MODELS II and III Option F, F1 and F2 Specifications

GENERAL

Option F adds to the Beehive Models II and III a unique add-on expansion

module containing circuitry which generates a graphic display by point-

plotting on a matrix of 512 horizontal by 240 vertical positions. (Due to

internal blanking of the terminals only 508 by 237 positions can be viewed).

A standard raster scan type television monitor is refreshed by an internal

memory which contains the graphic information. The add-on graphic capabilities

in no way affects the normal operation of the alphanumeric operation of the

Models II and III. The 512 by 240 matrix is specified by 512 entries to

the graphic memory of which contains vertical displacement information for

each of the 512 equally spaced horizontal positions. Sequential data entry

to the graphics memory is such that the initial entry is viewed on the

right hand side of the screen. Subsequent entries shift the graphic display

to the left. When more than 512 entries have been made, the data at the left

hand edge of the display will be discarded from the graphic memory and lost

from display.

Option F1 adds to the graphic expansion model a graphic pointer. The

graphic pointer is useful in bringing the attention of the operator to a

particular point as displayed on the graphic trace. The graphic pointer

is displayed as a vertical line starting at the top of the display and

extending downward until it touches a point on the curve. The pointer

can be turned on and off for display; and, in addition be addressed to

any one of the 512 horizontal positions within the graphic display.

Option F2 provides the ability to add an additional two channels of

graphic memory to the graphic expansion model. This feature provides the

the ability to expand the graphic display such that three continuous curves are displayed simultaneous. When this option is incorporated, turn-on circuitry initializes the addressing of all graphic information to channel 1. After the terminal has been placed in the graphic mode of operation, control codes are utilized to provide addressing of the other graphic memories for data entry. In combining Option F1 (graphic pointer) and Option F2 addition graphic channels, it should be noted that only one graphic pointer is provided and will be oriented with respect to the graphic memory which is currently addressed.

Because the graphic expansion module utilizes the I/O of the Model II or III terminal, it can be specified for serial or a parallel (Option B interface) operation. Data rates up to 4800 Baud formatted in 10 or 11 bit structure is standard for serial operation. For parallel operation transfer rates up to 10,000 characters per second on a request acknowledge control sequence. In addition, the graphic expansion module can be specified as an export (Option D) and can be used in conjunction with an 80 character per line (Option A) and/or an upper/lower case alphanumeric display (Option E).

II OPERATION

The control codes used to control the operation of the display terminal relative to the graphics mode of operation are as follows:

For entry to the graphics mode of operation, a two-code sequence consisting of the USASCII code control F/V causes the terminal to enter the graphic mode of operation. All codes received by the terminal thereafter will be treated as graphic codes for graphic display information.

While the terminal is operating in the graphic mode of operation, a control G will cause the terminal to be removed from the graphic mode of operation and return to the alphanumeric mode of operation.

While in the graphics mode of operation, a control H clears the graphic memory to a no display condition.

Option F1

While in a graphics mode of operation, a control J will cause the graphic pointer to be turned off and inhibits the display of the graphic pointer. A control I immediately followed by a two-code sequence will cause the graphic pointer to move and be displayed relative to the two-code sequence, as per enclosure 1 page E12, graphic pointer option.

Option F2

When more than one channel of graphic memory is provided in the graphic expansion module, circuitry is used to initialize addressing of data to graphic memory channel 1. To select channel 2 or 3 control codes H and I are used respectively. To return to channel 1, a control I is used to re-select this channel.

All other control codes as defined in the USASCII code charts are treated as no operation type codes and are used to initialize and even/odd counter used for a data-packing operation as explained further in this section.

All other remaining codes as defined in the USASCII charts are treated
as graphic display information. Because the code only provides 7 bits of
information and the graphics memory required 11 bits of information, data
packing is required. See enclosure Page E10

After the receipt of any previously described control code, an even/odd
counter is initialized to the even state. The next code received
by the terminal will then be loaded and held in an even character buffer
at which time the even/odd counter is toggled to the odd state. The terminal
then receives the next code, loads it into the odd character buffer, signals
the graphic memory that data is available and the terminal is now
ready to receive the next graphic memory point information. This operation
is continued throughout the entire entry of the 512 graphic points.

