

4662

INTERACTIVE DIGITAL PLOTTER (WITH OPTION 31)

*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 and found to comply with the limits for Class A computing devices pursuant to Subpart J of 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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MANUAL REVISION STATUS

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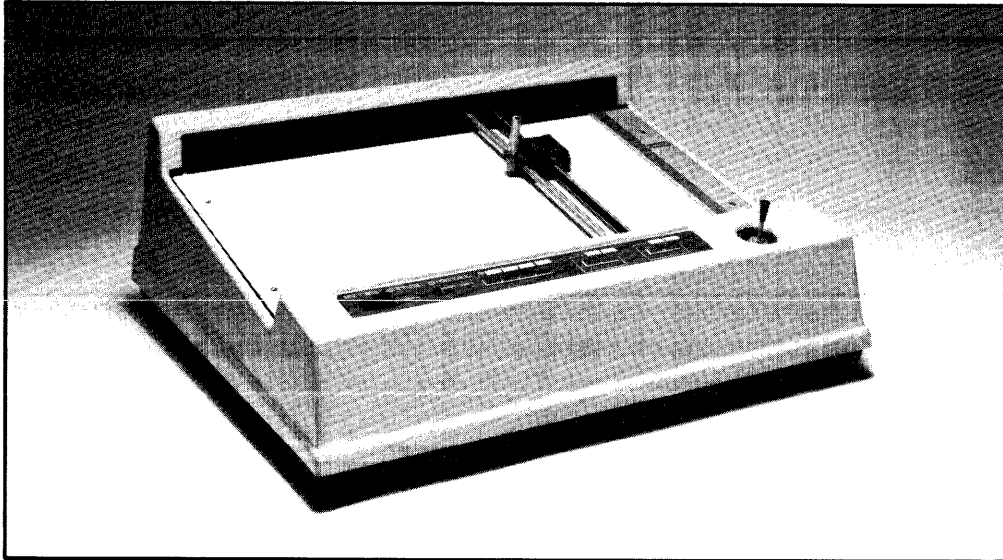
PREFACE

This manual and the 4662 Interactive Digital Plotter Programmer's Reference Manual replace the 4662 Interactive Digital Plotter User's Manual.

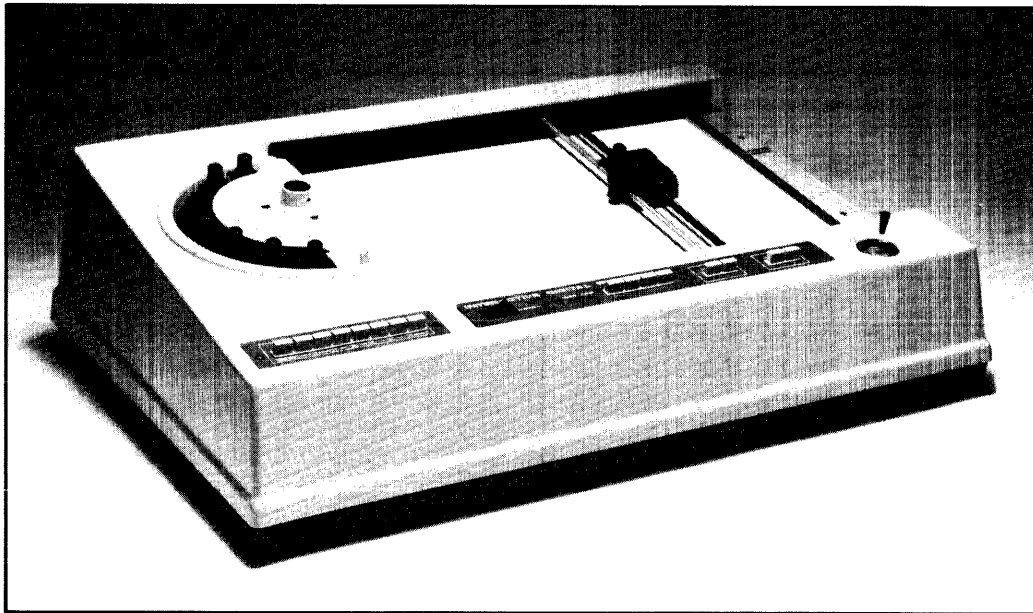
This manual provides information to use and care for the 4662 Plotter. However, this manual does not contain information on the host system requirements. This information is provided in the 4662 Interactive Digital Plotter Programmer's Manual.

Related documentation includes:

- 4662 Interactive Digital Plotter Programmer's Reference Manual
- 4662 Interactive Digital Plotter Service Manual
- 4662 Interactive Digital Plotter Programmer's Reference Guide
- 4662 Interactive Digital Plotter Option 31 Installation Guide



A. Standard 4662 Plotter.



B. 4662 Plotter Equipped with Option 31.

4165-1

Figure 1-1. 4662 Interactive Digital Plotter.

Section 1

INTRODUCTION

GENERAL DESCRIPTION

The 4662 Interactive Digital Plotter (shown in Figure 1-1) is an intelligent, B-sized flatbed plotter. The 4662 uses an electrostatic paper hold-down system to draw or print on paper (or transparent film) that is as large as 11x17 inches (279x432 mm). The plotter is equipped with both RS-232-C and GPIB interfaces and is compatible with TEKTRONIX PLOT 10 and PLOT 50 Graphic Software. This means that the plotter can be used with controlling devices ranging from simple monochrome terminals to sophisticated computers.

Since the plotter is digital, it converts external commands from a host into appropriate vector movements. Data input to the plotter is internally buffered to optimize data transfer from the host computer. The plotter also has an internal character generator which produces the full uppercase and lowercase ASCII character set as well as variations for several foreign languages and graphic symbols. The 4662 can scale characters (print them with any width or height) or rotate them.

The 4662 draws with fiber-tip or plastic hard-nib pens — or a variety of thin-line wet-ink pens on any weight paper or transparent film.

The plotter also can digitize the location of the pen. That is, by using the joystick to move the pen, the plotter can convert a drawing, a picture, or a graph into computer-usable language. This function makes the plotter an efficient digitizer.

The 4662 can be equipped with a multiple pen option, Option 31. With this option, either the operator or the host can choose up to eight different pens (or colors) for elaborate multi-colored plots.

The following summarizes some of the plotter's features:

- Electrostatic paper hold-down system that accepts any type, weight, or size of paper or transparent film up to 11x17 inches (279x432 mm).
- Buffer that accepts 2K bytes (expandable to 8K bytes with Option 20), which allows the host to work on something else while the 4662 is plotting.
- Digitizing function that turns any picture, drawing, or graph into computer-usable language.
- A built-in joystick that moves the pen — useful for digitizing or manual pen positioning.
- Nine resident language and graphic character fonts.
- 110, 150, 300, 600, or 1200 baud rates available.
- Two RS-232-C interface ports for “loop-thru” capability.
- Two plotting speeds, selected by a switch on the rear panel (except on multiple pen equipped plotters, which have front panel fast and slow switches and host-programmable plotting speeds).
- Scaling, positioning, or reversing capabilities that allow the plotter to, for example, create larger or smaller images, mirror images, upside-down mirror images, or upside-down plots.

Option 31 equips the plotter with multiple-pen capabilities. This option, which is retrofittable to all existing plotters, adds these features:

- Capability to produce elaborate multi-colored plots without the operator touching a pen.
- Pause function to stop the plotter without stopping the host.
- DC1/DC3 ASCII character flagging to control the host and prevent possible input data buffer overflow and lost data.
- Programmable plotting speeds, which are set by host commands.

4662 OPTIONS

The following options are available for the 4662 Plotter.

OPTION 01 — GPIB INTERFACE CABLE

This option deletes the standard RS-232-C cable and adds the GPIB cable. Option 01 does not affect the interfaces; both GPIB and RS-232-C interfaces are provided in the 4662 Plotter.

OPTION 20 — 8K BYTE INPUT BUFFER

This option increases the input storage capacity of the plotter from 2K to 8K bytes. This allows more information to be sent to the plotter without overflowing the input data buffer.

OPTION 31 — MULTIPLE PENS

This option adds multiple pen capabilities so that the operator or the host can control pen changing. Felt-tip, plastic hard-nib, or wet-ink pens in several colors can be interchanged to produce elaborate plots. Option 31, which is retrofittable to all existing 4662 Plotters, also adds these features:

- DC1/DC3 ASCII character flagging to control the data transmission from the host.
- Pause and resume capability to interrupt the plotting process.
- Host-controlled programmable plotting speeds.

OPTION 48 — 220-VOLT OPERATION

This option internally rewires the plotter's power supply to allow it to operate on 220-volt, 50-Hz line voltages.

DEFINITIONS

The following definitions describe some of the terms used throughout this manual.

Alpha Mode. Alpha mode is the condition that causes the plotter to print each ASCII character as it is received from the host. The plotter is configured to Alpha mode each time it is powered up or has received a US ASCII character.

Copy Mode. The plotter normally addresses a coordinate system of 4096 points in the X-axis direction and 2732 points in the Y-axis direction (this results in an aspect ratio of 3X to 2Y). Copy mode changes the plotter's coordinate system to display points visible on the 4010 Series terminal, which addresses 3124 points in the Y-axis direction. That is, the plotter's new coordinate system uses 4096 points in the X-axis direction and 3124 points in the Y-axis direction, resulting in an aspect ratio of 4X to 3Y. Copy mode is selected by rear panel switches.

Copy mode also causes the plotter to power-up in a "logically-on" condition. That is, no initial Plotter On command is needed from the host prior to receiving data.

Digitizing. Digitizing (sometimes called Graphic Input or GIN) is the condition that causes the plotter to transmit the coordinates of the pen's location when either (1) the front panel CALL switch is pressed or (2) the plotter receives a GIN command. This means that the plotter can change a picture, a graph, or a drawing into digital information that can be used by a computer.

Draw. Draw is a movement of the pen carriage (a vector) during which the pen is **down**. Since the pen is down during the pen movement, a line is drawn on the paper. A Draw command is supplied by the host, but the plotter must be in Graph mode to execute the draw. If no other Draw commands are received within 0.5 seconds, the plotter's internal automatic pen-lift feature lifts the pen from the paper following the Draw to prevent ink from bleeding onto the paper. A draw can also occur when the joystick is used to move the pen carriage and the PEN switch has been pressed. (The plotter does not have to be in Graph mode to execute a joystick draw.)

Graph Mode. Graph mode is the condition that causes the plotter to draw vectors which are determined by ASCII character commands from the host. The plotter is configured to Graph mode each time it receives a GS ASCII character.

Move. Move is a movement of the pen carriage (a vector) during which the pen is **up**. Since the pen is up during the move, no line is drawn on the paper. A Move command is supplied by the host, but the plotter must be in Graph mode to execute the move. A move can also occur when the joystick is used to move the pen carriage and the PEN switch has not been pressed. (The plotter does not have to be in Graph mode to execute a joystick move.)

Page. Page refers to the rectangular (or square) area of the paper (or other media) on which the plotter can draw or print. Normally, this area is 10x15 inches when using 11x16.5-inch paper. (The plotter cannot draw in the margin area of the paper.) The operator can change the page size, move the page, or even reverse the page to create many special effects (such as smaller drawings, multiple drawings on a single piece of paper, and mirror image or upside-down drawings).

Pause. When equipped with multiple pen capability (Option 31), the operator can interrupt the plotter from drawing host-controlled plots. The operator can use this feature to stop the plotter to, for example, adjust a pen or paper location. The plotter remains interrupted until the RESUME switch is pressed.

Platen. The platen is the smooth plotting surface.

Self-Test. Self-test is an internal program which, when activated, causes the plotter to draw a predetermined plot. The operator can then examine this plot to determine the plotter's electro-mechanical condition.

HOW TO USE THIS MANUAL

Two separate manuals provide information for using the 4662 Plotter — the 4662 Interactive Digital Plotter Operator's Manual and the 4662 Interactive Digital Plotter Programmer's Reference Manual.

The 4662 Interactive Digital Plotter Operator's Manual (this manual) provides information necessary to use and care for the plotter. (This manual does not, however, contain information on the host system requirements.) This manual includes:

- First-time operation procedures (useful for acquainting the operator with features of the plotter or checking the plotter functions).
- The purpose of each front and rear panel switch.

- Loading paper and pens.
- Establishing page boundaries.
- Cleaning the plotter.
- Installing the plotter in a typical RS-232-C or GPIB communication system.

The 4662 Interactive Digital Plotter Programmer's Manual provides the information necessary for a host system programmer to design special application programs; these application programs permit the host computer to communicate with and operate the plotter. The 4662 Interactive Digital Plotter Programmer's Reference Manual includes a description of the plotter's interfacing requirements and all operating commands that operate the plotter.

Section 2

OPERATION

ABOUT THIS SECTION

This section provides information necessary to operate the 4662 Interactive Digital Plotter. Information in this section includes:

- A first-time operation and functional check procedure
- A description of the front and rear panel controls
- A discussion of page formatting (scaling and positioning plotting areas)
- Instructions for installing and removing paper
- Instructions for installing and removing pens
- Information on types of paper and pens

The First-Time Operation and Functional Check Procedure consists of step-by-step instructions to acquaint a new operator with the plotter's operation. These procedures can also be used as a functional check of the plotter. Also included are two optional procedures that can be used to understand the plotter's operation when connected to different types of hosts.

The description of the front and rear panel controls includes information about each plotter control and indicator — their purpose and application.

Page formatting provides information on establishing plotting boundaries. This includes page scaling, positioning, and plotting with special effects such as mirror images, upside-down mirror images, and upside-down plots.

Installing and removing paper and pens instructs the operator in how to ready the plotter for drawing.

Finally, this section provides general information about available papers and pens and their applications. This information is intended to aid the operator choose the best paper and type of pen for a particular task.

FIRST-TIME OPERATION AND FUNCTIONAL CHECK PROCEDURES

Use this procedure to familiarize yourself with the functions of the plotter and as a plotter functional check. First perform one of the General Operational Procedures, which follow. Then, follow either the RS-232-C Familiarization procedure or the GPIB Familiarization procedure, depending on which interface the plotter will use.

NOTE

The Familiarization Procedures not only check communications with a host, but also check additional operating functions not checked under the General Operating Procedures. Therefore, to obtain a better appreciation of the plotter's capabilities, perform both the General Operational Procedure and the applicable interface Familiarization Procedure.

These procedures provide familiarity with many of the command sequences and the actions the plotter takes in response to the commands.

No detailed explanation of all the commands is provided with these procedures; therefore, it may be helpful to refer to the description of the front panel controls later in this section and the description of the host commands in the 4662 Interactive Digital Plotter Programmer's Reference Manual.

GENERAL OPERATION PROCEDURE

Two procedures are included here — one for single-pen plotters and one for multiple-pen plotters (Option 31 equipped).

NOTE

In the following procedures, the plotter does not have to be connected to either a terminal or host.

Throughout these procedures, several parts of the plotter are referenced that may not be obvious to a new operator. These parts are shown in Figure 2-1.

OPERATION

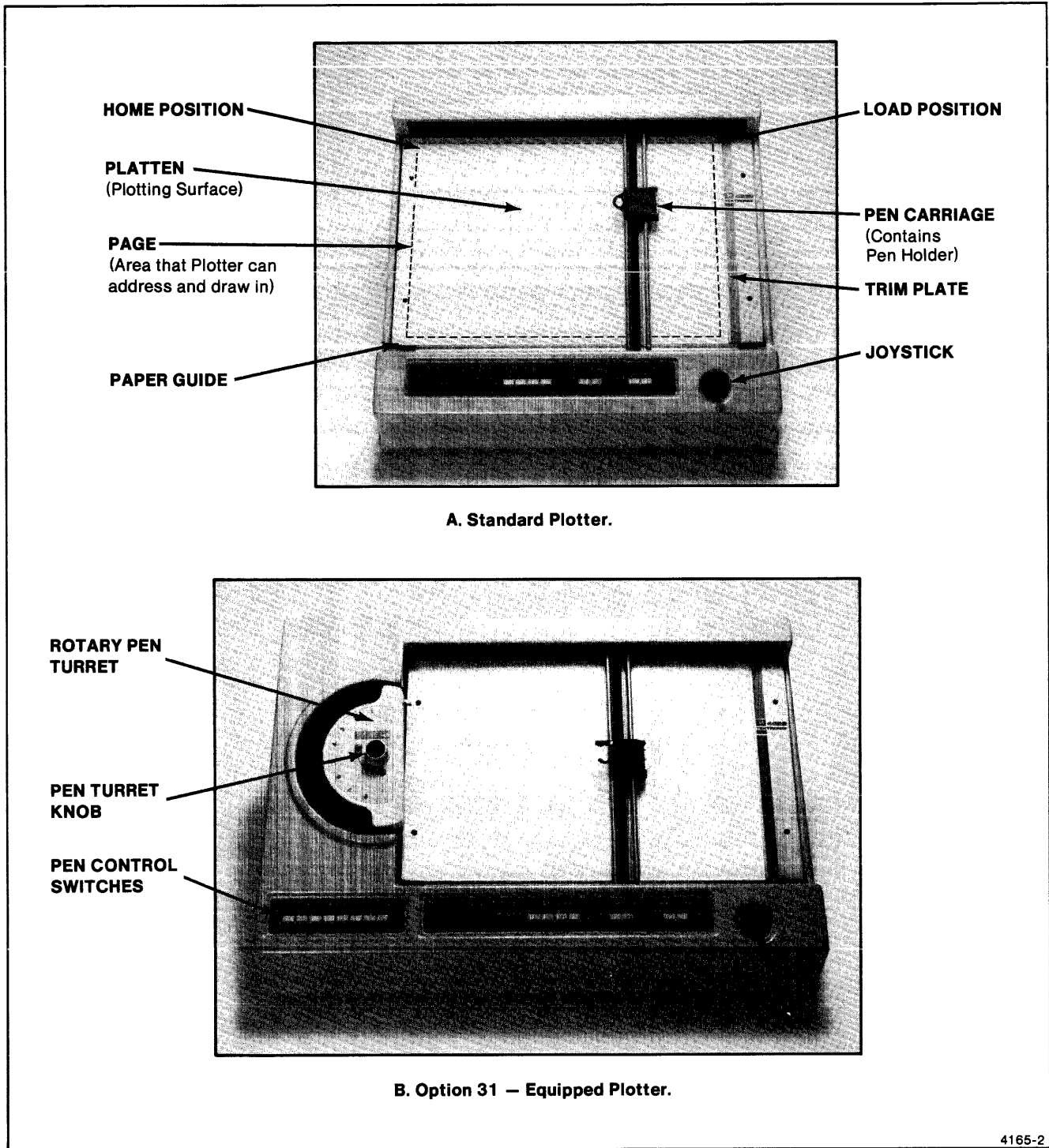


Figure 2-1. Plotter Parts Locations.

Procedure for Standard Plotters

This procedure assumes the plotter has been installed following the instructions in Appendix A (Installation). The plotter should be connected to a suitable line voltage source.

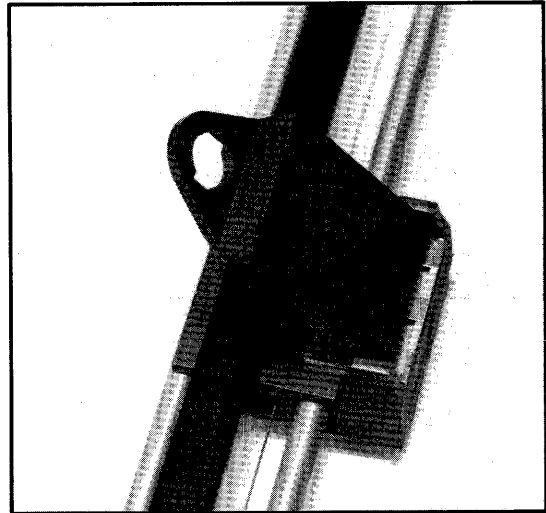
Power-Up Sequence

Press the POWER switch to the right. The following sequence of events occurs:

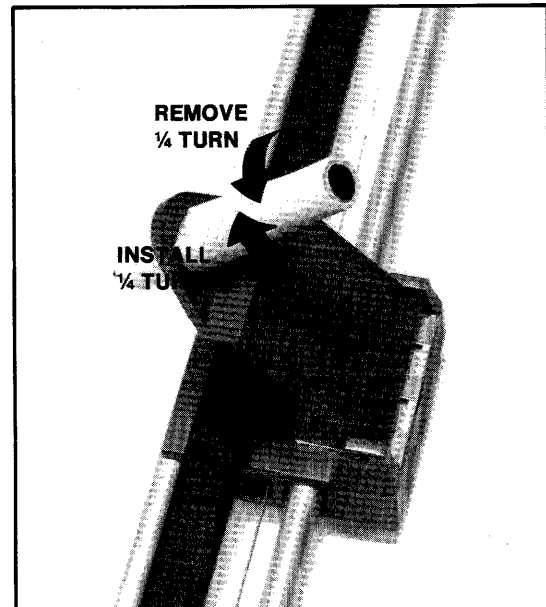
- The POWER indicator light goes on.
- The pen carriage moves to the right boundary and then down to the lower-right corner and stops.

Install Paper and Pens

1. Press the LOAD switch to its locked-down position. The pen carriage moves to the LOAD position (upper-right corner). Pressing LOAD also deactivates the electrostatic paper hold-down.
2. Tilt the pen holder up to the 45-degree detent position (see Figure 2-2A).
3. Remove any paper present on the platen (plotting surface).
4. Position a new piece of 11x17-inch paper on the platen. To do this, position the left edge of the paper even with the left edge of the platen. Ensure that the bottom edge of the paper lies evenly along the paper guide. This applies to smaller-sized paper as well.
5. Install a pen in the pen carriage. To do this, align the tabs on the pen with the slots on the pen holder and insert the pen into the pen holder. Rotate the pen one-quarter turn clockwise to lock it into place (see Figure 2-2B). Remove the pen's protective cap and lower the pen to its lowest position (tip of pen should be just above the paper).
6. Press the LOAD switch to release it from its locked-down position. This activates the electrostatic paper hold-down. If bubbles appear between the paper and the platen, smooth the paper across the surface with a clean, lint-free industrial wipe or drafting brush. Never use your hand as body oils will transfer to the paper and reduce the acceptance of ink.



A. Pen Holder Tilted to the 45° Detent Position.



B. Installing/Removing the Pen.

4165-3

Figure 2-2. Installing and Removing the Pen.

OPERATION

Pen Up/Down Switch

1. Move the joystick handle and notice that the pen carriage moves in the same direction as the deflected joystick handle. The speed of the pen carriage is dependent on the joystick's deflection angle.
2. Press the PEN switch momentarily to lower the pen tip to the paper.
3. Repeat Step 1. Notice that with the pen lowered to the paper, the plotter will draw a line wherever the joystick-directed pen carriage moves.
4. Momentarily press the PEN switch again to raise the pen tip.

Locate Page Boundaries

1. Press the LOCATE LOWER LEFT switch. The pen carriage travels to the lower-left corner of the current plotting area.
2. Press the LOCATE UPPER RIGHT switch. The pen carriage travels to the upper-right corner of the current plotting area.

Self-Test

1. Press the CALL switch and hold until the plotter sounds the bell twice (approximately two seconds). The plotter draws the pattern shown in Figure 2-3. To check on the plotter's performance, compare the plot obtained to the plot shown in Figure 2-3.

Establish New Page Boundaries

1. After the plotter completes the self-test pattern, press the LOCATE LOWER LEFT switch again to bring the pen carriage down to the lower-left corner of the platen.
2. With the joystick, move the pen carriage diagonally up and to the right approximately two to three inches (50 to 76 mm).
3. Press the SET LOWER LEFT switch and hold until the plotter sounds the bell once (approximately one second). This establishes a new lower-left corner of the page boundary at this location.
4. With the joystick, move the pen carriage diagonally up and to the right approximately three to four more inches (76 to 102 mm).

5. Press the SET UPPER RIGHT switch and hold until the plotter sounds the bell once (approximately one second). This establishes a new upper-right corner of the page boundary at this location.
6. Press the LOCATE LOWER LEFT switch. The pen carriage should move to the location established in Steps 2 and 3.
7. Press the LOCATE UPPER RIGHT switch. The pen carriage should move to the location established in Steps 4 and 5.
8. Repeat the self-test instruction. The self-test pattern will now be drawn inside of this new page. Any distortion of the pattern is the result of unequal scaling in both axes.

Positioning the Page Boundaries

1. With the joystick, move the pen so that it is approximately two inches (50 mm) below the small square box drawn in the previous step.
2. Press the SET LOWER LEFT switch and hold until the plotter sounds the bell once. This moves the entire page boundary established earlier so that its lower-left corner is now located at this location. This means that the upper-right corner of the page has also moved by the same amount as the lower-left corner. Moving the lower-left corner of the page causes both the lower-left and upper-right corner of the page to be moved. However, moving the upper-right corner does not affect the lower-left corner.
3. Repeat the self-test by pressing the CALL switch and holding until the plotter sounds the bell twice. Notice that the pattern is exactly the same as that drawn in Step 8 of Establish New Page Boundaries, except it has moved to the new location.
4. If the plotter is going to be used further, replace the paper.
5. If the plotter is not to be used further, remove the pen, replace its protective cap, and turn the plotter off.

NOTE

Since LOCAL does not have a function unless the plotter is connected to a host or terminal, it is not discussed in this procedure.

This completes the familiarization procedure for the plotter. To familiarize yourself with the operating commands used with the serial interface, the GPIB interface, or the TEKTRONIX 4050 Series Graphic System, refer to those procedures later in this section.

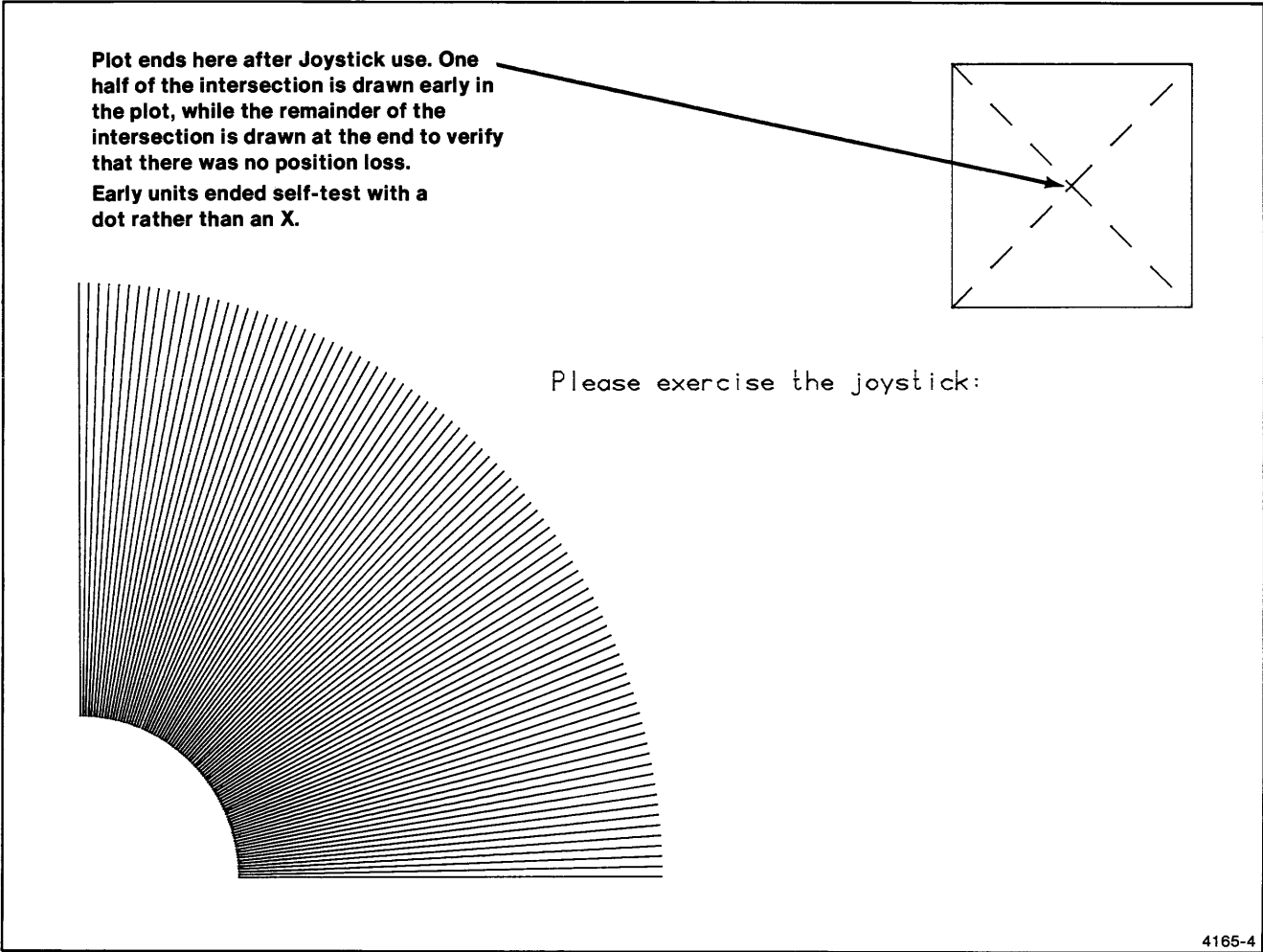


Figure 2-3. Self-Test Pattern.

OPERATION

Procedure for Option 31 Equipped Plotters

This procedure assumes the plotter has been installed following the instructions in Appendix A (Installation). The plotter should be connected to a suitable line voltage source.

Power-Up Sequence

Press the POWER switch to the right. The following sequence of events occurs:

- The POWER indicator light goes on.
- The pen carriage moves to the right boundary and then down to the lower-right corner and stops.

Install Paper and Pens

1. Press the LOAD switch to its locked-down position. The pen carriage moves to the LOAD position (upper-right corner). Pressing LOAD also deactivates the electrostatic paper hold-down and activates the LOAD/UNLOAD 1-4, LOAD/UNLOAD 5-8, and RETURN functions of the eight PEN CONTROL switches.
2. Remove any paper present on the platen (plotting surface).
3. Thread each pen into a pen adapter until the pen is firmly seated (see Figure 2-4).

NOTE

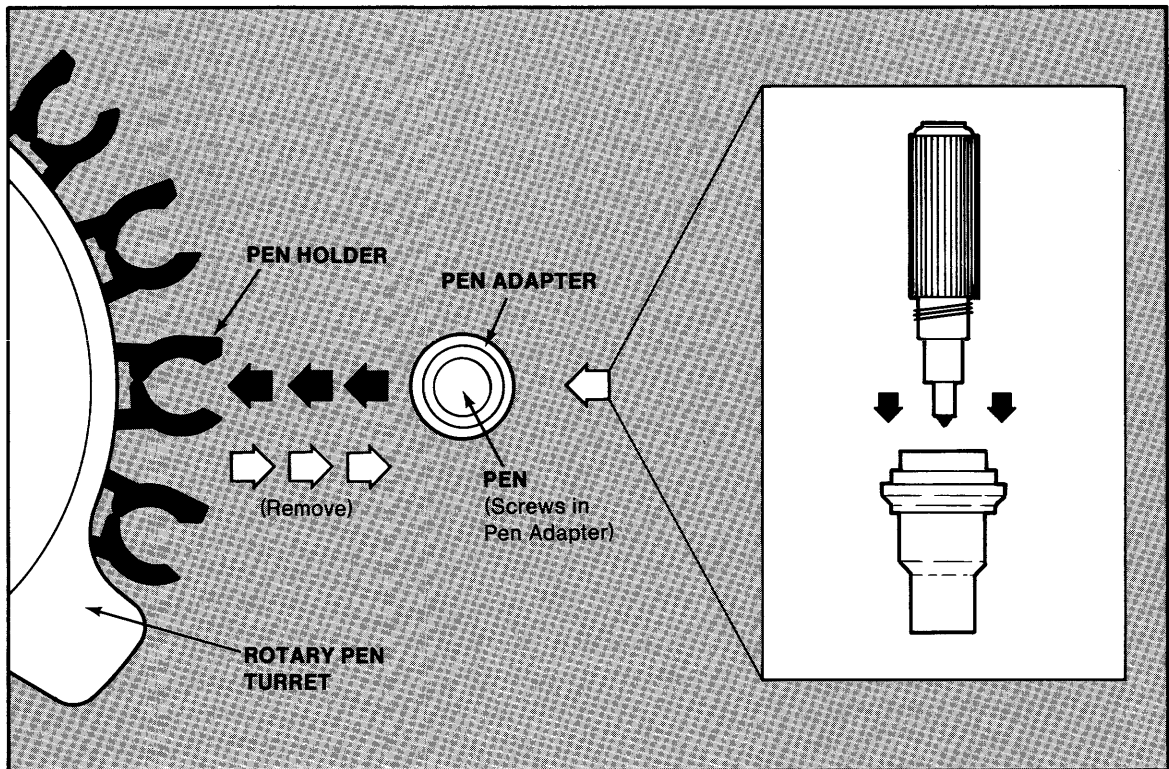
Do not attempt to rotate the rotary pen turret by grasping any part of it other than its knob. To rotate the rotary pen turret, use the knob or press the PEN CONTROL switches.

4. Press the PEN CONTROL 6 switch. Since the LOAD switch is locked down, this switch controls the LOAD/UNLOAD 1-4 function. The rotary pen turret will rotate until Pen Positions 1-4 are over the platen.
5. Leaving one or two pen positions empty, place two or three pens in pen positions 1-4. To do this, insert pens, which have been threaded into pen adapters, into the pen holder "claw," as shown in Figure 2-4. Use care so that the pens do not mark the paper (or platen) while they are being loaded into the rotary pen turret. Also, be sure that the adapters are correctly seated in each pen holder, as shown in Figure 2-4C.

