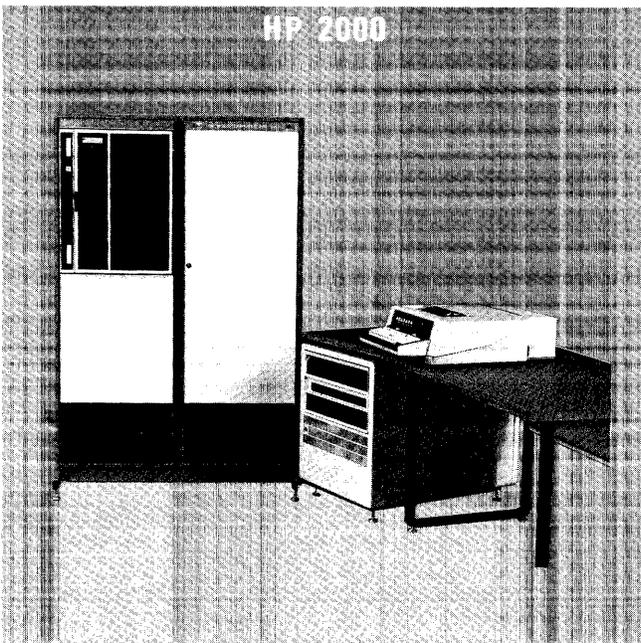# computer systems

COMMUNICATOR

2000

HP 2000

HP 2026

REVISION 1725 OF EDITOR/2000 AND FCOPY/2000

Correction to pages 20 and 21 of issue number 14 of the COMMUNICATOR 2000 regarding revision 1725 of EDITOR/2000 and FCOPY/2000.

Users currently on a software maintenance agreement should be receiving this new release around the end of <u>November</u>, rather than September as indicated in the COMMUNICATOR.

EDITOR'S NOTE

This issue contains two articles that show some of the capabilities of an HP 2026, the newest member of the 2000 family. One article describes an application program where employee location data, such as numbers for telephones, buildings, and mail stops, can be stored. This data can be read in various formats, such as a listing of names by telephone number of location. The second article describes some of the screen design potential available to an HP 2026 user.

Other information describes how HP 2000 precision can be extended from 6-7 digits to 12-13 digits, using six subroutines, and how to obtain a 2000 source code. Also, software updates and documentation changes are described.

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CONTENTS

AN ON-LINE
TELEPHONE BOOK APPLICATION
PROGRAM FOR THE HP 2026

Scott Guthrie
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For some time, Hewlett Packard's General Systems Division's telephone book was typed and maintained every month by a multitude of secretaries. Each change in the location of groups or individuals brought with it a period of mass confusion for those who needed to know the location and telephone extention of those involved in the move. No longer must the secretaries type that long list of names and numbers each month! No longer must there be mass confusion for the telephone switchboard operators!! The HP 2026 has solved it all !!!!

This article presents an application program capable of recording telephone, location, mail stop and other valuable information necessary to perform related services. This online Telephone Book can be updated as required with the updated information immediately available to other users.

The capabilities of the HP 2026 System make it possible to sort, select, and/or print this information in various formats. An example of this would be, a listing of the names of individuals sorted by telephone extension number or by location.

PHONE FILE

This particular application program requires a file called PHONE to be stored on the disc of a size such that there is one 80-character record for each person in the Telephone Book. Each record contains the following information:

Record Items	Characters
Employee's Names	20
Telephone Extension	4
Alternate Extension	4
Division Code	2
Location Code	4
Building Number	3
A Status Indicator	1
Mail Stop Number	2
Telephone Key System	6
Comments Field	34
Total	80 characters/ record

This Telephone Book application has two jobs associated with a common data base file called PHONE. The first of these two jobs, called PHONES, provides a means for modifying, adding, displaying and deleting records from the file. The second job, called OPRATR, provides a method for quickly retrieving a desired record. A possible application for this job would be to provide a telephone operator (thus the job name of OPRATR) with a very fast method of obtaining telephone extension numbers for routing calls.

PHONES JOB

The PHONES job is designed to provide for complete file maintenance. File entries can be retrieved and examined by use of the DISPLAY command. The DISPLAY command retrieves an information record from the file based on the input supplied by the user in the NAME field of the displayed screen. Partial key searches can be made by entering part of the name in the NAME field followed immediately by a closing parenthesis. This will retrieve the first record encountered starting with the supplied "key". For example, "S)" will return the first name beginning with "S" and "SMITH)" will return the first "SMITH" found in the file. If any NAME Key entered does not exist in the file, the NAME field will blink, indicating that a record with that "key" was not found.

The ADD command allows the user to enter a new person (record) to the file, and the REPLACE command allows modification of existing records for updating. The ADD and REPLACE commands both make some checks to ensure that the NAME field is not left completely blank, and that the Telephone Extension numbers, Division and Location Code fields are only numeric or left blank.

All of the information displayed on the screen, with the exception of the NAME field, can be modified or updated. To correct or modify a NAME field, the record must be ADDed as a new entry, and the old one deleted. The PURGE command is used to delete records which are no longer desired in the file. The record is not actually deleted, but is marked as logically deleted by having an "X" placed in the STATUS field of the screen by the PURGE routine. A message stating that the record is deleted is also placed in

the COMMENTS field. The deleted records are actually re-
moved from the file by resorting and rebuilding the file:
This should be done after a large number of records are
added, or before a listing of the file contents is performed.

Provisions have been made in this application for displaying
the "next" or "previous" record in the file. Entering a blank
in the command field will increment the file pointer and
display the next physical record, while entering a hyphen (-)
will display the prior record. This is very helpful if searching
for a person with a common name, where the initial displayed

record is not the one desired (assuming a file is sorted by name).

The screen format below shows the order in which the infor-
mation is presented to the user. The shaded areas of the
screen are used to highlight some of the more important in-
formation and allows easier identification of particular fields.

Each dot in the PHONES screen represents each of the 80
unprotected character positions. The file information, as
previously described, is distributed on the screen into these
areas.

```
                    T E L E P H O N E   B O O K
          =================================================

          COMMAND   ->  [ DIS ]              File Scrolling:
                         DIS    Display        " "   -> Forwards
                         ADD    Add           "_"   -> Backwards
                         REP    Replace
                         PUR    Purge Entry    #  to exit 'Telephone Book'
     ---------------------------------------------------------------------------

      NAME: [................]        Telephone Ext. [.....]
                                        Alternate      [....]

                        DIV.  LOC.            BLDG.
     LOCATION CODE:    [.. - ....]          [...]     STATUS:  [..]

         MAIL STOP:   [...]               KEY SYSTEM:  [......]

          COMMENTS:  [.........................................]
```

FULL BRIGHT   [____]

HALF BRIGHT   ▨▨▨▨

DEAL LANGUAGE EDITS

The DEAL Language Edits (instructions) on the following pages are listed with comments following, however, please refer to the HP 2026 Reference Manual (HP Part # 22704-90001) for a complete description of the edits. The following is the job definition for PHONES. This is followed by the edit listings for PHONES and PHO01.

```
JOB FILE DEFINITION FOR JOB:"PHONES"

FORMAT NAME    LENGTH   REPEAT
-----------    ------   ------
    PHONES       83       01
    //
```

```
                              DATA ENTRY
                         EDIT FILE DOCUMENTATION
FORMAT NAME:"PHONES"
                                                L O G I C A L    F L A G S
                                PARAMETER
    EDIT#  CHAR.POS.  LENGTH   #1    #2    #3    SET   TEST  NON-BLINK  SAME  OPP

    01 07      01       03                       B                X               A

TABLE  DISADDREPPUR #04

    02 07      01       01                       B     B

TABLE   - #02

    03 07      01       01                       C     B           X

TABLE    #01

    04 26      00     - 02      01    01                C
    05 26      00     - 01      01    01                B
    06 23      04       80  PHONE    01    01          B
    07 28      00       00                             B
    08 13      00       00                             B
    09 07      01       01                       D                X

TABLE  D  #01

    10 21      04       20  PHONE    01    01          D
    11 23      04       80  PHONE    01    01          D
    12 28      00       00                             D
    13 13      00       00                             D
    14 06      01       20
    15 03      24       04
    16 03      28       04
    17 03      32       02
    18 03      34       04
    19 07      01       01                       E                X

TABLE  A  #01

    20 21      04       20  PHONE    01    01    F     E           X
    21 16      04       20                       F

TABLE  NAME ALREADY EXISTS! #01

    22 28      00       00                             F
    23 13      00       00                 F     F           X               A
    24 29      00       01  PHO01
```

4

```
                                    DATA ENTRY
                              EDIT FILE DOCUMENTATION
     FORMAT NAME:"PHO01 "
                                                         L O G I C A L   F L A G S
                                          PARAMETER
        EDIT#   CHAR.POS.   LENGTH    #1     #2     #3    SET  TEST NON-BLINK SAME OPP

        01 25       04        80    PHONE                              E
        02 28       00        99                                      E
        03 13       00        00                                      E
        04 21       04        20    PHONE     01     01
        05 07       01        01                          G                  X

        TABLE   P   #01

        06 16       41        29                               G

        TABLE   X        ***DELETED RECORD***   #01

        07 24       24        60    PHONE     01     21
        08 28       00        99
```

The following describes the edit entries that appear in the
edit listings for PHONES and PHO01. Edit Number refers
to the instruction number.

