Presentation/2700 Camera Interface

User Manual

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Introduction 1

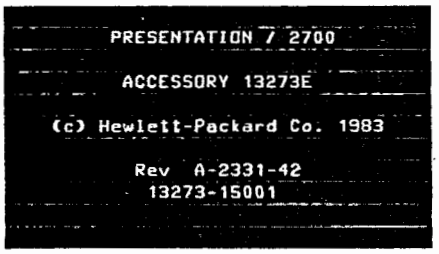
The PRESENTATION/2700 Camera Interface allows you to transfer high resolution pictures from an HP 2700 Color Graphics terminal to a MATRIX QCR film recorder. The pictures may be created on an HP 2700 terminal, loaded from local disc storage, or down loaded to the terminal from a host computer. Some of the Camera Interface features are:

- 4K or 2K line resolution
- Color or black and white
- Local or host control
- 35mm, 4" x 5", or 8" x 10" format
- Spooled output
- Color separation

The Camera Interface provides photographic output at up to 4K lines resolution (16 million pixels). The output is limited by the format of the film and the camera used. The output can be color or black and white, and is available in 35 mm, 4" x 5", or 8" x 10" format.

The Camera Interface is made up of two programs. The first program allows you to output the currently displayed picture to the digital camera. The camera is connected to the terminal through the HP-IB interface bus. The camera is added to the terminal's device configuration list and is configured through a device menu.

The second program allows you to list or "spool" several pictures that you want to copy. The picture spooling feature allows you to program an entire series of pictures to be taken automatically without the presence of an operator.




```
Please wait for PRESENTATION / 2700 to load.

        Use DEVICE CTRL, PLOT TO CAMERA for single picture.
    Press GEDIT to access spooler menu for multiple pictures.

 Run FIG2700.PUB.SYS on your HP3000 to upload picture to HP3000 figure file.

PRESENTATION /2700 is loaded - press RETURN
```

Figure 1-1. PRESENTATION/2700 Welcome Menu

The Presentation/2700 software is loaded using the CHART TYPE key after placing the PRESENTATION/2700 software disc in drive #1 (the left hand drive). You then load a picture from disc, the host computer, or create a picture using an application program such as Paintbrush.

Once the software is loaded, all that is needed to take a high resolution picture is to press the DEVICE CTRL key and enter the command: PLOT TO :CAMERA

The camera shutter will open and close automatically and the film will advance after the picture is taken.

Press the G EDIT key to load the picture spooler. The spooler allows you to enter a list of disc files to be sent to the camera. The spooler menu allows you to select the desired number of copies of each of the files.

Installing the Camera Interface 2

Installing the camera interface consists of setting up the camera and installing the interface software.

Setting up the Camera

Install the camera and its interface as follows:

Step 1. Make sure the power switches are off in both the terminal and the camera.

Step 2. Open the terminal's rear door so that it latches in the open position. (Refer to section 2 of the terminal User Manual for a detailed description of this procedure.)

Step 3. Locate the HP-IB (shared interface bus) printed circuit assembly (PCA). The HP-IB PCA (HP part no. 02700-60014) has a trapezoidal connector located on the rear edge of the PCA. The HP-IB PCA is required, if it is not present contact your HP Sales and Service office.

Step 4. Connect one end of the camera HP-IB cable to the HP-IB PCA in the terminal.

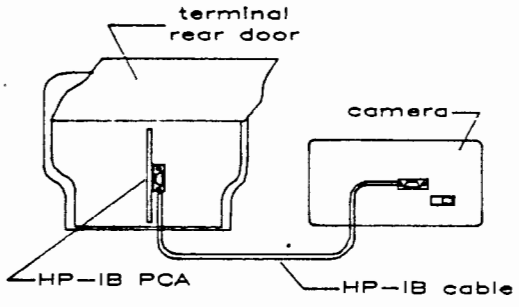


Figure 2-1. HP-IB Cable Connection

Step 5. Connect the other end of the cable to the interface connector at the back of the camera.

Step 6. Connect the camera and terminal power cords to an appropriate power source.

NOTE

The camera should be off when the terminal is turned on.

Step 7. Turn on the HP 2700 and wait for the terminal to "beep". The "beep" indicates that the terminal is ready for use. (If the terminal fails to turn on properly, refer to the power on procedure in the terminal User Manual.)

Step 8. Turn on the camera (see figure). The power indicator should go on. The other front panel indicators may blink in a random pattern. (It is normal for the front panel lights to blink for a few minutes while the camera warms up and adjusts color intensity levels. After about 12 minutes all lights but the power and ready indicators should be out.

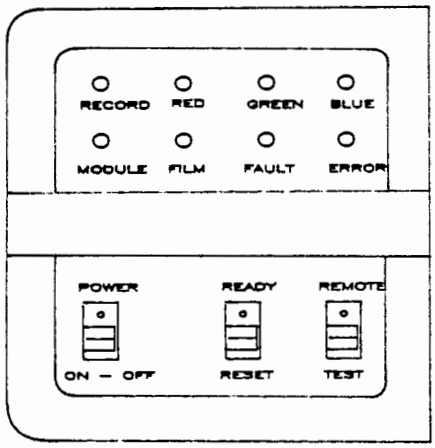


Figure 2-2. Camera Front Panel Switches and Indicators

If the camera detects a problem during warm up, the camera Error light will go on. Refer to the camera manuals for a discussion of error procedures.

If the Film light is on, the camera probably needs film to be loaded. An abbreviated film loading procedure follows. (Refer to the camera manuals for detailed film loading procedures.)

Abbreviated film loading procedures for the 35 mm module

Step 1. Open the smoked plastic door on the camera to access the 35 mm camera.

Step 2. Open the camera back using the slide lever at the left side of the camera.

Step 3. Mount and thread film so that it is hooked on the drive teeth.

Step 4. Close the camera. The film will advance to the first frame. The film winder will rotate indicating that the film is properly threaded. If not, open the camera and rethread the film.

Step 5. Close the plastic access door.

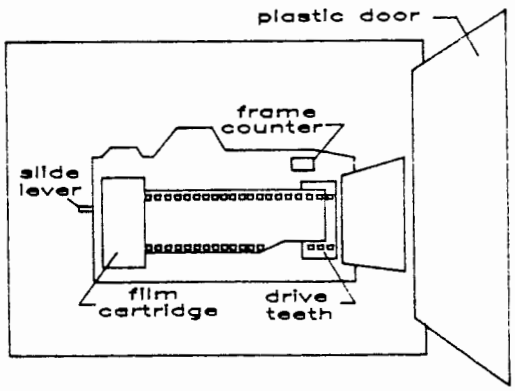


Figure 2-3. Film Loading

Table 2-1 describes the camera controls and indicators.

