GraphiCard™
USER'S MANUAL

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Attention DAK Customers:
This interface unit has been modified at the factory to support Olivetti graphics. To select the Olivetti mode, set the card in the "ANADEX" mode as defined in Table 1.

CONTENTS

1 INTRODUCTION

GRAPHICARD is an intelligent parallel printer interface for APPLE II, APPLE II +, and APPLE IIe microcomputers. Twenty-nine easy commands allow you to format text, send controls to the printer, dump text screens and control the GRAPHICARD card itself. Designed to fit in a slot inside the APPLE, GRAPHICARD is easy to install and easy to use.

GRAPHICARD is completely compatible with APPLE DOS 3.3 (Disk Operating System) and with APPLE CP/M and Pascal programs. Additionally, GRAPHICARD supports the APPLE IIe 80-column screen.

Figure 1 - THE GRAPHICARD BOARD
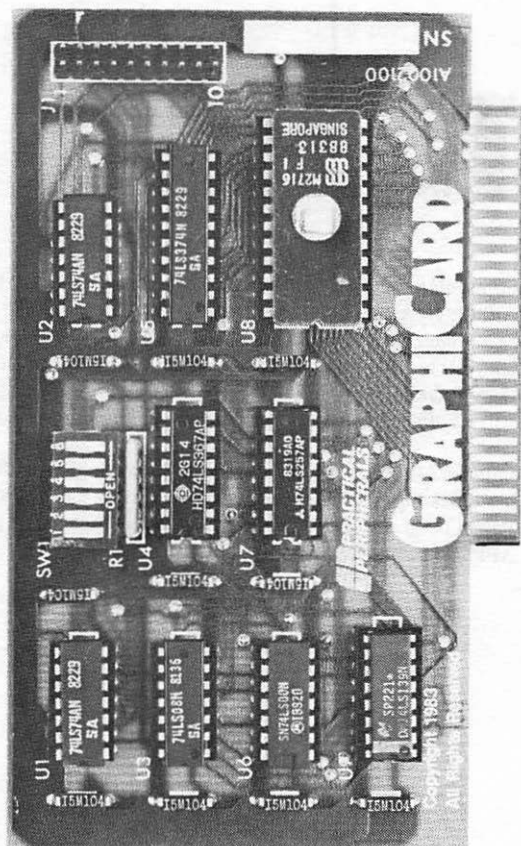
2 Installing GRAPHICARD Inside the APPLE

Please read the following instructions carefully *before* you begin to install GRAPHICARD inside your APPLE.

IMPORTANT: Before starting, TURN OFF POWER to both the printer (or other device) and the APPLE computer. Failure to turn off the power to all system components may cause serious damage to the computer and to GRAPHICARD. Also, please note that failure to follow the installation instructions may void your warranty.

Installing the GRAPHICARD BOARD

1. Remove the cover from the APPLE by pulling up on its rear edge until the fasteners release. Next, slide the cover towards the rear of the APPLE and lift it out.

2. Make sure the supplied transition cable is properly seated at connection J1 on the GRAPHICARD board. The supplied parallel transition cable has a colored strip which marks line 1. When attaching the transition cable to the GRAPHICARD connector, be sure the colored strip is connected to pin 1 of the J1 connector. (Pin 1 is marked on the GRAPHICARD board.)

GRAPHICARD into slot 1 inside the APPLE. If you are using CP/M or Pascal, GRAPHICARD *must* be installed in slot 1. If you are using Applesoft BASIC you *may* install the card in any unused slot except zero. However, to insure compatibility with standard off-the-shelf software, it is recommended that GRAPHICARD be placed in slot 1.

Note: Unless you are using an APPLE //e, slots are numbered from left to right (0 to 7) along the rear edge of the APPLE main circuit board. The APPLE //e does not have a slot 0.

4. Route the transition cable(s) through any of the vertical openings at the rear of the APPLE.

Completing and Testing the Installation

1. Replace the APPLE cover.
2. Connect GRAPHICARD to the printer or other device. The connector on the GRAPHICARD transition cable can only fit one way.
3. Turn on the APPLE power switch, install paper in the printer, and turn on the printer (or other device).
4. GRAPHICARD has a self-test function. The self test should be run from Applesoft BASIC. The Applesoft prompt ( ]) should be present on the screen. Activate the self test by typing: **PR#n** and pressing the **RETURN** key where n is the APPLE slot number which contains GRAPHICARD.

Next press and hold the **CTRL** key and press the **I** key. Release the **I** key, then the **CTRL** key. Now, press the **V** key. You will receive a message similar to the following:

EPSON REV 1.00 © 1983 PPI GOOD

The graphics print routines you selected with Switches 1, 2, 3, and 4 will be displayed on the screen. (If you did not set these switches because you don't plan to print graphics, don't worry. The current graphics setting will be displayed.)

The GraphiCard revision number will be displayed along with a copyright notice from PRACTICAL PERIPHERALS, INC. (PPI). This is followed by a diagnostic message (**GOOD**). The printer will then print a three-line test pattern followed by the words "**TEST OK.**"

If you have trouble with this test, or if a problem develops with GraphiCard, please consult the Troubleshooting section of this manual.

Table 1. Switch Settings for Graphics Printing

Printer	1	2	3	4
Epson	On	On	On	On
NEC 8023A/ C.Itoh Pro	Off	On	On	On
Anadex	On	Off	On	On
IDS	Off	Off	On	On
Okidata 84	On	On	Off	On
Other Oki.	Off	On	Off	On
APPLE D. M.	On	Off	Off	On
Mann. Talley	Off	Off	Off	On
BMC Bx-80/ Spirit 80	On	On	On	Off

Note: On is also Closed. Off is also Open.

3 Operation

Turning On GRAPHICARD

From Applesoft or Integer BASIC, GRAPHICARD is activated by typing: **PR#n** and pressing **RETURN** where "n" is the slot number in the APPLE which contains the GRAPHICARD board.

GRAPHICARD Default Values on Power-up

On power-up, GRAPHICARD defaults to the following:

Page Length = 0	(The automatic skip-over perforation function is not activated.)
Line Length = 0	(This prevents GRAPHICARD from issuing extra carriage returns if the line length is exceeded.)
Left Margin = 0	

Automatic linefeed with carriage return from BASIC

No automatic linefeed from CP/M or Pascal

Printer Bell disabled

Screen Echo enabled for BASIC programs

Screen Echo disabled for CP/M and Pascal programs

Maintain Mode off
High order bit disabled

Issuing Commands from Applesoft BASIC

Use CTRL-I as the control character when you are operating in Applesoft BASIC. To issue commands from the keyboard in APPLE DOS:

1. At the Applesoft prompt [ ]], type: **PR#n** to activate GRAPHICARD (n is the APPLE slot number which contains the card.) You must activate GRAPHICARD before it can receive any other commands.

