



PII-134 Monochrome Graphic Printer Card User's Manual

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MADE IN TAIWAN R.O.C.

FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

Warning: This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of FCC rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.



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Contents

Introduction	1
Checklist	2
Card layout and ports	3
Hotkey 1-2-3	4
Functions	5
Configuration	6
Full/ half screen buffer option	6
Half screen buffer	7
Full screen buffer	7-8
Software switch	8
Installation	9-11
Connections	12-13
Technical information	14-21
Logic device identities	14
I/O ports	14
Interrupt requests	15
Graphic dot generation	15-16
Text generation	16-17
LPT1: interface	17-19
CON: interface	19-21
Appendices	
Appendix A — Troubleshooting	
Appendix B — Register descriptions	
Appendix C — 6845 Programming considerations	

Introduction

You can rest assured of having made a wise choice in buying the PII-134 Monochrome Graphic Printer Card to enhance the display functions of your IBM PC™, PC/XT™, PC/AT™, or compatible computer. With its monochrome display port and a parallel printer port, the PII-134 Monochrome Card will enable your computer to interface with a 720 x 348-resolution monochrome monitor. And the additional port allows your computer to interface with a parallel printer.

The PII-134 card is fully compatible with Hercules-style monochrome cards and software produced for them.

Each of the two graphics pages used by the PII-134 card are in standard 720 x 348 resolution. The most popular graphics applications software packages, such as AutoCAD® and Lotus 1-2-3® are compatible with the PII-134 card.

And the easy-to-understand, well-illustrated instructions in this manual ensure that even if you are a newcomer to the computer world, you will have the Courier Plus II installed and running with a minimum of effort.

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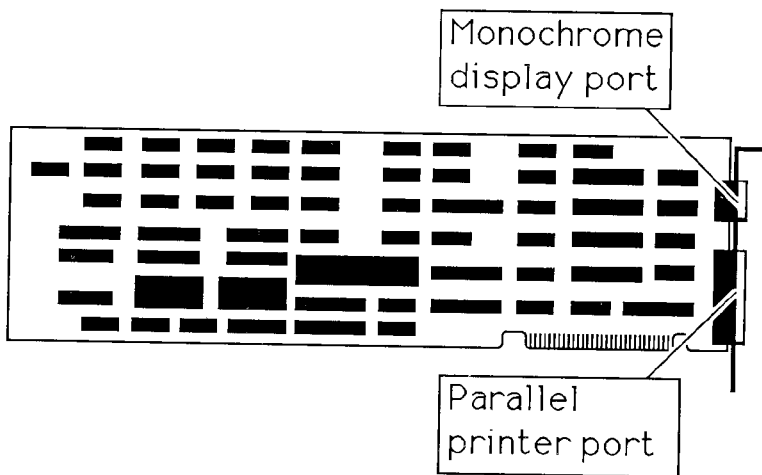
Checklist

Your PII-134 package contains the following:

- One PII-134 card
- One user's manual

Card layout and ports

The illustration below will familiarize you with the layout of the PII-134 Monochrome Printer Card and the location of the two ports:



Hotkey 1-2-3

To start Lotus 1-2-3 with three keystrokes upon installing your PII-134 monographic card, do the following:

- Install your PII-134 card in your computer after configuring it according to the instructions in this manual
- After placing the Lotus 1-2-3 system disk in drive A of your system, edit the system disk's AUTOEXEC file by typing in:

```
COPY CON:AUTOEXEC.BAT    <ENTER>
DATE                      <ENTER>
TIME                      <ENTER>
LOTUS                    <ENTER>
F6 (function key F6)    <ENTER>
```

- Type in the same as shown above for the Lotus 1-2-3 backup system disk if you have one.

You can now "hotkey" Lotus 1-2-3 by pressing <Ctrl>-<Alt>-.

Functions

The PII-134 has a monochrome monitor port and a parallel printer port designed to work with the IBM dot matrix printer and compatibles.