Table 2-1. Camera Controls and Indicators

Control	Description
ON/OFF	Turns camera power on and off.
RESET	Resets the camera. Also used to display error messages.
TEST	Performs camera selftest. Generates benchmark color pattern.
Indicator	**Description**
POWER	Lights when power is on.
READY	Lights when the camera is ready to accept commands. The indicator goes out while the camera is processing commands.
REMOTE	Lights when the camera is processing a command.
RECORD	Lights when the camera is exposing film.
RED, GREEN, BLUE	These lights indicate the setting of the color filter wheel in the camera. All lights off indicate that the neutral (clear) filter is being used. All lights on indicate that the filter wheel is in motion.
ERROR	Indicates that an incorrect command has been received or that some other error has occured.
FAULT	Indicates that a hardware failure has been detected.
MODULE	Indicates that the camera module is not properly plugged in.
FILM	Indicates that the camera is out of film.

Installing the Software

The camera interface software is provided on a flexible disc. The disc contains programs and data used to control the transfer of picture data from the terminal to the camera. A list of the disc contents is given in table 2-2.

Table 2-2. Camera Interface Software

```
Contents of Directroy: ;PR2331

             File      Start     Size
File Name     Type    Address  (sectors)
----------  ------   -------  ---------
WELCOME      Ascii        16          5
CHARTTYPE    Ascii        21          1
CHKAPPL       -7040       22          5
PRES          -7039       27        323
GEDIT         -7040      350        255
FONT3        Ascii       605         49
FONT5        Ascii       654         73
FONT7        Ascii       727         30
D10AUG83     Ascii       757          1
```

File Name	Description
WELCOME	Screen display giving loading instructions (figure 1-1).
CHARTTYPE	Load command executed by the CHART TYPE key.
CHKAPPL	Routine to see if the application is loaded.
PRES	PRESENTATION/2700 software.
GEDIT	Spooler application loaded by the G EDIT key.
FONT3	Character set font #3.
FONT5	Character set font #5.
FONT7	Character set font #7.
D10AUG83	Software date flag.

Note

Loading the Presentation software causes a Full Reset to occur in the terminal. If you have data in display memory or a graphics figure in the picture file, you should save it on a disc before loading the Presentation software.

Step 1. Place the software disc in the left disc drive and press [CHART TYPE]. It will take about 15 seconds for the software to load. When the loading is complete, the terminal will perform a full reset. When the reset is complete the terminal will display function key labels and beep.

Step 2. The default settings for camera interface configuration are shown in figure 2-4. A description of menu fields is given in table 2-3. If you wish to change any of the configuratiion values press [ALPHA AIDS], config keys, device config to display the device list. Place the cursor on camera and press display menu. (Instructions for modifying menus are given in the Terminal User Manual.) Once you have saved the configuration, it will be retained in the terminal even if you turn power off.

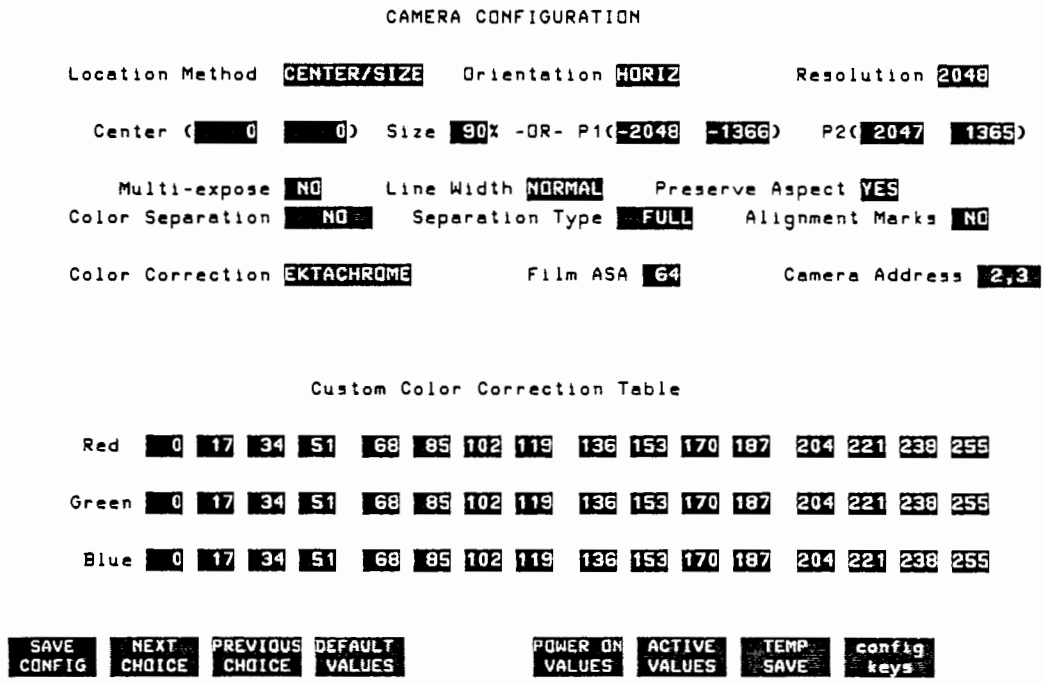


Figure 2-4. Camera Configuration Menu

Table 2-3. Configuration Menu Field Descriptions

Location Method -- Selection Field CENTER/SIZE or P1/P2
Default CENTER/SIZE

If set to P1/P2, the P1 and P2 coordinates specified in this menu will be used to locate the film image corners.

If set to CENTER/SIZE, the image Center and Size fields will be used.

Orientation -- Selection Field HORIZ/VERT
Default HORIZ

When set to HORIZ the image on the screen will appear on the film with the same orientation.

When set to VERT the image will be rotated 90 degrees on the film. This is useful for formats such as vertical text slides created by AUTOPLOT/2700.

Resolution -- Selection Field 2048/4048
Default 2048

When set to 2048, the max slide resolution will be 2048 horizontal dots.

When set to 4096, the max slide resolution will be 4096 dots.

It should be noted that 4096 mode slides will take four times as long to produce as do 2048 mode slides.

P1 -- Integer Field Min = -9999, Max = 9999
Default -2048 , -1264 (Full frame 35mm)

