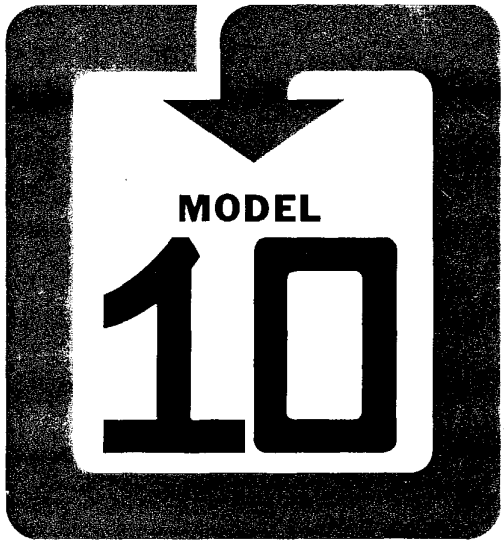


HEWLETT-PACKARD 9810A CALCULATOR
11211A PRINTER ALPHA ROM

OPERATING MANUAL

TABLE OF CONTENTS

GENERAL DESCRIPTION

The 11211A Printer Alpha Read-Only-Memory (Alpha ROM) enables the 9810A Calculator with the Option 004 printer to print 54 separate alphanumeric and mnemonic characters. Alpha messages (data labels, printed instructions, etc.) may be printed directly from the keyboard or from programmed instructions.

> **NOTE**
> Please read the INSTALLATION PROCEDURE before plugging in your Alpha ROM.

The Alpha ROM also enhances the calculator's keylog and list operations by adding key mnemonics to the information normally printed during either operation. These added mnemonics are shown in the program listing on Page 2-8 .

COMPATIBILITY WITH OTHER ROM'S

The Alpha ROM may be used concurrently with other ROM's available for your 9810A Calculator. A brief description of other ROM's may be found in the 9810A Operating Manual.

EQUIPMENT SUPPLIED

The following table lists equipment furnished with the -hp- 11211A Printer Alpha ROM.

Table 1. Equipment Supplied

DESCRIPTION	QUANTITY	-hp- PART NUMBER
Magnetic Card Alpha Printer Exerciser	1	09810-90024
Operating Manual	2	09810-90003

INSTALLATION PROCEDURE

The procedure given below should be used to plug in the Alpha ROM.

> **CAUTION**
> THE PRINTER ALPHA ROM MUST BE INSTALLED ONLY IN ROM SLOT 3.
>
> CALCULATOR POWER SHOULD BE OFF WHEN INSTALLING OR REMOVING A ROM.

INSTALLATION PROCEDURE (continued)

NOTE

This ROM may be used only if your Calculator contains a printer (Option 004).

1. Switch the calculator power off.
2. Position the Alpha ROM as shown in Figure 1, then push it straight down through the opening until the ROM is firmly seated.
3. Switch the calculator power on.

To verify ROM electrical performance, proceed to the section titled ELECTRICAL INSPECTION.

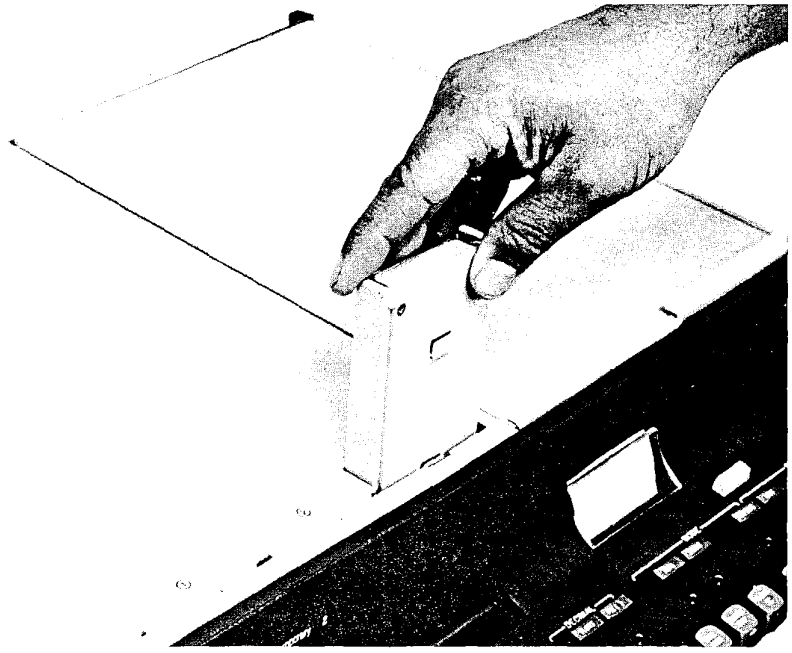


Figure 1. Installation Procedure

ELECTRICAL INSPECTION

The magnetic card supplied with your Alpha ROM contains two programs. One program (side 1) exercises both the printer and the Alpha ROM. The other program (side 2) exercises the Mathematics ROM.