The monochrome display operates in two modes: text and graphic. The two modes are defined as follows:

Text	80 columns x 25 lines
Graphic	720 x 348 addressable dots Display buffer stores two screen-sized pages

Text generation

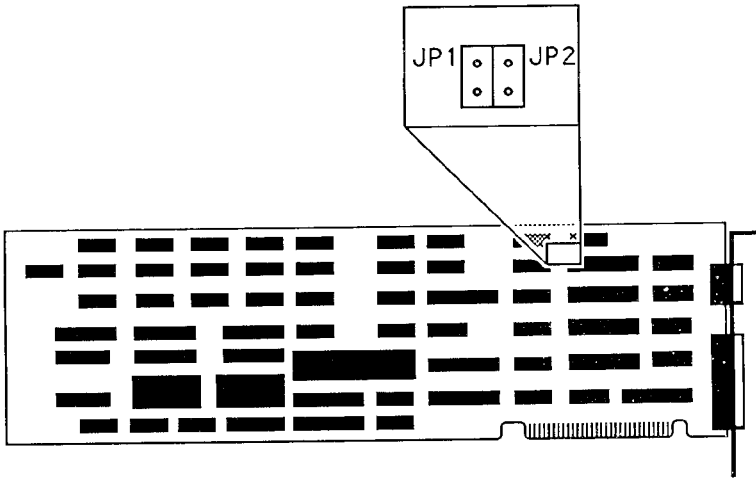
The character box in the text mode is 9 x 14 dots. The attributes of the character mode are predefined, and you can specify an eight-bit code to control the attributes of each character (code key found in **Technical information** section). The attributes are defined below:

- Normal — light character on dark background
- Reverse — dark character on light background
- Highlight — bold character
- Blink — blinking character
- Underline — underlined character

Configuration

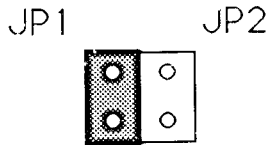
Jumpers JP1 and JP2 are used to select the size of the screen buffer on the card. The screen buffer is memory on the card which stores data for the display.

To find the location of jumpers JP1 and JP2, refer to the illustration below:



Full/half screen buffer option

Placing a jumper cap over JP1 enables the full/half screen buffer option. Refer to the illustration below:



With a jumper cap placed over JP1 a full screen buffer or a half screen buffer may be selected by software commands.

To select a full screen buffer, type in:

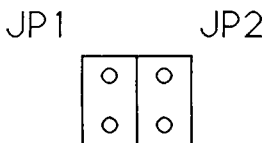
HGC FULL <ENTER>

To select a half screen buffer, type in:

HGC HALF <ENTER>

Half screen buffer

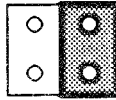
The half screen buffer allows graphics software to access the first graphics page (page 0), but the second graphics page is suppressed to permit use of other graphics cards. Graphics are enabled on the first page only. The address of the display buffer is B0000-B7FFF, and bit 1 of port 3BF is 0 in this configuration. For this configuration, neither JP1 nor JP2 will have jumper caps placed over them. Refer to the illustration below:



Full screen buffer

The full screen buffer allows graphics software to access both graphics pages. The address of the display buffer is B0000-BFFFF, and bit 1 of port 3BF is 1 in this configuration. For this configuration jumper JP2 will have a cap placed over it. Refer to the illustration on the next page:

JP1 JP2

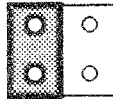


Note: Lotus 1-2-3 and AutoCAD require full screen buffer configuration.

Software switch

Text, half screen buffer and full screen buffer modes may be selected by software commands after a cap has been placed over jumper J1 as shown below:

JP1 JP2



Assembler language or BASICA may be used to program bit 0 and bit 1 of port 3BF as shown in the table below:

Bit 1	Bit 0	Configuration	BASICA command
0	0	Text	OUT 3BF,0
0	1	Half screen buffer	OUT 3BF,1
1	1	Full screen buffer	OUT 3BF,3

Note: Lotus 1-2-3 and AutoCAD require full screen buffer configuration.

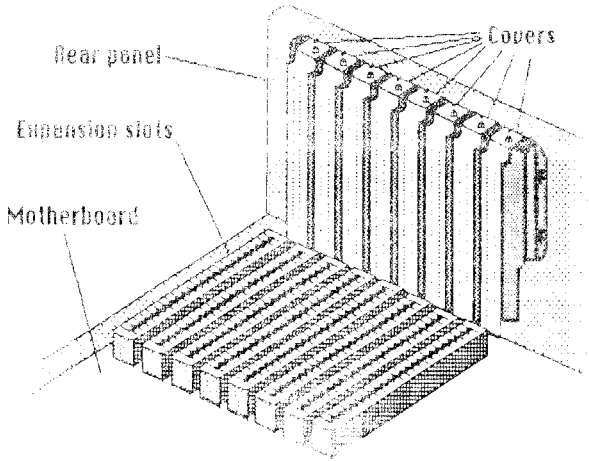
Installation

Refer to the user's manual of your computer to open it up.

