B 00232
 P 00030 00066 TG
     T
 P 00050 00066 TG     090304                                      NNA
 F 00011
*B 00029
 G 00052 90042 00051
 F 00050 90041 00050
 F 00052 90041 00052
*B 00231
     T  (Y)        (X)
 P 00030 00066 TG
     T
 P 00050 00066 TG     09030903                                    NNNN
 F 00011
*B 00040
 C 00050 00030 00041 00041
     T  (Y)  WRITE AN END OF FILE MARK ON APPROPRIATE TAPE
 P 00030 00066 TG
     T
 F 00050 90041 00050
 R 00052 00053
 P 00050 00066 TG     090315150603                                NNSSSA
 F 00011
*B 00041
     T  (Y)     REWIND THE APPROPRIATF TAPE
 P 00030 00066 TG
```

```
K=    00000

     T
 F 00050 90041 00050
 R 00052 00053
 P 00050 00066 TG     0903150603                                NNSSA
 F 00011
*B 00183
 L 00030 00065 TF
 L 00053 00066 TF     1103020606061503040404040 2              SASNNNSSAAAAA
     T@P    X    Y    Z     COLUMNS PER FIELD    WAY DATA IS STORED
 P 00030 00066 TG
     T
 P 00050 00066 TG     0106060306060604040404 02                ANNANNNAAAAA
 G 00050 90042 00052
 C 00066 00050 00042
     T  (Y)      (X)
 C 00057 00039 00043
 G 00052 90042 00051                  T1=A
 F 00050 90041 00050
 F 00232
*B 00043                              T1=N
 G 00052 90042 00051
 F 00050 90041 00050
 F 00052 90041 00052
 E 00231
*B 00042
 C 00050 00030 00044 00044
     T  (Y)      BACK SPACE A FILE
 F 00233
*B 00044
     T  (Y)      BACK SPACE N RECORDS
*B 00233
 P 00030 00066 TG
     T
 F 00050 90041 00050
 P 00050 00066 TG     0903                                      NN
 F 00011
*B 00176                              FUNCTION COMMAND
 G 00098 90042 00052
 C 00098 90040 00212 00212
 F 00011
*B 00212
     T@P    X    Y     Z       (Z)
```

```
K=    00000

 P 00030 00066 TG
 G 00054 90042 00053
 F 00054 90041 00054
     T
 P 00050 00066 TG     010606060903                                ANNNNN
 C 00052 00088 00170 00170          IS IT THE ⊙UTPUT SCALE FN
 S 00252 00053 00191
 S 00253 00051 00191
 F 00250                            G⊙ T⊙ ⊙UTPUT SCALE
*B 00170                            FN IS N⊙T ⊙UTPUT SCALE
 L 00030 00065 TF
 L 00054 00066 TF     151515150505                                SSSSSN
 S 00098 00053 00052
 H 90045 00052 00098                Z MINUS Y INT⊙ K + 3
 S 00098 00051 00052
 H 90046 00052 00098                X MINUS Y INT⊙ K + 4
 H 90047 00052 00054                REC⊙RD MARK G⊙ES INT⊙ K + 2
 P 00030 00065 TF
*B 00200
 L 00055 00066 TF     0105                                        AN
 C 00055 00032 00200 00200        SEARCHING F⊙R ⊙P EQUAL T⊙ B
 C 00056 00052 00200 00200         SEARCH F⊙R RIGHT FUNCTI⊙N
     T X EQUALS X ⊙F FUNCTION STATEMENT              SEARCH F⊙R RIGHT FUNCTI⊙N
 P 00030 00066 TG
     T⊙P   X
 P 00030 00066 TG
     T
 P 00055 00066 TG     0106                                        AN
 H 00110 00087 00052
 H 00111 00087 00054
 A 00087 00087 00080
 F 00011
*B 00201
 L 00050 00066 TF     0105                                        AN
 C 90050 00006 00222 00222
     TRIGHT BEGIN CAN N⊙T BE F⊙UND      HALT
 P 00000 00066 TG
 P 00000 00066 PA
 F 00030
*B 00222
 C 00032 00050 00201 00201
 C 00051 00053 00201 00201
 F 00223
```