2. To issue a command, type: **CTRL-I** followed by the GRAPHICARD Command Character(s). For example, the Command Character for issuing an Automatic linefeed with every carriage return is A. You would:

    a. Press and hold the **CTRL** key
    b. Press the **I** key
    c. Release the **I** key
    d. Release the **CTRL** key
    e. Press the **A** key

3. Turn off GRAPHICARD by typing: PR#0 when the Applesoft prompt is present on the screen.

To activate GRAPHICARD from within an operating BASIC program, you will need to initialize the card, then send the equivalent control character to the output device followed by the desired GRAPHICARD command enclosed in quotation marks.

In Applesoft BASIC, CTRL-I is equivalent to CHR$(9). For example to set the page length to 60, the command would be: CTRL-I60P followed by a carriage return. Inserting this command within a program would look like this:

```
10 PRINT CHR$(4);"PR#n"
20 PRINT CHR$(9);"60P"
```

To turn off the GRAPHICARD card, insert a program line like the following:

```
30 PRINT CHR$(4);"PR#0"
```

Issuing Commands from Pascal

GRAPHICARD is completely compatible with both CP/M and Pascal 1.0 and 1.1. Because both CP/M and Pascal use CTRL-I as a tab character, GRAPHICARD will change this control character to CTRL-Y when these systems are used. Further, because CTRL-Y is used to home the cursor in CP/M and Pascal, CTRL-SHIFT-M (CTRL-) on the APPLE //e is provided as an alternate GRAPHICARD control character.

When Pascal is in filer mode, text formatting commands for the card can be issued from the keyboard by using the Pascal transfer function. This is done by typing **T** to get into the transfer mode. Next type the following lines:

> CONSOLE: (Press **RETURN**)
> PRINTER: (Press **RETURN**)
> The control character you are using (CTRL-Y, CTRL-SHIFT-M, or CTRL-|) followed by the desired GRAPHICARD commands.
> CTRL-C

To list a program, type **T** followed by the name of the program. Then type **PRINTER:** and press **RETURN**.

> Note: Use the GRAPHICARD Maintain mode to retain all entered formatting parameters. This is because Pascal re-initializes GRAPHICARD each time it accesses the card.

Issuing Commands from CP/M

In CP/M, to issue commands, type:

> **CTRL-P**
> The control character you are using (CTRL-Y, CTRL-SHIFT-M, or CTRL-|) followed by the desired GRAPHICARD commands.
> Press **RETURN**.

LLIST and **LPRINT** are used to send data to the printer from BASIC under CP/M.

GRAPHICARD Commands

GRAPHICARD has the following types of commands:

Text Formatting Commands
Printer Control Commands
GRAPHICARD Board Commands
Screen Commands
Communication Commands
Graphics Commands

GRAPHICARD commands are initiated by sending a special control character followed by the appropriate GRAPHICARD command sequence. Commands may be sent from either the APPLE keyboard or from within operating programs.

Control charcters have ASCII decimal values of zero (0) to thirty-one (31). They are not part of the normally displayed character set.

CTRL-I is the control character for Applesoft BASIC programs. Use **CTRL-Y** for CP/M or Pascal programs.

Note: If you are using an APPLE II, or APPLE II + you may also use **CTRL-SHIFT-M** for CP/M or Pascal programs. If you are using an APPLE //e, you may use **CTRL-]** in place of **CTRL-Y** for CP/M and Pascal.

You may change the control character if you wish for either Applesoft BASIC, CP/M, or Pascal. This is explained in the section on GRAPHICARD Board Commands.

Control characters are sent by doing the following:

1. Press and hold the **CONTROL (CTRL)** key.
2. Press **I** if you are in Applesoft BASIC, or press **Y** if you are running a Pascal or CP/M program.
3. Release the letter key.
4. Release the CTRL key.

This sequence is represented by **CTRL-I** or **CTRL-Y** in the command listings.

Once the control character is sent, you will need to enter the appropriate GRAPHICARD command (see the Command Listings).

Note: You do not need to enter any spaces between the control character and the GRAPHICARD command. Spaces shown in the command listings are included only for clarity. However, if you accidentally enter extra spaces, they will be ignored.

Terminating Commands

All commands (except graphics commands) will take effect as soon as the last character in the command sequence is entered. Commands may also be completed by pressing **RETURN** or **CTRL-X**. (CTRL-X tells the APPLE to ignore the commands and eliminates your receiving a SYNTAX ERROR message on the screen or in your printout.)

Graphics commands do not take effect until you enter **RETURN, CTRL-X**, or press the **Space Bar**. Please refer to the Graphics Command Listing for complete information on using GRAPHICARD Graphics Commands.

GRAPHICARD Text Formatting Commands

GRAPHICARD has many useful text formatting features including setting margins, line length, and page length, and formatting BASIC program listings. These functions can be initiated from either the keyboard or under program control.

> **Note:** Remember to substitute **CTRL-Y** for **CTRL-I** if you are using CP/M or Pascal and do not include any spaces when entering commands.

Issue Automatic Linefeed: CTRL-I A

This command instructs GRAPHICARD to issue an Automatic linefeed with every carriage return. GRAPHICARD defaults to this on power-up when BASIC programs are being run.

When running CP/M or Pascal programs, GRAPHICARD will not issue an automatic linefeed unless you enter this command. This is because CP/M and Pascal automatically issue a linefeed after every carriage return.

Kill Automatic Linefeed: CTRL-I K

This command kills the automatic linefeed sent with each carriage return.

Format a BASIC Program Listing: CTRL-I F

This command instructs GRAPHICARD to format BASIC program lines by breaking multiple statement lines at the

colons and placing each statement on a new indented line. This makes the listing easier to read, and allows you to see the program logic more clearly. After entering the command, type LIST to produce a formatted listing.

Do not activate this command unless you are listing a BASIC program. Otherwise, all lines of output will be broken wherever a colon appears. This mode is turned off by typing the control character (CTRL-I) followed by RETURN or by issuing any other GRAPHICARD command.