Screen PHONES Edits

Edit Number	Comments
01,02	Check for valid command.
	Scrolling Routine
03	Decide whether scrolling is forward or not.
04	Increment file pointer by two records if forward scroll.
05	Decrement file pointer to adjust.
06	Retrieve record from file.
07,08	Display and halt.
	Display Routine
09	Check for DISPLAY command.
10	Perform a serial search on the PHONE file.
11	Retrieve record from file.
12,13	Display and halt.
	Check Fields For Remainder Of Commands
14	Verify name field is not completely blank.
15,16,17,18	Verify Telephone numbers, Division and Location Code fields are numeric (or blank).
	Add Routine
19	Check for ADD command.
20	Perform serial search.
21,22,23	Put out message if name is already on the file and halt.
24	Branch to further edits on screen PHO01.

Screen PHO01 Edits
(A Continuation For PHONES)

Edit Number	Comments
01	ADD record since it doesn't already exist.
02,03	Redisplay and halt.
	Purge And Replace Routine
04	Perform serial search (cannot purge or replace if name does not already exist!)
05	Check for PURGE command.
06	Insert deleted record flag in the STATUS field and deleted record message in the COMMENTS field.
07	Replace modified record in the file.
08	Clear screen and wait for further commands.

5

OPRATR

OPRATR is designed to provide the type of information that would be required of a telephone or PBX system operator. The screen, as follows, displays eleven names taken from the PHONE file. The name found by the given "key" is displayed in the brighter highlighted area in the center, with five names preceding, and five names following. This job is of most use if the file PHONE is sorted on the NAME field. Following the screen are the job definition and edit listings, which show the repetitive nature of this type of job in pointing to, and retrieving the desired records.

FORMAT NAME:"PHOO2 "


```
                    T E L E P H O N E    B O O K
        =============================================================

            COMMAND [ D ]              NAME [ .................. ]
                    [ D ] Display
                    [ b ] Forwards
                    [ - ] backwards
        ----------------------------------------------------------------

                                          MAIN        ALT.
                    NAME                   EXT.        EXT.
```

FULL BRIGHT [_ _ _ _ _]

HALF BRIGHT ▨▨▨▨▨▨

```
    JOB FILE DEFINITION FOR JOB:"OPRATR"

    FORMAT NAME    LENGTH    REPEAT
    -----------    ------    ------
       PHOO2        329        01
       //
```

```
                              DATA ENTRY
                       EDIT FILE DOCUMENTATION
FORMAT NAME:"PH002 "
                                                    L O G I C A L    F L A G S
                              PARAMETER
   EDIT#  CHAR.POS.  LENGTH    #1    #2    #3   SET  TEST NON-BLINK SAME OPP

01 07        01        01

TABLE   D -  #03

02 07        01        01                         3              X

TABLE   D  #01

03 21        02        20   PHONE    01    01    E    B
04 26        00      - 05          01    01         B
05 07        01        01                    C              X

TABLE      #01

06 26        00        01    01    01              C
07 07        01        01                    D              X

TABLE   -  #01

08 26        00      - 21    01    01                   D
09 29        00        01   PH003
```

```
                              DATA ENTRY
                       EDIT FILE DOCUMENTATION
FORMAT NAME:"PH003 "
                                                    L O G I C A L    F L A G S
                              PARAMETER
   EDIT#  CHAR.POS.  LENGTH    #1    #2    #3   SET  TEST NON-BLINK SAME OPP

01 23        22        28   PHONE    01    01         E    X
02 26        00        01          01    01         E
03 23        50        28   PHONE    01    01         E    X
04 26        00        01          01    01         E
05 23        78        28   PHONE    01    01         E    X
06 26        00        01          01    01         E
07 23       106        28   PHONE    01    01         E    X
08 26        00        01          01    01         E
09 23       134        28   PHONE    01    01         E    X
10 26        00        01          01    01         E
11 23       162        28   PHONE    01    01         E    X
12 26        00        01    01    01         E
13 23       190        28   PHONE    01    01         E    X
14 26        00        01          01    01         E
15 23       218        28   PHONE    01    01         E    X
16 26        00        01          01    01         E
17 23       246        28   PHONE    01    01         E    X
18 26        00        01          01    01         E
19 29        00        01   PH004
```

7

```
                                    DATA ENTRY
                              EDIT FILE DOCUMENTATION
        FORMAT NAME:"PHO04 "

                                                          L O G I C A L    F L A G S
                                           PARAMETER
          EDIT#   CHAR.POS.   LENGTH    #1      #2      #3      SET   TEST  NON-BLINK  SAME  OPP

          01 23     274       28    PHONE     01      01              E              X
          02 26     00        01        01      01              E
          03 23     302       28    PHONE     01      01              E              X
          04 28     00        00
```

Screen PHO02 Edits For Job OPRATR

Edit Number	Comments
01	Check for valid command (Display or Scroll).
	Display Routine
02	Check for Display command.
03	Perform serial search on the file PHONE.
04	Set pointer back five records. The pointer now points to the first record to be displayed.
	Forward Scroll Routine
05	Check for forward scroll.
06	Modify current pointer to beginning of next series by adding one.
	Backward Scroll Routine
07	Check for backward scroll.
08	Modify current pointer to beginning of previous series by subtracting twenty-one.
09	Branch to further edits on screen PHO03.

Screen PHO03 Edits
(A Continuation Of PHO02)

Edit Number	Comments
01 to 19	This series of edit 23's and 26's performs the actual retrieval and increment function for the eleven records to be displayed.

Screen PHO04
(A Continuation Of PHO03)

Edit Number	Comments
01,02,03	These edits complete the retrieval of the records.
04	Present the display.

SUMMARY

These two programs can be modified by adding or deleting fields to suit the needs of a particular application. They are presented here as examples, demonstrating some simple file manipulation through the use of the DEAL Language.

A more sophisticated approach to this application design would be to have a sorted Master File with the serial searches replaced by binary searches (Edit #20). All added records would be placed in an overflow file and if any record is not found in the master file, the job would then search this other file. This would provide much faster response for a very large data base of several thousand records. However, for our data base of about 1200 records, we are provided a response time of under 1 second for either of the two jobs.

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TERMINAL TRICKS WITH THE HP 2026 FOR REVISION 1727

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Since the HP 2026 now fully supports all video, cursor control and soft key functions on the HP 2645A terminal, an HP 2645A Display Station User's Manual (HP Part # 02645-90001) is an essential reference for advanced screen design using the Data Entry Application Language (DEAL).

There are two basic types of screen definitions:

- Formatted
- User Specified

FORMATTED SCREENS

Formatted, the most commonly used type, is where the screen contains one or more unprotected fields, and the cursor begins in the first position of the first field. A blank CONTROL field during screen design is used to designate this type of screen.

USER SPECIFIED SCREENS

User Specified allows the screen designer to place the cursor at any screen location and/or place the terminal in a more desirable mode. It is obtained by placing US in the CONTROL field.

For example, it may be desired in an application to have a blank screen displayed on the user's terminal. To do this, a User Specified screen could be used to allow the entire screen area to be "unprotected" by leaving the terminal in a Non-Format mode. If needed, titles or headings that would normally be entered for the application could be placed on the screen, thus eliminating the need for redundently entering this common data. Since this information is not placed in a protected area, the screen information could be modified or deleted at data entry time, if desired.

Initial positioning of the cursor on a User Specified screen is done by typing the desired commands to be performed at the end of the screen while "Display Functions" is on. In Display Function mode, escape sequences are displayed rather than executed. Thus, "esc h" will be displayed for a "Home Up", "esc C" for a "Right Arrow", etc. These sequences will be executed whenever the screen is displayed. An example of how to print a title on the top of a screen and position the cursor below it would be as follows:

```
THIS IS A SAMPLE TITLE   ᴿhᴿBᴿB


(Supplied by entering ↖↓↓ with DISPLAY FUNCTIONS on.)
```

When this screen is presented, the title will be printed and the cursor will be positioned in column 1 of the third line from the top.

VIDEO-ENHANCED LITERAL MESSAGES

An easy way to get video-enhanced literal messages displayed on the 2645A terminal during data entry is to incorporate the desired escape sequence(s) into a Literal Insert edit (#16). A Redisplay edit (#28) would be used to put the enhanced message onto the terminal. Error messages or a message indicating that some processing function is currently being performed would be likely candidates for this type of treatment. The trick is to remember to put the 2645A terminal into "Display Functions" mode when typing the string for the edit #16.

