

4663
INTERACTIVE
DIGITAL
PLOTTER

4663 INTERACTIVE DIGITAL PLOTTER

*Please Check for
CHANGE INFORMATION
at the Rear of This Manual*

WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested to comply with the limits for Class A computing devices pursuant to Subpart J or Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the users at their own expense will be required to take whatever measures may be required to correct the interference.

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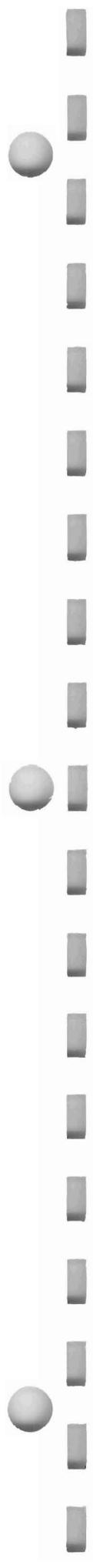
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MANUAL REVISION STATUS

PRODUCT: 4663 and 4663S Interactive Digital Plotters

This manual supports the following versions of this product: Serial Numbers B060100 and up.

REV DATE	DESCRIPTION
JAN 1982	Original Issue. This manual and the 4663 Programmer's Reference Manual (070-3806-00) replace the original 4663 Operator's Manual (070-2670-00). This manual also replaces an October 1981 preliminary version (061-2637-00).
JUL 1982	Revised: page 1-1.
SEP 1982	Revised: pages 4-6 and C-1.



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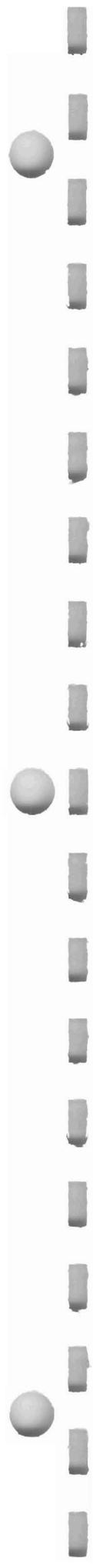
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Figure 1-1. The 4663 Interactive Digital Plotter.

Section 1

GENERAL INFORMATION

ABOUT THIS MANUAL

This manual provides general information and operating instructions for the TEKTRONIX 4663 and 4663S Interactive Digital Plotters.

NOTE

The 4663S Interactive Digital Plotter provides the following standard features (optional with the 4663):

- *GPIB Interface*
- *Circular interpolation and programmable macros*
- *Downloadable characters and math character set*
- *Added parameters storage*

The first three features are described in the 4663 Interactive Plotter Programmer's Reference Manual, while a description of the added parameters storage is found under "Parameter Setup Select Line" (Parameter Entry Module) in Section 3 of this manual.

Section 1, *General Information*, introduces the major features of the Plotter and lists the available options and accessories.

Section 2, *Getting Started*, presents five topics designed to guide the operator through the series of operations required to prepare the Plotter for plotting. Much of the information in this section is tutorial; you will be told exactly what to do to perform a given task.

The last major topic in this section, *Using the Front Panel Controls*, provides step-by-step instructions for many of the jobs the operator can perform. It may be helpful for the first-time operator to perform each operation as a training exercise.

Section 3, *Controls and Indicators*, includes detailed information about the function of the Plotter's front panel switches and indicators. This section provides additional technical information not included in Section 2.

Section 4, *Pens and Media*, describes all aspects of the Plotter pens and media, including pen types, media types, instructions for loading media, pen installation, selection, and pen maintenance.

Section 5, *Maintenance*, includes instrument cleaning instructions and adjustments the operator can perform.

RELATED DOCUMENTATION

In addition to this Operator's Manual, the following manuals support the TEKTRONIX 4663 Interactive Digital Plotter:

- *4663 Interactive Digital Plotter Programmer's Reference Manual*
- *4663 Interactive Digital Plotter Reference Guide*
- *4663 Interactive Digital Plotter Service Manual (two volumes)*

The 4663 is compatible with two of the most popular and complete graphics libraries available: the TEKTRONIX PLOT 10 and PLOT 50 software packages. The 4663 matches its abilities to this software to provide an easy method of reproducing these programs' vast graphics possibilities.

Clay Archer

GENERAL INFORMATION

MAJOR FEATURES OF THE 4663 INTERACTIVE DIGITAL PLOTTER

The 4663 is a C-size (metric size A2) flatbed interactive digital plotter. It can handle up to 17x22 inch (432x569 mm) sheet media and, with the Media Advance option, 18-inch wide roll media. The 4663 Plotter can plot on paper or film with fiber-tip, plastic hard-tip, or wet-ink pens.

Compatibility exists in nearly all environments. RS-232-C full duplex comes standard; a GPIB interface is optional. The 4663 supports TEKTRONIX PLOT 10 and PLOT 50 Graphic Software.

The 4663 produces all 94 printable ASCII characters. Characters can be scaled, slanted, rotated, and centered. Ten character fonts come standard with the 4663 and others are offered as options.

The 4663 also includes a Positioning Control (Joystick) for digitizing operations, pen carriage positioning, and media advancement (the latter requires the Media Advance option). A crosshair cursor is located on the pen carriage.

A *Parameter Entry Card* allows easy selection of operating parameters. This feature allows the user to select parameters such as baud rate, pen type, pen pressure, pen velocity limit, aspect ratio, Page size, and others. The Plotter includes a battery so these parameters can be stored up to approximately 90 days (45 days with Option 37 installed) without power. Option 37 allows three additional parameter sets to be stored and retrieved so that up to four users can configure the Plotter to their individual requirements by pressing a single retrieval switch.

OPTIONS TO THE 4663 PLOTTER

The following describes the options available for the 4663 Interactive Digital Plotter.

Option 01 GPIB Interface — provides communications with GPIB instruments, such as the TEKTRONIX 4050 Series Controllers, while maintaining the standard RS-232-C interface capability.

Option 04 GPIB Interface Only — replaces the standard RS-232-C interface with a GPIB interface to permit communications with GPIB instruments. Option 04 cannot be configured with Options 01 or 30.

Option 30 RS-232-C Interface to TEKTRONIX 4081 — permits the Plotter to communicate with the TEKTRONIX 4081 Graphic System.

Option 31 Circular Interpolation and Programmable Macros — permits the Plotter to draw arcs and circles and to save and then recall *macros* (series of MOVES, DRAWS, PRINTS, or other Plotter commands).

Option 32 Downloadable Characters and Math Character Set — provides Greek and math character sets, and allows a user to add, modify, or define characters or sets of characters.

Option 36 Media Advance — permits the Plotter to be equipped with roll media in addition to the standard sheet media. With roll media installed and activated on the Parameter Entry Card, program control of the media advance allows multiple plots to be produced without requiring operator intervention.

Option 37 Added Parameters Storage — allows three additional sets of Parameter Entry Card setups to be saved and later recalled. With this option installed, up to four users can configure the Plotter to their individual requirements by pressing a single switch.

Option 48 220 Volt Operation — operates the 4663 with a 220 V, 50 Hz line source.

STANDARD ACCESSORIES

The following accessories are shipped with the 4663 Plotter.

Power Cord	161-0066-00
RS-232-C 15 ft. cable (standard with basic unit only)	012-0829-00
GPIB I/F Cable, 6.5 ft. (2 meter) (standard with Options 01 and 04)	012-0630-03
4663 Interactive Digital Plotter Operator's Manual	070-3807-00
4663 Interactive Digital Plotter Programmer's Manual	070-3806-00
4663 Interactive Digital Plotter Reference Guide	070-2828-01

Pen — fiber tip, pkg. of 3	
Black	016-0414-00
Red	016-0415-00
Blue	016-0416-00
Green	016-0417-00
Paper — sheet, blank, white, 432x559 mm (17x22 in), box of 100 sheets	006-3150-00
Paper — roll, blank, 18 in x 200 ft (standard with Option 36 only), 2 rolls/box	006-2837-00
Computer Graphics Supplies Catalog	11AX-4761

OPTIONAL ACCESSORIES

These accessories can be ordered from Tektronix, Inc..

NOTE

Pens listed for use on the 4663 Plotter can also be used on 4662 Option 31 Plotters.

4663 Interactive Digital Plotter Service Manual Vol. I	070-2669-00
4663 Interactive Digital Plotter Service Manual Vol. II	070-3453-00
Media	
Paper — sheet, blank, Vellum 432x559 mm (17x22 in), 100 sheets/box	006-2836-00
Roll Paper — blank, 457 mm x 61 meters (18 in x 200 ft), 2 rolls/box, C-size after tear off	006-2837-00
Roll Paper — blank, 457 mm x 61 meters (18 in x 290 ft), 2 rolls/box, metric size A2 after tear off	006-3473-00
Film — Antistat, Polyester, 432x559 mm (17x22 in), 100 sheets/box	006-2835-00
Plotter Film — Preframed, 100 sheets/box	006-3309-00

Transparency Kit	020-0595-00
Dust Cover — soft vinyl	200-2392-00
Pens — fiber tip for paper, pkg. of nine pens, all colors included	016-0687-00
Pens — fiber tip for film (water soluble), pkg. of nine pens, all colors included	016-0688-00
Pens — fiber tip for paper, pkg. of 3	
Brown	016-0682-00
Orange	016-0683-00
Yellow	016-0684-00
Purple	016-0685-00
Magenta	016-0686-00
Black	016-0414-00
Red	016-0415-00
Blue	016-0416-00
Green	016-0417-00

(cont)

GENERAL INFORMATION

OPTIONAL ACCESSORIES (cont)

Pens — fiber tip for film (permanent), pkg. of 3		Pen Replacement Part Kit, contains: 1 cap, 1 body section, 2 plain nuts, and 6 ink cartridges	006-2968-01
Black	016-0418-00	Extra Ink Cartridges (1 ea.)	016-0649-00
Brown	016-0418-01	Ink — for wet-ink pens, 3/4 ounce, squeeze bottle	
Red	016-0418-02	For paper:	
Orange	016-0418-03	Black	016-0428-00
Yellow	016-0418-04	For film:	
Green	016-0418-05	Black	016-0427-00
Blue	016-0418-06	Red	016-0426-00
Magenta	016-0418-07	Blue	016-0425-00
Purple	016-0418-08	Green	016-0424-00
Pens — hard tip for paper, pkg. of 3		Brown	016-0423-00
Black	016-0668-00	Solvent, Ethyl Alcohol (4 oz)	006-3380-00
Red	016-0668-01	Cleaning and Maintenance Systems	
Green	016-0668-02	Cleaning Tank, Ultrasonic (1 ea)	002-1555-00
Blue	016-0668-03	Cleaning Fluid, 3069 Ultrasonic (8 oz)	002-1556-00
Wet-Ink Pen Assembly		Cleaning Fluid, 3068 with Strainer (5.2 oz)	002-0920-01
Point size PL3 — (.01", 0.3 mm dia.)	016-0444-01	Pressure/Suction Cleaning Bulb (1 ea)	002-1560-00
Point size PL5 — (.02", 0.5 mm dia.)	016-0442-01	Magnifying Instrument, 3095 PMG (1 ea)	002-1558-00
Point size PL8 — (.03", 0.8 mm dia.)	016-0443-01	Humidifier, Pen Storage 746-700 (1 ea)	002-1559-00
Replacement Tips			
Wet-Ink Tip — PL3 — (.01", 0.3 mm dia.)	214-2706-00		
Wet-Ink Tip — PL5 — (.02", 0.5 mm dia.)	214-2706-01		
Wet-Ink Tip — PL8 — (.03", 0.8 mm dia.)	214-2706-02		

For a complete listing and description of all Tektronix Plotter supplies, please request a copy of the current *Computer Graphics Supplies Catalog* from the nearest Tektronix, Inc. office.

Section 2

GETTING STARTED

This section provides the information needed to prepare the Plotter and the operator to begin plotting as soon as possible. The following topics are covered:

- *Introduction to the Plotter* — provides a quick orientation to the Plotter's controls, indicators, and basic terminology.
- *Operator's Installation Check* — allows the operator to easily verify that the Plotter is correctly installed. It includes references to detailed information located in other parts of this manual or in the *4663 Service Manual*.
- *Using the Parameter Entry Card* — describes the selections to make on the Parameter Entry Card for general plotting. Selections are indicated for both Serial and GPIB interface applications.
- *Installing Pens and Media*.
- *Run Self-Test* — verifies that the Plotter's electrical and mechanical components are functioning properly.
- *Using the Front Panel Controls* — gives step-by-step instructions on use of the front panel controls to perform many of the basic Plotter functions. These instructions should be very helpful to the person using the Plotter for the first time.

INTRODUCTION TO THE PLOTTER

Figure 2-1 and the following text provide a quick overview of the Plotter's controls and indicators. Additional information about the controls and indicators is included in Section 3.

CAUTION

Before turning the POWER switch on, make sure the Plotter is clear of all materials. The pen carriage moves to the upper-right corner 5 to 10 seconds after power is applied.

- **POWER switch** — The Power switch is used to turn the Plotter on and off.
- **Control Matrix** — The cluster of switches at the center of the front panel used to control many of the Plotter functions. The Control Matrix includes two SHIFT switches, two INTERFACE switches, six FUNCTION switches, and the indicators within these switches.
- **SHIFT 1 and SHIFT 2** — These two switches are used to select one of the available functions of a FUNCTION switch. SHIFT 1 is the lower switch; SHIFT 2 is the upper switch.
- **INTERFACE switches** — These two switches are used to establish the correct interface hardware configuration to allow communications with the other system devices.
- **FUNCTION switches** — These six switches, used in conjunction with the SHIFT switches, allow selection of a variety of Plotter operations.
- **Switch names** — The top row of labels indicate the names of the switches. The other rows of labels indicate the operations performed by the switches.
- **Pen Control switches** — This group of switches is used to select the active pen, to adjust the pen pressure on the media, and to manually raise or lower the active pen.
- **Positioning Control (Joystick)** — The Joystick controls the position of the pen carriage, advances the media if the Media Advance Option is installed, and is used during digitizing operations.
- **Parameter Entry Module** — The Parameter Entry Module includes the INIT light, lighted switches, and the Parameter Entry Card.
- **Parameter Entry Card** — The Parameter Entry Card serves as a directory of the Plotter's operating parameters.
- **Lighted switches** — The switches on the Parameter Entry Module select the desired parameters; the lights indicate the active selections.
- **INIT light** — This light, on the Parameter Entry Module, signals the operator to fully insert the Parameter Entry Card before examining or changing parameter selections.
- **Pen carriage** — The pen carriage carries the pens about the plotting area.
- **Pen holders** — The two pen holders accept a variety of pen types and colors. The holder nearer the front panel holds PEN 1; the other holds PEN 2.
- **Crosshair cursor** — This small plastic crosshair device, mounted on the pen carriage, indicates the position to which the active pen will move when it is directed to draw on the media.
- **Platen** — The large flat surface on which media is placed. Heavy materials should never be placed on this surface.

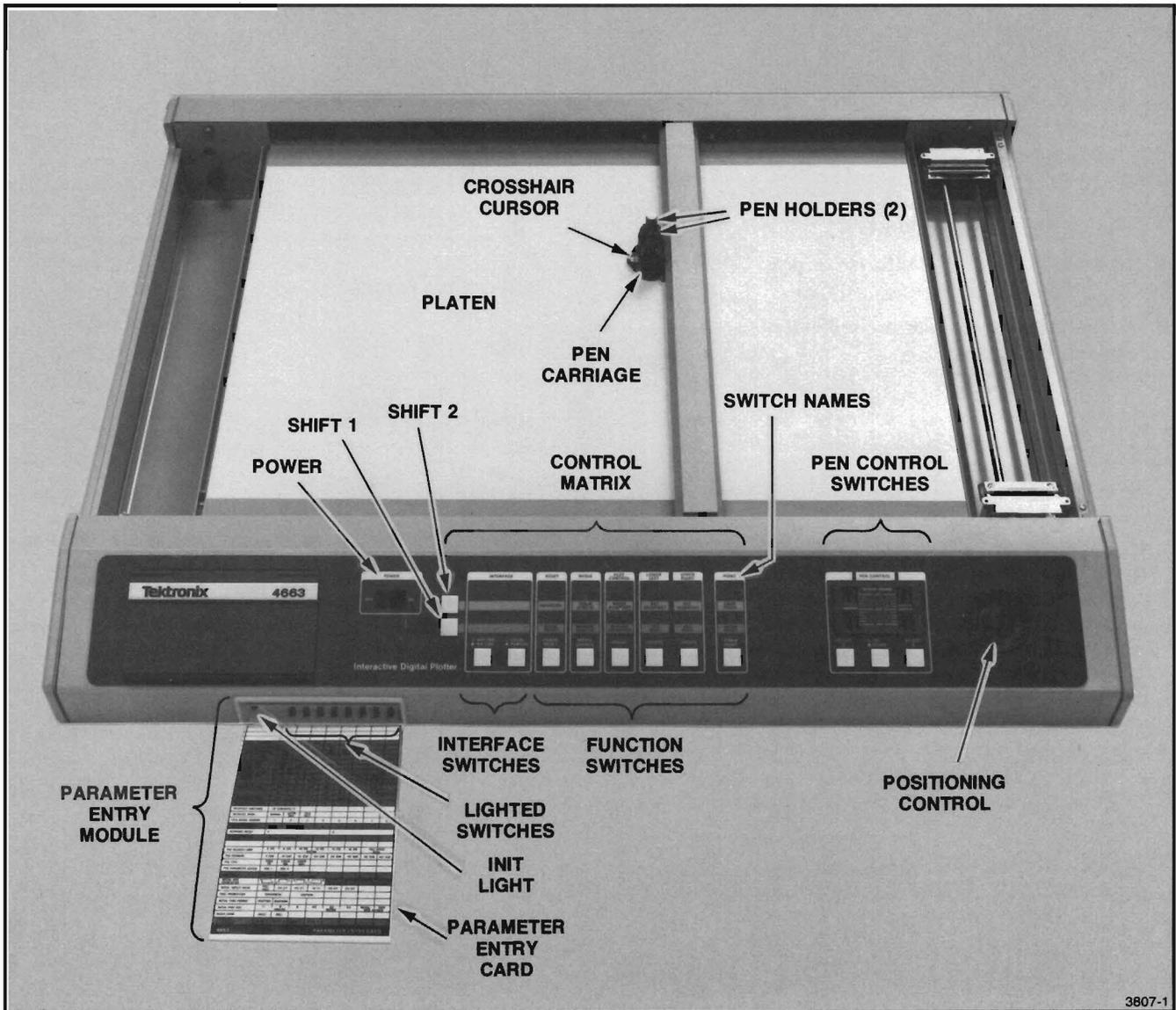


Figure 2-1. Introduction to the Plotter.

3807-1

OPERATOR'S INSTALLATION CHECK

This Operator's Installation Check provides the information necessary to quickly verify that the Plotter is properly installed and ready to make plots. These procedures may be helpful in other circumstances, such as:

- When training a new operator.
- When relocating the Plotter, to check that the cables are correctly reinstalled.
- If plotting problems occur, to check that the Plotter is properly installed before calling a service person.

CAUTION

This procedure is a CHECK only. The initial installation of the Plotter must be performed by qualified service personnel only, in accordance with the installation instructions located in the 4663 Service Manual, Volume 2, Appendix A.

PROCEDURE

1. **Check** the location. The Plotter should be placed on a solid, level desk or table that is at least 38x30 inches (97x77 cm) in size. Make sure that no materials are on the platen.
2. **Check** that the POWER switch is off and the power cord is attached to the voltage source.
3. **Check** that the interface cables are installed correctly for your application. Refer to Figure 2-2 while reading the following:
 - For Serial interface applications, check that the cable from the terminal is connected to the Plotter connector labeled TERMINAL. If a host computer is to be used, attach the cable from a modem (or computer) to the Plotter connector labeled MODEM.
 - For GPIB interface applications, attach the cable from the controller to the Plotter connector labeled IEEE-488-1975.

CAUTION

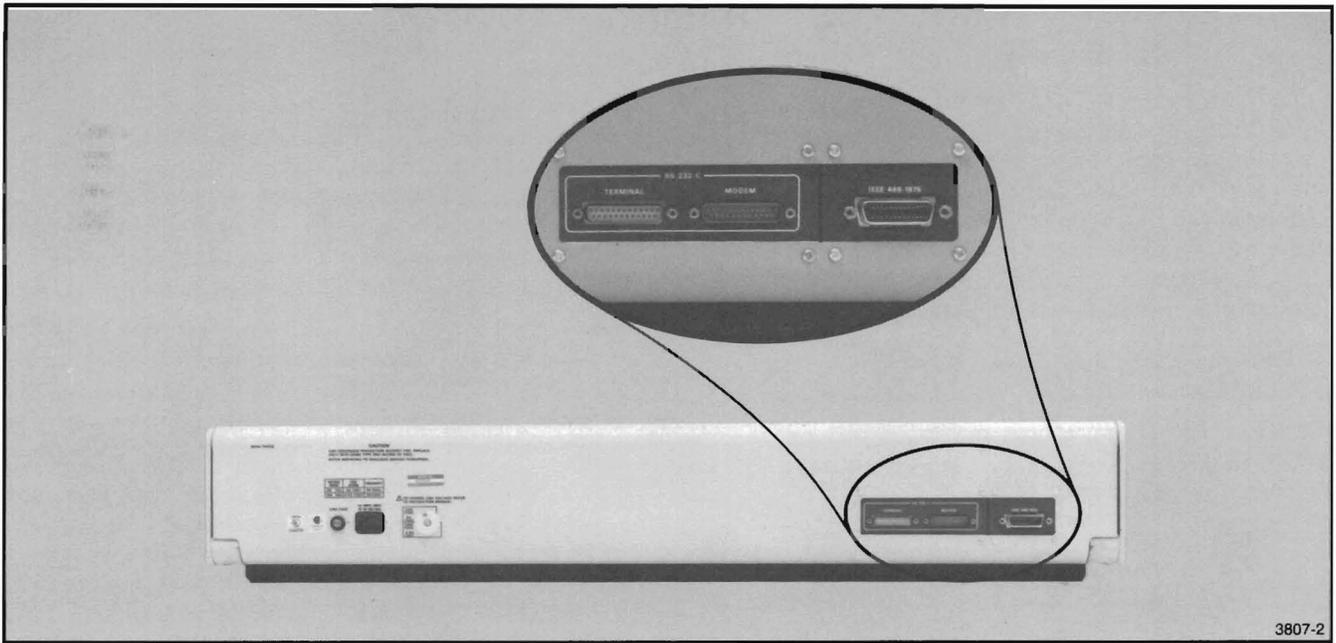
Before turning the POWER switch on, ensure that the platen (plotting surface) is clear of all materials. The pen carriage moves to the upper-right corner of the platen when power is applied.

4. **Turn** the POWER switch on. After a brief period (5-10 sec), the pen carriage moves to the platen's upper-right corner.

NOTE

If the Plotter's bell sounds during the power-up sequence and the Error Reset light on the front panel is not flashing, the Parameter Entry Card selections are not correct. Correct selections must be made on the Parameter Setup Select line and the Interface Select line of the Parameter Entry Card before the Plotter can be used. See Using the Parameter Entry Card next in this section for instructions.

5. **Check** the INTERFACE switches. For most applications, both Interface lights should be turned on (selects ONLINE REMOTE). Refer to Section 3 for more information on the INTERFACE switches.



3807-2

Figure 2-2. Interface Cable Connections.

USING THE PARAMETER ENTRY CARD

The Parameter Entry Card permits the operator to enter, observe, and modify the Plotter's parameters. Using the available selections, the Plotter can be set to operate with different controllers and host computers, can use a variety of pens and media, and can tailor the plotting Page and Viewport to meet special requirements. For detailed information about any line on the Parameter Entry Card, refer to Section 3 of this manual.

Checking and resetting the selections on the Parameter Entry Card lines is easy. With the POWER switch on:

1. **Push** the Parameter Entry Card in fully, making sure the INIT light turns off.
2. **Check** the current selections by pulling the Parameter Entry card out slowly, stopping at each line. One or more of the lighted switches may be on, indicating the current parameter(s) for that line.
3. **Change** the current setting (if necessary) by pressing the switch above the desired parameter (the light should turn on). On lines that permit only one selection at a time, the light above the previously selected parameter will turn off. On some lines, multiple selections are possible so more than one light may be on. If an invalid selection is made, the Plotter's bell sounds once and the switch does not light.
4. **Push** in the Parameter Entry Card when all lines are checked or reset.

The selections are remembered for approximately 90 days (45 days if Option 37 is installed), even if power is removed from the Plotter.

Figure 2-3 lists the Parameter Entry Card settings suitable for general plotting and can be used to record the Parameter Entry Card settings for your specific applications. Space is provided to record the application of each setup, as well as other information such as the type and color of pens used, the media used, and so forth. Figure 2-3 also includes:

- Two sample setups, one for Serial and one for GPIB installations. These setups list settings suitable for general plotting, and should be very useful when the Plotter is first installed. Using the settings listed, you can quickly set up the Plotter and begin plotting.
- Four blank columns, labeled Setup 1 through Setup 4, correspond to selections available on the Parameter Setup Select line of the Parameter Entry Card. (Option 37, Added Parameters Storage, must be installed to use all four selections; only SETUP 1 can be selected on standard instruments.) Use these columns to record the line settings for your specific applications. These columns should be filled in (with pencil) during installation of the Plotter. This provides a handy reference for other Plotter users.

On those instruments with Option 37 installed, you can program the Plotter to remember up to four complete sets of parameters. For more information, refer to the description of the Parameter Setup Select line of the Parameter Entry Card, located in Section 3.

To set the Parameter Entry Card for general plotting, locate the two columns in Figure 2-3 labeled *Sample Setups*. Choose either the Serial or GPIB, depending on your installation, and make the selection indicated for each line.

NOTE

When the selection is changed on either the Parameter Setup Select or the Interface Select lines of the Parameter Entry Card, the Plotter reinitializes. The Parameter Entry Card must then be pushed fully in before examining or modifying any other lines on the Parameter Entry Card.

SETUP 1 APPLICATION: _____
 SETUP 2 APPLICATION: _____
 SETUP 3 APPLICATION: _____
 SETUP 4 APPLICATION: _____
 NOTES: _____

LINE NAME									SAMPLE SETUPS		RECORD YOUR SETUPS HERE			
									SERIAL	GPIB	1	2	3	4
EXECUTE SELF TEST	1	2	3	4	5	6	7	8	---	---				
ERROR DATA	ERROR CODE	ERROR COUNT	1	2	3	4	5	6	---	---				
OUTPUT TERMINATOR	CR	CR & EOT	NONE						CR	--				
ATTENTION CHARACTER	ESC	^	^	SYN					ESC	--				
INTERFACE FUNCTIONS	AUTO MUTE	CR GENERATES LF	DEL IGNORE	CARRIER DETECT					AUTO MUTE	--				
DC1/DC3 CONTROL	INPUT	OUTPUT							--	--				
COMMUNICATIONS CONTROL MODE	FULL DUPLEX	HARDWARE RECEIVE FLAGGING							FULL DUPLEX	--				
RECEIVE PARITY	ODD	EVEN	IGNORE LOGIC 0	IGNORE LOGIC 1					IGNORE LOGIC 0	--				
TRANSMIT PARITY	ODD	EVEN	IGNORE LOGIC 0	IGNORE LOGIC 1					IGNORE LOGIC 0	--				
CHARACTER FORMAT	7	8	1	2					8 and 1	--				
DATA BITS/CHAR	STOP BITS													
TRANSMIT BAUD RATE LIMIT	50	75	110	300	600	1200	FULL SPEED		FULL SPEED	--				
TRANSMIT BAUD RATE	50	75	134.5	150	1800	1X EXT	16X EXT	64X EXT	(F)	--				
RECEIVE BAUD RATE	110	300	600	1200	2400	4800	9600		(F)	--				
SERIAL DEVICE ADDRESS	A	B	C	D	E	F	G	H	A (E)	--				
INTERFACE FUNCTIONS	CR GENERATES LF								--	CR/LF				
INTERFACE MODE	NORMAL	LISTEN ONLY	TALK ONLY						--	NORMAL				
GPIB DEVICE ADDRESS	1	2	3	4	5	6	7	8	--	(D)				
INITIAL COMMAND/RESPONSE FORMAT	1	2	3	4	5	6	7	8	1	1 (C)				
INTERFACE SELECT	1				2				1 (G)	OPT. 01-2 OPT. 04-1 (G)				
ALPHA CHARACTER QUALITY	NORMAL	ENHANCED							NORMAL	NORMAL				
PEN VELOCITY LIMIT	6 IPS	8 IPS	10 IPS	12 IPS	14 IPS	16 IPS	FULL SPEED		--	--				
PEN PRESSURE	5 GM	10 GM	15 GM	20 GM	25 GM	30 GM	35 GM	40 GM	--	--				
PEN TYPE	FIBER TIP	WET INK	PLASTIC HARD TIP						FIBER TIP	FIBER TIP				
PEN PARAMETER ACCESS	PEN 1	PEN 2							1 (B) 2 (B)	1 (B) 2 (B)				
LINE QUALITY	PREVIEW	NORMAL	1	2					NORMAL	NORMAL				
INITIAL AXIS ORIENTATION	y x	x y	x y	y x	x y	y x	x y	y x	y x	x y				
INITIAL ASPECT RATIO	FULL PAGE	3X:2Y	4X:3Y	1X:1Y	3X:4Y	2X:3Y			FULL PAGE	FULL PAGE				
PAGE ORIENTATION	HORIZONTAL	VERTICAL							HORIZONTAL	HORIZONTAL				
INITIAL PAGE FORMAT	DRAFTING	GRAPHING							DRAFTING	DRAFTING				
INITIAL PAGE SIZE	C	B	A	A2	A3	A4	RECALL USER DEFINED		C	C				
MEDIA FORM	SHEET	ROLL							SHEET (A)	SHEET (A)				
PARAMETER SETUP SELECT	SETUP 1	SETUP 2	SETUP 3	SETUP 4					SETUP 1	SETUP 1				

NOTE: A Select ROLL if Media Advance Option installed (optional).
 B Select PEN 1, then select FIBER TIP on next line. Select PEN 2 and repeat.
 C Select 1 for use with TEKTRONIX, INC. 4050 Series Graphic Computing Systems.
 For other applications, this must be set to match controller. Refer to 4663 Programmer's Manual for information about Initial Command/Response Formats.
 D Select 1 if only Plotter attached to controller. Otherwise, system programmer must assign GPIB Device Address.
 E Select A unless another device has that address.
 F Set to match Host Computer, modem, etc.
 G If the Interface Selection is changed, it will be necessary to push the Parameter Entry Card in fully before making the selection on the next line.

PROVIDED BY: _____ 3807-3

Figure 2-3. Parameter Entry Card Setups.

INSTALLING MEDIA AND PENS

Pens and media (paper, film, etc.) must be installed before running the self-test and using the front panel controls. The instructions included here are abbreviated and are only for loading sheet media. They are designed to help you begin plotting quickly; for additional information, including instructions for the installation of roll media, refer to Section 4, *Pens and Media*.

While performing the procedures in this section, use C-size sheets of blank, white paper and install fiber-tip pens. If you made the selections indicated in the earlier discussion of the Parameter Entry Card, the parameters are already set correctly for these pens and media

LOADING SHEET MEDIA

NOTE

The Media Form line on the Parameter Entry Card must be set to SHEET.

Install sheet media according to the following instructions:

1. **Press** the POWER switch off, then back on. After 5 to 10 seconds, the Plotter moves the pen carriage to the upper-right corner.

The Media light should be blinking, indicating that the electrostatic hold-down is turned off to allow removal or installation of the media.
2. **Place** the C-size sheet of media on the platen, aligning it with the arrow in the lower-right corner of the media guide. Align the bottom edge of the media evenly along the media guide. See Figure 2-4.

