

## 2.6 Screen Display Summary

### 2.6.1 Specifications of Video Display

- 1) Display Type: Memory mapped into the RAM
- 2) Display Mode: Text mode, low resolution graphics mode, high resolution graphics mode.
- 3) Text display format: 960 characters (24 rows by 40 columns)
- 4) Character font: 5 by 7 dot matrix
- 5) Character mode: Normal, inverse
- 6) Character set: 64 upper case ASCII characters
- 7) Graphics capability: 1920 blocks (40 by 48) for low resolution graphics, 53760 dots (280 by 192) for high graphics mode.
- 8) Number of colors: six colors for both low and high resolution graphics modes.

### 2.6.2 Text Mode

In text mode, the MPF-II is capable of displaying a screen of 24 rows and 40 columns. Characters displayed on the screen are stored in the video display buffer. Each character position corresponds to one memory location, which can be used to store any of the ASCII code of 64 characters--26 upper case English letters, 10 numerals, and 28 special characters. Each character is displayed as a 5 by 7 dot matrix with a one-dot space on both side of the character and above the character to keep the word apart.

Fig. 2-5 shows the 64 characters that can be displayed on the screen

©ABCDEFGHIJKLMNO  
PQRSTUVWXYZ[\ ] -  
! " # \$ % & ' ( ) \* + , - . /  
ø 1 2 3 4 5 6 7 8 9 : ; < = > ?

Fig 2-5 MPF-II Character Set

### 2.6.3 Low Resolution Graphics

In low resolution graphics mode, the screen can display an array of 40 by 48 blocks, while each block may come in any of the six colors available on the MPF-II. But the blocks come in only white and grey on monochrome monitors.

Table 2-5 Low Resolution Graphics Colors					
Decimal	Hex	Color	Decimal	Hex	Color
0	\$0	black	8	\$8	Purple
1	\$1	green	9	\$9	green
2	\$2	purple	10	\$A	purple
3	\$3	white	11	\$B	white
4	\$4	green	12	\$C	white
5	\$5	orange	13	\$D	orange
6	\$6	blue	14	\$E	blue
7	\$7	white	15	\$F	white

If color does not show up on your color TV screen, you can adjust a screw (which connects to a variable capacitor on the MPF-II main board) at the bottom of the MPF-II until color shows up on your screen. The shade of color may vary, depending on different brands of color TVs. You may use the color trimmer on your screen to make adequate adjustment.

### 2.6.4 High Resolution Graphics

When your MPF-II operates in high resolution graphics mode, the screen displays an array of 53,760 dots (280 by 192). Each dot may come in one of the six colors--white, black, green, blue, orange, purple.

When operating in high resolution graphics mode, the MPF-II fetches screen information from a memory area consisting of 8,192 bytes. This memory area is known as display buffer. The display buffer is divided into two areas: page 1 and page 2. The memory range of page 1 or primary page is from 2000H (hexadecimal) or 8192 (decimal) through 3FFFH or 16383, and the memory range



of page 2 is from A000H (or 40960) through BFFFH (or 49151).

In text and low resolution graphics modes, the two memory areas of page 1 and page 2 are also used for screen buffer.

Each dot displayed on the screen (when the MPF-II operates in high resolution graphics mode) represents one bit in the screen buffer. The seven bits of a byte is displayed on the screen, while the remaining bit is used for selecting color for the seven bits displayed on the screen.

Each line on the screen requires 40 bytes of information. The first bit of the first byte is displayed as the leftmost bit (or at the leftmost position of a line), followed by the second bit, third bit through the seventh bit. The eighth bit of the first byte is used for selecting color, so it is not displayed. Following the seventh bit of the first byte is the first bit of the second byte, and the first bit of the third byte follows the seventh bit of the second byte. Therefore, each line consists of

$$7 \text{ (dots)} \times 40 \text{ (bytes)} = 280 \text{ (dots)}$$

On a black-and-white TV or video monitor, if a dot whose corresponding bit is 1 or "on", the dot appears in white on the screen; if the dot whose corresponding bit is 0 or "off", the dot comes in black on the screen.

However, on a color TV or monitor, the color of a dot is determined not only by whether its corresponding bit is on or off, but also by the position where the dot appears on the screen. If the corresponding bit of the dot is off, the dot will come in black. But if the corresponding bit of the dot is on, the color of the dot will be decided by its position on a screen. If the dot appears on the column 0, leftmost column, or on even-numbered columns, it will come in purple. If it appears on column 279, rightmost column, or any of odd-numbered columns, it will appear in green. If two dots come side by side, they will be in white. If the dot which is contained in a byte with the eighth bit being one, then the purple and green colors will be replaced by blue and orange colors.