AN ALTERNATE WAY TO LOAD SOFT-KEYS AND SUPPLY CURSOR CONTROL

The Literal Insert edit (#16) approach can be used to load the 2645A soft-keys and/or provide cursor control on a screen that is being redisplayed using edit #28. Again, remember to put the terminal in the "Display Functions" mode when typing the string for the edit #16.

NOTE

If cursor control is incorporated into the screen design, the control will only be affected the FIRST time the screen is displayed. On repeated-screen applications, a Literal Insert edit (#16), as discussed above, may provide the desired cursor control.

EXTENDED PRECISION ARITHMETIC

Tom Aguirre
HP General Systems Division

DOUBLE-NUMERIC ARITHMETIC

The ability to expand the HP 2000 precision from 6-7 digits to 12-13 digits is made possible through the use of 6 subroutines described in this article. Although the BASIC code is unsupported, it should work on either 2000 E, F or 2000 systems. Code source listings are located in the latter part of this article.

The concept is referred to as Double-Numeric (D-N) and allows working with numbers ±83,886,079,999.99. D-N is roughly eight times slower than Floating Point arithmetic (F-P).

THE FORM OF D-N

D-N just uses two F-P variables. The D-type variable is used for the most significant 6+ digits (±8388607) and the N-type variable used for the least significant 6 digits (±999999). D and N combined make the D-N variable.

ADDITION AND SUBTRACTION OF D-N

Addition takes three lines of BASIC code to perform. In the following example D, X1 and Y1 are D-type and N, X2 and Y2 are N-type variables. As pairs they represent the D-N variables.

The addition code appears in line 160, 170 and 180. The subroutine at line 9000 is the only extra code needed — GOSUB 9000 must follow every addition and subtraction. D and N only are fixed by GOSUB 9000. Following is an example of addition:

    ($999,999,999.99 + $2,222,222,222.22):
    110   X1=99999.
    120   X2=999999.
    130   Y1=222222.
    140   Y2=222222.
    160   D=X1+Y1
    170   N=X2+Y2
    180   GOSUB 9000
    190   PRINT D;N

Subtraction requires only a sign change in line 160 and 170.

ABILITY TO SHIFT D-N LEFT OR RIGHT

Since all D-N arithmetic is handled as integer, the user has the duty of keeping the imaginary decimal point in the correct position for the next operation. In the multiplication example above this might consist of shifting the answer in the pair D and N three places to the right. This would be achieved by setting variable D0 to -3 and calling GOSUB 9050.

    Example: 150   D0=-3
               160   GOSUB   9050
               170   PRINT D;N

D,N will be returned shifted three places to the right.

MULTIPLICATION OF D-N

The following example shows how a multiplication is performed where the amount is $9,999,999.99 with a discount of 34.5%

    100   D1=999
    110   N1=999999
    120   D2=0
    130   N2=655
    140   GOSUB 9100
    150   PRINT D;N

The result returned is the pair D and N.

D-N INPUT/OUTPUT

NEED FOR CONVERSION ROUTINES

D-N provides extended precision capability without sacrificing machine performance or flexibility, but D-N without additional conversion routines is not easy to input or output. Thus, the String-Numeric i/o will be discussed.

STRING-NUMERIC I/O

The easiest and most effective way to get numbers in and out of the 2000 in extended precision applications is to use strings. String-Numeric (S-N) uses a string variable (such as D$) to input or output a number.

THE FORM OF S-N

S-N uses a string variable:

- String length "nul" to 14 places.
- – (minus) sign is first place if amount is negative or Credit.
- Positive or Debit amounts have no sign.
- Digits 0 – 9 are only other legal characters.
- Maximum absolute value of number 8388607999999.
- Number is left justified.
- No other characters beside '–' and 0 – 9 may be used.
- String ends immediately after number.

> Examples:
>
> Valid S-N's
> D$="12345"
> D$="-4567"
> D$=" "   same as D$="0"
> D$="-8388607999999"

Invalid S-N's	Reason Why Invalid
D$="+.12345"	+ is not valid character
D$="12345.66"	. is not valid character
D$="- 1234"	space is not valid character
D$="99999999999999"	number is too big
D$="999-"	– sign is in wrong location

CONVERSION OF S-N INTO D-N

An S-N in proper form is placed in D$, then GOSUB 9300 is called.

> Example: 100 A$="-1235"
>
> .
> .
> .
> .
> 200 D$=A$
> 210 GOSUB 9300

The D-N variable in the pair D and N is returned ready for use in calculations.

CONVERSION OF D-N INTO S-N

The D-N variable is placed in the pair D and N. Then GOSUB 9400 is called.

> Example: 500   D=X(Z)   D TYPE
>   510   N=Y(Z)   N TYPE
>   520   GOSUB 9400

The S-N variable D$ is returned with number in S-N form.

WHEN TO USE CONVERSION ROUTINES

The S-N to D-N and D-N to S-N routines are envisioned for use only when a number is initially INPUT or READ into a running program and then after all computation is performed just before final results are printed.

The output from the GOSUB 9400 could, of course, be PRINTed but is is recommended that it only be considered an intermediate result to be used to write to files or to be further formatted, as described in the following text.

PICTURE-NUMERIC FORMATTING

Picture-Numeric (P-N) formatting basically is a formatting mask (F$) used to edit a S-N (D$) variable to a P-N (P$) variable which is complete and ready to be printed.

PICTURE-NUMERIC FORMAT

Format masks are used to edit ASCII numeric, 0-9. These masks consist of placement holders, sign characters and insertion characters.

Replacement Holders

- 9 (Numeric) — Each 9 of F$ is replaced by a decimal digit in the corresponding position of D$, and the result appears in P$.
- Z (Zero Suppression) — The position of the Z in the F$ is replaced by a decimal digit in the corresponding position of the D$. Zeros to the left of the first significant position in the F$ are replaced by blanks, and the results appear in P$.
- * (Asterisk) — Asterisks rather than blanks are inserted to the left of the first significant decimal digit in P$.
- $ (Dollar Sign) — A dollar sign is inserted to the left of the first significant decimal digit in the P$ result, and is to the left of the position that defined the zero suppression. Any zero in the remaining non-significant positions is replaced by blanks.

Sign Characters

- DB (Debit) —These two characters are placed in the rightmost position of the format mask F$. If D$ is positive, the characters remain in the edited output. If F$'s value is negative, DB is replaced by two blanks. When DB is present in F$, no data is edited into the last two positions but only into the edit characters to the left.
- CR (Credit) — These two characters are placed in the rightmost positions of the format mask, F$. If D$ is negative, the characters remain in the edited output. If F$'s value is positive, CR is replaced by two blanks. When CR is present in F$, no data is edited into the last two positions but only into the edit characters to the left.
- SS (Debit or Credit: DB, CR) — These two characters are placed in the rightmost position of the format F$. If D$ is positive, SS is replaced with DB. If D$ is negative, SS is replaced with CR. When SS is present in F$, no data is edited into the last two positions but only into the edit characters to the left.

- **+ (Plus)** — This character, placed in the rightmost position of F$, is treated similarly to DB.
- **− (Minus)** — This character, placed in the rightmost position of F$, is treated similarly to CR.
- **S (Plus or Minus: +, −)** — This character, placed in the rightmost position F$, is treated similarly to SS.
- **None of the Above** — A − (minus) in D$ remains in that position in formatted output.

Insertion Characters

All other characters in F$ not defined above are insertion characters and remain in the P$ result.

P-N OPERATION

P–N formatting requires converting an unformatted S–N variable into D$, putting a format in F$, calling GOSUB 9500, with the result returned in P$.

Example:

```
600   D$="-346789"
610   F$="$$$$,$$$,$$$.99  CR"
620   GOSUB 9500
630   PRINT P$
        .
        .
        .
```

NOTE

1. The characters are placed in P$ using F$ mask from right to left. Only the characters 9, Z, *, and $ are replaced by decimal characters F$.

2. If all D$ characters have not been placed in the edit mask when the end of the edit mask is reached, the entire edited output is filled with asterisks and editing terminates.