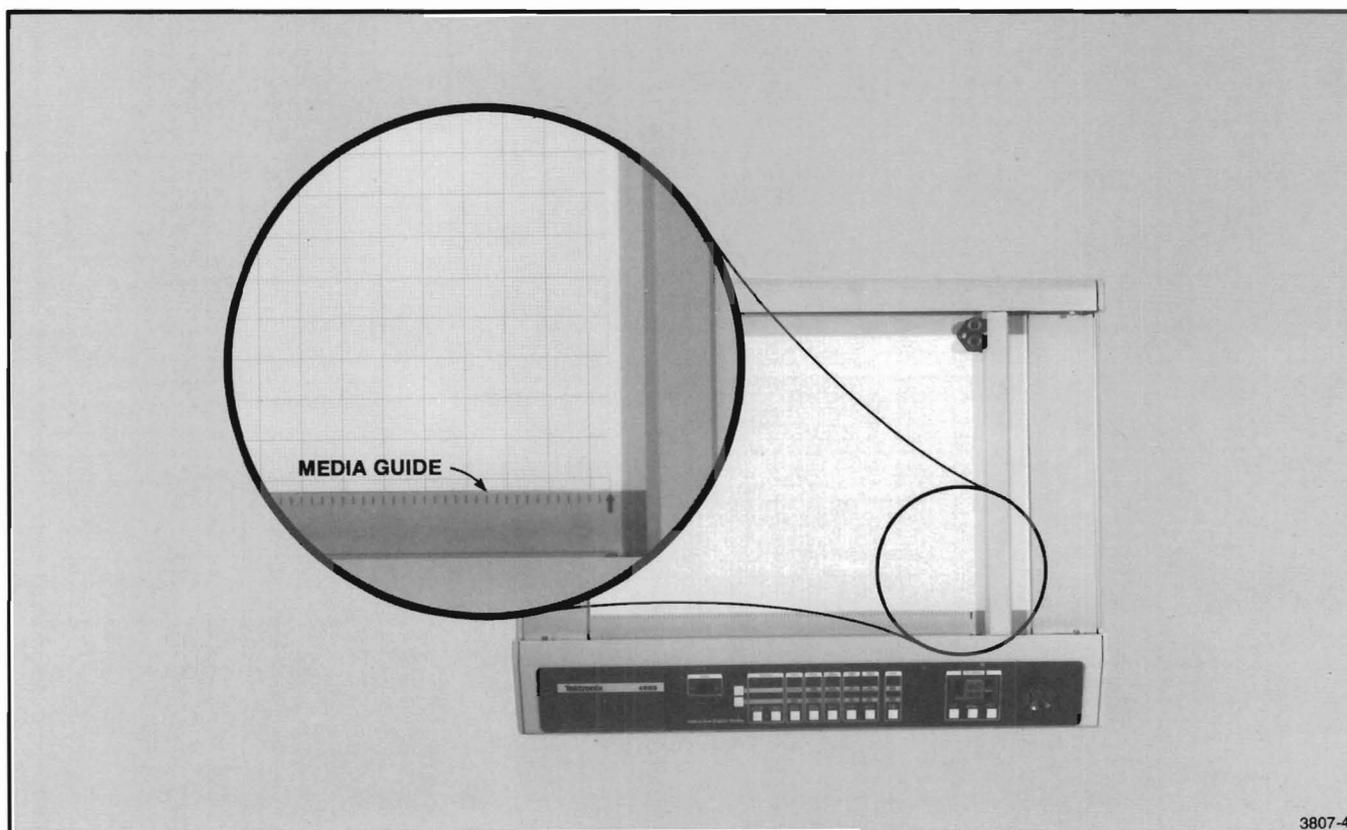


Figure 2-4. Positioning Media on the Platen.

3. **Press** the MEDIA switch to activate the electrostatic hold-down.
4. **Remove** any bubbles from the media using a clean, lint-free industrial wipe or a drafting brush. Avoid using your hand as body oils will be transferred to the paper, which reduces the acceptance of ink.

This completes the sheet-media loading instructions.

PEN INSTALLATION

CAUTION

To protect the platen from ink spills or other damage, always place media on the platen before installing pens. To prevent damage to the pen tips and to prevent fiber-tip pens from prematurely drying out, always replace caps on pens that are not in use.

Before installing any pen, use that pen to write on a piece of scrap media to ensure that ink flows. Be careful not to press too hard, since excessive pressure could damage the pen tip. Then simply screw the pen into the pen holder, as shown in Figure 2-5.

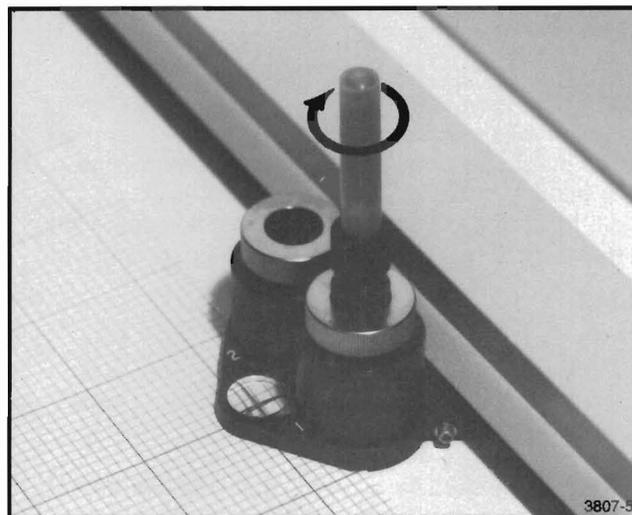


Figure 2-5. Installing a Pen.

RUN SELF-TEST

You can perform a brief operational test of the Plotter using the following procedure. This test verifies the operation of only one pen; the second pen must be selected and the test run again to perform an operational test of both pens. This test does not verify communications with a controller or a host computer.

CAUTION

Pens and media must be installed before operating the Self-Test. See Installing Pens and Media earlier in this section.

1. **Turn** the POWER switch off, then back on. After 5 to 10 seconds, the pen carriage will move to the upper-right corner. Make certain that paper and pens are installed, then press the MEDIA switch.
2. **Check** that the INIT light (located on the left side of Parameter Entry Module) is off. If the light is on, push the Parameter Entry Card in all the way. The light should go out.
3. **Move** the Joystick handle around. The pen carriage should move in the same direction you move the handle.
4. **Operate** the Self-Test features, as follows.

NOTE

The appearance of the test pattern can be changed if any of the following Parameter Entry Card lines have other than the left-most switch selected: Media Form, Initial Page Size, Initial Page Format, Page Orientation, Initial Aspect Ratio, and Initial Axis Orientation.

If you set the parameters as directed in Using the Parameter Entry Card, earlier in this section, the Parameter Entry Card is set correctly and the plot will appear as shown in Figure 2-6.

- a. **Pull** out the Parameter Entry Card to the last line (*Execute Self Test*).
- b. **Press** the switch above 2. All front panel switch lights and all Parameter Entry Module lights should turn on. PRESS this switch again to cancel the light test.

NOTE

If any front panel lights are flashing, the front panel lights will light only temporarily during this test.

NOTE

In the next step, the Plotter will draw a test pattern. During this test, the Plotter draws a box with two dashed lines extending diagonally from corner to corner and intersecting at the center of the box (see Figure 2-6). The Plotter then draws a fan pattern in the lower-left corner of the Page. Next, the message "Please exercise the Joystick" is printed. At this time, use the Joystick to reposition the pen carriage. After a short period, the Plotter resumes plotting and redraws the intersection of the dashed diagonal lines within the box. This demonstrates the Plotter's ability to repeatedly draw vectors at the same location on the media, even if the Joystick has repositioned the pen carriage.

- c. **Press** the switch above 1 to draw the plot shown in Figure 2-6.

If these tests are successful, the Plotter is operational. If the resultant plot is different from that shown in Figure 2-6, check these selections on the following Parameter Entry Card lines: Media Form, Initial Page Size, Initial Page Format, Page Orientation, Initial Aspect Ratio, and Initial Access Orientation. If any of these lines have other than the left-most switch selected, the self-test plot will appear different from the plot shown in Figure 2-6. If the plot is greatly different, call your Tektronix Service Representative.

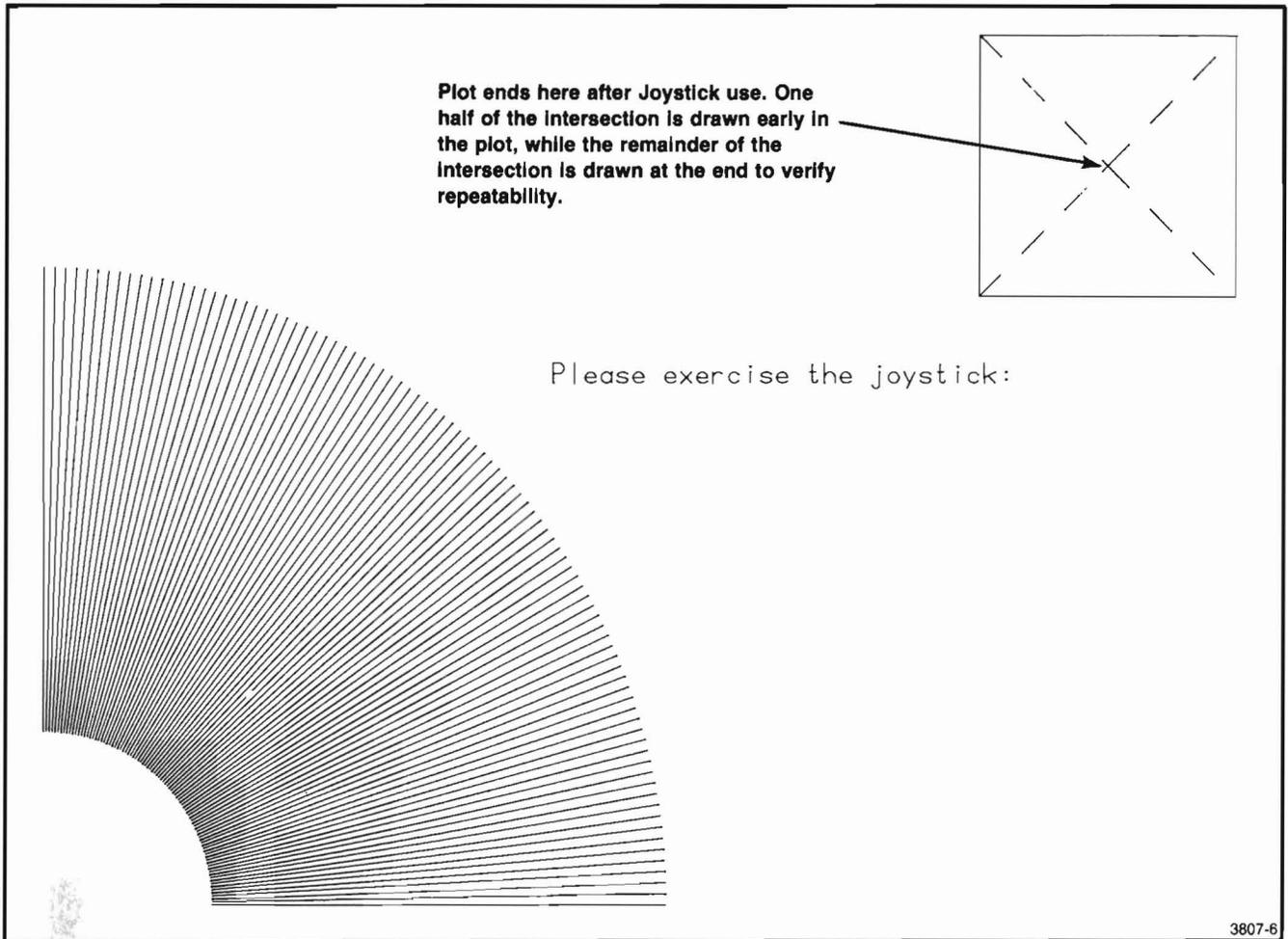


Figure 2-6. Test Pattern Drawn by Self-Test Feature.

USING THE FRONT PANEL CONTROLS

This series of instructions describes the steps required to perform Plotter operations that use the front panel controls. A more detailed description of the front panel controls is included in Section 3 *Controls and Indicators*. The first-time operator may want to perform each of the operations in sequence to learn the operation procedures as quickly as possible. The experienced operator, who may occasionally need to refresh his or her memory, can refer to the Front Panel Operations Index that follows to locate the operating procedure for any one front panel. Figure 2-7 illustrates the front panel switches.

OPERATOR'S CHECK PROCEDURE

The first step of this procedure serves as an Operator's Check Procedure. Perform this step to verify that each of the Plotter's functions, indicators, and switches is operational. The remaining procedures (Steps 2 through 16) will familiarize the operator with other front panel operations.

Whenever a SHIFT and a FUNCTION switch are used jointly to select a function, the SHIFT switch must be pressed before pressing the FUNCTION switch.

Illustrations that accompany some of the following steps can be used to help locate the switches required to perform the operation under discussion.

The terms *Page* and *Viewport* are described at length in the Introduction Section of the *4663 Programmer's Reference Manual*. Default Page and Viewport dimensions are described in Appendix A of this manual. Brief definitions are as follows:

- The *Page* corresponds to the size of the media being used, minus the margin areas.
- The *Viewport* is the area of the Page on which the plot is drawn. The Viewport can occupy all or part of the Page.

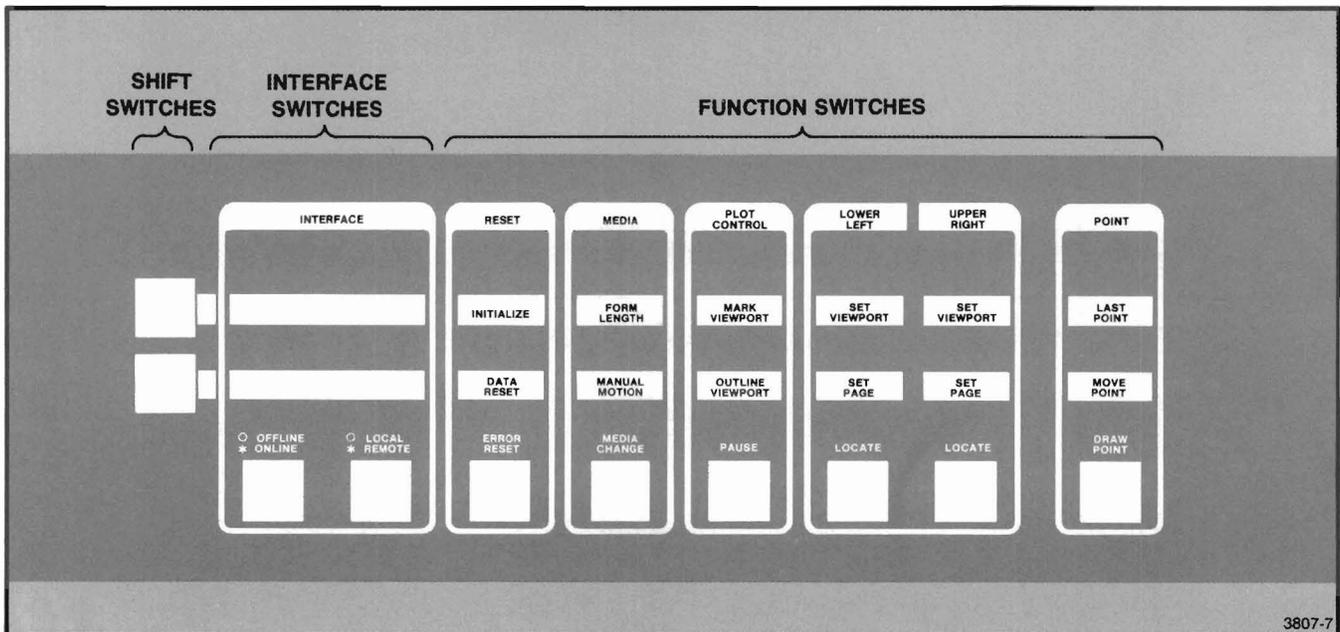


Figure 2-7. Front Panel Switches.

FRONT PANEL OPERATIONS INDEX

Procedure Step No.	Title
1	Check Procedure
2	Lower a Pen to the Paper and Exercise the Joystick
3	Change the Pen Selection
4	Locate the Upper-Right Corner of the Page
5	Locate the Upper-Right Corner of the Viewport
6	Select the Mark Viewport Function
7	Select the Outline Viewport Function
8	Select a Different Page Size
9	Select a New Page Orientation
10	Change the Parameter Entry Card
11	Set a New Viewport
12	Change the Paper in Sheet Mode
13	Change the Paper in Roll Mode (Requires Option 36)
14	Reposition the Page
15	Define a Page Size
16	Make Mirror-Image or Upside-Down Plots

NOTE

Media and pens must be installed before completing the following procedures. See Installing Media and Pens earlier in this section for instructions.

1. Check Procedure

CAUTION

BEFORE turning the POWER switch on, ensure that the platen is clear of all materials. The pen carriage moves to the upper-right corner of the platen soon after power is applied.

- a. **Press** the POWER switch on. After 5 to 10 seconds, the pen carriage moves to the upper-right corner of the platen (the load point). If the MEDIA switch light is flashing, PRESS the MEDIA switch.

- b. **Check** the INIT light. If it remains on, push the Parameter Entry Card in fully to complete initialization.
- c. **Check** or set the following Parameter Entry Card lines: Initial Page Size set to C, Page Orientation set to HORIZONTAL, and Initial Aspect Ratio set to 3X:2Y.
- d. **Move** the Joystick down and to the left to move the pen carriage to the center of the platen. Notice that the pen carriage moves in the same direction as you move the Joystick and that the pen carriage velocity increases as the Joystick deflection angle increases.
- e. **Check** that the SELECT 1 light is on (one of the Pen Control switches). If not, press the SELECT 1 switch.

2. Lower a Pen to the Paper and Exercise the Joystick

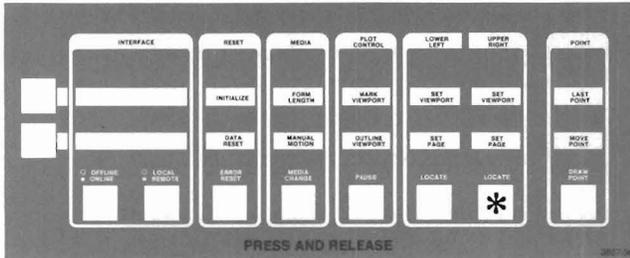
- a. **Press** the UP/DOWN switch. The pen carriage moves the selected pen into position and then lowers the pen to the paper.
- b. **Move** the Joystick around, drawing a line on the paper.
- c. **Press** the UP/DOWN switch again. The pen is raised and the pen carriage automatically positions the intersect point of the crosshair cursor above the last pen position.

3. Change the Pen Selection

- a. **Press** the SELECT 2 switch on the Pen Control.
- b. **Press** the UP/DOWN switch. Notice that Pen 2 now moves to the point previously occupied by the crosshair cursor.
- c. **Press** the UP/DOWN switch again to raise the pen off the paper.

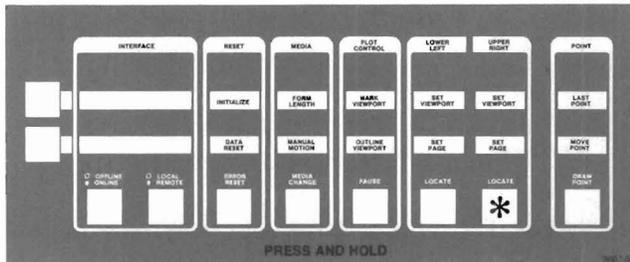
GETTING STARTED

4. Locate the Upper-Right Corner of the Page



- a. **Press**, then immediately release, the UPPER RIGHT switch. The crosshair cursor moves to the upper-right corner of the current Page.

5. Locate the Upper-Right Corner of the Viewport



- a. **Press** the UPPER RIGHT switch and hold until the bell rings (approximately 2 seconds). The pen carriage moves immediately to the upper-right corner of the Page when the bell rings.
- b. **Release** the UPPER RIGHT switch. The pen carriage will move to the upper-right corner of the current Viewport.

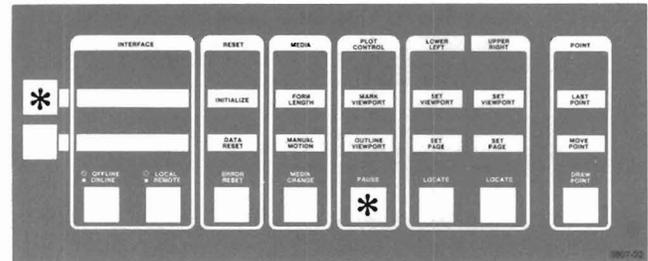
NOTE

The Lower Left Locate functions are operated in the same manner as the Upper Right Locate functions.

NOTE

When the Initial Aspect Ratio line on the Parameter Entry Card is set to FULL PAGE, the Page and Viewport boundaries are the same.

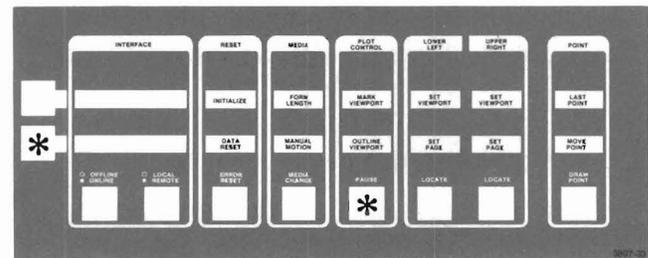
6. Select the Mark Viewport Function



- a. **Press** the upper SHIFT switch (SHIFT 2).
- b. **Press** the PLOT CONTROL switch.

The Plotter draws small 90° angle brackets at each corner of the Viewport. The pen carriage then returns to the last active pen position.

7. Select the Outline Viewport Function



- a. **Press** the lower SHIFT switch (SHIFT 1).
- b. **Press** the PLOT CONTROL switch.

The Plotter draws the boundaries of the Viewport and the pen carriage moves to the last active pen position.

8. Select a Different Page Size

- Pull** the Parameter Entry Card out to the third line (Initial Page Size) and press the switch above A.

The light above A turns on and the light above C turns off. The Plotter is now programmed for an A-size Page and Initial Viewport as determined by the Initial Aspect Ratio of 3X:2Y. The previous Page and Viewport (which you set earlier) are lost.

- Outline** the Viewport as you did in Steps 10 and 11 by pressing SHIFT 1, then the PLOT CONTROL switch. This draws the boundaries of the new Viewport.

9. Select a New Page Orientation

- Pull** the Parameter Entry Card out to the fifth line (Page Orientation).
- Press** one of the two switches above VERTICAL. The pressed switch will light and the light above HORIZONTAL will turn off. The Page is now oriented vertically on the paper and the margins are the correct size.
- Press** SHIFT 1, then press the PLOT CONTROL switch to outline the new Page (and Viewport) orientation. The Page has been rotated around the lower-right corner of the original Page. The X- and Y-axes of the Viewport have also rotated with the Page. This can be verified using the Locate Lower Left functions described earlier.

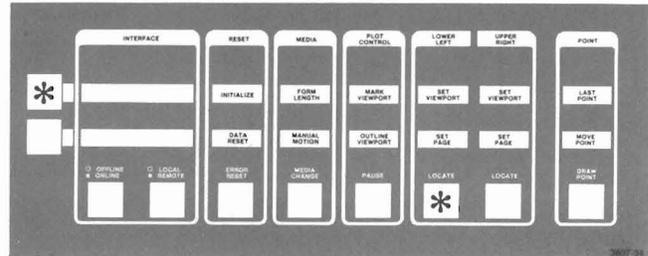
10. Change the Parameter Entry Card

To return the Plotter to the configuration used at the start of this procedure, change the Parameter Entry Card settings as follows:

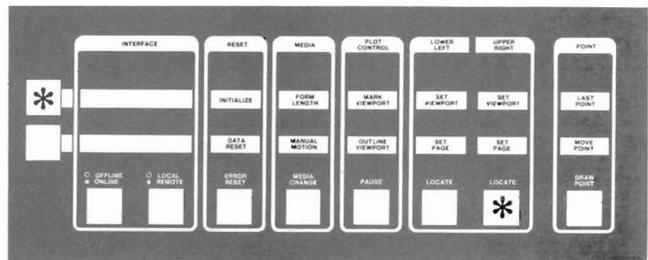
- Change** the Page Orientation line to HORIZONTAL.
- Change** the Initial Page Size line to size C.

11. Set a New Viewport

- Move** the pen carriage using the Joystick to a point well within the last marked Viewport.



- Press** the upper SHIFT switch followed by the LOWER LEFT switch to activate the Set Viewport Lower Left function.
- Move** the pen carriage in a 45° angle up and to the right about 3 to 6 inches (7 to 15 cm). This point must also be within the last marked Viewport.
- Press** the upper SHIFT switch again.



- Press** the UPPER RIGHT switch to set the upper-right corner of the Viewport.
- Outline** the new Viewport by pressing the lower SHIFT switch again, then pressing the PLOT CONTROL switch.

12. Change the Paper in Sheet Mode

NOTE

Steps 12 and 13 provide directions for changing paper. If in SHEET mode (as established on the Parameter Entry Card), perform Step 12. If in ROLL mode, go to Step 13 for paper changing instructions. Refer to the Section 4, Pens and Media, for additional information. The term "paper," rather than "media," is used here since paper should be installed at this time.

- a. **Press** the MEDIA switch. The electrostatic hold-down turns off, the pen carriage moves to the load point (upper-right corner of the the platen), and the Media light flashes.
- b. **Replace** the paper with a clean sheet of C-size paper.
- c. **Press** the MEDIA switch. Use a drafting brush or an industrial wipe to smooth out any wrinkles in the paper; avoid using your hands as body oils will transfer to the paper and reduce the paper's ability to accept ink.

13. Change the Paper in Roll Mode (Requires Option 36)

- a. **Press** the MEDIA switch. The pen carriage moves to the load point (upper-right corner) and the paper automatically advances.

14. Reposition the Page

The Page can be repositioned by setting the lower-left corner of the Page. To reposition the Page:

- a. **Move** the crosshair cursor, using the Joystick, to the desired position of the lower-left corner of the Page.
- b. **Press** the SHIFT 1 switch.
- c. **Press** the LOWER LEFT switch.

This completes the procedure for repositioning the Page. As shown in Figure 2-8, notice that moving the lower-left (LL) corner also moves the upper-right (UR) corner. This maintains the same Page size. The newly positioned Page corner boundaries can be verified by first momentarily pressing the LOWER LEFT switch and then pressing the UPPER RIGHT switch. The crosshair cursor travels to the respective corners of the Page.

If the Locate Upper Right function turns on the two Locate lights, part of the Page has been positioned beyond the Platen Clipping Boundary. The pen carriage will then stop with the crosshair cursor positioned on that boundary. Thus, portions of subsequent plots lying outside this boundary will not be plotted. The Page size is not altered and can be restored by repositioning the Page fully within the clipping boundary. If the two Locate lights are off after the Locate Upper Right function is used, the complete Page is available for plotting.

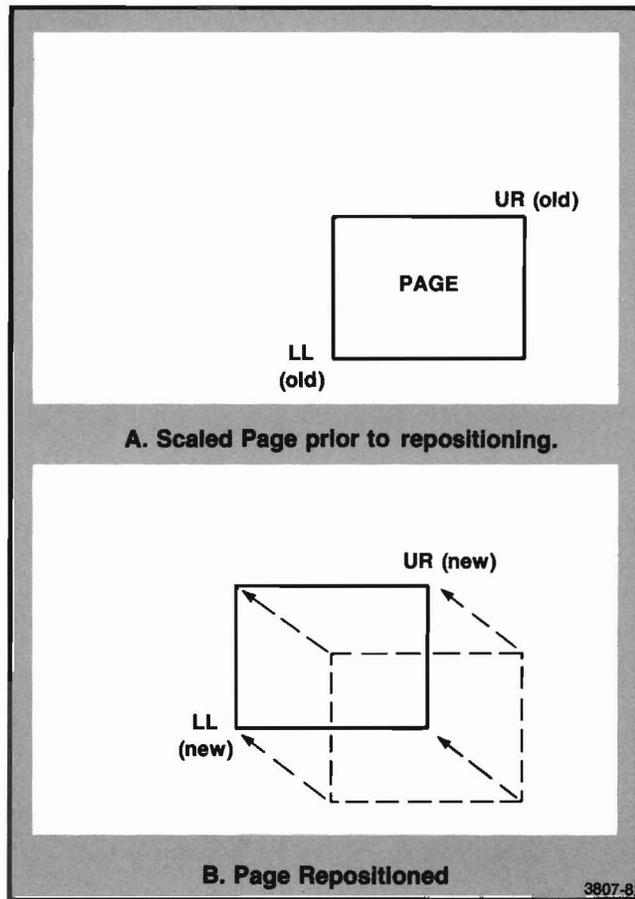


Figure 2-8. Page Positioning.

15. Define a Page Size

- a. **Move** the crosshair cursor, using the Joystick, to the desired position of the lower-left corner of the page. (If the lower-left corner is to remain the same, skip ahead to Step d.)
- b. **Press** the SHIFT 1 switch.
- c. **Press** the LOWER LEFT switch.
- d. **Move** the crosshair cursor, using the Joystick, to the desired position of the upper-right corner of the page.
- e. **Press** the SHIFT 1 switch.
- f. **Press** the UPPER RIGHT switch.

This completes the Set Page Size function sequence. For detailed information, refer to the discussion of the Set Page functions in Section 3.

16. Make Mirror-Image or Upside-Down Plots

The Plotter can be set to orient the plotting area to produce mirror, upside-down mirror, or upside-down image plots. The right column of Figure 2-9 shows an example of each of these features. Compare the placement of the lower-left (LL) and upper-right (UR) corners in the three plots to the standard plots (left column). These features can be useful in preparing plots for mirror or projection transparencies.

Mirror Image Plots (Figure 2-9a):

- a. **Position** the pen, using the Joystick, at the lower-right corner of the Page.
- b. **Press** SHIFT 1 and then the LOWER LEFT switch.
- c. **Position** the pen, using the Joystick, at the upper-left corner of the Page.
- d. **Press** SHIFT 1 and then the UPPER RIGHT switch.

Upside-Down Mirror Image Plots (Figure 2-9b):

- a. **Position** the pen, using the Joystick, at the upper-left corner of the Page.
- b. **Press** SHIFT 1 and then the LOWER LEFT switch.
- c. **Position** the pen, using the Joystick, at the lower-right corner of the Page.
- d. **Press** SHIFT 1 and then the UPPER RIGHT switch.

Upside-Down Image Plots (Figure 2-9c):

- a. **Position** the pen, using the Joystick, at the upper-right corner of the Page.
- b. **Press** SHIFT 1 and then the LOWER LEFT switch.
- c. **Position** the pen, using the Joystick, at the lower-left corner of the Page.
- d. **Press** SHIFT 1 and then the UPPER RIGHT switch.

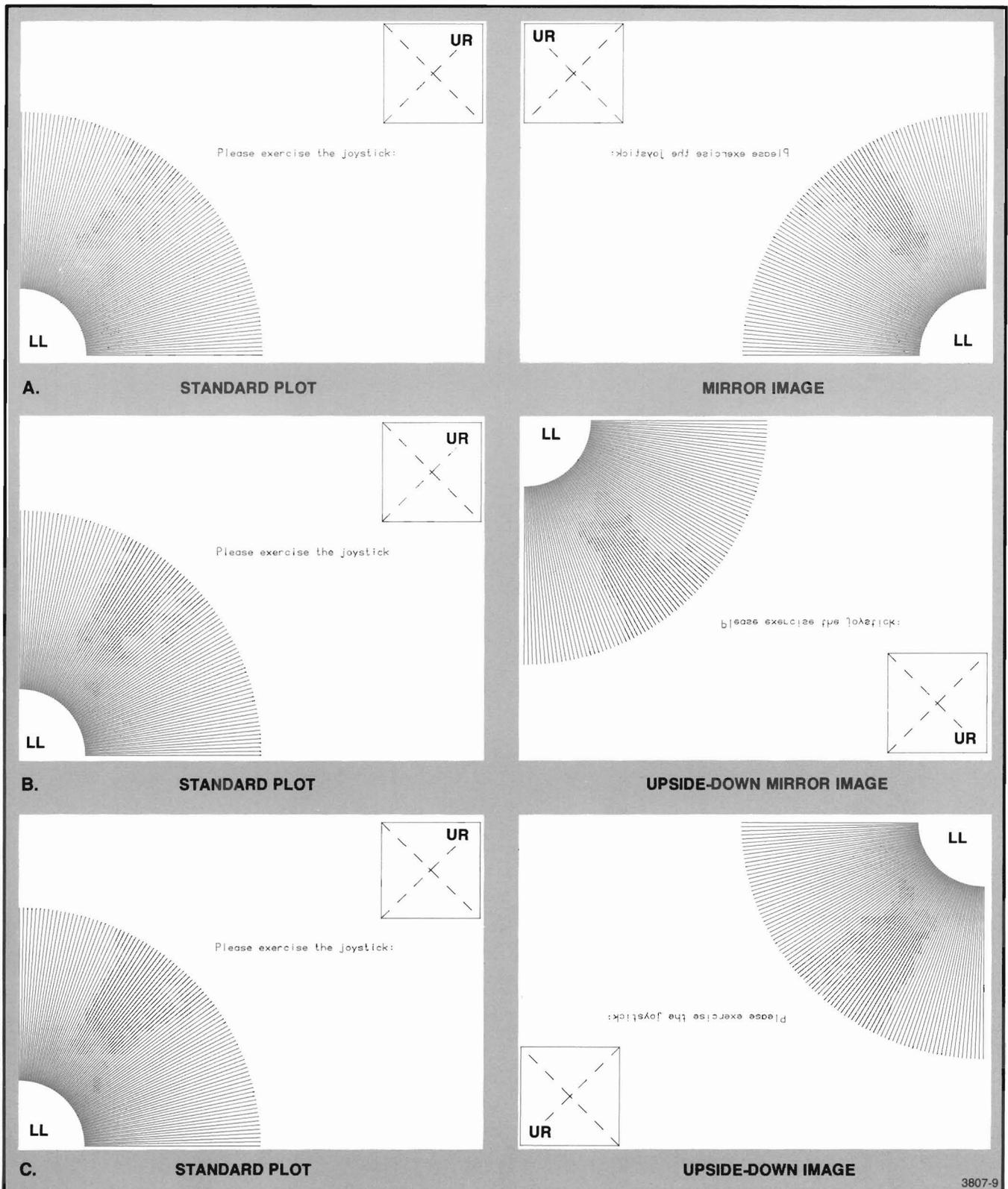


Figure 2-9. Mirror, Upside-Down Mirror, and Upside-Down Image Plots.