> Note: Set your line lengths, margins, and enter any other GRAPHICARD commands *before* you enter CTRL-I F. The CTRL-I F command should be the last command entered before printing begins since entering any other GRAPHICARD commands will cancel it.

Example: if you wanted to get a listing that had a left margin of 5, a line length of 75, a page length of 60 (with 3 lines at the top and bottom margins for auto skip-over perforation) you would first adjust paper in the printer to 3 lines below top of form.

Next you would enter: **CTRL-I5L CTRL-I75N CTRL-I60P CTRL-IF CTRL-X** with no spaces between commands. (If you accidentally enter spaces, they will be ignored.)

Completing the command with **CTRL-X** (instead of RETURN) prevents the system from printing a SYNTAX ERROR message.

Type **LIST** and press **RETURN**. The listing will be printed according to the parameters you entered.

Reset Left Margin to Zero: CTRL-I L

This command resets the left margin to zero.

Set Left Margin to n: CTRL-I nL

This command sets the left margin n columns from the left edge of the paper. The left margin can be from 0 to 255.

Set Line Length to Zero and Disable Screen Echo: CTRL-I N

This command sets the line length to 0 and disables the line length function. This keeps GRAPHICARD from issuing extra carriage returns if the line length is exceeded. This command also disables screen echo (see **CTRL-I I**).

Set Line Length to n and Enable Screen Echo: CTRL-I nI

This command sets the line length to n characters from the left margin (n can be from 1 to 255) and enables screen echo.

> Note: When screen echo is enabled, an Applesoft BASIC program listing will still not exceed 40 characters per line on the screen unless you are using an 80-column card and it is active.

Set Line Length to n and Disable Screen Echo: CTRL-I nN

This commands sets the printer line length to n characters from the left margin. The line length can be set from 1 to 255. It also disables screen echo (see **CTRL-I I**).

Reset Page Length to Zero: CTRL-I P

This command resets the page length to zero. This also cancels the skip-over perforation function (CTRL-I nP).

> **Note:** In the above commands, if you enter a number higher than 255 for "n," GRAPHICARD will default to a line length of 255.

Set Page Length to n Lines and Enable Automatic Skip-over Perforation: CTRL-I

Set the page length to n lines. ("n" may be from 1 to 127.) GRAPHICARD will issue six linefeeds and reset its line counter after n lines have been printed. This allows automatic skip-over perforation.

Standard continuous form paper has 66 lines per page so **CTRL-I 60P** followed by **RETURN** will allow automatic skip-over perforation with a three-line margin at the top and bottom of the paper. Setting n to zero disables automatic skip-over perforation and produces continuous printing.

> **Note:** Issue this command *after* setting the paper to the top of form. This is because the **CTRL-I nP** command sets the GRAPHICARD internal line counter to 0.

> **Note:** If you enter a number greater than 127 for "n," GRAPHICARD will default to 127 as the page length.

Printer Control Commands

The following are printer control commands:

Enable Printer Bell: CTRL-I B

This commands instructs GRAPHICARD to pass CTRL-G
characters received from the APPLE on to the printer.
(CTRL-G rings the printer bell, if it has one.)

From software, a **PRINT CHR$(7)** program line will also
ring the bell if this command is in effect.

Cancel Printer Bell: CTRL-I C

This command instructs GRAPHICARD to filter out any
CTRL-G characters. GRAPHICARD defaults to this on
power-up so that CTRL-G will not ring the printer bell
(if it has one).

Send Escape Character to the Printer:
CTRL-I E

This command sends an escape character to the printer.
If you are using Integer BASIC, the escape character can-
not be sent because of the lack of the CHR$ function.

GRAPHICARD Board Commands

These commands are used to issue instructions directly to
the GRAPHICARD board.

Set the Control Character to n:
CTRL-I nC

This command allows you to set the control character to the value of n, where n is the ASCII value of any character on the APPLE keyboard. You may change the control character to one of your own choosing.

Using this command also allows the control character to become a printable character which can be imbedded in a text file. Further, it may be used to allow unusual data to be passed through the GRAPHICARD card without being incorrectly interpreted as a command character.

> Note: If you are running Applesoft BASIC programs, and you want to change the control character from CTRL-I to something else, the ASCII value you enter as "n" must be greater than 128. If you select a character with an ASCII value of less than 128, simply add 128 to it, and enter this total as "n".

Example: let's say you decide to change the control character from CTRL-I to the @ sign. The @ character has an ASCII value of 64. Adding 128 to 64 equals 192. You would enter 192 as the value of "n" in this command. While this command is in effect, you would use the @ key as the control character instead of CTRL-I.

Null Command: CTRL-I RETURN, CTRL-X, or Backspace Key (◄—)

If you start to enter a GRAPHICARD Command and then decide to exit the command mode just press RETURN, CTRL-X, or the Backspace Key (◄—).

Change Control Character from CTRL-I to CTRL-n: CTRL-I CTRL-n

This changes the control character from **CTRL-I** to **CTRL-n** where n is almost any character on the APPLE keyboard. Be careful not to change to a character which is used by the printer or by your software.

> **Note:** GRAPHICARD protects you from changing to control characters which are used extensively by the APPLE. These are: **CTRL-M** (carriage return); **CTRL-H** (backspace); and **CTRL-X** (cancel). Should you attempt to change the control character to one of these, GRAPHICARD will ignore the command.

Change Control Character from CTRL-I to: Λ CTRL-I (SHIFT N)

This lets you change the control character from **CTRL-I** to the Λ symbol. The Λ symbol is accessed by pressing **SHIFT-N** (or **SHIFT-6** on the APPLE //e).

Change Control Character from CTRL-n to CTRL-m: CTRL-n CTRL-m

This changes the control character from **CTRL-n** to **CTRL-m** where n and m are almost any character on the APPLE keyboard. Again, be careful not to change to a character which is used by the printer or by your software. (See the note under the **CTRL-I CTRL-n** command.)

> **Note:** If you enter the control character by mistake, you can cancel it by just pressing **RETURN**, **CTRL-X** or the **Backspace Key**.

Set Text Formatting Parameters to their Default Values: CTRL-I D

This command sets all text formatting parameters back to their default values. The default text parameters are:

Page Length = 0 (The automatic skip-over perforation function is not activated.)

Line Length = 0 (This prevents GRAPHICARD from issuing an extra carriage return if the line length is exceeded.)