In high resolution graphics mode, there are six colors available. However, they are subject to the following limitations:

- 1) Dots on even-numbered columns only come in black, blue, or purple.
- 2) Dots on odd-numbered columns only come in black, green, or orange.
- 3) Each byte must come in either purple/green or blue/orange. It is absolutely impossible that purple/orange, purple/blue, green/orange, green/blue come in the same byte.

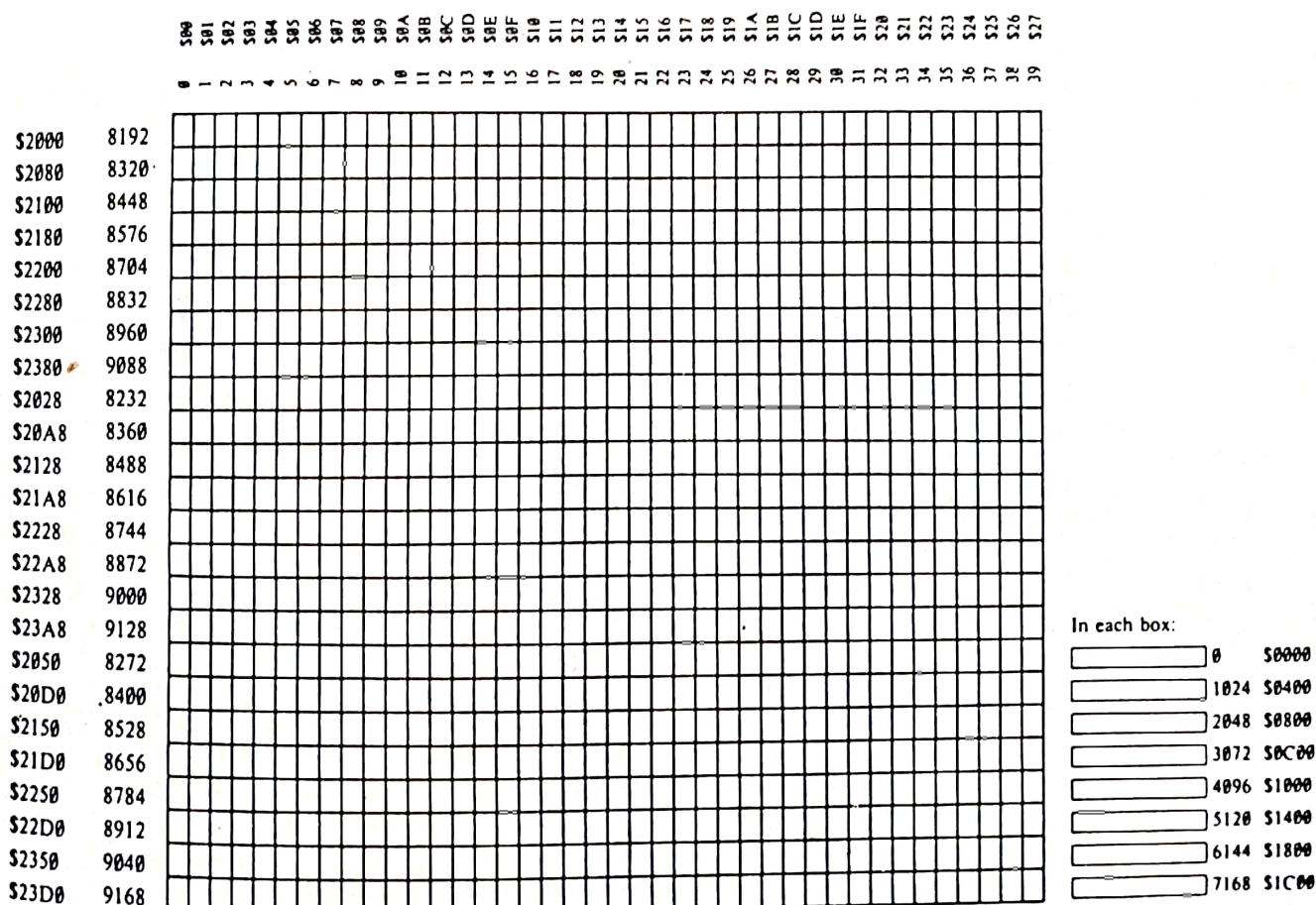


Fig. 2-6 Map of the High Resolution Graphics Mode