```
 K 00249
 Q 90011 00811
*B 00001                    OUTPUT CONVERTER USES LOCATIONS 1 TO 128
 I 00005 +10000000+01
 I 00006 +10000000+02
 I 00007 +67108864+08
 A 00007 00007 00007
 I 00008 +00000000+00
 D 00009 00005 00007
 I 00011 +45000000+02
 H 00030 00008 00009
 N 00001
 A 00008 00008 00005
 M 00009 00009 00006
 H 00030 00008 00009
 C 00011 00008 00001
 I 00005 +00000000+00
 I 00006 +67108864+08
 A 00006 00006 00006
 I 00007 +10000000+01
 I 00008 +70000000+01
 I 00009 +50000000+01
 N 00001
 V 00017 +10000000+09
 V 00018 +99999999+07
 V 00019 +80000000+01
 G 00010 00001 00003
 A 00010 00005 00010
 I 00025 +10000000+01
 C 00010 00005 00020
 S 00010 00005 00010
 I 00025 -10000000+01
 C 00010 00005 00020
*B 00129
 H 00001 00004 00005
 H 00002 00004 00005
 E 90011
*B 00020
 C 00007 00010 00022
 F 00012 00076 00010
 C 00012 00008 00021
 S 00011 00008 00012
```

K= 00249

```
 G 00013 00030 00011
 M 00014 00010 00013
 M 00015 00014 00006
 A 00012 00012 00007
 F 00023
*B 00021
 S 00011 00012 00008
 G 00013 00030 00011
 D 00014 00010 00013
 D 00015 00014 00006
 A 00012 00012 00007
 A 00015 00015 00009
 C 00015 00018 00023
 A 00015 00015 00009
 F 00023
*B 00022
 D 00016 00007 00010
 F 00012 00076 00016
 A 00011 00012 00019
 S 00012 00005 00012
 G 00013 00030 00011
 M 00014 00010 00013
 M 00015 00014 00006
 C 00017 00015 00023
 G 00013 00029 00011
 M 00015 00010 00013
 A 00012 00012 00007
*B 00023
 M 00015 00015 00025
 H 00001 00004 00015
 H 00002 00004 00012
 F 90011
*B 00076
 G 00080 00076 00078
 R 00081 00082
 R 00084 00005
*B 00085
 D 00081 00081 00083
 C 00007 00081 00086
 A 00084 00084 00081
 C 00084 00090 00089
 G 00087 00091 00084
 C 00080 00087 00085
```

K= 00249

```
 S 00084 00084 00081
 C 00087 00080 00085
 A 00084 00084 00081
*B 00086
 H 00076 00079 00084
 F 00077
 V 00028 +10000000+08
 V 00082 +64000000+02
 V 00083 +20000000+01
*B 00089
 S 00084 00084 00081
 F 00085
 V 00090 +37000000+02
 V 00091 +10000000+01
 V 00092 +10000000+02
 V 00093 +10000000+03
 V 00094 +10000000+04
 V 00095 +10000000+05
 V 00096 +10000000+06
 V 00097 +10000000+07
 V 00098 +10000000+08
 V 00099 +10000000+09
 V 00100 +10000000+10
 V 00101 +10000000+11
 V 00102 +10000000+12
 V 00103 +10000000+13
 V 00104 +10000000+14
 V 00105 +10000000+15
 V 00106 +10000000+16
 V 00107 +10000000+17
 V 00108 +10000000+18
 V 00109 +10000000+19
 V 00110 +10000000+20
 V 00111 +10000000+21
 V 00112 +10000000+22
 V 00113 +10000000+23
 V 00114 +10000000+24
 V 00115 +10000000+25
 V 00116 +10000000+26
 V 00117 +10000000+27
 V 00118 +10000000+28
 V 00119 +10000000+29
```

K= 00249