Section 3

CONTROLS AND INDICATORS

INTRODUCTION

This section includes detailed information about the function of the Plotter's front panel switches and indicators. The front panel is illustrated in Figure 3-1 and includes the following:

- The Power Switch
- The Positioning Control (Joystick)
- The Pen Controls
- The Control Matrix
- The Parameter Entry Module

Detailed information about the operation of these switches to perform specific tasks is included in appropriate sections throughout this manual.

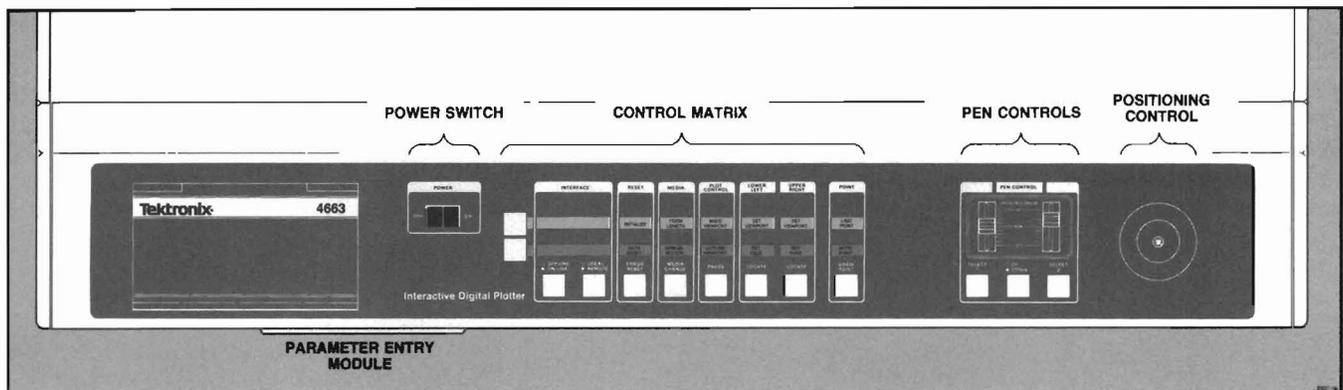


Figure 3-1. Front Panel Controls and Indicators.

POWER SWITCH

The POWER switch is a rocker switch used to activate the Plotter. (Some circuits always have power applied

when the Plotter is plugged in. These are described in the *4663 Service Manual*.)

POSITIONING CONTROL (JOYSTICK)

The POSITIONING CONTROL (or Joystick) is used to move the pen carriage manually about the platen. If the Media Advance Option (Option 36) is present, the Joystick can be used to position roll media on the platen. Information about this second function is located in the description of the Manual Motion function, later in this section.

The Joystick is enabled either at power-up or approximately a half-second after the pen carriage stops moving in response to Plotter commands. One or both axes of the Joystick can be disabled by the JOYSTICK DISABLE command, described in the *4663 Programmer's Manual*.

To move the pen carriage, simply push the Joystick in the desired direction. Notice that the velocity of the pen carriage increases as the angle of deflection increases.

When using the Joystick, remember that if neither pen is down, the crosshair cursor on the pen carriage indicates the position at which plotting will occur when the selected pen is lowered.

CAUTION

Do not use the Joystick to move the pen carriage under any of these conditions:

- *During the 5 to 10 second power-up sequence.*
- *When changing selections on either the Parameter Setup Select line or the Interface Select line of the Parameter Entry Card.*
- *When using the front panel Initialize function.*
- *When using a front panel Media switch function.*

Failure to observe this precaution can cause loss of the pen carriage position and you will hear a grinding noise. A front panel Initialize function (discussed later in this section) is used to recover from this condition.

PEN CONTROLS

The Pen Controls include these three controls:

- SELECT switches (1 and 2) and their light indicators.
- UP/DOWN switch and its light indicator.
- PRESSURE OVERRIDE control.

Two switches, labeled SELECT 1 and SELECT 2, can be used to manually select the active pen (the PEN SELECT command is also used to designate the active pen). Lights within the switches indicate the selected pen. SELECT 1 selects the pen closest to the front panel; SELECT 2 selects the remaining pen.

Pressing the UP/DOWN switch alternately lowers or raises the pen selected by the SELECT switches. When the light within the switch is on, the active pen is down. (The light also turns on when the active pen is lowered under program control.)

The two PRESSURE OVERRIDE adjustments can be used to make fine adjustments to the pressure of the pens on the media. This feature can be used to improve line quality and to minimize pen tip wear. The left control affects Pen 1 and the right control affects Pen 2.

The nominal pen pressure is set automatically according to selections made on the Parameter Entry Card (see *Pen Group* in the Parameter Entry Card descriptions). Moving the PRESSURE OVERRIDE control toward "+" increases the pen pressure; moving the control toward "-" decreases pressure. The full range of this control varies the pen pressure approximately $\pm 25\%$ of the total nominal pressure set by the Parameter Entry Card. (Proper pen pressure depends on the media and the pen type in use. See Section 4 for selection instructions.) These controls should be set to NOM unless specific adjustments are desired.

CONTROL MATRIX

The Control Matrix includes switches and lights. The switches select a variety of Plotter functions and the lights (located within the switches) indicate the operating conditions.

The Control Matrix includes three sets of switches, shown in Figure 3-2. These are INTERFACE, SHIFT, and FUNCTION switches. The INTERFACE switches operate as one group, independent of other switches on the Control Matrix. The SHIFT and FUNCTION switches, however, operate jointly to allow selection of a wide variety of Plotter functions. Information about switch operation, the functions performed by each switch, and the light indications follows.

OPERATING THE INTERFACE SWITCHES

By pressing the INTERFACE switches, you can select different communications interface modes. Lights within the switches indicate the selected mode.

Most applications require that both INTERFACE switch lights be on. The Plotter automatically selects this condition (ONLINE REMOTE) at power-up and during the front panel Initialize function for both Serial and GPIB installations.

For your convenience, the descriptions of the switch functions and the communication interface modes are separated according to interface type. You need read only the description that applies to your installation.

INTERFACE Switches – Serial Installations

When used with Serial interface installations, the INTERFACE switches allow selection of one of four communication interface modes. Each switch setting, the light indications, and their corresponding communication interface modes are described and illustrated in the following text.

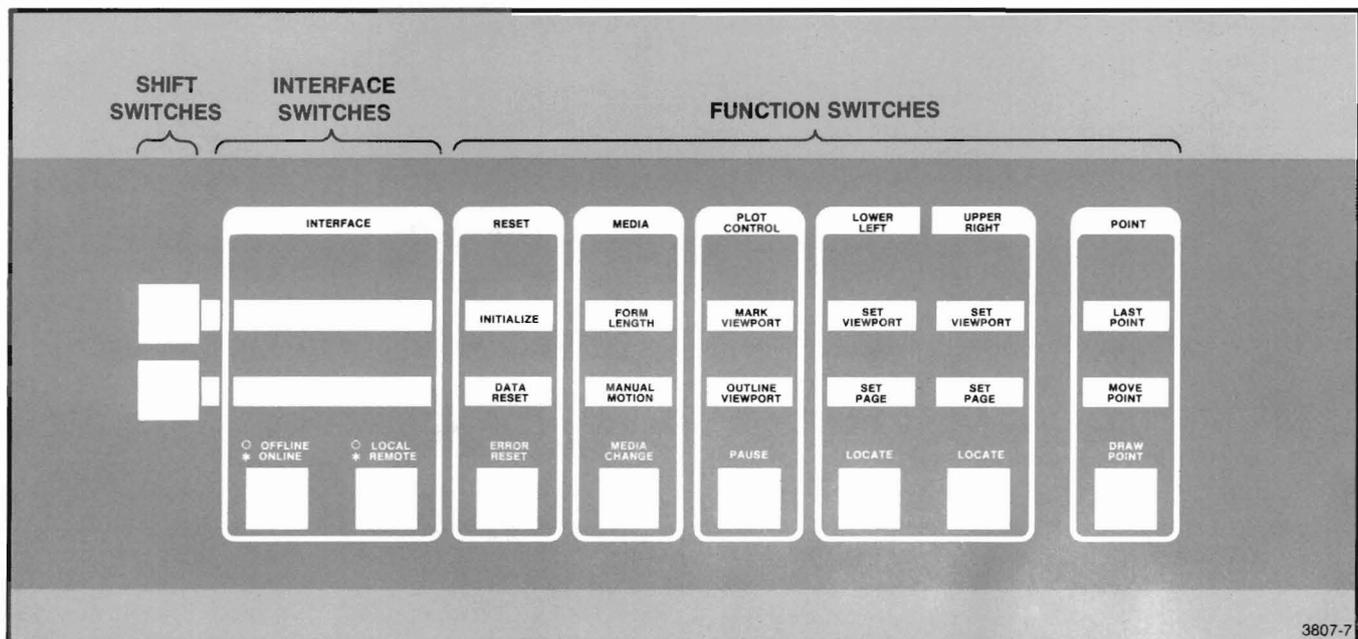


Figure 3-2. Control Matrix.

CONTROLS AND INDICATORS

ONLINE REMOTE. This combination establishes communications from the terminal to the host; from the Plotter to the host; from the host to the Plotter; and from the host to the terminal via loop-thru. See Figure 3-3a.

Information from the host to the Plotter is not passed on to the terminal when the Plotter is turned logically on via a DEVICE ON command and AUTOMUTE is selected on the Interface Function line of the Parameter Entry Card.

OFFLINE REMOTE. The terminal and host communicate via loop-thru; the Plotter remains isolated. See Figure 3-3b.

ONLINE LOCAL. The Plotter and terminal communicate; the host remains isolated. See Figure 3-3c.

OFFLINE LOCAL. Used mainly for troubleshooting; the Plotter, host computer, and terminal are isolated from each other. No communications can occur between devices. See Figure 3-3d.

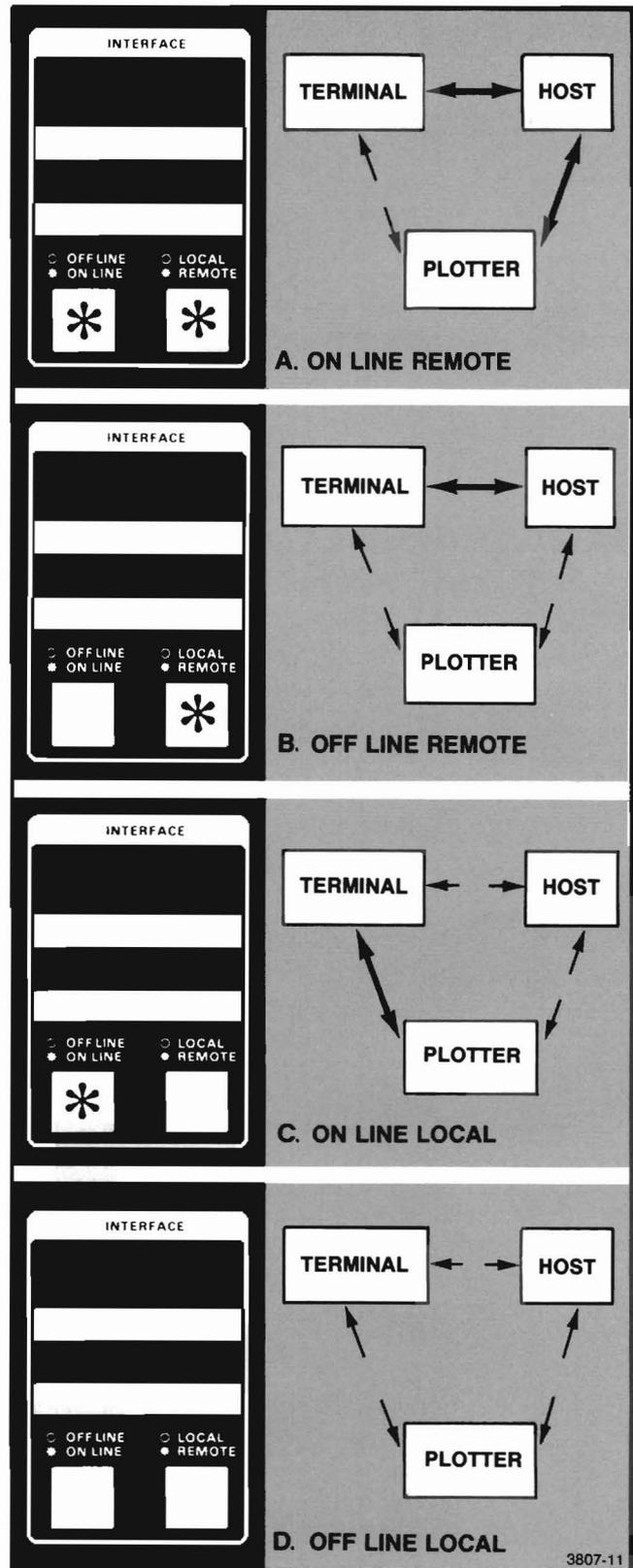


Figure 3-3. INTERFACE Switch Selections for the Serial Interface.

INTERFACE Switches – GPIB Installations

The INTERFACE switches, the light indications, and their corresponding communications interface modes for GPIB operation are described and illustrated in the following text.

ONLINE REMOTE. With both lights on, full GPIB communications are established; all lines on the GPIB bus are active. This is the normal mode of operation and the mode automatically selected at power-up. See Figure 3-4a.

ONLINE LOCAL. With this light combination, the Plotter receives but ignores all Plotter commands. GPIB bus handshaking signals are recognized by the Plotter. See Figure 3-4b.

NOTE

If either OFFLINE REMOTE or OFFLINE LOCAL is selected, the Plotter disregards all GPIB information. This is equivalent to removing the GPIB cable from the rear panel connector.

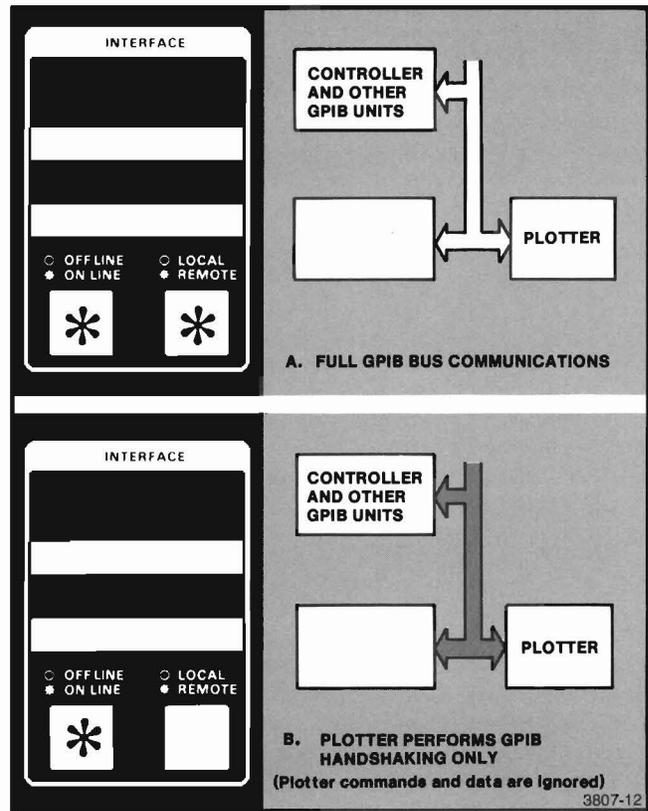


Figure 3-4. INTERFACE Switch Selections for the GPIB Interface.

CONTROLS AND INDICATORS

Operating the SHIFT and FUNCTION Switches

The SHIFT and FUNCTION switches, shown in Figure 3-5, permit selection of a variety of Plotter operations. These operations are described later in this section.

The SHIFT switches are the two leftmost switches within the Control Matrix. Though not labeled on the Plotter, the lower switch is referred to as SHIFT 1 and the upper switch as SHIFT 2. These SHIFT switches act similar to the shift key on a typewriter; they allow you to select from three functions of any one FUNCTION switch. Lights within each SHIFT switch flash when the switch is active.

NOTE

It is not necessary to hold a SHIFT switch down when pressing any FUNCTION switch. You need only press the SHIFT switch, release it, then press the desired FUNCTION switch.

There are six FUNCTION switches, labeled RESET, MEDIA, PLOT CONTROL, LOWER LEFT, UPPER RIGHT, and POINT. Notice that above each FUNCTION switch are four labels. The top label is the name of the switch. The three labels directly above each switch identify each of the possible switch functions.

Examine the first three labels above each FUNCTION switch. The label immediately above the switch indicates the Plotter action performed when only the FUNCTION switch is pressed. To select the Plotter action indicated by the second label above the switch, press SHIFT 1 prior to pressing the desired FUNCTION switch. In the same manner, the Plotter action indicated by the third label is selected by pressing SHIFT 2 and then pressing the appropriate FUNCTION switch.

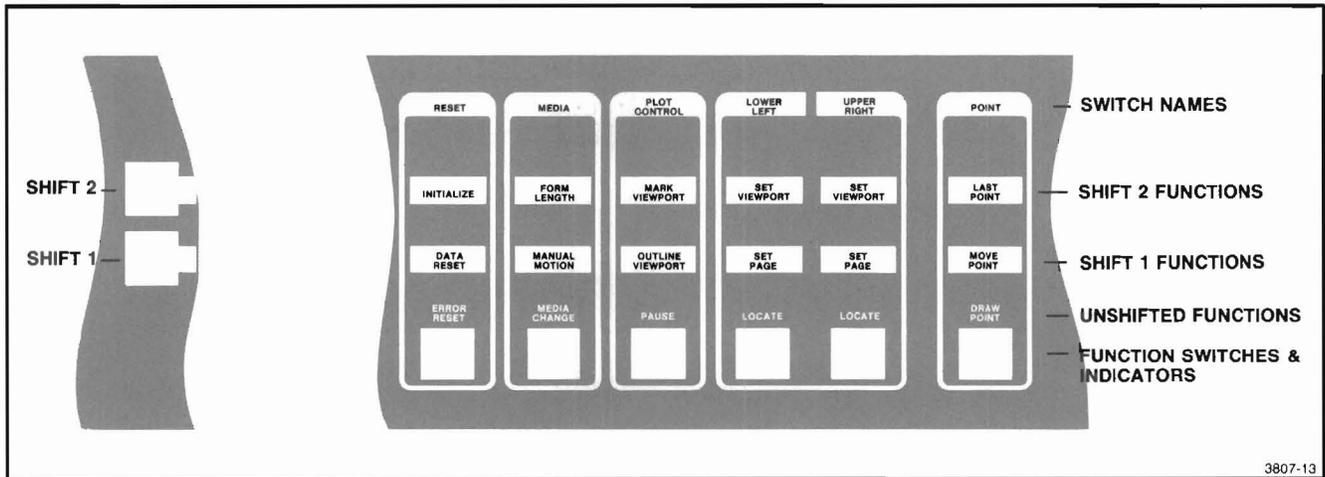


Figure 3-5. SHIFT and FUNCTION Switches.

Other Comments

A few additional comments are required to complete the SHIFT and FUNCTION switch operating instructions.

- A SHIFT switch remains active (indicated by a flashing light) for only one selection. The SHIFT switch must be pressed each time a shifted function is selected. Either SHIFT switch can be canceled simply by pressing the lighted switch a second time.
- You can change from one SHIFT switch to another by pressing the desired SHIFT switch. The first SHIFT switch is automatically turned off and the light goes out.
- If a switch without a defined shifted function is pressed and a SHIFT switch is active, the SHIFT switch will be canceled (light goes out) and no action occurs.

Examples

The following examples of PLOT CONTROL switch operation demonstrate three ways to use the SHIFT and FUNCTION switches.

To select the Pause function (normally only used when actually plotting):

1. **Press** only the PLOT CONTROL switch (the light will begin flashing).
2. **Wait** — if actively plotting, the Plotter may execute a few MOVES and DRAWS before it stops.
3. **Press** the PLOT CONTROL switch a second time to cancel the Pause function (flashing light stops).

To select the Outline Viewport function (only used when not plotting):

1. **Press** SHIFT 1 (the lower SHIFT switch).
2. **Press** the PLOT CONTROL switch.
The Plotter will draw the boundaries of the current Viewport.

To select the Mark Viewport function (only used when not plotting):

1. **Press** SHIFT 2 (the upper SHIFT switch).
2. **Press** the PLOT CONTROL switch.
The Plotter will draw the four corners of the current Viewport.

RESET SWITCH INDICATIONS AND FUNCTIONS

The RESET switch includes two light indications (the non fatal and fatal error indications) and three functions (Error Reset, Data Reset, and Initialize functions)

Reset Light Indications

The Reset light indicates either a nonfatal or a fatal error. The two indications and the appropriate action are described here.

- **Flashing Light** — indicates that one or more non-fatal errors have been detected. Processing of commands continues with no operator action required. The flashing light can be cleared by pressing the RESET switch to initiate the Error Reset function. The Error Reset function also clears the error code, the count, and the parameters accessible via the Parameter Entry Card.
- **Steady Light** — indicates that a fatal error has occurred and processing of commands has halted. A fatal error is cleared by turning the POWER switch off and on after correcting the source of the error

If the Parameter Entry Card is pushed fully in and an error occurs, the binary error code is displayed by the lights on the Parameter Entry Module. Other information about the errors is available via the Parameter Entry Module lights. (See the description of the Parameter Entry Card's Error Data line, later in this section.) The error codes are listed in Appendix C. The *4663 Programmer's Manual* includes additional error information.

NOTE

The Parameter Entry Card should be kept fully inserted to allow the error code to be read regardless of the error type.

Error Reset Function

The Error Reset function performs two tasks:

- Clears any error data accessible via the Parameter Entry Module.
- Turns off the flashing Reset light.

See the description of the Error Data line on the Parameter Entry Card for additional information about the error data.

Data Reset Function

The Data Reset function clears the Plotter's input buffer without resetting any programmable parameter values. In addition, Data Reset causes the following:

- Allows execution of commands that have completed the input buffer processing.
- Continues plotting (if data continues to be received) using data supplied subsequent to the Data Reset.
- Sets the local data reset bit in Device Status Word 0. (Refer to the description of the READ STATUS command in the *4663 Programmer's Manual*.)

The following Plotter actions can be terminated by the Data Reset function: self-test, arc drawing, circle drawing, programmable macro execution, and axis drawing. For any action that is not terminated, the Data Reset will be performed at the completion of the action.

NOTE

If Data Reset is selected while the Plotter is receiving a continuous stream of commands, the Plotter will delete all commands received until a short delay in transmission occurs.

Initialize Function

The Initialize function clears a communications problem without reinitializing the Plotter.

The Initialize function also reestablishes the pen carriage position. The pen carriage is moved to a known position (the upper-right corner of the platen) and its position is set to the known coordinate values. This may be necessary if the pen carriage is blocked or bumped with enough force to cause a loss of axis orientation. The local position modification and local data reset bits in Device Status Word 0 are set (refer to the description of the READ STATUS command in the *4663 Programmer's Manual*).

To use the Initialize function to recover from a communications problem, proceed as follows:

1. Interrupt the host computer or controller to suppress further commands.
2. Activate the Initialize function on the Plotter.
3. Restart the host computer or controller.

The action of the Initialize function is interface dependent; the action for each interface (Serial and GPIB) is discussed in the following text.

When the Serial interface is active, the Initialize function causes the following:

- The Plotter switches communications from Block mode to Continuous mode.
- The input buffer is cleared of commands.
- Pending interface communications (such as a DC1/DC3 control character or a Block mode block acknowledge character) are cancelled.

NOTE

If the Initialize function is used in conjunction with a DC1/DC3 control character, it may be necessary to send a D_1 (CTRL Q) from the terminal to enable the host computer to resume communications with the Plotter.

- The INTERFACE switches are set to ONLINE REMOTE.
- The Plotter turns the interface logically off (equivalent to DEVICE OFF command).
- Any pending output messages are canceled.
- Cancels any operator digitize enable or reestablishes any permanent enable.
- Turns off the Point light (except for Serial Command/Response Formats 3 and 4 when operator digitize is permanently enabled).
- Pen 1 is selected with the pen in the raised position.

The Initialize function does not modify any current programmable interface parameters, such as prompt character, signature character, and turnaround delay time.

When the GPIB interface is active, the Initialize function causes the following:

- Clears the input buffer.
- Sets the INTERFACE switches to ONLINE REMOTE.
- Cancels any operator digitize enable (or reestablishes any permanent enables).
- Cancels any Talk or Listen enables (unless the interface mode is Talk Only or Listen Only).
- Cancels any pending output messages.
- Pen 1 is selected with the pen in the raised position.
- Cancels any SRQ message or serial poll enables.
- Turns off the Point light (except for GPIB Command/Response Formats 5 and 6 when operator digitize is permanently enabled).

MEDIA SWITCH INDICATIONS AND FUNCTIONS

The MEDIA switch includes two light indications (flashing or on steady) and three functions. Two of the functions, Manual Motion and Form Length, require the Media Advance Option (Option 36) and the Media Form line on the Parameter Entry Card must be set to ROLL.

Media Light Indications

The Media light, whether flashing or on steady, may be turned off by pressing the MEDIA switch.

A flashing Media light has two possible meanings, depending on whether SHEET or ROLL is selected on the Media Form line of the Parameter Entry Card.

1. If the Media Form line on the Parameter Entry Card is set to SHEET, a flashing Media light indicates selection of the Media Change function. With Media Change selected, the electrostatic hold-down is off and the sheet media can be changed. Read the description of the Media Change function later in this section.
2. If the Media Form line on the Parameter Entry Card is set to ROLL, a flashing Media light indicates selection of the Form Length function. The Form Length function is described later in this section.

A Media light turned on steady indicates selection of the Manual Motion function. Manual Motion enables movement of the media using the Joystick, as described later in this section.

NOTE

On instruments that include Option 36 (Media Advance), an Out-of-Media condition is indicated by a flashing Pause light, not by the Media light.

Media Change Function

Selecting Media Change causes two different operations, depending on whether SHEET or ROLL is selected on the Media Form line of the Parameter Entry Card. (ROLL can be selected only on Plotters with the Media Advance Option installed.)

With SHEET selected on the Parameter Entry Card, selecting Media Change causes the following:

- Moves the pen carriage to the upper-right corner of the platen (this position is called the *load point*).
- Turns the electrostatic hold-down off.
- Flashes the Media light.

To cancel the Media Change function, press the MEDIA switch a second time. This turns the electrostatic hold-down on, turns off the flashing Media light, and allows plotting to resume.

NOTE

If it is necessary to smooth the media before plotting resumes, press the PLOT CONTROL switch to select the Pause function before pressing the MEDIA switch the second time. This turns the electrostatic hold-down on but inhibits plotting until Pause is deactivated. See the Pause function description later in this section.

With the Media Advance Option installed and ROLL selected on the Parameter Entry Card, Media Change advances a length of media across the platen. When the MEDIA switch is pressed, the following occurs:

- The pen holder moves to the load position.
- A fresh section of the roll media is moved onto the platen. The length of the new section of media is determined by the current form length parameter. This parameter is modified by Parameter Entry Card settings, by the SET FORM LENGTH command, or by the Form Length function. The Form Length function is described later in this section.
- The Plotter resumes plotting (unless the Pause function was selected before the Media Change).

Manual Motion Function (Requires Option 36)

This function requires the Media Advance Option and selection of ROLL on the Media Form line of the Parameter Entry Card. Manual Motion has several uses, including:

- Moving a random length of the roll media onto the platen.
- Aligning preprinted media with the index arrow on the lower media guide.
- Moving a group of completed plots to the left side of the Plotter to prepare for separation of the plots using the paper tear bar.

When the Manual Motion function is selected, the following occurs:

- The Media light turns on steady and the pen carriage moves to the load point.
- The X-axis of the Joystick is enabled so the operator can advance the media across the platen. The rate of advance is proportional to the angle of Joystick deflection; maximum speed is obtained by moving the Joystick to the extreme left or right.

To disable this function, press the MEDIA switch again. The Media light turns off.

Form Length Function (Requires Option 36)

The default length of media advanced during a media change operation or by a PAGE CHANGE command is established in one of two ways: 1) by setting the Parameter Entry Card to one of several available media sizes, or 2) by the Set Page, function described later in this section. However, since standard lengths may not meet all requirements, other form lengths may be established by using the Form Length function described here. (The SET FORM LENGTH command is also used to set form lengths.)

NOTE

The default form length is the distance from the index arrow on the media guide to a point 1-1/4 inches beyond the left Page (not media) boundary.

To establish a new form length, do the following:

1. **If required**, use the Manual Motion function to position the media. The beginning of the desired form should be aligned with the arrow on the media guide.
2. **Select** the Form Length function (press the upper SHIFT switch and then press the MEDIA switch). The Media light begins to flash and the pen carriage moves to the load point.
3. **Move** the Joystick to the right to advance the media the required length.
4. **Press** the MEDIA switch to store the required length in memory and to terminate this function.

Now, when the Plotter receives either a PAGE CHANGE command or when Media Change is initiated from the front panel, the media will be advanced the distance set during the Form Length function.

You can use any of the following to change the existing form length:

- Use the procedure above.
- Modify the Page size with a Set Page function.
- Send a SET FORM LENGTH command.
- Establish an Initial Form Length by making a selection on one of Parameter Entry Card lines two through six.
- Send a DEVICE RESET (0,1,3) command to re-establish the selected Initial Form Length selected on the Parameter Entry Card.

CONTROLS AND INDICATORS

PLOT CONTROL SWITCH INDICATIONS AND FUNCTIONS

The PLOT CONTROL switch gives two light indications and performs three functions. The Plot Control light signals selection of the Pause function or an out-of-media condition; the three functions are Pause, Outline Viewport, and Mark Viewport. The light indications and functions are discussed here.

Plot Control Light Indications

The Plot Control light flashes to indicate one of two conditions:

- The Pause function has been selected. Several MOVE and DRAW commands can be executed before plotting stops.
- The Plotter has run out of roll media.

Pause Function

The Pause function interrupts plotting and can be used to allow pens to be changed or to smooth the media. While Pause is active, only the READ STATUS command and the interface commands are executed. (The Interface commands are any of the commands listed in the Serial Interface Commands or the GPIB Interface Commands sections of the *4663 Programmer's Manual*.) Other commands, such as MOVE and DRAW, can be received, but they are not executed. The READ STATUS command is executed as long as it is not preceded by other commands.

The operating characteristics of some of the front panel controls during Pause mode are:

- If the pen carriage is repositioned using the Joystick or the Locate function, when Pause is deactivated and plotting resumes, the pen carriage returns to the correct position.
- If digitizing is enabled and the POINT switch is pressed, pen location information is transmitted to the host or controller.
- The Mark Viewport or the Outline Viewport functions will not be performed until Pause is disabled.

CAUTION

With the Serial interface, if the Pause function is selected while operating in Continuous mode via the Serial interface and no active rate control is used, commands sent from the host computer may be lost. Refer to the 4663 Programmer's Manual for information about communicating with other devices.

The following occurs when the Pause function is selected:

- The Plot Control light flashes.
- If Pause is selected while plotting, the Plotter may execute a few MOVES or DRAWS before pausing.
- Plotting stops.

To resume plotting, press the PLOT CONTROL switch.

Outline Viewport Function

NOTE

A detailed discussion of the Viewport, Page, and their related units of measure is included in the Introduction section of the 4663 Programmer's Reference Manual.

The Outline Viewport function draws a line along the perimeter of the Viewport, indicating the boundary of the current plotting area. After the Viewport is outlined, the pen carriage returns to its previous location. This function can be initiated using the front panel controls or by the OUTLINE VIEWPORT command.

When the Pause function is selected, any Outline Viewport (or Mark Viewport) operations will not be performed until the PLOT CONTROL switch is pressed to exit the Pause function.

NOTE

To protect the platen, media should always be installed when using this function.

Mark Viewport Function

The Mark Viewport function draws 90° corner brackets at the four corners of the current Viewport. This is useful for aligning overhead transparencies, grid media, and so forth.

When the Pause function is selected, any Mark Viewport operations will not be performed until the PLOT CONTROL switch is pressed to cancel the Pause function. This function can be initiated by the front panel controls or by the MARK VIEWPORT command.

NOTE

To protect the platen, media should always be installed when using the Mark Viewport function.

LOWER LEFT AND UPPER RIGHT SWITCHES, INDICATIONS, AND FUNCTIONS

These two switches activate several functions and include lights to signal when clipping occurs. The switches can be used to locate corners of the Page and the Viewport, to set the Page size or position, and to set the Viewport size and locations. The lights operate in tandem; they are both on or both off. Each indication and function is described in turn.

LOWER LEFT and UPPER RIGHT Switch Indications

NOTE

Clipping and clipping boundaries are discussed in the Introduction section of the 4663 Programmer's Manual.

These lights, when on, signal the occurrence of clipping. Both lights normally turn on at power-up since the initial pen carriage position (the load point) is outside the power-up Viewport. Any subsequent command that positions the pen carriage within the Viewport turns the lights off, indicating that the coordinates are within the current Viewport or Page boundaries and clipping is no longer occurring.

Both lights on indicates that clipping occurred. The lights go on when a command or front panel function attempts to position the pen carriage at coordinates under one of three conditions:

- Either or both coordinates fall outside the Viewport and clipping control is in effect.
- Either or both coordinates fall outside the Page.
- Either or both coordinates are within the current Viewport or Page but fall outside the platen clipping boundary. This situation might occur after repositioning the Page or after vertical orientation is selected for a large media size (e.g., C-size).