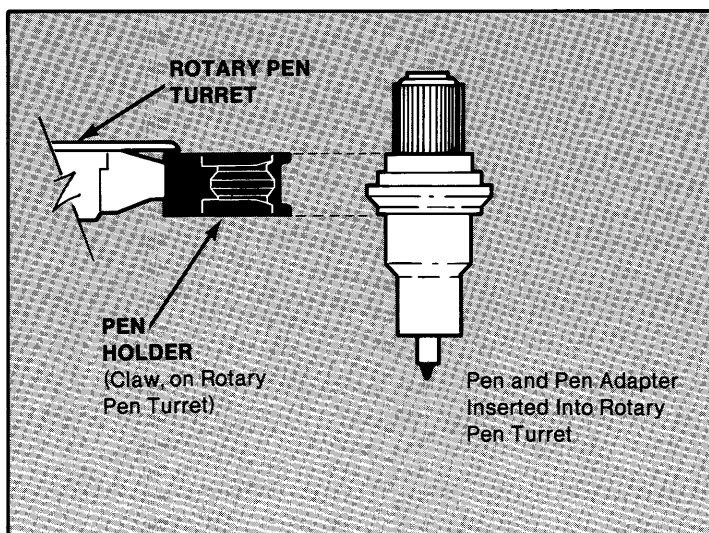
6. Press the PEN CONTROL 7 switch (labeled LOAD/UNLOAD 5-8). The rotary pen turret will rotate further until Pen Positions 5-8 are over the platen.
7. Place two or three pens in pen positions 5-8 in the same manner described in Step 5 above.
8. Press the PEN CONTROL 8 switch (labeled RETURN). The rotary pen turret will rotate back to the stored position.
9. Remove any pen stored in the pen carriage.
10. Position a new piece of 11x17-inch paper on the plotting surface (platen). To do this, position the left edge of the paper even with the left edge of the platen. Ensure that the bottom edge of the paper lies evenly along the paper guide. This applies to smaller-sized paper too.
11. Press the LOAD switch to release it from its locked-down position. This activates the electrostatic paper hold-down. If bubbles appear between the paper and the platen, smooth the paper across the surface with a clean, lint-free industrial wipe or drafting brush. Never use your hand as body oils will transfer to the paper and reduce the acceptance of ink.

Selecting Pens

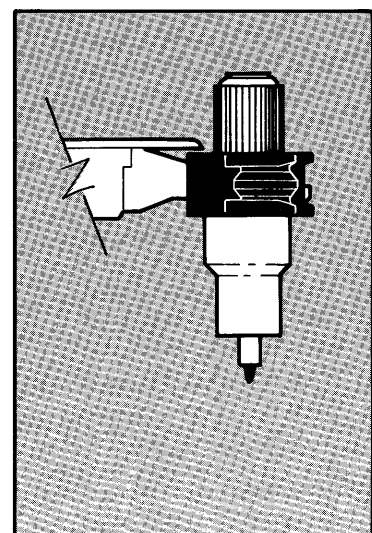
1. Press the PEN CONTROL switch corresponding to the first available pen in the rotary pen turret (i.e., if a pen occupies Pen Position 1, press PEN CONTROL 1). Several events will occur:
 - First, the rotary pen turret rotates and checks to see if the pen carriage contains a pen.
 - Second, the rotary pen turret rotates until Pen 1 is over the platen.
 - Third, the empty pen carriage travels over and picks up Pen 1.
 - Fourth, the rotary pen turret rotates back to the closed (or stored) position.
 - And fifth, the pen carriage travels back to its original position.
2. Press any other PEN CONTROL switch corresponding to a pen position containing a pen. Several sequential events will happen:
 - First, the rotary pen turret rotates until the empty pen location on the rotary pen turret (from which the pen in the pen carriage came from) is over the platen.
 - Second, the pen carriage transfers the pen back into the rotary pen turret.



A. Top View.



B. Side View.



C. Correctly Installed.

4165-5

Figure 2-4. Loading Pens in Option 31 Equipped Plotters.

OPERATION

- Third, the rotary pen turret rotates until the newly selected pen is adjacent to the pen carriage.
- Fourth, the pen carriage picks up the selected pen.
- Fifth, the rotary pen turret rotates back to the closed (or stored) position.
- And sixth, the pen carriage travels back to its original position.

NOTE

In this step (Step 2), the plotter does not check for the presence of a pen in the pen carriage. This is done only at power-up and after having been in Load mode (LOAD switch locked down and then later released).

3. Repeat Step 2 several more times. Notice that each time you press a PEN CONTROL switch, the pen in the pen carriage is placed into the empty rotary pen turret position from which it came, and the pen carriage picks up the newly selected pen.
4. Press the PEN CONTROL switch that corresponds to the pen position last selected. Notice that the command request is ignored since the pen carriage already has that pen.
5. Press the PEN CONTROL switch for one of the empty pen positions. Notice that after the pen carriage stores the pen, it will attempt to pick up the non-existent pen. Since no pen is present at that location, the plotter briefly sounds the bell (indicating an error) and turns on the ERROR indicator.
6. Clear the ERROR indicator by pressing the LOAD switch twice (first to its locked-down position and then to its released or up position).
7. Press the PEN CONTROL switch corresponding to the first available pen in the rotary pen turret. After checking for the presence of a pen in the pen carriage, the pen carriage picks up that pen.
8. Turn off the plotter's power.
9. Turn the plotter's power back on and allow the plotter to initialize (5 to 10 seconds).
10. When the plotter is turned off while a pen is in the pen carriage, the plotter forgets which pen turret position the pen in the pen carriage came from. This step checks the ability of the plotter to return the pen to the first available pen turret position upon power-up. Press the PEN CONTROL switch corresponding to the first available pen in the rotary pen turret. Notice that before attempting to select a pen, the plotter first

checked to see if a pen was present in the pen carriage. Since a pen was left in the pen carriage, the plotter "discovered" the pen in the pen carriage and stored the pen in the first available empty pen position in the rotary pen turret (which may not have been the original position of that pen) before picking up the newly selected pen.

NOTE

If there are no empty pen positions available to store the pen, the plotter sounds the bell and turns on the ERROR indicator. The operator must then manually remove the pen from the pen carriage and press the LOAD switch twice to clear the ERROR indicator.

Pen Up/Down Switch

1. Move the joystick handle and notice that the pen carriage moves in the same direction as the deflected joystick. The speed of the pen carriage is dependent upon the joystick's deflection angle.
2. Press the PEN switch momentarily to lower the pen tip to the paper.
3. Repeat Step 1. Notice that with the pen lowered to the paper, the plotter will draw a line wherever the joystick directs the pen carriage to move.
4. Momentarily press the PEN switch again to raise the pen tip.

Locate Page Boundaries

1. Press the LOCATE LOWER LEFT switch. The pen carriage travels to the lower-left corner of the current plotting area.
2. Press the LOCATE UPPER RIGHT switch. The pen carriage travels to the upper-right corner of the current plotting area.

Self-Test

1. Press the CALL switch and hold until the plotter sounds the bell twice (approximately two seconds). The plotter draws the pattern shown in Figure 2-3. To check on the plotter's performance, compare the plot obtained to the plot shown in Figure 2-3. Notice the speed at which each vector is drawn as this speed will be compared to the slow speed later in this procedure. The plotter always powers up in fast speed (see Specifications).

Establish New Page Boundaries

1. After the plotter completes the self-test pattern, press the LOCATE LOWER LEFT switch again to bring the pen carriage down to the lower-left corner of the platen.
2. With the joystick, move the pen carriage diagonally up and to the right approximately two to three inches (50 to 76 mm).
3. Press the SET LOWER LEFT switch and hold until the plotter sounds the bell once (approximately one second). This establishes a new lower-left corner of the page boundary at this location.
4. With the joystick, move the pen carriage diagonally up and to the right approximately three to four more inches (76 to 102 mm).
5. Press the SET UPPER RIGHT switch and hold until the plotter sounds the bell once (approximately one second). This establishes a new upper-right corner of the page boundary at this location.
6. Press the LOCATE LOWER LEFT switch. The pen carriage should move to the location established in Step 3.
7. Press the LOCATE UPPER RIGHT switch. The pen carriage should move to the location established in Step 5.
8. Select another pen. Press any of the eight PEN CONTROL switches (except the currently selected pen position) to get a different pen. That pen will be exchanged with the pen in the pen carriage.
9. Press the SLOW switch (PEN CONTROL 5) and hold until the plotter sounds the bell once (approximately one second). This establishes all subsequent plots at slow speed (see Specifications).

NOTE

The plotter ALWAYS powers up with the FAST plotting speed. Therefore, if slow plotting speed is desired, press and hold the SLOW switch at power-up until the plotter sounds the bell.

10. Repeat the self-test instruction. Notice that the speed at which each vector is drawn is slower than the self-test pattern drawn earlier. The self-test pattern will now be drawn inside the new page boundaries. Any distortion of the pattern is the result of unequal scaling in both axes.

Positioning the New Page Boundaries

1. With the joystick, move the pen so that it is approximately two inches (50 mm) below the small square box drawn in the previous step.
2. Press SET LOWER LEFT switch and hold until the plotter sounds the bell once. This moves the entire page boundary established earlier so that its lower-left corner is now located at this location. This means that the upper-right corner of the page has also moved by the same amount as the lower-left corner. Moving the lower-left corner of the page always causes both the lower-left and upper-right corner of the page to be moved. However, moving the upper-right corner does not affect the lower-left corner.
3. To select another pen color, press any of the eight PEN CONTROL switches (except the currently selected pen position). That pen will be exchanged with the pen in the pen carriage.
4. Press and hold the FAST switch (PEN CONTROL 4) until the plotter sounds the bell once. This establishes the fast plotting speed.
5. Press the CALL switch and hold until the plotter sounds the bell twice (self-test). Notice that the pattern is exactly the same as the pattern drawn in Step 10 of Establish New Page Boundaries, except that it has moved to the new location. Also notice that the plotter is operating at the fast (normal) speed again.

Loading Pens Using the PEN CONTROL Switches

1. Initially, you were instructed to load pens while the LOAD switch was locked down. This step and the next two steps demonstrate another way to load pens without having to lock the LOAD switch down (in Load mode). In this variation, the function labels *under* the switches define their actions. Press and hold down the PEN CONTROL 6 switch until the plotter's bell sounds (approximately one second). The rotary pen turret will rotate until Pen Positions 1-4 are over the platen.
2. Press and hold down the PEN CONTROL 7 switch until the plotter's bell sounds (approximately one second). The rotary pen turret will rotate further until Pen Positions 5-8 are over the platen.
3. Press and hold down the PEN CONTROL 8 switch until the plotter's bell sounds (approximately one second). The rotary pen turret will rotate back to the stored position.

OPERATION

Store Function

1. Press the PEN CONTROL 1 switch and hold it down until the plotter sounds the bell twice (approximately one second). This is the Store function. The rotary pen turret first rotates until the position from which the pen was obtained is adjacent to the pen carriage. The pen carriage transfers the pen to the rotary pen turret, then the rotary pen turret rotates back to the stored or closed position. The pen carriage is left empty.
2. If the plotter is to be used further, press the LOAD switch and repeat the instructions for replacing the paper.
3. If the plotter is not to be used further, turn the power off.

NOTE

Since the LOCAL, PAUSE, and RESUME keys do not have functions unless the plotter is connected to a host or a terminal, they are not discussed in this procedure.

This completes the familiarization procedure for the plotter. If you wish to familiarize yourself with the operating commands used with the serial interface, the GPIB interface, or the TEKTRONIX 4050 Series Graphic System, refer to those procedures found later in this section.

Manual Conventions

<CR> stands for CARRIAGE RETURN (or RETURN). <ESC> (ESCAPE) may be CONTROL SHIFT K on some terminals. "Type <ESC>AV<CR>" means "press the ESCAPE key (or the sequence of keys generating an ESCAPE, such as CONTROL and SHIFT K), then press the A key, then the V key, and finally, press the RETURN key."

NOTE

Throughout this procedure, spaces may be shown between adjacent characters. These are placed there for clarity in illustrating. However, in communicating with the plotter, do not send any SPACE characters between characters unless indicated by a SPACE or <SP>.

Normally a host is used to send characters to the plotter, but for programmer familiarization, a terminal is used in these procedures to simulate a host and to enable you to easily see what the plotter requires and how it responds.

UNDERSTANDING OPERATION WITH THE RS-232-C INTERFACE

This procedure will familiarize the host programmer and operator with the various host-plotter commands and the associated plotter response. It can also be used as a partial plotter functional check.

Before this procedure is performed, complete either of the General Operational Procedures (located earlier in this section).

Both of the interface procedures (RS-232-C and GPIB) are intended to provide familiarity with many of the various command sequences through first-hand experience. This will give you some idea of the actions the plotter will take in response to these commands. These familiarization procedures do not cover every possible command or sequence of commands, but rather provide a general overview of plotter operation.

NOTE

Follow these procedures in the order they are presented. For example, do not skip to the Plotter-On Command steps without performing the two preceding steps (Initial Setup and Loading Paper and Pens). In most cases, each step is based on actions performed in preceding steps.

No detailed explanation of the commands is provided with these procedures. It may be helpful to refer to the description of each command as you encounter it in this section. These descriptions are located in the 4662 Interactive Digital Plotter Programmer's Reference Manual.

RS-232-C FAMILIARIZATION PROCEDURE

Initial Setup

1. Turn off the plotter (if not already off).
2. Attach an ASCII terminal, such as a TEKTRONIX 4010 Series, 4006-1, 4020 Series, or equivalent, to the serial port labeled TERMINAL on the rear panel (refer to the Installation in Appendix A, if necessary).
3. Turn on the terminal and put it in Uppercase mode. (If the terminal is not uppercase only, press SHIFT LOCK or TTY LOCK on terminal.) TEKTRONIX 4006-1 and 4010 terminals are uppercase only.

NOTE

If a TEKTRONIX 4024, 4025, or 4027 terminal is used, do not establish a workspace in the terminal – use in Monitor mode.

NOTE

It may be helpful to put the terminal in local Echo mode in order to see the commands displayed. However, non-printing ASCII characters, such as ESCAPE and CARRIAGE RETURN, will not print on the terminal's display.

4. Press the plotter's LOCAL switch to its locked-down position.
5. Determine the terminal's baud rate and whether one or two stop bits are needed. Then, set the plotter's four rear panel switches accordingly:
 - 1-3-2-1 for 300 baud, one stop bit (that is, set Switch A to 1, Switch B to 3, Switch C to 2, and Switch D to 1)
 - 1-2-2-1 for 300 baud, two stop bits
 - 1-3-2-3 for 1200 baud, one stop bit
 - 1-2-2-3 for 1200 baud, two stop bits

Setting these switches in any of these four configurations also:

- Causes the plotter to recognize the DEL ASCII character as a possible plotting coordinate.
- Does not establish Copy mode.
- Establishes a plotter device address of A.
- Sets the GIN Terminator character to CR (carriage return).

- Causes the plotter to execute a line feed each time it receives a CR (carriage return) (CR implies CR plus LF).
 - Does not establish DC1/DC3 flagging in plotters equipped with the multiple pen Option 31.
 - Establishes normal (fast) plotting speed.
6. Turn on the plotter's POWER switch. The pen carriage will move to the lower-right corner of the platen.

NOTE

If the plotter is equipped with Option 31 (multiple pens), the plotting speed will be FAST (see Specifications). If the type of pen used requires slow plotting speed, each time you power-up the plotter, press and hold the SLOW switch (PEN CONTROL 5) until the plotter sounds the bell.

Loading Paper and Pens

1. Press the LOAD switch to its locked-down position and place a piece of B-sized paper (11x17 inches or 279x432 mm) on the platen in the manner described under Loading Paper (described later in this section). Then, release the LOAD switch to the up position.
2. Install a pen in the pen carriage, unless the plotter is equipped with Option 31 (multiple pens). In that case, ensure that eight pens are loaded in the rotary pen turret (see Installing Pens later in this section), and do not place a pen in the pen carriage.

Plotter-On Command

1. Type <ESC>AE<CR>. To do this, press the ESCAPE key (or the sequence of keys generating an ESCAPE, such as holding the CONTROL and SHIFT keys down while pressing the K key once), then press the A key, then the E key, and finally the RETURN key. This turns on the plotter's internal interface and command processing logic. The pen carriage will move to the upper-left corner of the platen. This is one line below the "home" position, since you are operating with CR (carriage return) which implies CR plus LF (Line Feed). The line feed moved the pen carriage down one line.

NOTE

Skip to Alpha mode instructions if your plotter is not equipped with multiple pens (Option 31).

OPERATION

Pen Change Command (Option 31 Equipped Plotters)

1. If your plotter is equipped with Option 31, type **<ESC>ABP1<CR>**. To do this, press the ESCAPE key, the A key, the B key, the P key, the 1 key, and finally the RETURN key. The plotter will transfer the pen in Position 1 of the rotary pen turret to the pen carriage.

Alpha Mode

1. Type the following text:

4662 Interactive Digital Plotter<CR>

The plotter powers-up in Alpha mode and prints each character as it is typed. The **<CR>** moves the pen carriage to the left margin of the next line.

2. Repeat Step 1. A new line of text will be printed.

3. Type the Plotter-Off command:

<ESC>AF<CR>

This turns off the plotter's internal interface and command processing logic.

4. Repeat Step 1. and notice that the plotter does not respond.

5. Type the Plotter-On command:

<ESC>AE<CR>

This turns on the plotter's internal interface and command processing logic.

6. Repeat Step 1 to verify that the plotter does respond again.

7. Type the Alpha Scale command:

<ESC>AI28,176<CR>

This scales the alpha size for future printing, so that printed characters will be half as wide and twice as tall as the default. (Default-size characters are those printed up to now.)

8. You may want to change pens at this time. If your plotter is equipped with Option 31, type the Pen-Change command:

<ESC>ABP4<CR>

This assumes the fourth pen is a different color than Pen 1. The plotter will exchange pens.

If your plotter is not equipped with Option 31, simply remove the pen and install a different colored pen following the procedure for Removing and Installing Pens described later in this section.

9. Repeat Step 1 to verify that printed characters are half as wide and twice as tall as those printed in Steps 1, 2, and 6.

10. Change pens again. If your plotter is equipped with Option 31, transmit this pen-change command:

<ESC>ABP6<CR>

If your plotter is not equipped with Option 31, change the pen manually.

11. Transmit an Alpha Reset command as follows to reset the Alpha Scale back to the default size:

<ESC>AV<CR>

12. Repeat Step 1 and notice that the characters are printed in their original (default) size.

Graph Mode

1. Since the plotter powers-up in Alpha mode, it is necessary to transmit an ASCII GS character to place the plotter into Graph mode. With a TEKTRONIX 4010 Series terminal, hold down the CONTROL and SHIFT keys and momentarily press the M key. With a TEKTRONIX 4020 Series terminal, hold down the CONTROL key and momentarily press the] key.

NOTE

The following graphic-coordinate ASCII characters are taken from the Appendix B Coordinate Chart. The characters are sent in the following order:

HIY, LOY, HIX, and LOX

<SPACE> means the SPACE key, means the DELETE (or RUBOUT) key. So, "<SPACE>@?" means to press the SPACE key, followed by the @ key, followed by the RUBOUT key, and finally the ? key.

2. After the GS character, enter the following string:

<SPACE><SPACE> @

This ASCII string causes the plotter to move the pen carriage to the lower-left corner. The first pen movement to the coordinate pair entered after the GS character is always a Move (vector with the pen up). Figure 2-5 shows the pattern you will draw in this procedure.

- Transmit the following string, which is the coordinate pair 0,2684.

4<SPACE>@

A line will be drawn to near the upper-left corner of the platen.

- Transmit the following, which is the coordinate pair 4092,2684. A line is drawn to near the upper-right corner of the platen:

4?_

- Transmit the following, which is the coordinate pair 4092,124. A line should be drawn to a point near the lower-right corner of the platen.

<SPACE>?_

- Transmit the following, which is the coordinate pair 0,-124. A line should be drawn to the original point (lower-left corner of the platen).

<SPACE><SPACE> @

- Transmit the following, which is the same point as in Step 4. A line is drawn diagonally to the upper-right corner.

4?_

- Transmit an ASCII GS character (CONTROL SHIFT M on 4010 Series terminal or CONTROL] on 4020 Series terminals). This will cause the next vector to be a Move rather than a Draw.

- Repeat Step 5 to move the pen to the lower-right corner.

- Repeat Step 3 to draw a diagonal line to the upper-left corner of the platen. Figure 2-5 shows the pattern drawn in this exercise.

Alpha Mode

- Place the plotter in Alpha mode by transmitting an ASCII US character. This is CONTROL SHIFT O from TEKTRONIX 4010 Series terminals or CONTROL — from TEKTRONIX 4020 Series terminals.
- Press the <LF> (line feed) key four times and notice that the pen carriage moves down four lines.
- Transmit some ASCII alphanumeric characters and notice that they are printed as they are typed.

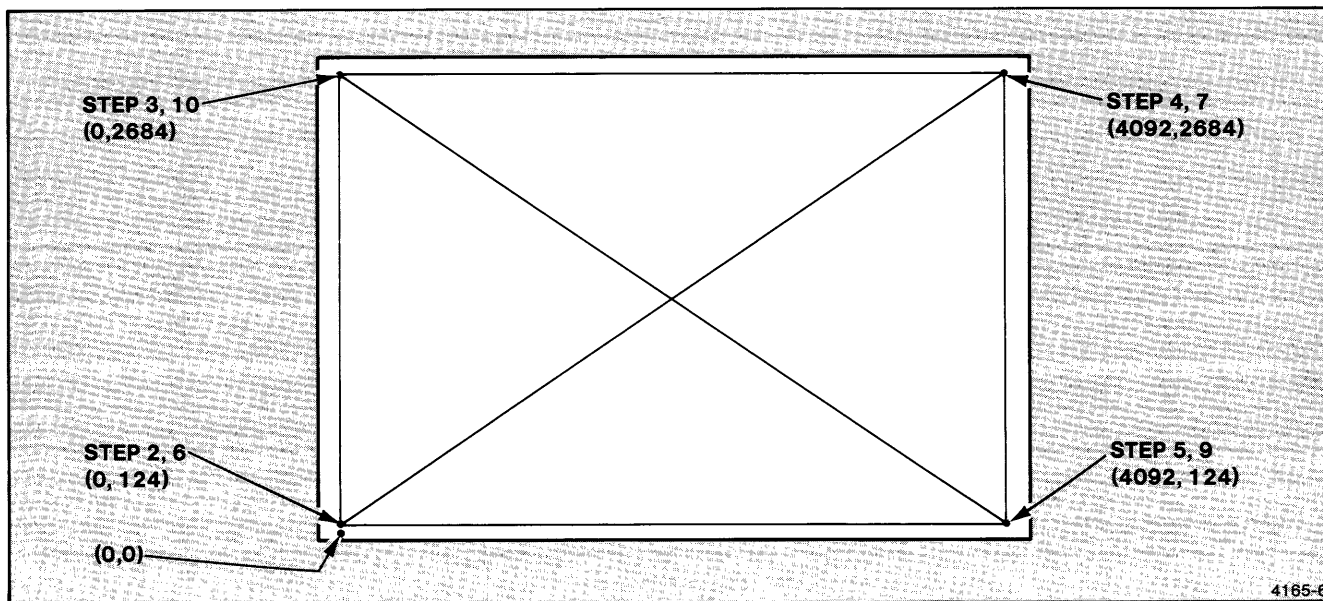


Figure 2-5. Example Plot Using RS-232-C.

OPERATION

Graph Mode

1. Transmit an ASCII GS character (CONTROL SHIFT M on 4010 Series terminal or CONTROL] on 4020 Series terminals).
2. Transmit the following, which is 2000,1532. This causes the pen to move near the center of the platen.

+/T

Alpha Mode

1. Transmit an ASCII US character to place the plotter in Alpha mode again (same as Step 1 of previous Alpha Mode).
2. Transmit the following Alpha Rotate command:

<ESC>AJ45<CR>

This causes subsequent printing to be along a 45-degree angle.

3. Type the following line three or four times:

4662 PLOTTER<CR>

Observe that a new carriage return and line feed reference have been established, as shown in Figure 2-6.

Pause Command

1. If your plotter is not equipped with Option 31 (multiple pens), skip to Step 5 below. If the plotter is equipped with Option 31 (multiple pens), press and hold the PAUSE switch (PEN CONTROL 2) until the plotter's bell sounds once (approximately one second). The PROMPT indicator should blink at approximately a one-second rate, which indicates Pause mode. The plotter can still receive and store commands, but will not be able to execute those commands that cause pen carriage movement.
2. Type the following line and notice that the plotter does not respond (it is in Pause mode):

4662 PLOTTER<CR>

3. Use the joystick handle to move the pen carriage several inches in any direction. The plotter, however, will remember the coordinates of the pen position prior to this step.
4. Press and hold the RESUME switch (PEN CONTROL 3) until the plotter's bell sounds once. The pen carriage will move to the original position and execute the stored command to print "4662 PLOTTER." The PROMPT indicator will stop blinking.
5. Reset the alphanumeric printing angle back to 0 degrees (horizontal) with another Alpha Rotate command as follows:

<ESC>AJ0<CR>

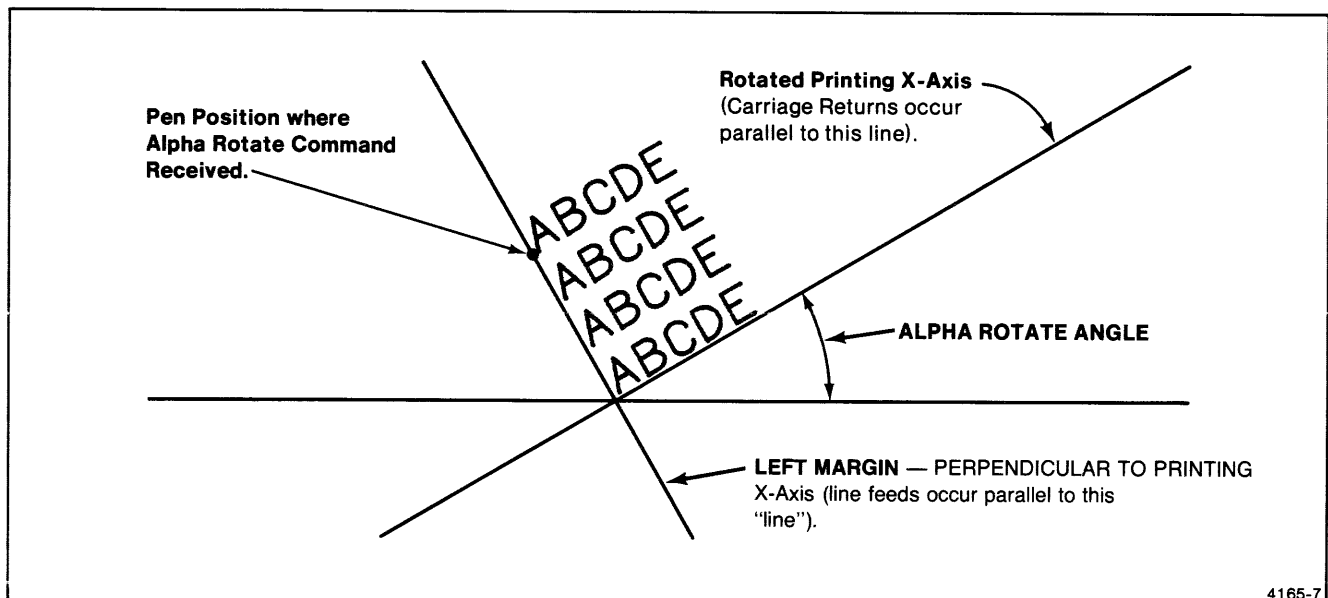


Figure 2-6. Rotated Alphanumeric Characters.

Change Paper

1. Press the LOAD switch to its locked-down position, remove the paper from the platen, and replace with a fresh sheet of 11x17-inch paper.
2. Press the LOAD switch again to release it. This will reactivate the electrostatic paper hold-down. Smooth the paper if necessary.

Home Command

1. Type the following to move the pen to the upper-left corner of the platen ("home" position).

<ESC><FF>

<FF> is CONTROL L on most Tektronix terminals.

Alpha Fonts

1. Type as many of the following ASCII characters as you can from your terminal keyboard:

#\$@[\] ^ { | } <CR>

These are the characters of the default (FONT 0) character set which are changed when alternate fonts are selected.

2. Transmit the following to select Font 1:

<ESC>AT1<CR>

3. Repeat Step 1 and notice the changes in characters printed. These are Scandinavian characters.

4. Transmit the following to select Font 2:

<ESC>AT2<CR>

5. Repeat Step 1 and notice the changes in characters printed. These are German characters.
6. Continue repeating Step 2 and then Step 1, each time changing to a new font (up to Font 9). Notice that Font 7 is the same as Font 0. The results should be as shown in either Figure 2-7A or 2-7B, depending on the setting of the OLD/NEW strap on the System Memory circuit board (if equipped). Refer to 4662 Interactive Digital Plotter Programmer's Reference Manual for more details on this strap. Normally, the factory setting for this strap is NEW, although older instruments will print with the OLD font.
7. Transmit the Alpha Reset command to reset all of the alphanumeric parameters back to the default (establishes font 0):

<ESC>AV<CR>

Digitizing

1. Use the joystick to position the pen near the center of the plotting area.
2. Type the following Graphic Input (GIN) or Digitizing command:

<ESC>AM

The plotter should immediately send the coordinates of the pen position to the terminal's screen in seven bytes. Refer to Plotter Output Data Coding (RS-232) in the 4662 Interactive Digital Plotter Programmer's Reference Manual for an explanation of this coordinate data.

3. Use the joystick to move the pen an inch or two (25 to 50 mm) in any direction.
4. Press the plotter's CALL switch momentarily. The plotter should immediately send the coordinates of the pen position to the terminal screen in seven bytes. Again refer to the 4662 Interactive Digital Plotter Programmer's Reference Manual for an explanation of this coordinate data.
5. Type the following to turn on the plotter's PROMPT light:

<ESC>AK<CR>

6. Type the following to turn off the plotter's PROMPT light:

<ESC>AL<CR>

This completes the familiarization procedure for the RS-232-C interface. To familiarize yourself with the host commands using the GPIB interface, proceed to the following procedure, which uses a TEKTRONIX 4050 Series Graphic System.

Characters varying with alternate fonts:

Font	ADE	35	36	48	64	91	92	93	94	123	124	125
0		#	\$	Ø	@	[	\	\]	^	{	|	}
1		£	¤	Ø	§	ä	ö	å	↑	Ä	Ö	Å
2		£	¤	Ø	§	ä	ö	ü	↑	Ä	Ö	Ü
3		£	¤	Ø	§	[	\	\]	↑	{	|	}
4		£	¤	Ø	§	i	ñ	¿	↑	{	|	}
5		#	\$	Ø	§	[\]	↑	←	↙	→
6		#	\$	Ø	@	[	\	\]	↑	{	|	}
7		#	\$	Ø	@	[	\	\]	^	{	|	}
8		£	\$	0	@	[	\	\]	↑	{	|	}
9		#	\$	0	@	Æ	Ø	Å	^	œ	ø	å

A. Old Font Character Variations

Characters varying with alternate fonts:

Font	ADE	35	36	48	64	91	92	93	94	123	124	125
0		#	\$	Ø	@	[	\	\]	^	{	|	}
1		#	\$	Ø	@	Ä	Ö	Å	^	ä	ö	å
2		£	\$	Ø	@	Ä	Ö	Ü	^	ä	ö	ü
3		£	\$	Ø	@	[	\	\]	^	{	|	}
4		#	\$	Ø	@	i	ñ	¿	^	{	|	}
5		#	\$	Ø	§	[\]	↑	←	↙	→
6		#	\$	Ø	@	[	\	\]	↑	{	|	}
7		#	\$	Ø	@	[	\	\]	^	{	|	}
8		£	\$	0	@	[	\	\]	↑	{	|	}
9		#	\$	0	@	Æ	Ø	Å	^	œ	ø	å

B. New Font Character Variations
(Compatible with TEKTRONIX 4663 Interactive Digital Plotter).

4165-B

Figure 2-7. Characters That Change When Alternate Alpha Fonts Are Selected.

UNDERSTANDING OPERATION WITH THE GPIB INTERFACE

This procedure will familiarize the host programmer/operator with the various host plotter commands and their associated plotter responses.

Before performing this procedure, complete either of the General Operational Procedures (located earlier in this section).

This procedure will familiarize you with many of the various command sequences through first-hand experience, and give you an idea of the actions the plotter takes in response to these commands. The familiarization procedures do not cover every possible command or sequence of commands, but rather provide a general overview of plotter operation.

NOTE

Follow these procedures in the order they are presented. For example, do not go directly to the Graph Mode steps without performing the preceding steps (Initial Setup and Alpha Mode). In most cases, each step is based on actions performed in preceding steps.

No detailed explanation of the commands is provided with these procedures. It may be helpful to refer to the description of each command as you encounter it in this section. These descriptions are located in the 4662 Interactive Digital Plotter Programmer's Reference Manual.

<CR> stands for CARRIAGE RETURN (or RETURN).

