DIGITAL RESEARCH™

DR Graph™

Graphic Application

User's Guide Supplement

for the IBM® Personal Computer

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for the
IBM®Personal Computer

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Foreword

DR Graph™ version 1.0 for the IBM® Personal Computer is easy to use and install. You can start using DR Graph in just a few minutes by following the steps in "Using DR Graph" in Section 2.

In addition to using DR Graph to create presentation-quality graphs, your DR Graph package contains a CP/M-86® system that lets you do the following:

- display a directory (a list of the files on a diskette)

- erase a file

- check the amount of remaining space on a diskette

- format and copy diskettes

- print graphs on the following Epson® printers:

  MX-80™ with GRAFTRAX PLUS™
  MX-100™
  FX-80™
  FX-100™

- plot graphs on the 7470A Hewlett-Packard® Graphics Plotter

- display graphs on the high-resolution monochrome graphics monitor attached to your IBM Personal Computer

Although this package gives you DR Graph and more, it does not replace the CP/M-86 operating system package. By purchasing CP/M-86 for the IBM Personal Computer, you receive all the programs required to produce graphs on components other than those listed in the preceding paragraph, and to create full color graphics. You also receive the following:

- documentation on CP/M-86 and its Graphics System Extension (GSX-86™), a prerequisite for DR Graph

- more utilities and programming tools, such as:

  ED, the CP/M® editor
  PIP, a utility that copies files
  HELP, interactive command reference file

- the GSX-86 Library, which extends the range of printers and plotters that you can use with your computer and allows for color capability

- access to a wide range of application packages listed in the CP/M Software Finder available at retail and computer stores nationwide

SYSTEM COMPONENTS This DR Graph package is designed for the following components. If your IBM Personal Computer does not have the minimum components listed, contact your computer dealer.

- two double-sided, dual-density disk drives
- 192K of Random Access Memory (RAM)
- Graphics Card
- Graphics Monitor

The following plotter and printer are optional:

- A Hewlett-Packard 7470A Graphics Plotter with the following configuration:

  - option 1 (RS-232-C/CCITT V.24)

  - null modem cable

  - connect plotter to communications port 0 on the IBM Personal Computer

  - plotter must be configured with the communications protocol:

    8-bit ASCII
    No parity
    1 start bit
    1 stop bit
    4800 baud
    XON/XOFF handshaking

  (Refer to your Operator's Manual or contact your computer dealer for details on the preceding communications protocol.)

- One of the following Epson printers:

  - MX-80 with GRAFTRAX PLUS
  - MX-100
  - FX-80
  - FX-100

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Tables and Figures

Section 1
DUPLICATING YOUR DR GRAPH DISKETTE

Protect your new investment. Before you begin
using DR Graph make one or more copies of the
master diskette. After you duplicate the DR
Graph master diskette, store it in a safe place
away from extreme heat, temperature changes,
humidity, and dust. If you accidentally damage
the duplicate, you can create another copy with
the master diskette.

Use the Disk Maintenance program to copy your
DR Graph master diskette. Because the Disk
Maintenance program copies an entire diskette
track-by-track, rather than each file
individually, you can copy an entire diskette
in minutes without formatting it first. After
data is copied, the Disk Maintenance program
verifies the integrity of the copied data.

The following steps guide you through
duplicating your DR Graph diskette:

1. Insert the DR Graph diskette in the system
   drive (the left drive). Insert a double-
   sided diskette in the data drive (the right
   drive). For CP/M-86, the letter A refers to
   the system drive; the letter B refers to the
   data drive.

2. Turn on the power to your IBM Personal
   Computer. There is a short delay while your
   computer checks its internal system.

3. After the checks are complete, the following
   messages appear on the screen:

   Loading CP/M-86......

   CP/M-86 for the IBM Personal Computer Version 1.1

   Copyright (C) 1983, Digital Research

   Hardware Supported:

          Diskette Drive(s): 2
       Parallel Printer(s): 1
           Serial Port(s): 2
            Memory (kb): XXX

   A>submit startup

   A>TYPE ESC0

   A>GRAPHICS

   GSX-86   Graphics System Extension 18 Mar 83 V1.1
   Serial No. 1024-0000-003756   All Rights Reserved
   Copyright (c) 1983   Digital Research, Inc.