Locate Functions

NOTE

Clipping and clipping boundaries are discussed in the Introduction section of the 4663 Programmer's Manual.

Both the LOWER LEFT and the UPPER RIGHT switches perform two Locate functions: Locate Page and Locate Viewport.

- Momentarily pressing, then releasing, either the LOWER LEFT or the UPPER RIGHT switch moves the pen carriage to the corresponding corner of the Page.
- Holding either switch until the Plotter bell sounds once (approximately two seconds) causes the pen carriage to immediately move to the corner of the Page; when the switch is released, the pen carriage moves to the corner of the Viewport.

Set Page Function (Repositioning the Page)

One of the Set Page functions allows repositioning of the Page (a second Set Page function allows readjustment of the Page size and is discussed next). The repositioning function can be used, for example, to align the Page position with preprinted forms.

To reposition the Page (without adjusting the Page size) proceed as follows:

1. **Move** the crosshair cursor, using the Joystick, to the new position of the lower-left Page corner. (For example, align the crosshair cursor with the grid marks on the lower-left corner of a preprinted form.)
2. **Press** SHIFT 1.
3. **Press** the LOWER LEFT switch.

This procedure sets the lower-left corner of the Page and at the same time repositions the entire Page. The upper-right corner of the Page shifts to maintain the same Page size. The newly positioned Page corner boundaries can be verified by first momentarily pressing the LOCATE LOWER LEFT switch and then pressing the LOCATE UPPER RIGHT switch. The crosshair cursor travels to the respective corners of the Page.

When the Page is repositioned, the form length used during media advance operations (using roll media) is updated to reflect the distance from the index arrow on the media guide to a point 1-1/4 inches past the left Page border.

NOTE

If, as a result of a Locate Upper Right function, the Lower Left and Upper Right (Locate) lights turn on, part of the Page has been positioned beyond the platen clipping boundary and the crosshair cursor has stopped at that boundary. Consequently, portions of subsequent plots that lie outside this boundary will be clipped (i.e., not plotted). Page size is not altered; complete Page access can be restored by repositioning the Page again. If the Locate lights are not on, the crosshair cursor has moved to the upper-right corner of the Page and the complete Page can be accessed during subsequent plotting.

Set Page Function (Setting Page Size)

The Page size can be adjusted to accomplish one or more of the following:

- To produce a custom Page size.
- To produce mirror-image or upside-down plots (instructions for this procedure are in Section 2).
- To adjust the Page size to compensate for tolerance differences in the size of preprinted media.
- As part of a SAVE USER-DEFINED Page size operation.

To set a Page size, set the lower-left corner of the Page and then set the upper-right corner of the Page (in that order) as follows:

1. **Move** the crosshair cursor, using the Joystick, to the new position of the lower-left Page corner (or, if no change, skip to step 3).
2. **Press** SHIFT 1, then the LOWER LEFT switch
3. **Move** the crosshair cursor, using the Joystick, to the position of the new upper right Page corner.
4. **Press** SHIFT 1, then the UPPER RIGHT switch.

This procedure establishes the position of the lower-left and upper-right Page corners, and, therefore, establishes the physical size of the rectangular Page. (The Viewport size also changes to maintain the same Viewport-to-Page ratio.) If ROLL is selected on the Media Form line of the Parameter Entry Card, the form length used during a media advance operation is updated to reflect the distance from the index arrow on the media guide to 1-1/4 inches past the left Page border.

NOTE

At this point in the procedure, two choices are available: 1) no numerical adjustment, or 2) automatic numerical adjustment of coordinate ranges for the Page.

Setting Page Size Without Numerical Adjustment.

This operation is useful when fine-tuning the Plotter to compensate for variations in the size of preprinted media, or for any application where the aspect ratio of the Page and plots should change correspondingly.

The Setting Page Size procedure produces a new Page size, but does not alter the coordinate ranges associated with the Page (or Viewport or Window). Note that, because the Page coordinate ranges do not change, any alteration in the aspect ratio of the Page causes distortion of the plot.

NOTE

To maintain the Page size without numerical adjustment, avoid subsequent use of the DEVICE RESET (0, 1, or 3) command and avoid changes to the following lines on the Parameter Entry Card: Media Form, Initial Page Size, Initial Page Format, Page Orientation, and Initial Aspect Ratio.

Setting Page Size With Numerical Adjustment. The second choice of operation removes any distortion of the plot that would otherwise occur as a result of establishing a Page with an altered aspect ratio. This occurs whenever a front panel Set Page function is followed by a SAVE USER DEFINED operation (on the Parameter Entry Card) or the DEVICE RESET command (0 or 1). The Plotter then automatically adjusts the Page units numerically so the horizontal and vertical units are of equal physical length; in addition, if millimeters are selected (by the SET DEVICE UNITS command), the length of the units are adjusted to millimeters.

The numerical adjustments can occur on both axes. A discussion of numerical range adjustments is discussed in the description of the Initial Page Size line on the Parameter Entry Card, later in this section. After this adjustment, a new initial Viewport is established according to the Initial Aspect Ratio line selection on the Parameter Entry Card.

The user can save the Page size set by the above procedure as a user-defined Initial Page size. To do so, select SAVE USER DEFINED on the Initial Page Size line of the Parameter Entry Card.

NOTE

To maintain Pages that are not saved using the SAVE USER DEFINED function, avoid the following:

- *Turning the power off.*
- *Making selections on the following Parameter Entry Card lines: Media Form, Initial Page Size, Initial Page Format, Page Orientation, and Initial Aspect Ratio.*
- *Using the DEVICE RESET (3) command.*

This completes the Set Page Size procedure.

Set Viewport Lower Left and Upper Right Functions

The Viewport size can be reduced to fit several plots on a single piece of media or to provide space on the plot for notation outside the Viewport area.

Viewports are normally set under program control using the SET VIEWPORT command, but, if desired, can be set independently using the Set Viewport Lower-Left and Upper-Right functions.

To set the Viewport from the front panel, move the crosshair cursor to the desired location for the lower-left corner of the Viewport and press SHIFT 2, then press LOWER LEFT. Move the crosshair cursor to the desired location for the upper-right Viewport corner and press SHIFT 2, then press LOWER LEFT. The order in which the Viewport corners is selected does not matter. The Viewport upper-right corner location is not affected by changes to the Viewport lower-left corner position.

The Viewport must be contained within the current plotting Page. If the operator attempts to place the Viewport boundary outside the current Page boundary, the Plotter sets that corner of the Viewport boundary to the nearest point on the current Page boundary and then reports an error.

CONTROLS AND INDICATORS

POINT SWITCH INDICATIONS AND FUNCTIONS (DIGITIZATION)

The POINT switch includes two light indications (flashing and on steady) and three functions. These switches and lights, when enabled, allow the operator to digitize coordinate points and send them to the host or controller.

Point Light Indications

A Point light turned on steady indicates that Point switch functions are either enabled or permanently enabled for operator digitizing. See the *4663 Programmer's Reference Manual* for information about the digitizing functions and related commands used to enable digitizing.

A flashing Point light, sometimes referred to as a *Prompt light*, signals the operator to perform a predefined action associated with the POINT switch.

The flashing Point light is turned on and off by PROMPT LIGHT ON and PROMPT LIGHT OFF commands, respectively. In addition, any command that sets the steady indication (e.g., OPERATOR DIGITIZE ENABLE command) or clears the steady indication also turns off the flashing Point light.

POINT Switch Functions

The Draw Point and Move Point functions are used during operator digitizing. They are used to store and then send pen carriage position information and Move vs. Draw information for points on the Viewport (or Page). If any POINT switch functions are selected when the POINT switch is not enabled, the Plotter's bell sounds once.

Typical digitizing actions are as follows:

- Locate a point using the Joystick.
- Send the coordinates of the point to the host computer or GPIB controller via a front panel Draw Point or Move Point function.

The Last Point function sends the last set of coordinates, signals the host or controller that digitizing is complete, and disables the POINT switch functions. (POINT switch functions are not disabled for certain Command/ Response Formats. See the discussion of the Initial Command/Response Format line on the Parameter Entry Card, later in this section, for more information.)

PARAMETER ENTRY MODULE

The Parameter Entry Module provides a convenient way to enter, observe, and modify Plotter parameters. The types of parameters entered via the Parameter Entry Module include parameters (such as the interface parameters) that must be set before plotting begins. There are also optional parameters, such as pen speed, line quality, Page size, and Page orientation selections, which can be used to optimize the plot quality or presentation independently of the host computer/controller software.

MAJOR PARTS OF THE PARAMETER ENTRY MODULE

The major parts of the Parameter Entry Module, shown in Figure 3-6, are as follows:

- Parameter Entry Card — This card serves as a directory of parameters and of the available selections.
- Switches — These eight switches are used to select parameters listed on the Parameter Entry Card.

- Lights (lighted switches) — The lights within the eight switches indicate the current parameter selections on the Parameter Entry Card. The lights also indicate error codes (see the Error Data line discussion later in this section for information about error codes).
- INIT Light — This light signals the operator to push the Parameter Entry Card fully in. Doing this synchronizes the Parameter Entry Card.
- Battery-Backed RAM (not shown) — This is a section of RAM (Plotter memory) that is battery-powered to “remember” the Parameter Entry Card settings. This feature allows the Plotter to be turned off for up to approximately 90 days without having to reestablish the Parameter Entry Card selections. If Option 37 (Added Parameters Storage) is installed, the Plotter can be turned off for up to approximately 45 days without having to reestablish the Parameter Entry Card selections.

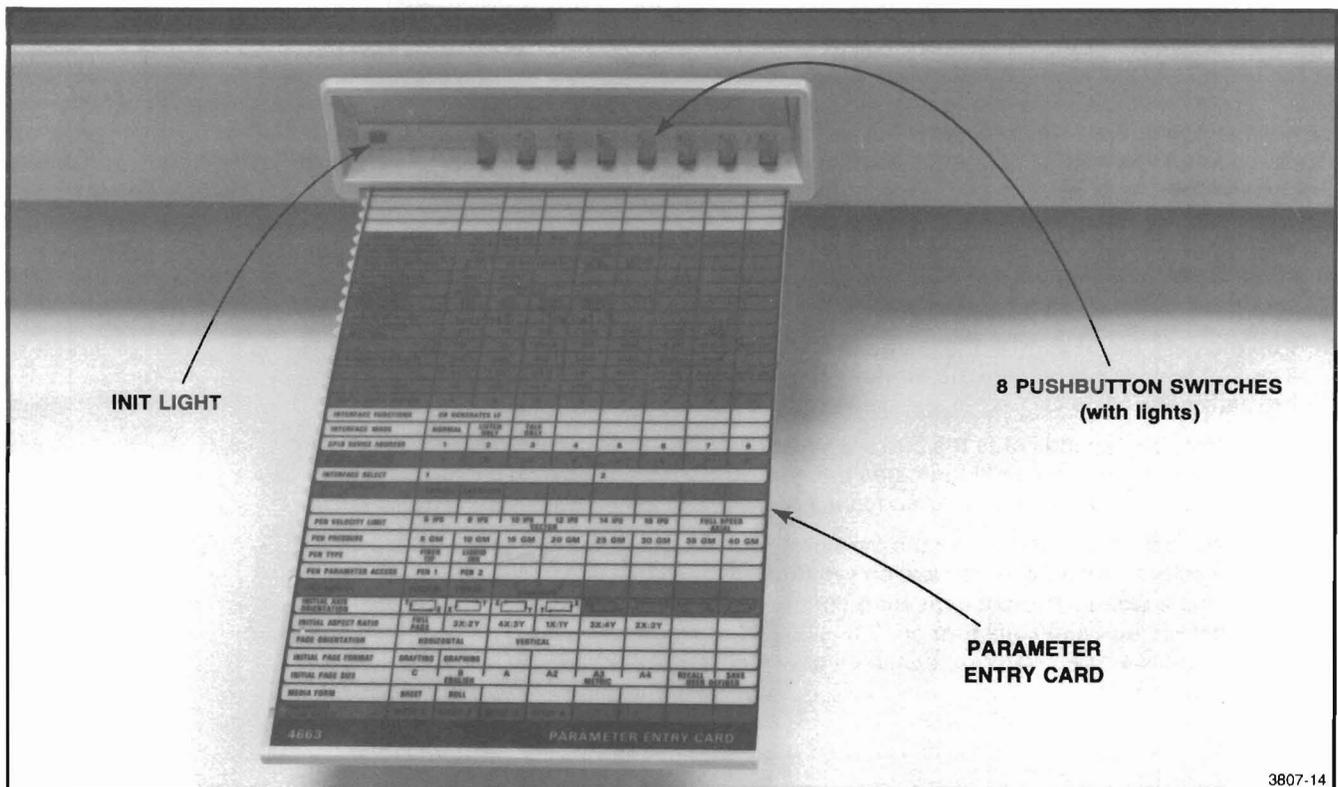


Figure 3-6. Parameter Entry Module.

OPERATING THE PARAMETER ENTRY CARD

Pull out the Parameter Entry Card and examine the organization of the lines. As shown in Figure 3-7, the lines are generally organized according to their function. The major groups of lines are the Media Group, the Pen Group, the GPIB Interface Group, and the Serial Interface Group. Other lines, such as Line Quality, Interface Select, and Alpha Character Quality are not grouped.

Changes to any Parameter Entry Card settings are made on a line-by-line basis as follows:

1. **Push** in the Parameter Entry Card fully before making any selections. This enables and synchronizes the Parameter Entry Card and turns off the INIT light.

NOTE

The INIT light, located on the left of the Parameter Entry Card, turns on at power-up (if the Parameter Entry Card is not fully inserted), when a change is made to the Interface Select line, and when a change is made to the Parameter Setup Select line that changes the interface selection. When the INIT light turns on, push the Parameter Entry Card in fully before reading or modifying any lines.

If the bell sounds at power-up, a valid selection has not been made on the Interface Select line of the Parameter Entry Card. A correct selection must be made before operating the Plotter with the host computer or a GPIB controller. See the Interface Select line description later in this section for more information.

2. **Pull** the card out to expose the line to be modified. The first line visible outside the Plotter's bezel is the active line.

The lighted switch indicates the current selection for the active line. If the light indicates the selection(s) you want, no further action is required.
3. **Press** the switch located above the parameter you want to select. The light in that switch will turn on and, in most cases, the light indicating the previous selection will automatically turn off. Some lines allow multiple entries so more than one light can be on at a time.

Before any selection can be made on a line within one of the interface groups (either Serial or GPIB), the corresponding interface must be installed and selected on the Interface Select line of the Parameter Entry Card. The Plotter cancels improper interface group selections and sounds the bell.

On most lines, making a selection replaces any current selection. Other lines require that a current selection be changed by pressing the switch a second time to disable the function (and extinguish the light).

Selections that cover more than one column (for example, CR GENERATES LF on the Interface Functions line) can be selected by pressing a switch over any or all of the columns.

Some selections in the Serial Interface Group modify selections on other lines within that group. Any such interaction is carefully noted in the line descriptions that follow.

PARAMETER ENTRY CARD LINE DESCRIPTIONS

The following pages include detailed information about the function of parameters shown on each line of the Parameter Entry Card.

For those who seek only enough information to get started and to make basic plots, refer to Section 2, *Getting Started*. That section includes information about which Parameter Entry Card selections you should make for general plotting.

EXECUTE SELF TEST	1	2	3	4	5	6	7	8
ERROR DATA	ERROR CODE	ERROR COUNT	1	2	3	4	5	6
OUTPUT TERMINATOR	CR	CR & EOT	NONE					
ATTENTION CHARACTER	ESC	!	^	SYN				
INTERFACE FUNCTIONS	AUTO MUTE	CR GENERATES LF	DEL IGNORE	CARRIER DETECT				
DC1/DC3 CONTROL	INPUT	OUTPUT						
COMMUNICATIONS CONTROL MODE	FULL DUPLEX	HARDWARE RECEIVE FLAGGING						
RECEIVE PARITY	ODD	EVEN	IGNORE LOGIC 0	IGNORE LOGIC 1				
TRANSMIT PARITY	ODD	EVEN	IGNORE LOGIC 0	IGNORE LOGIC 1				
CHARACTER FORMAT	7 DATA BITS/CHAR	8	1 STOP BITS	2				
TRANSMIT BAUD RATE LIMIT	50	75	110	300	600	1200	FULL SPEED	
	50	75	134.5	150	1800	1X EXT	16X EXT	64X EXT
TRANSMIT BAUD RATE	110	300	600	1200	2400	4800	9600	
	50	75	134.5	150	1800	1X EXT	16X EXT	64X EXT
RECEIVE BAUD RATE	110	300	600	1200	2400	4800	9600	
SERIAL DEVICE ADDRESS	A	B	C	D	E	F	G	H
INTERFACE FUNCTIONS	CR GENERATES LF							
INTERFACE MODE	NORMAL	LISTEN ONLY	TALK ONLY					
GPIB DEVICE ADDRESS	1	2	3	4	5	6	7	8
INITIAL COMMAND/RESPONSE FORMAT	1	2	3	4	5	6	7	8
INTERFACE SELECT	1			2				
ALPHA CHARACTER QUALITY	NORMAL	ENHANCED						
PEN VELOCITY LIMIT	6 IPS	8 IPS	10 IPS	12 IPS	14 IPS	16 IPS	FULL SPEED	AXIAL
			VECTOR					
PEN PRESSURE	5 GM	10 GM	15 GM	20 GM	25 GM	30 GM	35 GM	40 GM
PEN TYPE	FIBER TIP	WET INK		PLASTIC HARD TIP				
PEN PARAMETER ACCESS	PEN 1	PEN 2						
LINE QUALITY	PREVIEW	NORMAL	1 ENHANCED		2			
INITIAL AXIS ORIENTATION	Y <input type="checkbox"/> X <input type="checkbox"/>	X <input type="checkbox"/> Y <input type="checkbox"/>	X <input type="checkbox"/> Y <input type="checkbox"/>	Y <input type="checkbox"/> X <input type="checkbox"/>	X <input type="checkbox"/> Y <input type="checkbox"/>	Y <input type="checkbox"/> X <input type="checkbox"/>	Y <input type="checkbox"/> X <input type="checkbox"/>	X <input type="checkbox"/> Y <input type="checkbox"/>
INITIAL ASPECT RATIO	FULL PAGE	3X:2Y	4X:3Y	1X:1Y	3X:4Y	2X:3Y		
PAGE ORIENTATION	HORIZONTAL		VERTICAL					
INITIAL PAGE FORMAT	DRAFTING	GRAPHING						
INITIAL PAGE SIZE	C	B ENGLISH	A	A2	A3 METRIC	A4	RECALL USER	SAVE DEFINED
MEDIA FORM	SHEET	ROLL						
PARAMETER SETUP SELECT	SETUP 1	SETUP 2	SETUP 3	SETUP 4				
4663								
PARAMETER ENTRY CARD								

SERIAL INTERFACE GROUP

GPIB INTERFACE GROUP

PEN GROUP

MEDIA GROUP

3807-15

Figure 3-7. Parameter Entry Card.

CONTROLS AND INDICATORS

Parameter Setup Select Line

NOTE

The following description applies only to Plotters equipped with Option 37 (Additional Parameter Storage Option). For standard Plotters, select SETUP 1 and proceed to the descriptions of the Media Group.

A set of selections for each of the card parameters is referred to as a *parameter entry setup*. With Option 37, four setups can be established and maintained, allowing quick selection of an appropriate operating configuration without having to reset each line on the Parameter Entry Card.

To change any parameter entry setup, or to operate using any of the four set-ups:

1. **Push** the Parameter Entry Card in fully. (This is required to resynchronize the card after the power-up action).
2. **Pull** the Parameter Entry Card out to the Parameter Setup Select line.
3. **Press** the desired SETUP switch. The lighted switch indicates the current selection.
4. **Push** the Parameter Entry Card in fully. (This step is also required to resynchronize the Parameter Entry Card after the power-up action associated with a change to the SETUP selection.)
5. **Pull** out the Parameter Entry Card to change the settings on any or all of the following Parameter Entry Card lines, as necessary.

The Plotter will utilize the selected set of parameters until another SETUP switch is pressed.

MEDIA GROUP

The Media Group allows the 4663 Plotter to appear to the host controller as a C-, B-, or A-size Plotter to meet different plotting requirements. The user can configure the Plotter to provide, for example, a C-size quick verification plot on roll media, a high quality B-size final plot, and an A-size plot made on sheet media for a notebook. All of these can be plotted without modifying the host software program, as long as the Initial Aspect Ratio line on the Parameter Entry Card remains unchanged.

The Media Group consists of six lines. The first five lines allow selection of parameters that, as a group, determine the following: the Initial Page, the Initial Window, the Initial Viewport, and the Initial Form Length for roll media operation. When changes are made on any one of the five lines, the complete set of parameters is recomputed and changed accordingly. When these parameters are recomputed, any transformations established by Plotter commands or any Viewport set via the front panel is automatically deleted.

The sixth line in the Media Group functions independently from the first five lines. This line, the Initial Axis Orientation line, offers selections to re-orient and/or make mirror images of the plot. The purpose of each line is summarized here.

- **Media Form** — Sets the Plotter to use either roll or sheet media.
- **Initial Page Size** — Sets either a standard Page size by specifying media size or sets a user-defined size.
- **Initial Page Format** — Sets the Page size to meet Drafting or Graphing standards for the selected media size.
- **Page Orientation** — Allows either horizontal or vertical orientation of the Page.
- **Initial Aspect Ratio** — Specifies the aspect ratio of the Initial Viewport.
- **Initial Axis Orientation** — Determines the orientation of the axes for plotting.

Detailed information about each line is provided in the following text.

Media Form Line

The Media Form line selections, ROLL and SHEET, set the Plotter to use either roll or sheet media. The Initial Page position and the media change operation are affected by these settings.

NOTE

Operation in ROLL mode requires Option 36 (Media Advance Option).

One function of this line is to allow the operator to specify the media change operation that corresponds to the selected media format. When SHEET is selected, the front panel MEDIA switch (or the PAGE CHANGE command) moves the pen carriage out of the way and turns off the electrostatic hold-down. When ROLL is selected, the MEDIA switch, when pressed, advances a length of roll media. (See the descriptions of Form Length and Media Change functions earlier in this section.) The electrostatic hold-down is disabled when ROLL is selected. If desired, a Media Form selection of SHEET can be used with roll media to enable the electrostatic hold-down.

NOTE

When switching from SHEET to ROLL, the media should not be changed until the electrostatic charge has dissipated from the media. Otherwise, the media sticks to the platen and will not move properly.

The Media Form selection also adjusts the Page position according to the type of media installed. When describing the Page position of sheet media, the media is assumed to be positioned with the lower edge against the lower media guide and the right edge located at the arrow at the right end of the guide. When describing the Page position of roll media, the media is assumed to be positioned with the lower edge 0.05 inch above the media guide and the right end of the form located at the arrow. When Roll is selected, the Page will be 0.55 inch above the lower media guide to account for the 1/2-inch wide tear-off strip used on roll media and the spacing between the media and the media guide.

Initial Page Size Line

NOTE

A standard Initial Page size is established by the Initial Page Size line and the Initial Page Format line. Together these two lines provide twelve Initial Page sizes. Appendix A, Characteristics, includes the Page sizes and margin dimensions.

The Initial Page Size line can be used to obtain a standard Initial Page size for a specified media size and Page format or to select a user-defined Initial Page size. This line can also be used to save a user-defined Initial Page size. You can use three English media sizes (C, B and A) and three metric media sizes (A2, A3 and A4).

When an Initial Page is established, the form length used during media advance operations (performed with Option 36 only) is updated.

The user-defined Initial Page size is established as follows:

1. Use the front panel Set Page Lower Left and Set Page Upper Right functions (in that order) to set the desired physical Initial Page size.
2. Press the switch above SAVE on the Initial Page Size line.

This causes the Initial Page size to be saved and automatically recalled, causing the light above RECALL on the Initial Page Size line to be turned on.

Whenever an Initial Page is established, numerical ranges are assigned as follows:

- The lower left corner is 0,0.
- For ADUs (Addressable Device Units), the longer axis range is 4096. ADUs are the default Device Unit selection for a Serial interface.
- For GDUs (Graphic Device Units), the shorter axis range is 100. GDUs are the default Device Unit selection for a GPIB interface.
- For both ADUs and GDU's, the remaining axis range is set to make the physical size of one horizontal unit equal to the size of one vertical unit.
- For millimeters, both axes are expressed directly in millimeters.

CONTROLS AND INDICATORS

Initial Page Format Line

This line establishes Page margins conforming to either drafting or graphing standards, as shown in Appendix A. The Page margins and the standard media size selection on the Initial Page Size line determine the Initial Page size.

NOTE

The Initial Page Format line has no effect on the user-defined Initial Page Size selection.

Graphing margins for C, B, and A sizes have wider margins along one side for binding purposes (such as three-hole punch) and are set to conform to most preprinted graph paper. The A2, A3, and A4 sizes also have one wider margin, which is set according to the DIN 6781 standard.

The drafting margins for C, B, and A sizes are set according to the American National Standard drawing sheet size and format ANSI Y14.1-1975; A2, A3, and A4 sizes are set according to the DIN 6781 standard.

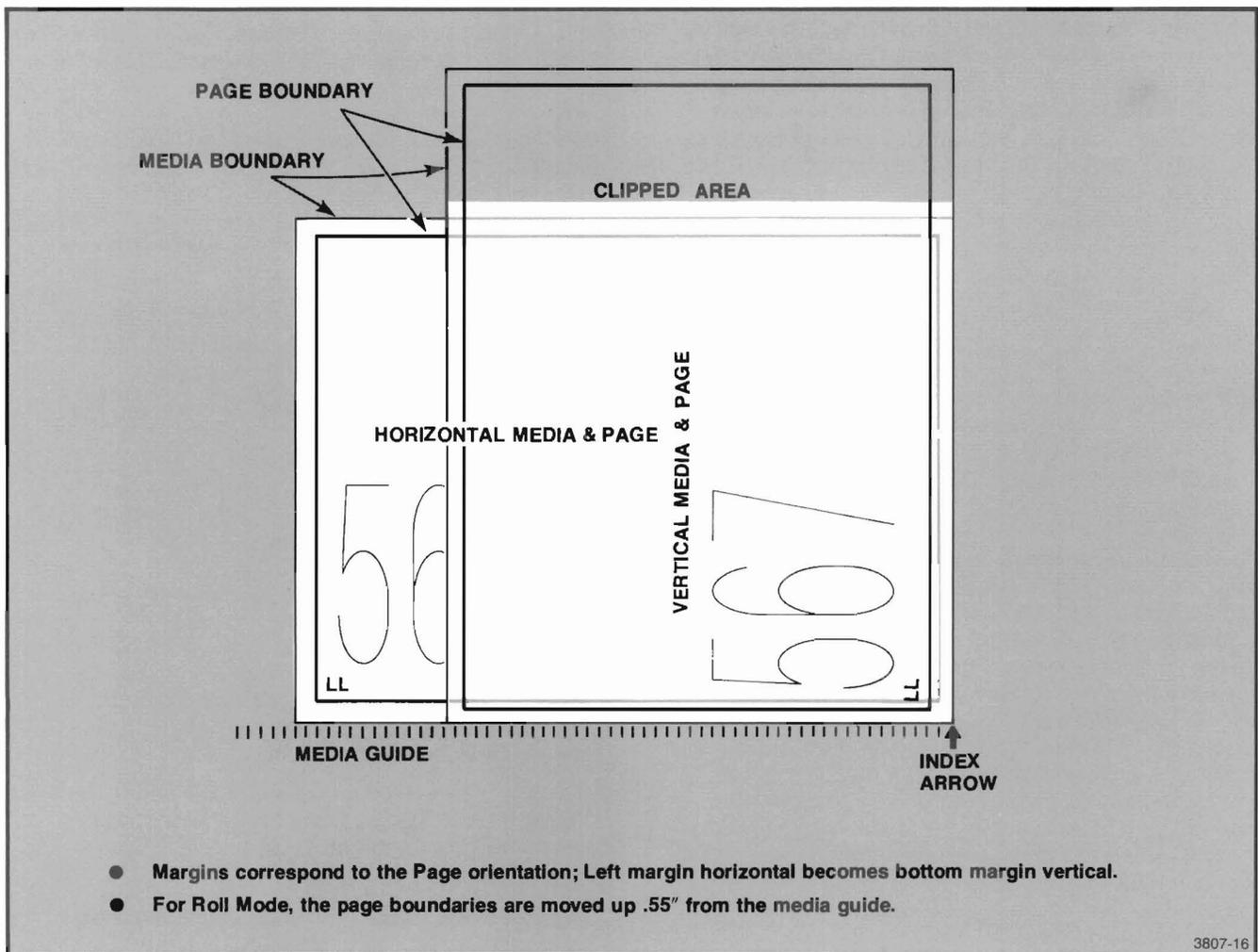


Figure 3-8. Page Orientation (for C-Size Drafting).

NOTE

The B-standard media size is 11x17 inches for drafting and 11x16.5 inches for graphing. For all other selections of Initial Page Size, the Initial Page Format line selection does not change the assumed media size.

Page Orientation Line

The Page Orientation line allows the Page to be oriented horizontally or vertically. A horizontal to vertical conversion is equivalent to rotating a piece of media (and the Page) 90° counterclockwise about the lower-left corner of the media, then translating the media until the lower-left corner of the media is located at the previous position of the lower-right corner (see Figure 3-8). The precise position of the Page depends upon Page margins for preselected media sizes. Note that part of the reoriented media and Page may lie outside the platen clipping boundary.

When using a user-defined Page size (set via the front panel Set Page Lower Left and Set Page Upper Right functions) in conjunction with a VERTICAL selection on the Page Orientation line, observe the following: the lower-left corner must be the normal lower-left corner (i.e., for each axis the corner physically nearest the Joystick). Avoid reversals of Page corners.

Initial Aspect Ratio Line

The Initial Aspect Ratio line selects the initial aspect ratio for the Initial Viewport and for the Initial Window. The aspect ratio is the length to width ratio of the Viewport or Window. For example, a selection of 3X:2Y creates a Viewport with an X-axis 1-1/2 times the length of the Y-axis. The initial aspect ratios are shown in Figure 3-9.

The FULL PAGE selection produces an Initial Page, Initial Viewport, and Initial Window of the same dimensions. For this selection, all points have the same numerical address in either World or Device Units.

For other selections on the Initial Aspect Ratio line, the Initial Viewport is the largest Viewport with the specified aspect ratio that fits within the Initial Page. The lower-left corners of the Initial Viewport and Initial Page are at the same point on the platen.

The numerical ranges for the Initial Window and for the Initial Viewport are established according to the rules for the Initial Page, as listed in the previous description for the Initial Page Size line. Note that, except for FULL PAGE and millimeters, the numerical address for a point within the Initial Viewport may be different for World Units vs. Device Units.

Initial Axis Orientation Line

The Initial Axis Orientation line can be used to produce four different orientations of plots within the Viewport and to produce mirror image plots. This Parameter Entry Card line does not affect selections made on other Media Group lines, does not affect Moves and Draws specified in Device Units, and does not affect the front panel Mark Viewport or the Outline Viewport functions.

The first (left-most) selection on the Initial Axis Orientation line produces the normal result, with the usual relationship between the window and the viewport and the usual axis orientations. The fifth selection produces a plot with the X- and Y-axes interchanged, while maintaining the lower-left corner intact.