Left Margin = 0

Automatic linefeed with carriage return for BASIC programs

No automatic linefeed with CP/M or Pascal programs

Printer Bell disabled

Disable bit 8 (high order bit)

Screen Echo enabled for BASIC programs

Screen Echo disabled for CP/M and Pascal programs

Maintain mode off

Set Maintain Mode: CTRL-I M

This command enables the Maintain mode. When in this mode, all print formatting parameters are maintained when leaving and re-entering the card. This allows parameters

to be entered only once for as long as the APPLE is powered on, and also maintains parameters when switching to or from BASIC, CP/M, or Pascal.

The Maintain mode is especially useful when running programs in which interface commands cannot be imbedded. (Many off-the-shelf software programs have no provisions for imbedding additional commands.)

The Maintain mode can only be turned off by the Default Command (CTRL-I D) or by powering off the computer.

Note: The PFS GRAPH program uses a run-time Pascal compiler which clears the Maintain Mode and all GRAPHICARD parameters.

Set Transparent Mode: CTRL-I T

This command sets GRAPHICARD in Transparent mode. In this mode, GRAPHICARD does not recognize any commands. This is useful when using a program (such as a word processor or graphics screen dump software) which might send characters through GRAPHICARD which could be interpreted as commands.

The Transparent mode is also appropriate when you are running a program which handles text formatting internally and inserting carriage returns, etc. is undesirable. Because the Transparent mode disables the GRAPHICARD automatic linefeed function, when you are in BASIC you will need to either turn on your printer's automatic linefeed switch or make sure your program contains linefeeds.

In Transparent Mode, character data is sent with the high order bit cleared unless the **CTRL-I H** command is entered prior to setting the Transparent Mode.

Reinitializing GRAPHICARD by typing **PR#n** will clear the Transparent mode.

> **Note:** If you issue the Transparent mode command when the Maintain mode (CTRL-I M) is in effect, the only way to clear the Transparent mode without powering off the APPLE is to clear the high-order bit at location $4F8 + n where n is the slot number containing the GRAPHICARD. This can be done when the Applesoft prompt is on the screen typing:

> POKE 1272 + n,PEEK(1272 + n)-128

Verify Operation: CTRL-I V

This command is used to verify operation of GRAPHICARD by performing a self-test. The GRAPHICARD revision number will be listed and the card will check the on-board firmware and give a status report on the screen. The printer will then print a three-line pattern which verifies most of the GRAPHICARD internal components.

Screen Commands

GRAPHICARD supports the following video screen commands.

Enable Screen Echo: CTRL-I I or CTRL-I O

This command enables screen echo to allow simultaneous output to the video screen and to the printer (or other device). To be compatible with other interface cards, **CTRL-I O** has the same effect. If you are using an APPLE //e, GRAPHICARD will echo either 40- or 80-column screens.

Enable Screen Echo and
Set Line Length to n: CTRL-I nI

This enables screen echo and allows you to set the line length. Line length can be from 1 to 255.

> **Note:** When screen echo is enabled, an Applesoft BASIC program listing will still not exceed 40 characters per line on the screen unless you are using an 80-column card and it is active.

Disable Screen Echo and
Set Line Length to Zero: CTRL-I N

This command disables screen echo. It also sets the line length to zero, which disables the line length function.

Disable Screen Echo and
Set Line Length to n: CTRL-I nN

This command disables screen echo. It also sets the line length to n characters from the left margin. The line length can be from 1 to 255.

Dump Present Screen to the Printer:
CTRL-I S

This instructs GRAPHICARD to dump the contents of the present screen to the printer. GRAPHICARD automatically knows if you are using an APPLE //e or not, and will dump either a 40-column or 80-column screen from the APPLE //e. If you are not using an APPLE //e only 40-columns screens may be dumped.

Dump the Present Screen
Starting at Line n: CTRL-I nS

This instructs GRAPHICARD to dump the present screen to the printer starting at line n and stopping at line 24. "n" may be from 1 to 23. This command is particularly useful for dumping a portion of the screen, such as a spreadsheet window.

Dump the Present Screen from
a Videx 80-Column Card: CTRL-I W

If you have installed a Videx 80-column card in your APPLE, this command will dump the contents of the 80-column screen to the printer. The Videx card must be installed in slot 3 for this command to work.

Dump the Present Screen from
a Videx Card from Line n: CTRL-I nW

This instructs GRAPHICARD to dump the present screen from the Videx board starting at line n and stopping at line 24. "n" may be from 1 to 23.

> Note: GRAPHICARD does not support other peripheral 80-column cards. If you do not have a Videx Card installed in your APPLE, you may not dump 80-column screens.

Communication Commands

These commands may be used to modify the communication between GRAPHICARD and your computer system.

Leave the High Order Bit Intact: CTRL-I H

GRAPHICARD defaults to receiving 7-bit data from the APPLE on power-up. This means it will automatically strip off the 8th (high order) bit. The **CTRL-I H** command tells GRAPHICARD to leave the 8th data bit intact.

Strip Off the High Order Bit: CTRL-I X

This command cancels the **CTRI-I H** command, and instructs GRAPHICARD to strip off the 8th (high order) bit on data sent to it from the APPLE. (GRAPHICARD defaults to this on power-up.)

Graphics Commands

The following commands are for use with dot-matrix printers which have graphics capabilities.

Graphics commands are initiated by typing **CTRL-I G**. You may then enter any of the graphic sub-commands listed below. Graphics commands must be completed by:

1. Pressing **RETURN**
2. Entering **CTRL-X**
3. Pressing the **Space Bar**

Pressing **RETURN** tells the GRAPHICARD to execute the entered graphics sub-commands.

Entering **CTRL-X** tells GRAPHICARD to execute the graphics sub-command(s) but instructs the APPLE to ignore them. This prevents SYNTAX ERROR messages from appearing on the screen or on your printout.

Pressing the **Space Bar** tells GRAPHICARD to execute the entered graphics sub-commands, but leaves GRAPHICARD in the graphics mode after the command is executed. You may then enter another graphics sub-command without having to enter **CTRL-I G** first. When you enter additional sub-commands, the graphic pictures will be "concatenated," i.e. they will be printed one right after the other, with the upper and lower borders actually touching each other.

You may enter multiple sub-commands before pressing **RETURN**, **CTRL-X**, or the **Space Bar**. (The execption is that M and R may not be entered simultaneously.)