Coordinate of the lower left film image corner

```
P2          -- Integer Field   Min = -9999, Max = 9999
               Default   2047 , 1263   (Full frame 35mm)

               Coordinate of the upper right film image corner


Image Center -- Interger field   Min = -9999, Max = 9999
                Default     0 , 0     (Center of frame)

                Coordinate of film image center


         Size   -- Integer field
                   min = 0     max = 255

                   Image size in percent.  100% = full frame 35mm.


Preserve Aspect -- Selection Field  [YES/NO]
                   Default           YES

                   If set to YES than film image will be centered
                   in the P1-P2 area with the maximum expansion
                   possible while maintaining the screens viewport
                   aspect.

                   If set to NO, the film image will fill the P1/P2
                   area without regard to the screens viewport aspect.


Color Separation -- Selection field  [4-color, 3-color, NO]
                    Default           NO

                    NO       - normal color negatives
                    4-color - yellow, magenta, cyan, black color sep
                    3-color - yellow, magenta, cyan color sep
```

```
Line Width  -- Selection Field  [THIN/NORMAL]
               Default          NORMAL

               When set to NORMAL, all vectors drawn to film will have
               one additional vector draw on either side.  This
               compensates for line width shrink due to high res.

               When set to THIN, all vectors draw to film as single
               vectors.

Alignment Marks -- Selection Field  [YES/NO]
                   Default          NO

               When set to YES, corner alignment tics are drawn on
               the negatives.  This is useful for color separation
               negative alignment.  The tics will have a different
               pattern for yellow, magenta, cyan, and black negatives.

               When set to NO, no tics are drawn

Film ASA    -- Integer Field    Min = 0 , Max = 999
               Default          64

               Varies intensity of film exposure

HP-IB Address  -- Selection field
                  Default          2,3  (preset on camera at factory)

                  Set by user to match HP-IB address set on camera.
                  Any file system transfers to the :CAMERA device will
                  go to this address.  Any transfers to the :HP-IB#2
                  device will use the :CAMERA driver.

Mult-expose    -- Selection Field  [YES/NO]
                  Default          NO

                  If set to NO, a close shutter and advance film
                  command is set to camera after each film exposure.

                  If set to YES, shutter remains open and film will
                  not advance after a picture is taken.

                  Setting the field to NO, after a mult-exposure has
                  been taken, will close the shutter and advance the
                  film.
```

Separation Type -- Selection Field [FULL/y/m/c/b]
Default FULL

FULL - If the color separation field is set to NO, then a normal color image is made.

If field is set to 3-color, three negatives are made, 1 B&W negative for yellow
1 B&W negative for magenta
1 B&W negative for cyan

If field is set to 4-color, four B&W negatives are made.

y - If the color separation field is set to NO, then a normal color image is made.

If field is set to 3-color, then a B&W image is made of the images yellow intensities.

If field is set to 4-color, then a B&W image is made of the the pictures yellow intensity after black subtraction.

m,c - Same pattern as yellow

b - Same pattern as yellow for the 4-color and NO color separation selections.

For the 3-color separation selection, this setting produces a black and white image with gray scales. This setting can be used to produce black and whith prints three times faster than color prints.

Color Correction -- Selection Field [STANDARD/CUSTOM]
Default STANDARD

Sets color correction factors for the various film types. If the Custom selection is made, the color correction values are taken from the menu. If the STANDARD selection is made, color correction factors are taken from the camera.

Red -- Integer field Min = 000 , Max = 255
Default No correction, Linear curve

Field is active only if Color Correction field is set to "Custom". Fields are used to increase or decrease intensity of the 16 levels of red sent to the film recorder.

GREEN -- Integer field Min = 000 , Max = 255
Default No correction, Linear curve

Field is active only if Color Correction field is set to "Custom". Fields are used to increase or decrease intensity of the 16 levels of green sent to the film recorder.

Blue -- Integer Field Min = 000 , Max = 255
Default No correction, Linear curve

Field is active only if Color Correction field is set to "Custom". Fields are used to intensify or detensify the 16 levels of green sent to the film recorder.

How To Make Pictures 3

Once the camera and software has been installed taking pictures is easy.

- Load film in the camera.
- Make sure the camera configuration menu is correct
- Display the picture data to be photographed.
- Enter a PLOT TO: CAMERA command.

There are several ways to take pictures:

- Single pictures
- Multiple pictures
- Autoplot/2700 Pictures
- Paintbrush/2700 Pictures
- Raster Pictures

Taking Single Pictures

You can take pictures one at a time by simply loading a picture into the terminal and then pressing DEVICE CTRL PLOT TO: CAMERA RETURN. This will cause the picture currently displayed on the terminal screen to be sent to the camera based on the settings in the camera configuration menu.

Example: A picture is stored as file PIC1 on a disc named VOL1. The current camera menu configuration values are to be used.

Step 1. Load the disc in an empty drive.

Step 2. Press DEVICE CTRL, COPY FILE PIC1;VOL1 TO : PICTURE RETURN.

Step 3. Press PLOT TO : CAMERA RETURN.

Taking Multiple Pictures

You can take multiple pictures using the "spooling" feature. Spooling is the process of listing a series of pictures to be output and then letting the terminal fetch and output each of the pictures in the list. You can request multiple copies of selected pictures. This technique is useful for unattended or overnight operation.

Spooler Menu

To list the pictures to be output, press the [EDIT] key. This will display the spooler menu.

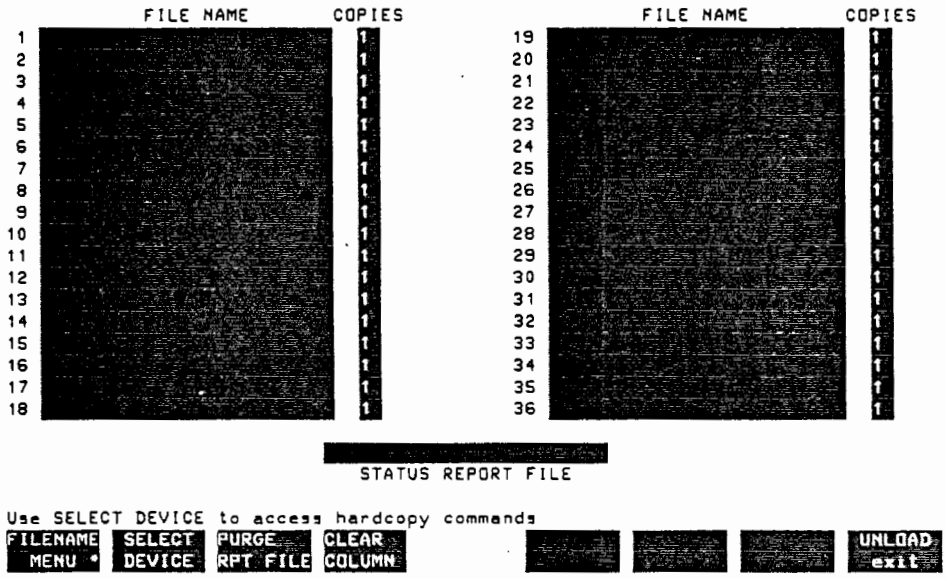


Figure 3-1. Spooler Menu

Up to 36 separate file names can be entered. A separate column is provided for selecting the number of copies to be made of each picture. (Note that normally a maximum of 36 exposures can be made on a typical roll of film.)

File name This field specifies the name and volume of the file to be exposed. If an invalid or inaccessable file is entered, an error message is sent to the status file and the spooler advances to the next entry if a status file has been named. If an error occurs and a status file has not been named, the spooler will halt.

Copies This field specifies the number of copies to be made from a given file. If this field is set to "0", one exposure will be made for the associated file.

Status File Status messages and error reports will be sent to the file named in the status file field. If you leave this field blank, messages will be shown in the terminal message line. The spooler will stop. To resume operation, you must press [RETURN]. For example, to send spooler status to disc file REPORT;VOL1, enter REPORT;VOL1 in the status file field of the spooler menu.