   GSX-86 installed
   DDFXHR8 .SYS is 14400 bytes long at 05C7:0000

   These tell you CP/M-86 and GSX-86,
   prerequisites for DR Graph, are present.

4. When the CP/M-86 system prompt A> appears on
   your screen, type the following DSKMAINT
   command.   The DSKMAINT command starts the
   Disk Maintenance program that allows you to
   copy and format diskettes.

   A>**DSKMAINT**

The Main Menu for the Disk Maintenance Program
for the IBM Personal Computer appears on your
screen.

```
┌─────────────────────────────────────────────────────────┐
│  CP/M-86 Disk Maintenance Program for the IBM PC   version 1.0  │
├─────────────────────────────────────────────────────────┤
│                                                         │
│                      Main Menu                          │
│                 SELECT  FUNCTION                        │
│                                                         │
│            ┌────┐                                       │
│            │ F1 │ ──►  Verify a Diskette                │
│            └────┘                                       │
│            ┌────┐                                       │
│            │ F3 │ ──►  Copy from one Diskette to another│
│            └────┘                                       │
│            ┌────┐                                       │
│            │ F5 │ ──►  Format a Single Sided Diskette   │
│            └────┘                                       │
│            ┌────┐                                       │
│            │ F7 │ ──►  Format a Double Sided Diskette   │
│            └────┘                                       │
│                                                         │
│            ┌────┐                                       │
│            │ F9 │ ──►  Exit this program                │
│            └────┘                                       │
│                                                         │
└─────────────────────────────────────────────────────────┘
```
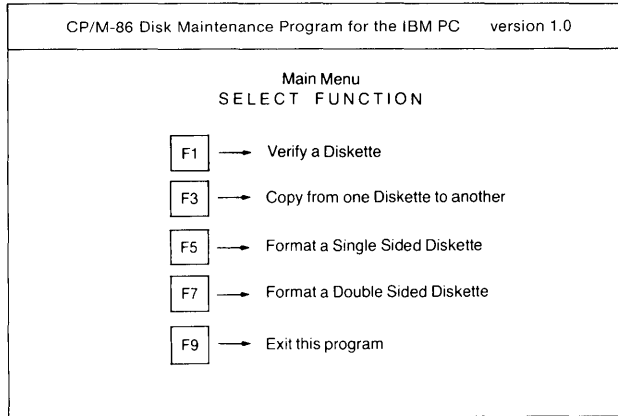
Figure 1-1.   Main Menu for the CP/M-86
Disk Maintenance Program

5. To copy the DR Graph master diskette, press the F3 key on your keyboard. The SELECT SOURCE DISKETTE Menu appears on your screen:

```
┌─────────────────────────────────────────────────────────┐
│ CP/M-86 Disk Maintenance Program for the IBM PC   version 1.0 │
├─────────────────────────────────────────────────────────┤
│                                                         │
│              Copy from one Diskette to another          │
│                 SELECT SOURCE DISKETTE                   │
│                                                         │
│                                                         │
│        ┌────┐                                           │
│        │ F2 │ ──▶  A:                                   │
│        └────┘                                           │
│        ┌────┐                                           │
│        │ F4 │ ──▶  B:                                   │
│        └────┘                                           │
│                                                         │
│                                                         │
│                                                         │
│        ┌────┐                                           │
│        │F10 │ ──▶  Exit to Main Menu                    │
│        └────┘                                           │
│                                                         │
└─────────────────────────────────────────────────────────┘
```
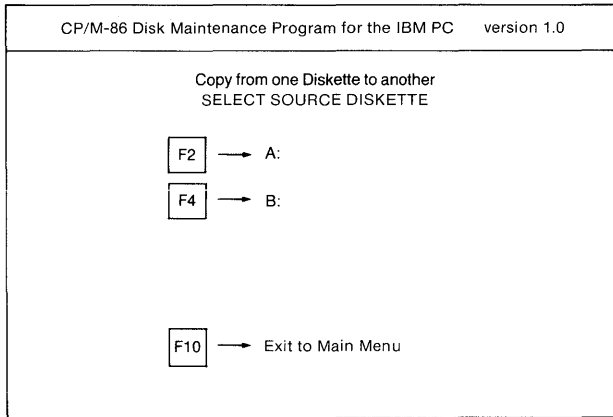
Figure 1-2.   SELECT SOURCE DISKETTE Menu