Print Primary Hi-Resolution Screen:
No Sub-Command

Entering CTRl-I G alone (with no sub-command) will print the primary Hi-Resolution screen. The image will be centered on the page, with each white dot on the screen printed as a black dot on the paper.

Print Graphics Screen Double Size:
D Sub-Command

This will print the graphics screen double-size.

Print Graphics Screen in
Emphasized Print: E Sub-Command

This will print the graphics screen using emphasized (double-strike) print.

Invert Graphics Screen: I Sub-Command

This will invert the graphics image. Each dot on the screen will appear on the paper as a white space against a black background.

Print Graphics Screen at Left Margin:
L Sub-Command

This will print the graphics image at the left margin which was set with the CTRl-I nL command.

Dump the Mixed Hi-Res and Text Screen: M Sub-Command

Some programs use the APPLE mixed text and graphics mode for annotating and displaying various kinds of data. This command allows that mixed image to be recreated on paper. The four lines of text at the bottom of the screen will always be from the primary text page regardless of which Hi-Res screen is printed.

Rotate the Graphics Screen 90 Degrees: R -Sub Command

This command rotates the graphics image 90 degrees on the paper.

> Note: The M sub-command will be ignored if the Rotate Graphics sub-command (R) is entered. (This is because most printers cannot print text characters sideways.) Also, on some printers the text portions may appear to be slightly different than it looks on the screen. This is due to the difference in width of the screen characters versus the printer's characters.

Dump the Secondary Graphics Page: 2 Sub-Command

This will print the secondary graphics page.

Print Both HGR1 and HGR2 Side by Side: S Sub-Command

This will print page one next to page two or page two next to page one if used with "2" command. Also, this can be used with the "R" (rotated) command to print rotated top to bottom.

Using Graphics Commands

You might want to try out a few Graphics Sub-Commands. First, initialize GRAPHICARD by typing **PR#n** at the Applesoft prompt. Next, insert the disk containing the graphics you wish to print in the drive. Load the graphics image into the primary Hi-Res page by typing:

   BLOAD filename,A$2000

You may also load another image in the secondary Hi-Res page by typing:

   BLOAD filename,A$4000

Once loaded, try printing the primary page. Make sure your printer is turned on and type **CTRL-IG** followed by **CTRL-X**. This will print the image centered on the page.

The following are examples of how to use graphics sub-commands. From the keyboard, type:

   CTRL-IGDR 21E followed by **CTRL-X**
                or
   CTRL-IGRD E21 followed by **CTRL-X**

Either of the examples above will produce the same printout. The order of graphics sub-commands (i.e. D,R,I,E,2,S,L,M) does not matter.

The preceding example will produce two pictures touching each other with the following characteristics:

   CTRL-IGDR   A double size, rotated image of the
   BLOAD filename,A$2000 picture.

2EI CTRL-X   An emphasized, inverted image of the
BLOAD filename,A$4000 picture.

Switching Between 40 and 80 Columns on the APPLE //e

For those of you who are using an APPLE //e, the following may be helpful.

You can change from 40 to 80 columns by typing **PR#3**. Doing this however, turns off GRAPHICARD. Turn the card back on again by typing **PR#n** where n is the APPLE slot number containing GRAPHICARD.

You can also go from 40 to 80 columns by typing **ESC 8**. This can only be done if the 80-column firmware has been initialized by typing **PR#3**, and the 80-column mode has not been disabled with **ESC CTRL-Q**. Switching from 40 to 80 columns in this way doesn't affect GRAPHICARD.

You may switch from 80 to 40 columns by typing **CTRL-Q** or **ESC 4**. Doing this does not affect GRAPHICARD.

You may also switch from 80 to 40 columns by typing **ESC CTRL-Q**. Doing this turns off GRAPHICARD. Turn it back on by typing **PR#n**.

Using GRAPHICARD with VisiCalc

GRAPHICARD is also completely compatible with VisiCalc spreadsheet software. To access GRAPHICARD from within VisiCalc, get into the printer mode by tying /PP. (Alternatively you can type /Pn where n is the slot number containing the GRAPHICARD card.)

Next, send CTRL-I to GRAPHICARD by typing: " Λ CI and follow it with any GRAPHICARD command. The Λ is typed by pressing SHIFT-N or SHIFT-6 on the APPLE //e. (If you have changed the control character from I to another letter enter that other letter after typing " Λ C.)

Finally, type the desired bottom right-hand coordinate of the printout, and press RETURN.

Compatibility with WordStar

To use GRAPHICARD with WordStar on the APPLE to its fullest capacity, you should perform the following steps.

1. Run the WordStar INSTALL program entering the correct information for your system. When you receive this message:

    *****Communication Menu*****

    Please enter selection (E, X, N, B, U):

    Select N for none required (or handled outside WordStar).

2. This message should appear:

   No Communication Protocol
   OK (Y/N) :

   Press Y.

3. The Driver Menu will then appear. Select P for Port
   Driver (Direct I/O) to 8 bit port.

4. The following message will be displayed:

   The port driver directly accesses hardware
   ports to control the printer. Note that the
   port driver contains a "busy test,"
   resulting in the best response when
   editing and printing simultaneously.

   OK (Y/N) :

   Press Y.

5. Next you will be asked:

   Are the printer ports "I/O" or "Memory Mapped"
   (I/or M) :

   Select M.

   What is the output address in HEX:

   Enter E090.

   What is the OUTPUT STATUS address in
   Hex:

   Enter E091.

> What are the output status port bits for
> your printer?
>
> Do you wish WordStar to determine the
> values or should WordStar accept them
> from you (**D** or **A**) :

Select A.

> What are the bit(s) that change at the
> OUTPUT STATUS port when the OUTPUT
> port becomes ready to accept a character
> for output (enter Hex value) :

Enter 80.

> Which bit(s) change(s) from A "0" to A "1"
> (Enter Hex value) :

Enter 00.

At this point, the system is ready to be used for
simultaneous printing and editing.

Compatibility with VisiPlot Version 1.1

The following gives instructions for creating a driver which
will allow you to use GRAPHICARD with VisiPlot Version
1.1 to its fullest capacity.

Note: This driver will also work with printer cards
which have graphics dump capabilities and which
support a C102 entry.

1. Boot up the VisiPlot diskette.

2. Choose the "QUIT" option from the menu.

3. Press Y to indicate you do want to quit.

4. At the Applesoft prompt ( ]), type: **CALL-151** and
    enter the following driver routine. Do not enter the
    ] character or the asterisks. (R) at the end of each
    line means press **RETURN**.