CONTROLS AND INDICATORS

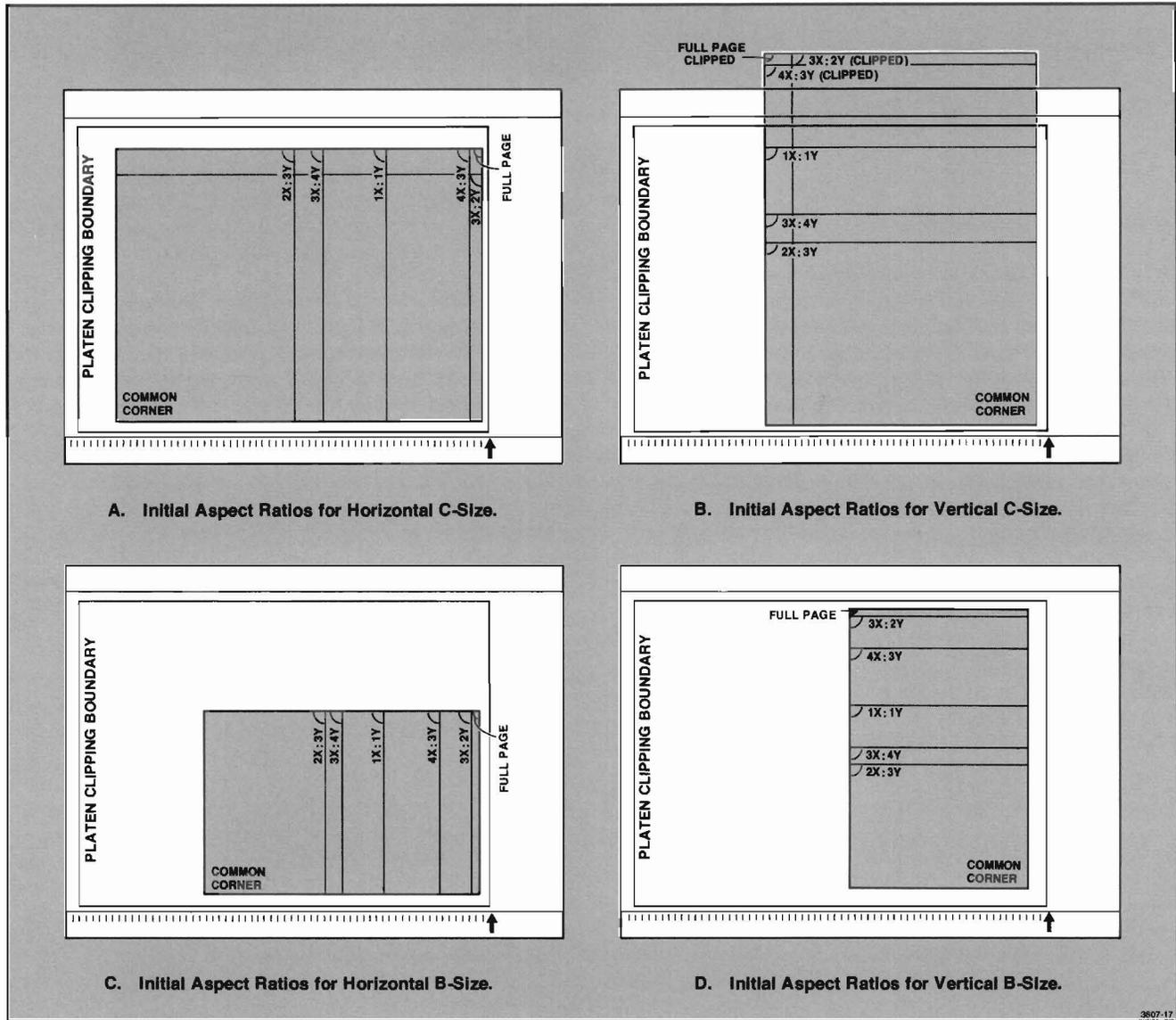


Figure 3-9. Viewports for Different Initial Aspect Ratios.

The three selections after the first (or fifth) selection change the orientation of the plot. To simulate these changes, consider that each successive selection rotates the plot clockwise in 90° steps about the lower-left corner of the Viewport, then translates the plot such that the lower-left corner of the plot moves to the upper-left, upper-right, or lower-right corner of the Viewport, respectively. Figure 3-10 illustrates the axis orientations established by each selection on the Initial Axis Orientation line. Note that the numerical ranges used along this axis for plotting within the Viewport are modified by this selection.

The selection on this line affects only plotting done in World Units. When Device Units are used, the axis orientation corresponds to the normal orientation (set by the left-most column selection).

Line Quality Line

Selections on this line determine the quality of lines drawn on the plot. Four line quality selections are available: PREVIEW, NORMAL, ENHANCED 1, and ENHANCED 2. PREVIEW draws at the fastest speed to provide plots suitable for a quick preview. NORMAL, ENHANCED 1, and ENHANCED 2 provide successively better line quality, but reduce plotting speed accordingly.

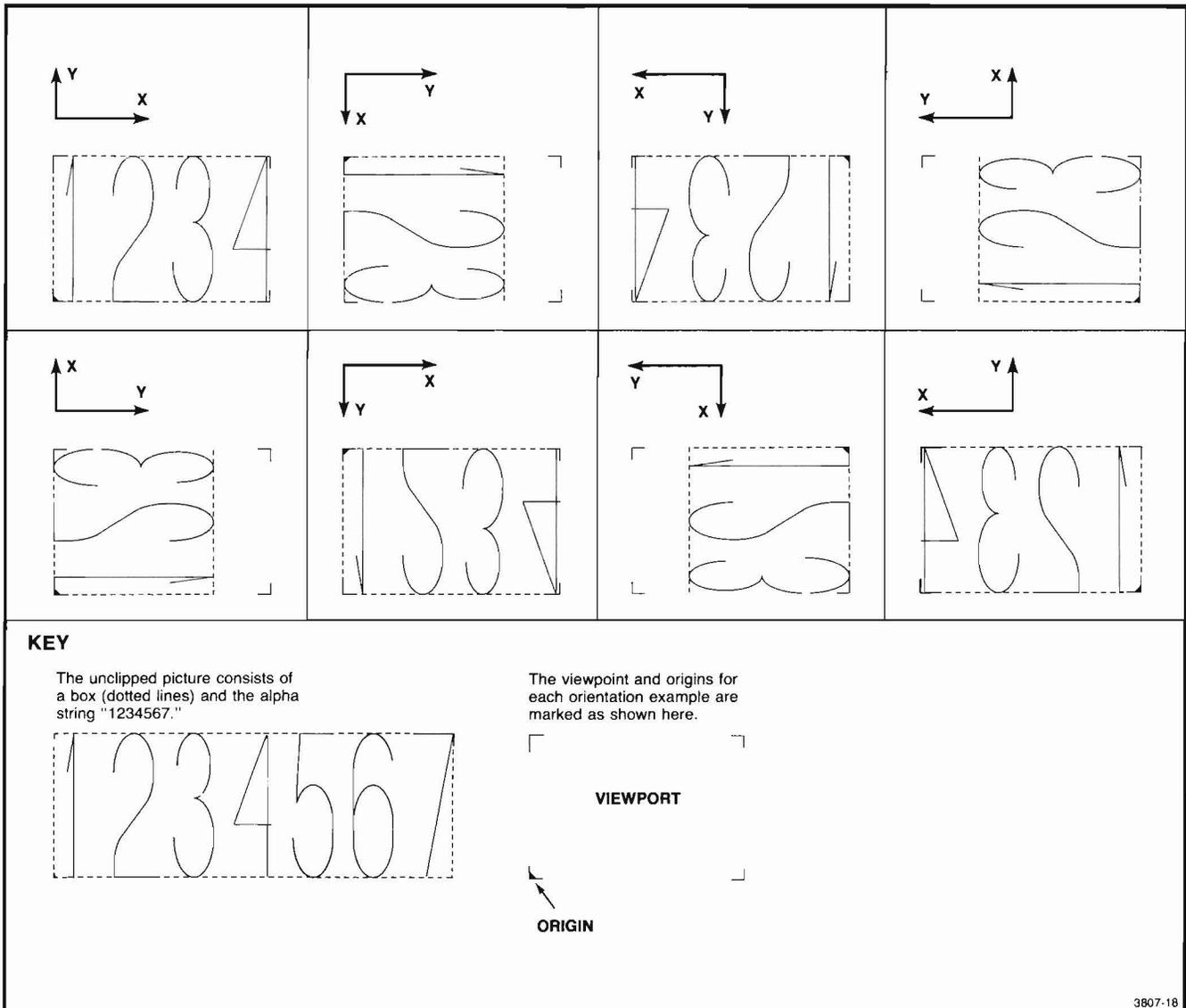


Figure 3-10. Axis Orientations.

PEN GROUP

Selections from the Pen Group lines adapt the Plotter to match the requirements of various pen types with various types of media to optimize line quality.

For most applications, only the first two lines of the Pen Group need to be set. The first line determines whether Pen 1 or Pen 2 parameters are being accessed (parameters for both pens must be set separately). The second line, Pen Type, automatically sets default values for the two following lines, Pen Pressure and Pen Velocity Limit, and it also establishes the necessary pen parameters for the selected pen type. For special applications, the operator can make other selections on the Pen Pressure and Pen Velocity Limit lines (see Section 4 for pen selection and installation information).

Pen Parameter Access Line

The Pen Parameter Access line allows the operator to establish a different set of parameters for each pen via the Pen Type, Pen Pressure, and Pen Velocity Limit lines. Since the two pens can be of different types, each may require a unique set of parameters because of the various characteristics of pens, inks, and media.

When either PEN 1 or PEN 2 is selected, the Plotter accepts changes in the next three lines for the accessed pen. After setting the parameters for one pen, you can select the alternate pen on the Pen Parameter Access line and assign parameters for it. The lights on each parameter line indicate the current selections for the accessed pen.

Pen Type Line

The Pen Type line selection must correspond to the type of pen installed in the pen holder selected on the Pen Parameter Access line. This selection sets the necessary internal parameters for this pen type and automatically establishes default values for the Pen Pressure and the Pen Velocity Limit lines for the accessed pen. Once the Pen Type is selected, the Pen Pressure line and the Pen Velocity Limit lines need only be changed to meet special plotting requirements.

NOTE

Changes to the Pen Pressure should be made carefully to avoid damage to the platen or the pen tips. Table 3-1 lists the default pen pressure and pen velocity values for each pen type.

**Table 3-1
DEFAULT PEN PRESSURE AND PEN VELOCITY**

Pen Type	Pen Pressure	Pen Velocity Limit
Fiber Tip	5 Grams	Full Speed Axial
Wet Ink	30 Grams	10 IPS
Plastic Hard Tip	20 Grams	16 IPS

For further information, the *Selection Guide* in Section 4 provides a table of recommended settings for a wide variety of applications.

Pen Pressure Line

If a pen pressure other than the default pressure for the selected pen is desired, select a value from the Pen Pressure line. The pen pressure selected sets the nominal downward pressure (pen to media contact) for the selected pen. The nominal value can be adjusted $\pm 25\%$ by the Pen Control PRESSURE OVERRIDE on the front panel.

Pen Velocity Limit Line

If a pen velocity other than the default velocity for the selected pen is desired, select a value from the Pen Velocity Limit line. The pen velocity selected sets the maximum terminal velocity of the pen. The last selection made on this line or the Pen Type line sets the current pen velocity limit.

The first six columns on this line set the maximum vector velocity of the pen carriage. All six selections are specified in inches per second (ips) and apply to all drawing angles.

Either of the last two columns (FULL SPEED AXIAL) allow maximum plotting velocity. When FULL SPEED AXIAL is selected, each axis is allowed to reach its maximum axis of 16 ips. The corresponding vector velocity of the pen carriage ranges from 16 to 22 ips, depending on the drawing angle. Lines drawn at 45°, 135°, 225°, or 315° angles are drawn at the greatest vector velocity.

Alpha Character Quality Line

This line permits the operator to emphasize either character smoothness or plotting speed during the execution of PRINT or PRINT CENTERED commands. The NORMAL selection draws quickly using straight line segments to produce block style characters. The ENHANCED selection uses circles and arcs to produce rounded characters. However, the ENHANCED selection requires additional time to produce each character. Characters drawn in both modes are shown in Figure 3-11.

The degree of smoothness for ENHANCED characters can be changed using the SET ARC SMOOTHNESS command, described in the 4663 Programmer's Manual.

NOTE

The remaining Parameter Entry Card lines, with the exception of the Error Data and Execute Self Test lines, are described in greater detail in the 4663 Programmer's Manual. Sections 4 and 5 of the Programmer's Manual describe the Serial Interface Group and the GPIB Interface Group on the Parameter Entry Card, respectively. These sections of the 4663 Programmer's Manual include technical details beyond the scope of this manual.

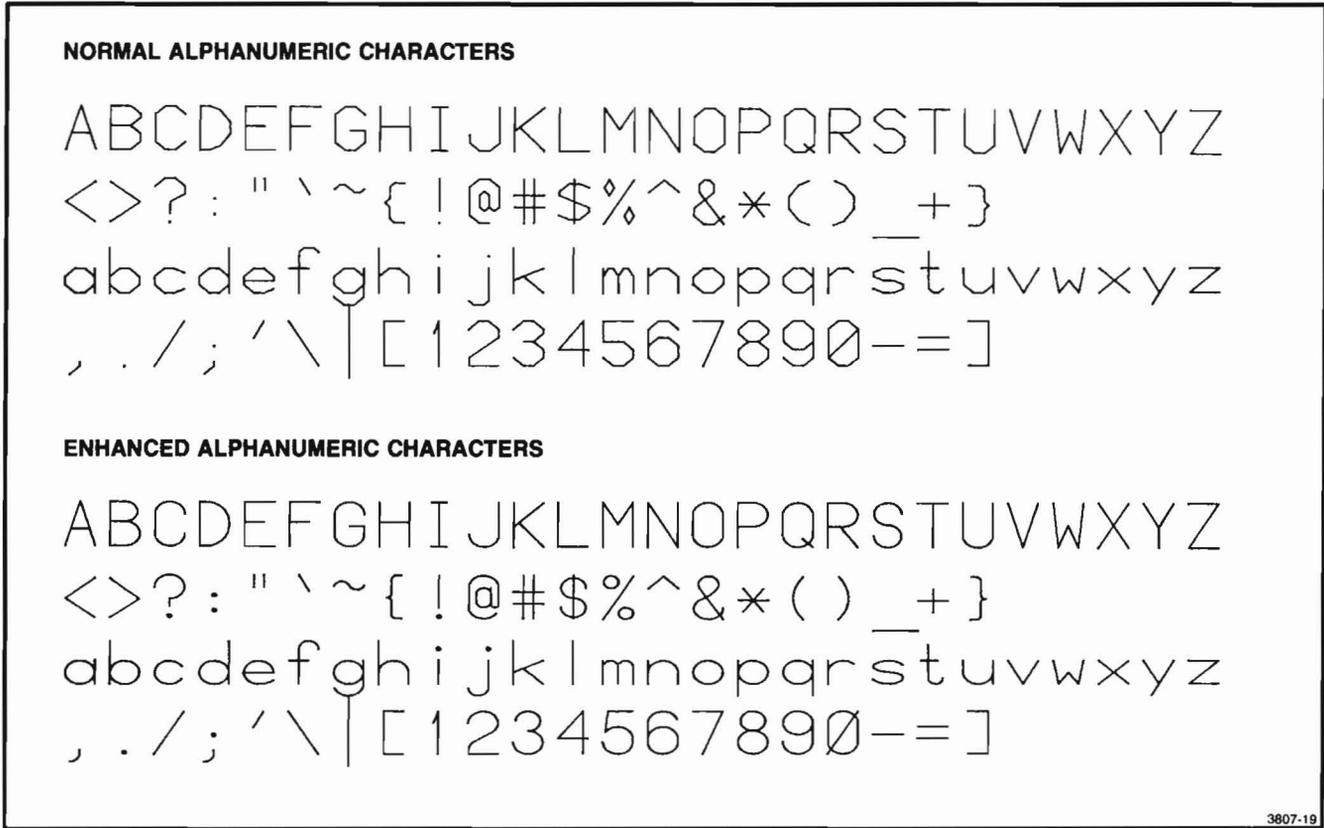


Figure 3-11. NORMAL and ENHANCED Characters.

Interface Select Line

The Interface Select line enables the installed interface to be selected, as shown in Table 3-2.

NOTE

When the Interface Select line is changed, the Plotter performs normal power-up functions and the INIT light on the Parameter Entry Card turns on. Whenever the Interface Select line is changed, push the Parameter Entry Card in fully and wait until the front panel INTERFACE switch lights are on before reading or modifying any lines.

**Table 3-2
INTERFACE SELECT LINE DEFINITIONS^a**

Instrument/Option	Selection Number	
	1	2
Standard 4663	Serial	Not used
Option 01	Serial	GPIB
Option 04	GPIB	Not used

^aAs shipped from the factory.

If the straps on the Interface circuit board have been reset, the selection activated by "1" and "2" will be different from that shown in Table 3-2. Refer to the *4663 Service Manual* for additional information.

Initial Command/Response Format Line

Selections on this line enable the hardware interface (Serial or GPIB) to be compatible with a variety of command/response formats. In general, these selections provide Plotter communications compatibility with a number of Tektronix and other manufacturers' products. In addition, these selections enable the 4663 Plotter to partially emulate the TEKTRONIX 4662 Plotter.

The command/response formats selected on this line provide the current active interface with a detailed description of:

- The format of the input commands.
- The format of any output data.

The current command/response format is normally set to an initial value, but can be changed under Program Control via the SELECT COMMAND/RESPONSE FORMAT command. Refer to the *4663 Programmer's Manual* for additional information about this command. The use of this command does not modify the Initial Command/Response Format line selection.

Table 3-3 summarizes the formats available for use with a Serial interface. Table 3-4 summarizes the GPIB formats and lists some of the instruments commonly used with the GPIB versions of each format. See the *4663 Programmer's Manual* for information about selecting a format to meet your application.

Table 3-3
COMMAND/RESPONSE FORMATS – SERIAL

Format	Characteristics	Compatible Software
#1	4663 Command Set Packed Binary Response Encoding	TEKTRONIX PLOT 10 Graphic Library 4663 Support
#2	4663 Command Set ASCII Decimal Response Encoding	
#3	4662 Compatible Command Set Packed Binary Response Encoding	TEKTRONIX PLOT 10 Graphic Library 4662 Support
#4	4662 Compatible Command Set Restricted 4662 Packed Binary Response Encoding	

Table 3-4
COMMAND/RESPONSE FORMATS – GPIB

Format	Characteristics	Compatible Devices
#1	4663 Command Set Output Terminator – EOI	TEKTRONIX 4050 Series TEKTRONIX 4924 Digital Cartridge Tape Recorder TEKTRONIX 4040 Series Other GPIB Devices Requir- ing this output terminator
#2	4663 Command Set Output Terminators C_R , L_F , and EOI	Hewlett-Packard 9800 Series Fluke 1720A Pet 2001 Other GPIB Devices Requir- ing one of these Output Terminators
#3	4663 Command Set No Printstring Arguments Output Terminator – EOI	Same devices as Format 1 ; allows same string form to be used for all string argu- ments. Additional program- ming required for TEKTRONIX controllers to avoid use of Printstrings.
#4	4663 Command Set No Printstring Arguments Output Terminator – – C_R , L_F , and EOI	Same devices as Format 2 ; allows the same string forms to be used for all string arguments.
#5	4662 Compatible Command Set Output Terminator – EOI	TEKTRONIX 4020 Series with Option 04. TEKTRONIX 4081 TEKTRONIX 4014/4015 with Option 05 and a TEK- TRONIX 4907 (if /P COPY switch used to translate 10- or 12-bit graphics). Also with Format 1 devices if software written for a TEKTRONIX 4662 Plotter.
#6	4662 Compatible Command Set Output Terminator – C_R , L_F , and EOI	Used with Format 2 devices if software written for TEK- TRONIX 4662 Plotter.
#7	4663 Serial Interface Commands No Output	TEKTRONIX 4014/15 Op- tion 5 and a TEKTRONIX 4907 System (if /P COPY switch not used).

GPIB GROUP

The GPIB interface functions are contained on three lines: GPIB Device Address, Interface Mode, and Interface Functions. These lines are used to establish parameters and enable functions for the GPIB interface. Refer to the *4663 Programmer's Manual* for information about the GPIB interface.

To make a selection on any of the three lines, the GPIB interface must be present and selected as the active interface via the Interface Select line (described earlier). An attempt to make a selection on any GPIB Group line without having a GPIB interface installed and active sounds the Plotter's bell and deletes all selections on the current line.

GPIB Device Address Line

The GPIB Device Address line can be used to assign a number (from 1 to 8) as the Primary Address for the Plotter's talk and listen functions. This allows several devices, including one or more Plotters, to be connected to the GPIB bus and to be selectively activated by a controller (such as a Tektronix 4050 Series Graphics System).

Interface Mode Line

The Interface Mode line allows the Plotter to be assigned as a talker or a listener as described here:

- **NORMAL** permits the Plotter to act as either a talker or listener, as directed by the GPIB controller.
- **LISTEN ONLY** directs the Plotter to act as a listener. **LISTEN ONLY** would be selected when the GPIB system does not include a controller. This may be used, for example, when transferring a plot directly from a GPIB tape unit that is configured as **TALK ONLY**.
- **TALK ONLY** directs the Plotter to act as a talker in a GPIB system that does not include a controller. This may be useful when digitizing directly to a GPIB tape unit configured as **LISTEN ONLY**.

Interface Functions Line

The **CR GENERATES LF** selection causes the Plotter to perform a line feed function (in addition to a carriage return function) when the Plotter receives a carriage return (CR) in a **PRINT** command. This selection should be made whenever **PRINT** commands do not include line feeds following each carriage return.

NOTE

The TEKTRONIX 4050 Series Graphics Systems do not automatically generate a line feed (LF) when outputting print data, so this function should be selected when communicating with these controllers.

SERIAL INTERFACE GROUP

The 13 Parameter Entry Card lines within the Serial Interface Group establish parameters and functions for the Serial interface. Refer to the *4663 Programmer's Manual* for information about the Serial interface.

To change any selection within this group, a Serial interface must be present and activated via the Interface Select Line. An attempt to make a selection on any Serial Group line without an active Serial interface sounds the Plotter's bell and deletes all selections on that line.

Note that some lines can have more than one selection active. As usual, lights indicate the current selections and all selections are immediately effective.

Serial Device Address Line

The Serial Device Address line allows any one of eight addresses (uppercase A through H) to be assigned as the Plotter device address. This allows up to eight serial devices (including one or more Plotters) to be chained together in the same communications system and to be selectively activated. (Style I commands, described in the *4663 Programmer's Manual*, are accepted only if they contain this address.)

In systems that communicate with a single Plotter, any one of the eight device addresses can be assigned ("A" is usually selected). In more complex systems, the system programmer must designate a unique device address for each device within the system.

Receive Baud Rate Line

This function permits the Plotter's received baud rate to be matched to that of the transmitting device. Because of the number of rates available, this function occupies two lines on the Parameter Entry Card.

It may be necessary to move the Parameter Entry Card to each of the Receive Baud Rate lines to locate the current setting (indicated by the lighted switch). As is true on other lines, changes are made by moving the Parameter Entry Card to the appropriate line and pressing the desired switch; the previous setting, regardless of which line, is cancelled.

The Receive Baud Rate line selections include: 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2400, 4800, 9600 baud or external clock (with a multiplier of 1X, 16X, or 64X). Refer to the *4663 Programmer's Manual* for information about the external clock selections.

Transmit Baud Rate Line

The Transmit Baud Rate lines (two) permit the Plotter's transmit baud rate to be matched to that of the receiving device in the same manner as described in the previous discussion (*Receive Baud Rate Line*).

Transmit Baud Rate Limit Line

In some systems, the host computer, due to software considerations, may require a reduction in the rate of data transmission from the Plotter. The Transmit Baud Rate Limit lines permit the reduction of the effective output baud rate. When a value less than the current transmit baud rate is selected, the Plotter adds delays between characters transmitted to the host computer.

To operate the Transmit Baud Rate Limit function, the operator need only make the selection on this line that specifies a lower rate than the selection made on the Transmit Baud Rate line. If no delay is required, select FULL SPEED to transmit data at the rate determined by the Transmit Baud Rate setting.

NOTE

The Transmit Baud Rate Limit must be set to FULL SPEED if selections are made on the DC1/DC3 Control line.

Character Format Line

Two selections can be made on the Character Format line. Selections are available to set the number of data bits and the number of stop bits for each character.

The DATA BITS/CHAR selection establishes either seven or eight as the number of data bits to be included in each character. The DATA BITS/CHAR selection should be 7 if the parity of the received character is to be checked. If the received character parity is to be ignored, then 8 should be selected.

The STOP BITS selection establishes either 1 or 2 as the number of stop bits to be transmitted after each character. Characters with one or two stop bits may be received regardless of the STOP BITS selection.

NOTE

There is some interaction between the Character Format selection and the Receive Parity/Transmit Parity selections (next line). The selection of 8 DATA BITS/CHAR and 2 STOP BITS forces the parity selection on the Receive Parity/Transmit Parity line to IGNORE/LOGIC 1. See the NOTE under Interface Functions line (later in this section) for a specific case when 2 STOP BITS should be selected.

CONTROLS AND INDICATORS

Receive Parity/Transmit Parity Line

The Receive Parity/Transmit Parity line permits selection of the type of parity check desired for incoming characters and sets the parity bit (most significant bit) for transmitted characters. The choices include the following:

- ODD/ODD — Selects odd parity for transmitting and receiving.
- EVEN/EVEN — Selects even parity for transmitting and receiving.
- IGNORE/LOGIC 0 — The Plotter ignores received parity bits (no parity check performed) and sets transmitted parity bits to LOGIC 0.
- IGNORE/LOGIC 1 — The Plotter ignores received parity bits (no parity check performed) and sets transmitted parity bits to LOGIC 1.

NOTE

There is some interaction with the Character Format line. If either ODD/ODD or EVEN/EVEN is selected on this line and DATA BITS/CHAR is set to 8 on the Character Format line, the STOP BITS selection on the Character Format line is forced to 1. If DATA BITS/CHAR is set to 7 and IGNORE/LOGIC 0 or 1 is selected, ODD/ODD is set on the Receive Parity/Transmit Parity line.

Communications Control Mode Line

The Communications Control Mode selections permit FULL DUPLEX communications control protocol or FULL DUPLEX with the addition of HARDWARE RECEIVE FLAGGING.

When FULL DUPLEX is selected, the Plotter/Host interface system observes normal asynchronous full-duplex operation. In this mode, the RS-232-C DATA TERMINAL READY (DTR) control line is always asserted whenever the Plotter is turned on and any loop-thru terminal is also asserting Data Terminal Ready (DTR).

HARDWARE RECEIVE FLAGGING can be selected to ensure that the Plotter's input buffer is not overloaded by data from the Host, causing a loss of data. When HARDWARE RECEIVE FLAGGING is selected, the Plotter/Host interface system observes normal asynchronous full-duplex operation and, in addition, uses the DATA TERMINAL READY (DTR) interface hardware line to inform the Host of the Plotter's input buffer status.

NOTE

When HARDWARE RECEIVE FLAGGING is selected, selections should not be made on the DC1/DC3 Control line.

DC1/DC3 Control Line

The DC1/DC3 Control line permits selection of software input flagging to prevent overflowing the Plotters input buffer with data transmitted between the host computer and the Plotter. The INPUT selection permits the Plotter to regulate the connected devices transmission rate; the OUTPUT selection allows a connected device to control the Plotter's transmission of command responses.

In this mode, an ASCII P_3 (stop read) control character (CTRL S) and an ASCII P_1 (start read) control character (CTRL Q) are used to stop and start, respectively, host or Plotter transmissions.

NOTE

To use the DC1/DC3 Control function, FULL DUPLEX must be selected on the Communications Control Mode line and the Transmit Baud Rate Limit line selection must be FULL SPEED.

Interface Functions Line

This line allows the independent selection of four special operating functions used with a Serial interface. The functions are AUTO MUTE, CR GENERATES LF, DEL IGNORE, and CARRIER DETECT. Each function is described in turn here.

The AUTO MUTE function prevents Plotter commands (sent from the host to the Plotter) from being displayed on the terminal's screen. If AUTO MUTE is not selected, all data from the Host passes through the Plotter's interface to the terminal, regardless of the Plotter's logical on/off state.

NOTE

If the Plotter is logically off, even though AUTO MUTE is selected, a portion of the next PLOTTER ON command will be sent to the terminal before the mute function is activated.

At receive baud rates of 9600, characters following the DEVICE ON command may be garbled by the terminal if the characters received by the Plotter do not contain two STOP bits.

Alternatively, there should be a delay of approximately one character time following the DEVICE OFF command or the DEVICE OFF command should be followed by an ASCII P_T (DEL) character with even parity.

The CR GENERATES LF selection causes the Plotter to perform a line feed function (in addition to a carriage return function) when the Plotter receives a carriage return (C_R) for printing. This function is selected when operating with host computers that do not automatically provide a line feed after each carriage return.

The DEL IGNORE selection allows the Plotter to ignore ASCII P_T (DEL) characters when communicating with host computers that use P_T for special system functions (such as padding). Since the P_T character is a low Y graphics character for graphics commands, an Attention Character sequence ($\text{^}_T ?$) must be used in place of the graphics P_T character when DEL IGNORE is selected.

The CARRIER DETECT selection enables monitoring of the DATA CARRIER DETECT (DCD) output from the modem when the front panel INTERFACE switches are set for ONLINE REMOTE. If this function is active and the carrier is lost, even momentarily, the Remote light (on the right INTERFACE switch) flashes to indicate a possible loss of data. Pushing the INTERFACE switch with the flashing light cancels this indication.

Attention Character Line

The Attention Character line permits the operator to select the one attention character that the Plotter will recognize for use in Style I and Style II commands. The choices are ESC, ! , ^ , and SYN. For operation with TEKTRONIX 4010 Series Graphics Systems and software, the Attention Character line is usually set to ESC. (Style I and Style II commands are discussed in the Serial Interface section of the *4663 Programmer's Manual*.)

Output Terminator Line

This line allows selection of the output termination ASCII character sequence to be sent at the end of each Plotter to host transmission. The choices are as follows:

- CR
- CR & EOT (End of Transmission) characters.
- NONE (no termination characters)

Error Data Line

The Error Data line is used for the following:

- To retrieve information about errors.
- To determine the version number of the Plotter's firmware.
- To determine the amount of memory installed in the Plotter.

The version number and memory status information functions of the Error Data line are included in the Maintenance section of this manual. Use of this line to retrieve error information is discussed in the following text.

The Parameter Entry Module lights and switches are used differently on the Error Data line than on any other line of the Parameter Entry Card. The lights, instead of indicating a selection made on the Error Data line, indicate one 8-bit byte of error information. The byte may be either error code information to identify the error, or the error count which indicates the number of errors, or one of six error parameters which provides further information about the type or cause of the error.

The desired byte of error data is selected for display by pushing the corresponding switch. If another switch is pushed, a different byte will be displayed. If the Parameter Entry Card is moved and then returned to the Error Data line, then the lights indicate the last switch depressed on the Error Data line.

If multiple errors occur (the error count is greater than one), the error data displayed represents the first error that occurred. If a non-fatal error is followed by a fatal error (one that stops plotting), then the fatal error code is saved as the contents of Error Parameter 4 and overrides the non-fatal error parameters.

The error code, error count, and error parameters are all cleared after a front panel Error Reset function or a READ ERROR command.

Error Codes. Error codes are displayed in the Parameter Entry Module lights (if the Parameter Entry Card is fully inserted) in either of two cases:

- When the Plotter detects an error.
- When the Error Data line is selected and the operator presses the left-most switch.

When the Plotter is receiving commands (plotting) and an error occurs, the Reset light flashes. If the Parameter Entry Card is fully inserted when the error occurred, the error code can be read directly from the Parameter Entry Module lights. If the Parameter Entry Card is not inserted, the Parameter Entry Card must be moved to the Error Data line and the error code (left-most) switch must be pressed to display the error code message.

After determining the error code, refer to Appendix C, *Error Types*, to determine the cause of the error.

NOTE

The Plotter should be operated with the Parameter Entry Card fully inserted. With the card fully inserted, the error code is displayed automatically, even for fatal errors.

Error Count. The error count is displayed when the Error Data line is selected and the operator presses the second switch. The error count indicates the number of errors that have occurred.

Error Parameters. Error parameters are displayed when the Error Data line is selected and the operator presses one of the remaining six switches. Error parameter indications provide additional information about the error and are discussed in the *4663 Programmer's Manual*.

Execute Self Test Line

Two tests of the Plotter's operation can be made using the selections on this line; one tests the mechanical integrity and one tests the indicators.

The first self-test feature is activated by pressing the switch over selection 1. This test exercises the Plotter mechanism, including the motors and their drives, bearings, pulleys and cables, and the pen carriage. The test consists of the Plotter drawing a predetermined plot, shown in Figure 3-12, which may be examined to determine Plotter integrity. In this test, the right side of the center intersection (in the box) is drawn early in the plot. Then, after permitting the operator to briefly exercise the Joystick, the Plotter completes this center intersection. The center "X" then can be examined to verify the positional accuracy during the plot and subsequent Joystick operations. The test can be made with either pen selected.

The second self-test feature tests the Plotter's indicators and is activated by pressing the switch over selection 2. Make sure no indicators are flashing when starting this test. During the test, all front panel lights and Parameter Entry Card indicators should be turned on, with the exception of the INIT light on the Parameter Entry Module. To end the test and return the indicators to normal, press the switch over selection 2 again. The test ends automatically if any front panel indicator flashes or if any front panel indication changes.

NOTE

A third self-test is performed at power-up. The Plotter automatically performs internal checks on the firmware and internal memory.