The even/odd character bit structure as pertaining to the functions
within the graphic memory are indicated on Page E10 of Enclosure 1.
A brief description of the fields are as follows:

1. Y Coordinate - This particular bit field contains the value
    of the vertical displacement of the graphic point with 0 at
    the bottom of the display and the decimal value 240 at the
    extreme top of the display.

2. Display control - Display control is divided into four control
    functions: (a) Normal dot--this control code defines the
    point as defined by the Y coordinate to be displayed as a
    normal video dot. (b) Blinking dot--this control code controls
    the point as defined by the Y coordinate to be displayed as a

blinking dot whose repetition rate is approximately 3 cycles per second. (c) Blank dot--this control code defines the point to be inhibited as video information (no display). (d) Start-stop--this control code is defined as follows: For any points having this control code and having the same value of Y coordinate and starting with the left-hand most point and scanning to the right display a horizontal line starting at the first dot and stopping at the following dot. If more than two sets of these dots occur on the same Y coordinate, an alternate action of starting and stopping horizontal lines is sequenced through the display.

III INTERPOLATE FIELD

When the Interpolate bit is set, the following is performed:

A vertical line made up of discrete points is displayed on scan lines by that particular entry and the next most previous entry. Therefore, a vertical line as specified by end points is displayed halfway between the previous entry and the present entry which contains this control bit. If the end point specified interpolate is blinking, the entire vertical line will be caused to blink.

IV TECHNICAL

Interface between Model II & III to the graphic expansion module is via a 25 conductor cable with the cable an integral part of the expansion module.

A switched AC receptical on the graphic expansion module is provided to control power to the Beehive Model II or III.

The items contained within the graphic expansion module are:

    Standard Terminal Power Supply
    Graphic Interface Card
    A minimum of 1 but up to 3 graphic memory cards
    Special - 5 VCD Poser Supply
    Mechanical Package including card cage and skin

A block diagram of the graphic expansion module is shown in Figure 1.

Interface signals between the graphic expander module and the Beehive terminal can be divided into four groups.

1. Graphic interface timing and control

    The graphic interface timing and control are those signals required to control the loading of data into the buffers for the purpose of data packing. These signals in general interface to the Beehive terminal Input logic. In addition, these signals are used for gating of the data lines for the decoding of the graphic control functions previously defined.

2. Graphic memory timing

    The graphic memory timing signals are those associated with synchronizing of the graphic video with that of the terminals alpha-numeric display for presentation on the raster scan television monitor.

3. Data Lines

    The data lines transfer the ASCII codes in bit parallel, character serial to the graphic expander module.
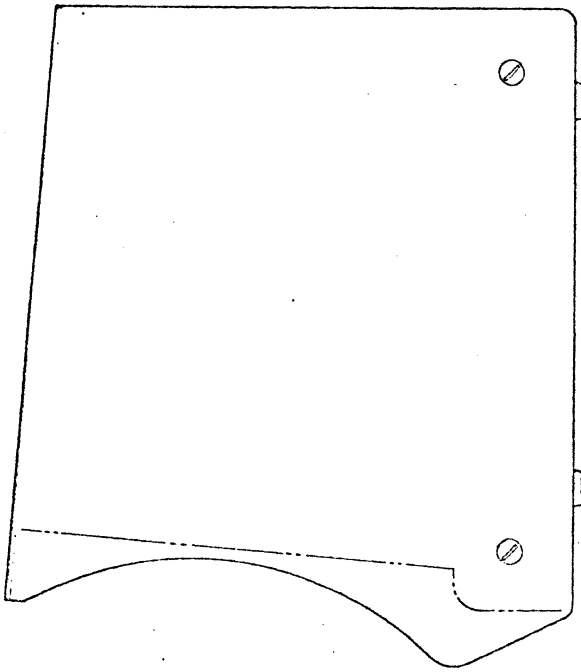
4. Graphic video

    The graphic video is the composite video signal of all graphic memories (up to three) presented back to the terminal for display on the display on the television monitor.