To exercise the Alpha ROM and printer:

SWITCH: LINE ON

PRESS: RUN STOP END LOAD

Insert side 1 of the magnetic card into the upper slot of the magnetic card reader. After the program is loaded (the calculator display will return):

PRESS: END CONTINUE

HARD COPY:

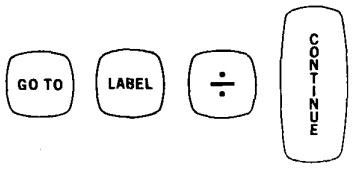
```
      ALPHA PRINTER
        EXERCISER

 ALPHA KEYBOARD
==================
AFK PUZ ┌π→, =?
BGL QV@ /789 $()
CHM RW  *456  %
DIN SX  -123  "1
EJO TY  +0 .  #0
==================

ALPHA CHARACTERS
   ABCDEFGHIJ
   KLMNOPQRST
   UVWXYZ

NUMERICS
   0123456789

SYMBOLS
   ┌ π → + -
   * W # = %
   $ @

PUNCTUATION
   , . ( )? "

==================
//////////////////
==================
 END OF PROGRAM
```

'LABEL K' PRINTOUT

'LABEL ÷' PRINTOUT

ELECTRICAL INSPECTION (continued)

Place the hard copy just printed next to the above sample. Compare each line of print and note any unprinted or partially printed characters. Your printer may require maintenance if any of the diagonal lines in your hard copy (corresponding to the 'LABEL ÷' area in the sample) are not completely printed. This portion of the exerciser may be repeated by pressing:

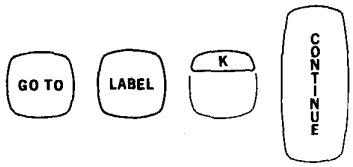


NOTE

Ignore the STATUS light when printing separate 'LABEL' messages from this program.

If the 'LABEL ÷' portion of your hardcopy is not completely printed, remove the Alpha ROM from your calculator and check the printer by performing the electrical inspection in Chapter 6 of your 9810A Operating Manual. The Alpha ROM cannot be accurately checked if the printer is defective. If the printer functions correctly, replace the Alpha ROM and continue inspecting it by reloading the exerciser and reprinting the 'LABEL K' portion of the exerciser according to the following directions.

If the 'LABEL ÷' portion of your hard copy is completely printed but one or more other characters are not printed correctly, your Alpha ROM is defective. The 'LABEL K' portion of the exerciser may be repeated by pressing:

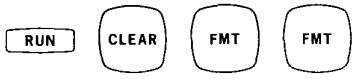


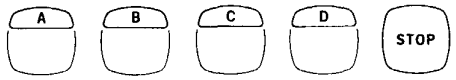
Compare both printouts with the preceding sample. Any characters printed incorrectly or not printed indicates that your ROM is defective.

NOTE

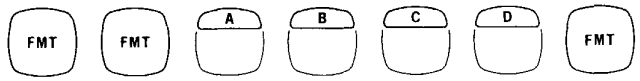
The 'LABEL K' portion of the exerciser printout represents a partial index of the Alpha Keyboard. A complete Alpha Keyboard index is located at the back of this manual.

To verify the STOP instruction during alpha printing:

PRESS: 

PRESS: 

Your calculator should return to the display mode and no printer operation should occur.

PRESS: 

HARD COPY: ABCD

If your Alpha ROM is defective, contact your local -hp- Sales and Service Office for assistance.

NOTES

INTRODUCTION

This chapter describes the function of each key when the calculator keyboard is redefined by the Alpha ROM to enable alpha characters to be printed. The last section of this chapter shows a sample program containing typical methods for programming alpha messages.

ALPHA MODE

When the alpha mode is set, the entire calculator keyboard is redefined to include printing of alphanumeric characters. This 'alpha keyboard' contains 54 character-entry keys, 5 operational keys, and 16 "non-essential" keys. These non-essential keys are either inoperative or duplicate other keys during the alpha mode.

> **NOTE**
>
> During the alpha mode, the keylog feature is deactivated, thus any keys pressed are not logged.

KEY INDEX

An index of the alpha keyboard is located on the foldout at the back of this manual. The user should refer to the key index until he is thoroughly familiar with the alpha keyboard. The exerciser program supplied with your Alpha ROM generates a printout which also may be used as an alpha keyboard index. To obtain a copy of this printout, see the preceding electrical inspection.

SIDE-OF-KEY CHARACTERS

The small characters on the front side of most keyboard keys may be used to identify keys during alpha printing. The side-of-key characters printed in dark green do not apply to the alpha keyboard.

CHARACTER KEYS

Pressing any of the unshaded keys shown in Figure 2 during the alpha mode will cause the key's alpha character to be printed in line-printer fashion. The printer operates as a line-printer in that each character is not immediately printed, but an entire line (16 characters) is first stored and then printed. The printout occurs as the 16th character is entered.