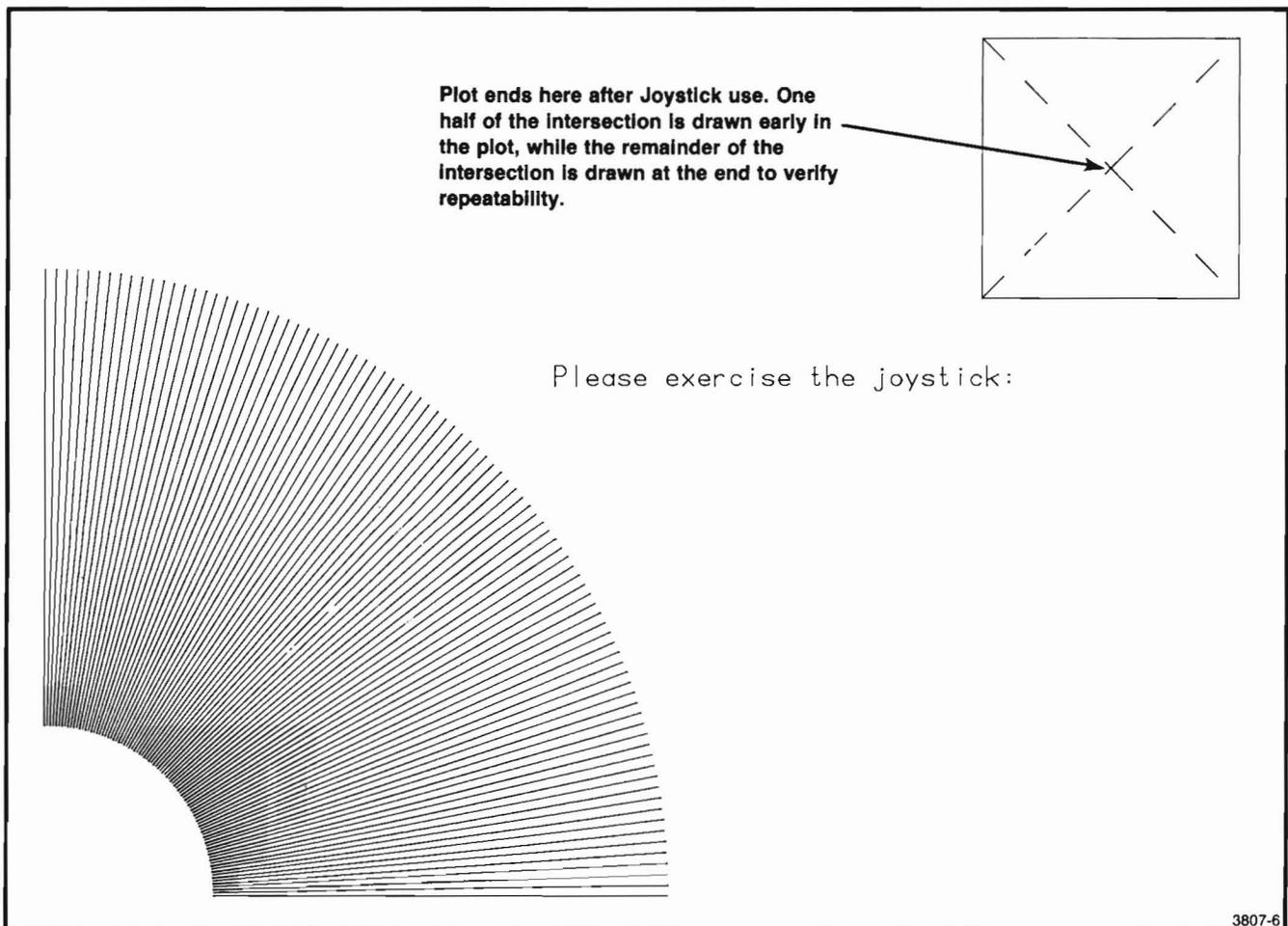


Figure 3-12. Test Pattern Produced by Self-Test Feature.



Section 4

PENS AND MEDIA

This section contains information on types of pens and media, selecting and using pens and media, and pen maintenance. All accessories discussed in this section

are listed in Section 1 of this manual and can be purchased directly from Tektronix, Inc.

PEN TYPES

The 4663 uses three different pen types (see Figure 4-1).

- Two varieties of fiber-tip pens: (1) a standard fiber-tip pen for paper, which is shipped with the 4663, and (2) an optional permanent-ink fiber-tip pen, used for film. Fiber-tip pens are available in nine colors.
- One plastic hard-tip pen (available in four colors, used for paper).
- One wet-ink pen (five ink colors available for film and one for paper)

The wet-ink pen can be ordered in three tip sizes. Each pen is designed to plot best on specific media.

STANDARD FIBER-TIP PENS (FOR PAPER)

This pen is shipped as a standard accessory with the Plotter. It is designed to write on most paper. Line width is not as fine nor as controllable as that of other 4663 pens, but this standard pen does provide a good quality plot at generally faster speeds with minimal operator attention. Due to ink properties, line density may vary somewhat from color to color.

You can order the standard fiber-tip pen in nine colors (see the accessories list in Section 1). On standard fiber-tip pens, the pen body color is the same as the color of the ink.

PERMANENT-INK FIBER-TIP PENS (FOR FILM)

Permanent-ink fiber-tip pens are designed to write on film for overhead projection. Performance on paper varies, hence, the permanent-ink fiber-tip pens are not recommended for use on paper.

The permanent-ink fiber-tip provides an excellent plot with minimal operator attention. A solvent, available from Tektronix, Inc., will remove the ink from film.

You can order the permanent-ink fiber-tip pen in nine colors (see the accessories list in Section 1). Line density may vary slightly from color to color. Optional permanent-ink fiber-tip pens are identified by a white P printed on the colored paper dot on the top of the pen. The background color of the paper dot indicates the ink color.

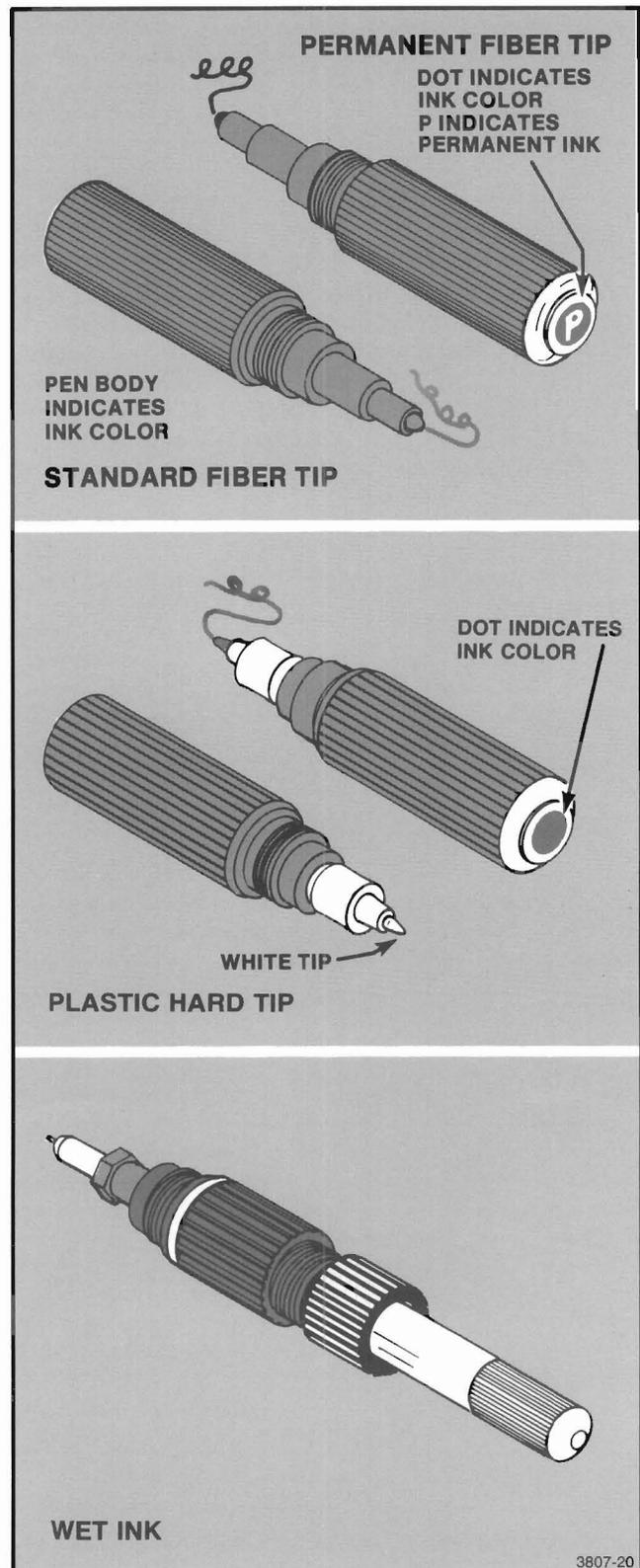


Figure 4-1. 4663 Pens.

PLASTIC HARD-TIP PENS (FOR PAPER)

This pen writes on most paper and the matte side of polyester film. Line width is more constant throughout the plot, and the pen has a longer life expectancy than fiber-tip pens. The hard-tip pen plots at slightly slower speeds than fiber-tip pens. Like the fiber-tip pen, it requires minimal operator attention.

The plastic hard-tip pens can be ordered in four colors, as listed in the accessories list in Section 1. These pens are identified by their white tip. Plastic hard-tip pens are recommended for line and letter plotting.

WET-INK PENS

Wet-ink pens write on most paper and the matte side of polyester film. These pens provide the best line width control of all 4663 pens. Wet-ink pen colors and ordering information are included in the accessories list in Section 1.

You can choose from the three tip sizes, listed here:

Name	Tip Size (mm)	Line Width (in)
PL3	0.3mm	0.01 in
PL5	0.5mm	0.02 in
PL8	0.8mm	0.03 in

As a general rule, the smaller the tip size, the faster you can plot with the wet-ink pen.

Never use cleaning powder on paper or film when using a wet-ink pen, since the powder will clog the pen tip.

Wet-ink pens require more operator attention, clean-up, and maintenance than other 4663 pens, but these pens produce the highest possible line quality.

Inks For Wet-Ink Pens

Two types of ink can be used with wet-ink pens. Both types come in squeeze bottles designed for convenient filling of wet-ink pen cartridges.

The first type of ink writes best on the matte side of polyester film and comes in five colors (see the accessories list). These inks are identified by a phrase on the bottle label, such as "Brown Ink For Film."

The second type of ink writes best on paper and is available in black only. This ink is identified by "Rapidograph Waterproof Black Drawing Ink" on the bottle label.

MEDIA TYPES

Tektronix provides three different types of media for use with the 4663, each of which is described here. For a complete list of available media, including part numbers and sizes, refer to the accessories list in Section 1.

Blank paper is available in either sheet or roll form. The blank paper is a translucent bond, general-purpose sulphite paper, which has a smooth surface to reduce the chance of clogging pens. Because of the medium translucency of sulphite paper, it is suitable for DIAZO-type machines, photography, and microfilming. This paper is recommended for use where permanence is not a requirement.

The standard media shipped with the 4663 is a blank sulphite paper that comes in a box containing 100 sheets of C-size paper (432x559 mm or 17x22 in). For instruments equipped with Option 36 (Media Advance Option), blank paper is available in 200-foot rolls.

Vellum with 100% rag content has a smoother surface that is slightly harder than paper. Generally used for final drafting plots, it has a whiter color, produces a faster DIAZO copy, has better photographic reproduction, and is more durable than paper. Vellum is recommended for use where average permanence is required.

Polyester antistat film is virtually unaffected by changes in temperature or relative humidity. It makes the sharpest DIAZO copies, as well as excellent microfilming originals. The polyester antistat film supplied by Tektronix has one smooth side and one low-profile matte surface side. This low-profile matte surface is particularly suited for Plotter applications because (1) it produces less pen wear than other matte surfaces, and (2) the Plotter's electrostatic hold-down keeps this film in place more securely than other films.

PENS AND MEDIA

Ink lines can be erased from polyester film with a film type eraser or alcohol. Polyester film is waterproof and, since it is nearly indestructible, makes good archive originals. This film can be stored for indefinite periods without discoloration, change in drafting quality, or change in reproductive quality. However, films generally wear out pens faster than paper or vellum.

For your convenience, Tektronix, Inc. makes preframed film available to you. Some commonly available films are uncontrolled products that may or may not be coated for use with Plotter inks. Therefore, Tektronix, Inc. recommends using only specially coated Tektronix film for overhead transparencies (also known as slides or foils).

LOADING SHEET MEDIA

Sheet media can be used on both standard Plotters and those with the Media Advance Option installed. To operate using sheet media, pull the Parameter Entry Card out to the Media Form line and press the switch above the word SHEET.

Change the sheet media according to the following directions:

1. **Press** the PLOT CONTROL switch to select the Pause function.
2. **Press** the MEDIA switch. The pen carriage moves to the upper-right corner, the Media light blinks, and the electrostatic hold-down turns off to allow removal of the media.
3. **Place** the new media on the platen, aligning it with the arrow in the lower-right corner of the paper guide. The bottom edge of the media should be aligned evenly along the paper guide (see Figure 4-2).
4. **Press** the MEDIA switch to reactivate the electrostatic hold-down.
5. **Remove** any air bubbles from under the media using a clean, lint-free industrial wipe, tissue, or drafting brush. Avoid using your hand as body oils will be transferred to the paper and may reduce the acceptance of ink.
6. **Press** the PLOT CONTROL switch to resume plotting.

USING ROLL MEDIA (REQUIRES OPTION 36)

Instructions for using roll media are described in the following text. These instructions describe how to advance a new section of media, how to use the paper-tear bar to cut the media, and how to replace the media roll when empty.

ADVANCING ROLL MEDIA

Roll media can be used only on Plotters with Option 36 (Media Advance Option) installed. To use roll media, pull the Parameter Entry Card out to the Media Form line and press the switch above the word ROLL.

Change the roll media according to the following directions:

1. **Press** the PLOT CONTROL switch, if the Plotter is actively plotting, to enable the Pause function.
2. **Press** the MEDIA switch to advance a new length of media. The pen carriage moves to the load position, the media advances across the platen and stops after moving the current form length. (Form length is established by setting the Parameter Entry Card or by the Form Length function described in Section 3.)
3. **Smooth** the media as described previously under *Loading Sheet Media*.
4. **Press** the PLOT CONTROL switch to release the Pause function and to resume plotting.

Several operating parameters affect the length of advance in the media advance operation. If not already set, the following lines should be set on the Parameter Entry Card: Initial Page Size, Initial Page Format, Page Orientation, and Initial Aspect Ratio. Detailed information about each line is included in Section 3; Section 2 includes sample setups in the description of the Parameter Entry Card.

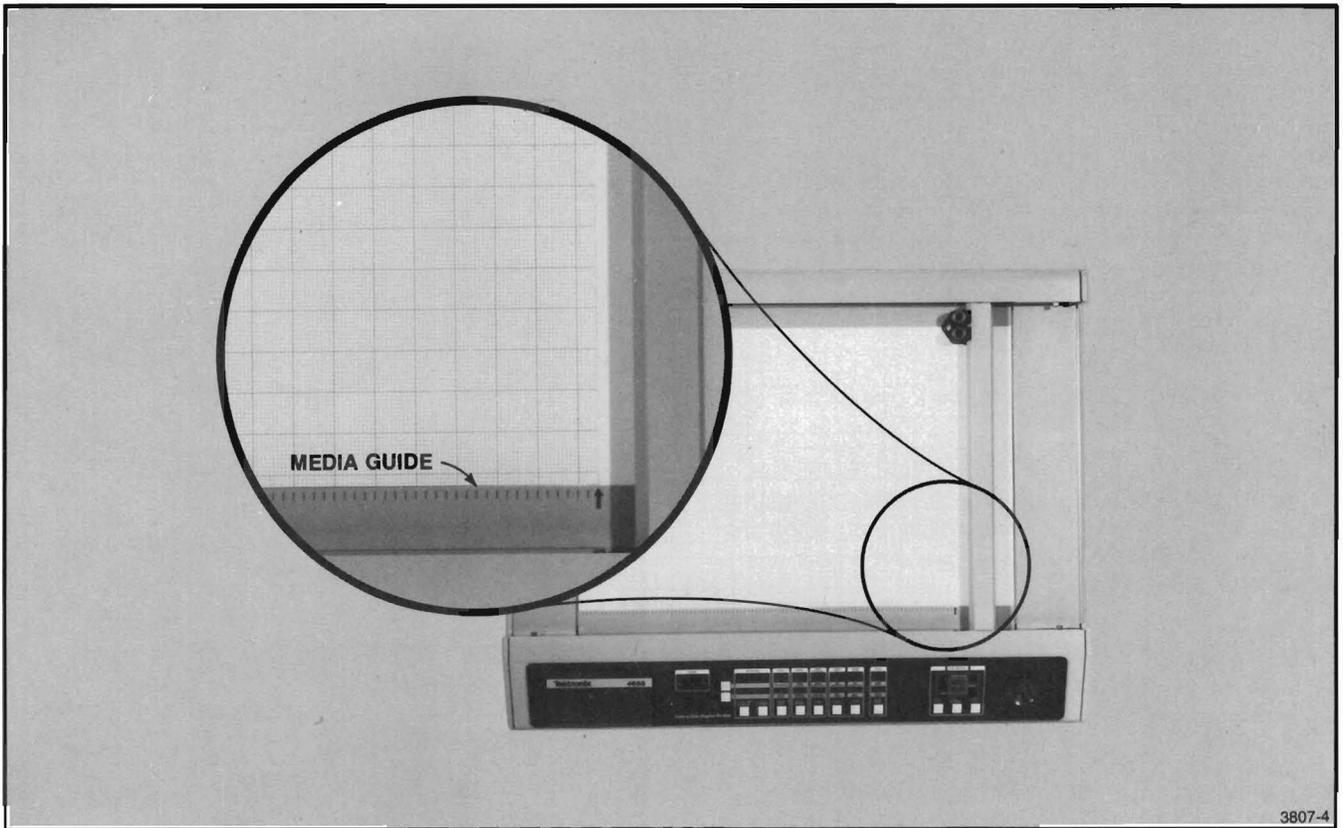


Figure 4-2. Positioning Media on the 4663 Platen.

PENS AND MEDIA

USING THE PAPER-TEAR BAR

A paper-tear bar, located on the right of the Plotter (see Figure 4-3), can be used to separate plots on roll media.

To cut the media, firmly grab the media on the right side of the paper-tear bar and pull steadily upward against the bar. It may be helpful to press down on the left side of the bar while cutting the media.

REPLACING ROLL MEDIA

Replace roll media according to the following instructions.

1. **Face** the left end of the Plotter. Firmly slide the paper roll core to the left (you are pushing against a spring — see Figure 4-4a). Then remove the old core, right end first. Two end paper roll bearings will be in the core.
2. **Remove** the paper roll bearings from the old core and place them in the corresponding ends of the new roll of media. The paper roll bearings are not interchangeable; the paper roll bearing with the cross-pin engages at the right end of the media roll.

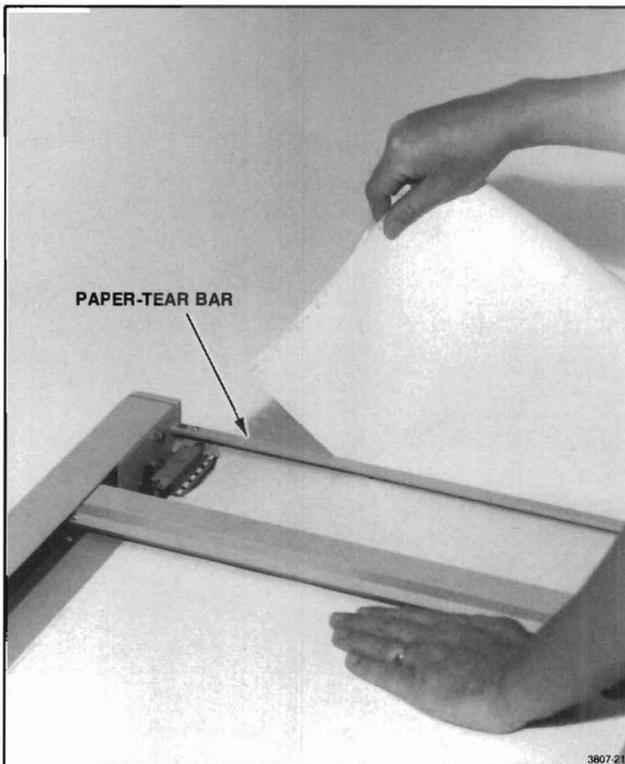


Figure 4-3. Using the Paper-Tear Bar.

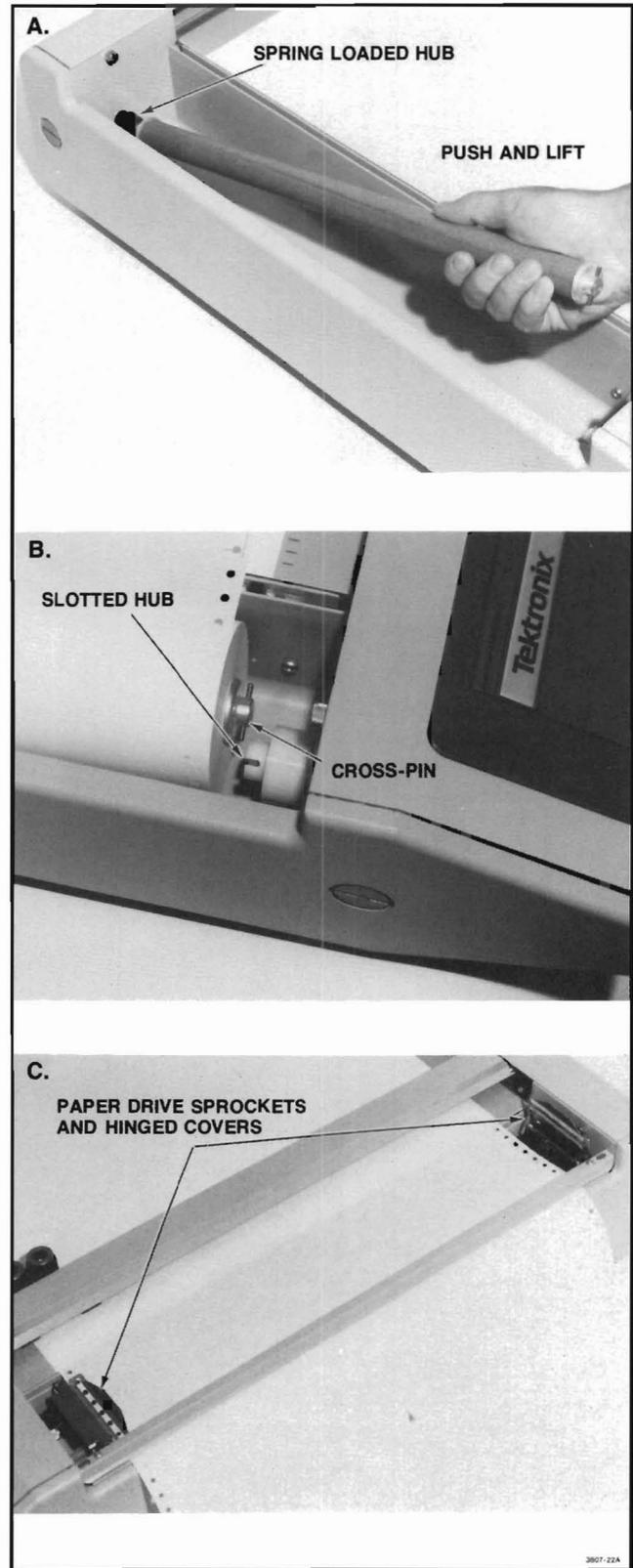


Figure 4-4. Replacing Roll Media.

3. **Insert** the new roll of media. Insert the left end of the paper roll into the spring loaded hub; then drop the right end into place, making sure that the bearing with the cross-pin is fully engaged with the slotted hub (see Figure 4-4b). The media should now pass over the top of the roll and onto the platen.
4. **Slide** the media across the platen, passing it under the Y-axis arm and pen carriage.
5. **Lift** the hinged covers over each paper drive sprocket, located on the right side of the instrument (viewed from the front), and align the holes in the paper with the drive sprocket teeth. Lower the covers over the sprocket drives. See Figure 4-4c.
6. **Check** to ensure that the paper lays flat against the platen and passes through the paper-tear bar.
7. **Test** the media advance mechanism by pressing the MEDIA switch to advance a length of media.

NOTE

If wrinkles are present in the portion of the media that is on the platen, the paper drive mechanism may require adjustment according to the instructions in Section 5.

PEN INSTALLATION

Always place media on the platen when installing pens. This procedure protects the platen from ink spills or damage. To prevent damage to the pen tips and to prevent fiber-tip pens from prematurely drying out, **always replace caps on pens that are not in use.**

All 4663 pens insert into the pen holders in the same manner. Make certain that you insert pens into the proper pen holder on the pen carriage. See Figure 4-5.

Before installing any ink pen, use that pen to write on a piece of scrap media to ensure that the ink flows. Even though the pen writes on paper, it may not function when installed. The Plotter writes at such high speeds that pens that are low in ink may not be able to supply sufficient ink for plotting. If the ink in a wet-ink pen does not flow, refer to the Pen Maintenance information later in this section.

CAUTION

Always check wet-ink pens to ensure that the pen tip is tightened properly. To tighten, use the 4663 wet-ink pen tip replacement tool. An improperly tightened pen tip can scratch the platen.

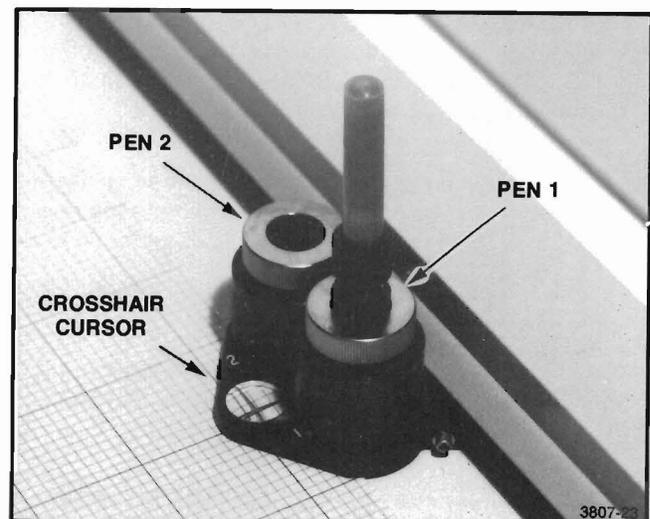


Figure 4-5. The 4663 Pen Carriage.

PARAMETER ENTRY CARD PEN GROUP SETTINGS

When changing pen types, such as from fiber-tip to wet-ink, remember to check that the Pen Group lines on the Parameter Entry Card are set to match the new pen type. For most applications, only the first two lines of the Pen Group must be set. The Pen Parameter Access line determines whether Pen 1 or Pen 2 is being addressed. The Pen Type line establishes the correct pen pressure and pen velocity limit for the selected pen type. The other two lines in the Pen Group, called Pen Pressure and Pen Velocity Limit, are used to reset the default parameter values to match specific applications. Complete information about each line on the Parameter Entry Card is included in Section 3 of this manual.

Procedure

1. **Pull** the Parameter Entry Card out to the Pen Parameter Access line; select either PEN 1 or PEN 2. Changes made to the following three lines on the Parameter Entry Card apply only to the pen selected on the Pen Parameter Access line.
2. **Pull** the Parameter Entry Card out to the Pen Type line; make the selection corresponding to the new pen type. Push the Parameter Entry Card back in.

NOTE

For most applications, no further action is required. For standard pen types, these parameters are automatically set. The remaining instructions are included for those who wish to use other than the default parameter values.

On early model 4663 Plotters, the PLASTIC HARD TIP selection is not available. To use plastic hard-tip pens with earlier Plotters, set the Pen Pressure and Pen Velocity Limit lines according to the parameter listed in the Selection Guide, later in this section.

3. **Refer** to the *Selection Guide* located later in this section. Find the pen pressure and pen velocity limit (speed) to use for the combination of pen and media installed.
4. **Select** the Pen Pressure and the Pen Velocity Limit on the Parameter Entry Card. These values replace the default values set on the Pen Type line.
5. **Repeat** this procedure to set the Pen Group parameters for the second pen.

SHEET MODE PEN INSTALLATION PROCEDURE

1. **Press** the PLOT CONTROL switch to enable the Pause function. If actively plotting, the Plotter continues for a few seconds and then stops.
2. **Grasp** the pen holder by the top with one hand, and unscrew the old pen from its holder. See Figure 4-6.
3. **Remove** the cap from the replacement pen.
4. **Insert** the new pen into the correct pen holder, and screw the pen clockwise into the holder until the pen seats in the holder finger-tight. See Figure 4-7.
5. **Press** the PLOT CONTROL switch and the Plotter is ready to continue operation.

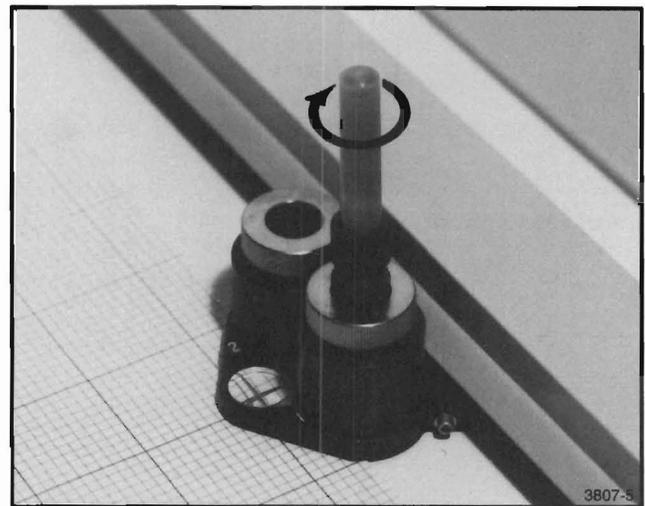
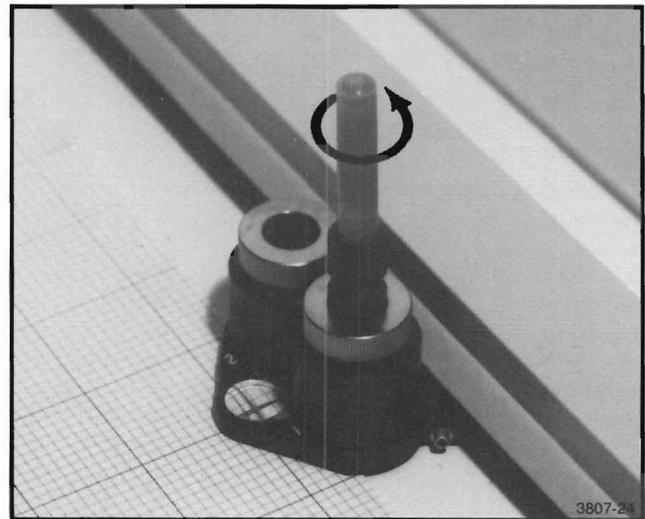


Figure 4-7. Installing 4663 Pen Into the Pen Holder.

ROLL MODE PEN INSTALLATION PROCEDURE

1. **Press** the PLOT CONTROL switch to enable the Pause function. (If actively plotting, the Plotter continues for a few seconds and then stops.)
2. **Grasp** the pen holder by the top with one hand, and unscrew the old pen from its holder. See Figure 4-6.
3. **Remove** the cap from the replacement pen.
4. **Insert** the new pen into the correct pen holder, and screw the pen clockwise into the holder until the pen seats in the holder finger-tight. See Figure 4-7.
5. **Press** the PLOT CONTROL switch and the Plotter is ready to continue operation.

PEN PRESSURE ADJUSTMENTS

The two PRESSURE OVERRIDE adjustments (shown in Figure 4-8) fine-adjust the pen pressure set by the Pen Pressure line on the Parameter Entry Card. This feature can be used to improve line quality and to minimize pen tip wear. The left control affects Pen 1 and the right control affects Pen 2.

Moving the control toward "+" increases the pen pressure on the media; moving the control toward "-" decreases pressure. The full range of this control pressure is approximately $\pm 25\%$ of the nominal pressure set using the Parameter Entry Card.

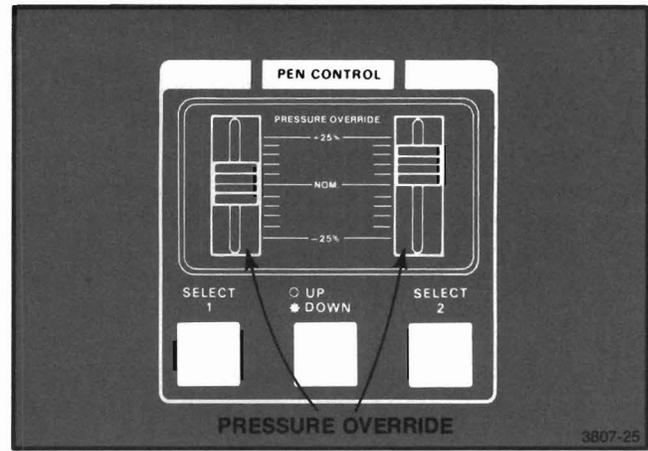


Figure 4-8. PRESSURE OVERRIDE Adjustments.

LINE QUALITY CONSIDERATIONS

To maintain the best line quality, the pens must be properly installed, the Parameter Entry Card speed and pressure must be set to match the pens and media installed, and the pens must be in good working order. A few comments regarding line quality follow.

When installing the pens, it is essential that the Pen Pressure and Pen Velocity Limits be set to the default values or according to the values indicated in the Selection Guide. Setting the Pen Pressure too high reduces pen life and risks damaging the platen surface. Setting the Pen Velocity Limit too high or too low may cause skipping.

Pen skipping (intermittent writing) may be caused by dry pens. Pens that are low on ink tend to skip rather than draw lighter and lighter lines, as might be expected. Reducing the setting on the Pen Velocity Limit line of the Parameter Entry Card can produce usable results with such pens. Damaged pen tips can also cause skipping. If a pen is skipping, it is possible that the pen tip is pushed into the body of the pen.

The easiest way to check fiber-tip and hard-tip pens is to compare the pen in question with a new pen. Pen tip damage, if present, should be quite apparent. To check wet-ink pens for wear, refer to the Pen Maintenance instructions later in this section.