Interaction between the graphic interface board and the graphic memory is 12 bit parallel, character serial data, load signals and pointer information as required for the various options.
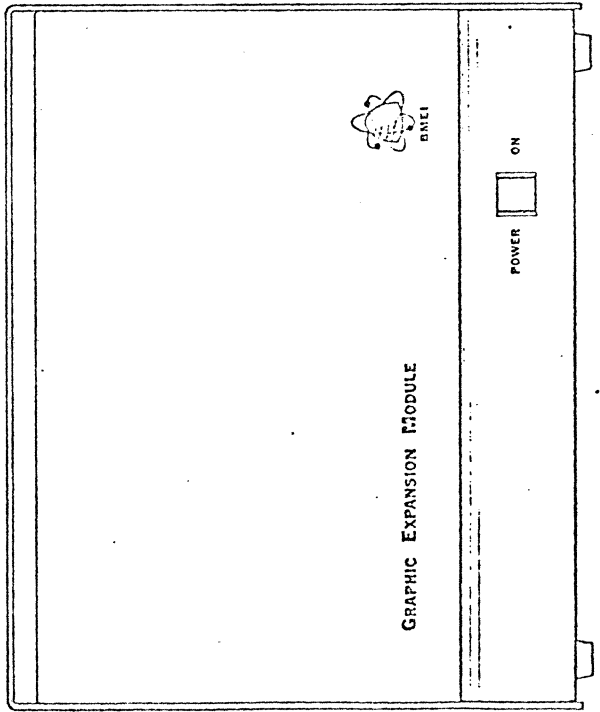
The power supplies are used to provide power for the logic and MOS memory devices.