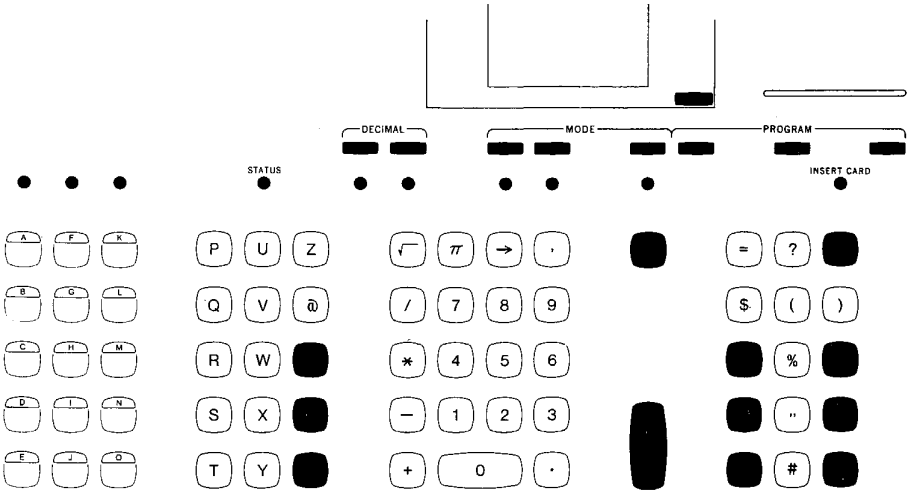


Figure 2. Character Keys

ALPHA CONTROL KEYS

During the alpha mode, the following keys are pressed to perform various printing operations.

FMT FMT **Redefines the keyboard to the alpha mode, after which character keys may be pressed.**

FMT **After the last character is entered, pressing FMT will cause a line print, line feed, and return the keyboard to normal operation.**

> NOTE
>
> The calculator display is blanked during the alpha mode, although the contents of the X, Y and Z registers remain unchanged.

ALPHA CONTROL KEYS

EXAMPLE:

Print the alphabet.

PRESS: [RUN] [STOP] [FMT] [FMT]

PRESS: [A] (through) [x^2 / Z] [FMT]

HARD COPY:

```
ABCDEFGHIJKLMNOP
QRSTUVWXYZ
```

[CLEAR] **Causes a line print and advances the printer to the next line (i.e., like a typewriter carriage-return and line feed operation). The alpha mode remains set after this instruction. Successive CLEAR instructions will cause the printer to advance without printing, one line for each instruction.**

[CLEAR]

EXAMPLE:

Print a list of numbers.

PRESS: [FMT] [FMT]

PRESS: [A] [PAUSE /)] [1] [2] [•] [5]

PRESS: [CLEAR]

PRESS: [B] [PAUSE /)] [−] [3] [7] [•] [8]

PRESS: [CLEAR]

PRESS: [C] [PAUSE /)] [0] [•] [7] [5]

(continued)

ALPHA CONTROL KEYS

CLEAR
(continued)

PRESS: FMT

HARD COPY:

```
A)12.5
B)-37.8
C)0.75
```

CONTINUE

Inserts a blank space in the printed line; similar in operation to the space bar on a typewriter.

STOP

Terminates the alpha mode without a line print or line feed. Any characters entered but not printed will be erased when STOP is pressed.

> NOTE
> This instruction is not programmable and should not be used while programming alpha messages.

The following example shows how an entered alpha message may be corrected without a line print.

EXAMPLE:

An error is made while entering the message:
"ENTER → X"

PRESS: RUN FMT FMT

PRESS: E N x→( ) J
T

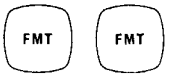
While entering the message, an error is made ("J" entered instead of "E").

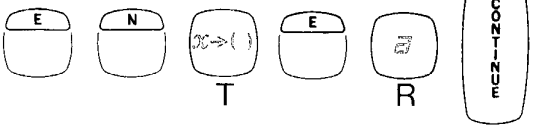
ALPHA CONTROL KEYS

To cancel the message:

PRESS: 

To reenter the message and print it:

PRESS: 

PRESS: 

PRESS: 

HARD COPY: ENTER →X

PAPER is a manual paper advance control. This operation is not programmable.

PAPER

NON-ESSENTIAL KEYS

The shaded keys in the alpha keyboard index (see the foldout at the back of this manual) are not essential for alpha printing operations. The non-essential keys which are programmable duplicate the SPACE key, while most of the non-programmable keys are 'locked-out' (i.e., not operational) during alpha printing operations.

> **NOTE**
>
> Pressing BACK STEP or STEP PRGM will cause 1 or 0, respectively, to be printed.

PROGRAMMING SUGGESTIONS

LISTED KEY MNEMONICS

When listing a program which contains alpha printing, the listed keycode and related mnemonics for each program step will correspond to the key's *normal* keyboard function rather than the key's alpha function. Many examples of this appear in the sample alpha program listing (i.e. steps: 0007, 0009, 0013, 0015, etc.).