Make sure that —

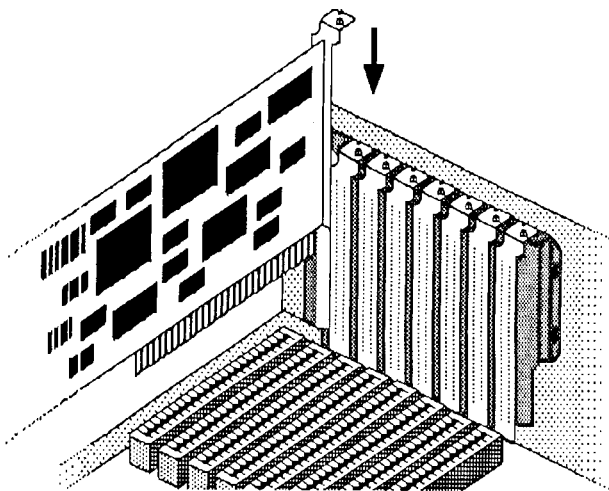
- no video board using the same screen buffer memory map is inserted in one of the expansion slots
- no other card in any of the expansion slots has the LPT1 printer port identity; otherwise, the PII-134 card will not function

With a nutdriver or a small screwdriver (usually a Phillips), remove the cover at the back of an unused slot. Keep the screw to attach the card. Refer to the illustration below:



Before you install the card in your computer, make sure the computer is unplugged, and then remove any static electric charge from your body by placing one hand on the power supply box inside your computer.

Pick up the PII-134 card by its non-conductive edges. Avoid touching the connector contacts or any components with your hands as it could damage the card. Insert the card into a empty expansion slot as shown in the illustration below



Attach the mounting bracket of the card securely to the rear panel of your computer with the screw you saved.

Change the switch settings on the motherboard for a monochrome display (refer to the user's manual of your computer or motherboard for the appropriate settings) or more than one monitor. Do not count the 64K screen buffer on the PII-134 card when setting the switches for system memory.

Finishing up

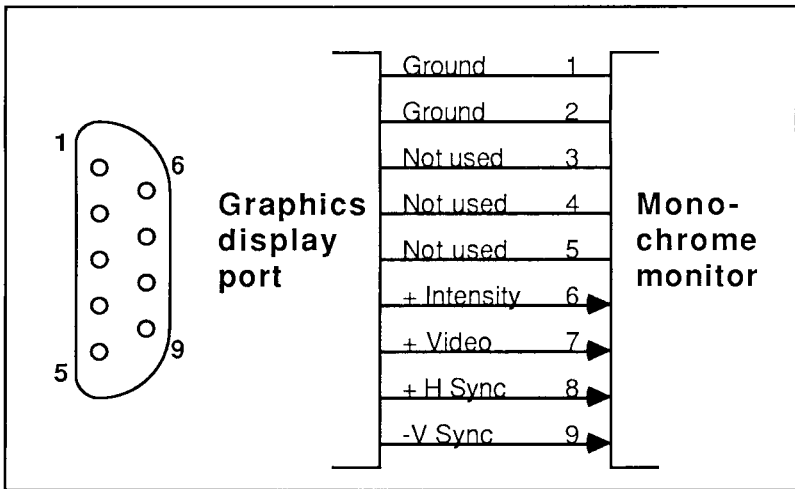
If you have any other cards to install, put them in now following the same steps as those for the PII-134 card. When all of your new cards have been installed, you can close your computer