After a Beehive terminal has been wired for a graphic expansion module operation requires the graphic expansion module interface cable or a shorting connector connected to the Beehive terminal. The shorting connector routes through those signals normally interrupted by the graphic interface logic.
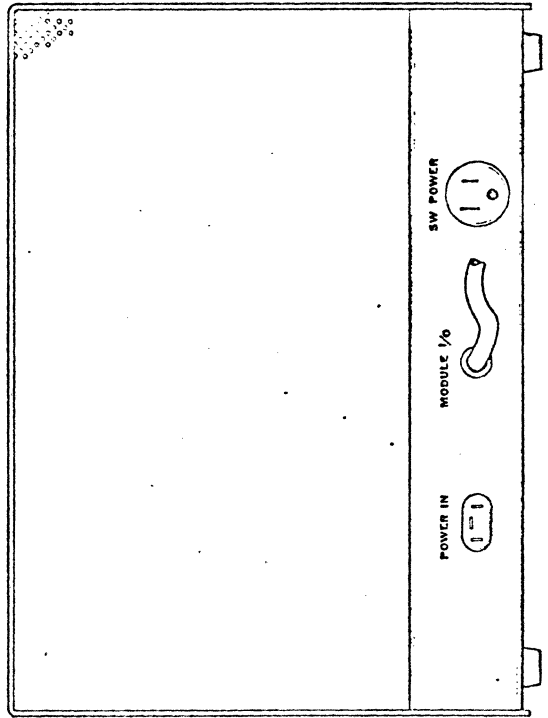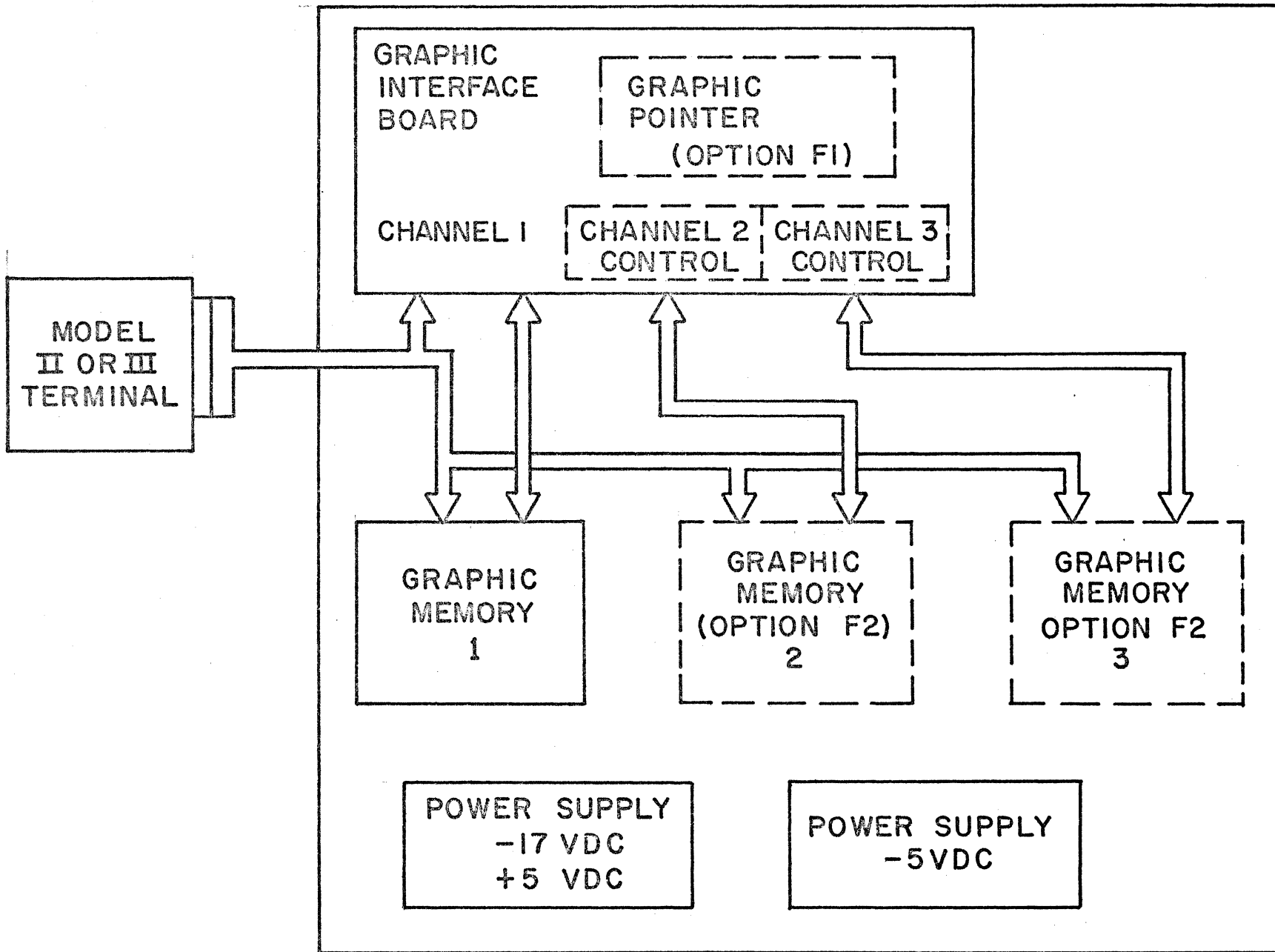
GRAPHIC MODULE ILLUSTRATION

SIDE VIEW

GRAPHIC EXPANSION MODULE

POWER

ON

BMEI

FRONT VIEW

POWER IN

MODULE I/O

SW POWER

BACK VIEW

GRAPHIC EXPANSION MODULE

GRAPHIC INTERFACE BOARD

GRAPHIC POINTER (OPTION FI)

CHANNEL I   CHANNEL 2 CONTROL   CHANNEL 3 CONTROL

MODEL II OR III TERMINAL

GRAPHIC MEMORY 1

GRAPHIC MEMORY (OPTION F2) 2

GRAPHIC MEMORY OPTION F2 3

POWER SUPPLY
-17 VDC
+5 VDC

POWER SUPPLY
-5VDC

BLOCK DIAGRAM