USE OF STEP PRGM

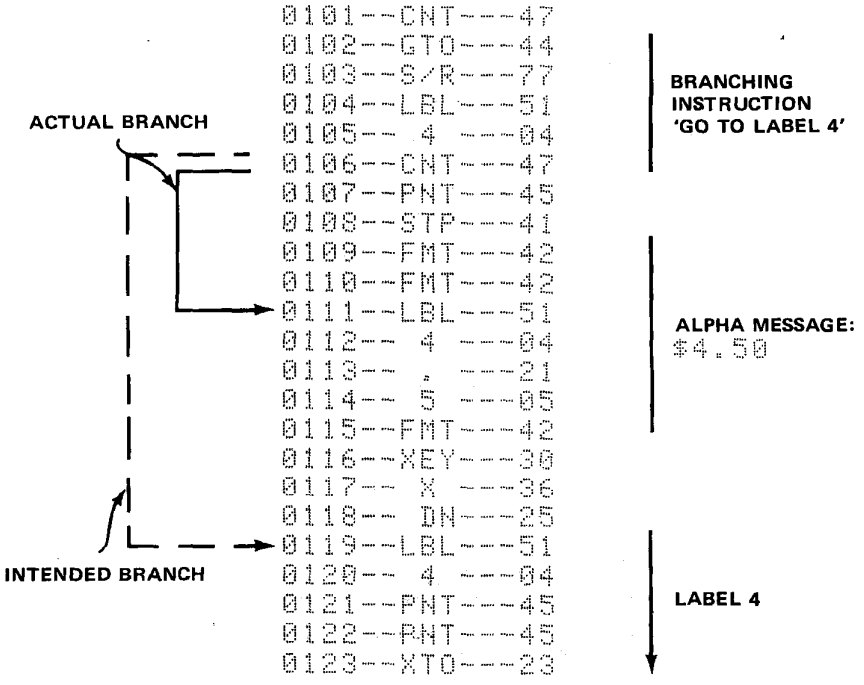
When stepping through a program (the run mode is set) with the STEP PRGM key, an entire Alpha message will be automatically printed once the program is stepped to the FMT, FMT instruction. STEP PRGM operates normally when the calculator is in the program mode.

LABELLING ALPHA MESSAGES

Assigning Alpha messages 'labels' and loading the actual messages at the end of the program may save the programmer considerable editing time if the messages require rewriting or rearranging in the program. This procedure is especially helpful when editing long programs. Examples of labelled messages appear in both the Printer Alpha Exerciser and the sample alpha program.

USE OF LABEL **$**

A program branching anomaly may result from use of the '$' character in a programmed alpha message if a branching instruction, in the same program, contains the LABEL key. The following partial program listing is used to illustrate the possible anomaly.



PROGRAMMING SUGGESTIONS

Notice that during execution of the above program, the program will branch to step 0111 instead of to step 0119 as intended.

This unwanted branching anomaly can be avoided by either: not using a label address containing any key which also immediately follows the '$' character in an alpha message, or loading all alpha messages at the end of the program (see LABELLING ALPHA MESSAGES on Page 2-6).

SAMPLE ALPHA PROGRAM

The following program contains various types of programmed alpha messages. Although the application of this program may be more entertaining* than practical, it is presented here to show how alpha messages may be programmed to: label input data, instruct the operator, or record program results. Loading and running this program are not required, however, user instructions are included at the bottom of Page 2-9 .

Referring to the program and printout, notice that alpha messages may be inserted wherever they are needed to improve program operation (such as, where they are 'labeled' and 'called' to inform the operator of program decisions, or where they are used as data input instructions). Also notice that data and data labels (alpha) must always be printed on separate lines thus the proper use of line feed instructions is important in order to locate the message next to its corresponding printed data.

*This program computes a pseudo-random number between 0 and 9 from a number entered by the operator, then asks the operator to guess the unknown computed number within 3 guesses.

PROGRAMMING SUGGESTIONS

```
0000--CLR---20
0001--FMT---42
0002--FMT---42
0003--CLR---20
0004--CLR---20
0005-- E ---60
0006-- N ---73
0007--XTO---23
0008-- E ---60
0009-- a ---13
0010--CNT---47
0011-- A ---62
0012-- N ---73
0013--XFR---67
0014--CNT---47
0015--GTO---44
0016--FMT---42
0017--STP---41
0018--PNT---45
0019--PNT---45
0020--XEY---30
0021-- . ---21
0022-- 1 ---01
0023-- + ---33
0024--XEY---30
0025-- r ---76
0026-- UP---27
0027--INT---64
0028-- - ---34
0029-- 1 ---01
0030-- 0 ---00
0031-- X ---36
0032-- DN---25
0033--INT---64
0034--XTO---23
0035-- a ---13
0036--FMT---42
0037--FMT---42
0038-- 3 ---03
0039--CNT---47
0040-- C ---61
0041-- H ---74
0042-- A ---62
0043-- N ---73
0044-- C ---61
0045-- E ---60
0046--YTO---40
0047--CNT---47
0048--XTO---23
0049-- 0 ---71
0050--FMT---42
0051-- 1 ---01
0052--XTO---23
0053-- + ---33
0054-- b ---14
0055-- b ---14
0056-- UP---27
0057-- 4 ---04
0058--X=Y---50
0059--GTO---44
0060--LBL---51
0061-- L ---72
0062--CNT---47
0063--FMT---42
0064--FMT---42
0065-- G ---15
0066--1/X---17
0067-- E ---60
```

Prints Instruction: ENTER ANY #

Print Entered #.