GOSUB 9000 — USE AFTER ADD AND SUBTRACT

```
9000    REM USE AFTER EVERY ADD/SUB OF DOUBLE-NUMERIC; I/O D-N
9002    GOTO SGN(D)+2 OF 9004,9008,9006
9004    GOTO SGN(N)+2 OF 9008,9014,9010
9006    GOTO SGN(N)+2 OF 9010,9014,9008
9008    IF ABS(N)<1.E+06 THEN 9014
9010    D=INT(SGN(N)+D)
9012    N=INT(N-1.E+06*SGN(N))
9014    IF ABS(D) <= 8.38861E+06 THEN 9018
9016    PRINT "WARNING- DOUBLE-NUMERIC HAS EXCEEDED +-8388607999999"
9018    RETURN
```

GOSUB 9050 — SHIFT

```
9050    REM SHIFT RIGHT (-) PLACES WITH ROUNDING OR LEFT (+) PLACES
9052    REM INPUT D,P,DO-SHIFT AMT; OUTPUT D,P SHIFTED; USES D7,D8,D9
9054    D7=1
9056    IF SGN(D)=-1 OR SGN(N)=-1 THEN 9060
9060    D7=-1
9062    D=INT(ABS(D))
9064    N=INT(ABS(N))
9066    GOTO SGN(DO)+2 OF 9068,9094,9082
9068    FOR D9=1 TO ABS(DO)
9070    N=INT((N+5)/10)
9074    N=INT((D-INT(INT(D/10)*10))*100000.+N)
9076    D=INT(D/10)
9078    NEXT D9
9080    GOTO 9094
9082    FOR D9=1 TO ABS(DO)
9084    D=INT(D*10)
9086    D8=INT(N/100000.)
9088    D=INT(D+D8)
9090    N=INT((N-D8*100000.)*10)
9092    NEXT D9
9094    D=INT(D*D7)
9096    N=INT(N*D7)
9098    RETURN
```

GOSUB 9100 — MULTIPLY

```
9100    REM ROUTINE TO MULTIPLY DOUBLE-NUMERIC
9102    REM INPUT D1,N1;D2,N2.  OUTPUT D,N.  USES D3-D9;N3-N9.
9104    IF D1*1.E+06+N1>D2*1.E+06+N2 THEN 9116
9106    D5=ABS(D2)
9108    N5=ABS(N2)
9110    D6=ABS(D1)
9112    N6=ABS(N1)
9114    GOTO 9124
9116    D5=ABS(D1)
9118    N5=ABS(N1)
9120    D6=ABS(D2)
9122    N6=ABS(N2)
9124    D3=N3=N8=N9=D=N=0
9126    IF D6=0 AND N6=0 THEN 9180
9128    D=D6
9130    N=N6-5
9132    D0=-1
9134    GOSUB 9050
9136    D4=D
9138    N4=N
9140    D0=1
9142    GOSUB 9050
9144    N8=N6-N
9146    D6=D4
9148    N6=N4
9150    D0=N9
9152    N9=1
9154    D=D5
9156    N=N5
9160    GOSUB 9050
9162    D5=D
9164    FOR N7=1 TO N8
9166    D=D5+D3
9168    N=N5+N3
9170    GOSUB 9000
9172    D3=D
9174    N3=N
9176    NEXT N7
9178    GOTO 9126
9180    D=D3
9182    N=N3
9184    IF SGN(D1)=-1 OR SGN(N1)=-1 THEN 9188
9186    GOTO 9192
9188    D=-D
9190    N=-N
9192    IF SGN(D2)=-1 OR SGN(N2)=-1 THEN 9196
9194    GOTO 9200
9196    D=-D
9198    N=-N
9200    RETURN
```

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```
9300    REM CONVERT STRING-NUMERIC TO DOUBLE-NUMERIC
9302    REM INPUT D$(14); OUTPUT D,N; USES N$="0123456789",D7,D8,D9
9304    D=N=D7=0
9306    FOR D9=1 TO LEN(D$)
9308    FOR D8=1 TO 10
9310    IF D$[D9,D9]#N$[D8,D8] THEN 9324
9312    IF D9>LEN(D$)-6 THEN 9320
9314    D=INT(D*10+D8-1)
9316    D7=D7+1
9318    GOTO 9324
9320    N=INT(N*10+D8-1)
9322    D7=D7+1
9324    NEXT D8
9326    NEXT D9
9328    IF D$[1,1]#"-" THEN 9338
9330    D=-D
9332    N=-N
9334    IF D7#LEN(D$)-1 THEN 9340
9336    GOTO 9342
9338    IF D7=LEN(D$) THEN 9342
9340    PRINT "WARNING-ALPHA CHARACTERS IN STRING-NUMERIC--ERROR POSSIBLE!"
9342    RETURN
```

```
9400    REM  CONVERT DOUBLE-NUMERIC TO STRING-NUMERIC
9402    REMN INPUT D,N; OUTPUT DS(14); USES NS="0123456789",D4-D9
9404    D4=D6=1
9406    DS=""
9408    IF SGN(D)=-1 OR SGN(N)=-1 THEN 9412
9410    GOTO 9416
9412    DS[D4,D4]="-"
9414    D4=D4+1
9416    D5=ABS(D)
9418    IF D5 <= 8.38861E+06 THEN 9422
9420    PRINT "WARNING-DOUBLE-NUMERIC HAS EXCEEDED +- 8388607999999"
9422    FOR D8=7 TO 6 STEP -1
9424    FOR D9=D8 TO 1 STEP -1
9428    D7=INT(D5/10^(D9-1))-INT(INT(D5/10^D9)*10)+1
9429    IF D6=0 THEN 9434
9430    IF D7=1 THEN 9438
9432    D6=0
9434    DS[D4,D4]=NS[D7,D7]
9436    D4=D4+1
9438    NEXT D9
9440    D5=ABS(N)
9442    NEXT D8
9444    RETURN
```

GOSUB 9500 — FORMAT STRING-NUMERIC

```
9500    REM EDIT STRING-NUMBER  D$  WITH FORMAT IN  F$
9502    REM INPUT D$; OUTPUT P$; USES F$(AS REQUIRED);D4-D9
9504    P$=F$
9506    D4=1
9508    D5=LEN(P$)
9510    D6=LEN(D$)
9512    REM  DB SIGN:  'DB' OR BLANK
9514    IF D5-1<1 THEN 9592
9516    IF P$[D5-1,D5]="DB" THEN 9520
9518    GOTO 9528
9520    IF D$[1,1]#"-" THEN 9592
9522    P$[D5-1,D5]=" "
9524    GOTO 9588
9526    REM  CR SIGN; BLANK OR 'CR'
9528    IF P$[D5-1,D5]="CR" THEN 9532
9530    GOTO 9540
9532    IF D$[1,1]="-" THEN 9588
9534    P$[D5-1,D5]=" "
9536    GOTO 9592
9538    REM + SIGN:  '+' THEN 9544
9540    IF P$[D4,D5]="+" THEN 9544
9542    GOTO 9552
9544    IF D$[1,1]#"-" THEN 9592
9546    P$[D5,D5]=" "
9548    GOTO 9588
9550    REM  - SIGN: BLANK OR '-'
9552    IF P$[D5,D5]="-" THEN 9556
9554    GOTO 9564
9556    IF D$[1,1]="-" THEN 9588
9558    P$[D5,D5]=" "
9560    GOTO 9592
9562    REM   SS SIGN:  'DB'  OR  'CR'
9564    IF P$[D5-1,D5]#"SS" THEN 9578
9566    IF D$[1,1]="-" THEN 9572
9568    P$[D5-1,D5]="DB"
9570    GOTO 9592
9572    P$[D5-1,D5]="CR"
9574    GOTO 9588
9576    REM  S SIGN:  '+' PO  '-'
9578    IF P$[D5,D5]#"S" THEN 9592
9580    IF D$[1,1]="-" THEN 9586
9582    P$[D5,D5]="+"
9584    GOTO 9592
9586    P$[D5,D5]="-"
9588    D4=2
```

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```
9590    REM   LOAD DS INTO PS FROM RIGHT TO LEFT
9592    FOR D8=D5 TO 1 STEP -1
9594    IF D6<D4 THEN 9620
9596    IF PS[D8,D8]="Z" THEN 9612
9598    IF PS[D8,D8]="S" THEN 9612
9600    IF PS[D8,D8]="9" THEN 9606
9602    IF PS[D8,D8]="*" THEN 9612
9604    GOTO 9616
9606    IF DS[D6,D6]#"-" THEN 9612
9608    PS[D8,D8]="0"
9610    GOTO 9616
9612    PS[D8,D8]=DS[D6,D6]
9614    D6=D6-1
9616    NEXT D8
9618    REM WITH DS NOW IS PS--FIXUP PS TO LEFT TO FIRST "S" IF ANY
9620    FOR D9=D8 TO 1 STEP -1
9622    IF PS[D9,D9]#"Z" THEN 9628
9624    PS[D9,D9]=" "
9626    GOTO 9666
9628    IF PS[D9,D9]#"9" THEN 9634
9630    PS[D9,D9]="0"
9632    GOTO 9666
9634    IF PS[D9,D9]#"." THEN 9648
9636    IF D9+1>D5 THEN 9640
9638    IF PS[D9+1,D9+1]#" " THEN 9666
9640    IF D9-1 THEN 9666
9642    IF PS[D9-1,D9-1]="S" THEN 9666
9644    PS[D9,D9]=PS[D9-1,D9-1]
9646    GOTO 9622
9648    IF PS[D9,D9]#"," THEN 9660
9650    IF D9-1>0 THEN 9656
9652    PS[D9,D9]=" "
9654    GOTO 9666
9656    PS[D9,D9]=PS[D9-1,D9-1]
9658    GOTO 9622
9660    IF PS[D9,D9]="*" THEN 9666
9662    IF PS[D9,D9]#"S" THEN 9666
9664    GOTO 9670
9666    NEXT D9
9668    REM   FIXUP PS TO THE LEFT OF FIRST S
9670    FOR D7=1 TO D9-1
9672    IF PS[D7,D7]="S" THEN 9678
9674    IF PS[D7,D7]="," THEN 9678
9676    GOTO 9680
9678    PS[D7,D7]=" "
9680    NEXT D7
9682    REM   FILL WITH '*' IF NUMBER EXCEEDED FORMAT
9684    IF D6<D4 THEN 9692
9686    FOR D7=1 TO D5
9688    PS[D7]="*"
9690    NEXT D7
9692    RETURN
9999    END
```