]CALL-151

$3000.3057

```
*3000:FF  8D  02  BB  97  00  00  00  (R)
*3008:80  80  00  01  00  00  00  00  (R)
*3010:00  00  4C  BD  97  89  CE  A5  (R)
*3018:36  48  A5  37  48  A9  00  85  (R)
*3020:36  AD  B1  97  29  07  09  C0  (R)
*3028:85  37  A9  8D  20  F5  97  68  (R)
*3030:85  37  68  85  36  A9  89  20  (R)
*3038:F5  97  A9  C7  20  F5  97  AD  (R)
*3040:00  C0  10  FB  2C  10  C0  20  (R)
*3048:F5  97  C9  8D  D0  F1  60  6C  (R)
*3050:36  00  00  00  00  00  00  (R)
```

$3000.3057

```
3000-  FF  8D  02  BB  97  00  00  00
3008-  80  80  00  01  00  00  00  00
3010-  00  00  4C  BD  97  89  CE  A5
3018-  36  48  A5  37  48  A9  00  85
3020-  36  AD  B1  97  29  07  09  C0
3028-  85  37  A9  8D  20  F5  97  68
3030-  85  37  68  85  36  A9  89  20
3038-  F5  97  A9  C7  20  F5  97  AD
3040-  00  C0  10  FB  2C  10  C0  20
3048-  F5  97  C9  8D  D0  F1  60  6C
3050-  36  00  00  00  00  00  00  00
```

]BSAVE VISIPLOT.DRIVER,A$3000,L$58
and press **RETURN**.

5. Run VisiPlot as usual.

6. Choose "PRINT" for printing a graph when one is ready.

7. Press **RETURN** for a normal size picture, or enter any desired GRAPHICARD graphics commands and then press **RETURN**. For example, if you wanted to have the image rotated and printed double size enter: **DR** then press **RETURN**.

Note: GRAPHICARD graphics command set has the following options:

a. Press **RETURN** for a normal small picture
b. **R** for a rotated image
c. **D** for double size
d. **I** for inverse (white on black)
e. **E** for emphasized (darkens the graph image)
f. **L** to print the graph at the left margin
g. **M** Menu at the bottom is printed with the graph

Compatibility with VisiPlot Version 1.0

GRAPHICARD also works with VisiPlot Version 1.0. Follow the steps given above, but use this driver routine:

]CALL-151

$3000.3057

```
*3000:00   8D   02   D8   98   00   00   00   (R)
*3008:80   80   00   01   00   00   00   00   (R)
*3010:00   4C   DA   98   89   CE   A5   (R)
*3018:36   48   A5   37   48   A9   00   85   (R)
*3020:36   AD   CE   98   29   07   09   C0   (R)
*3028:85   37   A9   8D   20   12   99   68   (R)
*3030:85   37   68   85   36   A9   89   20   (R)
*3038:12   99   A9   C7   20   12   99   AD   (R)
*3040:00   C0   10   FB   2C   10   C0   20   (R)
```

```
*3048:12   99   C9   8D   D0   F1   60   6C   (R)
*3050:36   00   00   00   00   00   00   00   (R)
```

$3000.3057

```
3000-   00   8D   02   D8   98   00   00   00
3008-   80   80   00   01   00   00   00   00
3010-   00   00   4C   DA   98   89   CE   A5
3018-   36   48   A5   37   48   A9   00   85
3020-   36   AD   CE   98   29   07   09   C0
3028-   85   37   A9   8D   20   12   99   68
3030-   85   37   68   85   36   A9   89   20
3038-   12   99   A9   C7   20   12   99   AD
3040-   00   C0   10   FB   2C   10   C0   20
3048-   12   99   C9   8D   D0   F1   60   6C
3050-   36   00   00   00   00   00   00   00
```

At this point, continue as for VisiPlot Version 1.1.

Using GRAPHICARD with APPLEPLOT

As shipped, GRAPHICARD is compatible with the APPLEPLOT program. However, performance can be enhanced by making a modification to one line in the APPLEPLOT program.

Line 58 in the APPLEPLOT software now reads:

```
58 GG$ = "PRINT GRAPH": GOSUB 32:
   GOSUB 940: GOTO 20
```

Change it to:

```
58 VTAB 22: INPUT "GRAPH COMMANDS
   (DRIELM)?";D9$:PRINT CHR$ (4);
   "PR#1":PRINT CHR$ (9) "G";D9$: PRINT
   CHR$ (4)"PR#0": GOTO 20
```

This new line produces a new option in the text window. The new option is the DRIELM set of commands which corresponds to GRAPHICARD graphics dump commands. These are: **D**-Double size; **R**-Rotated 90 degrees; **I**-Inverse; **E**-emphasized; **L**-Left margin; and **M**-Mixed text and graphics.

Table 2. GRAPHICARD Command Summary

Text Formatting Commands

CTRL-I A	Issue Automatic Linefeed
CTRL-I K	Kill Automatic Linefeed
CTRL-I F	Format a BASIC Program Listing (Press **RETURN**, or any other GRAPHICARD command to exit.)
CTRL-I L	Reset Left Margin to Zero
CTRL-I nL	Reset Left Margin to n
CTRL-I N	Set Line Length to Zero and Disable Screen Echo
CTRL-I nl	Set Line Length to n and Enable Screen Echo
CTRL-I nN	Set Line Length to n and Disable Screen Echo
CTRL-I nP	Set Page Length to n Lines and Enable Automatic Skip-Over Perforation
CTRL-I P	Reset Page Length to Zero

Printer Control Commands

CTRL-I B	Enable Printer Bell
CTRL-I C	Cancel Printer Bell
CTRL-I E	Send Escape Character to the Printer

Table 2. *(Continued)*

Board Commands

CTRL-I nC	Set the Control Character to n
CTRL-I RETURN, CTRL-X, or ◄—	are the Null Commands
CTRL-I CTRL-n	Change Control Character from **CTRL-I** to **CTRL-n**
CTRL-n CTRL-I	Change Control Character From **CTRL-n** to **CTRL-I**
CTRL-I Λ	Change Control Character from **CTRL-I** to Λ symbol
CTRL-I M	Set Maintain Mode
CTRL-I T	Set Transparent Mode
CTRL-I V	Verify Operation