Connections

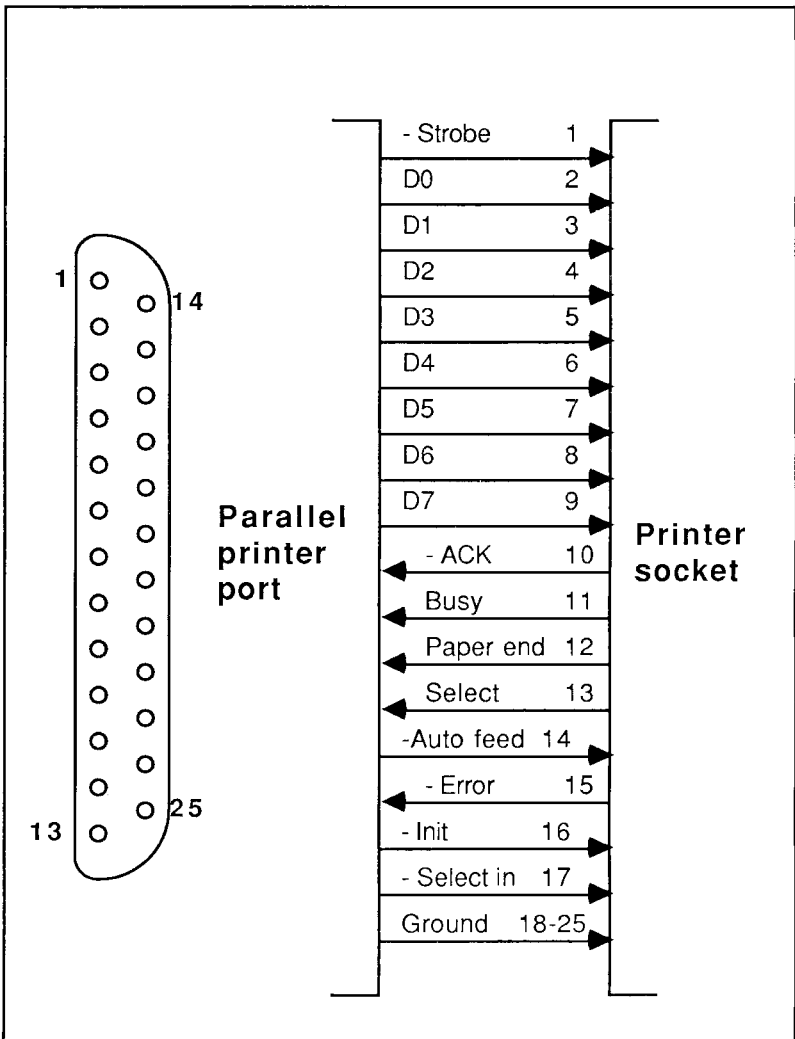
The next two illustrations show the ports on the PII-134 card and their pinouts.

Note: Do not connect color displays to the monochrome display port! The timing of color monitors differs from that of the monochrome display port, and your color monitor will be permanently damaged if it is connected to the PII-134 card.

Graphics display port and pinouts



Parallel printer port and pinouts



Technical information

The 64K system RAM on the card is divided into two video buffers of about 32K each. The two video buffers are used by the two graphics pages.

Logic device identities

LPT1: = Printer
CON: = Monochrome display
I/O = Input/Output
O = Output
I = Input

The system's LPT1: may be a parallel printer or a plotter. Control codes will vary depending on what type of printer is used.

I/O ports (Non DMA only)

(O)	03B4	=	6845 Index Register
(I/O)	03B5	=	6845 Data Register
(O)	03B8	=	CON: Mode Control Port
(I)	03BA	=	CON: Status Port
(I/O)	03BC	=	LPT1: Data Port
(I)	03BD	=	LPT1: Status Port
(I/O)	03BE	=	LPT1: Control Port
(O)	03BF	=	Configuration Switch*

* Refer to **Software switch** on page 8

Interrupt requests

The interrupt request, IRQ7, is usually masked off until it is enabled through the LPT1: Control Port at address 03BE. This interrupt request is produced when the printer acknowledges data.

Graphic dot generation

In this bit-mapped mode, the display buffer can store two screen-sized pages which may be alternately displayed.

Alterations of the buffer for the displayed page will alter screen display, and for the page that is not displayed, alterations will be shown only when that screen is selected.

Page selection through bit 7 of CON: Mode Control Port

0 for page 0

1 for page 1

CON: buffer

Page 0 = B0000 — B7FFF (32K)

Page 1 = B8000 — BFFFF (32K)

Address calculation

The bit in the byte that stores the dot is bit position 7 (X MOD 8).

The x value lies between 0 and 719

The y value lies between 0 and 347

The offset into the page of the byte containing dot (x,y) is:

$$\begin{aligned} & [2000H \times (Y \text{ MOD } 4)] \\ & + [90 \times \text{INTEGER } (Y/4)] \\ & + [\text{INTEGER } (X/8)] \end{aligned}$$

Text generation

In the text mode, characters are stored contiguously in two 80-byte pairs per line. Each pair is comprised of one byte for character code and one byte for attribute code. The display is 80 characters in width by 25 lines in height.