Spooler softkey functions When the spooler menu is displayed, several softkey functions are made available to the operator.

FILENAME MENU This function key is used to toggle between device selection and picture file selection. When the menu is first displayed using the [G EDIT] key, you can enter the names of files to be copied. When the list is complete, you then press **SELECT DEVICE** to select a device and output the list. While you are in the file list mode, an asterisk will be displayed in the **FILENAME MENU** label.

SELECT DEVICE This function key allows you to select the desired destination device for the pictures. Press this key until the `PLOT TO : CAMERA` or `PLOT TO : HPIB#` command comes up in the command window. Note that this allows you to spool the transmission of picture files to appropriate plotters or printers as well as the camera.

PURGE RPT FILE This function purges the old status report file.

CLEAR COLUMN This function clears the current menu column from the cursor positon to the end of the column.

UNLOAD exit This function is used to terminate the spooler.

The menu is now ready for file names and copies counts to be entered. The volume or disc# must follow the file name the same as it does in file system commands, i.e file;volume or file:DISC#1.

Note: the PRESENTATION/2700 disc is no longer needed at this time. It can be removed and the extra disc drive can be used to hold more spool files.

Before starting the spooler. The user can type a status file name in the STATUS REPORT FILE menu field. If any errors occur during spooler operation, the error message will be written to this file. If no name is entered, an error condition will stop spooler operation. The spooler will restart when an operator hits the return key.

Pressing the PURGE RPT FILE softkey will purge the STATUS REPORT FILE. This can be done before starting the spooler or after, when an error message tells the user the report file already exits.

The file type will be checked before sending image to camera. If the file type is binary, the image will always be sent as raster data. This allows mixed file types for the "PLOT TO :CAMERA" spooler command.

Pressing the CLEAR COLUMN softkey will clear all filenames in the column below the alpha cursor postion. If the cursor is in the "Count" field all counts below the cursor will reset to "1".

To start sending images to the camera, first press SELECT DEVICE. A file system command will apear in the command window. If this is the command wanted, press the RETURN key and the spooling will start. The most often used command, PLOT TO :CAMERA, will apear first. If another command is required, continue pressing the SELECT DEVICE key until the correct command apears, then press RETURN.

The exit softkey will return the user the terminal enviroment. The spooler will remain loaded in memory. If the UNLOAD key is used instead of the EXIT key, the spooler will be removed from program memory. The PRESENATION disc will have to be inserted in the disc drive to reload. The UNLOAD key must be pressed before loading PAINTBRUSH/2700.

Step 1. Enter the file and volume names for the pictures to be exposed.

Step 2. Enter the number of copies to be made of each picture.

Step 3. If desired, enter the name of a log file for status reports.

Step 4. Make sure adequate film is in the camera and that the camera is ready for operation.

Step 5. Press SELECT DEVICE until `PLOT TO: CAMERA` is displayed, then press RETURN to begin camera operation.

The terminal will load the first picture in the spooler menu into the terminal's picture file. The terminal will then begin stepping through the picture and sending the data to the camera. You can watch the camera indicators to verify normal operation.

When operation is complete the terminal will display the spooler menu.

If an error or malfunction occurs an error message will be sent to the status file, or if no status file has been assigned, to the message line on the terminal screen.

Example: Make 3 copies each of PIC1, PIC2, and PIC3 on VOL1 and 1 copy each of PIC4.VOL2 and PIC5.VOL1. Send any status information to STATFILE;VOL2.

```
PIC1;VOL1          3
PIC2;VOL1          3
PIC3;VOL1          3
PIC4;VOL2          1
PIC5;VOL1          1

        STATFILE;VOL2
```

Note

At maximum resolution, 36 full color exposures will take approximately 8 hours. The time will vary depending on picture content. (If pictures have black backgrounds, picture time will be reduced.) The spooler menu can be used to preprogram the camera for unattended overnight operation.

Making Pictures from PAINTBRUSH/2700

The PAINTBRUSH/2700 application allows you to create freeform artwork as well as aided drawings. You can make a camera copy of individual pictures produced with the PAINTBRUSH/2700 application program.

Step 1. Make sure the camera device menu is configured properly for your picture (refer to section 2). Press ALPHA AIDS, config keys, and device config. Move the cursor to the camera line and press RETURN to access the camera menu.

Step 2. If the camera is configured properly, press SAVE CONFIG to store the menu. (Once you have saved the configuration, it will be retained even if you turn power off.)

Step 3. Make sure the camera is ready for operation.

Step 4. Press hardcopy, select device, PLOT TO : CAMERA RETURN

Step 5. You can then reenter the PAINTBRUSH/2700 application by pressing EDIT.

Making Pictures Using Autoplot

Autoplot is an application that creates plotted graphs and charts from numeric data. The Autoplot application can be used to generate output on a plotter. If PRESENTATION/2700 has been loaded prior to using the Autoplot application, you can use Autoplot to output graphs to the camera or a plotter. The camera capability is accessed through the AUTOPLOT/2700 HARDCOPY function.

Single AUTOPLOT/2700 Pictures

To make a single picture using AUTOPLOT/2700, use the following procedure:

Step 1. Display the main level of AUTOPLOT/2700 function keys and press HARDCOPY. This will select the output functions.

Step 2. Press SELECT DEVICE until the `PLOT TO : HPIB#` command appears.

Step 3. Enter the camera address (normally 2). Press RETURN.

```
PLOT TO : HPIB#2 RETURN
```

Multiple AUTOPLOT/2700 Pictures

To make a multiple pictures using AUTOPLOT/2700, use the AUTOPLOT/2700 spooling feature as follows:

Step 1. Display the main level of AUTOPLOT/2700 function keys and press MULTIPLE HARDCOPY to select the output functions.

Step 2. This will display a spoolist file similar to the one in figure 3-1. Fill in the names of the files and the number of copies of each into the menu. Select a status file, if desired.

Step 3. Press SELECT DEVICE until the `PLOT TO : HPIB#` command appears.