NOTE

Throughout this procedure, spaces may be shown between adjacent characters. These are placed there for clarity of illustration. However, in communicating with the plotter, the 4050 Series Graphic System should not send any SPACE characters between characters unless indicated by a SPACE or <SP>.

Any host with a GPIB interface can be used to send characters to the plotter. For programmer familiarization, a TEKTRONIX 4050 Series Graphic System is used in these procedures to simulate a host and to enable the programmer to easily see what the plotter requires and how it responds.

GPIB FAMILIARIZATION PROCEDURE (Using a Tektronix 4050 Series Graphic System)

Initial Setup

1. Turn off the plotter (if not already off).
2. Connect a GPIB cable between the 4050 Series Graphic System and the plotter's rear panel terminal labeled GPIB J102.
3. Make sure that the plotter's LOCAL switch is up (released).
4. Set the plotter's back panel switches to 5-0-0-1. That is A= 5, B= 0, C= 0, and D= 1. This establishes CR (Carriage Return), implies CR plus LF (Line Feed), MSA (My Secondary Address) and DAB (Command Data Byte) commands, a Device Primary Address of 1, and 4020 Series Mode Disable.
5. Turn on the plotter's POWER switch. The pen carriage will move to the lower-right corner of the platen.
6. Press the plotter's LOAD switch and place a piece of B-sized paper (11x17 inches or 279x432 mm) on the platen in the manner described under Loading Paper (later in this section).
7. Install a pen in the pen carriage, unless the plotter is equipped with Option 31 (multiple pens). In that case, ensure that eight pens are loaded in the rotary pen turret (see Installing Pens located later in this section), and no pens are in the pen carriage.
8. Turn on the power to the 4050 Series Graphic System and, after a few seconds, erase the screen (PAGE).
9. If the plotter is not equipped with the multiple pens option, Option 31, skip to Alpha Mode. If the plotter is equipped with Option 31, type the following sequence from the 4050 Series keyboard to pick up Pen 1:

PRINT@1,8:1 <CR>

The pen carriage will travel back to the lower-right corner of the platen after obtaining Pen 1.

Alpha Mode

1. Type the following sequence from the 4050 Series keyboard to move the pen carriage to the "home" position (upper-left corner):

HOME@1:<CR>

2. To print on the plotter, type the following:

PRINT@1:"4662 INTERACTIVE DIGITAL PLOTTER" <CR>

OPERATION

Graph Mode

1. To move the pen carriage, type the following:

```
MOVE@1:0,0<CR>
```

NOTE

Although the plotter allows 150 Graphic Display Units (GDUs), the 4050 Series Graphic System limits its DRAW output to 130 GDUs.

2. To allow the 4050 Series to access the plotter's full platen, type:

```
VIE0,150,0,100<CR>  
WIN0,150,0,100<CR>
```

This changes the 4050 Window and Viewport to 150 GDUs in the X-axis.

3. To draw an outline around the platen, enter:

```
DRAW@1:0,100<CR>  
DRAW@1:150,100<CR>  
DRAW@1:150,0<CR>  
DRAW@1:0,0<CR>
```

Figure 2-8 shows the pattern drawn by this procedure.

NOTE

Secondary Addresses are not required for HOME, PRINT, MOVE, DRAW, or INPUT operations. The 4050 Series Graphic System automatically places the appropriate secondary address on the bus for these operations. However, you can accomplish the same task by using the PRINT command and include the secondary address. For example:

```
PRINT@1,23:<CR>  
PRINT@1,12:"4662 PLOTTER"<CR>  
PRINT@1,21:0,0<CR>  
PRINT@1,20:0,100<CR>  
PRINT@1,20:150,100<CR>  
PRINT@1,20:150,0<CR>  
PRINT@1,20:0,0<CR>
```

4. Diagonal vectors can be drawn with the following commands:

```
DRAW@1:150,100<CR>  
MOVE@1:150,0<CR>  
DRAW@1:0,100<CR>
```

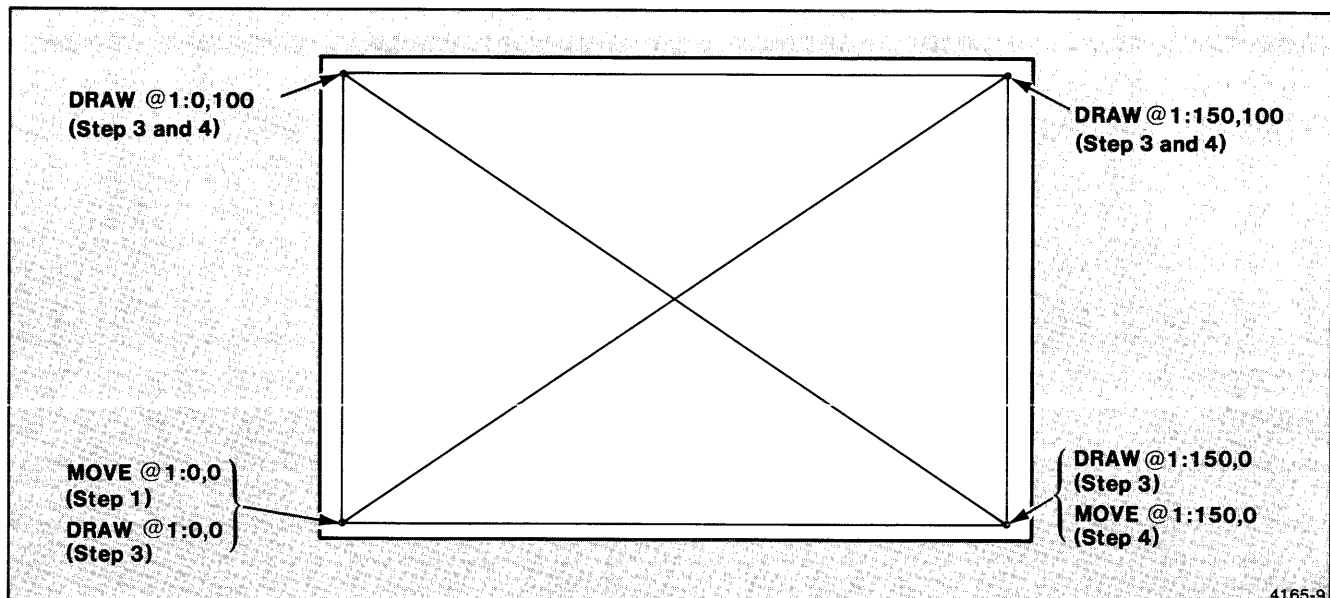


Figure 2-8. Example Plot Using GPIB.

Alpha Command

- To change the size of printed characters, the Alpha Scale command is used. Type:

```
PRINT@1,17:3.584,5.632<CR>
```

Now, subsequent printed characters will be twice as wide and twice as tall as the default printed character size (default character space = 1.792 GDU and default line space = 2.816 GDU).

- Type the following to transmit a Line Feed (note that <LF> is the LINE FEED or LF key):

```
PRINT@1:<CR>
```

- Now, type text as follows:

```
PRINT@1:"4662 INTERACTIVE DIGITAL  
PLOTTER"<CR>
```

Notice that the printed characters are twice as wide and twice as tall as previously printed characters.

- Type the Alpha Reset command, as follows, to reset the alphanumeric character size back to the default size:

```
PRINT@1,7:<CR>
```

- Repeat Step 3 to verify that the printed characters are the default size.

- Move the pen carriage to the center of the page as follows:

```
MOVE@1:75,50<CR>
```

- Enter the following command to rotate subsequent alphanumeric printing 45 degrees:

```
PRINT@1,25:45<CR>
```

- Enter the following print command three or four times, and observe that a new Carriage Return and Line Feed reference have been established, as shown in Figure 2-9:

```
PRINT@1:"4662 PLOTTER"<CR>
```

- Repeat Step 4 to reset the printing angle back to the horizontal.
- Enter one line of the text shown in Step 8 to see that the plotter prints text on a horizontal line.

Replace Paper

- Press the LOAD switch to its locked-down position, remove the paper from the platen, and replace with a fresh sheet of 11x17-inch paper.
- Press the LOAD switch again to release it. This will reactivate the electrostatic paper hold-down. Smooth the paper if necessary.

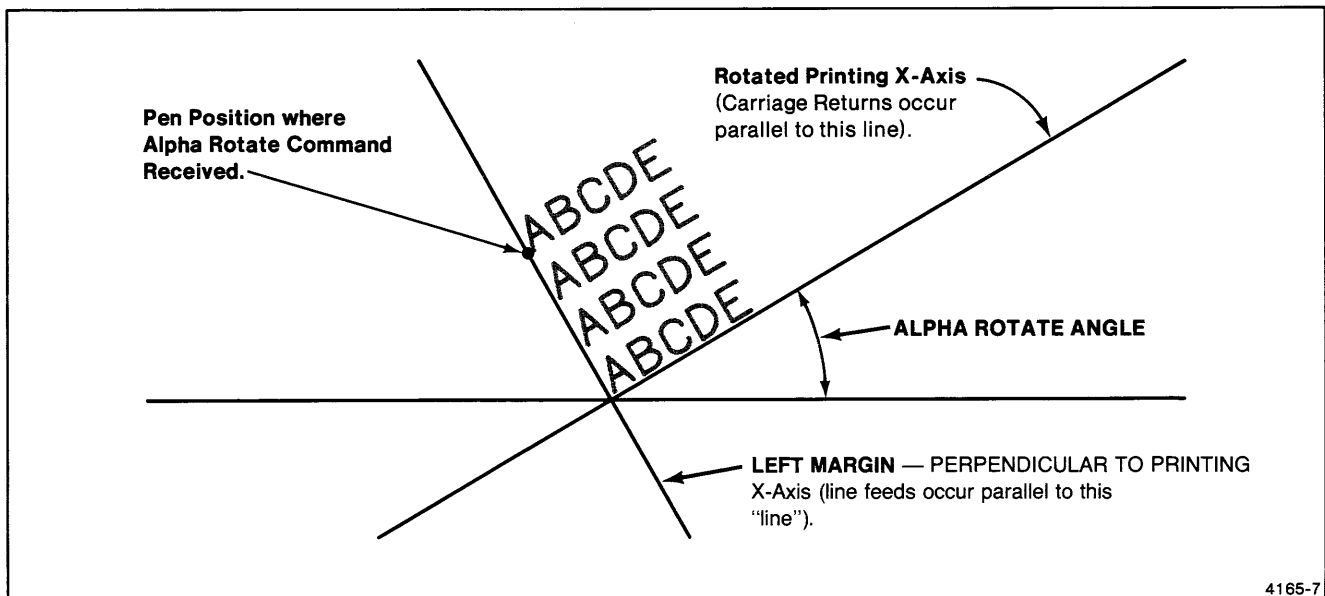


Figure 2-9. Rotated Alphanumeric Characters.

OPERATION

Alpha Fonts

1. Enter the following print command:

```
PRINT@1:" #${@[ \ ] ^ { | } }"<CR>
```

These are the characters of the default (Font 0) character set which are changed when alternate fonts are selected.

2. Type the following command to select Font 1: Scandinavian/Swedish characters:

```
PRINT@1,18:1<CR>
```

3. Repeat Step 1 and notice the changes in characters printed.
4. Type the following command to select Font 2: German Characters:

```
PRINT@1,18:2<CR>
```
5. Repeat Step 1 and again notice the changes in characters printed.
6. Continue repeating Step 2 and then Step 1, each time changing to a new font number (up to 9, although Font 7 is the same as Font 0). The results should be as shown in either Figure 2-10A or 2-10B depending upon the setting of the OLD/NEW strap on the System Memory circuit board (if equipped). Refer to the 4662 Interactive Digital Plotter Programmer's Reference Manual for further details on this strap.

Digitizing

1. Use the joystick to position the pen near the center of the plotting area.
2. Type the following Graphics Input (GIN), or Digitizing, command:

```
INPUT@1,24:X,Y,Z<CR>
```

The digitized coordinates are immediately returned to the 4050 Series Graphics System. However, they are not automatically printed on the display screen.

3. Type the following: X<CR>. The X-coordinate in GDUs is printed on the screen.
4. Type the following: Y<CR>. The Y-coordinate in GDUs is printed on the screen.
5. Type the following: Z<CR>. A zero is printed, which means that the pen is up.
6. Press the plotter's PEN switch causing the pen to touch the paper.
7. Repeat Steps 2 through 5 and notice that when the Z key and RETURN key are pressed, a 1 is printed showing that the pen is down.
8. Press the PEN switch again to raise the pen from the paper.
9. Use the joystick to move the pen one or two inches (25 to 50mm) in any direction.
10. Type the following Call GIN command:

```
INPUT@1,27:X,Y,Z<CR>
```
11. Press the CALL switch on the plotter. The coordinates are sent to the 4050 Series Graphic System and the cursor reappears.
12. Repeat Steps 3 through 5 to display the coordinates on the screen.
13. Again use the joystick to move the pen an inch or two in any direction.
14. Press the plotter's CALL switch to store the coordinates of the pen. Press the CALL switch to cause the plotter to send a Service Request (SRQ) to the 4050 Series Graphic System. However, the 4050 Series Graphic System is now in Idle mode (after Step 12), and so is not programmed to service the request from the plotter. The result is the 4050 Series Graphic System displaying the message:

**NO SRQ ON UNIT IN IMMEDIATE LINE —
MESSAGE NUMBER 43.**

Characters varying with alternate fonts:

Font	ADE	35	36	48	64	91	92	93	94	123	124	125
0		#	\$	Ø	@	[	\	\]	^	{	|	}
1		£	¤	Ø	§	ä	ö	å	↑	Ä	Ö	Å
2		£	¤	Ø	§	ä	ö	ü	↑	Ä	Ö	Ü
3		£	¤	Ø	§	[	\	\]	↑	{	|	}
4		£	¤	Ø	§	i	ñ	¿	↑	{	|	}
5		#	\$	Ø	§	[\]	↑	←	↙	→
6		#	\$	Ø	@	[	\	\]	↑	{	|	}
7		#	\$	Ø	@	[	\	\]	^	{	|	}
8		£	\$	O	@	[	\	\]	↑	{	|	}
9		#	\$	O	@	Æ	Ø	Å	^	œ	ø	å

A. Old Font Character Variations

Characters varying with alternate fonts:

Font	ADE	35	36	48	64	91	92	93	94	123	124	125
0		#	\$	Ø	@	[	\	\]	^	{	|	}
1		#	\$	Ø	@	Ä	Ö	Å	^	ä	ö	å
2		£	\$	Ø	@	Ä	Ö	Ü	^	ä	ö	ü
3		£	\$	Ø	@	[	\	\]	^	{	|	}
4		#	\$	Ø	@	i	ñ	¿	^	{	|	}
5		#	\$	Ø	§	[\]	↑	←	↙	→
6		#	\$	Ø	@	[	\	\]	↑	{	|	}
7		#	\$	Ø	@	[	\	\]	^	{	|	}
8		£	\$	O	@	[	\	\]	↑	{	|	}
9		#	\$	O	@	Æ	Ø	Å	^	œ	ø	å

B. New Font Character Variations
(Compatible with TEKTRONIX 4663
Interactive Digital Plotter).

4165-8

Figure 2-10. Characters That Change When Alternate Alpha Fonts Are Selected.

OPERATION

15. You can service the plotter's request by typing another Call GIN command as follows:

INPUT@1,27:X,Y,Z<CR>

16. Repeat Steps 3 through 5 to display the coordinates on the screen.
17. Using the joystick, move the pen carriage near the lower-left corner.
18. Press the plotter's CALL switch. The screen will display:

**NO SRQ ON UNIT IN IMMEDIATE LINE —
MESSAGE NUMBER 43**

19. Again using the joystick, move the pen carriage up near the upper right corner.
20. Press the plotter's CALL switch. The screen will display:

NO SRQ ON UNIT — MESSAGE NUMBER 43

You have now stored the coordinates of these two points in the plotter. The plotter can store only two points without having the 4050 Series Graphic System retrieve those coordinates.

21. Retrieve the first set of coordinates by a Call GIN command:

INPUT@1,27:X,Y,Z<CR>

Since there are two points stored in the plotter, retrieving the first one still leaves the second one. Therefore, the plotter still asserts the SRQ causing the 4050 Series to display:

**NO SRQ ON UNIT IN IMMEDIATE LINE —
MESSAGE NUMBER 43**

22. Repeat Steps 3 through 5 to display the coordinates of the lower-left corner point. Each time the display will also print:

**NO SRQ ON UNIT IN IMMEDIATE LINE —
MESSAGE NUMBER 43**

This indicates another coordinate set is stored in the plotter and the plotter is asserting SRQ.

23. Retrieve the second coordinate set (the upper-right) by issuing another Call GIN command (Step 21). This empties the plotter's output queue and no SRQ is issued.

24. Repeat Steps 3 through 5 to display the coordinates of the upper-right corner point.

25. To display the PROMPT light, type:

PRINT@1,26:1<CR>

26. To turn off the PROMPT light, type:

PRINT@1,26:0<CR>

Pause Function (Option 31 Equipped Plotters)

1. If the plotter is not equipped with Option 31, skip to the concluding paragraph in this procedure. If the plotter is equipped with Option 31, press and hold the PAUSE switch (PEN CONTROL 2) until the plotter's bell sounds once (approximately one second). The PROMPT indicator should blink at approximately a one-second rate indicating Pause mode. The plotter can still receive and store commands, but cannot execute them.
2. Type the following line and notice that the plotter does not respond:
PRINT@1:"4662 PLOTTER"<CR>
3. Use the joystick handle to move the pen carriage several inches in any direction. The plotter will remember the coordinates of the pen prior to this step.
4. Press and hold the RESUME switch (PEN CONTROL 3) until the plotter's bell sounds once (approximately one second). The pen carriage will move back to the original position and execute the stored command to print "4662 PLOTTER." Also, the PROMPT indicator will stop blinking.

This completes the familiarization procedure for the GPIB interface using a TEKTRONIX 4050 Series Graphic System. To familiarize yourself with the host commands using a serial interface, refer to that procedure earlier in this section.

FRONT PANEL SWITCHES AND INDICATORS

The following paragraphs describe the switches and indicators located on the front panel (see Figure 2-11). These descriptions contain information relevant to the plotter operator and the plotter programmer.

POWER SWITCH

The POWER switch is a rocker switch used to apply power to the 4662 Plotter. Rock the switch to the right to apply power.

When power is applied, the POWER indicator light goes on, and the following sequence of events occurs. The pen carriage moves from its present location until it reaches the right boundary. The pen then moves down until it reaches the lower-right corner, where it stops. This action establishes the plotting surface boundaries and initial pen position.

If the LOAD switch was locked-down when the power was applied, the initialization process will be the same except that when the pen carriage reaches the lower-right corner of the platen, it will proceed to and stop at the Load position (upper-right corner).

If the plotter is equipped with Option 31 and the knob on the rotary pen turret was left in the UNCAP position, the knob automatically returns to the CAP position.

POWER INDICATOR

The POWER indicator light monitors the internal +5-volt power supply. When on, it indicates that the plotter is receiving line power.

PROMPT INDICATOR

The PROMPT indicator light may be turned on and off with commands from a host (refer to the 4662 Interactive Digital Plotter Programmer's Reference Manual). The indicator is usually used to issue a prompt to the plotter operator, indicating that the program expects some pre-arranged operator action, such as changing paper or digitizing a point.

When the PROMPT indicator is on, the automatic pen lift feature is inhibited for convenience in digitizing (see Pen Switch).

If the plotter is equipped with Option 31 and the Pause function is initiated (by pressing and holding the PEN CONTROL 2 switch until the plotter's bell sounds), the PROMPT indicator flashes at a one-second rate indicating the Pause mode.

ERROR INDICATOR

When turned on, the ERROR light indicates one of four possible error conditions.

- A transmission error when operating with the RS-232-C interface (I/O Error).
- An internal plotter error.
- An external programming error, such as an illegal or undefined command, function, or argument.
- A pen change function error (if Option 31 is installed), such as an attempt to select a non-existent pen.

Turn the ERROR indicator off by cycling the power off and then on again to restart the plotter or by pressing and releasing the LOAD or LOCAL switches.

LOAD SWITCH

The LOAD switch is used when a new sheet of paper is to be placed on the plotting surface. When the LOAD switch is pressed in and locked down, the pen is lifted (if down) from the paper and moved to the upper-right corner of the platen — the *load position*. In addition, the electrostatic paper hold-down is turned off to allow removal and replacement of paper.

NOTE

The load position is a non-host-addressable pen position located just slightly to the right of the upper-right corner of the default page boundary.

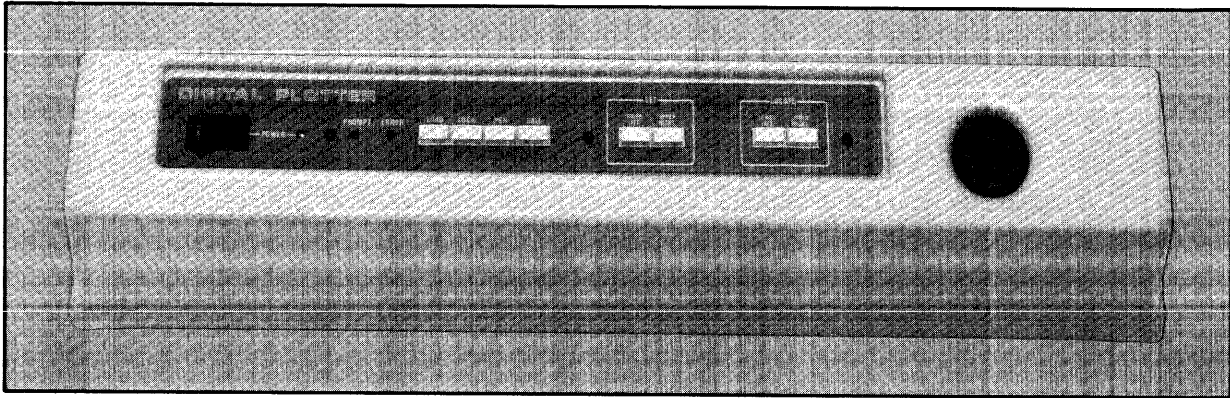
To release the LOAD switch from its locked-down position, simply press the switch again. This restores the electrostatic paper hold-down and permits the plotter to receive host-generated motion commands or front-panel switch motion commands.

While the LOAD switch is locked down, interface communications with the plotter are not affected. For example, the host can interrogate the plotter for status — i.e., Read Status. However, any stored commands in the input buffer are deleted, and received motion commands (Move and Draw) are ignored. Also, any error condition is cleared and the ERROR light turns off when the LOAD switch is pressed and released to the up position.

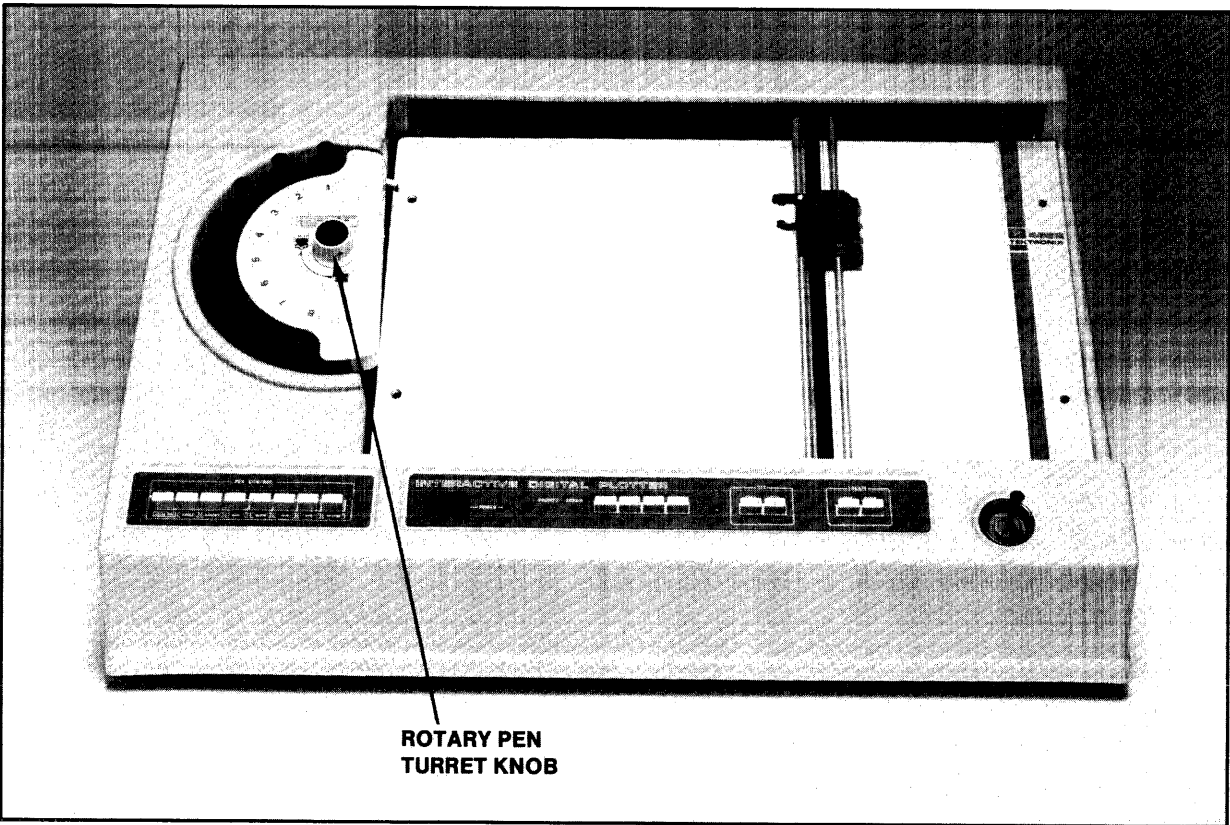
NOTE

Pressing the LOAD switch does not clear the plotter's output queue.

OPERATION



A. Standard 4662.



**ROTARY PEN
TURRET KNOB**

B. 4662 Equipped with Option 31.

4165-12

Figure 2-11. The Front Panel.

LOAD Switch with Multiple Pen Equipped Plotters (Option 31)

If the plotter is equipped with multiple pens and the LOAD switch is locked down, the following changes to front panel switch functions also occur:

- Pen selection is inhibited, both from the front panel switches and host-generated commands.
- Pause function is canceled (if activated previously).
- STORE function is inhibited.
- PEN CONTROL switches 6, 7, and 8 assume the LOAD/UNLOAD 1-4, LOAD/UNLOAD 5-8, and RETURN functions (see Multiple Pen Controls (Option 31 Only) for details).

LOCAL SWITCH

The LOCAL switch controls the routing of the data between the plotter, the terminal, and the host.

LOCAL Switch Released (Up)

When using the RS-232-C interface, data communication is between the terminal and host and between the host and the plotter (see Figure 2-12A).

Releasing the LOCAL switch to its up position clears any error condition and turns the ERROR light off.

LOCAL Switch Locked Down

When using the RS-232-C interface, data communication is between the plotter and terminal only. Communication between the plotter and the host (modem) is disabled (see Figure 2-12B).

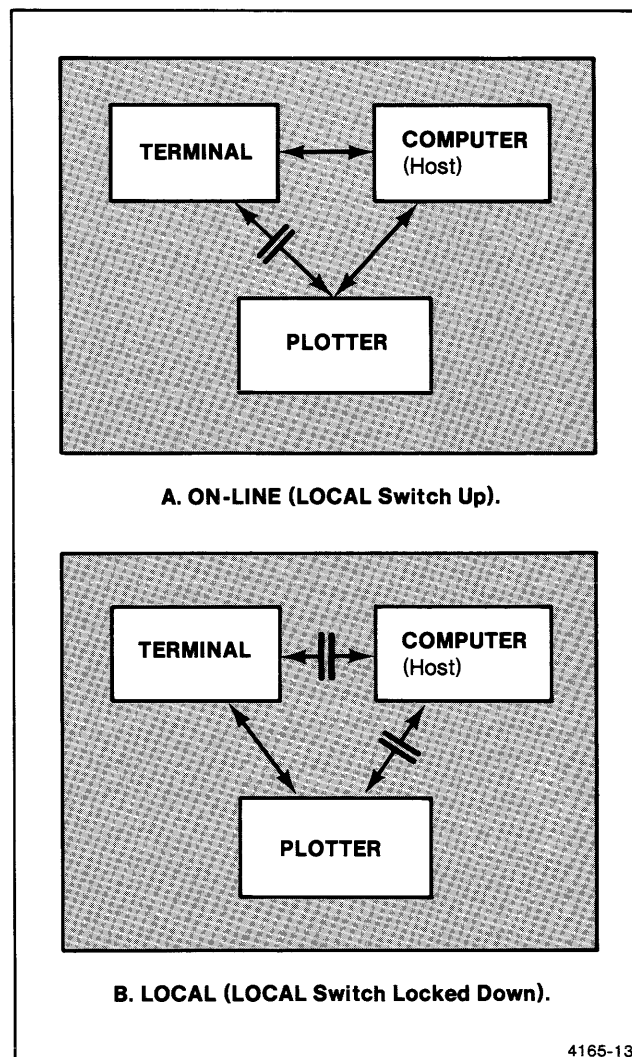


Figure 2-12. Communications Interface Modes.

OPERATION

When using the GPIB interface, the plotter will ignore all commands. To the GPIB controller, it appears that the plotter is not connected to the bus.

NOTE

Any pressing (up or down) of the LOCAL switch causes the commands currently stored in the input buffer to be deleted and clears the output buffer of any responses.

NOTE

Pressing the LOCAL switch on Option 31 equipped plotters will cancel the Pause function, if activated previously.

PEN SWITCH

The PEN switch raises or lowers the pen. For example, if the pen is up when the switch is pressed, the pen will be lowered to the plotting surface, and vice-versa.

If the plotter is busy executing a Move, Draw, or Print command when the PEN switch is pressed, it will ignore the pressing of this switch.

CALL SWITCH

The CALL switch is used when the plotter is being used as a digitizer and to initiate the self-test feature. Refer to the 4662 Interactive Digital Plotter Programmer's Reference Manual for details about digitizing.

The CALL switch initiates the internal self-test sequence when it is held down until the plotter's bell rings twice (approximately two seconds). The plotter then draws a predetermined plot, shown in Figure 2-3, which the operator can examine to determine whether the plotter is working properly.

SET CONTROLS

The SET LOWER LEFT and SET UPPER RIGHT switches enable the operator to establish the size and location of the desired page boundaries (the area on the platen which may be plotted upon). Typically, the operator uses the joystick to maneuver the pen over the desired corner of the intended page, and then the appropriate front panel switch (SET LOWER LEFT or SET UPPER RIGHT) is pressed and held down (about one second) until the plotter's bell sounds once. Establish the opposite page corner in the same manner. Refer to Page Formatting later in this section.

In addition, these switches control the mirror imaging capability of the plotter. See Page Formatting later in this section.

LOCATE CONTROLS

The LOCATE LOWER LEFT and LOCATE UPPER RIGHT switches enable the operator to check the locations of the lower-left and upper-right corners of the current page. Momentarily pressing the appropriate LOCATE switch causes the pen to move to the corresponding corner.

POSITIONING CONTROL (JOYSTICK)

The Positioning Control is a joystick which allows the operator to manually position the pen carriage to any location on the plotting surface. The pen carriage moves in the same direction as the joystick control and the velocity of the pen increases with the displacement angle of the joystick control. The joystick is disabled while the plotter is processing Move and Draw commands, but is enabled approximately one-half second after processing the last received Move or Draw command.

MULTIPLE PEN CONTROLS (OPTION 31 ONLY)

Pen Control Switches

This group of eight switches (see Figure 2-13) is used for manual selection of plotting pens, and for control of other Option 31 pen features. Whether a pen is selected or whether an Option 31 feature is selected depends on (1) the length of time the operator activates the key (i.e., momentary activation, where the bell does not ring, or extended activation, where the bell rings), and (2) the position of the LOAD switch.

NOTE

When instructed to momentarily press a switch, be sure you release it before the bell rings.

Pen Selection. To select one of the eight pens, wait for the plotter to complete any ongoing plots, then momentarily press the desired PEN CONTROL switch (1-8). The following actions occur:

- If there is a pen in the pen carriage, that pen is returned to its original position in the pen turret.
- The pen turret positions the selected pen so that the pen carriage picks it up.

If a selected pen position in the rotary pen turret does not contain a pen, an error condition occurs with the following indicators:

- The plotter's bell momentarily sounds,
- the ERROR light turns on, and
- the Pen Select Error bit is set in the plotter status word.

NOTE

Pen Selection is disabled when the LOAD switch is in the LOAD (locked down) position.

NOTE

The plotter ignores an attempt to select the pen that already is in the pen carriage.

Feature Selection. Multiple pen plotter features (store pen, pause, resume, etc.) are selected when a PEN CONTROL switch is held down until the bell sounds (approximately one second). These switch functions are described below.

- The STORE PEN switch causes the pen in the pen carriage to be placed into the rotary pen turret in its original position.
- The PAUSE switch causes the plotter to enter the Pause mode. See description of Pause mode in Section 1 for details.
- The RESUME switch clears the Pause mode. The plotter resumes processing and executing host-generated commands.

NOTE

STORE PEN, PAUSE, and RESUME functions are disabled when the LOAD switch is in the LOAD (locked down) position.