6. The SELECT SOURCE DISKETTE Menu prompts you to press a key to select the source diskette, the one from which files are copied. Press the F2 key to copy the files from the DR Graph master diskette in drive A.

7. After you select the source diskette, the SELECT DESTINATION DISKETTE Menu appears on the screen. It prompts you to press a key to select the destination diskette that receives the copied files. Press the F4 key.


```
CP/M-86 Disk Maintenance Program for the IBM PC     version 1.0


              Copy from one Diskette to another
              SELECT DESTINATION DISKETTE


         F2  ──►  A:

         F4  ──►  B:




         F10 ──►  Exit to Main Menu
```
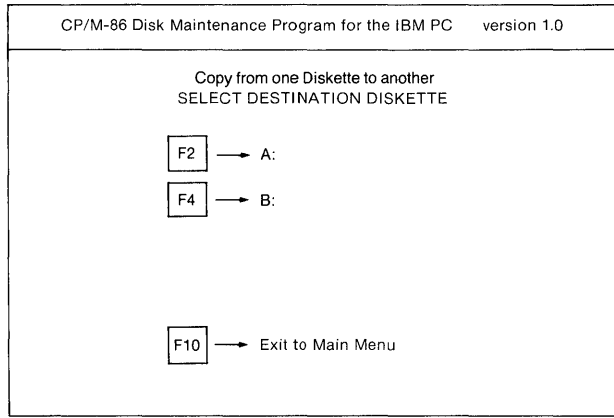
Figure 1-3.   SELECT DESTINATION DISKETTE Menu

8. After you select the destination diskette, the following menu appears on the screen. It prompts you to confirm the selections you made previously. If you made a mistake, press the N key; the SELECT SOURCE DISKETTE menu reappears on your screen. If you selected the correct diskettes for the source and destination, press the Y key.

```
+-------------------------------------------------------------+
| CP/M-86 Disk Maintenance Program for the IBM PC   version 1.0 |
+-------------------------------------------------------------+
|                                                             |
|                                                             |
|              Copying from the Diskette in Drive A:          |
|                   to the Diskette in Drive B:               |
|                                                             |
|   This operation will Destroy any data on the Diskette in Drive B: |
|                                                             |
|              Is this what you want to do (Y or N)?          |
|                                                             |
|                                                             |
|                                                             |
|                                                             |
|                                                             |
|                                                             |
|                                                             |
+-------------------------------------------------------------+
```

Figure 1-4.   COPYING WARNING Menu

As the Disk Maintenance program copies the diskette, the Reading track in the following message is replaced by another message that denotes the operation the program performs:

Reading track n

For example, this initial message is replaced with the following message when the program begins writing data to the destination diskette:

Writing track n

After data is copied to the diskette, the following message appears to inform you the data is being verified:

Checking track n

The lowercase letter n indicates the number of the track on which the operation is performed.
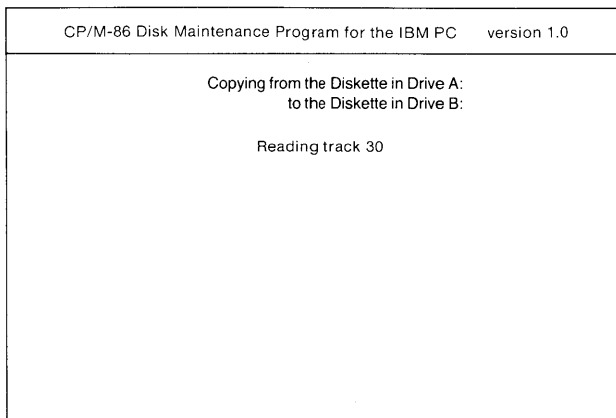
```
CP/M-86 Disk Maintenance Program for the IBM PC     version 1.0

                    Copying from the Diskette in Drive A:
                          to the Diskette in Drive B:

                    Reading track 30
```