Screen Commands

CTRL-I I or CTRL-I O	Enable Screen Echo
CTRL-I nI	Enable Screen Echo and Set Line Length to n
CTRL-I N	Disable Screen Echo and Set Line Length to Zero
CTRL-I nN	Disable Screen Echo and Set Line Length to n
CTRL-I S	Dump Present Screen to the Printer
CTRL-I nS	Dump the Present Screen starting at Line n

Table 2. Command Summary *(Continued)*

CTRL-I W	Videx 80 Column Screen Dump
CTRL-I nW	Dump the Present Videx 80 Column Screen Starting at Line n

Communication Commands

CTRL-I H	Leave the High Order Bit Intact
CTRL-I X	Strip off the High Order Bit

Graphics Commands

CTRL-I G	Print Primary Hi- Resolution Screen
CTRL-I GD	Print Graphics Screen Double Size
CTRL-I GE	Print Graphics Screen in Emphasized Print
CTRL-I GI	Invert Graphics Screen
CTRL-I GL	Print Graphics Screen at Left Margin
CTRL-I GM	Dump the Mixed Hi-Res and Text Screen
CTRL-I GR	Rotate the Graphics Screen 90 Degrees
CTRL-I G2	Dump the Secondary Graphics Page
CTRL-I GS	Side by Side for Normal Picture or Top to Bottom for Rotated Pictures

4 Troubleshooting

If you are installing a new GRAPHICARD and you are unable to get it to work properly, check the following:

1. Make sure you have followed the installation instructions exactly.
2. Check the printer for the following:

    a. The printer is powered-on and on-line
    b. Paper is properly installed
    c. There is no head or paper jam
    d. The cable from GRAPHICARD is properly attached

3. If graphics does not work check the switch settings to make sure that you have the correct setting for the printer you are using. Also make sure that switches are not in half position, by toggling them back and forth.

4. If you set the switches for positions which are presently unused, you get the following message:

    UNUSED—REV 1.00 C 1983 PPI GOOD

After checking the above, if you still experience difficulty, please contact your dealer.

5 Technical Description

GRAPHICARD Slot Dependent Ram Usage

Below are listed each of the scratchpad memory locations allocated by APPLE for peripheral cards. Beside them is their function in the GRAPHICARD firmware. The actual address is derived by adding 'n' to the number given, where n = slot#. All numbers are in hex.

$478 + n	Left Margin	Can be 0-255$
$4F8 + n	Lines/Page	Can be 0-127 (MSB indicates transparent mode.)
$578 + n	Text Flag	(See below)
$5F8 + n	Line Counter	Can be 0-127 (MSB indicates an APPLE //e.)
$6F8 + n	Chars/Line	Can be 0-255
$778 + n	Current Cmd Char.	
$7F8 + n	Char. Counter	Can be 0-255

Text Flag Bit Definitions:

> Bit0 thru Bit3—reserved
> Bit4—printer bell on
> Bit5—(LF) after (CR)
> Bit6—video turned on
> Bit7—output high order bit

Typical Direct Machine Language Driver

This small program demonstrates how to output a character directly to GRAPHICARD using machine language. It is typical of drivers to be inserted at location $300 for word processing programs, etc. You should note that this program expects GRAPHICARD to reside in slot 1.

Enter with the character to be sent in the A-register (most software does this anyway).

```
                1000            .OR $300
                1010
                1020    SAMPLE.DRIVER
                1030
                1040      *     Clear MSB
                                (Optional)
300:29 7F       1060            AND #$7F
                1070
                1080      *     Wait for
                                acknowledge
                1090
302:2C C1 C1    1100    .0      BIT $C1C1
305:30 FB       1110            BMI .0
                1120
                1130      *     Output char to card
                1140
```

307:8D 90 C0	1150	STA $C090
	1160	
30A:60	1170	RTS

Input/Output Locations

The following GRAPHICARD I/O locations should be used if you are writing your own drivers. Remember to add $n0 to the values given where n = slot #:

> $C080 + $n0 Write data
> (output port to card)
> $C081 + $n0 Read status

Status bit definitions:

> Bit0 thru Bit6—reserved
> Bit7—Busy (0 = ready 1 = busy)

Firmware Entry Points

There are three sets of entry points to the firmware. The first is used by Applesoft and DOS, and is defined as follows:

> $Cn00 - Coldstart (Initialization) entry
> $Cn02 - Warmstart entry

Make sure to use the "coldstart" entry first to initialize the card. Also, locations $36 and $37 should point to $Cn00 ($36 = 00, $37 = Cn) on entry. Normally this would be done by the "PR#n" command.

On entry, the A-register should contain the character to be output (or command). On exit, all registers (A, X and Y) will be unchanged.

By using this entry method, GRAPHICARD assumes it is in
BASIC, and therefore will use the BASIC power-on
defaults. These are: automatic linefeed after carriage
return, video echo enabled, and **CTRL-I** for the control
character.

The next two sets of entry points are used for Pascal and
CP/M. Using them indicates to the card that it should use
the Pascal, CP/M defaults. These are: no automatic linefeed
after carriage return, video echo disabled, and both **CTRL-Y**
and **CTRL-]** for the control characters.

Here are the entry points used by Pascal V1.0:

        $C800 - Initialization
        $C9AA - Write

On entry, the X-register should contain $Cn and for $C9AA
entry, the character to be output should be in location
$5B8 + $Cn. Assuming slot 1, here is an example:

```
  BIT $CFFF          ;Clear common ROM space
  BIT $C100          ;Turn on our ROM
  LDX #$C1           ;X-register = $Cn
  JSR $C800          ;Initialize card
  LDA character
  STA $679           ;$679 = $5B8 + $Cn
  LDX #$C1
  JSR $C9AA          ;Output character
```

The second Pascal, CP/M protocol, used by Pascal V1.1,
differs in that it uses indirect addressing. The entry points
are defined as follows:

        $Cn00 + the contents of $Cn0D - Init
        $Cn00 + the contents of $Cn0F - Write