Computes Pseudo-Random Number From Entered (Number #).

Prints Instructions: 3 CHANCES TO

Chance Counter (Go to Label L after 3 chances.)

```
0068--YTO---40
0069--YTO---40
0070--CNT---47
0071-- M ---70
0072--XFR---67
0073--CNT---47
0074--GTO---44
0075--CNT---47
0076--X<Y---52
0077-- 0 ---00
0078--EEX---26
0079-- 9 ---11
0080--PSE---57
0081--FMT---42
0082--STP---41
0083--PNT---45
0084-- UP---27
0085-- a ---13
0086--X>Y---53
0087--GTO---44
0088--LBL---51
0089-- A ---62
0090--CNT---47
0091--X=Y---50
0092--GTO---44
0093--LBL---51
0094-- B ---66
0095--CNT---47
0096--FMT---42
0097--FMT---42
0098--XTO---23
0099-- 0 ---71
0100-- 0 ---71
0101--CNT---47
0102-- L ---72
0103-- A ---62
0104-- a ---13
0105-- G ---15
0106-- E ---60
0107--CLX---37
0108--CLR---20
0109--CLR---20
0110--FMT---42
0111--GTO---44
0112-- 5 ---05
0113-- 1 ---01
0114--LBL---51
0115-- A ---62
0116--FMT---42
0117--FMT---42
0118--XTO---23
0119-- 0 ---71
0120-- 0 ---71
0121--CNT---47
0122--YTO---40
0123-- M ---70
0124-- A ---62
0125-- L ---72
0126-- L ---72
0127--CLX---37
0128--CLR---20
0129--CLR---20
0130--FMT---42
0131--GTO---44
0132-- 5 ---05
0133-- 1 ---01
0134--LBL---51
0135-- B ---66
```

Prints Instruction: GUESS MY # (0→9)

Print Entered Guesses.

Prints Decision: TOO LARGE,

Label A Prints Decision: TOO SMALL,

```
0136--FMT---42
0137--FMT---42
0138-- D ---63
0139-- A ---62
0140-- a ---13
0141-- N ---73
0142-- . ---21
0143-- . ---21
0144-- . ---21
0145--XFR---67
0146-- 0 ---71
0147--1/X---17
0148--CNT---47
0149--IND---31
0150-- I ---65
0151-- N ---73
0152--FMT---42
0153--CNT---47
0154--GTO---44
0155-- 1 ---01
0156-- 7 ---07
0157-- 7 ---07
0158--LBL---51
0159-- L ---72
0160--FMT---42
0161--FMT---42
0162--CLR---20
0163--YTO---40
0164-- 0 ---71
0165-- a ---13
0166-- a ---13
0167--XFR---67
0168-- . ---21
0169-- . ---21
0170-- . ---21
0171-- I ---65
0172--CNT---47
0173--IND---31
0174-- I ---65
0175-- N ---73
0176--FMT---42
0177--FMT---42
0178--FMT---42
0179--L ---72
0180-- E ---60
0181--XTO---23
0182--YTO---40
0183--CNT---47
0184-- π ---56
0185-- L ---72
0186-- A ---62
0187--XFR---67
0188--CNT---47
0189-- A ---62
0190-- G ---15
0191-- A ---62
0192-- I ---65
0193-- N ---73
0194--CLR---20
0195--CLR---20
0196--FMT---42
0197--GTO---44
0198-- 0 ---00
0199--END---46
```