Figure 1-5. COPYING INFORMATION Menu

FORMATTING
DISKETTES

To save your graphs on the data diskette, DR Graph requires that it has the CP/M-86 format. If your diskette does not have the CP/M-86 format, you must format it. If your diskette already has the CP/M-86 format, skip this section and turn to the Section 2, "Using DR Graph." The following steps outline how to format a diskette with the Disk Maintenance program.

1. From the Main Menu of the Disk Maintenance program, press the F7 key to format a double-sided diskette. The following menu appears on the screen.
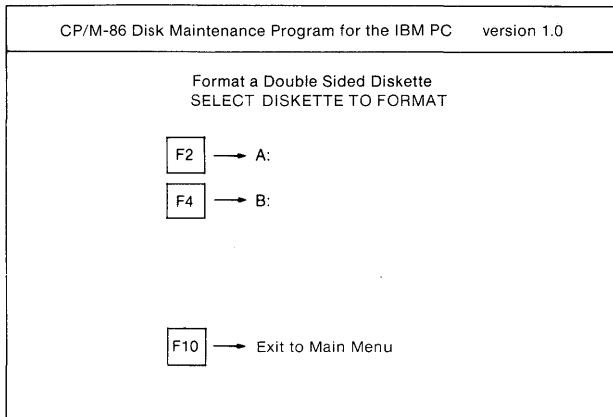
CP/M-86 Disk Maintenance Program for the IBM PC   version 1.0

Format a Double Sided Diskette
SELECT DISKETTE TO FORMAT

F2 ──► A:

F4 ──► B:

F10 ──► Exit to Main Menu

Figure 1-6.   Format a Double-sided Diskette

2. Press the F4 key to format the data diskette in drive B.

Note: DO NOT press the F2 key.

Drive A contains the DR Graph diskette; DO NOT format the DR Graph diskette. The following menu appears on the screen after you press the F4 key.

CP/M-86 Disk Maintenance Program for the IBM PC   version 1.0

Formatting the Diskette in Drive B:

This operation will Destroy any data on the Diskette in Drive B:

Is this what you want to do (Y or N)?

Figure 1-7. Format Warning Display

3. If you press N, the Format a Double Sided Diskette Menu reappears. However, if you press Y, the Disk Maintenance program formats the diskette in drive B. The warning message disappears. The screen shows this message:
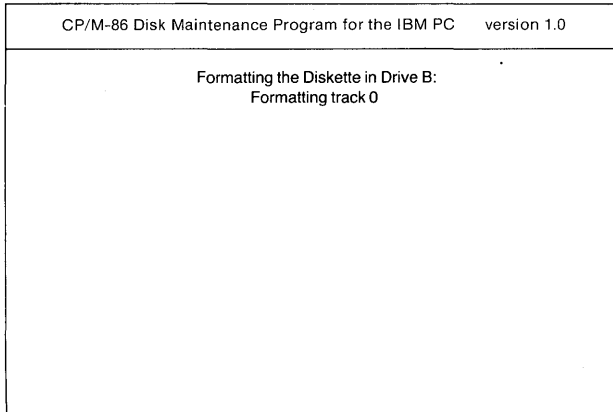
```
CP/M-86 Disk Maintenance Program for the IBM PC     version 1.0

        Formatting the Diskette in Drive B:
            Formatting track 0
```

Figure 1-8. Formatting the Diskette

After the Disk Maintenance program formats the diskette in drive B, the message:

Formatting track n

changes to the following message:

Verifying track n

where n indicates the number of the track. After the program verifies that all the tracks on the disk are usable, the Format a Double Sided Diskette Menu reappears on the screen. Press the F10 key to return to the Disk Maintenance Main Menu. Press the F9 key to exit the Disk Maintenance program and return to the CP/M-86 system prompt A>.