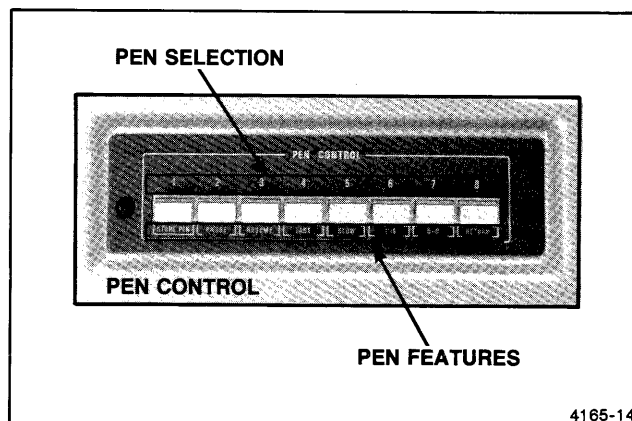


Figure 2-13. Pen Control Switches.

OPERATION

- The FAST switch selects fast (normal) plotting speed if SLOW plotting is currently selected.

NOTE

If the plotter is busy plotting at slow speed when FAST is selected, fast speed may not occur for several vectors. This is because the plotter stores several vectors and their associated drawing speed prior to plotting them.

- The SLOW switch selects slow plotting speed if the FAST plotting is currently selected.

NOTE

If the plotter is busy plotting at fast speed when SLOW is selected, slow speed may not occur for several vectors. This is because the plotter stores several vectors and their associated drawing speed prior to plotting them.

- The 1-4 switch causes the plotter to rotate the rotary pen turret to expose pen positions 1-4. You can then add or remove these pens as necessary.

NOTE

If the pen carriage is too close to the rotary pen turret when this key function is initiated, this function is ignored.

- The 5-8 switch causes the plotter to rotate the rotary pen turret to expose pen positions 5-8. You can then add or remove these pens as necessary.

NOTE

If the pen carriage is too close to the rotary pen turret when this key function is initiated, this function is ignored.

- The RETURN switch causes the plotter to rotate the rotary pen turret back to the stored (closed) position and cap the pens.

Rotary Pen Turret Knob

The Rotary Pen Turret Knob allows the operator to manually rotate the rotary pen turret when installing or removing pens from the rotary pen turret. Refer to Removing and Installing Pens later in this section for instructions about this knob.

PAGE FORMATTING

Page formatting is the process of establishing the desired plotting boundaries (plotting area). A plotting area is defined by two points located on opposite corners. These two points are the lower-left corner and the upper-right corner (see Figure 2-14). By establishing these two points, all plotting areas can be defined.

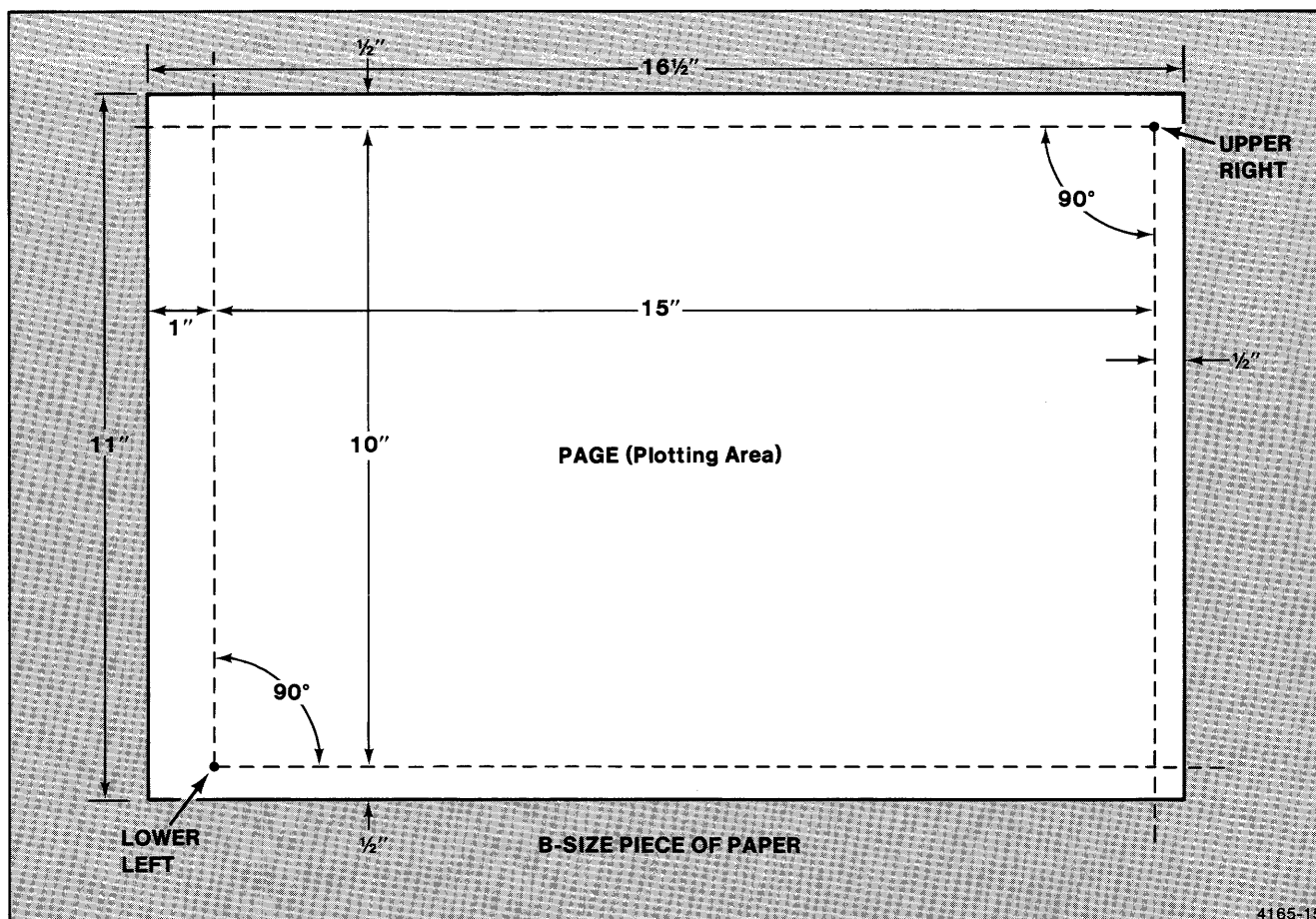


Figure 2-14. Page Defined by Lower-Left and Upper-Right Points.

OPERATION

It is not hard to see that since the plotter allows us to place these two points anywhere on the plotting surface, the plotting area can take the shape of any size rectangle or square. It is even possible to position (1) the upper-right corner to the left of the lower-left corner to create mirror image plots, (2) the upper-right corner below the lower-left corner to create upside-down plots, and (3) the upper-left corner to the left of and below the lower-left corner to create upside-down mirror image plots (see Figure 2-15).

The process of page formatting then consists of Page Scaling and Page Location, both described in the following paragraphs.

Page Scaling

The 4662 Plotter draws a default B-size plot (page) of 10x15 inches (254x381 mm) on standard 11x16.5 inch paper. This gives a 1-inch margin on the left side and 0.5-inch margins on the other three sides.

Scaling may be useful to adjust the plotting area to match the size of preprinted paper, such as graph paper, or to reduce a drawing so that several plots can fit on a single piece of paper. The default page size can be increased to 15.35x10.23 inches (390x260 mm).

When the page is scaled, all subsequent alphanumeric and graphic data are plotted within the scaled page, and the drawing will reflect any change in the X-Y aspect ratio. That is, all incoming data is automatically scaled proportionally in both axes to cause the plot to exactly fit inside the scaled page.

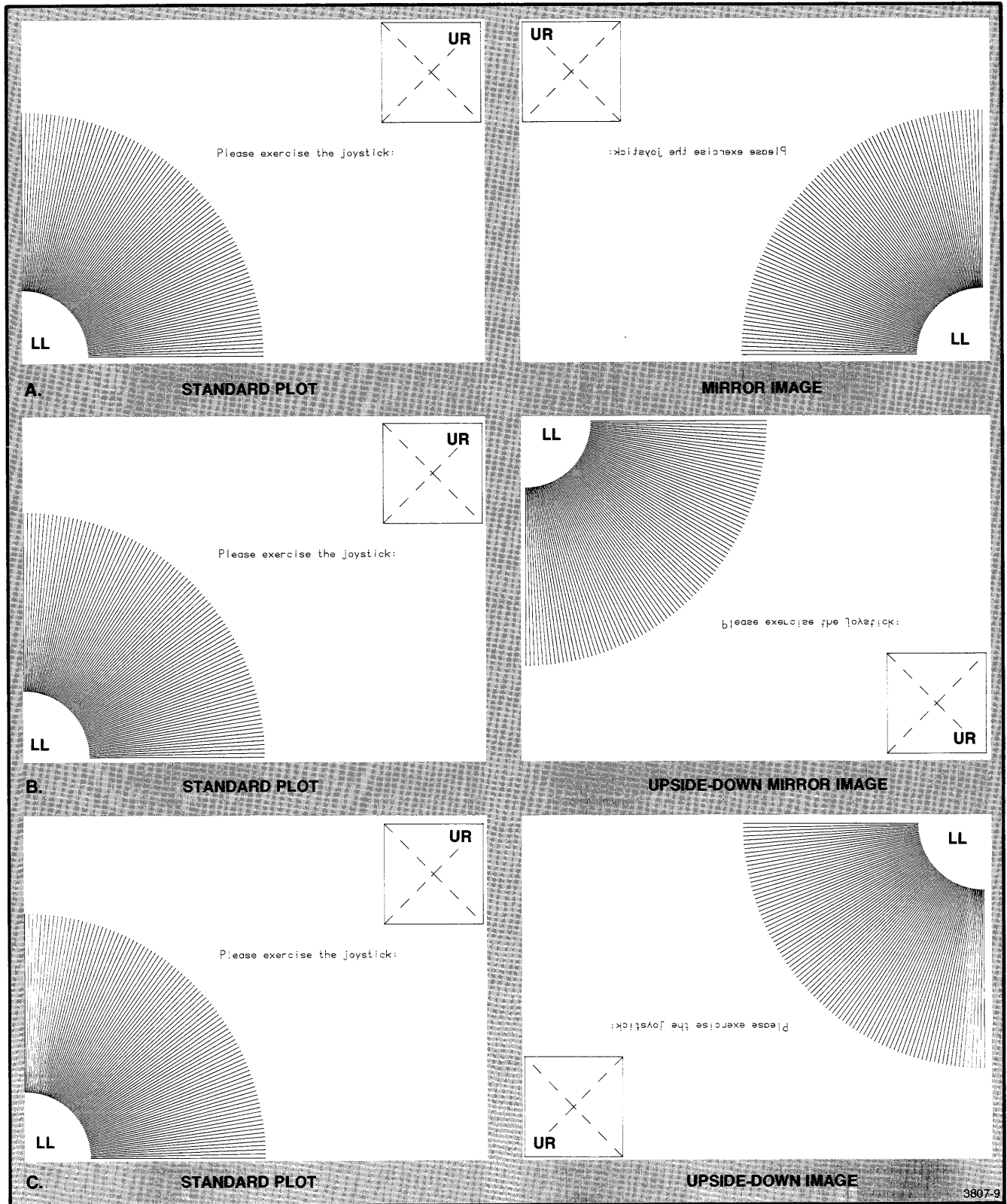


Figure 2-15. Mirror, Upside-Down Mirror, and Upside-Down Image Plots.

OPERATION

NOTE

In the following procedure, ALWAYS establish the lower-left corner of the scaled page FIRST; then, establish the upper-right corner. Any change in the location of the lower-left corner of the page ALWAYS causes an equal change in the location of the upper-right corner of the page (see Page Positioning instructions following). However, the opposite is not true. A change in the location of the upper-right corner of the page does NOT affect the location of the lower-left corner of the page. For this reason, the lower-left corner of the page is ALWAYS established FIRST.

1. Use the joystick to position the pen over the desired lower-left corner of the scaled page. The lower-left corner of the scaled page may be the default corner (in which case this step and Step 2 may be ignored) or any other location on the plotting surface.
2. Press and hold the SET LOWER LEFT switch until the plotter's bell rings once (approximately one second).
3. Using the joystick, position the pen to the desired upper-right corner of the scaled page.
4. Press and hold the SET UPPER RIGHT switch until the plotter's bell rings once (approximately one second).

To change the Page Scale, use the following procedure. Refer to Figure 2-16 as necessary.

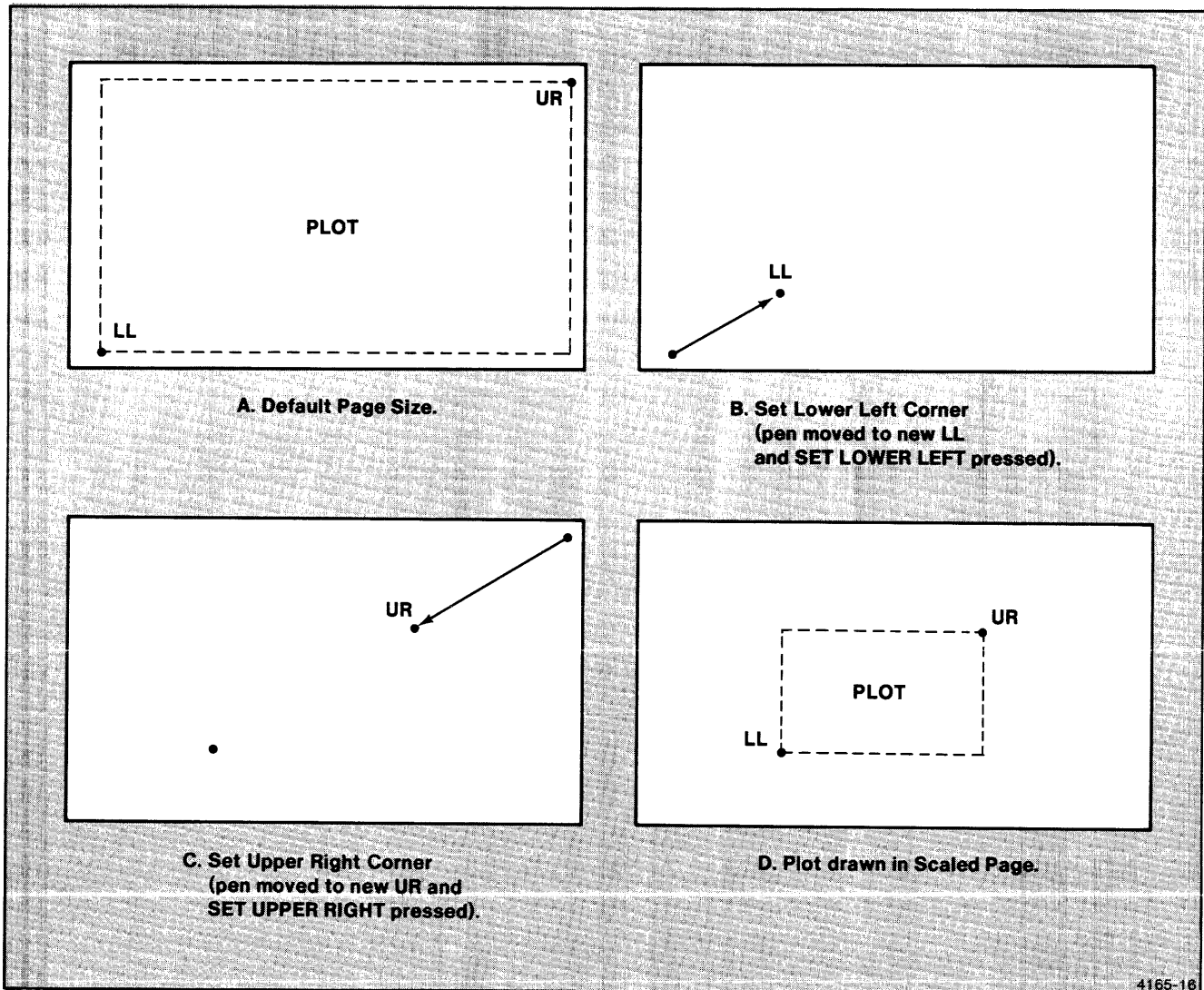


Figure 2-16. A Typical Page Scaling Operation.

This completes the page scaling operation. The newly established corners of the page can be verified by first momentarily pressing the LOCATE LOWER LEFT switch and then the LOCATE UPPER RIGHT switch. The pen will travel to the points established in Steps 1 and 3 above.

Page Positioning

Sometimes the operator may want to move a plotting area to another part of the paper. For example, if several different drawings are to be plotted on a single piece of paper, or if the paper is going to include text as well as the drawing.

A plotting area (page) may be repositioned anywhere on the plotting surface. This is accomplished by relocating the lower-left page boundary only; it is not necessary to reset the upper-right page corner when changing only the page's position on the plotting surface.

To change the page position:

1. Use the joystick to position the pen over the desired lower-left corner of the page (see Figure 2-17).
2. Press and hold the SET LOWER LEFT switch until the plotter's bell sounds once (approximately one second).

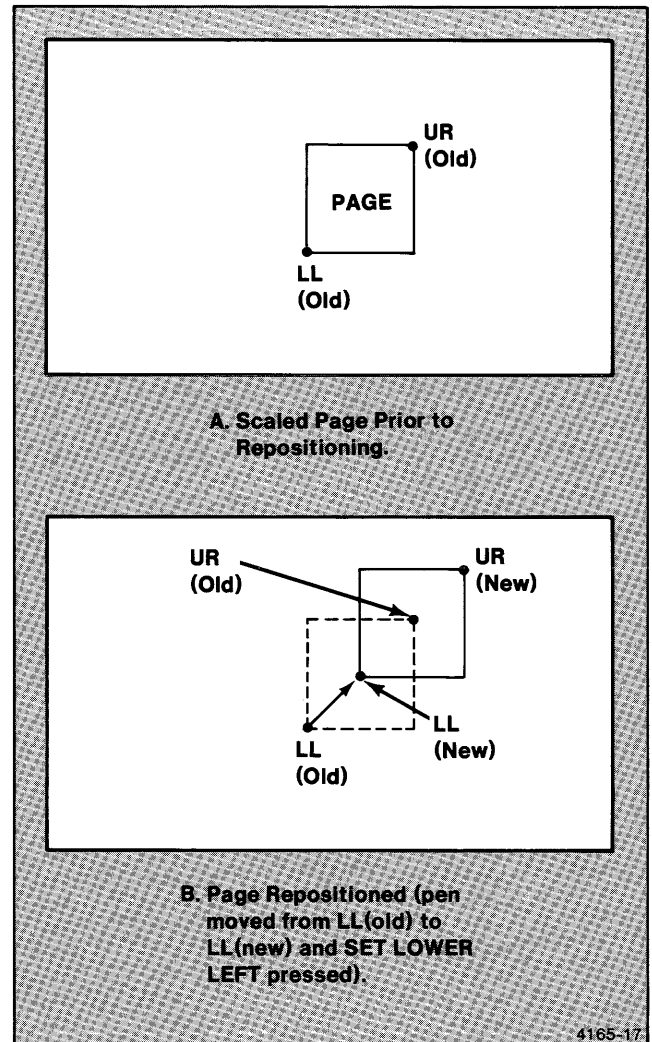


Figure 2-17. Page Positioning.

OPERATION

CAUTION

The upper-right corner location cannot be moved past the boundaries of the platen. If the lower-left corner is moved too far up or too far to the right, positioning either the right or upper boundary past the platen boundary, the page is automatically scaled to the boundary value. Then, if the page is moved back within the platen area, it retains its "squeezed" page size (see Figure 2-18).

This completes the procedure for repositioning the page. This means that the upper-right page boundary has also moved a corresponding amount to maintain the same page-size. The newly positioned page corner boundaries can be verified by first momentarily pressing the LOCATE UPPER RIGHT switch and then the LOCATE LOWER LEFT switch. The pen will travel to the respective corner boundaries of the page and the diagonal distance between the two points will be the same as it was prior to the page repositioning procedure.

Formatting Mirror Image Plots

The plotter may be set to orient the plotting area to produce mirror, upside-down mirror, or upside-down image plots. Figure 2-15 shows an example of each of these features. Notice the placement of the lower-left (LL) and upper-right (UR) corners in the three plots as compared with the standard plot.

These features can be useful in preparing plots for mirror or projection transparencies.

Mirror Image Plots

1. Use the joystick to position the pen near the lower-right corner of the plotting area.
2. Press and hold the SET LOWER LEFT switch until the plotter's bell sounds once (approximately one second).
3. Use the joystick to position the pen near the upper-left corner of the plotting area.
4. Press and hold the SET UPPER RIGHT switch until the plotter's bell sounds once (approximately one second).

The plotted image will be oriented as shown in Figure 2-15A.

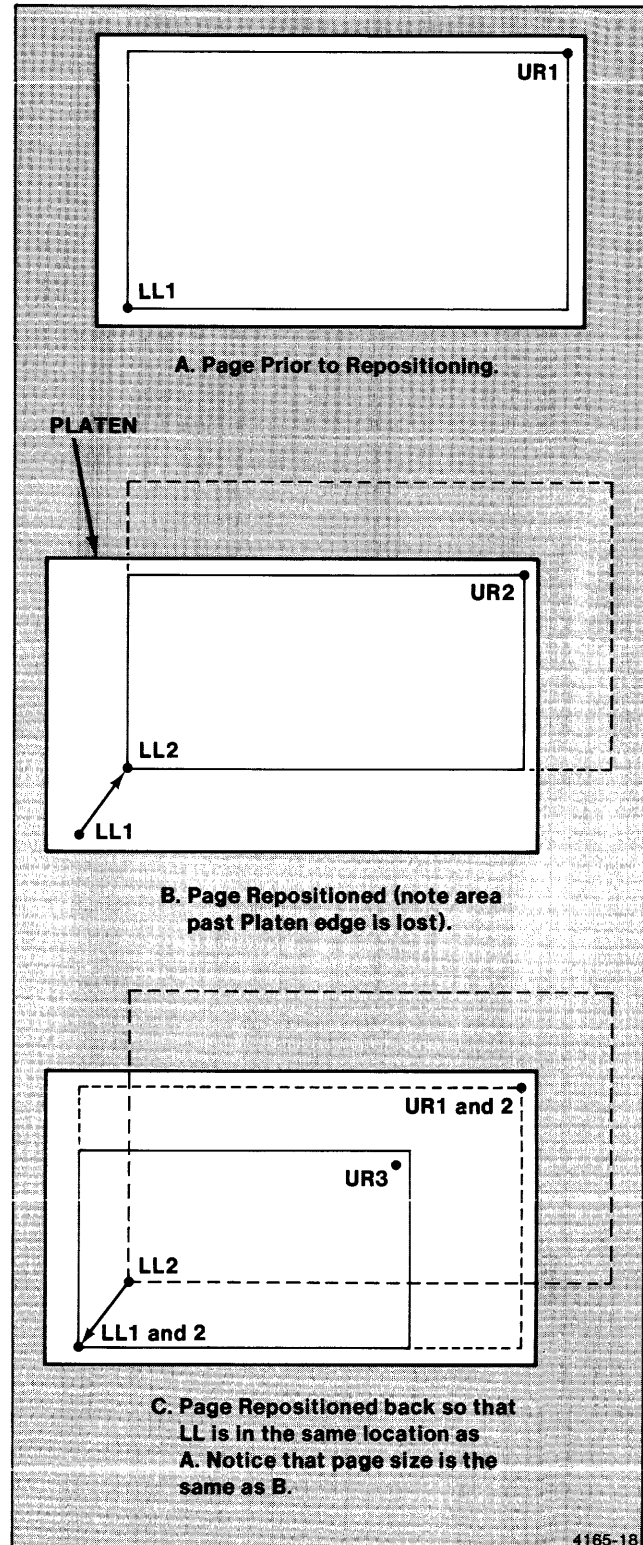


Figure 2-18. Page Positioning Past Platen Boundaries.

Upside-Down Mirror Image Plots

1. Use the joystick to position the pen near the upper-right corner of the plotting area.
2. Press and hold the SET LOWER LEFT switch until the plotter's bell sounds once (approximately one second).
3. Use the joystick to position the pen near the lower-left corner of the plotting area.
4. Press and hold the SET UPPER RIGHT switch until the plotter's bell sounds once (approximately one second).

The plotted image will be oriented as shown in Figure 2-15B.

Upside-Down Image Plots

1. Use the joystick to position the pen near the upper-left corner of the plotting area.
2. Press and hold the SET LOWER LEFT switch until the plotter's bell sounds once (approximately one second).
3. Use the joystick to position the pen near the lower-right corner of the plotting area.
4. Press and hold the SET UPPER RIGHT switch until the plotter's bell sounds once (approximately one second).

The plotted image will be oriented as shown in Figure 2-15C.

Locating the Page Boundaries

The existing page boundary locations may be checked from the front panel prior to executing a plot, if desired. This is accomplished by first momentarily pressing the LOCATE LOWER LEFT switch and then the LOCATE UPPER RIGHT switch. The pen will travel to its respective page corner location as each switch is released.

OPERATION

REAR PANEL CONTROLS

The 4662 Plotter has a versatile feature set that enables the device to be used in a variety of user systems. Also, programmers can select programmable features to fit personal preference. The features and functions of the front panel switches and controls have already been described. This part of Section 2 describes plotter features selectable via rear panel switches.

The rear panel (see Figure 2-19) has four 16-position switches, labeled A, B, C, and D. The switches, which are set with a small-blade screwdriver, provide control over a set of plotter features that are usually set only once. Although they can be changed, typically, they are set at installation to match the plotter to the user's host system and to select programmer preferred features/functions.

The description of these switches is in two parts: Switch settings for plotter operation with an RS-232-C interface and switch settings for plotter operation with a GPIB interface. Examples of each are given to aid users in selecting a feature to match their programming needs. In addition, two tables are provided which list commonly used rear panel switch settings for both RS-232-C and GPIB interfaces.

NOTE

The plotter only reads these switches at power-up. Therefore, if any of the rear panel switches are to be changed, the power must be turned off, the switches set, and then the power applied again.

RS-232-C SWITCH SETTINGS

The switch-selectable features that relate to RS-232-C interface requirements are described in Table 2-1.

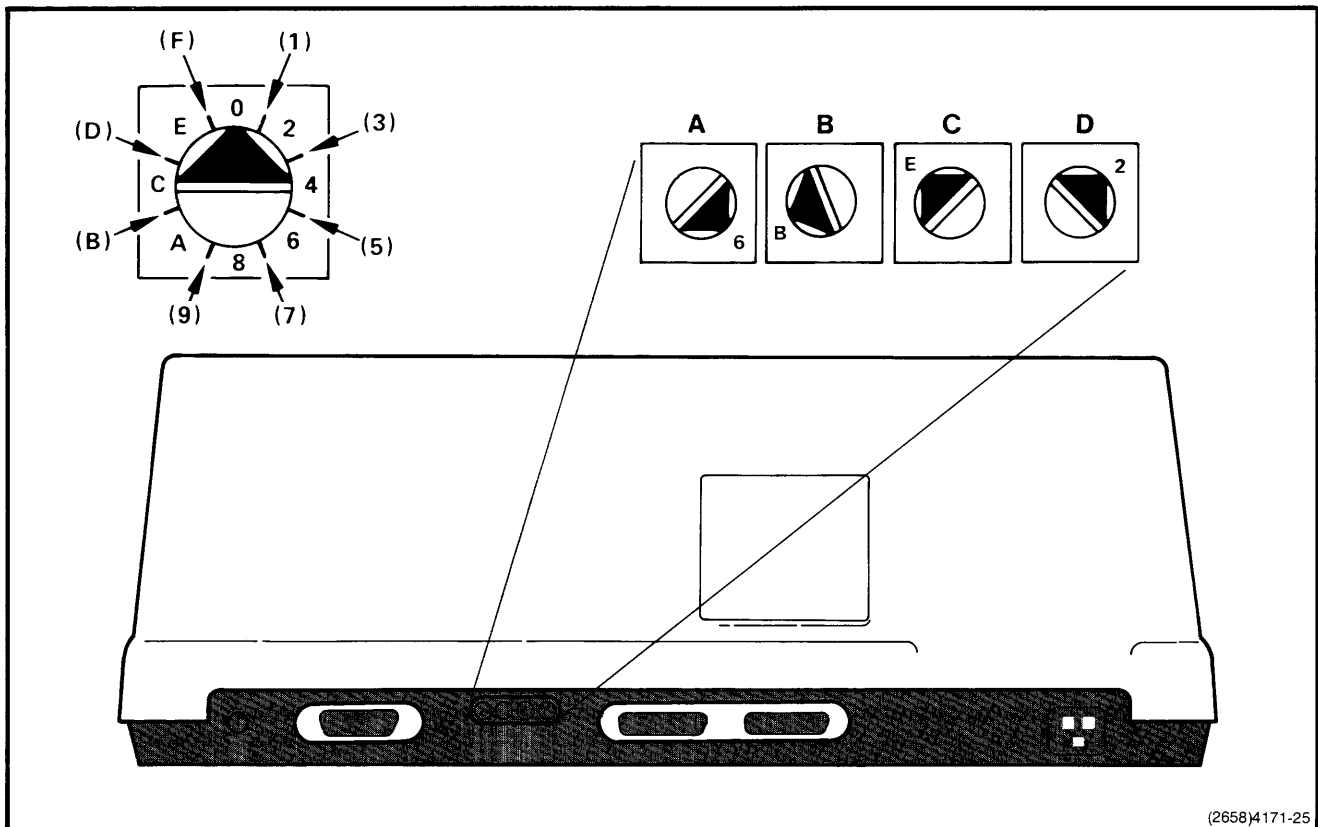


Figure 2-19. Switch Positions and Locations (Example Settings Only).

OPERATION

Table 2-1

RS-232-C SELECTABLE PARAMETER DESCRIPTIONS

Parameter	Description
Low Plotting Speed (non-Option 31 equipped plotters only)	This selectable feature allows the standard plotter to use custom pens, whose ink may not flow as rapidly as the standard pens. At low plotting speed, the plotter draws vectors at a much slower speed than at standard (fast) speed.
DC1/DC3 Flagging (Option 31 equipped plotters only)	This feature prevents inadvertent loss of host-generated data due to input buffer overflow. If this feature is selected, the plotter sends a DC3 (stop) character to the host when the input buffer has filled up so that room exists for 133 more characters. The host should then "coast to a stop" after finishing the output of its current output buffer (usually less than or equal to 133 characters). Later, when the plotter has processed enough input data so that space is again available for 195 more characters (133 + 62 characters), the plotter sends a DC1 (start) to the host. The DC1 informs the host that it can output at least 62 more characters before the plotter sends another DC3 character (flag) to stop the host again.
Terminal Mute	Selecting Terminal Mute Enable prevents the terminal from receiving data intended for the plotter after the plotter receives a Plotter-On command. Selecting Terminal Mute Disable allows all data from the host to pass through the plotter to the terminal, regardless of whether or not the plotter received a Plotter-On command.
Copy Mode	When selected, this feature allows the plotter to plot all the Y-axis data visible on the TEKTRONIX 4010 Series Terminal's display. If the plotter's full-scale X-axis is used to correspond to the terminal's X-axis, a portion of the Y-axis data displayed on the terminal screen can fall above the plotter's upper boundary. That is, Y-axis coordinates higher than 2731 cannot be plotted on the plotter (see Figure 2-20). Selecting the Copy mode option allows the plotter's Y-axis to correspond to the Y-axis of the terminal. In order to do this, the plotter's X- and Y-axes are scaled down to correspond to the terminal's display screen aspect ratio.

(cont)

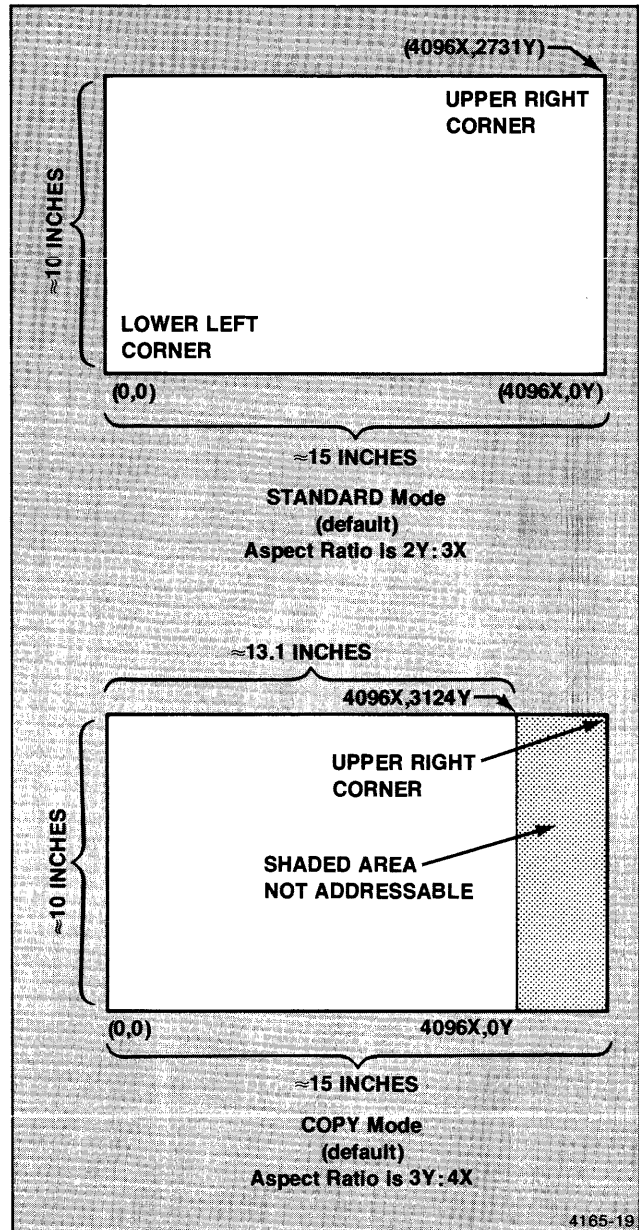


Figure 2-20. Standard Plotting Mode and Copy Mode.

