MG-200

MONOGRAPHICS CARD

with 1 parallel port included

USER'S MANUAL

Thank you for purchasing the MG-200 MONOGRAPHICS CARD for your IBM PC, PC-XT, PC Portable or compatible. The MG-200 is a high quality, high reliability monochrome graphics card designed to give you the flexibility and versatility needed for a wide variety of graphics application programs. The MG-200 uses a high resolution monochrome character set, similiar to IBM, and includes a parallel port. An RS232C serial port is optional.

FEATURES:

* TEXT MODE 80 COLUMNS X 25 LINES

* GRAPHIC MODE 720 X 348 PIXELS

* 1 PARALLEL PRINTER PORT

* 1 SERIAL COMMUNICATION PORT (Optional)

* FULLY COMPATIBLE WITH IBM MONOCHROME DISPLAY/PRINTER AND HERCULES GRAPHICS CARD.

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I. FAST START WITH 1-2-3

To get 1-2-3 running on your MG-200 monographics card use the following steps:

1. Install your MG-200 into your motherboard following the procedure described in section III. of your User's Manual. Make sure that JUMPER switch J6 in your MG-200 was set as shown in Figure 2-1.

2. Edit 1-2-3's AUTOEXEC file by placing the 1-2-3 System Disk in drive A. With "A>" appearing on your screen, type:

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

3. Repeat step 2 with the 1-2-3 backup System Disk.

4. You are now ready to start 1-2-3 by pressing the ALT-CTRL-DEL keys simultaneously.

NOTE: The Fast Start section is intended to give the experienced user a quick quideline for installation and operation of the MG-200 monochrome graphics card. It should not be considered as substitute for a thorough reading of the MG-200 user's manual.

II. INTRODUCTION

The MG-200 MONOCHROME GRAPHICS CARD includes both a serial port (RS232C) and a parallel printer port that are designed to work with the IBM dot matrix printer.

The following two display modes are available:

1. TEXT MODE: 80 columns X 25 lines

2. GRAPHICS MODE: 720 columns X 348 addressable dots.

In TEXT mode, each byte in the buffer controls a character of 9 by 14 dots. The pattern of these characters are predefined and the user can specify an 8 bit code to call them to the screen. There is a byte to control the attributes of each character being displayed.

The attributes can be:

NORMAL: a white character on a black screen.
REVERSE: a black character on a white background.
HIGHLIGHT: brighter color. (intensified body)
BLINK: blinking at a rate of 0.5 second.
UNDERLINE: underline the character being displayed.

In TEXT mode, the display buffer provides two independent pages of 80 columns by 25 lines each, only one of which is displayed at a time.

In GRAPHICS mode, the bits in the buffer control the actual dots on the screen. Screen patterns are formed by writing 1's and 0's to the buffer. The buffer is organized as two complete screens that can be alternately displayed. This feature makes it possible to compose one pattern while displaying another, which is particularly useful for animation.

The printing function is implemented using strictly input and output ports with a parallel interface printer. Handshake signals are provided from the I/O ports to allow the use of printers that operate at different speeds.

Your MG-200 MONOCHROME GRAPHICS CARD is directly compatible with the IBM Monochrome card in TEXT mode using the PRINTER port and/or the serial port with an additional capability of 720 x 348 pixel graphics on a monochrome monitor.

Application software such as Lotus 1-2-3, SYMPHONY, HBASIC, SBASIC and many others can operate using the MG-200 MONOGRAPHICS CARD. Please contact your dealer for details concerning compatibility with other application software packages.