Step 4. Enter the camera address (normally 2). Press RETURN.

```
PLOT TO : HPIB#2 RETURN
```

Making a Picture of the RASTER

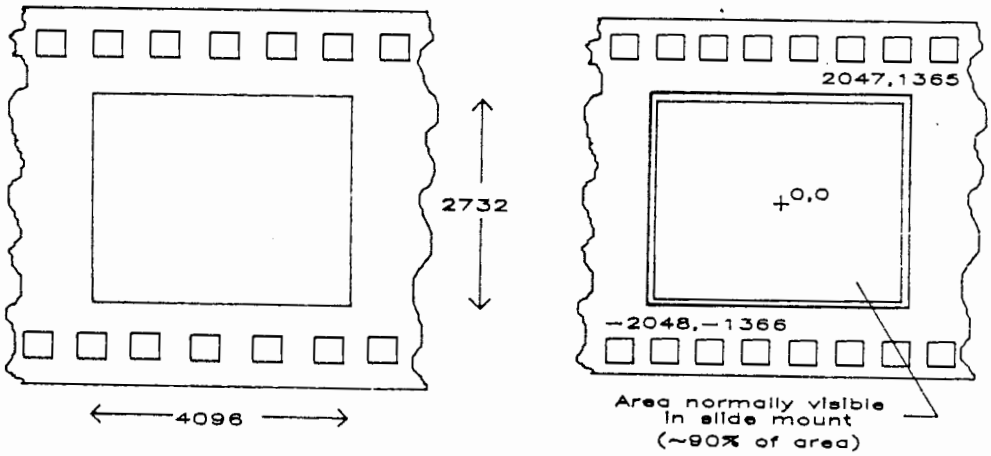
You can make a picture of the terminal's raster display using the same procedure described for AUTOPLOT/2700 steps 1 through 3 and then pressing DEVICE CTRL, TRANSFER RASTER TO: CAMERA RETURN.

Note that the resolution of the data on the slide will be the same as that on the screen (512 x 390 pixels). The size of the pixel dots will be varied in order to fill the film image area. You should configure the camera menu xxx field to specify the size of the final image. You could use the multiple exposure technique described elsewhere in this manual to place multiple raster images on the same film frame.

Making Pictures Using Multiple Exposures

You can make multiple exposures by setting the multi-expose field in the camera menu to YES. This will prevent the film in the camera from being advanced after each exposure. You can then select where you wish each particular image to be placed on the film and also the scale factor to be used.

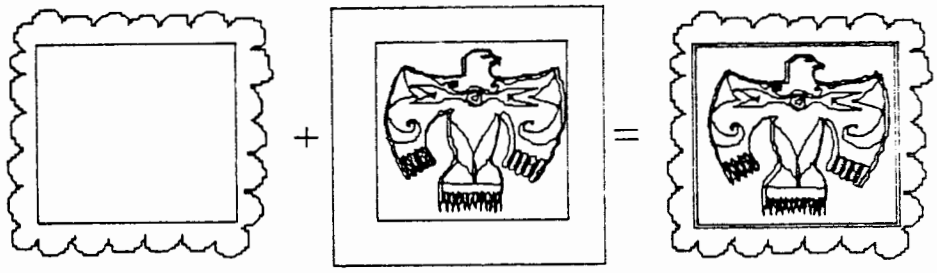
Note that the camera shutter will remain open as long as the menu field is set to YES. Be sure to set the field back to NO before rewinding film or removing the camera module.



Merging Pictures Using Multi-Exposure Techniques

You can set the multi-exposure field to YES, expose a picture, call up a second picture and expose it on the same film frame. Note that you must use care to select and position the pictures to prevent undesireble overlap or overexposure.

A simple multiple exposure would be to add an elaborate border to a figure.



Both pictures occupy the same drawing space. BORDER has a central black (clear) area to accommodate the art in PORTRAIT. PORTRAIT has a black (clear) border area to accommodate BORDER.

More complex overlays such as police sketches can also be done. A library of figures such as hair, eyes, eyebrows, noses, etc., could be used to build complex figures. Note that the resultant figures recorded on film would not be limited to just 16 colors. For example, there could be 16 shades of hair color and 16 different eye colors.

Step and Repeat Pictures

Multiple pictures can be placed on the same film frame using a "step and repeat" process. In this case the individual pictures would not have to overlap. Each original picture is scaled and positioned at a different location on the film frame.

Example:

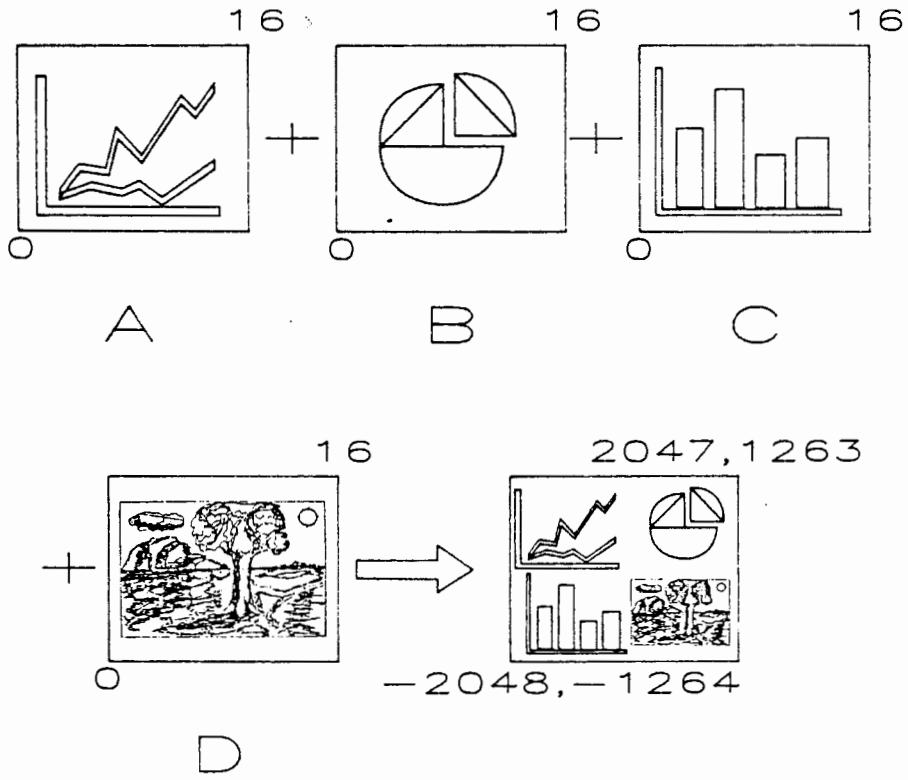


Figure A would be positioned with P1, P2 at -2048, 0 0, 1263 -1024, 631 and scaled at 25%
Figure B would be positioned with P1, P2 at 0, 0 2047, 1263 1024, 631 and scaled at 25%
Figure C would be positioned with P1, P2 at -2048, -1264 0, 0 -1024, -631 and scaled at 25%
Figure D would be positioned with P1, P2 at 0,-1264 2047, 0 1024, -631 and scaled at 25%

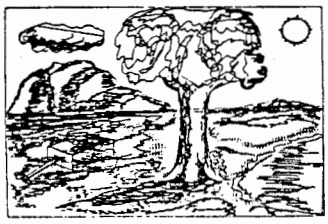
Using Color 4

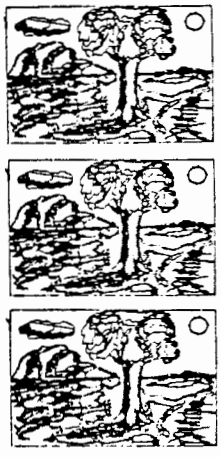
The camera interface allows you to create a variety of special color effects:

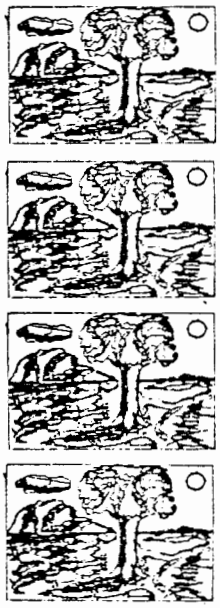
- Color separation
- Black and white pictures
- Multiexposures
- Color patterns
- Color correction

Color Separations

The camera interface allows you to produce color separations for printing. You can use the Color Separation field to select 3-color (cyan, magenta, and yellow) or 4-color (cyan, magenta, yellow, and black) separations. These selections will use one picture and produce 3 or 4 frames on the film. Each frame will be a grey scale of one color component from the original picture.