On entry, the X-register should contain $Cn and the A-register should contain the character to be output.
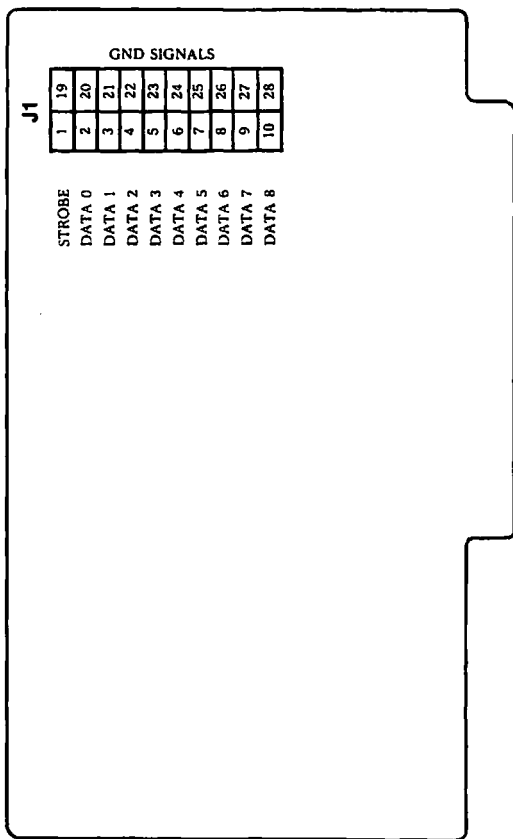
Parallel Connector Pins, Output and Timing

Figure 2 shows the GRAPHICARD parallel connector pin assignments.

Figure 3 shows the GRAPHICARD parallel output circuit.

Figure 4 shows the timing for parallel output.

Figure 2 - Parallel Connector Pin Assignments

GND SIGNALS

J1

| | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

STROBE
DATA 0
DATA 1
DATA 2
DATA 3
DATA 4
DATA 5
DATA 6
DATA 7
DATA 8

Pin Assignments for J1 is done per Centronics Configuration

Figure 3 - GraphiCard Circuit
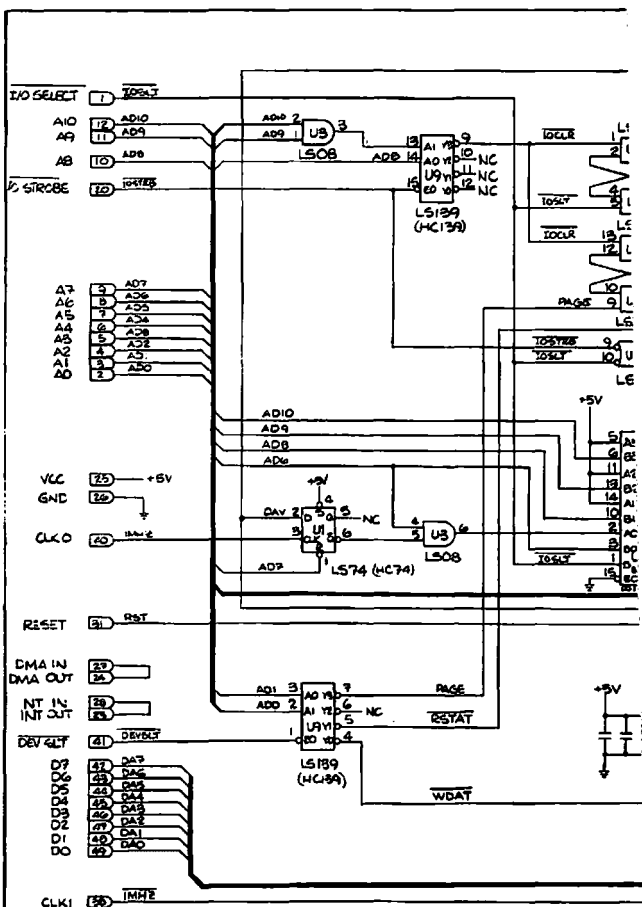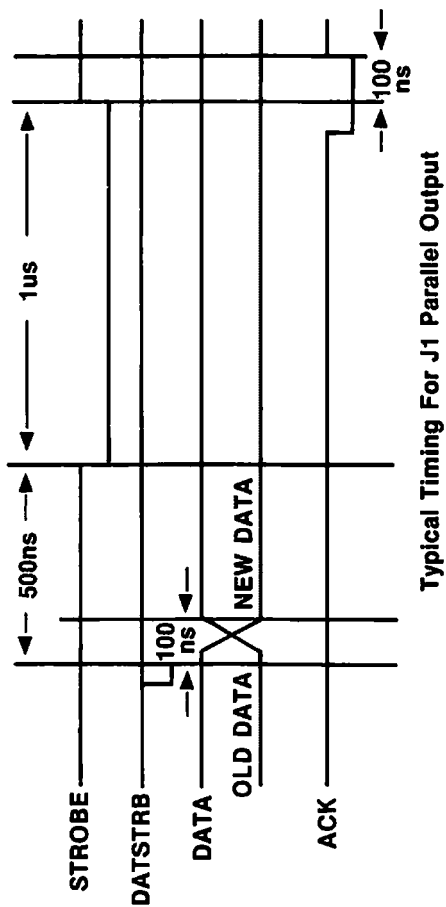
Figure 4 · Typical Timing for Parallel Output

Typical Timing For J1 Parallel Output

WARRANTY

PRACTICAL PERIPHERALS, INC. warrants that GRAPHICARD will be free from defects in materials and workmanship for five (5) years from the date of purchase. PRACTICAL PERIPHERALS, INC. will repair or replace, at its option, any cards or parts that it determines were defective when shipped to its initial customer. The reseller may pass along to its initial End User the remaining balance of the five-year warranty coverage on the terms and conditions stated herein. This warranty may not be further assigned.

LIMITED WARRANTY EXCLUSIONS

This limited warranty does not cover losses or damage which occur:

1. In shipment to or from the distributor or customer
2. Due to improper environment, temperature extremes, electrical power surges or failure, or other misuse or negligence.
3. Due to adjustment or repair by personnel not authorized by PRACTICAL PERIPHERALS, INC.
4. Due to improper installation, or failure to follow the installation instructions.
5. Due to forces beyond the control of PRACTICAL PERIPHERALS, INC. including but not limited to war, insurrection, civil disturbances, natural disasters, labor disputes, or government regulations.

PRACTICAL PERIPHERALS, INC. does not warrant that its products are merchantable or fit for any particular purposes. This limited warranty is in lieu of all other warranties, express or implied.

PRACTICAL PERIPHERALS, INC.'S liability shall not exceed the price of the defective individual product which is basis for the claim. In no event shall PRACTICAL PERIPHERALS, INC. be liable for any loss of profits, loss of use of facilities or equipment, or other indirect, incidental or consequential damages, even when PRACTICAL PERIPHERALS, INC. has been advised of the possibility of such damages.

The foregoing limited warranty is the exclusive and sole remedy provided to the buyer.

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