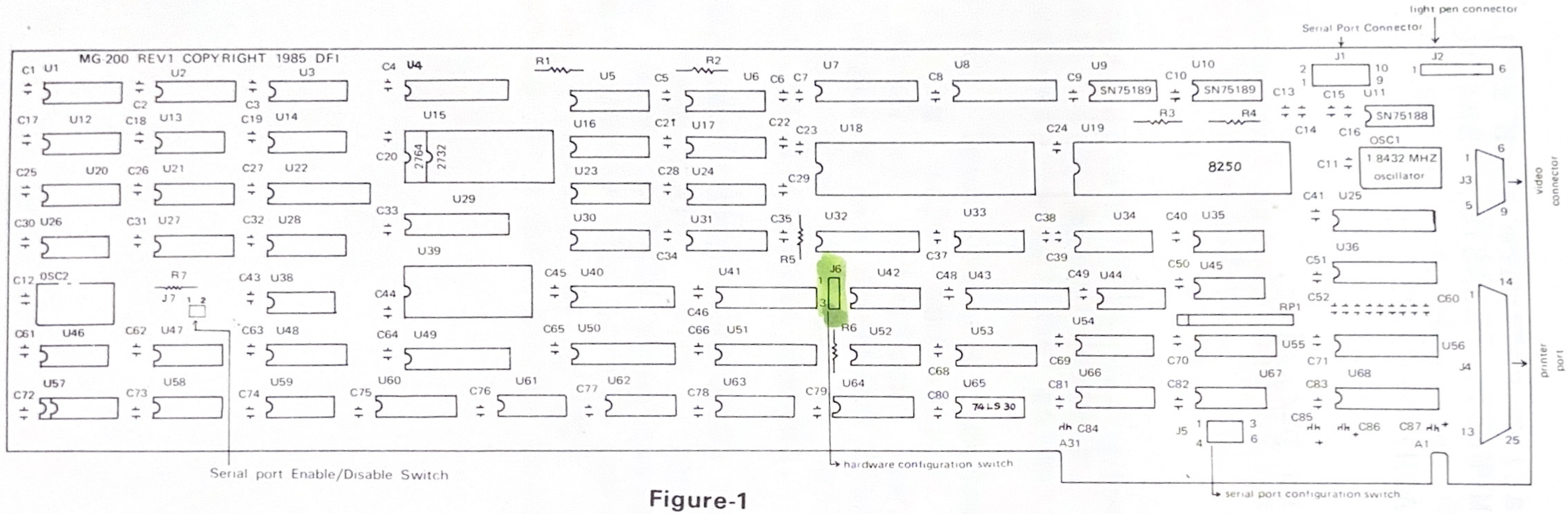

MG-200 REV1 COPYRIGHT 1985 DFI
light pen connector
Serial Port Connector
J1
J2
U1
U2
U3
U4
U5
U6
U7
U8
U9
U10
U11
SN75189
SN75189
SN75188
U12
U13
U14
U15
2764
2732
U16
U17
U18
U19
8250
U20
U21
U22
U23
U24
U25
OSC1
1.8432 MHZ
oscillator
video connector
U26
U27
U28
U29
U30
U31
U32
U33
U34
U35
U36
OSC2
R7
J7
U38
U39
U40
U41
U42
U43
U44
U45
RP1
U46
U47
U48
U49
U50
U51
U52
U53
U54
U55
U56
J4
printer port connector
U57
U58
U59
U60
U61
U62
U63
U64
U65
74LS30
U66
U67
U68
J5
A31
A1
Serial port Enable/Disable Switch
hardware configuration switch
serial port configuration switch

Figure-1

III. INSTALLATION

Follow these steps to install your MG-200 MONOCHROME GRAPHICS CARD:

NOTE: If your MG-200 without serial port installed, and you want to use serial port. Then purchase a set of MG-200 UPGRADE KIT from your dealer. Insert IC 8250 into U19, SN75188 into U11, SN75189 into U9, U10, 1.8432 MHZ Oscillator into OSC1 as shown in Figure 1.

1. Turn off your system power unit, remove the cover.

2. Make sure that there is not an IBM Monochrome Display/Printer Adapter, IBM Color Graphic Adapter, or any other video card in your system. Set the hardware configuration switch (J6) as shown in Figure 2-1. For systems which include an IBM Color Graphics Adapter, to avoid display memory conflict, please set the hardware configuration switch as shown in Figure 2-2.