Table 2-1 (cont)

Parameter	Description	Parameter	Description
Copy Mode (cont)	<p>Copy mode also causes the plotter to power up in a <i>logically-on</i> condition. That is, no Plotter-On command is needed from a host prior to receiving data.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;"><i>When Copy mode is used, a small portion of the right side of the plotting surface cannot be addressed (see Figure 2-20).</i></p>	Stop Bits	This feature selects the number of RS-232-C stop bits that the plotter transmits. It should be set to conform to system requirements. The choice is either one or two stop bits.
CR (Carriage Return) Effect	This feature determines whether an ASCII CR is interpreted as a Carriage Return only or as both a Carriage Return and Line Feed (CR implies CR plus LF).	Parity Select	<p>Many host systems use the eighth bit of every ASCII character as a parity bit (error check). Parity Select features are:</p> <ul style="list-style-type: none"> ● No Parity ● Even Parity ● Odd Parity
DEL (delete) Interpretation	In Graph mode, the ASCII DEL character is normally used as a LOY (Low Order Y) character. Setting the DEL (delete interpretation) feature causes the plotter to interpret the ESC? character sequence as a DEL character. The reason is, some host systems use the ASCII DEL character for special system functions. Their use by these hosts could result in unwanted vector drawing on the plotter. To prevent unwanted vectors when using hosts that use DEL characters, the programmer should substitute the ESC? character sequence for the DEL character when operating in Graph mode.	RS-232-C Interface Select	This option must be selected when the RS-232-C interface ports are in use.
Plotter Output GIN Terminator	<p>Some host systems require that peripherals let the host know when they have completed a transmission of data to the host. One means is to terminate the peripheral's data transmission with a specific ASCII character or string of ASCII characters. When the host recognizes the terminating sequence, it will know that the peripheral's transmission is complete. The Plotter Output GIN Terminator feature enables one of the following to be selected as the terminating character which follows data from the plotter to the host:</p> <ul style="list-style-type: none"> ● No GIN mode Terminator Character ● CR GIN mode Terminator Character ● CR and EOT GIN mode Terminating Characters. 	Device Address	This switch-selectable feature sets the plotter's device address. ASCII characters A, B, C, or D can be selected. This enables the plotter to be chained together with other peripherals in the same RS-232-C system. Each peripheral can then be selectively addressed by the host.
		Data Transfer Rate (Baud)	This switch option allows selection of data transfer rates of 110, 150, 300, 600, or 1200 baud.

OPERATION

Selecting RS-232-C Features Using Rear Panel Switches

Two methods are provided in this section: a logic tree method and a tabular method. The operator/programmer can choose either depending upon preference.

Using the Logic Tree Method. Figure 2-21 is a logic tree illustration of the RS-232-C features (selectable via the rear panel switches). For each switch, first determine what features your system requires, then simply read down through the logic tree until you arrive at a number. Set each switch accordingly.

For example, assume that you want to configure the standard 4662 Plotter as follows:

- Normal Plotting Speed
- No Terminal Mute Disable (terminal does not receive commands intended for the plotter)
- Copy Mode (matches plotter's X- and Y- axes to TEKTRONIX 4010 Series Terminals)
- CR (carriage return) implies CR plus LF (Line Feed)
- DEL implies LOY (low order Y)(or No DEL Ignore)
- GIN Terminator is CR
- Two Stop Bits
- No Parity Check
- Device Address is A
- 1200 Baud

Switch A

Refer to the diagram of Switch A in Figure 2-22. Beginning at the point labeled Start, follow the shaded line to the left to select Normal Plotting Speed (no Low Plotting Speed), No Terminal Mute Disable, Copy Mode, and CR implies CR plus LF. Notice that the shaded line ends at 3. Set Switch A to 3.

Switch B

In a similar manner, refer to the diagram of Switch B in Figure 2-22 and begin at the point labeled Start. Follow the shaded line to the left to select no DEL Ignore (this means the plotter accepts DEL as Low Order Y coordinate characters), GIN Terminator character of CR, and One Stop Bit. Notice that the shaded line ended at 2. Set Switch B to 2.

Switch C

From the Start point in the diagram of Switch C (Figure 2-22), follow the shaded line to the left to select No Parity Checks and a Device Address of A. Notice that the shaded line ended at 2 (or 6 if the Device Address had been B). Set Switch C to 2.

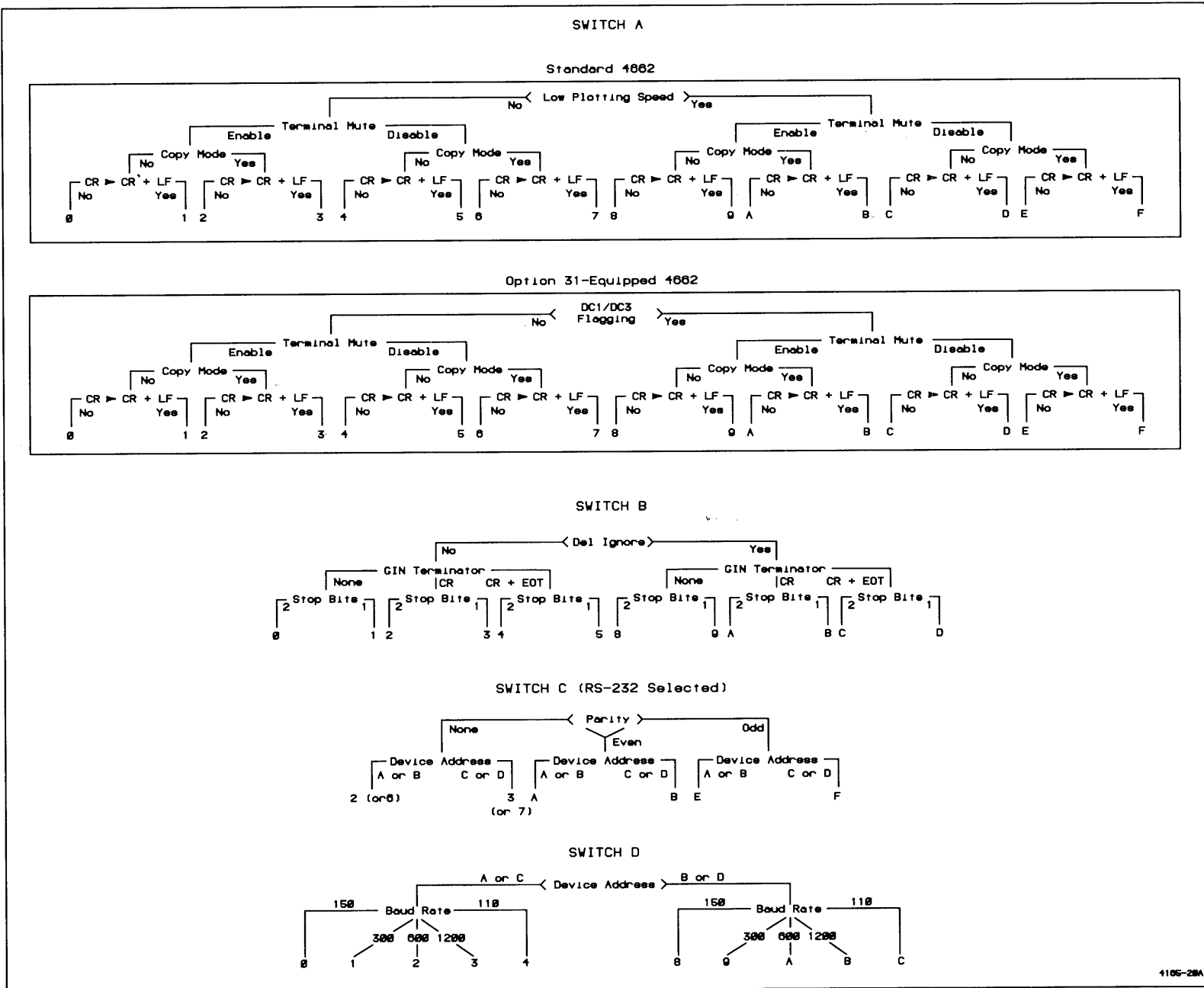
Switch D

Finally, from the Start point of the diagram of Switch D (Figure 2-22), follow the shaded line to the left (since this example has a Device Address of A) to select a Baud Rate of 1200. Notice that the shaded line ended at 3. Set Switch D to 3.

Summary

In summary, the proper switch settings for this example is 3-2-2-3 (A=3, B=2, C=2, and D=3). These rear panel switch settings are set using a small-blade screwdriver with the plotter's power OFF. Then, when the plotter's power is turned back on, the plotter will be automatically configured to the desired operating parameters listed at the beginning of this example.

Figure 2-21. RS-232-C Rear Panel Switchable Option Settings.



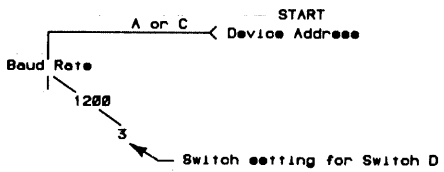
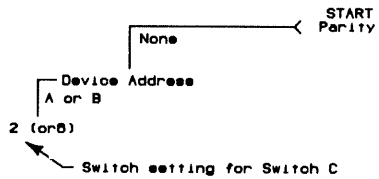
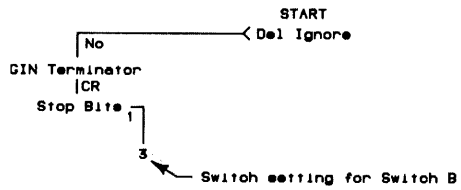
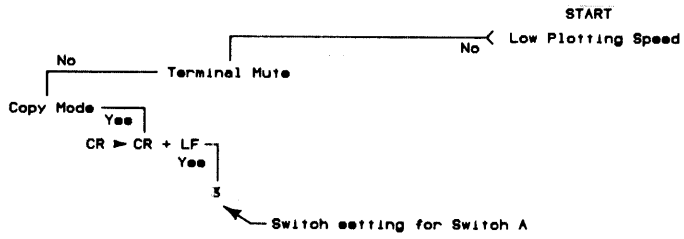


Figure 2-22. Example for Determining Rear Panel Switch Positions (RS-232-C).

Using the Tabular Method. Table 2-2 tabulates the set of RS-232-C features selectable via the rear panel switches. Note that the table contains four major parts, a part for each of the four switches.

NOTE

The last three columns (Desired Selection Assignment, Sum of Weighted Values, and Switch Setting) in Table 2-2 are left blank. By filling in the first two blank columns (in pencil), the operator can determine the appropriate switch settings. An example situation, including a completed table, follows the discussion on how to use the RS-232-C Switchable Option Settings Table.

Table 2-2 shows that each of the four rear panel switches encoded four bits of information to the plotter's internal electronics. In most cases, each bit (or a combination of several bits) controls one of the switchable options or configurations. Table 2-2 also shows the assignment (0 or 1) for each bit to indicate the presence or absence of that switchable option or configuration. Usually, a 1 means that that operating parameter is selected, or that option is "on." Since each bit is also weighted (1, 2, 4, 8), we can simply add up the four weighted bits that have an assignment of 1 to determine a switch setting. The actual switch setting is the sum total of the four weighted bits with an assignment of 1, expressed in hexadecimal. Table 2-4 is provided as an aid in determining the switch setting (hexadecimal value) for a particular sum.

In the same manner, the settings for the other three rear panel switches are determined.

Example

Assume you want to configure the standard plotter as follows:

- Slow Plotting Speed
- No Terminal Mute Disable (terminal does not receive commands intended for the plotter)
- No Copy Mode
- CR (carriage return) implies CR + Line Feed (LF)
- DEL implies LOY (low order Y)(or No DEL Ignore)
- GIN Terminator is CR
- Two Stop Bits
- Even Parity Check
- Device Address is A
- 1200 Baud

Refer to Table 2-3 and to the Desired Selection Assignment column and the Sum of Weighted Values column for each Switch (A, B, C, and D).

OPERATION

**Table 2-2
RS-232-C SWITCHABLE OPTION SETTINGS**

Switch	Bit	Control Function	Assignment	Weighted Value	Desired Selection Assignment	Sum of Weighted Values	Switch Setting
A	4	Low Plotting Speed (Standard 4662) or DC1/DC3 Flagging (4662 with Option 31)	1 = YES 0 = NO	8			
	3	Terminal Mute	1 = ON 0 = OFF	4			
	2	Copy Mode	1 = Yes 0 = No	2			
	1	CR Effect	1=CR gives CR + LF 0=CR only	1			
B	4	DEL Interpret	1=DEL Ignore 0=DEL (LOY)	8			
	3	GIN Terminator	00 = None 01 = CR	4			
	2		11=CR+EOI	2			
	1	Stop Bits	0 = 2 stop bits 1 = 1 stop bit	1			
C	4	Parity	00=None 01=None	8			
	3		10=Even 11=Odd					4
	2	RS-232-C Interface Select	1 = Yes 0 = No	2			
	1	Device Address	0=A or B 1=C or D	1			
D	4	Device Address	0=A or C 1=B or D	8			
	3	Data Transfer Rate	000=150 baud 001=300 baud	4			
	2		010=600 baud 011=1200 baud					2
	1		100=110 baud	1			

Table 2-3
RS-232-C SWITCHABLE OPTION SETTINGS EXAMPLE

Switch	Bit	Control Function	Assignment	Weighted Value	Desired Selection Assignment	Sum of Weighted Values	Switch Setting
A	4	Low Plotting Speed (Standard 4662) or DC1/DC3 Flagging (4662 with Option 31)	1 = YES 0 = NO	8	1	8	9
	3	Terminal Mute	1 = ON 0 = OFF	4	0	0	
	2	Copy Mode	1 = Yes 0 = No	2	0	0	
	1	CR Effect	1=CR gives CR + LF 0=CR only	1	1	1	
B	4	DEL Interpret	1=DEL Ignore 0=DEL (LOY)	8	0	0	2
	3	GIN Terminator	00 = None 01 = CR	4	0	0	
	2		11 = CR + EOT	2	1	2	
	1	Stop Bits	0 = 2 stop bits 1 = 1 stop bit	1	0	0	
C	4	Parity	00=None 01=None 10=Even 11=Odd	8	1	8	10
	3			4	0	0	
	2	RS-232-C Interface Select	1 = Yes 0 = No	2	1	2	
	1	Device Address	0=A or B 1=C or D	1	0	0	
D	4	Device Address	0=A or C 1=B or D	8	0	0	3
	3	Data Transfer Rate	000=150 baud 001=300 baud 010=600 baud 011=1200 baud 100=110 baud	4	0	0	
	2			2	1	2	
	1			1	1	1	

OPERATION

Notice that for Switch A, a 1 is entered in the Desired Selection Assignment column for Bits 4 and 1 (Low Plotting Speed and CR implies CR + LF). The weighted value of Bit 4 is 8 (shown in the Sum of Weighted Value column) and for Bit 1 is 1. Bits 2 and 3 are not assigned a 1 because both options (Terminal Mute Disable and Copy Mode) are either off or no.

The sum of the weighted values for Bits 1 and 4 is 9. Table 2-4 shows that with the sum of the weighted value of bits, the correct setting for rear panel Switch A is 9.

In a similar manner, Bit 2 (GIN Terminator is CR) for Switch B is assigned a 1 in the Desired Selection Assignment column. The weighted value of this bit is 2. Table 2-4 indicates that the correct setting for the rear panel Switch B is 2.

Bits 4 and 2 (Parity and RS-232-C Interface Select) for Switch C are assigned a 1. The weighted values of these two bits is 8 and 2 and their sum, therefore, is 10. Table 2-4 indicates that the correct setting for the rear panel Switch C is A.

Bits 1 and 2 (Data Transfer Rate) for Switch D are assigned a 1. The weighted values of these two bits is 2 and 1 and their sum, therefore, is 3. Table 2-4 indicates that the correct setting for the rear panel Switch D is 3.

In summary, for this example, the correct rear panel switch settings would be A=9, B=2, C=A, and D=3 (9-3-A-3).

GPIB SWITCH SETTINGS

The switch-selectable features that relate to the GPIB interface requirements are described in Table 2-6.

Selecting GPIB Features Using Rear Panel Switches

Two methods are provided for determining the proper rear panel switch settings: a logic tree method and a tabular method. The operator/programmer can use either one depending upon preference.

Using the Logic Tree Method. Figure 2-23 is a logic tree illustration of the GPIB features selectable via the rear panel switches. To use the logic tree, simply determine what feature set your system requires, then read down through the logic tree for each switch until you arrive at a number. Set each switch accordingly.

Table 2-4

SWITCH SETTINGS BASED ON SUM OF BITS

Sum of Weighted Value of Bits	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Switch Setting	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Common RS-232-C Rear Panel Switch Settings. Table 2-5 is a table of commonly used rear panel switch settings for RS-232-C operation.

Table 2-5

COMMONLY USED REAR PANEL SWITCH SETTINGS FOR RS-232-C

A	Setting			Description
	B	C	D	
1	2	2	1	This is the normal factory RS-232-C setting. This setting provides Normal Plotting Speed (standard plotter). No Terminal Mute Disable, No Copy Mode, CR implies CR + LF, DEL implies LOY, CR GIN Terminator, 2 Stop Bits, No Parity Check, Device Address of A, and 300 Baud. Option 31 equipped plotters have no DC1/DC3 flagging and plotting speed is determined by front panel switches.
0	2	2	1	Same as 1-2-2-1, except CR implies only CR.
1	2	2	3	Same as 1-2-2-1, except 1200 Baud.
1	2	6	1	Same as 1-2-2-1, except a Device Address of B.
1	2	A	1	Same as 1-2-2-1, except Even Parity.
1	2	E	1	Same as 1-2-2-1, except Odd Parity.
1	3	2	1	Same as 1-2-2-1, except 1 Stop Bit.
2	2	2	1	Same as 1-2-2-1, except Copy Mode and CR implies only CR.
2	3	2	1	Same as 1-2-2-1, except Copy Mode, 2 Stop Bits, and CR implies only CR.
3	2	2	1	Same as 1-2-2-1, except Plotter is in Copy Mode.
3	3	2	1	Same as 1-2-2-1, except Copy Mode and 2 Stop Bits.
9	2	2	1	Same as 1-2-2-1, except Slow Plotting Speed (standard plotter). Option 31 equipped plotters have DC1/DC3 flagging and plotting speed is determined by front panel switches.

For example, assume that you want to configure the standard plotter as follows:

- Normal Plotting Speed
- No Talk Only
- No Listen Only
- CR (Carriage Return) Implies CR + Line Feed
- Able to accept DAB Commands
- Able to accept MSA Commands
- Device Primary Address is 1
- No 4020 Series or 4014/4015/4016 terminal with Option 5

(continued on page 2-50)

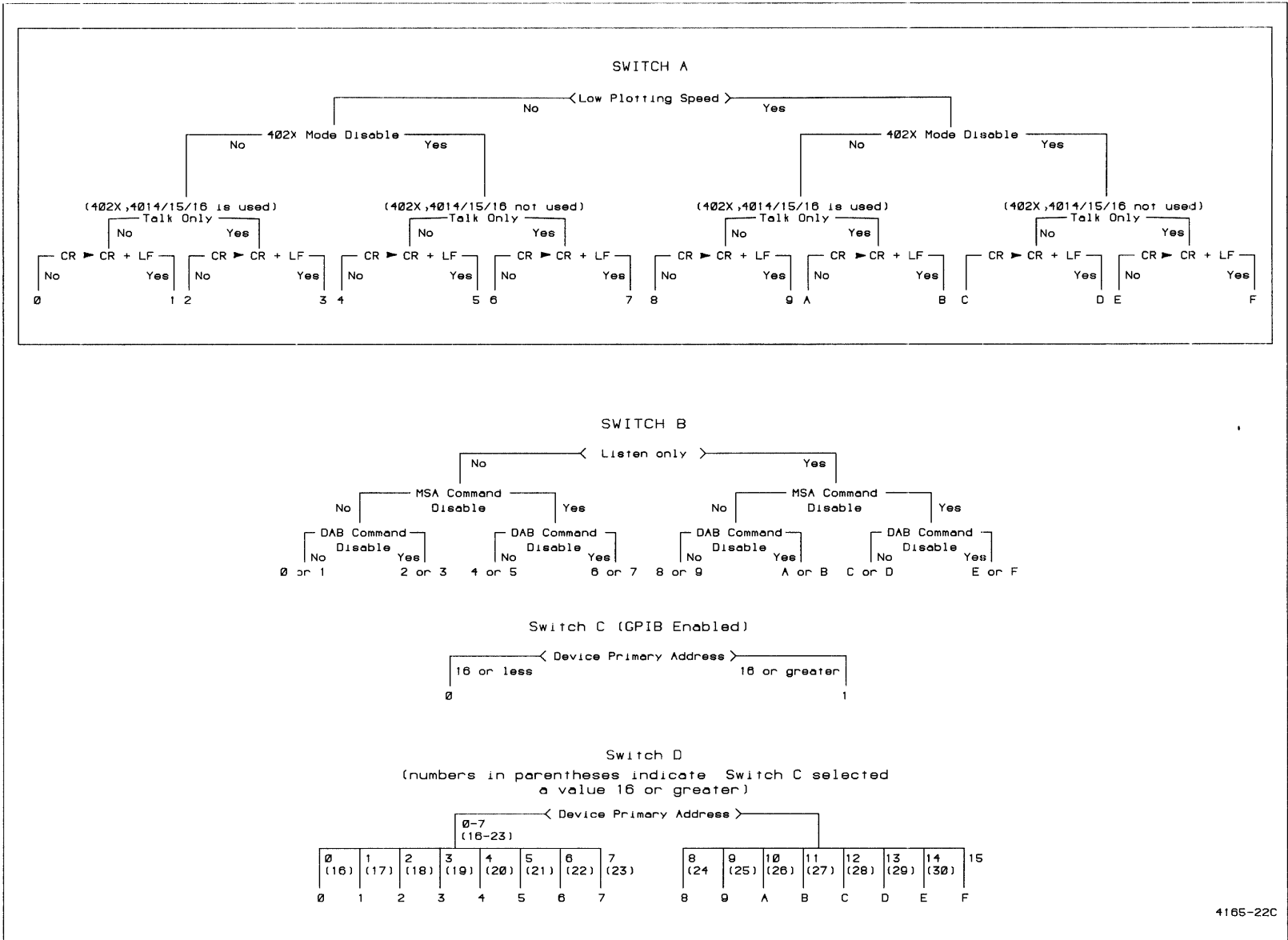
NOTE

Plotters serial numbered lower than B080000 may not be equipped with the 4020 Series Mode Disable function. However, the rear-panel switch information in Figure 2-23 is applicable to such plotters. Connecting the plotter to certain products (i.e., 4909, 4052A, 4054A, 4052F39, and 4054F39) require the 4020 Series Mode Disable selection for communication over the GPIB. If this selection is needed on plotters not equipped with the 4020 Series Mode Disable (or if you do not know if your plotter is so equipped), contact your local Tektronix Field Office.

**Table 2-6
GPIB SELECTABLE PARAMETER DESCRIPTIONS**

Parameter	Description	Parameter	Description
Low Plotting Speed (Standard, non-Option 31 equipped plotters only)	This selectable feature allows the plotter to use custom pens, whose ink may not flow as rapidly as the standard pens. At low plotting speed, the plotter draws vectors at a much slower speed than at standard (fast) speed.	DAB Command Disable	This switch option allows selective disabling and enabling of GPIB DAB (Command Data Byte) commands. The plotter must be set to respond to either MSA or DAB commands (or both), depending upon system requirements.
Talk Only	With Talk Only selected, the plotter will not plot or print alphanumeric characters. An example might be a GPIB system with no controller where the plotter provides digitizing information to another device for storage.	GPIB Interface Select	This option must be set when the GPIB is in use. If not, the plotter is logically disconnected from the GPIB bus.
CR (Carriage Return) Effect	This option setting determines whether the plotter will respond to an ASCII CR as a Carriage Return only, or whether CR also generates a Line Feed (CR implies CR + LF).	Primary Address	The Primary Address (from 0 to 30) is used to address the plotter for talk and listen functions (MTA, My Talk Address; and MLA, My Listen Address) is set by this combination of switch bits. The selectable address feature allows several GPIB devices to be connected to the bus and then be selectively addressed by the controller.
Listen Only	With Listen Only selected, the plotter will not provide digitizing (GIN) output. This mode might be used to produce plots on a GPIB system with no controller. DAB type commands must be selected.	4020 Series Mode Disable	This option is NOT selected when 4020 Series terminals (or 4014/4015/4016 terminals with Option 5) are used. This switch configures the plotter to interface properly with these terminals.
MSA Command Disable	This switch option allows selective disabling and enabling of GPIB MSA (My Secondary Address) commands. MSA commands are normally used with the TEKTRONIX 4050 Series Graphic System. Disabling the MSA commands allows the plotter to conform strictly to the talk and listen functions of the GPIB standard IEEE-488.		

Figure 2-23. GPIB Rear Panel Switchable Option Settings.



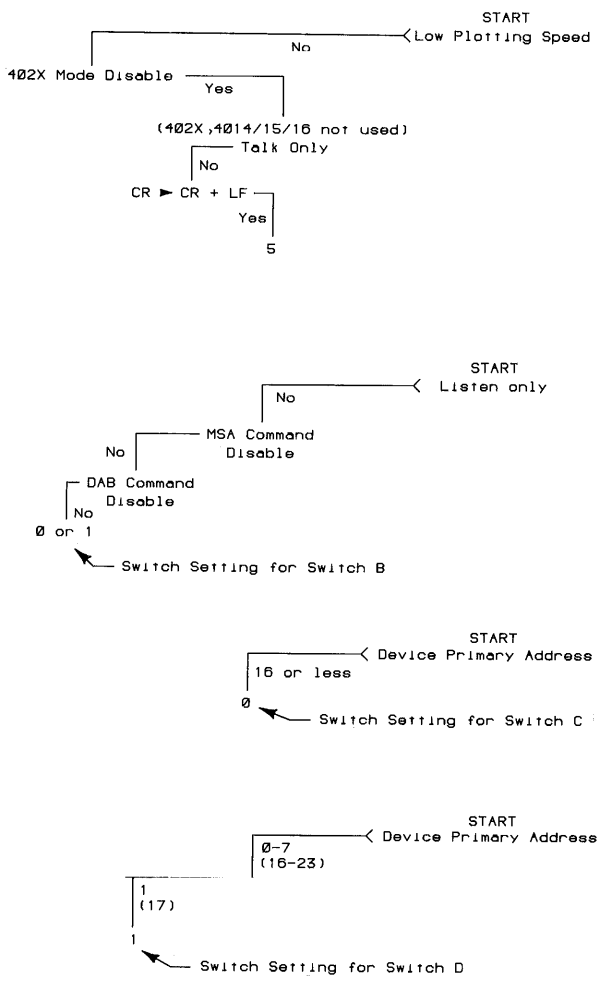


Figure 2-24. Example for Determining Rear Panel Switch Settings (GP1B).

OPERATION

Switch A

Refer to the diagram of Switch A in Figure 2-24. Beginning at the point labeled Start, follow the shaded line to the left to select Normal Plotting Speed (no Low Plotting Speed), 4020 Series Mode Disable, No Talk Only, and CR (Carriage Return) implies CR + Line Feed. Notice that the shaded line ends at a number five. Five is the correct setting for Switch A.

Switch B

In a similar manner, refer to the diagram of Switch B (Figure 2-24) and begin at the point labeled Start. Follow the shaded line to the left to select No Listen Only, No MSA Command Disable (this permits the plotter to accept MSA type commands), and No DAB Command Disable (this also permits the plotter to accept DAB type commands). Notice that the shaded line ends at either 0 or 1. Either of these numbers, zero or one, is the correct setting for Switch B.

Switch C

From the Start point in the diagram of Switch C, follow the shaded line to the left since the Device Primary Address is 16 or less (in this case, it is one). Notice that the shaded line ends at a number of zero. Zero is the correct setting for Switch C.

Switch D

Finally, from the Start point in the diagram of Switch D, follow the shaded line to the left; left, because our Device Primary Address of one falls in the range of 0-7. Notice that the shaded line ends at a number of one. One is the correct setting for Switch D.

Summary

In summary, the proper rear panel switch settings for this example are 5-0-0-1 (or 5-1-0-1) or A= 5, B= 0, C= 0, and D= 1. These rear panel switches are set using a small-blade screwdriver with the plotter's power OFF. Then, when the plotter's power is turned back on, the plotter will be automatically configured to the desired operating parameters listed at the beginning of this example.

Using the Tabular Method. Table 2-7 tabulates the set of GPIB features selected via the rear panel switches. Note that the table contains four major parts, one for each of the four switches.

NOTE

The last three columns in Table 2-7 for each of the four switches (Desired Selection Assignment, Sum of Weighted Values, and Switch Settings) are left blank for use by a plotter operator (in pencil). Refer to Table 2-3, an example of how to use the tabular method.

Table 2-7
GPIB SWITCHABLE OPTION SETTINGS

Switch	Bit	Control Function	Assignment	Weighted Value	Desired Selection Assignment	Sum of Weighted Values	Switch Setting
A	4	Low Plotting Speed (Standard 4662) or DC1/DC3 Flagging (4662 with Option 31)	1 = YES 0 = NO	8			
	3	4020 Series Mode Disable	1 = Yes 0 = No	4			
	2	Talk Only	1 = Yes 0 = No	2			
	1	CR Effect	1 = CR gives CR + LF 0 = CR only	1			
B	4	Listen Only	1 = YES 0 = No	8			
	3	MSA Command Disable	1 = Yes 0 = No	4			
	2	DAB Command Disable	1 = Yes 0 = No	2			
	1	Not Used		1			
C	4	Not Used		8			
	3	Not Used		4			
	2	GPIB Interface Select	1 = No 0 = Yes	2			
	1	Primary Address	0 = 0 to 15 1 = 16 to 30	1			
D	4			8			
	3	Primary	0 to 15	4			
	2	Address		2			
	1			1			

OPERATION

Common GPIB Switch Settings. Table 2-8 is a table of commonly used rear panel switch settings for GPIB operation.

**Table 2-8
COMMONLY USED REAR PANEL SWITCH SETTINGS
FOR GPIB**

A	Setting			D	Description
	B	C	D		
5	0	0	1		This is the normal factory GPIB setting. This setting provides Normal Plotting Speed (standard plotter), No Talk Only, No Listen Only, CR (Carriage Return) implies CR + Line Feed), accepts both MSA and DAB commands, and a Device Primary Address of 1. Plotters equipped with Option 31 have their plotting speed determined by front panel switches.
5	1	0	1		Same as 5-0-0-1.
4	0	0	1		Same as 5-0-0-1, except CR implies CR only (no Line Feed).
5	8	0	1		Same as 5-0-0-1, except Listen Only.
7	0	0	1		Same as 5-0-0-1, except Talk Only.
B	0	0	1		Same as 5-0-0-1, except Slow Plotting Speed (standard plotter). Plotters equipped with Option 31 have their plotting speed determined by front panel switches.
1	0	0	1		Same as 5-0-0-1 except for use with 4020 Series and 4014/4015/4016 terminals with Option 5.
0	0	0	1		Same as 4-0-0-1 except for use with 4020 Series and 4014/4015/4016 terminals with Option 5.

REMOVING AND CHANGING PAPER

1. With the plotter's power on, press the LOAD switch to its locked-down position. The pen will lift (if down) and move to the Load position (near the upper-right corner), and the electrostatic paper hold-down is disengaged.
2. Carefully lift (tilt) the pen holder back to either the 45- or 90-degree detent position.
3. Remove any paper present on the platen.
4. Position a new piece of paper on the platen (plotting surface). The left edge of the paper, regardless of its size, should be positioned even with the left edge of the platen. The bottom edge of the paper should lie evenly along the paper guide (see Figure 2-25).
5. Press the LOAD switch to release it from its locked-down position and activate the electrostatic paper hold-down. If "bubbles" appear between the paper and the platen, smooth the paper across the surface with a clean, lint-free industrial wipe, or drafting brush.

NOTE

Never use your hand to smooth the paper as body oils will be transferred to the paper and reduce the acceptance of ink.

6. Lower the pen to the "ready to plot" position (pen tip is just above the surface of the paper).

This completes the paper loading procedure for the plotter.