```
V 00120 +10000000+30
V 00121 +10000000+31
V 00122 +10000000+32
V 00123 +10000000+33
V 00124 +10000000+34
V 00125 +10000000+35
V 00126 +10000000+36
V 00127 +10000000+37
V 00128 +10000000+38
```

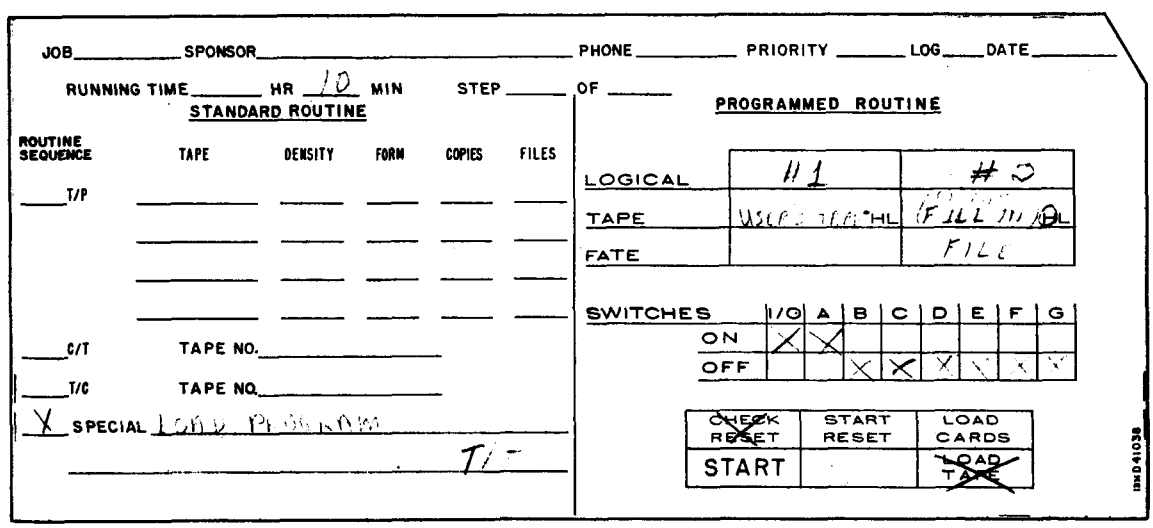
0563 CARDS

VIII. Operating Notes

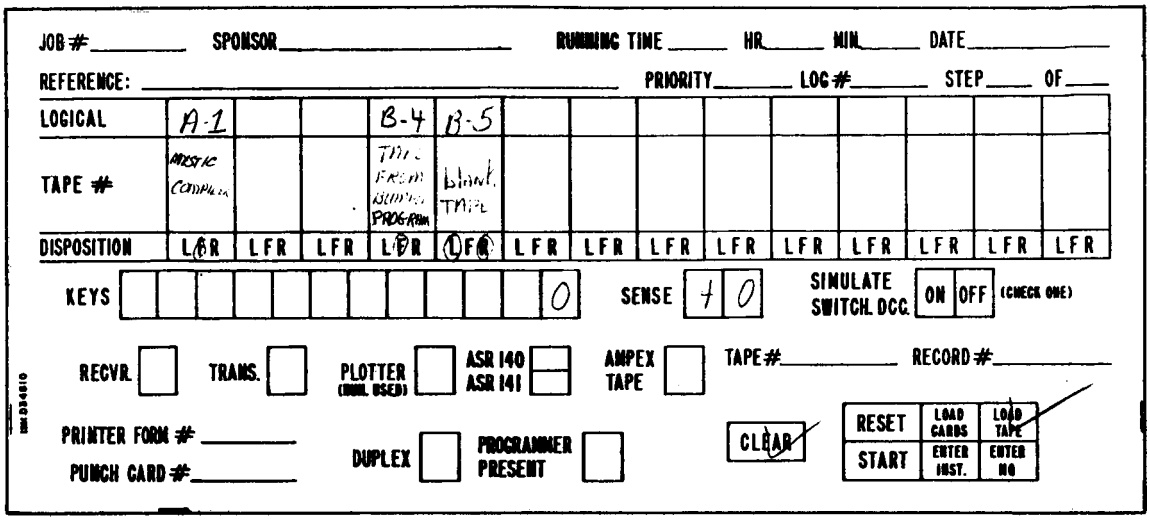
1401 Bumper

Run with sense switch A and I/O on. Load a blank output tape on unit #2. For card input, turn sense switch C on. For tape input, load tape on unit #1. Push load. USER MUST FILL OUT TAPE IDENTIFICATION LABEL CARD.

RUN CARD FOR CARD INPUT:



RUN CARD FOR TAPE INPUT:



JOB #_____ SPONSOR_____ RUNNING TIME ____ HR____ MIN____ DATE_____

REFERENCE: _____ PRIORITY_____ LOG #_____ STEP____ OF____

LOGICAL	A-1			B-4	B-5									
TAPE #	ARTIC COMPILER			THIS FROM BUMP PROGRAM	blank TAPE									
DISPOSITION	LOR	LFR	LFR	LOR	LOR	LFR	LFR	LFR	LFR	LFR	LFR	LFR	LFR	LFR

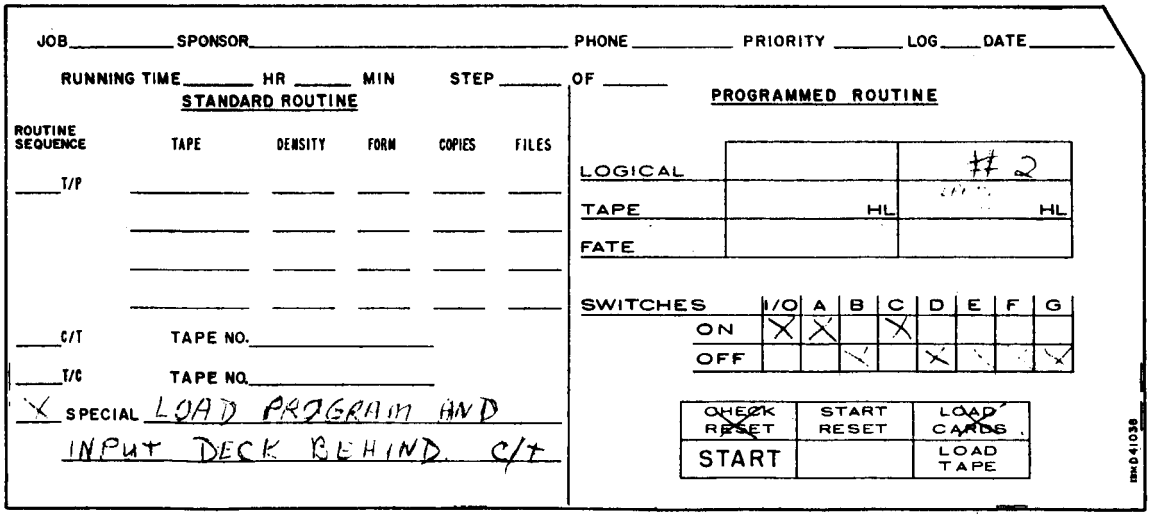
KEYS [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][0] SENSE [ ][0] SIMULATE SWITCH. DCC. [ON] [OFF] (CHECK ONE)