ERROR MESSAGES   The following table explains error messages that
                            can occur when you use the Disk Maintenance
                            program to copy or format a diskette:

Table 1-1. Disk Maintenance Error Messages

Message   Meaning
Drive does not respond   Either the drive door is open or the diskette is upside-down in drive.
Disk read error   The diskette is defective or damaged.
Diskettes are not of the same type   You are copying between a single-sided and a double-sided diskette.
Source and destination data do not match   A discrepancy exists with the diskette from which files have been copied and the diskette to which files have been copied. One of the diskettes is defective.
Disk is write-protected   The write-protect tab is on the diskette.
Disk is not formatted   Either the diskette is not a CP/M-86 formatted diskette or you attempted to format the diskette with a double-sided format in a single-sided drive.

In addition to the error message, the Disk
Maintenance program prompts you to type any key
on the keyboard. When you press a key, the
Main Menu reappears so you can try the step
again.

End of Section 1

Section 2
USING DR GRAPH

After you duplicate the master diskette and format a data disk, you are ready to use DR Graph. Just follow these steps:

1. Insert the duplicate copy of the DR Graph diskette in drive A. Insert a CP/M-86 formatted diskette for storing data files in drive B.

2. Press the CONTROL (CTRL) key and C key at the same time. This sequence informs CP/M-86 that you inserted a new diskette in one or more of the drives. Use CRTL-C when you replace a diskette in a drive.

3. When the CP/M-86 system prompt A> appears, type the command RUN GRAPH:

   A>**RUN GRAPH**

   These messages appear on your screen:

   ```
   ---------------------------------------------------
   RUN-86   Large Model .CMD Loader    12 May 83  V1.0
   Serial No. XXXX-0000-654321    All Rights Reserved
   Copyright (c) 1983         Digital Research, Inc.
   ---------------------------------------------------

   ---------------------------------------------------
   DR Graph          19 MAY 83                   V1.0
   Serial No. XXXX-0000-000000    All Rights Reserved
   Copyright (c) 1983         Digital Research Inc.
   ---------------------------------------------------
   ```

After these messages, the DR GRAPH MAIN MENU
appears on your screen. You are ready to
use DR Graph. Turn to Section 3, "Getting
Started," in your <u>DR Graph Graphic</u>
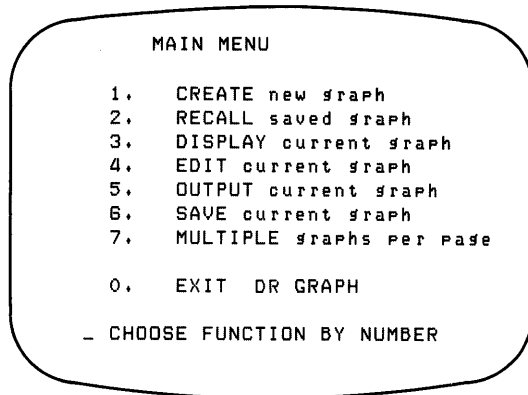<u>Application User's Guide.</u>

```
      MAIN MENU

   1.   CREATE new graph
   2.   RECALL saved graph
   3.   DISPLAY current graph
   4.   EDIT current graph
   5.   OUTPUT current graph
   6.   SAVE current graph
   7.   MULTIPLE graphs per page

   0.   EXIT  DR GRAPH

 _ CHOOSE FUNCTION BY NUMBER
```

Figure 2-1.   DR Graph MAIN MENU

**RECALLING AND
DISPLAYING THE
SAMPLE GRAPH**

For an example of a presentation-quality graph created by DR Graph, follow the directions below. In minutes you can display the sample graph from the master diskette on the graphics monitor.

1. Start from the DR Graph MAIN MENU shown in the preceding figure. Recall the file containing the sample graph by pressing the number 2 key for the RECALL option.

2. DR Graph displays the following message that asks you to type the name of the file containing the graph. Enter the filename, sample.dat, then press <RETURN>.