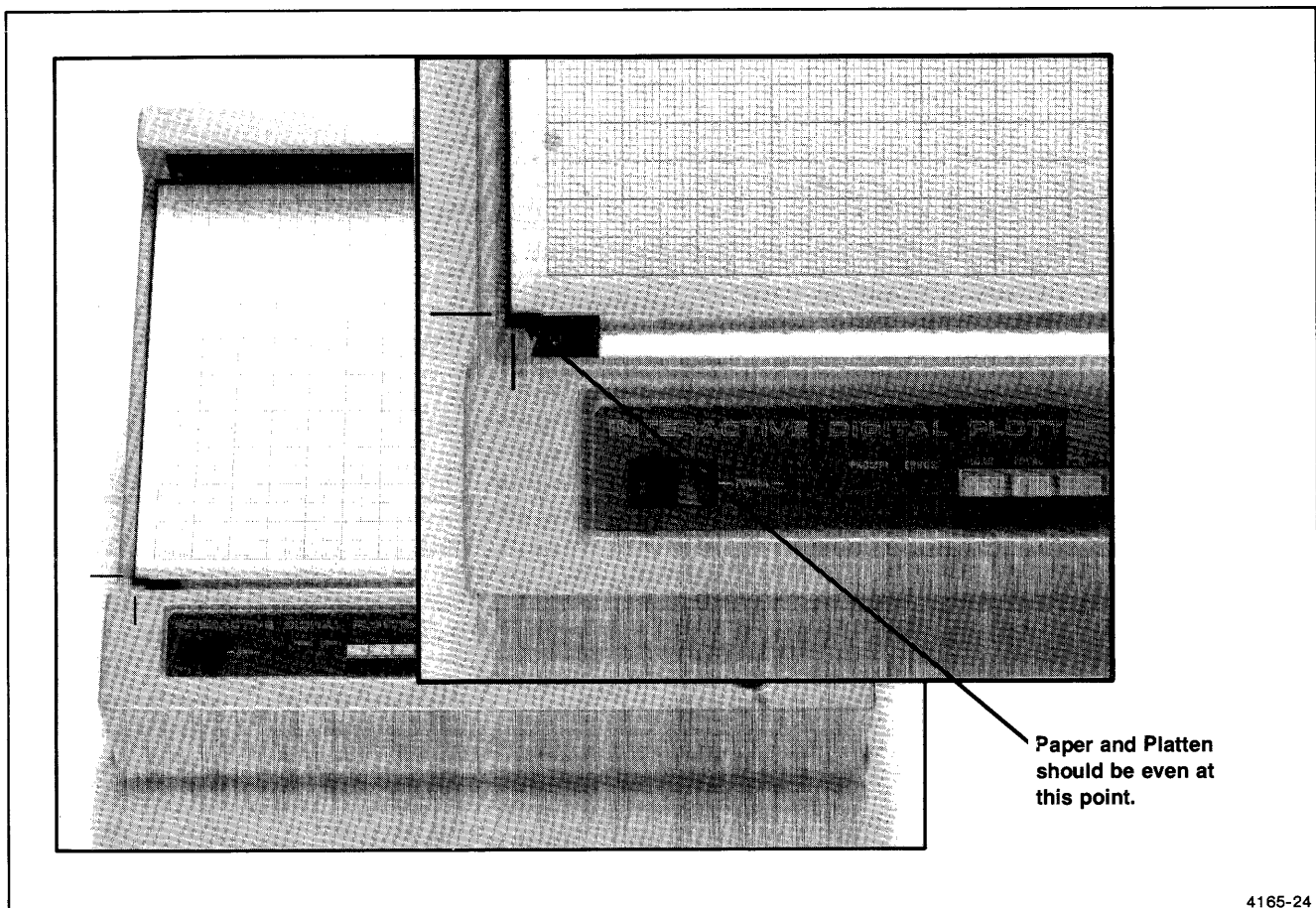


Figure 2-25. Paper Position on the Platen.

REMOVING AND INSTALLING PENS

STANDARD 4662

NOTE

For installation of wet ink pens, refer to Appendix E.

1. With the plotter's power on, press the LOAD switch to its locked-down position to move the pen to the Load position near the upper-right corner of the platen (also disengages the electrostatic paper hold-down circuits).
2. Carefully lift (tilt) the pen holder back to either the 45- or 90-degree detent position (see Figure 2-26). This will avoid accidentally marking the plotting surface with the pen during the following steps.
3. Remove the pen (if one is installed) by turning it one-quarter turn counterclockwise. This will align the tabs on the pen with slots on the pen holder (see Figure 2-27).
4. Lift the pen out of the pen holder.
5. Place the pen cap over the tip to prevent ink from drying out during storage.
6. To install a new pen, align the tabs on the pen with the slots on the pen holder and put the pen into the pen holder. Turn the pen one-quarter turn clockwise to lock it into place (see Figure 2-27).

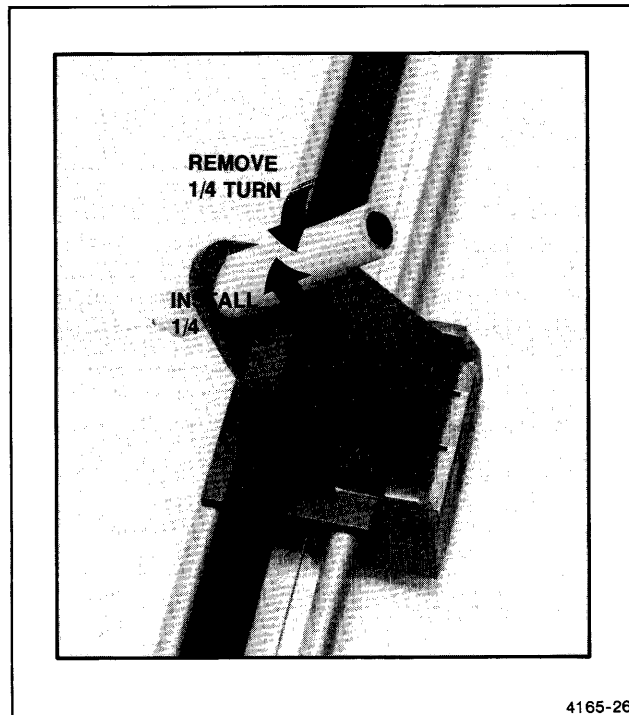


Figure 2-27. Installing and Removing a Pen.

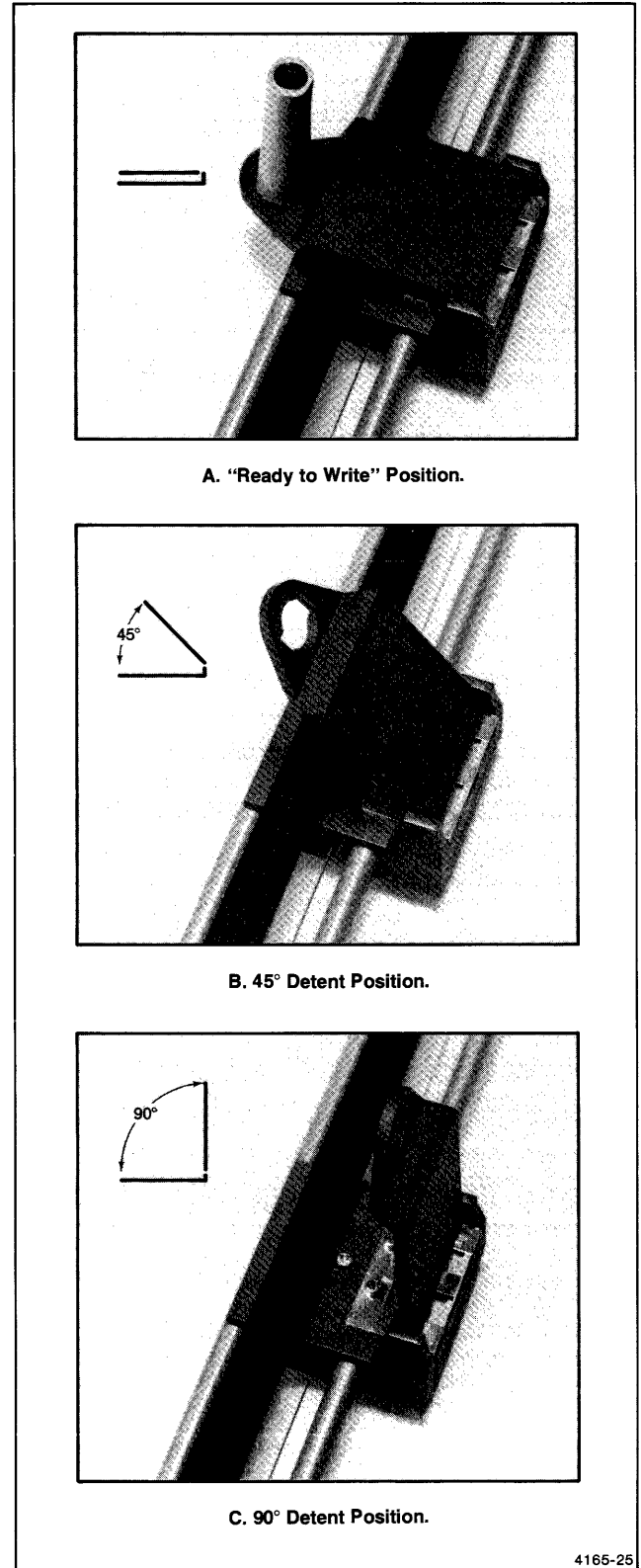


Figure 2-26. Pen Holder Detent Positions.

OPERATION

7. Remove the pen's protective cap and lower the pen to the "ready to plot" position (pen tip is just above the paper).
8. Press the LOAD switch to release it from its locked-down position to engage the electrostatic paper hold-down and enable the plotter to draw.

This completes the pen installation procedure for the standard 4662 Plotter.

4662 WITH OPTION 31 (MULTIPLE PENS)

With Power On

1. With the plotter's power on, press the LOAD switch to its locked-down position to move the pen to the Load position near the upper-right corner of the platen (also disengages the electrostatic paper hold-down circuits).



Do not attempt to manually rotate the pen turret by any means other than the Rotary Pen Turret Knob. To do so will cause misalignment of the knob with the pen turret, preventing pen turret closure and pen capping. To correct such a mechanical misalignment, turn the Rotary Pen Turret Knob completely clockwise, then slowly counterclockwise to the CAP position.

2. Press the PEN CONTROL 6 switch. The rotary pen turret will rotate Pen Positions 1 through 4 over the platen.



The pens are not removed or installed from above. Instead, they slide into the pen holder "claws" from the side (see Figure 2-28).

3. Remove any undesired pens from Pen Positions 1 through 4 by sliding the pens and their pen adapters out of the pen holders, as shown in Figure 2-28.
4. Remove the pen caps and thread the pens (up to eight wet-ink, hard-nib, or felt-tip) into the pen adapters (as shown in Figure 2-28). Thread the pen into the adapter until the pen "seats" and **do not over-tighten**.

5. Place four pens in any desired order in Pen Positions 1 through 4 (wet-ink, hard-nib, and felt-tip pens can be placed in any order). To do this, pens are inserted into the pen holders as shown in Figure 2-28. Use care so that the pens do not mark the plotting surface during this operation. When the pen is correctly installed, the top of the pen holder should be even with the top of the pen adapter.

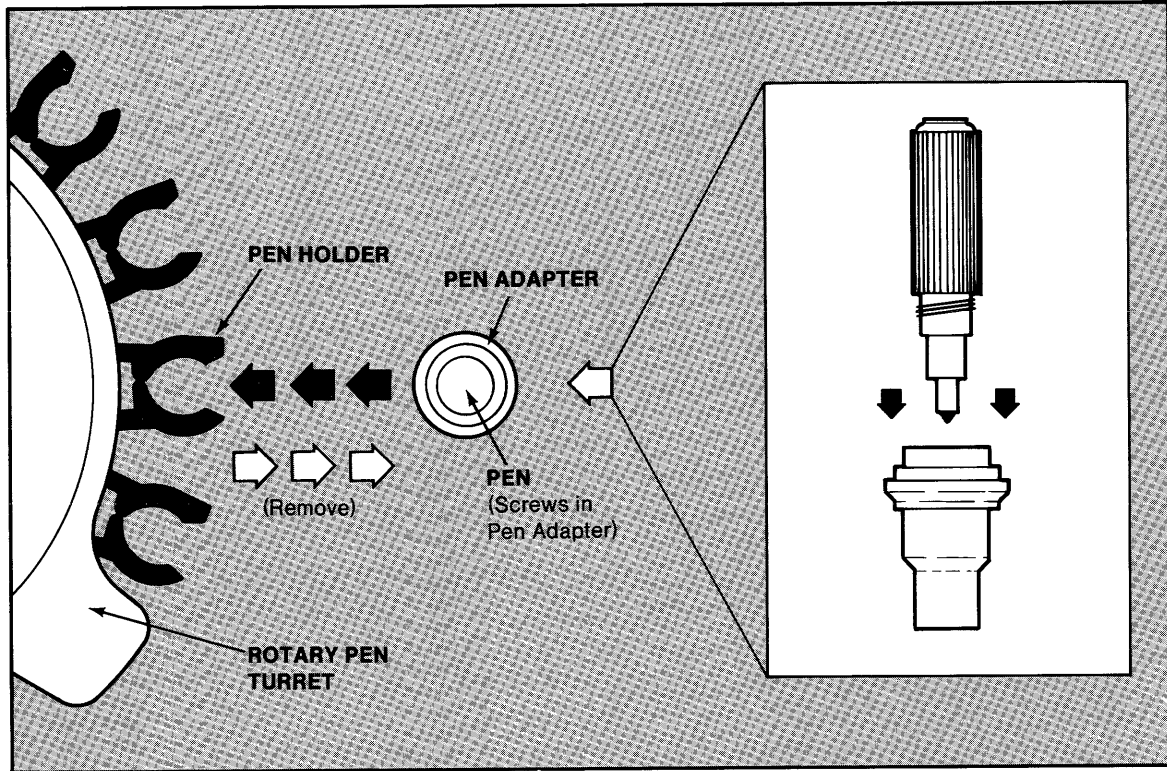
NOTE

The order of the pens is based on what pens are required by the plot (program). The operator must know the following:

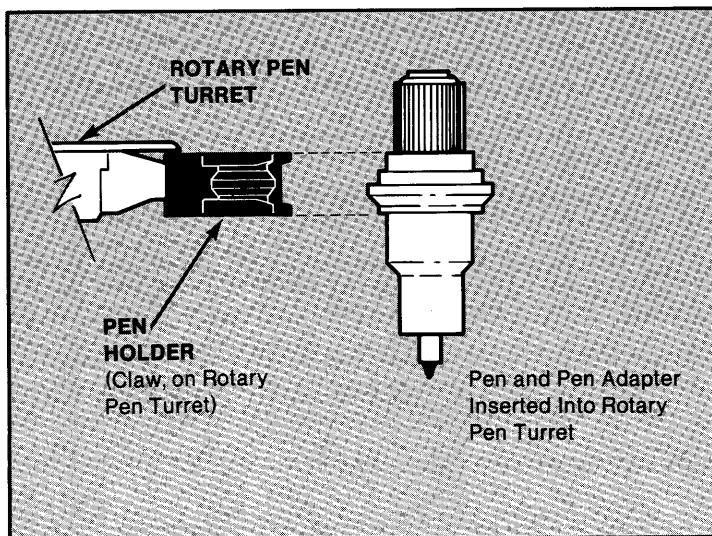
- *Type of paper (or film) needed.*
- *Type of pens needed.*
- *Positions of pens in the rotary pen turret.*

6. Press the PEN CONTROL 7 switch. The rotary pen turret will rotate such that Pen Positions 5 through 8 are over the platen.
7. Repeat Step 3 to remove any undesired pens from Pen Positions 5 through 8 (see Figure 2-28).
8. Repeat Step 5 to install pens in Pen Positions 5 through 8.
9. Press the PEN SELECTION 8 switch. The rotary pen turret will rotate back to the stored position.
10. If the rotary pen turret does not have at least one empty position, remove any pen from the pen carriage. Remove the pen from the pen carriage in the same manner as you would remove the pens in the rotary pen turret. If there is an empty position in the rotary pen turret, ignore this step and proceed to Steps 11 and 12.
11. Press the LOAD switch to release it from its locked-down position to engage the electrostatic paper hold-down and enable the plotter to draw.
12. If there is an undesired pen in the pen carriage and an empty position in the rotary pen turret, press and hold the PEN SELECTION 1 switch until the plotter's bell sounds once (approximately two seconds). The plotter will automatically store the pen in the pen carriage into the first available empty position in the rotary pen turret.

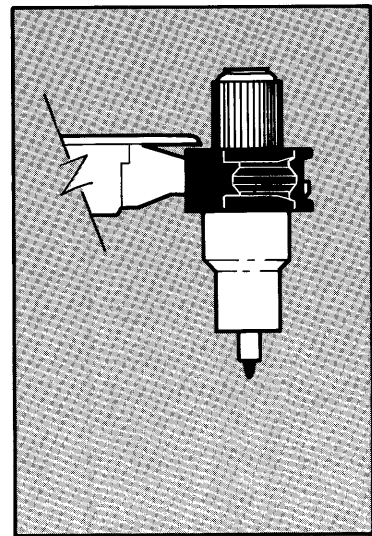
During plot operations, pens can be selected in one of two ways: manually, by pressing the desired PEN SELECTION switch corresponding to the rotary pen position number, or by the host with a Pen Change command (see the 4662 Interactive Digital Plotter Programmer's Reference Manual).



A. Top View.



B. Side View.



C. Correctly Installed.

4165-5

Figure 2-28. Loading and Unloading Pens in Option 31 Equipped Plotters.

OPERATION

With Power Off

The Rotary Pen Turret Knob (shown in Figure 2-29) allows the operator to manually rotate the pen turret; thus, the operator can add or remove pens as needed when the power is off. The knob has nearly 360 degrees of movement.

In the CAP position, the pen tips are covered (capped). This keeps the ink from drying when the pens are not being used and thus extends pen life. When the knob is rotated clockwise, the pen tips are uncapped. Further clockwise rotation of the Rotary Pen Turret Knob causes the pen turret to move accordingly, thus moving the pens out over the platen for operator access.

To return the pen turret to the stored (pen capped) position, slowly rotate the knob counterclockwise until the knob's index points to the CAP position.

CAUTION

Do not attempt to manually rotate the pen turret by any means other than the rotary pen turret knob. To do so will cause misalignment of the knob with the rotary pen turret, preventing pen turret closure and pen capping. To correct such a misalignment, turn the turret knob completely clockwise, then slowly counterclockwise to the CAP position.

NOTE

Do not manually rotate the rotary pen turret when the plotter is busy plotting. To do so causes all plotter pen motion to cease. (This prevents the pen carriage from striking the rotary pen turret.) In the event the pen turret knob is accidentally rotated while the plotter is busy drawing, the plotter automatically resets in the same manner as when the POWER switch is turned on.

1. Rotate the Rotary Pen Turret Knob (see Figure 2-29) clockwise from the CAP to the UNCAP position.
2. Continue to rotate the Rotary Pen Turret Knob clockwise until Pen Positions 1 through 4 are over the platen.

CAUTION

The pens are not removed or installed from above. Instead, they slide into the pen holder "claws" from the side (see Figure 2-28).

3. Remove any undesired pens from Pen Positions 1 through 4 by sliding the pens and their pen adapters out of the pen holders as shown in Figure 2-28.
4. Remove the pen caps and thread the pens (up to eight wet-ink, hard-nib, or felt-tip) into the pen adapters. Thread the pen into the adapter until the pen "seats" and **do not overtighten**.
5. Place four pens in any desired order in Pen Positions 1 through 4 (wet-ink, hard-nib, and felt-tip pens can be placed in any order). To do this, insert the pens into the pen holders as shown in Figure 2-28. Use care so that the pens do not mark the plotting surface during this operation. The top of the pen holder should be even with the top of the pen adapter when the pen is correctly installed.

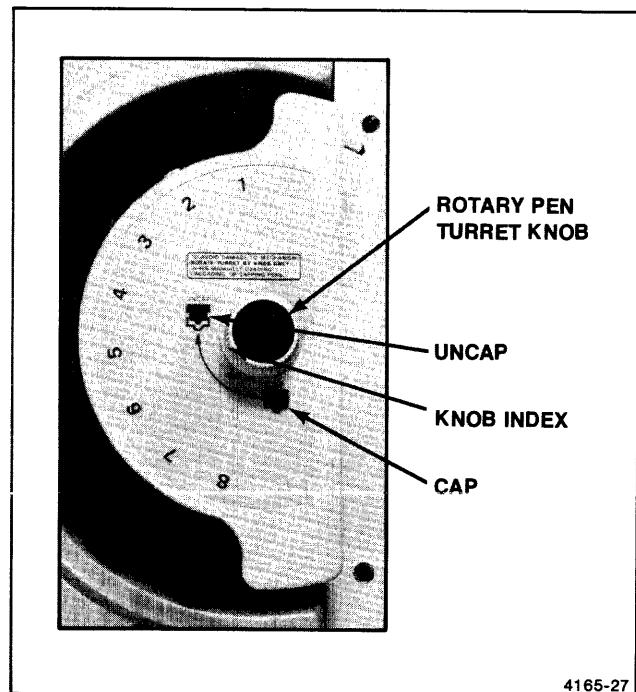


Figure 2-29. Rotary Pen Turret Knob.

NOTE

The order of pens is based on what pens are required by the plot (program). The operator must know the following:

- *Type of paper (or film) needed.*
 - *Type of pens needed.*
 - *Positions of pens in the rotary pen turret.*
6. Rotate the Rotary Pen Turret Knob further clockwise so that Pen Positions 5 through 8 are over the platen.
 7. Repeat Step 3 to remove any undesired pens from Pen Positions 5 through 8 (see Figure 2-28).
 8. Repeat Step 5 to install pens in Pen Positions 5 through 8.
 9. Rotate the Rotary Pen Turret Knob counterclockwise until the knob's index points to CAP.

NOTE

The Rotary Pen Turret Knob continues to turn 90 degrees from the UNCAP to the CAP position with no rotation of the rotary pen turret.

10. Remove any undesired pen from the pen carriage unless the plotter is to be powered-up shortly and there is at least one empty position in the rotary pen turret.

The plotter can now be powered up. During plotting operations, pens can be selected in one of two ways: manually, by pressing the desired PEN CONTROL switch that corresponds to the rotary pen turret pen position number, or by the host with a Pen Change command (see the 4662 Interactive Digital Plotter Programmer's Reference Manual).

MEDIA (PAPER OR FILM) AND PENS

The 4662 Plotter is designed to draw with a variety of pens on a variety of media (different types of paper, polyester or acetate films, etc.). The following descriptions of papers and films and types of pens available will aid the operator in choosing the proper pen and media for a particular plotting operation.

All accessories or supplies (paper, pens, etc.) discussed in this section are listed in Appendix D (Specifications) and may be purchased directly from Tektronix.

Media

The 4662 uses medium, translucent-bond, general-purpose sulphite paper. Sulphite paper has a smooth surface that reduces the chance of clogging pens.

Sulphite paper absorbs ink faster than other types of paper, which permits plots at faster speeds. In addition, sulphite paper is one of the least costly media available.

Standard Translucent (Sulphite) Paper. The standard media is a sulphite paper with dimensions of 11x16.5 inches (279x419 mm). It contains 10 grids per inch and comes in boxes of 100 sheets.

Optional Translucent (Sulphite) Paper. There are five optional translucent bond sulphite papers available for the 4662. Each comes in a box containing 100 sheets of 11x16.5-inch paper. The following optional paper types are available:

- Linear with 10x10 grids to the cm
- Semi-log with a 10x3 cycle
- Semi-log with a 10x2 cycle
- Full-log with a 2x3 cycle
- Blank sheet

Transparent Films (Foil or Polyester or Acetate Film). Clear or frosted polyester or acetate "write-on" films can be used to create overhead transparencies. However, Tektronix recommends antistatic polyester film available in preframed sheets for consistent, convenient plots. Be sure to use pens designed for use on film (see the Media and Pen Selection Guide later in this section).

Pens

Introduction. The following material provides information on pens, inks, and pen installation. A Selection Guide, in the form of a quick reference table, shows examples of which pens, media, inks, and plotting speeds to use for a particular plotting task. The Selection Guide is at the end of this section (Table 2-9).

OPERATION

The standard 4662 Plotter uses two different types of pens: fiber-tip and wet-ink. Both of these styles use a quarter-turn twist-lock mount.

Pens for Option 31 equipped plotters must have a thread mount to fit the adapter that attaches to Option 31 (see *Removing and Installing Pens* earlier in this section). In addition to both fiber-tip and wet-ink pens, Option 31 allows you to use a plastic hard-nib pen.

Fiber-tip pens come in three varieties (see Figure 2-30):

- A standard ink fiber-tip pen, which is shipped with the 4662.
- An optional water-soluble ink fiber-tip pen.
- An optional permanent-ink fiber-tip pen.

NOTE

Option 31 equipped plotters use the same types of pens, except they have thread mounts.

Standard Ink Fiber-Tip Pens. The standard ink fiber-tip pen is shipped as a standard accessory with the plotter. It is designed to write on most paper. This pen's line width is not as fine or as controllable as that of wet-ink pens, but it does provide a good quality plot at generally faster speeds than other pens with minimum operator attention. Fiber-tip pens are recommended for area fills.

The standard ink fiber-tip pen comes in black, red, blue, or green ink. Option 31 users can get standard fiber-tip pens in nine colors (in three-pen packages or one of each color in a package). Due to ink properties, line density may vary somewhat from color to color. Standard ink fiber-tip pen colors are identified by a solid color paper dot on the pen top; the color of the paper dot indicates the ink color.

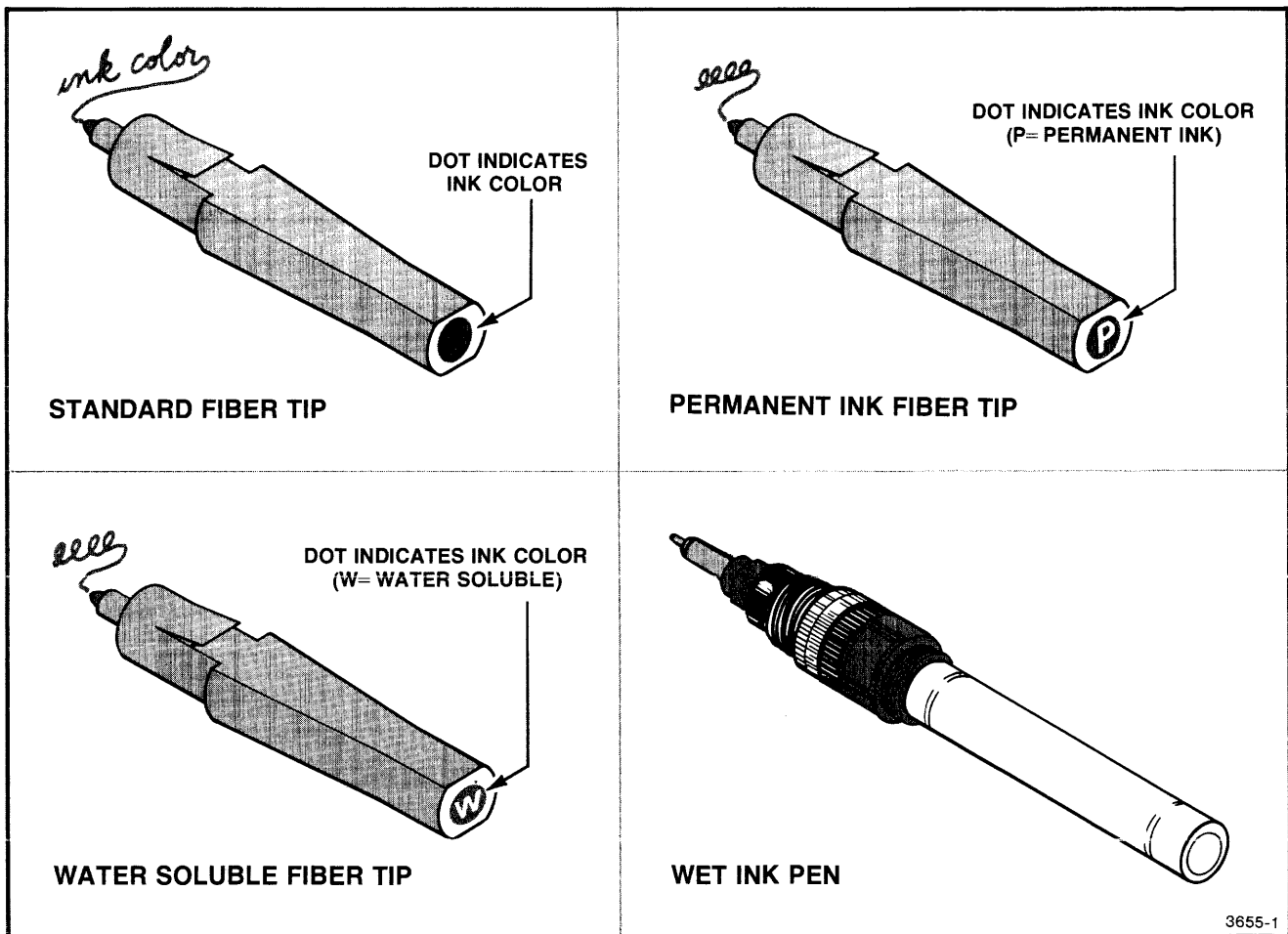


Figure 2-30. 4662 Pens.

Optional Water-Soluble Ink Fiber-Tip Pen.

Water-soluble ink fiber-tip pens write best on the matte and smooth sides of polyester film, as well as on acetates and most paper. Water-soluble ink can be wiped clean from acetates and the smooth side of polyester film with a damp cloth or a cotton-tipped swab; the pen may leave some ghosting (residual ink) on the matte side. Water-soluble ink cannot be removed from paper media. This pen provides a good quality plot on most media with a minimum of operator attention.

Water-soluble ink fiber-tip pens are available in black, brown, red, orange, yellow, green, blue, purple, or magenta inks. Due to ink properties, line density may vary somewhat from color to color. Optional water-soluble ink fiber-tip pens are identified by a white "W" printed on the colored paper dot on the top of the pen. The background color of the paper dot indicates the ink color.

Optional Permanent-Ink Fiber-Tip Pens.

Permanent-ink fiber-tip pens write best on the matte and smooth sides of polyester film and acetates; these pens also write well on most paper.

Permanent-ink fiber-tip pens are available in black, brown, red, orange, yellow, green, blue, purple, or magenta inks. Line density may vary slightly from color to color. 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.

Optional Wet-Ink Pens. The optional wet-ink pen has the best line quality and may be ordered in three tip sizes. Each size is designed to plot best on specific media. The procedures for installing, filling, cleaning, and storing wet-ink pens are located in Appendix E.

Optional Plastic Hard-Nib Pens (Option 31 Only).

The plastic hard-nib pen writes on most paper and the matte side of polyester film. Line width is more consistent throughout the plot, and the pen has a longer life expectancy than fiber-tip pens. The hard-nib pen plots at a slightly slower speed than the fiber-tip pen. Optional plastic hard-nib pens are identified by a light grey body and a color dot on the top of the pen that corresponds to the color of the ink.

Pen Maintenance. Proper pen maintenance prolongs pen life considerably and in general provides much better plots. The pen maintenance consists of checking tips for wear and storage.

Maintenance for wet-ink pens is described in Appendix E.

Checking Tips for Wear

The amount of tip wear depends on the type of pen and media used. Fiber-tip pens wear out more quickly than either plastic hard-nib or wet-ink pens. The matte side of polyester is very abrasive and wears down pen tips at a much faster rate than paper or the smooth side of films.

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

Some visible signs of tip wear are the following:

- Line width increases or becomes erratic.
- Residue forms on the tip.
- The ink starts to skip or stops completely (this might also be a sign that the pen is running out of ink).

Storing Pens. To store fiber-tip and plastic hard-nib pens, simply keep them at room temperature with the cap firmly in place. The key to pen maintenance is keeping the pen cap on the pen tip at all times when the pen is not being used.

NOTE

Permanent fiber-tip pens can often be restarted with a drop of solvent, or by manually exercising the pen's tip on a piece of scratch paper.

NOTE

When pens are not to be used, or if the interval between plots is more than 2 hours, they should be removed from the pen carriage (or rotary pen turret, in the case of Option 31) and capped. However, a pen can be stored in the pen carriage of standard plotters if it is capped.

OPERATION

Media and Pen Selection Guide

This selection guide provides a quick reference to help select media, pens, and speeds when plotting with the TEKTRONIX 4662 Interactive Digital Plotter.

The settings shown in Table 2-9 are recommendations based on factory tests for optimum line quality. A particular plot may require some deviation from these settings.

Generally, decreasing plotting speed increases line quality.

**Table 2-9
4662 PEN, MEDIA, AND SPEED SELECTION GUIDE**

Media	Pen	Standard	Permanent-Ink Fiber-Tip	Wet Fiber-Tip	Plastic Hard-Nib Ink (Option 31 only)
Paper		Fast or Normal	N/R	Slow (180-200 mm/sec)	Slow (160-200 mm/sec)
Mylar		N/R	Slow (smooth side — 140-190 mm/second)	Slow (matte side — 180-200 mm/sec)	N/R
Polyester/Acetate		N/R	Slow (140-200 mm/sec)	Slow (140-200 mm/sec)	N/R

N/R: Not Recommended

Numeric speeds in mm/sec apply to programmable speeds in Option 31 equipped plotters.

Section 3

PERIODIC CARE AND CLEANING

INTRODUCTION

Because the plotter is an electro-mechanical device, periodic care and adjustment is necessary for proper performance. The period between adjustments depends on the amount of use the plotter receives. (Semi-annual or annual adjustments and lubrication may be required.) It is recommended, however, that the two pen drive cables be adjusted at least every 500 hours of plotter operation.

The adjustment of the plotter should be preceded by a thorough cleaning and inspection for loose, damaged, or worn parts. It is especially important to check the entire length of the two pen drive cables for broken strands, worn spots, etc.

Refer to the 4662 Interactive Digital Plotter Service Manual for detailed instructions on the adjustment and lubrication of the plotter.