These separations are produced as continuous tone positive images. This eliminates the need for a printer to perform costly color separations. This can result in significant savings if you intend to publish your color pictures. (Normally a printer will still need to apply a mask (printer's "screen") to the separations to break each separation image into a dot pattern for printing.)

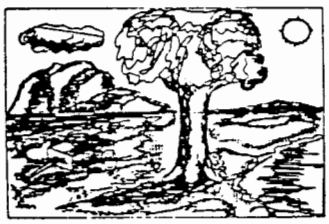
Yellow, magenta, cyan, and black separations can be identified by 1, 2, 3, or 4 dashes in the upper left corner of the film, in the area outside the normal slide border. These identification marks will appear on the film only if the alignment mark menu field has been set to YES.

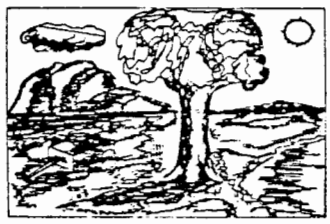
Selecting Separation Type

The Separation type field allows you to select the type of separation for the current exposure. If you select FULL, the terminal will automatically generate 3 or 4 exposures, 1 per frame depending on the selection made in the Color Separation field. You can also select individual separations (cyan, magenta, yellow, or black) that will cause only the selected separation to be made. This is useful if it is necessary to modify the color correction table for a particular separation.

Black and White Pictures

Proof copies of pictures can be recorded on film very rapidly (1/3 the time of a normal full color picture) by setting the color separation field to 3-COLOR and setting the Separation Type field to BLACK. This will cause a black and white version of the picture to be recorded. colors are represented as shades of grey.



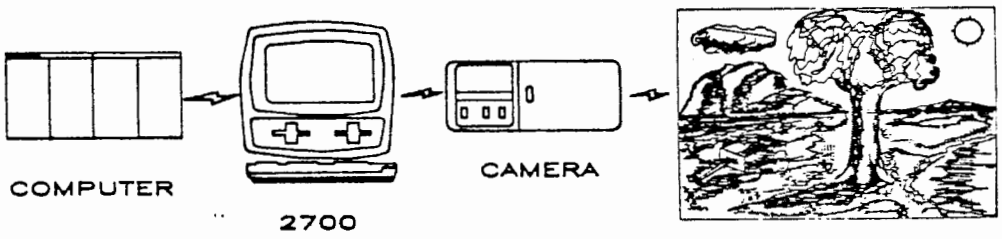


When making color separations or black and white (grey scale) output, you can use black and white film to reduce film and processing expense.

Multiexposures

Setting the Multi-expose field to YES prevents the the camera from advancing film after each exposure. As described earlier, this allows you to create composite pictures. In addition, you can overlay pictures drawn with different color pallets.

This process can be used if you have a picture that has been stored as color separated images and you wish to produce a normal full color image. Separate images containing red, green, and blue, or cyan, magenta, and yellow separations can be overlaid to produce the original picture. This process would provide for up to 16 shades for each separation or up to 4096 colors (65,000 with a 4-color separation). This technique is useful if you have digitized pictures that have been made avialable from some other graphic input system and you wish to output them to film using PRESENTATION/2700.



Producing special color effects using multiple exposures is similar to the step and repeat process described earlier. Note that it is possible to vary the values in the color correction table to compensate for imperfect film response.

You are not limited to red, green, blue or cyan, magenta, yellow color manipulation. The use of a host computer to manipulate picture colors directly or through the terminal color pallet allows you to produce pictures based on exotic color systems. (Refer to the description of the color correction table for additional information.)

Color Patterns

You can use the terminal's area fill patterns to generate additional colors. Shading patterns used to fill a colored area will blend together when sent as high resolution pictures to the camera. This will cause the area to appear as a tint of the original color. (Refer to the 2700 Color Graphics Reference Manual for information on line types, area fill patterns, and halftoning.)

The example shown below has been drawn using the "aided drawing" features of PAINTBRUSH/2700. A variety of area fill patterns with different sets of primary and secondary colors were used. The result is a photo that appears to have more than 16 colors. the camera has converted the various patterns into a different shade or tint of the original color depending on the percentage of color used in the pattern.

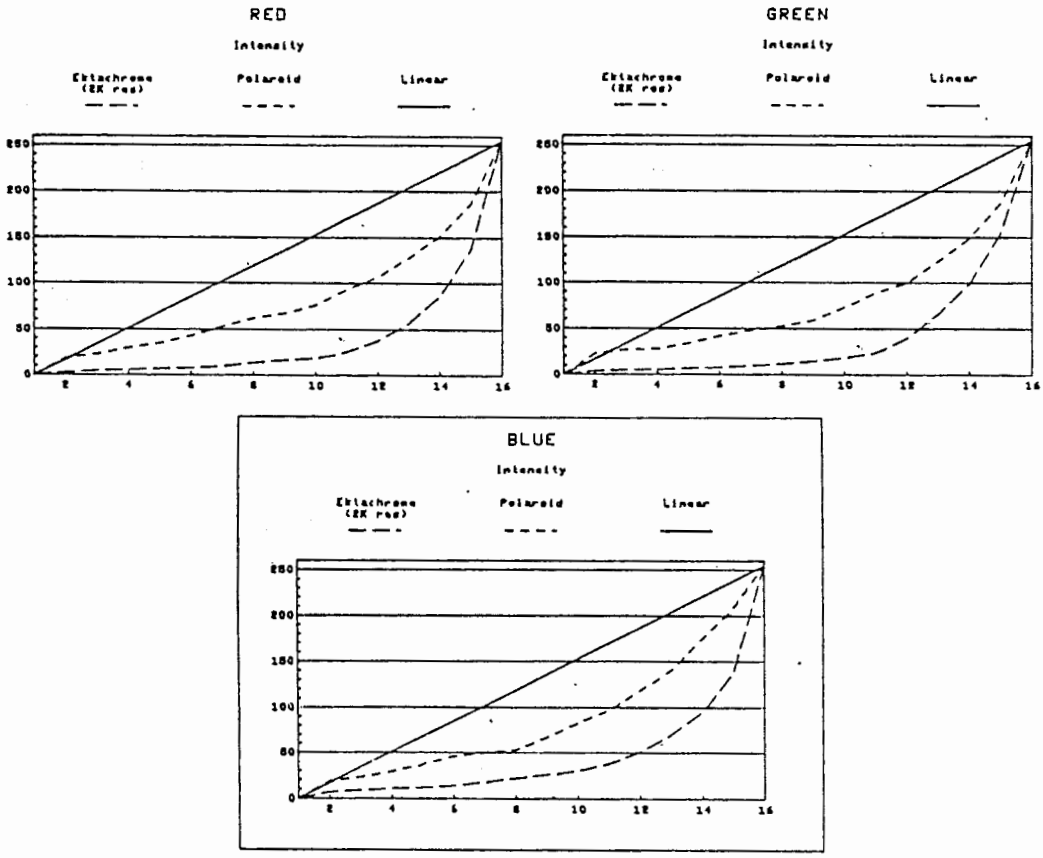
<figures of color swatches screen res and 4000 dot res>