3. Set JUMPER Switch J6 as shown in Figure 3 to select the proper serial communication port.

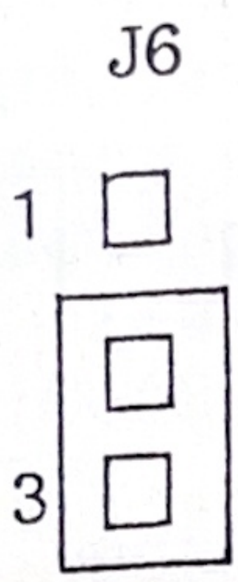


Figure 2-1

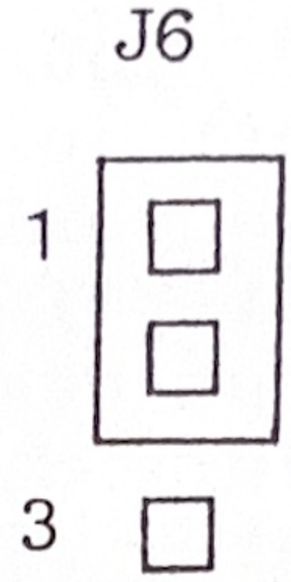
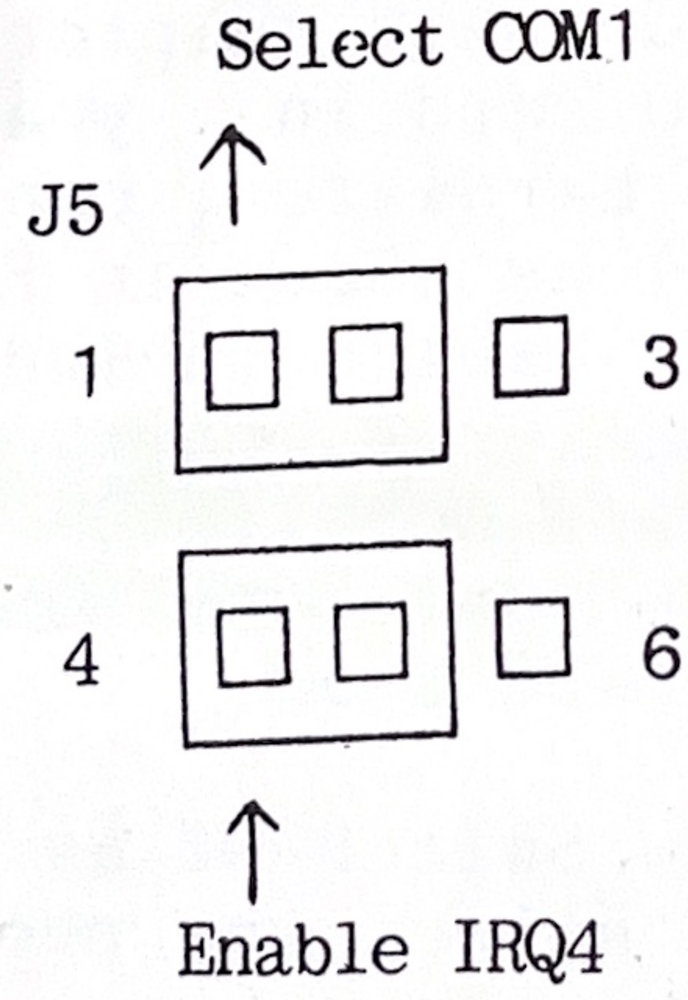
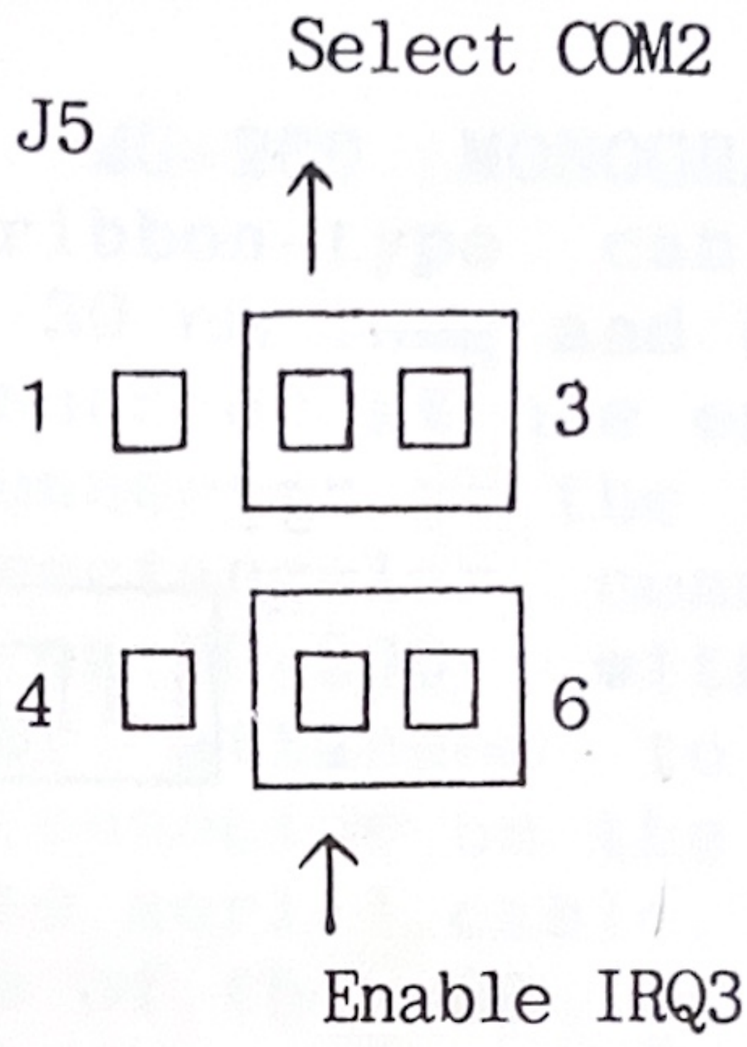