If the pen skips in only one area of the plot, check that the media is not wrinkled and that the platen is clean and free of grit. Any dirt on the platen can cause the pen to bounce, thereby reducing line quality.

SELECTION GUIDE

This *Selection Guide* provides a quick reference to help you select the settings on the Parameter Entry Card for different combinations of pens and media. The *Selection Guide* gives the operating parameters for the Pen Pressure and the Pen Velocity Limit lines.

Media, both paper and film, not supplied by Tektronix can be used with the Plotter. To obtain optimum performance, while running the self-test or a selected test plot, vary the Pen Velocity and Pen Pressure selections on the Parameter Entry Card and the PRESSURE OVERRIDE on the front panel.

The settings shown in Table 4-1 are recommendations based on factory tests for nominal line quality. The pen pressure can be fine-tuned by using the PRESSURE OVERRIDE on the front panel.

**Table 4-1
SELECTION GUIDE**

Media Type	Pen	Pen Velocity Limit (ips)	Pen Pressure
Sulphite Paper, Roll or Sheet	Standard Fiber-Tip	16	5 grams
	Permanent-Ink Fiber-Tip	16	5 grams
	Plastic Hard-Tip	14 ^a	20 grams
	Wet-Ink PL3	14	20 grams
	Wet-Ink PL5	10	20 grams
	Wet-Ink PL8	6	20 grams
Vellum	Standard Fiber-Tip	14	5 grams
	Permanent-Ink Fiber-Tip	14	5 grams
	Plastic Hard-Tip	12 ^a	20 grams
	Wet-Ink PL3	14	20 grams
	Wet-Ink PL5	10	20 grams
	Wet-Ink PL8	6	20 grams

Media Type	Pen	Pen Velocity Limit (ips)	Pen Pressure
Matte Side Polyester Film	Standard ^b Fiber-Tip	16	5 grams
	Permanent-Ink Fiber-Tip	16	5 grams
	Plastic ^b Hard-Tip	16 ^a	20 grams
	Wet-Ink PL3	16	30 grams
	Wet-Ink PL5	12	30 grams
Smooth Side Polyester Film	Wet-Ink PL8	8	30 grams
	Permanent-Ink Fiber-Tip	Full Speed Axial	5 grams

^aThe recommended setting listed is for plastic hard tip pens using black ink. When using plastic hard tip pens with colored ink, increase the recommended Pen Velocity Limit by one setting. For example, if the recommended setting is 14, select 16 when using colored ink plastic hard tip pens.

^bNot recommended for film.

PEN MAINTENANCE

Proper pen maintenance prolongs pen life considerably and, in general, provides much better plots. The pen maintenance procedures are divided into the following categories: Storing Pens, Checking Pen Tips for Wear, Cleaning Wet-Ink Pens, Filling Wet-Ink Pens, and Starting Wet-Ink Pens.

STORING PENS

To store fiber-tip and plastic hard-tip pens, simply keep them at room temperature with the cap firmly in place. Like any pen of these types, the caps should always be replaced after use to prevent the ink from drying. (To restore dried out permanent-ink fiber-tip pens, try placing a drop of solvent on the tip.)

There are two different methods of storing wet-ink pens. For short term (temporary) storage, store wet-ink pens in a Storage/Humidifier without removing the ink. The humidifier provides a moist environment for pens and reduces ink drying.

If you plan to store the pens for an extended period, the pens should be thoroughly cleaned prior to storage. Remove all ink and cleaning fluid and then store the pens at room temperature with the cap firmly in place. Instructions for cleaning wet-ink pens follow in this section.

CHECKING TIPS FOR WEAR

The amount of tip wear depends on the type of pen and media you are using. Fiber-tip pens wear out more quickly than other 4663 pens; plastic hard-tip pens are second; and wet-ink pens wear the least. The matte side of polyester film is very abrasive and wears pen tips at a much faster rate than paper or the smooth side of film.

Certain types of plots may not require excellent quality; in these cases, a worn tip may work fine. It is a good idea to have new pens available for critical plots and retain older pens that are not worn excessively for those plots where line quality is less important.

Some visible signs of tip wear are:

- Line width increases or becomes erratic.
- Residue forms on the tip.
- Ink starts to skip or stops flowing completely. (Skipping or very light lines may also indicate that the pen is running out of ink.)

Wet-ink pens are more expensive than other pens and are normally used for more critical plots. For this reason, check the tips frequently for tip wear. A special wet-ink pen tip magnifying instrument for checking tip wear comes complete with instructions (see accessories list, Section 1). This magnifier is very simple to operate and allows you to check wet-ink pen tips quickly and accurately. See Figure 4-9 for examples of good and worn tips as shown through the magnifier. If you determine that the tip is worn excessively, replace it.

CLEANING WET-INK PENS

Wet-ink pens should be thoroughly cleaned as soon as you are finished using them. These pens have a very small opening in the tip and if they are not cleaned or stored properly, ink dries inside the tip. Once the ink dries, the pen becomes much more difficult to clean.

Wet-ink pens should be cleaned each time ink colors are changed to prevent line color change. There are five recommended methods for cleaning wet-ink pens.

CAUTION

When reassembling pens after cleaning, ensure that the pen tip is tightened properly with the 4663 wet-ink pen tip replacement tool (see Figure 4-10.) An improperly tightened pen tip can scratch the platen.

The first method is to disassemble the pen, as shown in Figure 4-10, and place the parts in the Ultrasonic Cleaning Tank. (See the accessories list for ordering information.) The Ultrasonic Cleaning Tank cleans better than other cleaning systems, especially in cases where thorough cleaning is important. A complete set of cleaning instructions is included with each tank.

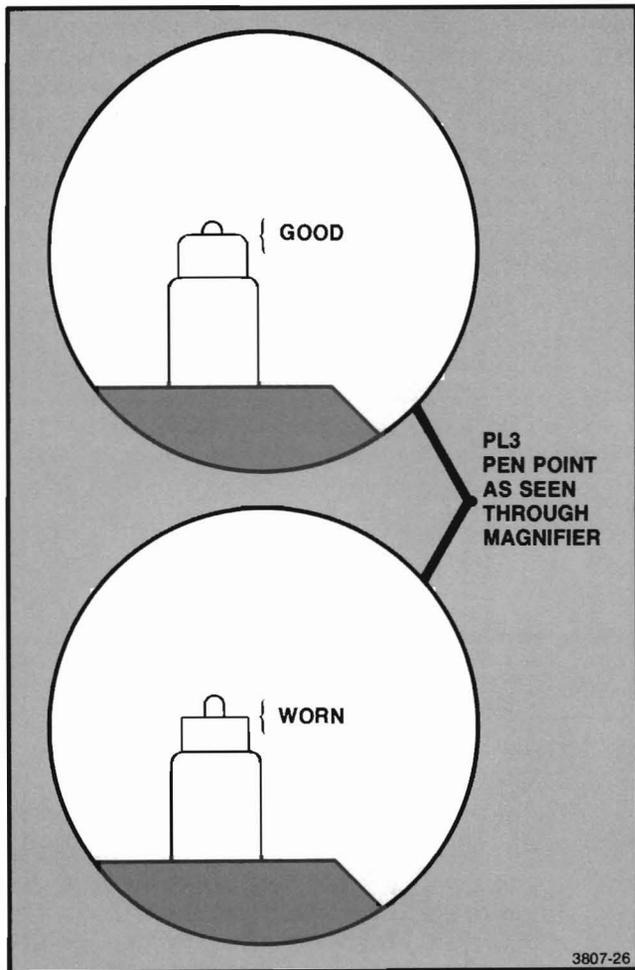


Figure 4-9. Good and Worn Wet-Ink Pen Tips.

The second method is to disassemble the pen, as shown in Figure 4-10, and soak the parts in the parts strainer that comes with each bottle of 3068 Cleaning Fluid (see the accessories list). This soaking method takes longer, but if time is not important, it will clean most pens adequately. Leave parts in the cleaning fluid until the dried ink is dissolved. Rinse with clear water and dry, making sure that the air channel and the vent hole are thoroughly cleaned. Air dry all parts completely before assembly. (A pressure/suction bulb or a small bellows are handy aids for decreasing drying time.)

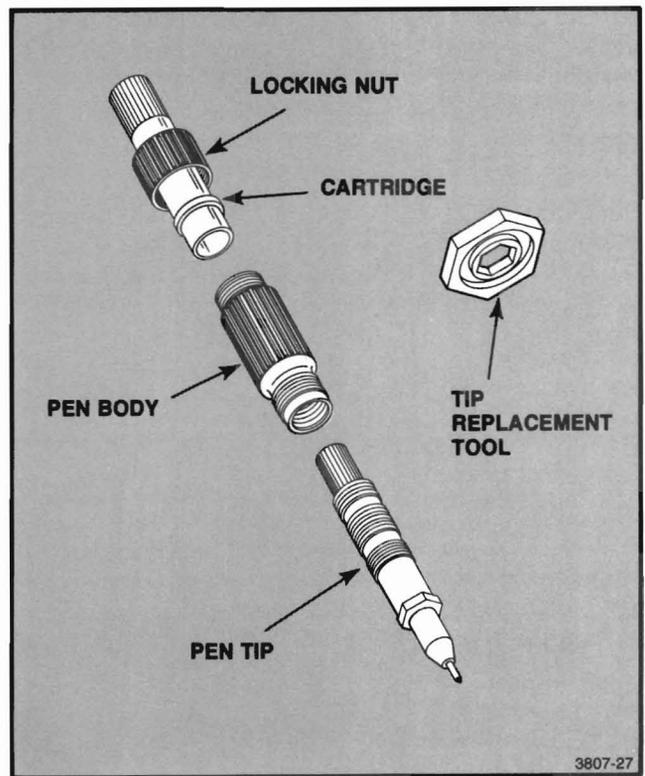


Figure 4-10. Disassembling the 4663 Wet-Ink Pen.

PENS AND MEDIA

The third method cleans pens with the ink cartridge removed. Screw the pen tip into a Pressure/Suction Cleaning Bulb (see the accessories list) and force cleaning fluid through the pen, as shown in Figure 4-11. This method is good for cleaning pens that have not been allowed to dry and works well as a flushing agent for pens. It is not, however, recommended as a means of cleaning pens that have had ink in them for a long period of time. The Pressure/Suction Cleaning Bulb comes with a complete set of operating instructions.

The fourth method is used when you are using several pens intermittently and a complete disassembled cleaning is not needed. Turn on the Ultrasonic Cleaning Tank and dip the tip of the pen into the cleaning fluid, as shown in Figure 4-12. This loosens the dried ink or residue that is in the tip. Remove the tip from the cleaning fluid, and use a lint-free cloth or paper to bleed off the cleaning fluid until the ink starts to flow normally.

The fifth method is to partially fill the tank with water and immerse a cup of cleaning fluid in the water, as shown in Figure 4-13. Dip the pen tip into the cleaning fluid. This is an effective way of conserving cleaning fluid.



Figure 4-12. Using the Ultrasonic Tank to Clean Pen Tips.

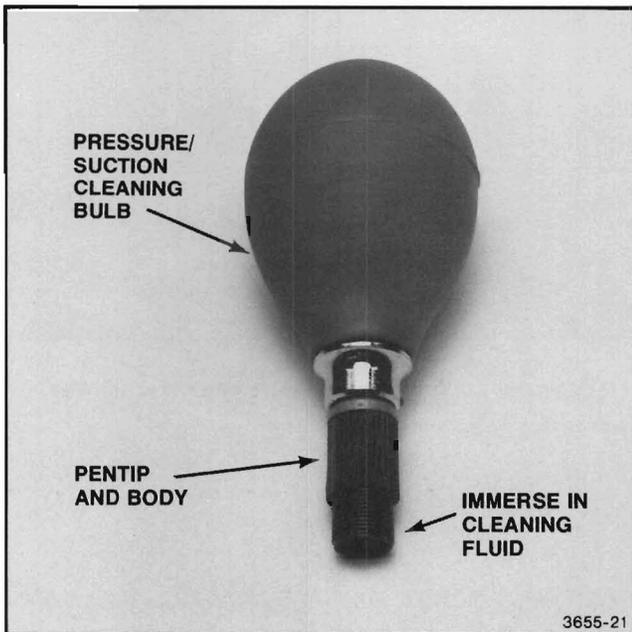


Figure 4-11. Using the Pressure/Suction Bulb to Clean Pens.

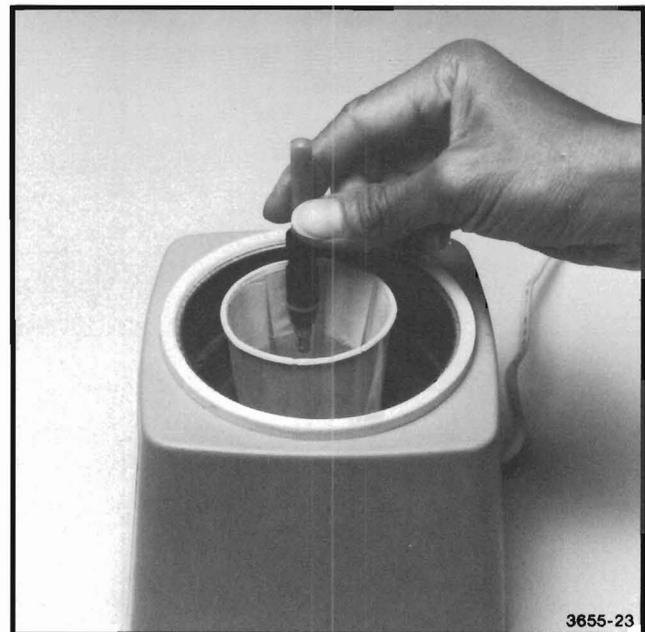


Figure 4-13. Conserving Cleaning Fluid.

FILLING WET-INK PENS

Ink can be difficult to handle because it spills easily. If at all possible, hold the pen over a rag or old piece of media while filling the cartridge. The procedure for filling ink pens is as follows:

1. **Unscrew** and remove the locking nut using light finger pressure. See Figure 4-14.
2. **Hold** the pen point upright and pull off the ink cartridge.
3. **Tap** the rear portion of the pen body lightly on absorbent paper to remove excess ink. See Figure 4-15.
4. **Fill** the cartridge with the squeeze bottle to a line about 1/4 inch from the top of the cartridge. **Do not fill past the 1/4 inch line.** See Figure 4-16.
5. **Insert** the cartridge on the pen body, keeping the cartridge upright. Reinstall the locking nut.
6. **Hold** the pen vertically and write on paper or film until ink flows. If the ink does not flow, refer to *Starting Wet-Ink Pen Flow*, later in this section.

NOTE

Always keep the cartridge more than one-quarter full to ensure proper flow.

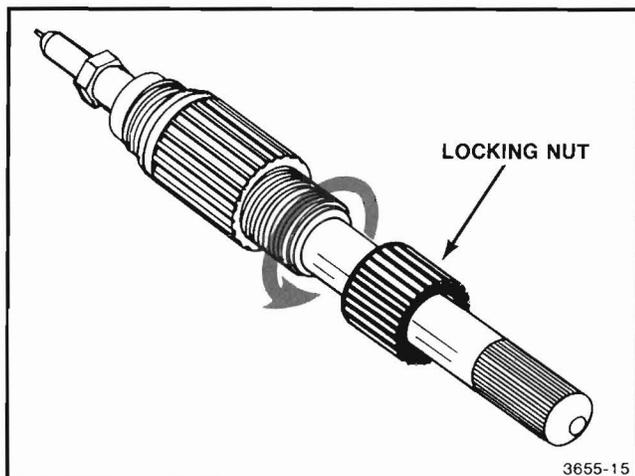


Figure 4-14. Removing the Wet-Ink Pen Locking Nut.

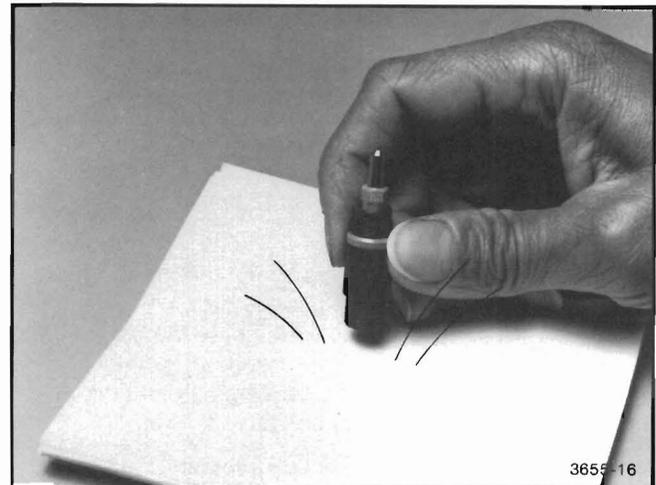


Figure 4-15. Removing Excess Ink From the Wet-Ink Pen.

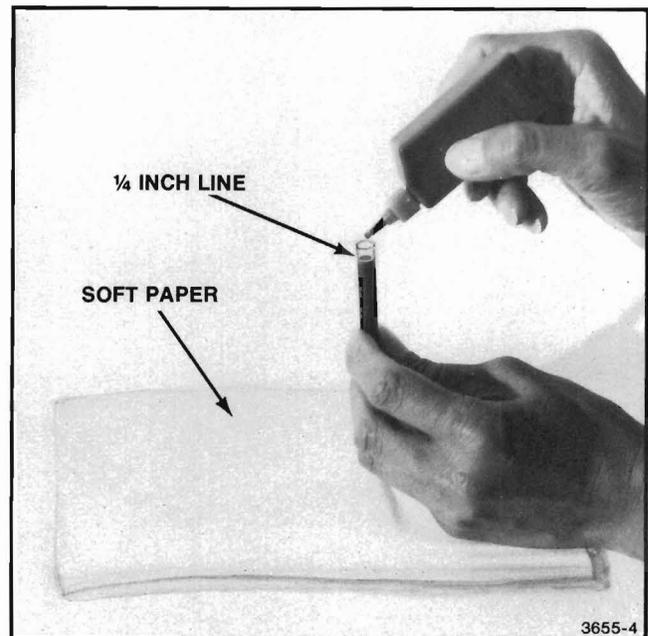


Figure 4-16. Filling the Ink Cartridge.

STARTING WET-INK PEN FLOW

Ink flow can be started in one of three ways. If necessary, try all three to get the desired results.

- Wet the end of the tip with water or cleaning fluid. Bleed off the water or cleaning fluid using a lint-free cloth or paper until ink begins to flow in a normal manner.
- Turn the pen upside down and tap the ink cartridge sharply on a hard surface (see Figure 4-17). This depresses the spring and wire inside the tip. When the wire returns to its normal position, it cleans the partially dried ink from the tip. Then try writing on paper or film. Repeat if necessary.
- Squeeze the Pressure/Suction Cleaning Bulb slightly and insert the pen tip into the bulb. When the tip is seated into the bulb, release it. This applies suction on the pen and sucks ink into the tip. See Figure 4-18.

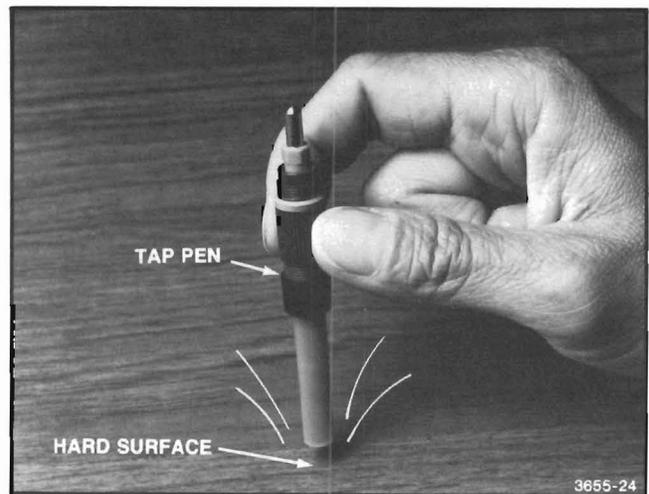


Figure 4-17. Starting Ink Flow by Tapping.

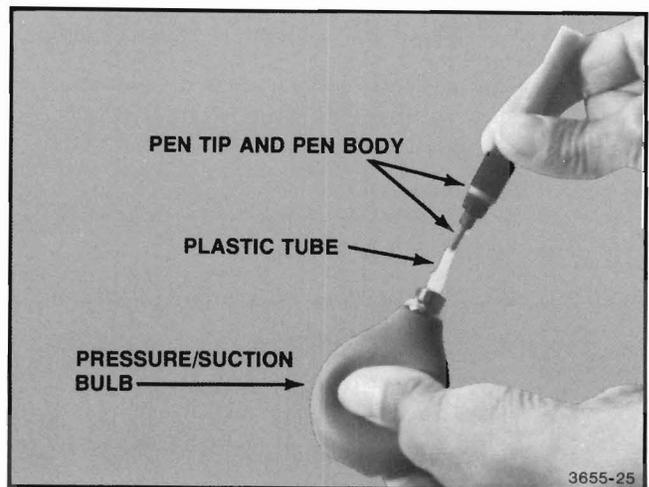


Figure 4-18. Starting Ink Flow With the Pressure/Suction Bulb.

Section 5

MAINTENANCE

This section contains information about cleaning and adjusting the 4663 Plotter. More detailed procedures

are described in the *4663 Service Manual* and should be performed by a service technician.

CLEANING THE PLATEN AND THE CASE

Occasional cleaning helps retain the electrostatic paper hold-down ability of the platen and preserves the Plotter's appearance. The frequency of cleaning varies with the instrument's environment. Use the following procedure to clean the Plotter.

1. **Press** the POWER switch on (or if power is already on, select the front panel Initialize function). This moves the pen carriage to the upper-right corner of the platen.
2. **Turn** the POWER switch off and disconnect the power cord.

CAUTION

Avoid using cleaners containing antistatic agents (most glass cleaners) as well as abrasive and strong chemical cleaners, which can scratch or remove layers of the thin insulating film on the platen's electrostatic surface. Conductive cleaners must also be avoided. These include products containing ammonia, oils, liniments, or scents that leave an electrically conductive film if not entirely removed. Any remaining film causes the electrostatic paper hold-down to fail due to the conductivity of the film residue. Isopropyl alcohol should not be allowed to seep under the paper guides, since it will break down the adhesive holding the paper guide strips to the platen.

3. **Clean** the platen with a clean cloth, well-dampened with water, since water will not leave a residue on the platen's surface. Avoid using excess water; do not allow water to stand on the surface of the platen.
 - If the platen is especially dirty, a plain detergent or alcohol pad (see the accessories list in Section 1) can be used to clean the platen. Both of these are more effective cleaners than water alone; but they leave a residue that must be removed. (A plain detergent is one free of additional ingredients such as bleach, scents, fabric softeners, and colored crystals.)
 - To remove any residue created in the preceding step, dampen and wring well a soft clean cloth. Wipe the platen with the damp cloth, turning the cloth frequently to prevent smearing the residue. If alcohol was the cleaning agent, one thorough wiping of the platen is sufficient. If detergent was used to clean the platen, this wiping procedure must be repeated a minimum of three times to remove all residue.
4. **Dry** the platen with a clean, dry cloth.
5. **Clean** the Plotter case with a cloth lightly dampened with a mild detergent solution.
6. **Connect** the power cord to the power source. The Plotter may again be operated.

PAPER-DRIVE MECHANISM ADJUSTMENTS (OPTION 36 EQUIPPED PLOTTERS ONLY)

The paper-drive mechanism, located at the right end of the Plotter, consists mainly of two paper-drive sprockets that pull the media off the roll and across the platen. One adjustment to the paper-drive mechanism compensates for the slight variations in the width of the roll media. A second adjustment, called the Lateral Paper-Drive Mechanism Adjustment, removes any wrinkles present in the media as it lies on the platen. Roll media must be installed and the POWER switch should be off to perform these adjustments.

PAPER WIDTH ADJUSTMENT

1. **Check** that the front paper-drive sprocket is properly engaged in the media holes; the media should lay adjacent to and touch the entire front paper guide.
2. **Loosen** the knurled nut shown in Figure 5-1a and position the front paper-drive sprocket to meet the conditions described in Step 1. Tighten the nut.
3. **Check** that the rear (closest to rear panel) paper-drive sprocket is aligned with the sprocket holes in the paper. Both front and rear sprockets should now be centered in the media holes.
4. **Loosen** the knurled nut shown in Figure 5-1b and align the rear drive sprocket with the holes in the media. Tighten the nut.

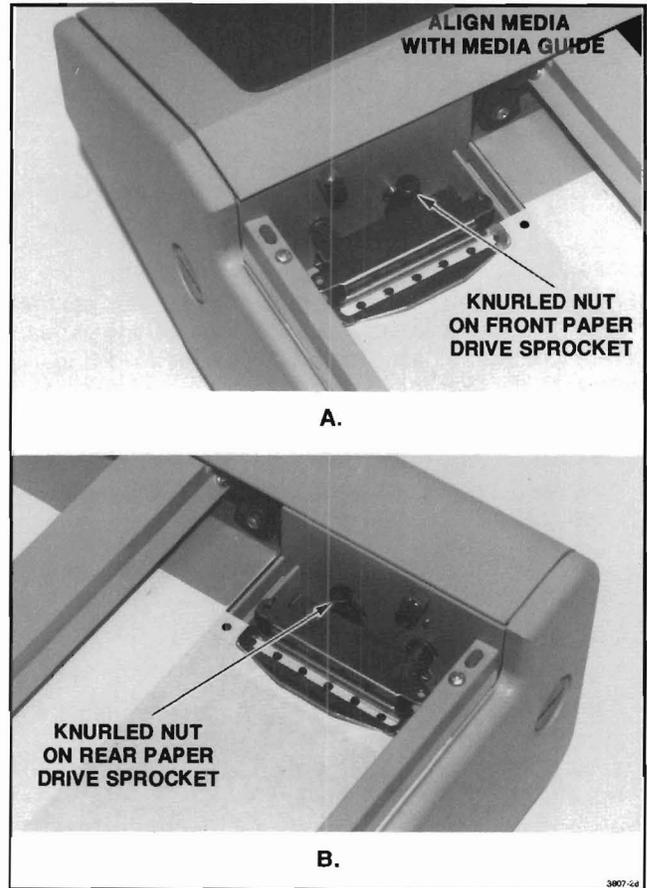


Figure 5-1. Paper Width Adjustment.

LATERAL PAPER-DRIVE MECHANISM ADJUSTMENT

1. **Check** that the media lies flat on the platen with no twists or large wrinkles. When pulling the media off the roll, the tension at both edges of the media should be equal.
2. **Adjust** the lateral position of the rear paper-drive sprocket:
 - a. **Open** the two end panels and then the rear panel.
 - b. **Loosen** the locking screw shown in Figure 5-2.
 - c. **Adjust** the lateral adjustment screw slowly until the tension at both edges of the paper is equal. Turning the adjustment screw clockwise moves the paper-drive sprocket to the left; turning the adjustment screw counterclockwise moves it to the right. You may have to adjust and check the tension more than once.
 - d. **Tighten** the locking screw and replace the rear and end panels.

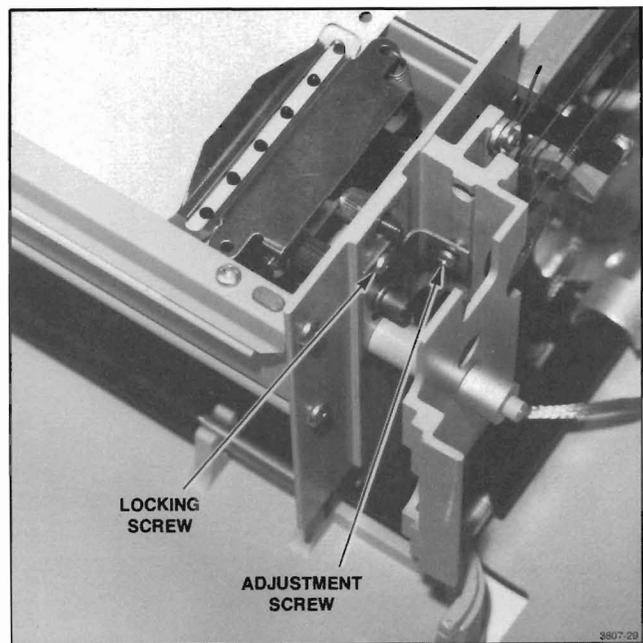


Figure 5-2. Lateral Paper-Drive Mechanism Adjustment.

FIRMWARE VERSION AND MEMORY STATUS INFORMATION

The Parameter Entry Card's Error Data line can be used to determine the version number of the Plotter's firmware and the size of the RAM (memory).

After power-up and until either an error occurs or the error data is cleared, pressing the Error Parameter 6 switch indicates (in binary) the version number of the firmware.

The number of valid 256 byte blocks of RAM is verified by the Plotter during power-up. You can read the number of blocks (minus 1) by selecting the Error Data line on the Parameter Entry Card and pressing the Error Parameter 5 switch. For example, for a standard 4663 with 8K of RAM memory, Error Parameter 5 indicates 1F (hex) = 31 (decimal), and $(31 + 1) \times 256 = 8192$ (8K) bytes of RAM installed.



Appendix A

CHARACTERISTICS

Table A-1
PHYSICAL CHARACTERISTICS

Weight	Outside Dimensions		
	Length	Width	Height
80 lbs (36.4 kg)	38.0 in (965 mm)	30.1 in (765 mm)	6.8 in (173 mm)

Table A-2
POWER REQUIREMENTS

Line Voltage, Switch Selection	Voltage Range	Line Fuse Size
110 V	90 – 130 V	5 A Fast-Blo
220 V	180 – 250 V	2.5 A Fast-Blo

Line Frequency 48 – 440 Hz

Input Power 115 Vac . . . 3.5 A maximum; 2.4 A typical

Table A-3
ENVIRONMENTAL SPECIFICATIONS

Characteristic	Non-Operating	Operating
Temperature	–67 to 167° F (–55 to +75° C)	32 to 104° F (0 to 40° C)
Altitude	To 50,000 ft (15240 m)	To 15,000 ft (4572 m)
Vibration	Up to 40 Hz @.01 in (.03 cm) total displacement	
Shock	To 30 Gs, ½ sine, 11 ms duration	
Transportation	Meets National Safe Transit Committee type of test when packaged as shipped by factory. Test procedure 1A, Category II with a 12-in drop.	
Humidity	Mil-T-28800B per test conditions 810B at 50.71 procedure IV (5-day operating and non-operating, 90 to 95% relative humidity).	

CHARACTERISTICS

Table A-4
PERFORMANCE SPECIFICATIONS

Characteristic	Specifications	Characteristic	Specifications		
Default Media Size	A-Size — 8 1/2 x 11 in (216 x 279 mm)	Point Plotting Rate	30 Points/s (max)		
	B-Size — 11 x 17 in (279 x 432 mm)	Plotting Accuracy	0.15% of Vector Length \pm 0.0025 in (0.0635 mm)		
	C-Size — 17 x 22 in (432 x 559 mm)	Repeatability	Returns any previously plotted point to within \pm 0.0025 in (0.0635 mm)		
	A4-Size — 8.3 x 11.7 in (210 x 297 mm)		Resolution (Addressable) 0.001 in (0.0254 mm)		
	A3-Size — 11.7 x 16.5 in (297 x 420 mm)		Pen Pressure Coarse Pressure, \pm 25%		
	A2-Size — 16.5 x 23.4 in (420 x 594 mm)	Pen Height (Up) 0.058 in \pm 0.013 (1.47 \pm 0.33 mm)	Linearity Geometry	Mean vector shall not deviate more than \pm 0.015 in from a straight line between two points.	
Paper Control Sheets	Electrostatic Hold-Down	Line Aberrations			Short term non-linearity shall not deviate more than \pm 0.003 in from mean vector.
Roll	Mechanical Hold-Down with Option 36				
Paper Drive Speed (Option 36)	\geq 4.5 in/s (114 mm/s)				
Paper Drive Resolution (Option 36)	0.016 in (0.4 mm)				
Plotting Area	Y-Axis \leq 17.25 in (438 mm) X-Axis \leq 23.5 in (597 mm)				
Plotting Speed	16.47 in/s along either axis, 23.3 in/s at a 45° angle				
Acceleration	600 in/s ² (15240 mm/s ²) in PREVIEW				
	400 in/s ² (10160 mm/s ²) in NORMAL				
	300 in/s ² (7620 mm/s ²) in ENHANCED 1				
	240 in/s ² (6096 mm/s ²) in ENHANCED 2				

Table A-5
PAGE SIZES^b

Page Format	Orientation ^c	Page Size & Media Dimensions ^d	Page Measurements (width x height)	
			English-inch	Metric-mm
Drafting	Horizontal	C 22 x 17 in	21.00 x 15.5	533.4 x 393.7
Drafting	Horizontal	B 17 x 11 in	15.76 x 10.24	400.3 x 260.1
Drafting	Horizontal	A 11 x 8.5 in	10.50 x 7.74	266.7 x 196.6
Drafting	Horizontal	A2 594 x 420 mm	22.6 x 15.75	574.0 x 400.0
Drafting	Horizontal	A3 420 x 297 mm	15.75 x 10.91	400.0 x 277.0
Drafting	Horizontal	A4 297 x 210 mm	10.91 x 7.48	277.0 x 190.0
Drafting	Vertical	C 17 x 22 in	15.50 x ^a	393.7 x ^a
Drafting	Vertical	B 11 x 17 in	10.24 x 15.76	260.1 x 400.3
Drafting	Vertical	A 8.5 x 11 in	7.74 x 10.50	196.6 x 266.7
Drafting	Vertical	A2 420 x 594 mm	15.75 x ^a	400.0 x ^a
Drafting	Vertical	A3 297 x 420 mm	10.91 x 15.75	277.0 x 400.0
Drafting	Vertical	A4 210 x 297 mm	7.48 x 10.91	190.0 x 277.0
Graphing	Horizontal	C 22 x 17 in	20.50 x 16.00	520.7 x 406.4
Graphing	Horizontal	B 16.5 x 11 in	15.00 x 10.00	381.0 x 254.0
Graphing	Horizontal	A 11 x 8.5 in	10.00 x 7.00	254.0 x 177.8
Graphing	Horizontal	A2 594 x 420 mm	22.20 x 15.75	564.0 x 400.0
Graphing	Horizontal	A3 420 x 297 mm	15.35 x 10.91	390.0 x 277.0
Graphing	Horizontal	A4 297 x 210 mm	10.91 x 7.28	277.0 x 185.0
Graphing	Vertical	C 17 x 22 in	16.00 x ^a	406.4 x ^a
Graphing	Vertical	B 11 x 16.5 in	10.00 x 15.00	254.0 x 381.0
Graphing	Vertical	A 8.5 x 11 in	7.00 x 10.00	177.8 x 254.0
Graphing	Vertical	A2 420 x 594 mm	15.75 x ^a	400.0 x ^a
Graphing	Vertical	A3 297 x 420 mm	10.91 x 15.35	277.0 x 390.0
Graphing	Vertical	A4 210 x 297 mm	7.28 x 10.91	185.0 x 277.0

^aThe page dimension is clipped since it would extend beyond the platen boundary.