Attribute and character codes for displayed characters are stored in the display buffer.

The attribute decoder has the functions of underline, reverse video, blank, boldface, and blink for any character font. The character generator can produce the 256 ASCII characters.

Address calculation

The character code offset of a character is:

$$160 \times (\text{LINE} - 1) + 2 \times (\text{COLUMN} - 1)$$

The attribute code offset of a character is:

$$160 \times (\text{LINE} - 1) + 2 \times (\text{COLUMN} - 1) + 1$$

Any particular line must lie between 1 and 25.
Any particular column must lie between 1 and 80.

The offset of storage is: B0000 — B0FFF (4K)

These rules are followed by the attribute decoder:

Attribute codes	7	6	5	4	3	2	1	0
Reverse video	B	1	1	1	1	0	0	0
Normal display	B	0	0	0	1	1	1	1
Underline	B	0	0	0	1	0	0	1
Blank	B	0	0	0	1	0	0	0

For normal body I = 0, for bold body I = 1

For blink off, display mode control port bit 5 = 0

For blink on, display mode control port bit 5 = 1

For normal background B = 0, for bold background
B = 1

For no blink, B = 0, and for blink, B = 1

LPT1: interface

The LPT1: interface utilizes the following three I/O ports:

LPT1: Control Port	(03BE)
LPT1: Status Port	(03BD)
LPT1: Data Port	(03BC)

LPT1: Control Port (An I/O port)

Bit 0 — /Strobe 0 = Printer accepting data
 1 = Printer not accepting
 data

Bit 1 — /Auto Feed 0 = Auto line feed
 1 = No line feed

Bit 2 — /Initialize 0 = Printer initialized
 1 = Normal printer operation

- | | |
|--------------------|---|
| Bit 3 — Select | 0 = Printer deselected
1 = Printer selected for data transfers |
| Bit 4 — IRQ Enable | 0 = Masks IRQ7
1 = Enables IRQ7 when printer data is ready |

Bits 5, 6, and 7 are not used.

LPT1: Status Port (An I port only)

- | | |
|-----------------------|---|
| Bit 3 — /Error | 0 = Error
1 = No error |
| Bit 4 — Select status | 0 = Printer inattentive
1 = Printer attentive |
| Bit 5 — Paper out | 0 = Operation normal
1 = No paper |
| Bit 6 — /ACK | 0 = Reading data
1 = Ready for more data |
| Bit 7 — /Busy | 0 = Printer busy, no error not selected
1 = Not busy |

Bits 0, 1, and 2 are not used.

LPT1: Data Port (03BC)

Output to this port will latch the data bus value to the printer. Actual pin conditions are returned when there is input. Data path integrity can be checked by this feature.

Configuration switch (03BF)

This software switch enables one of the three configurations of the card's memory map via this port. Accidental setting of the graphics mode is protected against by this port. Bit 0 uses bit 1 of the CON: Mode Control Port. Bit 1 uses bit 7 of the CON: Mode Control Port and either masks or brings page 1 into the memory map.

Bit 0 — 1 (B0000 — B7FFF)

Bit 1 — 1 (B8000 — BFFFF)

CON: interface

The interface to the monochrome display is achieved through the following I/O ports.

CON: Status Port (03BA)

CON: Mode Control Port (03B8)

6845 Index and Data Registers (03B4-5)

CON: Status Port (03BA)

Real time status of the monochrome display is sensed by this I port.

Bit 0 0 = Display active
 1 = Screen blanked temporarily (horizontal reface)

Bit 2 0 = Light pen switch status on
 1 = Light pen switch status off

Bit 3 0 = No dots
 1 = Dots (Echoes video signal sent to screen)

- Bit 7 0 = Screen blanked temporarily (vertical
 reface)
 1 = Active display

Bits 1, 4, 5, and 6 are not used.

CON: Mode Control Port (03B8)

The operational mode of the card is set through this I/O port.