SOURCE CODE FOR HP 2000 SYSTEMS

Tom Aguirre
HP General Systems Division

We recognize that there are some customer situations where source code is necessary in order for the customer to use his computer for the purpose for which it was acquired. It cannot be overemphasized that the user be fully cognizant of HP's limitations pertaining to modified software run on the HP 2000. *HP will not provide any support for customer-modified source code or the related object code.* If HP discovers, in the process of troubleshooting a software problem, that the problem was caused by the customer's modifications, HP may levy an additional charge over and above the customer's maintenance agreement.

However, if it is desirable to acquire the source code for the HP 2000, a special procedure has been set up to meet this need.

LICENSE AGREEMENT

A new Source Code License Agreement with the customer will be required. This agreement is designed to protect the customer by informing him of the limitations under which GSD is providing source code. The main points of this agreement are:

1. HP will not provide any of the following in connection with the source code covered by the Agreement:

   Maintenance
   Support
   Updates or information concerning updates

2. The customer may modify the materials furnished under the license agreement and may sell or license the object code derived from the modified source code to that user's customers *in conjunction with the scale of HP hardware by that user.*

3. The user shall not copy or otherwise reproduce the source code except copies for safeguarding or archival purposes. Of course, the user may compile the source code and may also modify and compile it.

It is important to note that this agreement allows OEMs to put one copy of their modified source code (in object code form) on each HP 2000 they sell. This is in keeping with the present policy of allowing OEMs to purchase a software sub-system once and copy it once for each subsequent system they buy from GSD.

This source code will only be made available to those customers who have already purchased (or ordered) the related object code (subsystems) or an HP 2000 Computer System.

The present price is $500 and you will be furnished the internal specifications of the code itself along with a magnetic tape containing the source code. The Source Code License Agreement must be signed and returned to GSD prior to the transmission of the order. No source code products will be shipped until a signed copy of the license agreement is on file at GSD.

OBTAINING THE SOURCE CODE

Customers should contact their local HP representative for ordering information.

OPERATING SYSTEM CHANGES

Please note that in the case of modification made to the operating system, the customer may no longer be able to take advantage of new versions as they are released. Because HP may subsequently modify some of the same modules that the customer may have changed, he may not be able to take advantage of changes and improvements HP may make to the HP 2000 system.

SOFTWARE UPDATE

ADDITIONS TO REVISION 1715 OF THE 2000 OPERATING SYSTEM

Michel Girard
HP General Systems Division

Since the last article regarding the release of 1715 of the HP 2000 system a number of additional bugs have been corrected. This article completes the list of bugs fixed in release 1715 of the HP 2000 software.

I/O PROCESSOR

1. The system now supports line printers with 136 print positions in all applications.

2. An incompatibility existed between the HP 2000 firmware and the rev. 1630 (and subsequent) 21MX base set firmware. A software routine has been implemented to replace one of the microcode routines.

3. An error existed in the CDC RJE Handler resulting in the possibility of losing console messages and/or RJE hangup.

4. The line printer handler did not properly handle illegal control codes (CTL function). An illegal control code for the line printer is an integer greater than 17 or less than 1. All illegal control codes are now defaulted to skip to the next line (CTL 3).

5. An error existed in the CDC RJE Synchronous Handler which caused the loss of host messages after an RJE system connect command.

SYSTEM PROCESSOR

1. The SYSTEM statement always ran to completion, allowing a deeply nested function call in the SYSTEM statement to monopolize the system, and locking out the other ports and the console.

2. Under certain conditions, the READ statement attempted to read beyond the end of the physical data statements.

3. A LOAD*OUT=F* command was incorrectly accepted and could cause a system processor halt.

4. Under certain conditions, users were allowed to redimension a matrix to a length beyond the physical limits of the DIM statement.

5. An unrestricted program in a group master account was incorrectly allowed to use FCP capabilities to create files in group member accounts when called from another group member account.

6. If an ASCII disc file overflowed by less than one block, the file overflow condition was not detected and the user did not receive the END OF FILE error message.

REVISION 1725 OF EDITOR/2000

Tom Aguirre
HP General Systems Division

This article describes the new capabilities and problems corrected in revision 1725 of EDITOR/2000 (22701A). All users who are currently on a software maintenance agreement will be receiving this new release about the end of September. Any users not on a software maintenance agreement and who have a license agreement may acquire a copy by contacting their local HP representative.

NEW CAPABILITIES

1. COBOL

   New default parameters — LBOUND=8 and RBOUND=72. COBOL statements normally begin in column 8, but L-BOUND may be set to 7 for continuations. Columns 1–6 are reserved for numbering COBOL statements. RBOUND may be set to 80 if the user desires to supply sequence numbers in columns 73–80.

   KEEP,NUMBERED will place line numbers in columns 1–6 without a decimal point. If KEEP,UNNUMBERED, columns 1–6 will be filled with blanks.

   TEXT will accept numbered lines (with line number in columns 1–6 without decimal point) or unnumbered lines with or without blanks in columns 1–6. When no blanks are present they are inserted by the EDITOR.

   New default settings for TABS — 12,16,20,24,28,32,36, 40,44,48.

2. TEXT command has been speeded up.

PROBLEMS CORRECTED BY THIS REVISION

1. FACING option.
2. DELETE now displays text of deleted lines.
3. LENGTHEN makes sure enough space is available before lengthening any file.
4. DELETE ALL from USE file when no lines are in work file no longer causes USE file to be abandoned.
5. JUSTIFY no longer requires a blank line after the last paragraph in the WORK file to avoid justification of the last line.
6. MOVE and COPY compute appropriate increment in advance if none is specified.
7. .SUPPRESS no longer decrements the line count.

MANUALS TO BE UPDATED

Update #2 to EDITOR/2000, dated June 1977, manual part number 22701-90001.

REVISION 1725 OF FCOPY/2000

Tom Aguirre
HP General Systems Division

This article describes the problems corrected in revision 1725 of FCOPY/2000 (22700A). All users who are currently on a software maintenance agreement will be receiving this new release about the end of September. Any users not on a software maintenance agreement and who have a license agreement may acquire a copy by contacting their local HP representative.

NEW CAPABILITIES

There are no new capabilities in this release.

PROBLEMS CORRECTED BY THIS REVISION

A misleading error message was generated when a user attempted to utilize an ASCII device such as a Magnetic Tape whose buffer size was configured for >256 words. The workspace size for FCOPY does not permit a record size greater than 256 words.

A user may configure two Magnetic Tape assignments: MT0 with 256 word buffer and MT1 with 1024 word buffer, even though only one physical tape drive is present. The computer operator may optionally select the MT id desired by pressing the appropriate id subchannel button located on the tape drive.

MANUALS TO BE UPDATED

There are no updates to the FCOPY/2000 manual for this release.

UPDATING THE HP 2026 SYSTEM

Terry Eastham
HP General Systems Division

HP 2026 Software releases (on 800 bpi or 1600 bpi mag tape) are mailed from the factory directly to each customer's designated "Central Site Manager." It is the Central Site Manager's task to first update the central 2026 system, add applications (DEAL) software, and then update the satellite 2026 systems. Here are some general procedures that should provide ease of updating:

1. It is first of all recommended that subchannel 2 on the (first) HP 7905 disc drive be reserved as a system software/scratch platter *only.* That is, files that cannot be overwritten (by accident or on purpose) should not be stored on subchannel 2. Data files and DEAL files should reside on any subchannel(s) other than the reserved system subchannel. The files TAPE1 ("D1"), TAPE2 ("D2"), UTMPF and perhaps LIBFL ("L1")

are the most likely candidates for system platter residence.

2. *Before* doing any updating, the entire system (i.e., all subchannels) should be backed-up on mag tape using the CSAVE program.

3. A User Listing of the system subchannel should be printed to confirm that it is ok to overwrite everything residing there. This may be printed by typing ":LI,U,6" on the system console.