   Input File Name (<RETURN> to exit): **sample.dat**

   DR Graph displays the following CURVE EDIT Menu.

```
                              CURVE EDIT

      Title              SGM INCORPORATED
      Subtitle           Operating Revenue
      Primary Axis Title 1982
      Secondary Axis Title $ MILLIONS


      Axis Type (N/P):  P   (Numeric or Periodic: days,months,quarters)
      Legends   (Y/N):  Y
                                        Bar    Line  Marker  Line
      Curve       Legend         Type  Color  Pattern Style Symbol Width
       1    Expenses               2     2       4     1      0     1
       2    Revenue                2     4       7     2      0     1
       3    Operating Revenue      1     1       3     1      0     4
       4                           2     1       4     4      0     1
       5                           2     1       5     5      0     1

           CURVE TYPES:   1=Line   2=Bar   3=Step   4=Stick   5=Scatter
    _____
      Press <ESC> to access above data items
  _   CHOOSE FUNCTION      1,       2,         3,      9,      0,
      BY NUMBER            Data    Additional  Axes    Display Exit to
                           Entry   Editing     Edit    Graph   Main Menu
```

Figure 2-2. CURVE EDIT Menu

3. Press the number 9 key to display the graph.
   The graph you see on your graphics display
   monitor is the same one shown in the "Sample
   Graph" figure in Section 1 of the DR Graph
   Graphic Application User's Guide.

   Press <RETURN> to go back to the CURVE EDIT
   Menu. Then, press zero to return to the DR
   Graph MAIN MENU.

   The graph, sample.dat, is created with the
   following menus:

   ● CURVE DATA Menu
   ● CURVE EDIT Menu
   ● PERIODIC AXES EDIT Menu
   ● ADDITIONAL CURVE EDIT Menu

EXITING THE
DR GRAPH
MAIN MENU

You can exit the DR Graph MAIN MENU by pressing the zero key. When you exit the DR Graph MAIN MENU, you return to the the CP/M-86 system prompt A>. From within DR Graph most of the submenus allow you to return to the MAIN MENU by pressing zero. For an overview of DR Graph Menus, refer to the Menu Map foldouts in the DR Graph Graphic Application User's Guide.

DR GRAPH ERROR

If you create a file and give it the same name as one of the DR Graph system files, this error message appears when you attempt to save the file:

BDOS ERR B:R/O

The error message means that the file you specified is a read-only file and cannot be written over. Press <RETURN> to recall the CP/M-86 system prompt. Type the RUN GRAPH command to return to DR Graph. The data you entered in the file is lost.

USING OTHER
PROGRAMS

With this package, you must exit DR Graph and and CP/M-86 by following these steps to use other programs:

1. Remove the DR Graph diskette from the system drive and replace it with another application or operating system diskette.

2. Simultaneously press the keys CTRL, Alt, and Del to restart the system.

End of Section 2

Section 3
MORE ABOUT YOUR CP/M-86 SYSTEM

This section describes commands in your CP/M-86 system that let you do the following:

- Display a directory of a diskette
- Erase a file
- Check the remaining space on a diskette

DISPLAY A
DIRECTORY

The DIR command displays a list of the files on a diskette in drive A or B. The DIR command lists directory files. To list the files on a diskette, type the DIR command in response to the system prompt as shown in the examples:

1. When you type the DIR command, CP/M-86 gives you a list of the files on the diskette in the default drive. As this example illustrates, the alphabetic letter of the default drive precedes the system prompt.

    A>**DIR**
    A:SAMPLE DAT
    SYSTEM FILE(S) EXIST

    In this example, DIR lists the directory files on the diskette in drive A. The only directory file this diskette contains is the sample graph. The message SYSTEM FILE(S) EXIST tells you files that are system files are on the diskette but they cannot be listed with the DIR command. The system files on the diskette are DR Graph files that are protected to ensure they are not accidentally erased.

---

2. To obtain a list of directory files on a
   diskette in another drive, type the DIR
   command followed by the letter of the drive
   and a colon.

   A>**DIR B:**
   B: SALES   MAR : EXPENSES MAY : NEWPRODS APR

   This DIR command lists the directory files
   on the diskette in drive B.   Only three
   directory files are on the diskette.