Label B Prints Conclusion: DARN...YOU WIN

Label L Prints Conclusion: SORRY...I WIN

Prints Request: LETS PLAY AGAIN

Figure 3. Sample Alpha Program Listing

PROGRAMMING SUGGESTIONS

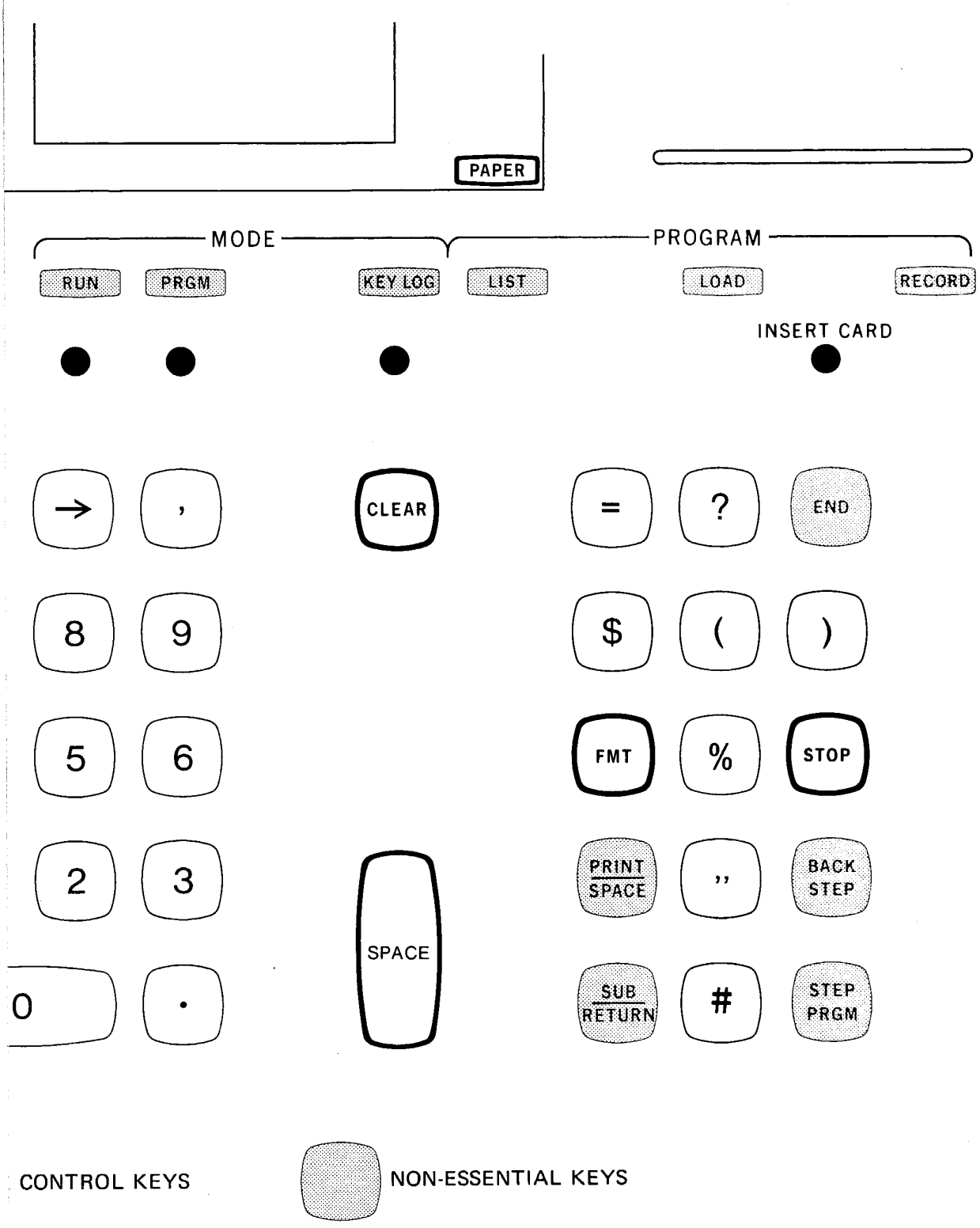
SAMPLE ALPHA PROGRAM (continued)