Color Correction

The camera interface allows you to change the camera's color response curve. The terminal will respond to 16 levels of color for each of the red, green, and blue components. Each of the color levels is mapped to an output color level that ranges from 0 to 255. This greater sensitivity of output is used to provide better color differentiation and to allow for variations in film response. The Color Correction field allows you to select the appropriate color parameters depending on the type of film used in the camera. (By default, the camera will use color parameters from an internal table based on the type of camera module installed.)

The default custom color response curve is linear (output directly proportional to the input). The Color Correction field allows you to select between EKTACHROME, POLAROID, LINEAR, CUSTOM, or CAMERA correction tables. The EKTACHROME and POLAROID tables are used with Kodak Ektachrome™ and Polaroid™ film. The linear table provides a simple proportional response. Selecting the CUSTOM table will cause the values in the camera menu to be used. Selecting CAMERA will cause the values currently stored in the camera hardware module to be used. Figure 4-1 shows typical response curves. Table 4-1 lists the various intensity values for the response curves.

Table 4-1. Color Correction Tables



You may wish to vary the response curve for a variety of reasons:

- increase or decrease the value of color components
- increase or decrease contrast
- lighten or darken a picture
- match a particular film's exposure characteristics

The color correction table entries range from 0 (off) to 255 (full on) in unit steps. There is one entry for each of the 16 input intensities for each of the primary (red, green, and blue) colors. Changing the entries and then selecting Custom Color in the Color Correction field will cause these values to be sent to the camera and used for the following pictures.

Example: Set the camera's blue response to a 200% linear curve. This means that an input signal of 50% blue is all that is required to provide maximum film exposure.

Example: Change the red response curve so that the output is a function of the sine of the input intensity.

Output (red) = sin (pi * Input (red))

This technique can be used to produce false color images to highlight a particular input color.

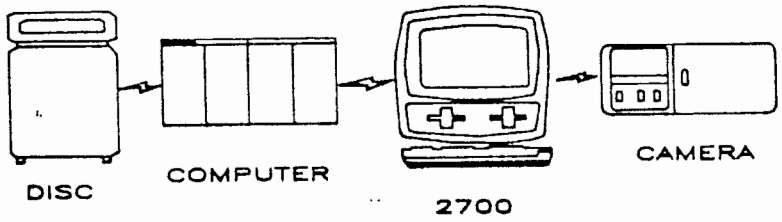
Example: Darken the picture by lowering the response curve so that an input value of about 20% is required before the first output level is reached. (Note that in this case, you could simply change the ASA setting in the camera menu.)

How to Make Pictures from a Computer 5

The camera interface can be controlled from a host computer. Host control requires the terminal to be online to the computer. Information on terminal data communications configuration and operation is described in the Alphanumeric Reference Manual. The general format for Device Control commands is given in the Alphanumeric Reference Manual. Information on graphics device configuration and status is given in the Color Graphics Reference Manual.

- Modify entries in the camera menu
- Send PLOT TO: CAMERA commands

A program executing on the computer can test to see if the camera interface is installed, configure the camera menu, and send picture transfer commands. The computer cannot access the terminal spooler menu.



It is possible to use the computer as a picture archive to store a large library of pictures. A more elaborate spooling program could be written for the host that would allow you to configure slide presentations. This would also make it possible to make programmatic corrections to color or picture size. Pictures that are too light and without sufficient contrast could be improved using the custom color parameters. Pictures that have been drawn to different scales or positioned at diffferent locations in the virtual drawing space could be properly scaled and positioned.

Camera Configuration from a Host Computer

The camera interface configuration menu can be controlled from a host computer. The normal ↯ • q sequences used to test and modify graphics device configuration allow you to access the camera menu. The camera is addressed as device #6. A description of the ↯ • q command is given in the Color Graphics Reference manual.

The procedure for accessing the camera configuration menu is as follows:

- Select the camera as the device to be accessed
- Send status requests to see if the camera software is present
- Check the camera's current configuration
- Set new configuration values if needed

Table 5-1 lists the various configuration commands that can be used with the camera.

Table 5-1. Camera Configuration Commands (↑ * q)

Command	Description
<device class> c	Specifies the type of device to be accessed. The device class for the camera is 6.
<device index> i	Specifies which device within a given class is to be accessed. The index for the camera is 1. In the case of the camera, this command is: ↑ * q 6 c 1 i
a	Set active values. Use the values last saved from the camera configuration menu using the SAVE or TEMP SAVE functions.
d	Use the default values. These are the values shown in figure 2-4.
p	Use the power on values. These are values that have been saved from the configuration menu using the SAVE function.
<field #> f	Select a menu field. Menu fields are numbered (refer to table 5-2).
<value> v	Value to be entered into the selected field.
<status type> ^	Return status. The terminal will return menu and device information depending on the type of status requested.

Select the Camera as the Desired Device

All status request operations must begin by selecting the camera as the desired device. Once this selection is made it will remain in effect until changed or the terminal is reset. The camera is device class 6. The software supports one camera interface at a time, therefore the device index is 1.

```
ESC*q6c1I
```

Verify the Presence of the Camera Interface Software

The camera interface menu will not be accessable if the interface software has not been loaded or the HP-IB Interface PCA is not installed. The procedure for this test is as follows: used to check to see if the software is loaded is 2.

`ESC*s0^` This clears graphics status.

`ESC*q6C` This selects the CAMERA.

`ESC*s0^` This reads graphics status. If the status returned is "0" then the camera interface software is present.
If the status returned is 4 (bit #2 set) the software and/or the HPIB interface is not present.

Verify the Presence of the HP-IB Interface PCA

The software may be loaded but the required HP-IB PCA may not be present. To verify that this PCA is installed send a type 4 status request.

```
ESC*q4^
```

The terminal will return a "1" if the camera interface software and a working HP-IB PCA are installed, "0" if either is not.