Figure 2-2



Enable Primary Serial Port

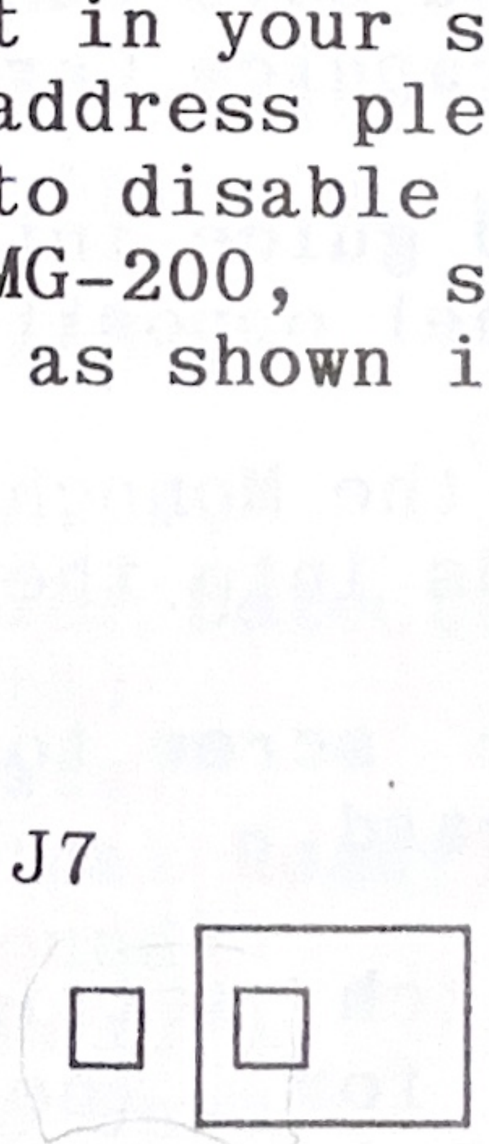
Figure 3-1



Enable Secondary Serial Port

Figure 3-2

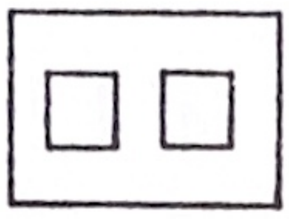
4. Make sure that there is no other card in the system with the same parallel printer port LPT1 and serial port. If you have another serial port in your system with the same I/O address please disable one of them, to disable the serial port in your MG-200, set the JUMPER SWITCH J7 as shown in Figure 4-1.