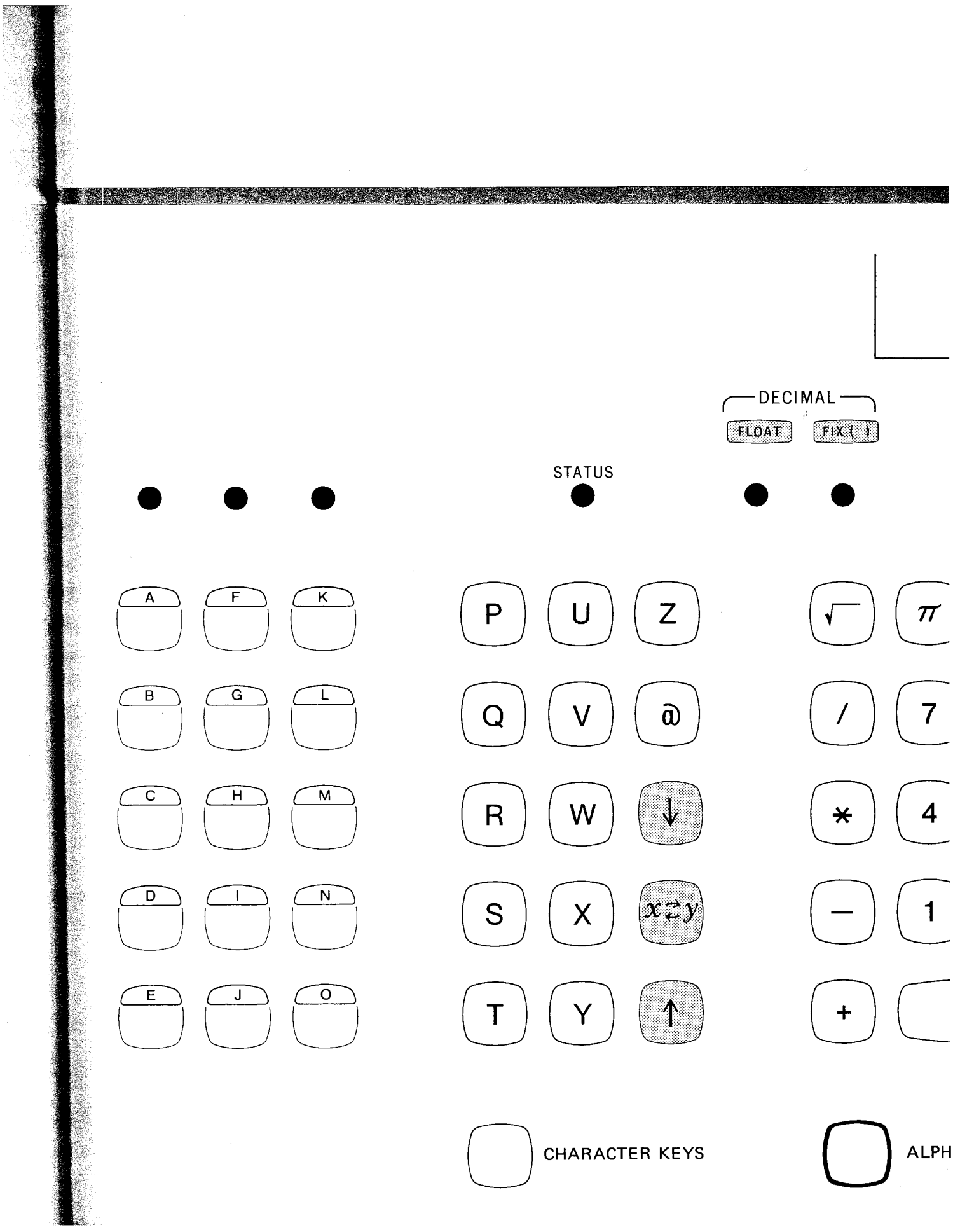
The following printout illustrates operation of the sample alpha program*.

```
ENTER ANY #                    | Request for number entry
            140.*

3 CHANCES TO                   | Request for first guess
GUESS MY # (0→9)               |   (enter number)
              9.*
TOO LARGE,                     | Program decision and request
                               | for another guess.
GUESS MY # (0→9)               |
              1.*
TOO SMALL,                     | Program decision and request
                               | for another guess.
GUESS MY # (0→9)               |
              5.*
TOO SMALL,                     |
                               | Final program decision and
                               | request.
SORRY...I WIN                  |
LETS PLAY AGAIN                |


ENTER ANY #
```

*This program may be loaded, beginning at step 0000, and run in your Model 10. After loading the program, press RUN, FIX, '0', END, CONTINUE. After entering each number requested from the printout, press CONTINUE. If unfamiliar with program loading, see the programming chapter of your Model 10 Operating Manual.

NOTES


PAPER
MODE
PROGRAM
RUN
PRGM
KEY LOG
LIST
LOAD
RECORD
INSERT CARD
→
,
CLEAR
=
?
END
8
9
$
(
)
5
6
FMT
%
STOP
2
3
PRINT SPACE
,,
BACK STEP
SPACE
0
.
SUB RETURN
#
STEP PRGM
CONTROL KEYS
NON-ESSENTIAL KEYS


DECIMAL
FLOAT
FIX ( )
STATUS
A
F
K
B
G
L
C
H
M
D
I
N
E
J
O
P
U
Z
Q
V
@
R
W
↓
S
X
x⇄y
T
Y
↑
√
π
/
7
*
4
−
1
+
CHARACTER KEYS
ALPH

ALPHA PRINTER USER'S GUIDE

FMT FMT — Redefines the keyboard to the alpha mode. Calculator display blanked during alpha mode. Any character keys may be pressed. The printer will line print, line feed after 16 characters are pressed.

DURING ALPHA MODE

CONTINUE — Enters a print space (space between words).