   If it is necessary to save files that are on the system subchannel, the files may be copied to another subchannel or dumped to mag tape. Subchannel-to-subchannel copy procedures are contained in the HP 2026 Reference Manual. If dumping files to mag tape, it is important to note that:

   a. DEAL files must be dumped using the DEAL program.

   b. Source Files must be dumped (to T1) using the system directive ":DU,8,name" and later reloaded using the system directive ":ST,S,name,8."

   c. "DB" files may be dumped using the UTIL or REFUT programs.

4. The UPDAT program can now be run from the system console. *Remember that the UPDATE program will overwrite everything on the system subchannel!*

5. After the UPDATE process, print another User Listing and note the sector allocations for the files TAPE1, TAPE2 and LIBFL. These files may now be purged (":PU,name") and, after repacking the disc (":RP"), restored ("ST,B,name,xxxx") to the desired sizes.

   Three DEAL files called FILE0, FILE1, and FILE2 are provided with the system software. A decision must be made whether these files should be purged, dumped to mag tape, or kept intact.

   In almost all cases, files of a given name must not exist on more than one subchannel. This applies to files such as TAPE1 and LIBFL as well as the DEAL files FILE0, FILE1, and FILE2. Likewise, it is critical that only one copy of system software exists (actively) on the HP 2026 system at any one time.

6. The CRTIO program must be run to reconfigure the terminal I/O lines appropriately. The default configuration is for all (sixteen) terminals on the first I/O line.

7. Depending on the HP 2026 data transmission line protocol desired, a Batch RENAME procedure may have to be run as appropriate (see HP 2026 User's Manual). The default protocol is "synchronous" with "Reverse Channel." ":BA,18,RV2SN" is the most likely RENAME procedure since this allows transmission using modems without reverse channel, such as Bell 208.

8. If RJE is a desired function, a configuration dialogue is required (see the HP 2026 User's Manual).

The above updating procedures apply especially to the Central Site Manager and the central 2026 system. However, consideration of each point is also recommended for satellite 2026 updating.

REVISION 1727 SOFTWARE FOR THE HP 2026 SYSTEM

Terry Eastham
HP General Systems Division

NEW CAPABILITIES

New software (Rev. 1727) is now available for the HP 2026 Data Entry/Data Communications system. New features include the following:

1. Screen design using the Data Entry Applications Language (DEAL) now supports:

   a. Any and all 2645A terminal video enhancements.

   b. Alternate character sets including the line drawing set.

   c. "Soft Key" loading upon screen display.

   d. Multiple page screens of length such that the maximum size is less than 2048 characters.

   ### NOTE

   Left and right brackets (e.g. [ ]) no longer delimit unprotected fields as in the past. Instead, control-F2 is used to "start unprotect" and control-F3 to "end unprotect."

2. Data Entry Terminal control has been changed such that:

   a. Only the "A" terminal can "up" other terminals.

   b. The "A" terminal can "down" all terminals except itself.

   c. "Non-A" terminals can "down" themselves only.

   d. "Downing" of a terminal will only occur if that terminal is at the Header screen. Note, however, that an "EXIT" command from the "A" terminal will override and "down" all terminal activity.

   e. "Upping" of a terminal that is already up now leaves the terminal undisturbed (rather than returning it to the Header screen as in the past).

   f. A new command, "T?", may be entered from any terminal to check status of all terminals. This command also shows what jobs each terminal is running, the current screen on each job, and what, if any background program is running.

3. Remote 2645A support via modems is enhanced by:

   a. A new four-line I/O configuration.

   b. CRC-16 error checking between 2645A terminal and 2026 system. (Note: Requires CRT strap change!)

   c. Terminal cartridge and remote printer support using DEAL instruction #18.

4. System operation has been made easier with respect to "operator attention":

   a. Typing any character on the system console during program execution will cause a "?" to be displayed. Valid console replies to the "?" are:

      1) "PR" = "Program #" (Switch #8 Equivalent)

      2) "FA" = Foreground Abort (Switch #15 Equivalent)

      3) "FC" = Foreground Count (Switch #1 Equivalent)

      4) "BA" = Background Abort (Switch #14 Equivalent)

      5) "BC" = Background Count (Switch #1 Equivalent)

      6) "0–15" = Appropriate Switch Equivalent

      If no reply is made within 30 seconds an ignored message is typed and the input request is ignored.

   b. Switch register continues to operator as in the past.

5. The MLRJE (HASP Workstation) program now contains the following new features:

   a. Line buffer size is configurable at initialization time.

   b. Multiple host configurations allowed.

6. In both the output definition of DEAL and in the formatting language of the REFUT program, backward relative positioning is possible by use of "A–xx."

7. The KFILE program has been added as a background program.

8. In the UTIL program, "KS" for "Keyed Sequential" is now a valid reply to the –copy function. This will dump files in Key File order instead of Master File order.

PROBLEMS CORRECTED BY THIS REVISION

Bugs fixed in Rev. 1727 software include the following:

1. During Data Entry, the MSG # in the Header screen is set to "000" if non-numeric (or blank).

2. In DEAL, the edit-instruction set is initialized to null upon job creation.

3. In DEAL, the Output Definition is initialized to "NO" upon Job creation.

4. In DEAL, a Replace of a screen format saves the previously defined edits for that screen.

5. If Data Entry is exited while a background program is still running, a message is displayed on the master terminal.

6. Data Entry terminals that have been "upped" but are powered off or do not exist are timed out more quickly.

7. In the SORT program, input block sizes of 256 byte multiples are now handled correctly.

DOCUMENTATION

The following tables list currently available customer manuals for HP 2000 Systems products. This list supersedes the list in the last issue of the **Communicator.**

The most recent changes to the tables are indicated for easy reference. Prices are subject to change without notice.

Copies of manuals and updates can be obtained from your local Sales and Service office. The address and telephone number of the office nearest to you are listed in the back of all customer manuals.

Update packages are free of charge. If you require an udpate package complete the Update Order Form in the back of the **Communicator** and mail the form to:

> Software/Publications Distribution
> 5303 Stevens Creek Blvd.
> Santa Clara, CA 95050

Customers in the U.S. may also order manuals directly by mail. Simply list the name and part number of the manual(s) you need on the Part and Supplies form in the rear matter.

TERMS

A few words about documentation terms:

New   A new manual refers only to the first printing of a manual. When first printed, a manual is assigned a part number.

Revised   A revised manual is a printing of an existing manual which incorporates new and/or changed information in its contents. For example, a manual is revised when an update package is incorporated into the manual: the manual gets a new print date and the update package disappears. Note that a revision to a manual effectively obsoletes the previous version of the manual.

Update   An update package is a supplement to an existing manual which contains new and/or changed information. Updates are issued when information must get to customers, yet it is inappropriate to issue a revised manual. An update has no part number; it is automatically included when you order the manual with which it is associated.

ADDITIONS AND CHANGES

The **Guidebook to Data Communications** (P/N 5955-1715) will give you a general understanding of the concepts for each aspect of data communications along with some simplified examples. First printed in January 1977 as an HP internal training manual, it is now available to the general public.

Update #1 to the **HP 2026 Data Entry and Communications Reference Manual** documents revision 1727 software for the HP 2026 System.

COMMUNICATOR BACK ISSUES

If you are ordering past issues of the **Communicator,** please note that supplies are now limited and only the following issues are available:

> Issues #4, 5, 8, 9, 11, 12 and 13

Order information can be found on the **Communicator** order form in the rear matter.

NEW FORM FOR ORDERING CONTRIBUTED SOFTWARE

When ordering contributed software by direct mail, please use the Contributed Software form, not the Parts and Supplies form. A copy of this new form is included in the rear matter.

Contributed software may also be ordered through your local HP Sales Office. NO direct mail order can be shipped outside the U.S.A.