RECVR. [ ] TRANS. [ ] PLOTTER (NUMB. USED) [ ] ASR 140 [ ] ASR 141 [ ] AMPEX TAPE [ ] TAPE #_____ RECORD #_____

PRINTER FORM #_____ PUNCH CARD #_____ DUPLEX [ ] PROGRAMMER PRESENT [ ]

CLEAR

RESET	LOAD CARDS	LOAD TAPE
START	ENTER INST.	ENTER NO



JOB_____ SPONSOR_____ PHONE_____ PRIORITY _____ LOG____ DATE_____

RUNNING TIME_____ HR _____ MIN STEP_____ OF _____

STANDARD ROUTINE

ROUTINE SEQUENCE	TAPE	DENSITY	FORM	COPIES	FILES
____T/P					
____C/T	TAPE NO._____				
____T/C	TAPE NO._____				
X SPECIAL	LOAD PROGRAM AND INPUT DECK BEHIND C/T				

PROGRAMMED ROUTINE

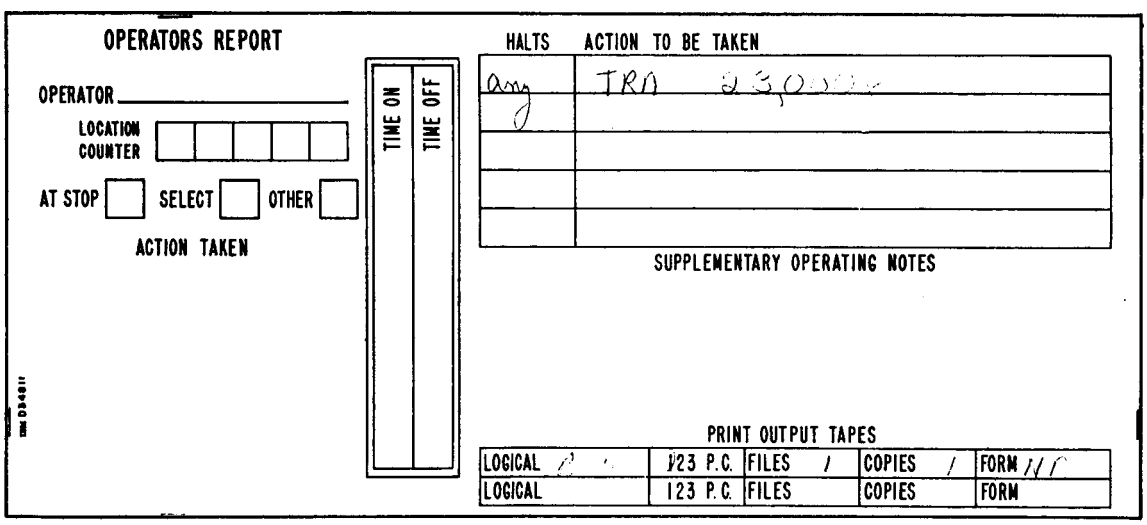
LOGICAL		#2
TAPE	HL	HL
FATE		

SWITCHES	I/O	A	B	C	D	E	F	G
ON	X	X		X				
OFF			X		X	X	X	X

CHECK RESET	START RESET	LOAD CARDS
START		LOAD TAPE

Mystic Tracer

Put a blank tape on B-5 and an input tape on B-4 from the 1401 Bumper program.



OPERATORS REPORT

OPERATOR _____

LOCATION COUNTER

AT STOP ☐ SELECT ☐ OTHER ☐

ACTION TAKEN

TIME ON | TIME OFF

HALTS	ACTION TO BE TAKEN
Any	TRN 2300

SUPPLEMENTARY OPERATING NOTES

PRINT OUTPUT TAPES

LOGICAL	123 P.C.	FILES 1	COPIES 1	FORM
LOGICAL	123 P.C.	FILES	COPIES	FORM