Disable serial port

Figure 4-1

J7



Enable serial port

Figure 4-2

5. Locate an empty long expansion slot.

6. Remove the metal plate on the back panel of the system unit opposite the slot you have chosen for the Monochrome Graphics Card.

7. Snap the card guide into the hole on the front panel opposite the slot.

8. Firmly press the Monochrome Graphics Card downwards into the slot.

9. Replace the screw to secure the bracket and card.

10. Set the switch settings on the motherboard for the Monochrome display. (Consult your system mamual for proper switch settings.)

11. The serial port connector on your MG-200 MONOGRAPHICS card is J1 which is a 10 PIN connector, 9 pins are used. An interface cable is

supplied with MG-200 MONOGRAPHICS card, this ribbon-type cable is approximately 30 cm long and has a rectangular connector at one end and a male DB25P connector at the other end. The rectangular connector plugs into J1 on MG-200, with the DB25P connector attaches to the female DB25S connector on the cable from your remote serial cable. Note that one edge of the 30 cm flat ribbon cable has a red or blue line on it. This line indicates which end of the rectangular connector is to be installed to pin 1 of J1. The rectangular connector plugs into J1 with the colored line at the left side of J1 (toward the front of PC), with the cable exiting toward the back of your MG-200 card.

Following is the wiring diagram from J1 connector to DB25P adapter cable.

Signal	J1 Connector	DB25P Connector
DCD (Data Carrier Detect)	1	8
RX (Receive Data)	2	3
TX (Transmit Data)	3	2
DTR (Data Terminal Ready)	4	20
GND (Signal Ground)	5	7
DSR (Data Set Ready)	6	6
RTS (Request To Send)	7	4
CTS (Clear To Send)	8	5
RI (Ring Indicator)	9	22

NOTE: Check that all dip switches on your motherboard are properly set prior to powering up your system.

IV. TECHNICAL INFORMATION

(A) DISPLAY BUFFER

In TEXT mode, each 16 bit word represents one character with the character code in the even byte and the attribute code in the odd byte. Each line of text (80 characters) uses up to 160 consecutive bytes.

There are two text pages, with page 0 starting at &HB0000 to &HB0FFF and page 1 at &HB8000 to &HB8FFF. By writing a '0' to bit 7 of the display mode control port (&H3B8) will select page 0 for display and writing a '1' will select page 1.

The attribute is controlled by the attribute data byte as follows:

DATA BIT:

7	6	5	4	3	2	1	0	ATTRIBUTE
B	0	0	0	I	0	0	0	BLANK
B	0	0	0	I	0	0	1	UNDERLINE
B	0	0	0	I	1	1	1	NORMAL VIDEO
B	1	1	1	I	0	0	0	REVERSE VIDEO

WHERE:

I = 0 for normal body intensity

= 1 for high body intensity

If BLINK ENABLE = 0 (i.e. the display mode control port bit 5=0)

B = 0 for normal background intensity

= 1 for intensified background

If BLINK ENABLE = 1

B = 0 for blink off

= 1 for blink on

Display Buffer Address Calculation:

(1) Text Mode:

Offset of the character code of a character = 160 * (LINE - 1) + 2 * (COLUMN - 1)

Offset of the attribute of a character = 160 * (LINE - 1) + 2 * (COLUMN - 1) + 1

Where LINE is between 1 and 25
COLUMN is between 1 and 80

(2) 720 X 348 Graphics Mode:

In graphics mode, each horizontal line of 720 dots is stored in the buffer as 90 consecutive bytes with bit 7 as the leftmost bit on the screen. The buffer stores two full screens by putting page 0 at B0000 to B7FFF and page 1 at B8000 to BFFFF. Each page is divided into one line from field 0, and then goes to fields 1, 2 and 3. This sequence continues for the entire screen so that adjacent lines from the same field are displayed 4 lines apart on the screen.