Note: Be careful when changing from text and graphic modes. You must program both CON: Mode Control Port bit 1 and the 6845 Index and Data Registers with the proper parameters at the same time

- Bit 1 0 = Text mode (information from
 character generator and
 attribute-decoding logic)
 1 = Graphics mode (information from
 graphics display buffer)
- Bit 3 0 = Blanked screen
 1 = Activated screen
- Bit 5 0 = Text blink off
 1 = Text blink on (Text blinks if attribute
 has bit 7 set, and cursor
 remains unaffected)
- Bit 7 0 = Page 0
 1 = Page 1

Bits 0, 2, 4, and 6 are not used.

Note: Assembly language routines should be used to control CON: Mode Control Port bit 1 because the monitor may receive undefined vertical and horizontal frequencies when switching between text and graphics modes (memory access may be done in any language). See Appendix C for the appropriate listings.

Appendices

Appendix A — Troubleshooting

If problems with the PII-134 card arise, checking out the following may be helpful:

- Check switch settings on your motherboard, and make sure they are set for the monochrome display. You may need to consult the user's manual for your motherboard to find the correct switch settings.
- Make sure that you are running software compatible with the PII-134 card. For example, software written for the IBM Color Graphics Adapter like Microsoft's Flight Simulator will not run on the PII-134 card.
- Never use other graphics cards simultaneously which have the same screen buffer address. The IBM Color Graphics Adapter, for example, uses the same screen buffer address.
- If you fail to solve your problem, your dealer can help you find the solution. Your dealer is always glad to provide you advice and support.

Appendix B — Register descriptions

Bit 7	Bit 6	Bit 5	Bit 4
Printer control (03BE) R/W Not used	Printer control (03BE) R/W Not used	Printer control (03BE) R/W Not used	Printer control (03BE) R/W Enable IRQ7
Printer status (03BD)	Printer status (03BD)	Printer status (03BD)	Printer status (03BD)
R.O. Busy - Status +	R.O. ACK -	R.O. Paper out +	R.O. Select
Printer data (03BC) R/W D7	Printer data (03BC) R/W D6	Printer data (03BC) R/W D5	Printer data (03BC) R/W D4
CRT status (03BA) R.O. Vertical - Sync	CRT status (03BA) R.O. Not used	CRT status (03BA) R.O. Not used	CRT status (03BA) R.O. Not used
CRT control (03B8) W.O. Page No.	CRT control (03B8) W.O. Not used	CRT control (03B8) W.O. Enable + Char. blink	CRT control (03B8) W.O. Not used

Abbreviations:

R.O. — Read only

W.O. — Write only

R/W — Read and write

Bit 3	Bit 2	Bit 1	Bit 0
Printer control (03BE) R/W Select in +	Printer control (03BE) R/W Initialize - Printer	Printer control (03BE) R/W Auto feed +	Printer control (03BE) R/W Strobe +
Printer status (03BD)	Printer status (03BD)	Printer status (03BD)	Printer status (03BD)
R.O. Error -	R.O. Not used	R.O. Not used	R.O. Not used
Printer data (03BC) R/W D3	Printer data (03BC) R/W D2	Printer data (03BC) R/W D1	Printer data (03BC) R/W D0
CRT status (03BA) R.O. Video + Output	CRT status (03BA) R.O. Reserved	CRT status (03BA) R.O. Reserved	CRT status (03BA) R.O. Hsync +
CRT control (03B8) W.O. Enable video	CRT control (03B8) W.O. Not used	CRT control (03B8) W.O. Select graphic mode	CRT control (03B8) W.O. Not used

Abbreviations:

R.O. — Read only

W.O. — Write only

R/W — Read and write

Appendix C — 6845 Programming considerations

The following table summarizes the 6845 internal data registers, their functions, and their parameters in the text and graphic modes.

Register number	Register name	Text mode (hexadecimal)	Graphics mode (hexadecimal)
R0	Horizontal total	61	35
R1	Horizontal displayed	50	35
R2	Horizontal sync position	52	35
R3	Horizontal sync width	F	35
R4	Vertical total	19	35
R5	Vertical total adjust	6	02
R6	Vertical displayed	19	57
R7	Vertical sync position	19	57
R8	Interlace & skew	02	02
R9	Max. raster address	D	03

R10	Cursor start	B	00
R11	Cursor end	C	00
R12	Start address (H)	00	00
R13	Start address (L)	00	00
R14	Cursor (H)	00	00
R15	Cursor (L)	00	00
R16	Light pen (H)	—	—
R18	Light pen (L)	—	—

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