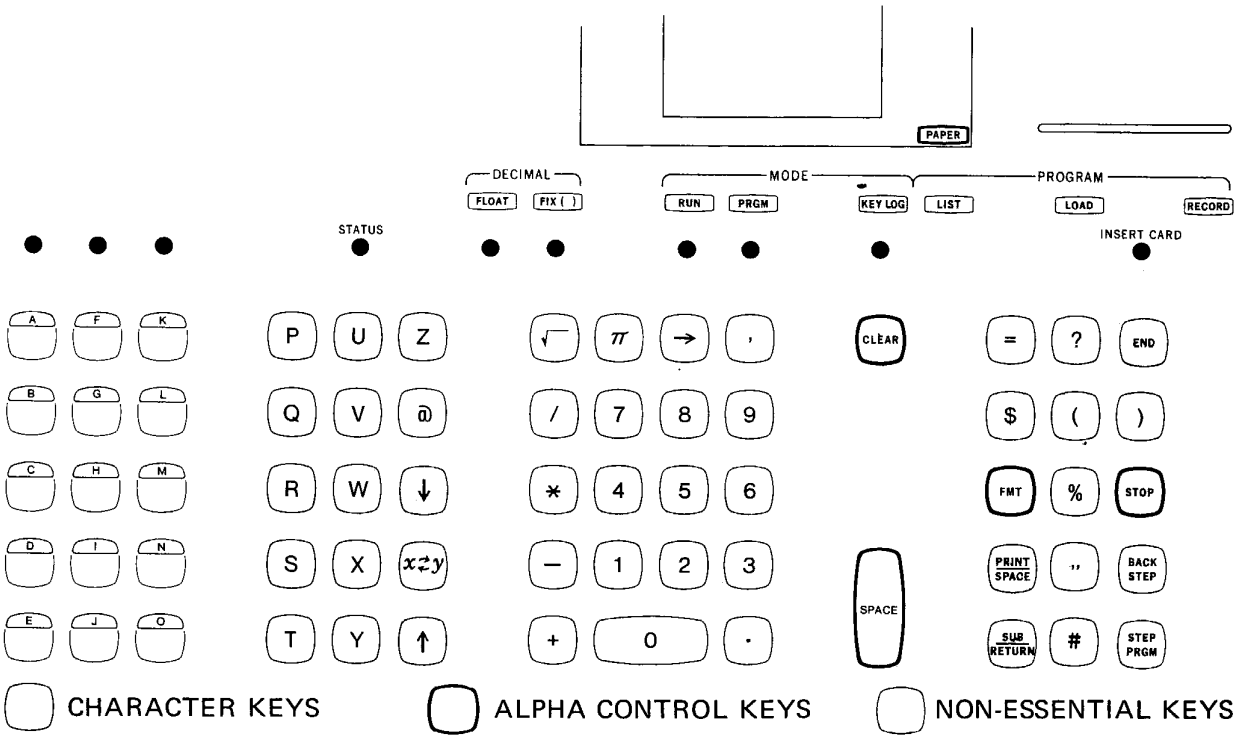
CLEAR — Causes a line print of any entered characters, and a line feed (paper advances one line).

STOP — Returns keyboard to normal run mode (no line print or line feed).

FMT — Causes a line print, line feed (if any characters are entered) and returns the keyboard to the run mode.

PAPER — Manually advances printer paper at any time.

ALPHA KEYBOARD



NOTE

Entered or computed DATA CANNOT BE PRINTED when the keyboard is in the alpha mode.

NOTE

PRINTER LINE WIDTH IS 16 CHARACTERS.

SALES & SERVICE OFFICES

UNITED STATES

ALABAMA
P.O. Box 4207
2003 Byrd Spring Road S.W.
Huntsville 35802
Tel: (205) 881-4591
TWX: 810-726-2204

ARIZONA
2336 E. Magnolia St.
Phoenix 85034
Tel: (602) 244-1361
TWX: 910-951-1330

5737 East Broadway
Tucson 85711
Tel: (602) 298-2313
TWX: 910-952-1162

CALIFORNIA
1430 East Orangethorpe Ave.
Fullerton 92631
Tel: (714) 870-1000
TWX: 910-592-1288

3939 Lankershim Boulevard
North Hollywood 91604
Tel: (213) 877-1282
TWX: 910-499-2170

6305 Arizona Place
Los Angeles 90045
Tel: (213) 649-2511
TWX: 910-328-6148

1101 Embarcadero Road
Palo Alto 94303
Tel: (415) 327-6500
TWX: 910-373-1280

2220 Watt Ave.
Sacramento 95825
Tel: (916) 482-1463
TWX: 910-367-2092

9606 Aero Drive
P.O. Box 23333
San Diego 92123
Tel: (714) 279-3200
TWX: 910-335-2000

COLORADO
7965 East Prentice
Englewood 80110
Tel: (303) 771-3455
TWX: 910-935-0705

CONNECTICUT
12 Lunar Drive
New Haven 06525
Tel: (203) 389-6551
TWX: 710-465-2029

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P.O. Box 24210
2806 W. Oakland Park Blvd.
Ft. Lauderdale 33307
Tel: (305) 731-2020
TWX: 510-955-4099

P.O. Box 13910
6177 Lake Ellenor Dr.
Orlando, 32809
Tel: (305) 859-2900
TWX: 810-850-0113

GEORGIA
P.O. Box 28234
450 Interstate North
Atlanta 30328
Tel: (404) 436-6181
TWX: 810-766-4890

HAWAII
2875 So. King Street
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