PART NUMBER	2000 E	2000 F	2000	2026	MANUAL TITLE	PRICE†	PUBLICATION DATE	CURRENT UPDATE
02000-90055		X			2000C/2000F IDF Author's Manual	$ 8.50	1/73	8/74
02000-90080		X			2000E to 2000F Conversion Guide	1.00	4/76	
19665-90001			X		2000/F to 2000 Computer System Upgrade Kit and Conversion Program Manual	2.00	8/76	
19665-90002			X		2000/F to 2000 Computer System Educational Application Upgrades	1.00	2/76	
22687-90001			X		2000 BASIC Reference Manual	10.00	5/76	4/77
22687-90005			X		2000 Operator's Manual	10.00	4/77	
22687-90007			X		2000 System Operator's Pocket Guide	1.50	4/77	
22687-90003			X		BASIC Pocket Guide	1.50	3/77	
02000-90048	X				BASIC/2000 Level E Reference Manual, Timeshared	10.00	9/75	
02000-90049	X				BASIC/2000 Level E System Operator's Manual, Timeshared	5.00	9/74	8/75
5952-4490	X				BASIC/2000 Level E Pocket Guide, Timeshared	0.15	10/74	
02000-90073		X			BASIC/2000 Level F Reference Manual, Timeshared	7.50	12/75	
02000-90074		X			BASIC/2000 Level F System Operator's Manual, Timeshared	10.00	8/76	
5952-4491		X			BASIC/2000 Level F Pocket Guide, Timeshared	0.15	8/75	
24387-90001		X			Basic Analysis and Mapping Program Manual	18.00	6/74	5/75
24387-90002		X			Basic Analysis and Mapping Program Pocket Guide	1.00	6/74	
24384-90001		X	X		College Information System — System Overview	5.00	6/74	9/76
24384-90003		X	X		College Information System Reference Manual	19.00	9/75	9/76
24384-90005		X	X		College Information System — Technical Manual	95.00	5/75	
24383-90001		X			Course Writing Facility Reference Manual	15.00	5/74	
22692-90001					Course Writing Facility Reference Manual	16.50	12/75	
5951-1381		X			DOS-M/2000C Timeshared BASIC File Handler	1.00	5/71	
22701-90001			X		EDITOR/2000 Reference Manual	7.00	9/76	
22701-90002			X		EDITOR/2000 Pocket Guide	1.00	11/76	
20352-90001		X			Educational Budget and Accounting System — System Overview	10.00	6/74	
20352-90002		X			Educational Budget and Accounting System — Reference Manual	10.00	3/75	4/76
20352-90003		X			Educational Budget and Accounting System — Technical Manual	75.00	3/75	
20353-90001		X			Educational Payroll System — System Overview	3.50	10/74	
22700-90001			X		FCOPY/2000 Reference Manual	4.50	1/76	
22693-90003			X		HP MATH Curriculum Guide	17.50	7/75	

PART NUMBER	2000 E	2000 F	2000	2026	MANUAL TITLE	PRICE†	PUBLICATION DATE	CURRENT UPDATE
22693-90002			X		HP MATH Proctor's Manual	6.50	7/75	
22693-90001			X		HP MATH Teacher's Handbook	5.50	7/75	
20310-90007		X			HP MATH Curriculum Guide	20.00	7/74	
20310-90005		X			HP MATH Proctor's Manual	5.00	9/74	
20310-90001		X			HP MATH Teacher's Handbook	5.00	9/74	
22691-90003			X		Instructional Dialogue Facility Author's Manual	13.00	9/75	
22691-90004			X		Instructional Dialogue Facility Author's Pocket Guide	3.00	9/75	
22691-90002			X		Instructional Dialogue Facility Course Developer's Manual	5.00	9/75	
22691-90001			X		Instructional Dialogue Facility Proctor's Manual	6.00	9/75	
20309-90005		X			Instructional Dialogue Facility Author's Pocket Guide	3.50	10/74	
20309-90003		X			Instructional Dialogue Facility Course Developer's Manual	6.00	8/74	
20309-90001		X			Instructional Dialogue Facility Proctor's Manual	10.00	9/74	
22690-90001			X		Instructional Management Facility Proctor's Manual	6.50	9/75	
22690-90002			X		Instructional Management Facility System Manager's Reference Manual	4.50	9/75	
20308-90001			X		Instructional Management Facility Proctor's Manual	7.00	9/74	
20308-90003		X			Instructional Management Facility System Manager's Manual	5.00	10/74	
22687-90009			X		Learning Timeshare BASIC	3.50	5/76	
20243-90001			X		Source Data Entry/2000 Reference	5.00	2/76	
20240-90001			X		Telecommunications Supervisory Package/2000 Manager's Manual	5.00	1/76	
20240-90002			X		Telecommunications Supervisory Package/2000 User's Manual	3.50	1/76	
20311-90001		X			Timeshared Graphics for Tektronix Terminals	7.00	8/74	
20311-90003		X			Timeshared Graphics Plotting Package	5.00	8/74	
19702-90002				X	Site Preparation, Installation, and Service Manual	4.00	3/77	
22704-90001				X	2026 Data Entry and Communications Reference Manual	18.00	4/77	8/77*N
5955-1715					Guidebook to Data Communications	4.50	1/77*N	

*N = New Manual

*R = Revised Manual

† Prices listed are subject to change without notice.

NOTE: This order form cannot be used for ordering manuals. It is for replacement pages only.

HEWLETT hp PACKARD

SOFTWARE/PUBLICATIONS DISTRIBUTION
ORDER FORM

UPDATES TO 3000 AND 2000
LEVEL MANUALS ONLY

SHIP TO:

NAME _____

COMPANY _____

STREET _____

CITY _____ STATE _____ ZIP CODE _____

MANUAL NAME	PART NUMBER	QUANTITY

When completed, please   *There is no charge for manual updates.*
mail this form to:

HEWLETT-PACKARD
SOFTWARE/PUBLICATIONS DISTRIBUTION
5303 Stevens Creek Blvd.
Santa Clara, CA   95050

HEWLETT **hp** *PACKARD*

CONTRIBUTED SOFTWARE
Direct Mail Order Form

NOTE: No direct mail order can be shipped outside the United States.

Please Print:

Name _____ Title _____

Company _____

Street _____

City _____ State _____ Zip Code _____

Country _____

Item No.	Part No.	Qty.	Description	List Price Each		Extended Total	

Sub-total		
Your State & Local Sales Taxes*		
Handling Charge	1	50
TOTAL		

*Tax is verified by computer according to your ZIP CODE. If no sales tax is added, your state exemption number must be provided: # _____ .
If not, your order may have to be returned.

Domestic Customers: Cash required on all orders less than $50.00. Mail the order form with your check or money order (payable to Hewlett-Packard Co.) or your U.S. Company Purchase Order to:

HEWLETT-PACKARD COMPANY
Contributed Software
P.O. Box 61809
Sunnyvale, CA 94088

International Customers: Order through your local Hewlett-Packard Sales office. No direct mail order can be shipped outside the United States.

All prices domestic U.S.A. only. Prices are subject to change without notice.

HEWLETT-PACKARD
COMMUNICATOR SUBSCRIPTION AND ORDER INFORMATION

The Computer Systems COMMUNICATORS are bi-monthly systems support publications available from Hewlett-Packard on an annual (6 issues) subscription.

The following instructions are for customers who do not have Software Service Contracts.

1. Complete name and address portion of order form.
2. For new direct subscriptions (see sample below):
   a. Indicate which COMMUNICATOR publication(s) you wish to receive.
   b. Enter number of copies per issue under Qty column.
   c. Extend dollars (quantity x list price) in Extended Dollars column.
   d. Enter discount dollars on line under Extended Dollars. (If quantity is greater than 1 you are entitled to a 40% discount.*)
   e. Enter Total Dollars (subtract discount dollars from Extended List Price dollars).

   *To qualify for discount all copies of publications must be mailed to same name and address and ordered at the same time.

SAMPLE

☒ DIRECT SUBSCRIPTION

Part No.	Description	Qty	List Price	Extended Dollars	Total Dollars
5951-6111	COMMUNICATOR 1000	3	$48.00	$144.00	
	(if quantity is greater than 1 discount is 40%)			57.60	
	TOTAL DOLLARS for 5951-6111				$86.40

3. To order back issues (see sample below):
   a. Indicate which publication you are ordering.
   b. Indicate which issue number you want.
   c. Enter number of copies per issue.
   d. Extend dollars for each issue.
   e. Enter total dollars for back issues ordered.

   All orders for back issues of the COMMUNICATORS are cash only orders (U.S. dollars only) and are subject to availability.

SAMPLE

☒ BACK ISSUE ORDER FORM (cash only in U.S. dollars)
(subject to availability)

Part No.	Description	Issue No.	Qty	List Price	Extended Dollars	Total Dollars
5951-6111	COMMUNICATOR 1000	X X	1	$10.00	$10.00	
		X X	2	10.00	20.00	
				10.00		
	TOTAL DOLLARS					$30.00

4. Domestic Customers: Mail the order form with your U.S. Company Purchase Order or check (payable to Hewlett-Packard Co.) to:

   HEWLETT-PACKARD COMPANY
   Computer Systems COMMUNICATOR
   P.O. Box 61809
   Sunnyvale, CA 94088
   U.S.A.

5. International Customers: Order by part number through your local Hewlett-Packard Sales Office.

Please photocopy this order form if you do not want to cut the page off. You will automatically receive a new order form with your order.

HEWLETT **hp** *PACKARD*

CONTRIBUTED SOFTWARE
Direct Mail Order Form

NOTE: No direct mail order can be shipped outside the United States.

Please Print:

Name _____ Title _____

Company _____

Street _____

City _____ State _____ Zip Code _____

Country _____

Item No.	Part No.	Qty.	Description	List Price Each		Extended Total	

Sub-total		
Your State & Local Sales Taxes*		
Handling Charge	1	50
TOTAL		

*Tax is verified by computer according to your ZIP CODE. If no sales tax is added, your state exemption number must be provided: # _____ . If not, your order may have to be returned.