^bPage sizes listed here assume FULL PAGE is selected on the Initial Aspect Ratio line of the Parameter Entry Card.

^cOrientation illustrated in Figure A-1.

^dPage size and media dimensions are shown in Figures A-2 and A-3.

CHARACTERISTICS

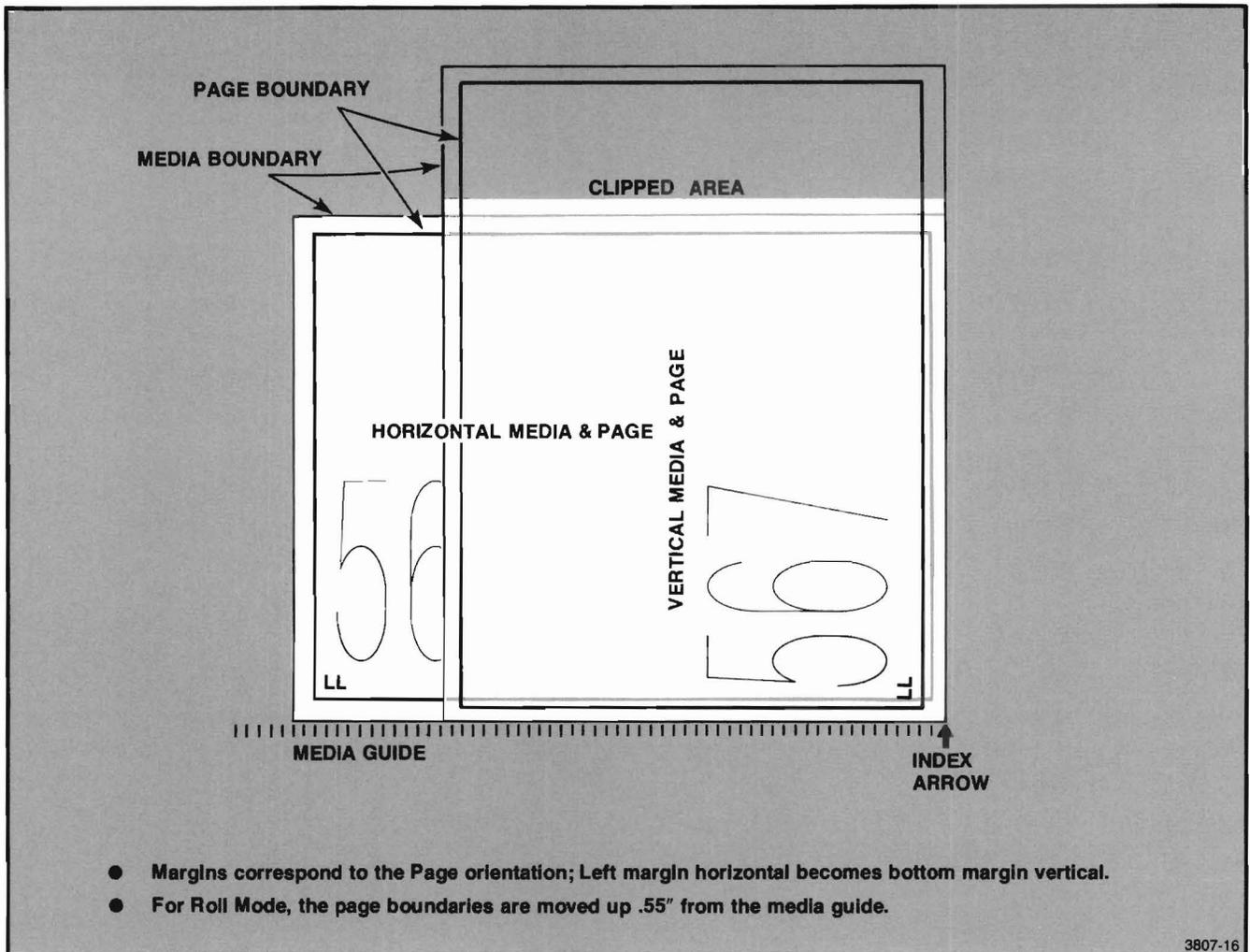


Figure A-1. Page Orientation.

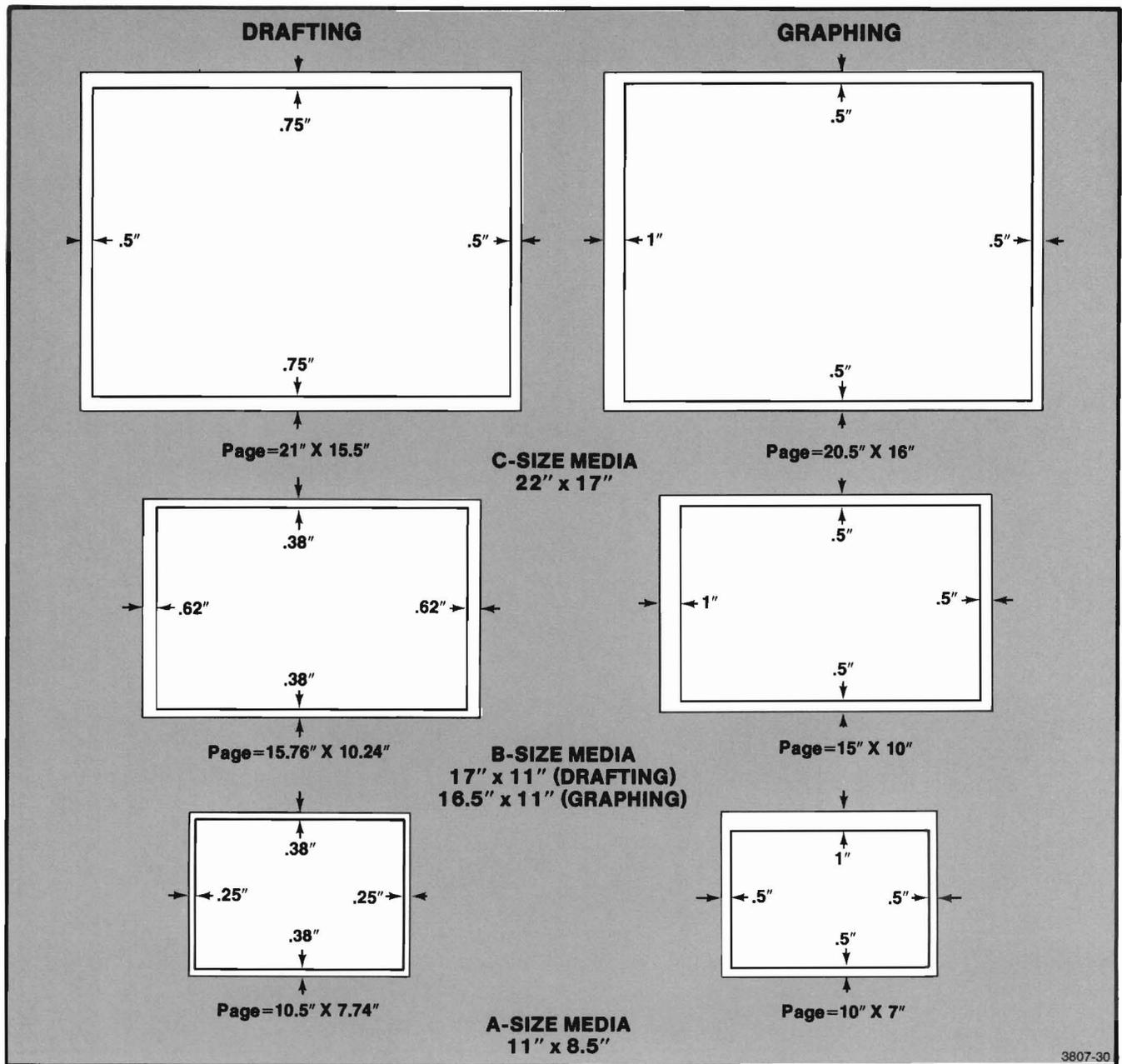
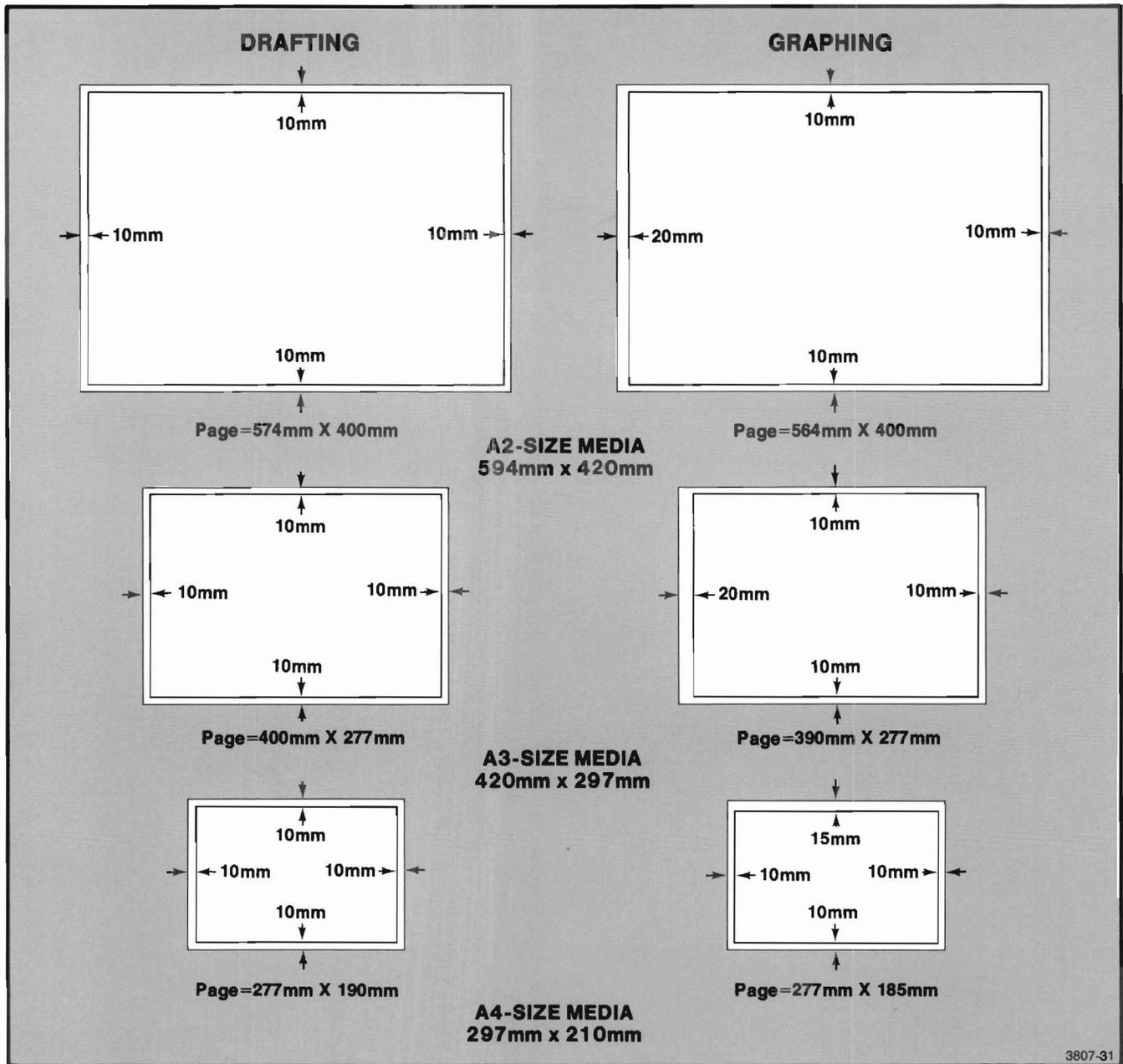


Figure A-2. English Media Size, Page Size and Margin Dimensions.

CHARACTERISTICS



3807-31

Figure A-3. Metric Media Size, Page Size, and Margin Dimensions.

MAXIMUM X AND Y COORDINATES FOR GIVEN ASPECT RATIOS (MINIMUM = 0,0)													
INITIAL PAGE SIZE AND PAGE FORMAT	INITIAL ASPECT RATIO												
	FULL PAGE	3X:2Y		4X:3Y (4096/3124)		1X:1Y		3X:4Y (3124/4096)		2X:3Y			
A-DRAFTING													
10.5" x 7.74"	Page Viewport Window	Viewport	Window	Viewport	Window	Viewport	Window	Viewport	Window	Viewport	Window		
ADU	X Y	4096 3019.23	4096 2730.67	4096 2730.67	3958.77 3019.34	4096 3124	3019.34 3019.34	4096 4096	2302.83 3019.34	3124 4096	2012.89 3019.34	2730.67 4096	X Y
GDU	X Y	135.66 100	135.66 90.44	150 100	131.11 100	131.11 100	100 100	100 100	76.27 100	100 131.11	66.67 100	100 150	X Y
MM	X Y	266.7 196.6	266.7 177.8	266.7 177.8	257.8 196.6	257.8 196.6	196.6 196.6	196.6 196.6	149.9 196.6	149.9 196.6	131.1 196.6	131.1 196.6	X Y
A-GRAPHING													
10" x 7"													
ADU	X Y	4096 2867.20	4096 2730.67	4096 2730.67	3759.30 2867.20	4096 3124	2867.20 2867.20	4096 4096	2186.80 2867.20	3124 4096	1911.47 2867.20	2730.67 4096	X Y
GDU	X Y	142.86 100	142.86 95.24	150 100	131.11 100	131.11 100	100 100	100 100	76.27 100	100 131.11	66.67 100	100 150	X Y
MM	X Y	254.0 177.8	254.0 169.3	254.0 169.3	233.1 177.8	233.1 177.8	177.8 177.8	177.8 177.8	135.6 177.8	135.6 177.8	118.5 177.8	118.5 177.8	X Y
B-DRAFTING													
15.76" x 10.24"													
ADU	X Y	4096 2661.36	3992.04 2661.36	4096 2730.67	3489.41 2661.36	4096 3124	2661.36 2661.36	4096 4096	2029.81 2661.36	3124 4096	1774.24 2661.36	2730.67 4096	X Y
GDU	X Y	153.91 100	150 100	150 100	131.11 100	131.11 100	100 100	100 100	76.27 100	100 131.11	66.67 100	100 150	X Y
MM	X Y	400.3 260.1	390.1 260.1	390.1 260.1	341.0 260.1	341.0 260.1	260.1 260.1	260.1 260.1	198.4 260.1	198.4 260.1	173.4 260.1	173.4 260.1	X Y
B-GRAPHING													
15" x 10"													
ADU	X Y	4096 2730.67	4096 2730.67	4096 2730.67	3580.29 2730.67	4096 3124	2730.67 2730.67	4096 4096	2082.67 2730.67	3124 4096	1820.44 2730.67	2730.67 4096	X Y
GDU	X Y	150 100	150 100	150 100	131.11 100	131.11 100	100 100	100 100	76.27 100	100 131.11	66.67 100	100 150	X Y
MM	X Y	381.0 254.0	381.0 254.0	381.0 254.0	333.0 254.0	333.0 254.0	254.0 254.0	254.0 254.0	193.7 254.0	193.7 254.0	169.3 254.0	169.3 254.0	X Y

Appendix B

DEFAULT PAGE, VIEWPORT AND WINDOW COORDINATES

MAXIMUM X AND Y COORDINATES FOR GIVEN ASPECT RATIOS (MINIMUM = 0,0)

INITIAL PAGE SIZE AND PAGE FORMAT	INITIAL ASPECT RATIO											
	FULL PAGE	3X:2Y		4X:3Y (4096/3124)		1X:1Y		3X:4Y (3124/4096)		2X:3Y		
C-DRAFTING 21" x 15.5"	Page Viewport Window	Viewport	Window	Viewport	Window	Viewport	Window	Viewport	Window	Viewport	Window	
ADU X	4096	4096	4096	3963.89	4096	3023.24	4096	2305.81	3124	2015.49	2730.67	X
ADU Y	3023.24	2730.67	2730.67	3023.24	3124	3023.24	4096	3023.24	4096	3023.24	4096	Y
GDU X	135.48	135.48	150	131.11	131.11	100	100	76.27	100	66.67	100	X
GDU Y	100	90.32	100	100	100	100	100	100	131.11	100	150	Y
MM X	533.4	533.4	533.4	516.2	516.2	393.7	393.7	300.3	300.3	262.5	262.5	X
MM Y	393.7	355.6	355.6	393.7	393.7	393.7	393.7	393.7	393.7	393.7	393.7	Y
C-GRAPHING 20.5" x 16"												
ADU X	4096	4096	4096	4096	4096	3196.88	4096	2438.24	3124	2131.25	2730.67	X
ADU Y	3196.88	2730.67	2730.67	3124	3124	3196.88	4096	3196.88	4096	3196.88	4096	Y
GDU X	128.3	128.3	150	128.13	131.11	100	100	76.27	100	66.67	100	X
GDU Y	100	85.42	100	97.72	100	100	100	100	131.11	100	150	Y
MM X	520.7	520.7	520.7	520.7	520.7	406.4	406.4	310.0	310.0	270.9	270.9	X
MM Y	406.4	347.1	347.1	397.14	397.14	406.4	406.4	406.4	406.4	406.4	406.4	Y
A2-DRAFTING 22.60" x 15.75"												
ADU X	4096	4096	4096	3742.45	4096	2854.35	4096	2177.00	3124	1902.90	2370.67	X
ADU Y	2854.36	2730.67	2730.67	2854.35	3124	2854.35	4096	2854.35	4096	2854.35	4096	Y
GDU X	143.50	143.50	150	131.11	131.11	100	100	76.27	100	66.67	100	X
GDU Y	100	95.67	100	100	100	100	100	100	131.11	100	150	Y
MM X	574.0	574.0	574.0	524.5	524.5	400.0	400.0	305.1	305.1	266.7	266.7	X
MM Y	400.0	382.67	382.67	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	Y
A2-GRAPHING 22.20" x 15.75"												
ADU X	4096	4096	4096	3808.81	4096	2904.96	4096	2215.60	3124	1936.64	2730.67	X
ADU Y	2904.96	2730.67	2730.67	2904.96	3124	2904.96	4096	2904.96	4096	2904.96	4096	Y
GDU X	141.00	141.00	150	131.11	131.11	100	100	76.27	100	66.67	100	X
GDU Y	100	94.00	100	100	100	100	100	100	131.11	100	150	Y
MM X	564.0	564.0	564.0	524.5	524.5	400.0	400.0	305.1	305.1	266.7	266.7	X
MM Y	400.0	376.0	376.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	Y

MAXIMUM X AND Y COORDINATES FOR GIVEN ASPECT RATIOS

(MINIMUM = 0,0)

INITIAL PAGE SIZE AND PAGE FORMAT	INITIAL ASPECT RATIO											
	FULL PAGE	3X:2Y		4X:3Y (4096/3124)		1X:1Y		3X:4Y (3124/4096)		2X:3Y		
A3-DRAFTING 15.75" x 10.91"	Page Viewport Window	Viewport	Window	Viewport	Window	Viewport	Window	Viewport	Window	Viewport	Window	
ADU X	4096	4096	4096	3719.03	4096	2836.48	4096	2163.37	3124	1890.99	2730.67	X
ADU Y	2836.48	2730.67	2730.67	2836.48	3124	2836.48	4096	2836.48	4096	2836.48	4096	Y
GDU X	144.40	144.40	150	131.11	131.11	100	100	76.27	100	66.67	100	X
GDU Y	100	96.27	100	100	100	100	100	100	131.11	100	150	Y
MM X	400.0	400.0	400.0	363.2	363.2	277.0	277.0	211.3	211.3	184.7	184.7	X
MM Y	277.0	266.67	266.67	277.0	277.0	277.0	277.0	277.0	277.0	277.0	277.0	Y
A3-GRAPHING 15.35" x 10.91												
ADU X	4096	4096	4096	3814.38	4096	2909.21	4096	2218.84	3124	1939.48	2730.67	X
ADU Y	2909.21	2730.67	2730.67	2909.21	3124	2909.21	4096	2909.21	4096	2909.21	4906	Y
GDU X	140.79	140.79	150	131.11	131.11	100	100	76.27	100	66.67	100	X
GDU Y	100	93.86	100	100	100	100	100	100	131.11	100	150	Y
MM X	390.0	390.0	390.0	363.2	363.2	277.0	277.0	211.3	211.3	184.7	184.7	X
MM Y	277.0	260.0	260.0	277.0	277.0	277.0	277.0	277.0	277.0	277.0	277.0	Y
A4-DRAFTING 10.91" x 7.48"												
ADU X	4096	4096	4096	3683.69	4096	2809.53	4096	2142.82	3124	1873.02	2730.67	X
ADU Y	2809.53	2730.67	2730.67	2809.53	3124	2809.53	4096	2809.53	4096	2809.53	4096	Y
GDU X	145.79	145.79	150	131.11	131.11	100	100	76.27	100	66.67	100	X
GDU Y	100	97.19	100	100	100	100	100	100	131.11	100	150	Y
MM X	277.0	277.0	277.0	249.1	249.1	190.0	190.0	144.9	144.9	126.7	126.7	X
MM Y	190.0	184.7	184.7	190.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0	Y
A4-GRAPHING												
ADU X	4096	4096	4096	3586.77	4096	2735.60	4096	2086.44	3124	1823.74	2730.67	X
ADU Y	2735.61	2730.67	2730.67	2735.61	3124	2735.60	4096	2735.61	4096	2735.61	4096	Y
GDU X	149.73	149.73	150	131.11	131.11	100	100	76.27	100	66.67	100	X
GDU Y	100	99.82	100	100	100	100	100	100	131.11	100	150	Y
MM X	277.0	277.0	277.0	242.6	242.6	185.0	185.0	141.1	141.1	123.3	123.3	X
MM Y	185.0	184.7	184.7	185.0	185.0	185.0	185.0	185.0	185.0	185.0	185.0	Y



Appendix C

ERROR TYPES

The following tables show the Parameter Entry switch display for each error type used in the Plotter. Table C-1 lists nonfatal error types, while Table C-2 lists fatal error types. The Parameter Entry display shows the states of the lighted switches on the Parameter Entry Module if 1) the Parameter Entry Card was pushed all the way in when the error occurred, or 2) the Error Data line on the Parameter Entry Card has been selected and the ERROR CODE switch is pressed. All references to errors in this manual identify the errors by the hex equivalent value of the light displays. Refer to the Error Data Line description in the *4663 Operator's Manual* to access the error parameters using the Parameter Entry Module.

Nonfatal errors shown in Table C-1 indicate when the Plotter is unable to recognize or perform a command. The usual response is that the command is ignored or some assumptions are made and processing continues. The first group of errors (01 through 0C) indicate a problem in communicating with the Plotter. The second group of errors (40 through 51) indicate a problem with recognition and/or specification of a command. The third group (80 through 8D) indicate problems with command processing (which may be caused by the specification and/or use of a command).

Table C-1
NONFATAL ERROR TYPES

* = Light is ON

Parameter Entry Display	Hex	Decimal	Cause of Error	Parameter Entry Display	Hex	Decimal	Cause of Error
0000000*	01	1	Serial—data overrun	0*00000*	41	65	Illegal paper advance command
000000*0	02	2	Serial—framing error	0*0000*0	42	66	Illegal macro command usage
000000**	03	3	Serial—parity error	0*0000**	43	67	Macro called itself
00000*00	04	4	Serial—input buffer full error	0*000*00	44	68	Integer outside legal range
00000*0*	05	5	Output attempt when message is in progress	0*000*0*	45	69	Toc many entries or string too long (dash pattern)
00000**0	06	6	Unused	0*000**0	46	70	Unused
00000***	07	7	Output Buffer full	0*000***	47	71	Unidentified interface command error
0000*000	08	8	Serial—block size exceeds input buffer size	0*00*000	48	72	Invalid command for selected output format
0000*00*	09	9	Serial—block checksum error	0*00*00*	49	73	Scale = 0
0000*0*0	0A	10	GPIB—illegal secondary address	0*00*0*0	4A	74	Viewport of 0 length or outside page boundary
0000*0**	0B	11	Unused	0*00*0**	4B	75	Window less than or equal to 0
0000**00	0C	12	Unused	0*00**00	4C	76	Page upper-right on top of lower-left position
0*000000	40	64	Integer argument exceeds 16-bit value				(Continued)

ERROR TYPES

Parameter Entry Display	Hex	Decimal	Cause of Error
O*OO**O*	4D	77	Argument type error (interface)
O*OO***O	4E	78	Unused
O*OO****	4F	79	Output value range error
O*O*OOOO	50	80	Illegal downloadable character command
O*O*OOO*	51	81	Illegal downloadable character command usage
*OOOOOOO	80	128	Invalid switch entry (Parameter Entry)
OOOOOO	81	129	Battery backup RAM checksum error
*OOOOO*O	82	130	Transform stack underflow or overflow
*OOOOO**	83	131	Transform cannot produce virtual digitizing data because of transform values
*OOOO*OO	84	132	RAM verify error—block not used
*OOOO*O*	85	133	Insufficient memory for buffer allocation
*OOOO**O	86	134	Cannot find specified macro
*OOOO***	87	135	Illegal alpha table command type
*OOO*OOO	88	136	Unused
*OOO*OO*	89	137	Illegal monitor usage
*OOO*O*O	8A	138	Output processing routine missing
*OOO*O**	8B	139	Number greater than 99999.999 in fixed ASCII conversion
*OOO**OO	8C	140	Too many PROM alpha tables in system
*OOO**O*	8D	141	Selected interface hardware or ROM not present

Fatal errors normally indicate either a Plotter failure or incorrect installation of Plotter hardware. Fatal errors OA and 11 indicate unexpected software processing conditions that can occur from improper usage of Plotter commands. The remainder of the fatal errors usually indicate a hardware failure and require diagnosis by a qualified service technician.

NOTE

Under some conditions, a fatal error may lock up the Plotter's Parameter Entry Module and prevent access of any error parameters.

Table C-2
FATAL ERROR TYPES

* = Light is ON

Parameter Entry Display	Hex	Decimal	Cause of Error
OOOOOOO*	01	1	Insufficient RAM
OOOOOO*O	02	2	RAM check error
OOOOOO**	03	3	ROM check error
OOOOO*OO	04	4	Undefined common subroutine
OOOOO*O*	05	5	Command dispatch error
OOOOO**O	06	6	Software interrupt
OOOOO***	07	7	Nonmaskable interrupt
OOOO*OOO	08	8	Nonexistent memory reference
OOOO*OO*	09	9	Unable to create a buffer (insufficient RAM)
OOOO*O*O	0A	10	Unexpected system error
OOOO*O**	0B	11	No service routine for level
OOOO**OO	0C	12	No self interrupt routine for level
OOOO**O*	0D	13	Motion Synchronization address not in first 256 bytes of ROM
OOOO***O	0E	14	No routine for specified system command
OOOO****	0F	15	ROM in wrong socket
OOO*OOOO	10	16	Motion buffer overrun
OOO*OOO*	11	17	Unexpected memory overflow

Appendix D

GLOSSARY

ADUs

Addressable Device Units. One of three choices of Device Units.

attention character

(Serial) The first character of most commands. May be set to ESC, I, ^, or SYN using the Parameter Entry Card.

Auto Move-To-Home

The process of automatically performing a move to the home position whenever a PRINT command follows power-up, media change, or a front panel Locate function without an intermediate Move or Draw.

baud rate

(Serial) See *receive baud rate* and *transmit baud rate*.

clipping

The process by which the portion of a plot that falls outside of a specified boundary is not plotted.

coordinate

The X-axis and Y-axis values used to describe a point.

crosshair cursor

The plastic sight located on the pen carriage.

Device Units

One of three sets of numerical values assigned to the Initial Page for the Device Coordinate System. The default selection will be ADUs for a Serial interface and GDUs for a GPIB interface. The range of values will be 4096 along the long axes for ADUs, 100 along the short axis for GDUs, or directly in millimeters for mms. Both axes will have physically identical unit size. See the Introduction section for more information.

digitizing

The process of locating and transmitting the coordinate information to the host.

Draw

The function of the Plotter drawing a line to a specified position.

EOI (End Or Identify)

(GPIB) This bus message is sent with the last data byte of a message, indicating that the message is complete and terminating the last command in the message.

error codes

Occurance of errors is reported by a flashing or steady Reset light and by sounding the bell. Lights on the Parameter Entry Module (with Error Data line selected) can be interpreted as an error code to determine the source of the error. Refer to *Appendix C* for more information.

fatal error

A detected error serious enough that all plotting is halted. The Reset light will be on steady. (See *nonfatal error*.)

form length

The length of media advanced during a Media Change function.

Full Duplex

A mode that allows communication in two directions at the same time.

GDUs

Graphic Device Units. One of three choices of Device Units.

GPIB interface

General Purpose Interface Bus. Used in reference to interface or interface-dependent characteristics.

home position

A point that is the height of an average uppercase letter below the upper-left corner of the Viewport (perpendicular to the printing direction). The home position allows a line of unrotated text to be printed along the top of the Viewport.

Initial Page

One of several preselected Pages (including the user-defined selection) that is established by Parameter Entry Card selections. See the Introduction section of the *4663 Programmer's Reference Manual* for additional information.

Initial Viewport

The Viewport that corresponds to the Initial Aspect Ratio line selection on the Parameter Entry Card. See the Introduction section of the *4663 Programmer's Reference Manual* for more information.

GLOSSARY

Initial Window

A Window that corresponds to the Initial Viewport. An Initial Window exists for each of the three Device Units selections of ADUs, GDUs, and millimeters. See the Introduction section of the *4663 Programmer's Reference Manual* for more information.

Initialize function

This front panel function resets the active interface after communications with the host or controller have been lost. However, it does not modify any of the current programmable interface parameters (such as prompt character, signature character, turnaround-delay time, etc.).

input buffer

Refers to the memory of the Plotter that permits incoming commands to be temporarily stored until the Plotter can generate the corresponding Plot actions.

loop-thru

(Serial) A scheme where the Plotter is inserted into the normal communication path between two pieces of equipment such as a computer or modem and a computer terminal.

macro

A group of Plotter commands that can be stored in the Plotter and later executed by a single command.

media

The paper, mylar, etc. upon which a plot is drawn.

Move

The movement of the pen carriage to a specified position (without the pen contacting the media).

nonfatal error

A detected error that is reported (Reset light flashes), but does not halt plotting operation.

Parameter Entry Card

A directory (part of the Parameter Entry Module) that assists the user in selecting the Plotter's operating parameters.

Parameter Entry Module

That portion of the Plotter that includes the Parameter Entry Card, the INIT light, and the lighted switches.

Page

A rectangular area on the platen that can be used for plotting.

pen carriage

The part of the Plotter that includes the crosshair cursor, Pen Holder 1, and Pen Holder 2.

platen

The flat surface upon which the media is placed.

platen clipping boundary

The border outlining the maximum area on the platen that is available for plotting.

receive baud rate

(Serial) The rate at which information can be received by the Plotter.

RS-232-C

(Serial) An industry standard for interface between data terminal equipment and data communication equipment that employs serial binary data interchange.

Serial interface

Refers to the RS-232-C interface or characteristics associated with that interface. The interface transmits and receives ASCII characters composed of individual bits transmitted one bit at a time (i.e., serially).

Style I commands

Unique Plotter commands that use ASCII decimal coding.

Style II commands

Plotter commands that use binary data coding. Used with TEKTRONIX 4010 Series terminals

transmit baud rate

(Serial) The rate at which information is transmitted by the Plotter.

Viewport

The rectangular portion of the Page onto which the plot is drawn.

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