ERASE A FILE   The ERA command lets you erase any unnecessary
files on a diskette to free more space for new
files. To erase a file, type the ERA command
followed by an alphabetic letter to denote the
drive (if the file is on a diskette in another
drive), and the name of the file. The
following examples show you how to use the ERA
command.

1. You can erase a file from the diskette in
   the default drive. The alphabetic letter in
   the system prompt A> tells you that drive A
   is the default drive.

   A>**ERA graphl.dat**

   This example erases the file graphl.dat on
   the diskette in drive A.

2. To erase a file on the diskette in the data
   drive, type the drive letter and a colon
   following the ERA command but preceding the
   filename:

   ERA B:graph34.dat

   This command erases the file named
   graph34.dat on the data diskette in drive B.

3. If you type a filename incorrectly and the
   file does not exist on the diskette, CP/M-86
   returns the No File message:

   A>**ERA GOBLYGOP**
   No File

   The No File message indicates the file
   GOBLYGOP does not exist on the diskette in
   drive A.

CHECK REMAINING
SPACE ON DISKETTES

You can check the amount of space that remains on the system and data diskettes to determine whether you need to erase files or use a new diskette before you can create and save more files. With the STAT command you can check how much space remains on the system and data diskettes. A typical DR Graph file consumes four to six kilobytes of space on a diskette. The following examples show you how to use the STAT command:

1. Type the following STAT command to check the remaining space on the system and data diskettes.

   A> **STAT**
   A:RW, Free Space: 48k
   B:RW, Free Space: 314k

   This STAT command tells you that 48 kilobytes remain on the diskette in drive A and 314 kilobytes remain on the diskette in drive B. The RW that precedes the Free Space message informs you that the diskettes can be read and written.

2. To check the remaining space on only one diskette, type the STAT command and the letter denoting the drive.

   A> **STAT B:**
   B:RW, Free Space: 92k

   This example checks the amount of space remaining on the diskette in drive B. The STAT command tells you that 92 kilobytes are available on the diskette and that you can read and write to it.

Note: Unless you access the data diskette with with DR Graph or a CP/M-86 command, STAT returns the amount of space remaining on the default drive only. However, if you access the data diskette in one of the following ways, STAT returns the amount of space that remains on it also:

- save or recall a file with DR Graph

- erase a file with the ERA command

- list the files on the diskette with the DIR command

End of Section 3

DR Graph™ V1.0 User's Guide Supplement
Application Note 01
Additional Features for the IBM® Personal Computer User

Applicable Product and Release Number: DR Graph™ V1.0 for the IBM®
Personal Computer and all subsequent versions.

This note details information of additional DR Graph features
available to the IBM Personal Computer user to those already
documented in the DR Graph User's Guide and the DR Graph User's
Guide Supplement for the IBM Personal Computer.

CURSOR CONTROL

To move the cursor, insert data, or delete data, use the four Arrow
keys plus the Insert (Ins) and Delete (Del) keys rather than the
Control Keys, documented in Table 3-1 of your DR Graph User's Guide.
The TAB, RETURN, and ESC keys work as documented in Table 3-1.

DISPLAY YOUR GRAPH IN COLOR

Although you design a graph in monochrome (black and white) mode,
you can display it in color mode by using the COLOR CRT option in
the OUTPUT GRAPH Menu. Monochrome mode provides high resolution
graphics that lets you more accurately position text when you
annotate a graph or move legends. Color mode is limited to medium
resolution graphics, which lets you display a graph in color before
you print or plot it.

ADDITIONAL COMPONENT SUPPORT

You can use this package on the IBM Personal Computer XT.

CONCURRENT CP/M-86™ SUPPORT

You can use DR Graph with both Concurrent CP/M-86 and CP/M-86®. To
use DR Graph, enter the GRAPHICS command after the system prompt.

    A>**GRAPHICS**

After several banners appear and the system prompt returns, type the
command RUN GRAPH to start DR Graph.

    A>**RUN GRAPH**