Address Calculation:

The offset (into the page) of the byte containing dot (X, Y) in each page is:

[2000H * (Y MOD 4)] + [90 * INTEGER (Y/4)] + [INTEGER (X/8)] and the bit in the byte that stores the dot is bit position 7 - (X MOD 8)

Where X is between 0 and 719
Y is between 0 and 347

(B) I/O INTERFACE

I/O PORTS:

3B4	6845 ADDRESS REGISTER
3B5	6845 DATA REGISTER
3B8	DISPLAY MODE CONTROL PORT
3BA	DISPLAY STATUS PORT
3BC	PRINTER DATA PORT
3BD	PRINTER STATUS PORT
3BE	PRINTER CONTROL PORT
3BF	CONFIGURATION SWITCH
3F8-3FF	PRIMARY SERIAL PORT
2F8-2FF	SECONDARY SERIAL PORT

(1) 6845 REGISTER TABLE (3B5 WITH REGISTER # WRITTEN TO 3B4)

REG.#	VIDEO PARAMETER	TEXT VALUE	GRAPHICS VALUE	UNIT
R0	HORIZONTAL TOTAL	61H	35H	CHAR
R1	HORIZONTAL DISPLAY	50H	2DH	CHAR
R2	HSYNC POSITION	52H	2EH	CHAR
R3	HSYNC WIDTH	0FH	07H	CHAR
R4	VERTICAL TOTAL	19H	5BH	ROWS
R5	VERTICAL ADJUST	06H	02H	LINES
R6	VERTICAL DISPLAYED	19H	57H	CHAR
R7	VSYNC POSITION	19H	57H	CHAR
R8	INTERLACE MODE	02H	02H	ROWS
R9	MAX. SCAN LINE ADDR	0DH	03H	----
R9	HORIZONTAL DISPLAY	0BH	00H	LINES
R10	HORIZONTAL DISPLAY	0CH	00H	LINES
R11	HORIZONTAL DISPLAY	00H	00H	LINES
R12	SCREEN START ADDR (H)	00H	00H	------
R13	SCREEN START ADDR (L)	00H	00H	------
R14	CURSOR ADDR (H)	00H	00H	------
R15	CURSOR ADDR (L)	00H	00H	------

NOTE: For more technical information about the 6845 CRT controller chip, please refer to the 6845 manual.

(2) DISPLAY MODE CONTROL PORT (3B8)

BIT 1: GRAPHIC ENABLE

When cleared to 0, the video information comes from the character generator and the attribute decoding logic. The character codes are fetched from

even bytes in the display buffer. The corresponding attribute codes are fetched from the next odd byte. When this bit is set to 1, video information comes from the graphic display buffer itself.

BIT 3: VIDEO ENABLE

This bit gates the video information onto the screen.

BIT 5: BLINK ENABLE

This bit is used only when the graphics enable bit is cleared. It causes a character to blink if its attribute code has bit 7 set.

BIT 7: PAGE SELECT

This bit selects the display page in both text and graphics modes.

NOTE: BIT 0, 2,4 & 6 are not used

(3) DISPLAY STATUS PORT (3BA)

BIT 0: HORIZONTAL SYNC

This bit is set during the horizontal retrace period.

BIT 2: LIGHT PEN SWITCH MODE
Light pen switch status is set to on.

BIT 3: VIDEO OUTPUT

This bit echoes the video signal being sent to the screen.

BIT 7: VERTICAL SYNC

This bit is cleared during the vertical retrace period.

(4) PRINTER CONTROL PORT (3BE)

BIT 0: STOBE-

A "0" in this bit causes the printer to read the data. The period must be 0.5 microseconds.

BIT 1: AUTOFEED+

Seting this bit causes the printer to line feed after printing.

BIT 2: INIT-

A "0" in this bit resets the printer.