Domestic Customers: Cash required on all orders less than $50.00. Mail the order form with your check or money order (payable to Hewlett-Packard Co.) or your U.S. Company Purchase Order to:

HEWLETT-PACKARD COMPANY
Contributed Software
P.O. Box 61809
Sunnyvale, CA 94088

International Customers: Order through your local Hewlett-Packard Sales office. No direct mail order can be shipped outside the United States.

All prices domestic U.S.A. only. Prices are subject to change without notice.

HEWLETT-PACKARD
COMPUTER SYSTEMS COMMUNICATOR ORDER FORM

Please Print:

Name _____ Title _____

Company _____

Street _____

City _____ State _____ Zip Code _____

Country _____

☐ HP Employee　　　Account Number _____　　　Location Code _____

☐ **DIRECT SUBSCRIPTION**

Part No.	Description	Qty	List Price	Extended Dollars	Total Dollars
5951-6111	COMMUNICATOR 1000 (if quantity is greater than 1 discount is 40%)	_____	$48.00	_____	
	TOTAL DOLLARS for 5951-6111				_____
5951-6112	COMMUNICATOR 2000 (if quantity is greater than 1 discount is 40%)	_____	25.00	_____	
	TOTAL DOLLARS for 5951-6112				_____
5951-6113	COMMUNICATOR 3000 (if quantity is greater than 1 discount is 40%)	_____	48.00	_____	
	TOTAL DOLLARS for 5951-6113				_____

☐ **BACK ISSUE ORDER FORM (cash only in U.S. dollars)**
(subject to availability)

Part No.	Description	Issue No.	Qty	List Price	Extended Dollars	Total Dollars
5951-6111	COMMUNICATOR 1000	_____	_____	$10.00	_____	
		_____	_____	10.00	_____	
		_____	_____	10.00	_____	
	TOTAL DOLLARS					_____
5951-6112	COMMUNICATOR 2000	_____	_____	$ 5.00	_____	
		_____	_____	5.00	_____	
		_____	_____	5.00	_____	
	TOTAL DOLLARS					_____
5951-6113	COMMUNICATOR 3000	_____	_____	$10.00	_____	
		_____	_____	10.00	_____	
		_____	_____	10.00	_____	
	TOTAL DOLLARS					=======

TOTAL ORDER DOLLAR AMOUNT　　　　　　　　　　　　　　　　　　　_____

☐ **SERVICE CONTRACT CUSTOMERS**

You will receive one copy of either COMMUNICATOR 1000, 2000, or 3000 as part of your contract. Indicate additional copies below and have your local office forward. Billing will be included in normal contract invoices.

Number of additional copies _____

FOR HP USE ONLY

CONTRACT KEY

- -

5951-6111　Number of additional copies　_____
5951-6112　Number of additional copies　_____
5951-6113　Number of additional copies　_____

Approved _____

HEWLETT-PACKARD
COMPUTER SYSTEMS COMMUNICATOR ORDER FORM

Please Print:

Name _____ Title _____

Company _____

Street _____

City _____ State _____ Zip Code _____

Country _____

☐ HP Employee   Account Number _____   Location Code _____

☐ **DIRECT SUBSCRIPTION**

Part No.	Description	Qty	List Price	Extended Dollars	Total Dollars
5951-6111	COMMUNICATOR 1000 (if quantity is greater than 1 discount is 40%)	_____	$48.00	_____	
	TOTAL DOLLARS for 5951-6111				_____
5951-6112	COMMUNICATOR 2000 (if quantity is greater than 1 discount is 40%)	_____	25.00	_____	
	TOTAL DOLLARS for 5951-6112				_____
5951-6113	COMMUNICATOR 3000 (if quantity is greater than 1 discount is 40%)	_____	48.00	_____	
	TOTAL DOLLARS for 5951-6113				_____

☐ **BACK ISSUE ORDER FORM (cash only in U.S. dollars)**
(subject to availability)

Part No.	Description	Issue No.	Qty	List Price	Extended Dollars	Total Dollars
5951-6111	COMMUNICATOR 1000	_____	_____	$10.00	_____	
		_____	_____	10.00	_____	
		_____	_____	10.00	_____	
	TOTAL DOLLARS					_____
5951-6112	COMMUNICATOR 2000	_____	_____	$ 5.00	_____	
		_____	_____	5.00	_____	
		_____	_____	5.00	_____	
	TOTAL DOLLARS					_____
5951-6113	COMMUNICATOR 3000	_____	_____	$10.00	_____	
		_____	_____	10.00	_____	
		_____	_____	10.00	_____	
	TOTAL DOLLARS					_____

TOTAL ORDER DOLLAR AMOUNT _____

☐ **SERVICE CONTRACT CUSTOMERS**

You will receive one copy of either COMMUNICATOR 1000, 2000, or 3000 as part of your contract. Indicate additional copies below and have your local office forward. Billing will be included in normal contract invoices.

Number of additional copies _____

FOR HP USE ONLY

CONTRACT KEY

- -

5951-6111   Number of additional copies _____
5951-6112   Number of additional copies _____
5951-6113   Number of additional copies _____

Approved _____

HEWLETT-PACKARD
COMMUNICATOR SUBSCRIPTION AND ORDER INFORMATION

The Computer Systems COMMUNICATORS are bi-monthly systems support publications available from Hewlett-Packard on an annual (6 issues) subscription.

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   a. Indicate which COMMUNICATOR publication(s) you wish to receive.
   b. Enter number of copies per issue under Qty column.
   c. Extend dollars (quantity x list price) in Extended Dollars column.
   d. Enter discount dollars on line under Extended Dollars. (If quantity is greater than 1 you are entitled to a 40% discount.*)
   e. Enter Total Dollars (subtract discount dollars from Extended List Price dollars).

   *To qualify for discount all copies of publications must be mailed to same name and address and ordered at the same time.

SAMPLE

☒ DIRECT SUBSCRIPTION

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	(if quantity is greater than 1 discount is 40%)			57.60	
	TOTAL DOLLARS for 5951-6111				$86.40

3. To order back issues (see sample below):
   a. Indicate which publication you are ordering.
   b. Indicate which issue number you want.
   c. Enter number of copies per issue.
   d. Extend dollars for each issue.
   e. Enter total dollars for back issues ordered.

   All orders for back issues of the COMMUNICATORS are cash only orders (U.S. dollars only) and are subject to availability.

SAMPLE

☒ BACK ISSUE ORDER FORM (cash only in U.S. dollars)
(subject to availability)

Part No.	Description	Issue No.	Qty	List Price	Extended Dollars	Total Dollars
5951-6111	COMMUNICATOR 1000	X X	1	$10.00	$10.00	
		X X	2	10.00	20.00	
				10.00		
	TOTAL DOLLARS					$30.00

4. Domestic Customers: Mail the order form with your U.S. Company Purchase Order or check (payable to Hewlett-Packard Co.) to:

   HEWLETT-PACKARD COMPANY
   Computer Systems COMMUNICATOR
   P.O. Box 61809
   Sunnyvale, CA 94088
   U.S.A.

5. International Customers: Order by part number through your local Hewlett-Packard Sales Office.

NOT TO BE USED FOR ORDERING COMMUNICATOR SUBSCRIPTIONS

HEWLETT **hp** *PACKARD*

CORPORATE PARTS CENTER
Direct Mail
Parts and Supplies Order Form

SHIP TO:

NAME _____

COMPANY _____ CUSTOMER REFERENCE # _____

STREET _____ TAXABLE*? _____

CITY _____ STATE _____ ZIP CODE _____

Item No.	Check Digit	Part No.	Qty.	Description	List Price Each		Extended Total	

Special Instructions		
	Sub-total	
*Tax is verified by computer according to your ZIP CODE. If no sales tax is added, your state exemption number must be provided: # _____ . If not, your order may have to be returned.	Your State & Local Sales Taxes*	
Check or Money Order, made payable to Hewlett-Packard Company, must accompany order.	Handling Charge	1 | 50
When completed, please mail this form with payment to:	TOTAL	

HEWLETT-PACKARD COMPANY
Mail Order Department   Phone: (415) 968-9200
P.O. Drawer #20
Mountain View, CA 94043

Most orders are shipped within 24 hours of receipt. Shipments to California, Oregon and Washington will be made via UPS. Other shipments will be sent Air Parcel Post, with the exception that shipments over 25 pounds will be made via truck. No Direct Mail Order can be shipped outside the U.S.

Although every effort is made to insure the accuracy of the data presented in the **Communicator,** Hewlett-Packard cannot assume liability for the information contained herein.

Prices quoted apply only in U.S.A. If outside the U.S., contact your local sales and service office for prices in your country.