The multiple-pen mechanical assembly on Option 31 equipped plotters should only be lubricated once a year, with a major overhaul occurring every four to five years. The overhaul includes the replacement of several parts. Refer to the 4662 Interactive Digital Plotter Service Manual for detailed instructions on the Option 31 lubrication and overhaul. In addition, the rubber pen caps should be replaced every 500 hours. They should be replaced more often if they become worn, deformed, filled with ink (especially if the ink is a different color and contaminates the present pen tips), or if the vent hole is plugged.

PERIODIC CARE

GENERAL

Periodic care (preventive maintenance) consists of cleaning the case and platen, visual inspection, adjustment, and lubrication. Preventive maintenance performed on a regular basis, maintains the plotter's reliability. The frequency and severity of the plotter's use will determine the required maintenance interval. However, it is recommended that the plotter's two pen drive cables be checked and adjusted at least every 500 hours of plotter operation. A convenient time to perform preventive maintenance is preceding adjustments.

CLEANING THE PLATEN AND CASE

Occasional cleaning preserves the appearance of the plotter. In addition, cleaning the platen prevents the accumulation of dust or dirt, which eventually works into its semi-porous surface and causes the electrostatic paper hold-down system to fail. The frequency of cleaning varies with the plotter's environment. Use the following procedure to clean the plotter:

1. Turn the plotter's power on and allow the plotter to initialize (approximately 5 to 10 seconds).
2. Press and lock down the LOAD switch. This causes the pen carriage to move to the upper-right corner and out of the way.
3. Turn off the power to the plotter and unplug the line cord.
4. Remove any paper present on the platen.

CAUTION

Abrasive and strong chemical cleaners 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, if not entirely removed, leave an electrically conductive film. Any remaining film causes the electrostatic paper hold-down to fail due to the conductivity of the film residue. Isopropyl alcohol can be used to remove this film, provided the isopropyl film is removed with a moist (with water) cloth.

5. Use water to clean the platen. Water will not leave a residue on the platen's surface.
6. If the platen is especially dirty, use a plain detergent or an alcohol pad (available from Tektronix). Either of these cleaners is more effective than water alone; but they leave a residue that must be removed. (A plain detergent is one that is free of additional ingredients such as bleach, scents, fabric softeners, colored crystals, etc.)

NOTE

Remove any soap or alcohol residue with a cloth moistened with water.

7. To remove any residue created in Step 6, wipe the platen with a water-moist cloth. Turn 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 the cleaning agent, repeat the wiping procedure a minimum of three times to remove all traces of the residue.
8. Dry with a clean, dry cloth.

CAUTION

The four rear panel switches are very sensitive to solvents. These switches should not be put through any cleaning process where water or solvents (or their vapor) will reach the interior of the switch.

9. Clean the plotter case with a cloth lightly dampened with a mild detergent solution.
10. Connect the power cord to the power source. The plotter can again be operated.

CHANGING PEN CAPS (OPTION 31 ONLY)

After every 500 hours of plotter operation, it may be necessary to replace the rubber pen caps on the pen capping plate. However, they should be replaced as often as they become worn, deformed, filled with ink (especially if the ink is a different color and contaminates the present pen tip), or if the vent hole in the bottom of the cap is plugged.

1. Turn the rotary pen turret knob until the rubber pen caps, located below the rotary pen turret, become visible.
2. Use your fingers to slide the rubber pen caps out of their holders (see Figure 3-1).
3. Use your fingers to slide the replacement rubber pen caps into their holders.

LUBRICATION

Approximately once a year the X-axis shafts should be cleaned of old lubricant (do not use solvents — use a clean dry cloth or tissue to wipe the old lubricant off) and relubricated. The cable drive motors and cable pulleys do not require any lubrication. The underside of the cam in the Option 31 mechanism (if installed) should also be lubricated once a year. Refer to the 4662 Interactive Digital Plotter Service Manual for details on lubricating the plotter.

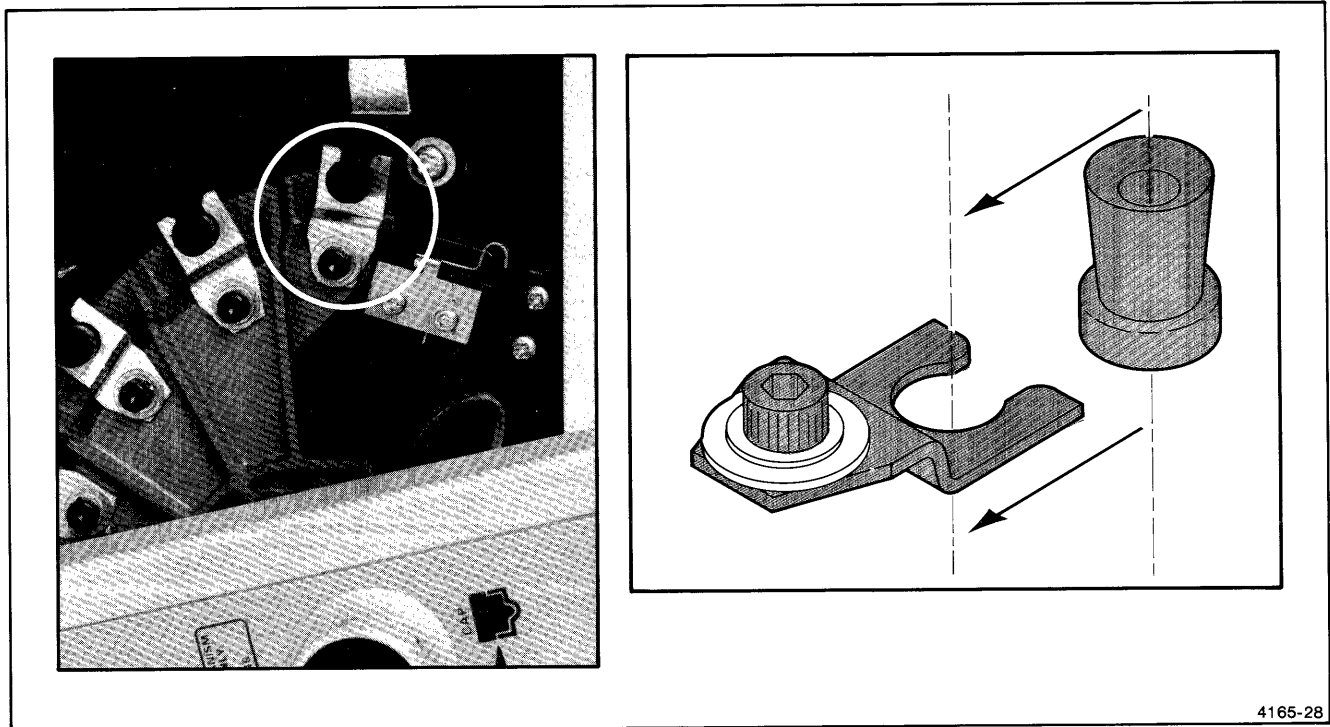


Figure 3-1. Replacing Rubber Pen Caps (Option 31 Only).

Appendix A

INSTALLATION

ABOUT THIS APPENDIX

This appendix describes how to install and connect the 4662 Interactive Digital Plotter into a system.

PLACEMENT OF THE PLOTTER

The plotter can be placed on any flat surface, such as a table or desk, that is at least 20x19 inches (508x483 mm), or 26x19 inches if the plotter is equipped with Option 31.

CONNECTING THE LINE CORD

Before plugging the plotter's line cord into a line voltage source, verify that the plotter is wired to accept your available line voltage. A tag near the center of the back panel indicates the voltage for which the plotter is wired. If this voltage is different from your available line voltage, refer to the 4662 Interactive Digital Plotter Service Manual for instructions on line voltage selection.

CAUTION

The 4662 operates on a single-phase power source with one of its current-carrying conductors (grounding) connected to Safety Earth (ground potential). Do not operate power sources that have both current-carrying conductors live with respect to ground. This includes phase-to-phase on a multi-phase system and across the legs of a 117-234 volt single-phase three-wire system. Neither of these systems are recommended because only the line conductor has over-current (fuse) protection within the instrument. The other conductor then would not be fused, which could cause instrument damage.

The plotter is designed to operate on a 115- or 230-volt nominal line voltage source with a frequency of 48 to 440 Hz. In addition, either of two voltage ranges for the 115- or 230-Vac can be selected. The ac power connector is a three-wire polarized plug with one lead connected directly to the instrument frame to provide electric shock protection. Connect this plug only to a three-wire outlet which has a

safety ground. If the unit is connected to any other power source, the plotter frame must be connected to a safety ground system. The connector configuration and color coding is shown in Figure A-1. The power cord is to be replaced only with another of the same polarity.

The line cord connects to the male 3-prong connector located on the back of the plotter near the right side (viewing the plotter's back panel).

INSTALLING THE PLOTTER INTO A SYSTEM

Installing the plotter into any system consists of installing the interconnecting cables and setting the four back-panel switches.

RS-232-C System

The plotter has two RS-232-C connection ports on the rear panel. One is for a terminal and the other is for a modem or host computer. These two connections allow the plotter to be "chained" to other serial interface devices. The connector labeled TERMINAL is wired to act as if it were an active modem, while the connector labeled MODEM is wired to act as if it were an active terminal. This also permits the plotter to be used alone with either a modem or a terminal.

Simply connect the serial interface cable from a terminal to the plotter connector labeled TERMINAL and/or connect the serial interface cable from a modem (or computer) into the plotter connector labeled MODEM (see Figure A-2).

Four hexadecimal (16-position) switches on the rear panel, labeled SWITCH A, B, C, and D, control several programmable parameters to allow the plotter to conform to various system and operator requirements. Use a small-blade screwdriver to set these switches. For a complete description of these switches and some application settings, refer to Rear Panel Controls in Section 2.

INSTALLATION

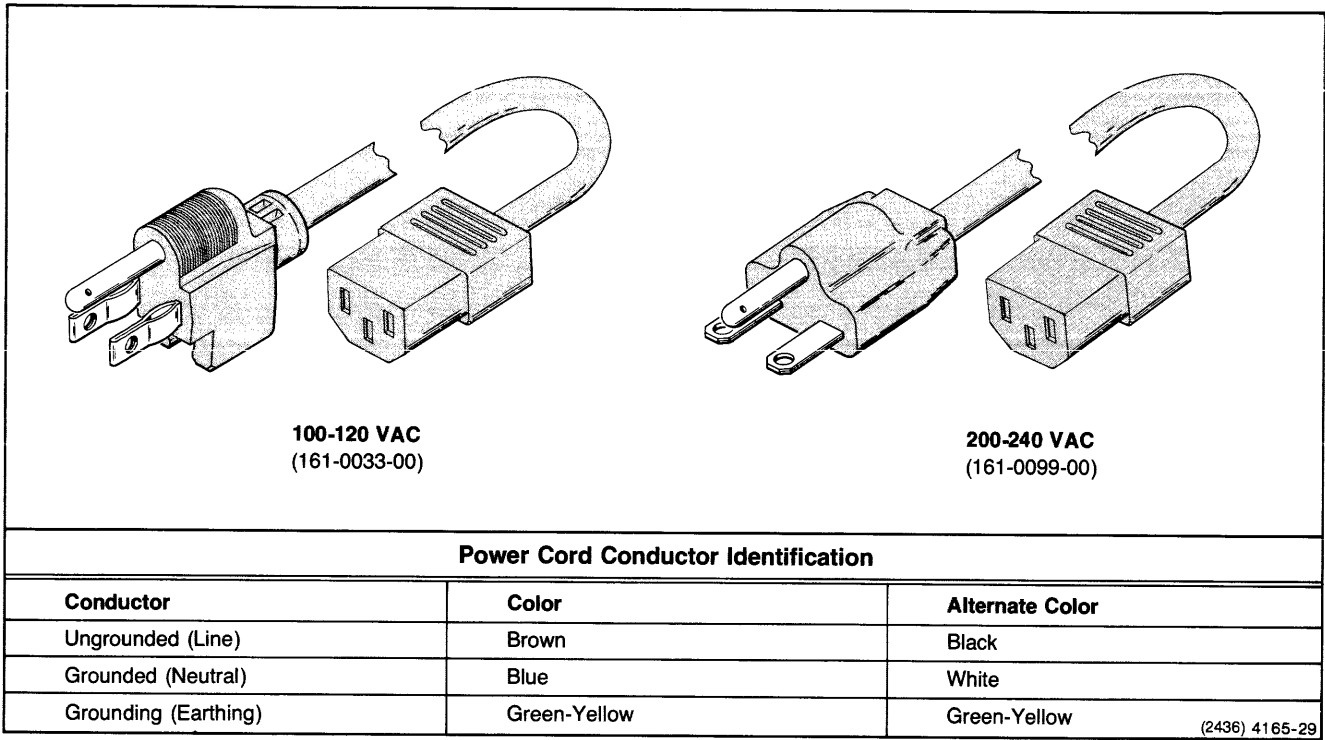


Figure A-1. USA Standard Power Cord Sets.

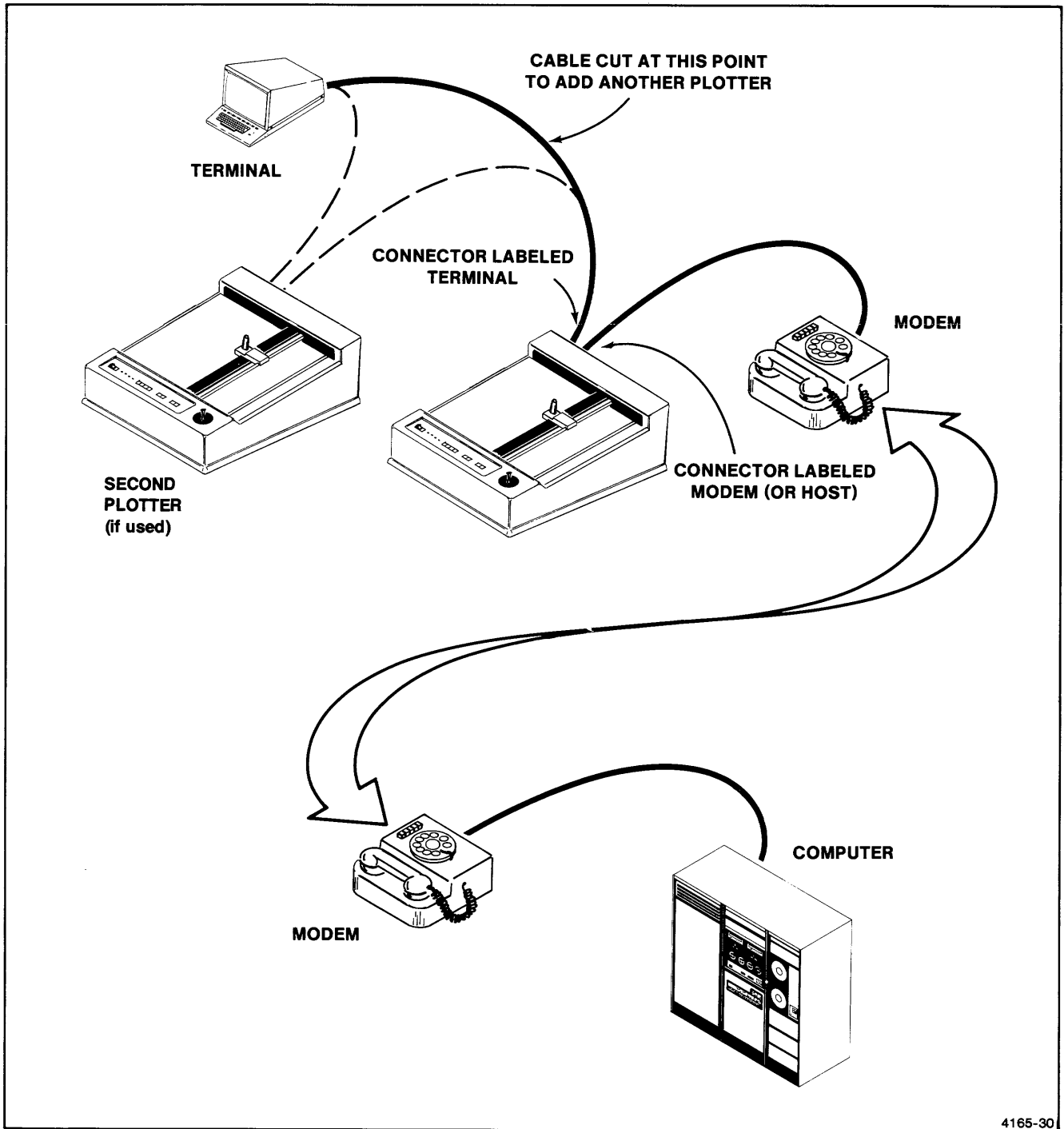


Figure A-2. RS-232-C Connections.

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INSTALLATION

TEKTRONIX 4050 Series Graphic System

The plotter has one GPIB connection port, which permits parallel communicating devices to be linked together sequentially or branched out from a central controller such as the TEKTRONIX 4050 Series Graphic System (see Figure A-3).

Simply connect the GPIB interface cable from the TEKTRONIX 4050 Series Graphic System to the plotter connector labeled PARALLEL INTERFACE J102 (see Figure A-4).

Four hexadecimal (16-position) switches on the rear panel, labeled SWITCH A, B, C, and D, control several programmable parameters to allow the plotter to conform to various system and operator requirements. Use a small-blade screwdriver to set these switches. For a complete description of these switches and some application settings, refer to Rear Panel Controls in Section 2.

GPIB System

Installing the plotter into a GPIB system is similar to installing the plotter into a TEKTRONIX 4050 Series Graphic System (see preceding description).

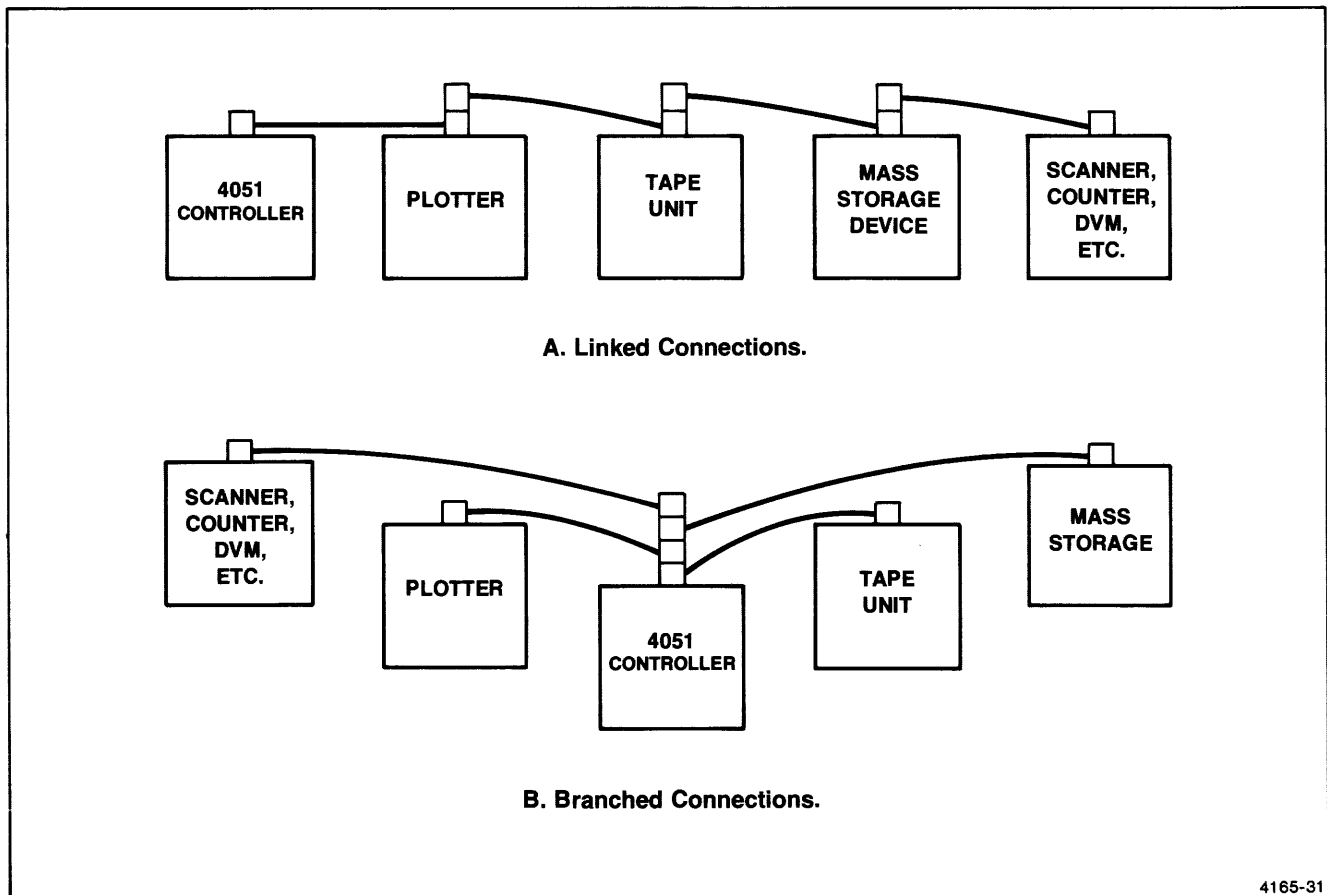


Figure A-3. Two Types of GPIB Connections Using a 4051 Controller.

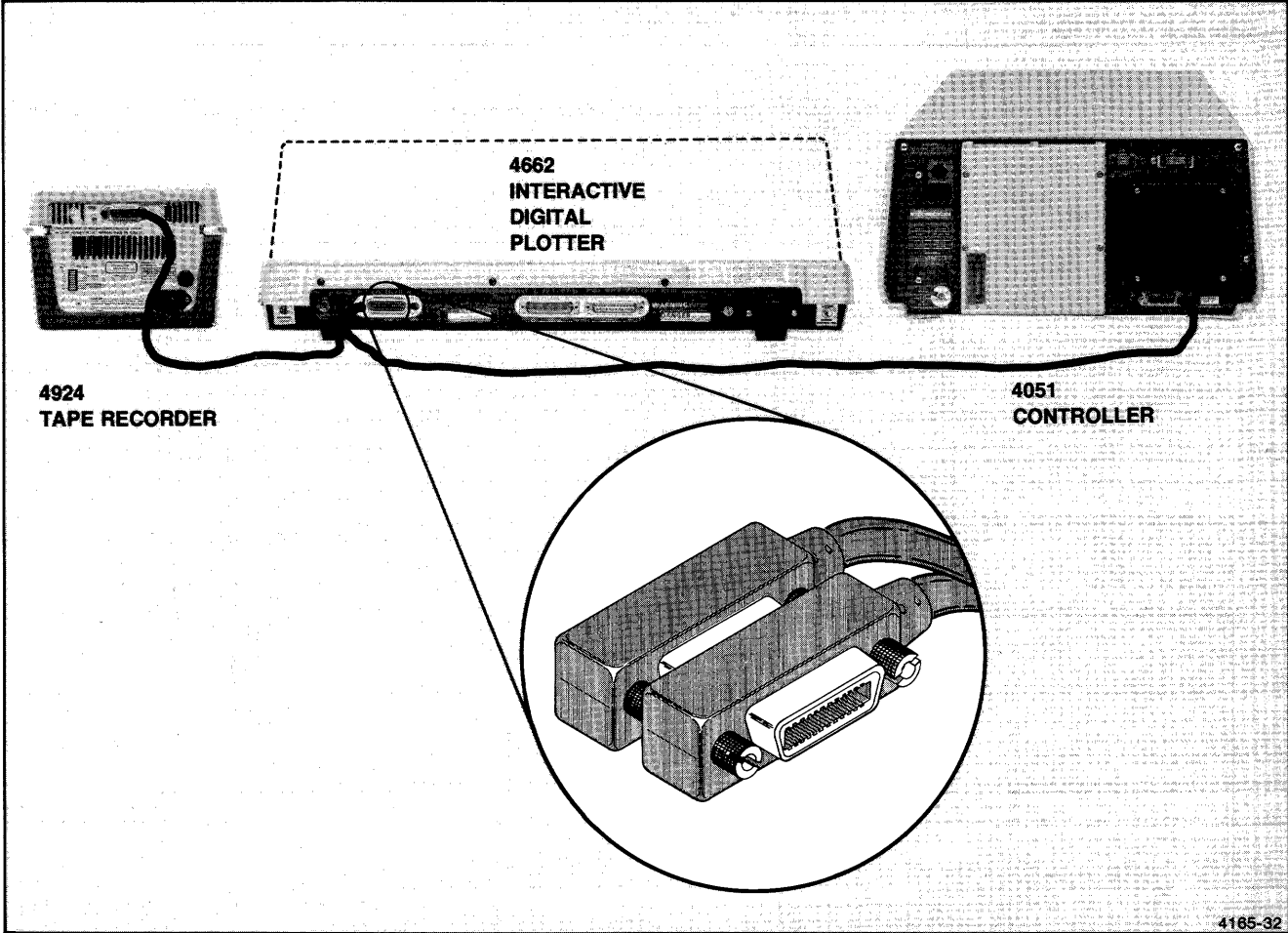


Figure A-4. GPIB Cable Connections.

Appendix B

COORDINATE CONVERSION CHART

The Coordinate Conversion Chart is designed for use with both 10- and 12-bit graphing.

10-BIT GRAPHING (WITH A TEKTRONIX 4010, 4012, OR 4013 TERMINAL)

Simply use the chart without the interpolation insert. Find the desired X- or Y-coordinate in the body of the chart; follow that column to the bottom of the chart to find the decimal value or the ASCII character which represents the HIY or HIX byte; go to the right in the row containing the coordinate value to find the LOY byte, or go to the left to find the LOX byte. With 10-bit graphing, it is not possible to use coordinate values between those shown on the chart. Arrange the characters in the sequence:

HIY, LOY, HIX, LOX

Example: 100Y, 480X would be <SP> y # X in ASCII code.

12-BIT GRAPHING (WITH A TEKTRONIX 4014 OR 4015 TERMINAL)

This requires the interpolation insert chart and the main coordinate chart following. Simply find the largest coordinate value in the chart that is equal to or less than the desired coordinate value using the main coordinate chart below; follow that column to the bottom of the chart to find the decimal value or the ASCII character which represents the HIY or HIX byte; go to the right in the row containing that largest coordinate value equal to or less than the desired coordinate value to find the LOY byte, or go to the left to find the LOX byte. Then subtract this largest coordinate value in the chart that is equal to or less than the

desired coordinate value from the desired coordinate value. Repeat for the other coordinate value. Note both of these remainders and their respective axes. Also notice that these values will always range from 0 to 3. Apply both of these remainders to the interpolation insert chart (using the X-remainder across the top and the Y-remainder down the left side) to determine the extra byte (EB) character in the sequence:

HIY, EB, LOY, HIX, LOX

Example: 31Y, 841X would be <SP> m g & R in ASCII code. (Y-axis has a remainder of 3 and X-axis has a remainder of 1).

INTERPOLATION INSERT CHART FOR THE EB BYTE

Y-Remainder	X-Remainder			
	0	1	2	3
0	'	a	b	c
1	d	e	f	g
2	h	i	j	k
3	l	m	n	o

COORDINATE CONVERSION

**Table B-1
COORDINATE CONVERSION CHART**

Low Order X		X or Y Coordinate								Low Order Y	
ASCII	DEC.									DEC.	ASCII
@	64	0	128	256	384	512	640	768	896	96	`
A	65	4	132	260	388	516	644	772	900	97	a
B	66	8	136	264	392	520	648	776	904	98	b
C	67	12	140	268	396	524	652	780	908	99	c
D	68	16	144	272	400	528	656	784	912	100	d
E	69	20	148	276	404	532	660	788	916	101	e
F	70	24	152	280	408	536	664	792	920	102	f
G	71	28	156	284	412	540	668	796	924	103	g
H	72	32	160	288	416	544	672	800	928	104	h
I	73	36	164	292	420	548	676	804	932	105	i
J	74	40	168	296	424	552	680	808	936	106	j
K	75	44	172	300	428	556	684	812	940	107	k
L	76	48	176	304	432	560	688	816	944	108	l
M	77	52	180	308	436	564	692	820	948	109	m
N	78	56	184	312	440	568	696	824	952	110	n
O	79	60	188	316	444	572	700	828	956	111	o
P	80	64	192	320	448	576	704	832	960	112	p
Q	81	68	196	324	452	580	708	836	964	113	q
R	82	72	200	328	456	584	712	840	968	114	r
S	83	76	204	332	460	588	716	844	972	115	s
T	84	80	208	336	464	592	720	848	976	116	t
U	85	84	212	340	468	596	724	852	980	117	u
V	86	88	216	344	472	600	728	856	984	118	v
W	87	92	220	348	476	604	732	860	988	119	w
X	88	96	224	352	480	608	736	864	992	120	x
Y	89	100	228	356	484	612	740	868	996	121	y
Z	90	104	232	360	488	616	744	872	1000	122	z
[	91	108	236	364	492	620	748	876	1004	123	{
\	92	112	240	368	496	624	752	880	1008	124	|
]	93	116	244	372	500	628	756	884	1012	125	}
^	94	120	248	376	504	632	760	888	1016	126	~
-	95	124	252	380	508	636	764	892	1020	127	RUBOUT (DEL)

DEC. → 32 33 34 35 36 37 38 39
 ASCII → sp ! " # \$ % & ' (

High Order X & Y

COORDINATE CONVERSION

Table B-1 (cont)
COORDINATE CONVERSION CHART

Low Order X		X or Y Coordinate								Low Order Y	
ASCII	DEC.									DEC.	ASCII
@	64	1024	1152	1280	1408	1536	1664	1792	1920	96	`
A	65	1028	1156	1284	1412	1540	1668	1796	1924	97	a
B	66	1032	1160	1288	1416	1544	1672	1800	1928	98	b
C	67	1036	1164	1292	1420	1548	1676	1804	1932	99	c
D	68	1040	1168	1296	1424	1552	1680	1808	1936	100	d
E	69	1044	1172	1300	1428	1556	1684	1812	1940	101	e
F	70	1048	1176	1304	1432	1560	1688	1816	1944	102	f
G	71	1052	1180	1308	1436	1564	1692	1820	1948	103	g
H	72	1056	1184	1312	1440	1568	1696	1824	1952	104	h
I	73	1060	1188	1316	1444	1572	1700	1828	1956	105	i
J	74	1064	1192	1320	1448	1576	1704	1832	1960	106	j
K	75	1068	1196	1324	1452	1580	1708	1836	1964	107	k
L	76	1072	1200	1328	1456	1584	1712	1840	1968	108	l
M	77	1076	1204	1332	1460	1588	1716	1844	1972	109	m
N	78	1080	1208	1336	1464	1592	1720	1848	1976	110	n
O	79	1084	1212	1340	1468	1596	1724	1852	1980	111	o
P	80	1088	1216	1344	1472	1600	1728	1856	1984	112	p
Q	81	1092	1220	1348	1476	1604	1732	1860	1988	113	q
R	82	1096	1224	1352	1480	1608	1736	1864	1992	114	r
S	83	1100	1228	1356	1484	1612	1740	1868	1996	115	s
T	84	1104	1232	1360	1488	1616	1744	1872	2000	116	t
U	85	1108	1236	1364	1492	1620	1748	1876	2004	117	u
V	86	1112	1240	1368	1496	1624	1752	1880	2008	118	v
W	87	1116	1244	1372	1500	1628	1756	1884	2012	119	w
X	88	1120	1248	1376	1504	1632	1760	1888	2016	120	x
Y	89	1124	1252	1380	1508	1636	1764	1892	2020	121	y
Z	90	1128	1256	1384	1512	1640	1768	1896	2024	122	z
[	91	1132	1260	1388	1516	1644	1772	1900	2028	123	{
\	92	1136	1264	1392	1520	1648	1776	1904	2032	124	|
]	93	1140	1268	1396	1524	1652	1780	1908	2036	125	}
^	94	1144	1272	1400	1528	1656	1784	1912	2040	126	~
_	95	1148	1276	1404	1532	1660	1788	1916	2044	127	RUBOUT (DEL)

DEC. →	40	41	42	43	44	45	46	47
ASCII →	()	*	+	,	-	.	/

High Order X & Y

COORDINATE CONVERSION

**Table B-1 (cont)
COORDINATE CONVERSION CHART**

Low Order X										Low Order Y	
ASCII	DEC.	X or Y Coordinate								DEC.	ASCII
@	64	2048	2176	2304	2432	2560	2688	2816	2944	96	`
A	65	2052	2180	2308	2436	2564	2692	2820	2948	97	a
B	66	2056	2184	2312	2440	2568	2696	2824	2952	98	b
C	67	2060	2188	2316	2444	2572	2700	2828	2956	99	c
D	68	2064	2192	2320	2448	2576	2704	2832	2960	100	d
E	69	2068	2196	2324	2452	2580	2708	2836	2964	101	e
F	70	2072	2200	2328	2456	2584	2712	2840	2968	102	f
G	71	2076	2204	2332	2460	2588	2716	2844	2972	103	g
H	72	2080	2208	2336	2464	2592	2720	2848	2976	104	h
I	73	2084	2212	2340	2468	2596	2724	2852	2980	105	i
J	74	2088	2216	2344	2472	2600	2728	2856	2984	106	j
K	75	2092	2220	2348	2476	2604	2732	2860	2988	107	k
L	76	2096	2224	2352	2480	2608	2736	2864	2992	108	l
M	77	2100	2228	2356	2484	2612	2740	2868	2996	109	m
N	78	2104	2232	2360	2488	2616	2744	2872	3000	110	n
O	79	2108	2236	2364	2492	2620	2748	2876	3004	111	o
P	80	2112	2240	2368	2496	2624	2752	2880	3008	112	p
Q	81	2116	2244	2372	2500	2628	2756	2884	3012	113	q
R	82	2120	2248	2376	2504	2632	2760	2888	3016	114	r
S	83	2124	2252	2380	2508	2636	2764	2892	3020	115	s
T	84	2128	2256	2384	2512	2640	2768	2896	3024	116	t
U	85	2132	2260	2388	2516	2644	2772	2900	3028	117	u
V	86	2136	2264	2392	2520	2648	2776	2904	3032	118	v
W	87	2140	2268	2396	2524	2652	2780	2908	3036	119	w
X	88	2144	2272	2400	2528	2656	2784	2912	3040	120	x
Y	89	2148	2276	2404	2532	2660	2788	2916	3044	121	y
Z	90	2152	2280	2408	2536	2664	2792	2920	3048	122	z
[	91	2156	2284	2412	2540	2668	2796	2924	3052	123	{
\	92	2160	2288	2416	2544	2672	2800	2928	3056	124	|
]	93	2164	2292	2420	2548	2676	2804	2932	3060	125	}
^	94	2168	2296	2424	2552	2680	2808	2936	3064	126	~
_	95	2172	2300	2428	2556	2684	2812	2940	3068	127	RUBOUT (DEL)

DEC. →	48	49	50	51	52	53	54	55
ASCII →	0	1	2	3	4	5	6	7

High Order X & Y

COORDINATE CONVERSION

Table B-1 (cont)
COORDINATE CONVERSION CHART

Low Order X										Low Order Y	
ASCII	DEC.	X or Y Coordinate								DEC.	ASCII
@	64	3072	3200	3328	3456	3584	3712	3840	3968	96	`
A	65	3076	3204	3332	3460	3588	3716	3844	3972	97	a
B	66	3080	3208	3336	3464	3592	3720	3848	3976	98	b
C	67	3084	3212	3340	3468	3596	3724	3852	3980	99	c
D	68	3088	3216	3344	3472	3600	3728	3856	3984	100	d
E	69	3092	3220	3348	3476	3604	3732	3860	3988	101	e
F	70	3096	3224	3352	3480	3608	3736	3864	3992	102	f
G	71	3100	3228	3356	3484	3612	3740	3868	3996	103	g
H	72	3104	3232	3360	3488	3616	3744	3872	4000	104	h
I	73	3108	3236	3364	3492	3620	3748	3876	4004	105	i
J	74	3112	3240	3368	3496	3624	3752	3880	4008	106	j
K	75	3116	3244	3372	3500	3628	3756	3884	4012	107	k
L	76	3120	3248	3376	3504	3632	3760	3888	4016	108	l
M	77	3124	3252	3380	3508	3636	3764	3892	4020	109	m
N	78	3128	3256	3384	3512	3640	3768	3896	4024	110	n
O	79	3132	3260	3388	3516	3644	3772	3900	4028	111	o
P	80	3136	3264	3392	3520	3648	3776	3904	4032	112	p
Q	81	3140	3268	3396	3524	3652	3780	3908	4036	113	q
R	82	3144	3272	3400	3528	3656	3784	3912	4040	114	r
S	83	3148	3276	3404	3532	3660	3788	3916	4044	115	s
T	84	3152	3280	3408	3536	3664	3792	3920	4048	116	t
U	85	3156	3284	3412	3540	3668	3796	3924	4052	117	u
V	86	3160	3288	3416	3544	3672	3800	3928	4056	118	v
W	87	3164	3292	3420	3548	3676	3804	3932	4060	119	w
X	88	3168	3296	3424	3552	3680	3808	3936	4064	120	x
Y	89	3172	3300	3428	3556	3684	3812	3940	4068	121	y
Z	90	3176	3304	3432	3560	3688	3816	3944	4072	122	z
[	91	3180	3308	3436	3564	3692	3820	3948	4076	123	{
\	92	3184	3312	3440	3568	3696	3824	3952	4080	124	|
]	93	3188	3316	3444	3572	3700	3828	3956	4084	125	}
^	94	3192	3320	3448	3576	3704	3832	3960	4088	126	~
_	95	3196	3324	3452	3580	3708	3836	3964	4092	127	RUBOUT (DEL)

DEC. →	56	57	58	59	60	61	62	63
ASCII →	8	9	:	;	<	=	>	?