Check the Entry in a Menu Field

You can use the terminal's device inquiry commands to return the contents of each camera menu field. Each of the fields is accessed by sending a status request with the field number. The terminal will respond with a string of ASCII characters. The characters may be one or more digits indicating coordinate values, picture size, or film speed. A response code is returned for other fields to indicate one of several settings.

A list of field numbers and their response codes is given in table 5-2

Table 5-2. Camera Menu Fields

```
                    DEVICE CONFIGURATION

EXTERNAL PRINTER
EXTERNAL PLOTTER
HP-IB#
PLOTTER1
CAMERA




+------+------+------+------+------+ +------+------+------+------+
! show ! NEXT !      !      !      ! !      !      !      !config!
! menu !DEVICE!      !      !      ! !      !      !      ! keys !
+------+------+------+------+------+ +------+------+------+------+


Press the NEXT DEVICE softkey until the alpha cursor points to
CAMERA, then press the "show menu" softkey.  The following config
menu will appear.


Configuration Menu Fields
-------------------------


        Class          Name
        -----          ----
          1            PRINTER
          2            PLOTTER
          3            GID
          4            RASTER
          5            EXTERNAL MONITOR
          6            CAMERA
```

Each field in the CAMERA menu has a field ID. What follows is a list of these field ID.

Field No.	Field Type	Field Name	Field Content
1	Selection	Location Method	0 - CENTER/SIZE 1 - P1/P2
2	Selection	Orientation	0 - HORIZ 1 - VERT
3	Selection	Resolution	0 = 2048 1 = 4096
4	Integer	Center	< x , y >
5	Integer	Size	< % >
6	Integer	P1	< x , y >
7	Integer	P2	< x , y >
8	Selection	Multi-expose	0 = NO 1 = YES
9	Selection	Line Width	0 = NO 1 = YES
10	Selection	Pres Aspect	0 = NO 1 = YES
11	Selection	Color Sep	0 = NO 1 = 4-COLOR 2 = 3-COLOR
12	Selection	Sep Type	0 = FULL 1 = y 2 = m 3 = c 4 = b
13	Selection	Align Marks	0 = NO 1 = YES
14	Selection	Color Cor	0 = STANDARD 1 = CUSTOM

15	Integer	Film ASA	< ASA >
16	Selection	HP-IB Addr	0 = 0,1 1 = 2,3 2 = 4,5 3 = 6,7 4 = 8,9 5 = 10,11 6 = 12,13 7 = 14,15 8 = 16,17 9 = 18,19 10 = 20,21 11 = 22,23 12 = 24,25 13 = 26,27
17	Integer	Red	< v1, v2, ... , v8 >
18	Integer	Red	< v9, ... , v16>
19	Integer	Green	< v1, v2, ... , v8 >
20	Integer	Green	< v9, ... , v16>
21	Integer	Blue	< v1, v2, ... , v8 >
22	Integer	Blue	< v9, ... , v16>

To change the various menu items send the following sequences:

Esc*q6c1I (This selects the CAMERA menu)

Esc*q<field ID>f<value list>V (This changes the value)

Example:
Esc*q6c1i9f0V will turn set the THIN line option.

After changing a field, the standard "Esc*s0^" read error code inquire can be sent.

To inquire the current value of a menu field the "Esc*q<>^ sequence is used

Esc*q<mask>^

mask bit	Format	Meaning
0	n	Device configuration menu is locked (Unlock with "Esc&q0L")
1	n	Device type exists
2	n	Device index exits
3	n	Current field type: 0 - Non-existent 1 - Selection field 2 - Integer 4 - Integer array
4	*	Current field value

* Type	Format
0	
1	*nnnnn
2	*nnnnn
4	n,*nnnnn,*nnnnn,...

Example:

```
Esc*q6c1I          (select CAMERA menu)
Esc*q13F           (select film format field)
Esc*q16^           (inquire current value)
```

After the trigger DC1 is received, the HP2700 return the current selection value followed by a carriage return. This value would be "*00000" if the current film format is 35mm.

Select a Field from the Menu

```
ESC*q<field #>F
```

The terminal will return the contents of the field as ASCII characters (letters or digits). The color correction table entries are read as two fields of 8 parameters for each color. The format of the returned data for color correction entries is as follows:

```
8,+nnnnn,+nnnnn,+nnnnn,+nnnnn,+nnnnn,+nnnnn,+nnnnn,+nnnnn
```

Enter New Values into a Selected Menu Field

New menu values can be entered into the currently selected field.

```
ESC*q<new value>V
```

You can select a field and enter the new value in the same sequence

```
ESC*q<field #>f<new value>V
```

Example: Check to see if the camera software and HP-IB PCA are present. Set the default menu values. Select Allignment marks.

```
10 DIM A(20)
20 PRINT CHR(27)"*s0^"
30 LINPUT A
40 PRINT CHR(27)"*q6C"
50 PRINT CHR(27)"*s0^"
60 LINPUT A$
70 IF A$<>"0" THEN PRINT "Software or HP-IB PCA not present"
80 ELSE PRINT "Software and PCA present"
90 PRINT CHR$(27)"*qd16f1V"
```

Error Messages A

The terminal may display an error message in reonse to a variety of error conditions. Table A-1 lists camera interface error messages in alphabetical order together with a brief description and operator user response. In most cases the error message is cleared by pressing RETURN. A detailed description of error indications shown on the camera front panel is given in the camera manual.

Table A-1. Camera Interface Error Messages

Message	Description
`Out of Film -- Press RETURN`	You have run out of film. Rewind and remove exposed film and reload new film. If you were in the spooler, loading new film and pressing RETURN will restart the spooler at the next picture.
`Image outside field of view -- press RETURN`	The camera menu specified an image size greater than the camera can accept. Reset the image size in the menu.
`Time out on HP-IB device -- Press RETURN`	The camera is not reponding. Check to see that the camera is turned on and that the HP-IB cable is properly connected. Also check to see that the HP-IB address selected on the camera has been used in the camera menu (normally 2 and 3).
`Data Transmission Error -- Press RETURN`	A data error has been detected. Check the HP-IB cable connection. The cable length may be too long, improperly loaded, or there may be too many HP-IB devices connected to the terminal. Try transfering the picture again.

Error Message

`Unsupported Function -- Press RETURN`

You have attempted a function that is not supported. Check the camera menu. Some earlier model cameras do not support all of the features described in this manual.

`CAMERA hardware fault -- Press RETURN`

A camera equipment failure has been detected. Turn off the camera. Wait 15 seconds and turn the camera back on. If the camera passes its self-test (about 12 minutes), try sending the picture again. If the camera fails to restart, contact the appropriate camera service personnel.

`CAMERA ERROR -- Press RETURN`

A camera error has been detected, the cause is unknown. Try sending the picture again.

`ILLEGAL HP-IB ADDRESS -- Press RETURN`

The camera address entered in the camera menu cannot be the same as the HP-IB address used for the terminal in the HP-IB menu. Change the camera address. (Note that this may require changing the physical address settings on the camera itself.