BIT 3: SELECT+

Setting this bit selects the printer and enables subsequent data transfers.

BIT 4: IRQ7 ENABLE+

Setting this bit causes a level 7 interrupt to be generated each

time the printer acknowledges a transfer of data.

(5) PRINTER STATUS PORT (3BD)

BIT 3: ERROR-

This bit is set if the printer shows no fault in operation.

BIT 4: SELECT STATUS+

This bit is set when the printer is in the selected state and ready to accept data.

BIT 5: PAPER OUT+

This bit is set when the printer is out of paper.

BIT 6: ACK-

This bit is cleared for about 5 microseconds when the printer is ready tc accept another data transfer.

BIT 7: BUSY-

This bit is set when the printer is ready to accept data. It will be cleared during data entries, printing operations and error states. The printer will also clear this bit when it is off-line.

(6) SOFTWARE CONFIGURATION SWITCH (3BF)

BIT 0:

0 = prevents the setting of graphics mode (bit 1 of Display Mode Control Port).

1 = allows the setting of graphics mode bit. (bit 1 of Display Mode Control Port).

BIT 1:

0 = mask page 1 (B8000-BFFFF) out of the memory map and prevent the setting of page bit (bit 7 of Display Mode Control Port).

1 = bring page 1 (B8000 - BFFFF) into the memory map and allow the setting of page bit (bit 7 of Display Mode Control Port).

NOTE: The power on default value of these two bits depends on the setting of JUMPER switch J6. If your switch was set as shown in Figure 2-1, the power on default value of these two bits are 1, if J6 setting as Figure 2-2, the power on default value of these two bits are 0.

V. CONNECTOR PIN ASSIGNMENT

(A) SERIAL PORT (J1)

PIN	SIGNAL NAME
1	DCD (DATA CARRIER DETECT)
2	RX (RECEIVE DATA)
3	TX (TRANSMIT DATA)
4	DTR (DATA TERMINAL READY)
5	GND (SIGNAL GROUND)
6	DSR (DATA SET READY)
7	RTS (REQUEST TO SEND)
8	CTS (CLEAR TO SEND)
9	RI (RING INDICATOR)
10	N.C.

(B) LIGHT PEN CONNECTOR (J2)

PIN	SIGNAL NAME
1	LIGHT PEN INPUT
2	N.C.
3	LIGHT PEN SWITCH
4	GND
5	+5V SUPPLY
6	+12V SUPPLY

(C) VIDEO PORT (J3)

PIN	SIGNAL NAME
1	GROUND
2	GROUND
3	N. C.
4	N. C.
5	N. C.
6	HIGH LIGHT
7	VIDEO
8	HORIZONTAL DRIVE
9	VERTICAL DRIVE

(D) PRINTER PORT (J4)

PIN	SIGNAL NAME
1	-STROBE
2	DATA 0
3	DATA 1
4	DATA 2
5	DATA 3
6	DATA 4
7	DATA 5
8	DATA 6
9	DATA 7
10	-ACK
11	BUSY
12	PAPER EMPTY
13	+SELECT
14	-AUTO EDXT
15	-ERROR
16	-INIT
17	-SLCTIN
18	GROUND
19	GROUND
20	GROUND
21	GROUND
22	GROUND
23	GROUND
24	GROUND
25	GROUND

VI. TROUBLESHOOTING

Please check the following conditions in the event you experience difficulties using your MG-200 MONOGRAPHICS CARD:

1. Make sure that your Jumper switch J6 setting as Figure 2-1. (i.e. page 0 and page 1 are in the display memory map) before attempting to run 1-2-3, SYMPHONY or HBASIC.

2. Make sure that all software you plan to use is fully compatible with your MG-200 MONOGRAPHICS CARD (check with your dealer).

3. If you are using an IBM Color Graphics Adapter in your system at the same time as you are using your MG-200 DIAMOND MONOGRAPHICS CARD, please check to make sure that your Jumper switch J6 setting as Figure 2-2 (i.e. only page 0 is in the display memory map).