High Order X & Y

Appendix C

ASCII CODE CHART

B7 B6 B5 BITS	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
B4 B3 B2 B1	CONTROL		NUMBERS SYMBOLS		UPPER CASE		LOWER CASE	
0 0 0 0	NUL 0 0	DLE 20 10 16	SP 40 0 16	0 60 0 16	@ 100 0 120 16	P 120 16 140 0 160 16	' 140 0 160 16	p 160 16
0 0 0 1	SOH 1 1	DC1 21 11 17	! 41 1 61 17	1 61 1 17	A 101 1 121 17	Q 121 17 141 1 161 17	a 141 1 161 17	q 161 17
0 0 1 0	STX 2 2	DC2 22 12 18	" 42 2 62 18	2 62 18 102 2 122 18	B 102 2 122 18	R 122 18 142 2 162 18	b 142 2 162 18	r 162 18
0 0 1 1	ETX 3 3	DC3 23 13 19	# 43 3 63 19	3 63 19 103 3 123 19	C 103 3 123 19	S 123 19 143 3 163 19	c 143 3 163 19	s 163 19
0 1 0 0	EOT 4 4	DC4 24 14 20	\$ 44 4 64 20	4 64 20 104 4 124 20	D 104 4 124 20	T 124 20 144 4 164 20	d 144 4 164 20	t 164 20
0 1 0 1	ENQ 5 5	NAK 25 15 21	% 45 5 65 21	5 65 21 105 5 125 21	E 105 5 125 21	U 125 21 145 5 165 21	e 145 5 165 21	u 165 21
0 1 1 0	ACK 6 6	SYN 26 16 22	& 46 6 66 22	6 66 22 106 6 126 22	F 106 6 126 22	V 126 22 146 6 166 22	f 146 6 166 22	v 166 22
0 1 1 1	BEL 7 7	ETB 27 17 23	' 47 7 67 23	7 67 23 107 7 127 23	G 107 7 127 23	W 127 23 147 7 167 23	g 147 7 167 23	w 167 23
1 0 0 0	BS 8 8	CAN 30 18 24	(50 8 70 24	8 70 24 110 8 130 24	H 110 8 130 24	X 130 24 150 8 170 24	h 150 8 170 24	x 170 24
1 0 0 1	HT 9 9	EM 31 19 25	) 51 9 71 25	9 71 25 111 9 131 25	I 111 9 131 25	Y 131 25 151 9 171 25	i 151 9 171 25	y 171 25
1 0 1 0	LF 10 A	SUB 32 1A 26	* 52 10 72 26	: 72 26 112 10 132 26	J 112 10 132 26	Z 132 26 152 10 172 26	j 152 10 172 26	z 172 26
1 0 1 1	VT 11 B	ESC 33 1B 27	+ 53 11 73 27	; 73 27 113 11 133 27	K 113 11 133 27	[133 27 153 11 173 27	k 153 11 173 27	{ 173 27
1 1 0 0	FF 12 C	FS 34 1C 28	, 54 12 74 28	< 74 28 114 12 134 28	L 114 12 134 28	\ 134 28 154 12 174 28	l 154 12 174 28	|* 174 28
1 1 0 1	CR 13 D	GS 35 1D 29	- 55 13 75 29	= 75 29 115 13 135 29	M 115 13 135 29	] 135 29 155 13 175 29	m 155 13 175 29	} 175 29
1 1 1 0	SO 14 E	RS 36 1E 30	. 56 14 76 30	> 76 30 116 14 136 30	N 116 14 136 30	^ 136 30 156 14 176 30	n 156 14 176 30	~ 176 30
1 1 1 1	SI 15 F	US 37 1F 31	/ 57 15 77 UNL	? 77 UNL 117 15 137 UNT	O 117 15 137 UNT	_ 137 UNT 157 15 177 DEL (RUBOUT)	o 157 15 177 DEL (RUBOUT)	DEL (RUBOUT) 177 7F 127
	ADDRESSED COMMANDS	UNIVERSAL COMMANDS	LISTEN ADDRESSES		TALK ADDRESSES		SECONDARY ADDRESSES OR COMMANDS (PPE) (PPD)	

KEY

*| on some keyboards or systems

octal	25	PPU	GIPIB code
	NAK		ASCII character
hex	15	21	decimal

Tektronix
COMMITTED TO EXCELLENCE

REF: ANSI STD X3. 4-1977
IEEE STD 488-1978
ISO STD 646-1973

TEKTRONIX STD 062-5435-00 4 SEP 80
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Appendix D

SPECIFICATIONS, ACCESSORIES, AND SUPPLIES

The following tables list specifications and accessories and supplies available for the 4662 Interactive Digital Plotter. The specifications are listed for your information only and are not verifiable. Information on options, supplies, and accessories are subject to change.

Table D-1
PHYSICAL SPECIFICATIONS

Characteristics	Standard 4662	With Option 31
Height	8 in (203 mm)	8 in (203 mm)
Width	20.375 in (517 mm)	25.75 in (654 mm)
Depth	19.5 in (495 mm)	19.5 in (495 mm)
Weight	30 lbs 4 oz (13.8 kg)	35 lbs (16 kg)
Shipping Weight	45 lbs 14 oz (20.8 kg)	46 lbs (21 kg)

Table D-2
ELECTRICAL SPECIFICATIONS

Characteristic	Specification (Standard and Option 31 Equipped 4662)
Input Power	90W maximum, 60W typical
Line Voltage	115 or 230 volts nominal. Line voltages are strappable within the plotter to select 105, 116, 210, or 232 volts ($\pm 14\%$).
Line Frequency	48 to 66 Hz
Line Fuse	1 amp (slow-blow) when operating in the 115 volt range. 0.5 amp (slow-blow) when operating in the 230 volt range.

Table D-3
ENVIRONMENTAL SPECIFICATIONS

Characteristic	Specification (Standard and Option 31 Equipped 4662)
Temperature	-55 to +75 degree C. (non-operating) 0 to +50 degree C. (operating)
Altitude	To 50,000 feet (15240 m) (non-operating) To 15,000 feet (4572 m) (operating)

SPECIFICATIONS

Table D-4
PERFORMANCE SPECIFICATIONS

Characteristic	Specification
Plotting Area (see Figure D-1)	X-Axis — 15 in (381 mm) Y-Axis — 10 in (254 mm) Can be increased to 15.35x10.23 in (390x260 mm).
Scaling	The plotter will scale incoming data that is intended for full-scale plotting into any size page within the plotting area.
Plotting Accuracy	± 0.0025 in (0.06 mm) or ± .4% of vector length, whichever is larger.
Repeatability	The plotter will return to any previously-plotted point within ± 0.0025 in (0.06 mm). With Option 31, within ± 0.012 inch (0.3 mm) after pen exchange.
Vector Linearity	Geometry — The mean vector line will not deviate more than 0.0007 inch (0.02 mm), per inch of line length, from a straight line drawn between two points. Line Aberrations — Short term non-linearities of a vector will not deviate more than ± 0.005 in (0.127 mm) from the mean vector.
Plotting Rate	Fast Speed — 16 in per second (400 mm/sec) at axial, 22 in per second (559 mm/second) maximum. Maximum rate achieved after about 100 ms, or about 1.3 in (33 mm) of pen travel. Slow Speed — approximately 0.5 of fast speed. Programmable Speed (Option 31 only) — limits the maximum pen velocity from 10 mm/sec to 570 mm/sec (0.4 in/sec to 22.4 in/sec) in 10 mm/sec (0.4 in/sec) steps (i.e., there are 57 speeds).
Joystick Moves (Manual)	The pen may be moved by using the front panel joystick at vector rates variable from 0.015 in/second to 4 inches/second (0.38 mm/sec to 101.6 mm/sec).
Point Plotting Rate	Pen action rate (up/down) is approximately 10 points/second maximum. Plotter points per second decreases for an increasing distance between points.
Data Resolution	0.005 in (0.127 mm)
Motor Drive Resolution	Approximately 8 times the data resolution (0.000625 in or 0.016 mm)

Table D-5
STANDARD ACCESSORIES AND SUPPLIES

Part	Tektronix Part Number
Power Cord	161-0066-00
RS-232-C Cable	012-0829-00
4662 Interactive Digital Plotter Operator's Manual	070-4165-00
4662 Interactive Digital Plotter Programmer's Reference Manual	061-2642-00
4662 Interactive Digital Plotter Programmer's Reference Card	070-2556-00
Paper, 100 sheets, 279x419 mm (11x16.5 in) linear grid, 10x10 lines to the in	006-1698-00
Digitizing Reticle — Standard 4662	214-2409-01
Digitizing Reticle — Option 31	119-1432-01
Pens, Fiber-Tip — Standard 4662 (Pkgs of 3) Red Green Black Blue	016-0589-00 016-0589-01 016-0589-02 016-0589-03
Pens, Fiber-Tip — Option 31 Two 9-pen pkgs (one pen each of nine colors)	016- 0687 -00 7-114

See Figure D-2 for telephone numbers for use when ordering.

**Table D-6
OPTIONAL ACCESSORIES AND SUPPLIES**

Part	Tektronix Part Number	Part	Tektronix Part Number
4662 Interactive Digital Plotter Service Manual	070-1933-00	Permanent-Ink Fiber-Tip for Standard 4662	
GPIB Interface Cable (2 meters) (supplied with Option 01 unit)	012-0630-01	Black	016-0648-00
Replacement Pen Caps (Option 31 only)	200-2630-00	Brown	016-0648-01
Pen Adapters (Option 31 only)	103-0229-00	Red	016-0648-02
Dust Cover		Orange	016-0648-03
Standard 4662	016-0345-00	Yellow	016-0648-04
Option 31 Equipped 4662	016-0462-00	Green	016-0648-05
Transparency Kit	020-0595-00	Blue	016-0648-06
RS-232-C Interface Cable	012-0829-00	Purple	016-0648-07
Remote CALL Foot/Hand Switch	131-0771-00	Magenta	016-0648-08
Paper		Permanent-Ink Fiber-Tip for Option 31	
Linear, 10x10 to 1 cm, 279x419 mm (11x16.5 in) pkg of 100 sheets	006-1699-00	Black	016-0418-00
Semilog, 10x3 cycles, 279x419 mm (11x16.5 in) pkg of 100 sheets	006-1700-00	Brown	016-0418-01
Semilog, 10x2 cycles, 279x419 mm (11x16.5 in) pkg of 100 sheets	006-1701-00	Red	016-0418-02
Full-log, 2x3 cycles, 279x419 mm (11x16.5 in) pkg of 100 sheets	006-2410-00	Orange	016-0418-03
Blank, 279x419 mm (11x16.5 in) pkg of 100 sheets	006-1702-00	Yellow	016-0418-04
Transparent Film		Green	016-0418-05
Preframed Polyester Film (pkg of 100 sheets)	006-3309-00	Blue	016-0418-06
Pens		Purple	016-0418-07
Water-Soluble Fiber-Tip for Standard 4662		Magenta	016-0418-08
Black	016-0386-00	Solvent for Permanent Ink	006-3380-00
Brown	016-0386-01	Plastic Hard-Nib Pens (Option 31 only)	
Red	016-0386-02	Black	016-0668-00
Orange	016-0386-03	Red	016-0668-01
Yellow	016-0386-04	Green	016-0668-02
Green	016-0386-05	Blue	016-0668-03
Blue	016-0386-06	Wet-Ink Pens for Standard 4662	
Purple	016-0386-07	TB-0, 0.014 in diameter (0.35 mm)	016-0448-00
Magenta	016-0386-08	TB-1, 0.018 in diameter (0.46 mm)	016-0449-00
Water-Soluble Fiber-Tip for Option 31		TB-2, 0.022 in diameter (0.56 mm)	016-0450-00
9 pen packages (one pen each of nine colors)	016-0688-00	Replacement Wet-Ink Pen Tips for Standard 4662	
		TB-0, 0.014 in diameter (0.35 mm)	016-0445-00
		TB-1, 0.018 in diameter (0.46 mm)	016-0446-00
		TB-2, 0.022 in diameter (0.56 mm)	016-0447-00
		Wet-Ink Pens for Option 31	
		PL3 0.01 in (0.3 mm) diameter	016-0444-01
		PL5 0.02 in (0.5 mm) diameter	016-0442-01
		PL8 0.03 in (0.8 mm) diameter	016-0443-01
		Replacement Wet-Ink Pen Tips for Option 31	
		PL3 0.01 in (0.3 mm) diameter	214-2706-00
		PL5 0.02 in (0.5 mm) diameter	214-2706-01
		PL8 0.03 in (0.8 mm) diameter	214-2706-02

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SPECIFICATIONS

Part	Tektronix Part Number
Replacement Wet-Ink Pen Parts Kit (1 cap, 1 body section, 2 plain nuts, and 6 ink cartridges)	006-2968-01
Extra Ink Cartridges (1 each)	016-0649-00
Inks for Wet-Ink Pens (3/4 oz squeeze bottle)	
For Films	
Brown	016-0423-00
Green	016-0424-00
Blue	016-0425-00
Red	016-0426-00
Black	016-0427-00
For Paper	
Black	016-0428-00
Wet-Ink Cleaning and Maintenance Systems	
Ultrasonic Cleaning Tank	002-1555-00
Cleaning Fluid (5.2 oz with strainer)	002-0920-01
Cleaning Fluid (8 oz)	002-1556-00
Cleaning Fluid (16 oz)	002-0920-00
Pressure/Suction Cleaning Bulb	002-1560-00
Magnifying Instrument	002-1558-00
Pen Storage Humidifier	002-1559-00

Part	Tektronix Part Number
Miscellaneous	
Colored Background Film	
Yellow (pkg of 25 sheets)	006-3381-00
Blue (pkg of 25 sheets)	006-3382-00
Bar Graph Adhesive Strips	006-3383-00
Color Adhesive Film	
Red (pkg of 10 sheets)	006-3384-00
Green (pkg of 10 sheets)	006-3385-00
Transfer Symbols	
Red (1 sheet)	006-3386-00
Black (1 sheet)	006-3387-00
Pencil Knife	006-3388-00

See Figure D-2 for telephone numbers for use in ordering.

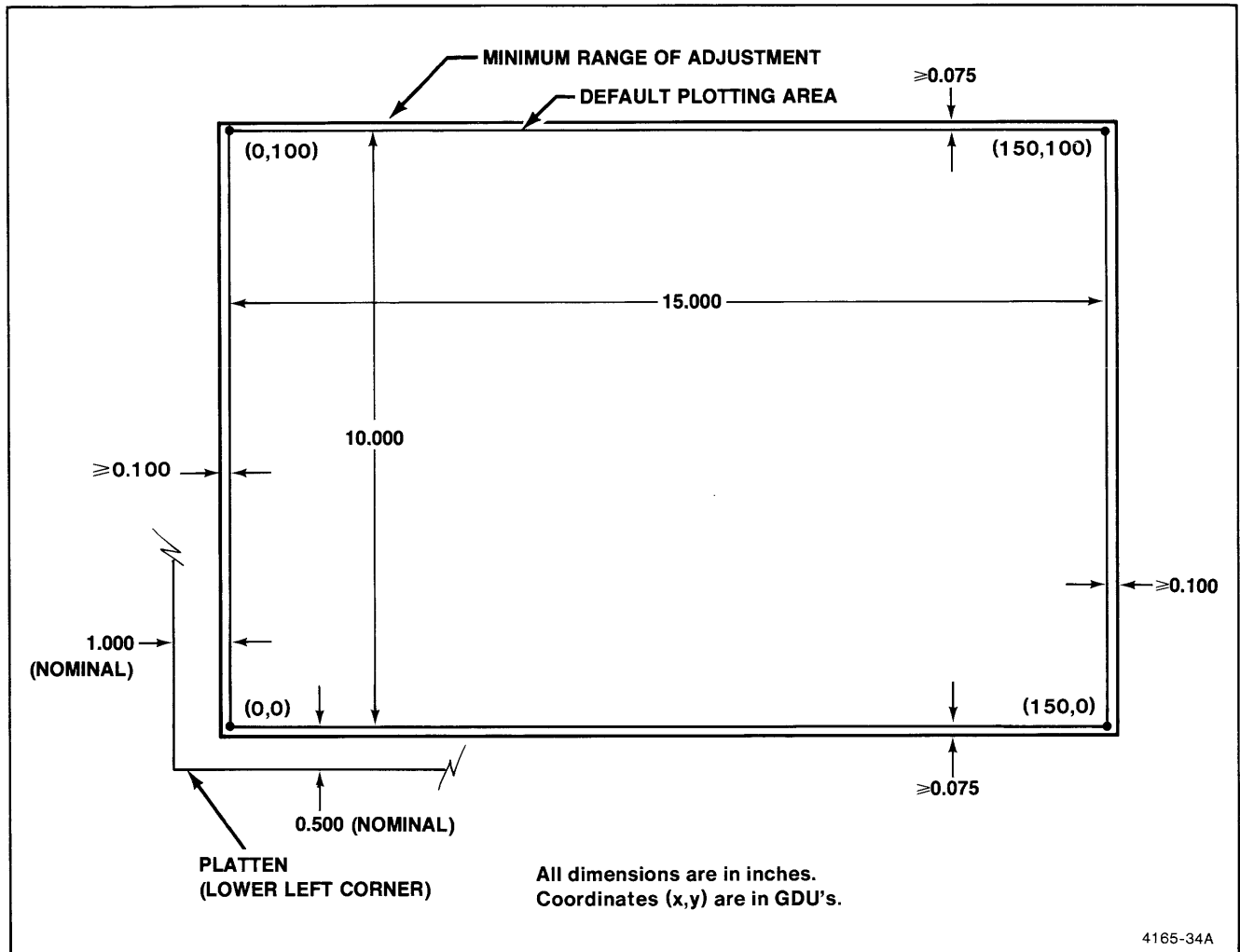


Figure D-1. Plotting Area.

SPECIFICATIONS

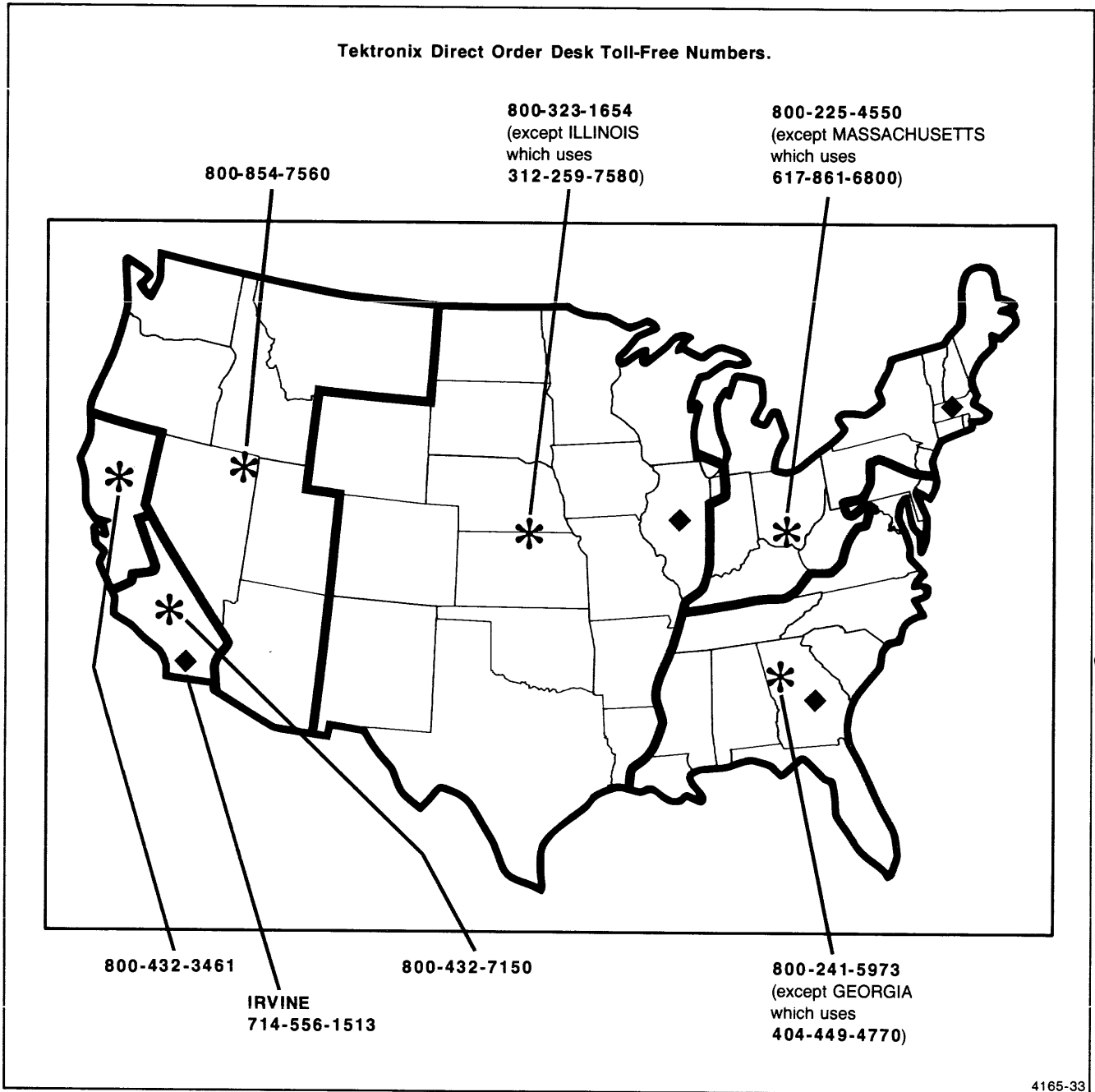


Figure D-2. Telephone Numbers for Ordering Supplies.

Appendix E

WET INK PENS

OPTIONAL 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 4662 pens. Wet-ink pens come in packages of one each, and you may choose from three tip sizes. Replacement body parts and tips may be purchased separately (see Appendix D). The tip sizes are as follows:

Name	Tip Size (mm)	Line Width
TB-0	.35 mm	0.0141 in.
TB-1	.50 mm	0.020 in.
TB-2	.60 mm	0.024 in.

Wet-ink pens require more operator attention, clean-up, and maintenance than fiber-tip pens, but if high-quality lines are important, these pens may be worth the added effort.

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

INKS FOR WET-INK PENS

There are two types of ink recommended for use with wet-ink pens. Both types come in 3/4-oz squeeze bottles designed for convenient filling of wet-ink pen cartridges.

The first type of ink, for film, writes best on the matte side of polyester film and comes in five colors: brown, green, blue, red, and black. These inks are identified by "brown ink for film," for example, on the bottle label.

The second type, for paper, is available in black ink only. This ink is identified by "rapidograph waterproof black drawing ink" on the bottle label.

FILLING WET-INK PENS

Because it's easy to spill ink, hold the pen over a rag or some waste paper while filling the cartridge.

The procedure for filling ink pens is as follows:

1. Gently unscrew and remove the locking nut by hand (see Figure E-1).
2. Hold the pen point upright and pull off the ink cartridge.
3. Tap the rear portion of the pen body lightly on absorbant paper to remove excess ink (see Figure E-2).
4. Fill the cartridge with the squeeze bottle to the line, which is about 1/4 inch from the top of the cartridge. **DO NOT FILL PAST THE 1/4 INCH LINE** (see Figure E-3).
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 properly, refer to "Starting Ink Flow," later in this appendix.

NOTE

For best performance, always keep the cartridge at least half full of ink.

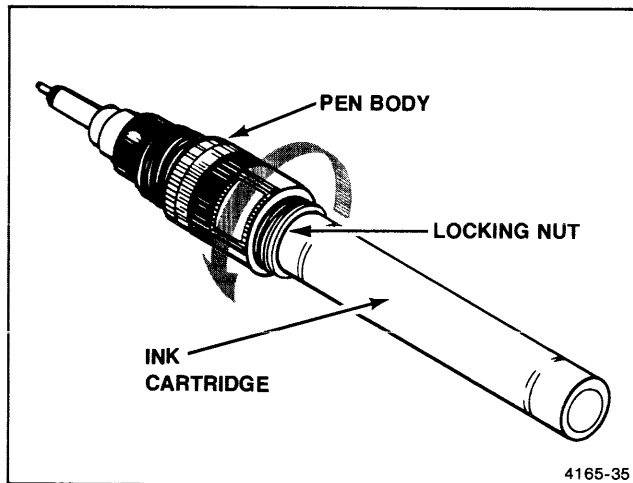


Figure E-1. Removing the 4662 Wet-Ink Pen Locking Nut.

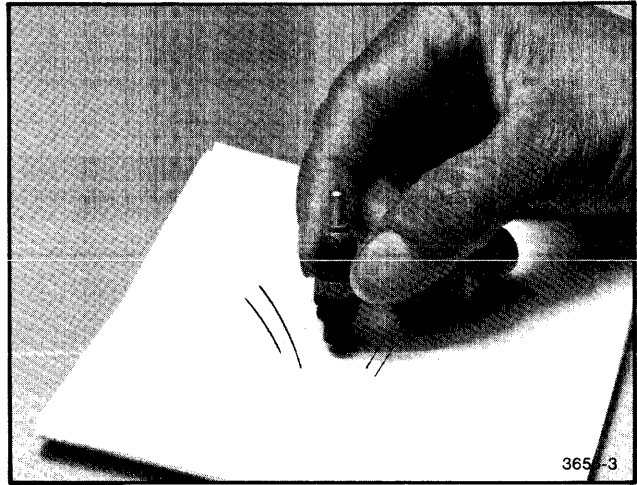


Figure E-2. Removing Excess Ink From the 4662 Pen Body.

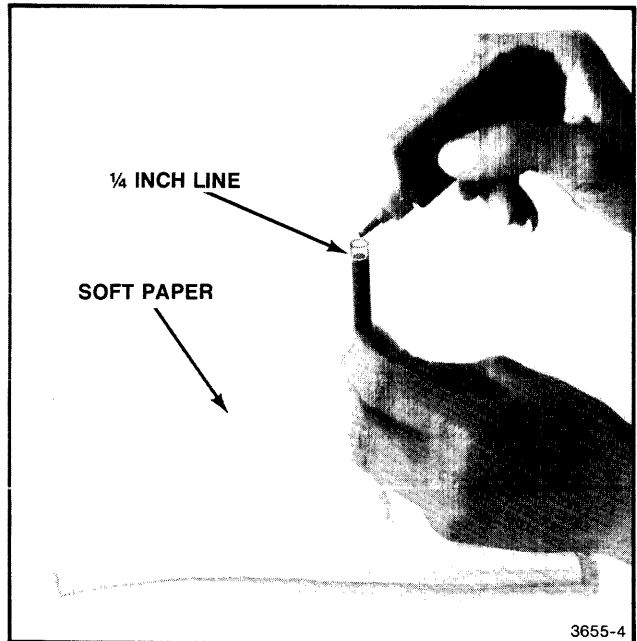


Figure E-3. Filling the 4662 Ink Cartridge.

INSTALLING WET-INK PENS IN STANDARD 4662 PLOTTERS

NOTE

For instructions on installing wet-ink pens in Option 31 equipped plotters (those with multiple pens), refer to Section 2 (Removing and Installing Pens – Multiple Pen Plotters).

The following procedure should be used for installing wet-ink pens on standard 4662 Plotters, since the procedure is somewhat different than the procedure for installing fiber-tip pens. The procedure for installing wet-ink pens in a standard 4662 Plotter is as follows:

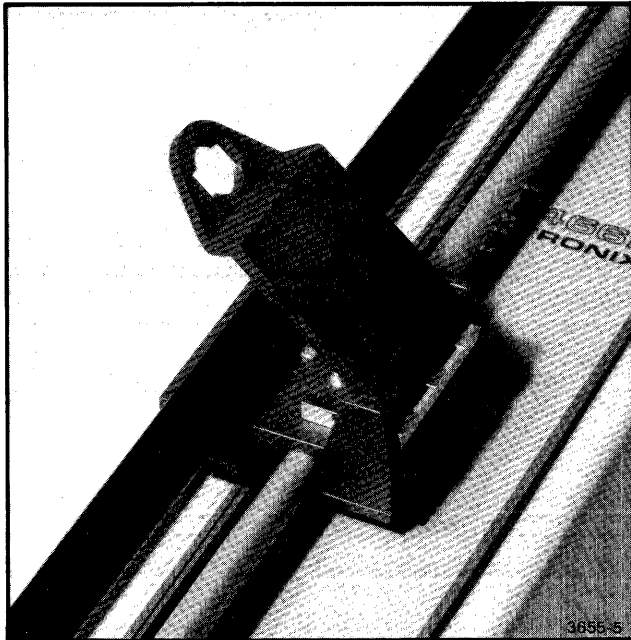


Figure E-4. The 4662 Pen Holder at the 45-Degree Detent Position.



Always check wet-ink pens to ensure that the pen tip is properly tightened. An improperly tightened pen can scratch the plotter's platen.

1. Lift the pen holder manually to the 45-degree detent position (see Figure E-4).
2. Remove the pen cap and ensure that the pen writes by writing on lint-free cloth or paper.
3. Insert the pen into the pen holder and turn the pen clockwise until it is screwed in finger-tight, as shown in Figure E-5.
4. Lower the pen holder carefully to the down position.

The pen should now be ready to write. If ink does not flow properly, refer to "Starting Ink Flow," later in this appendix.

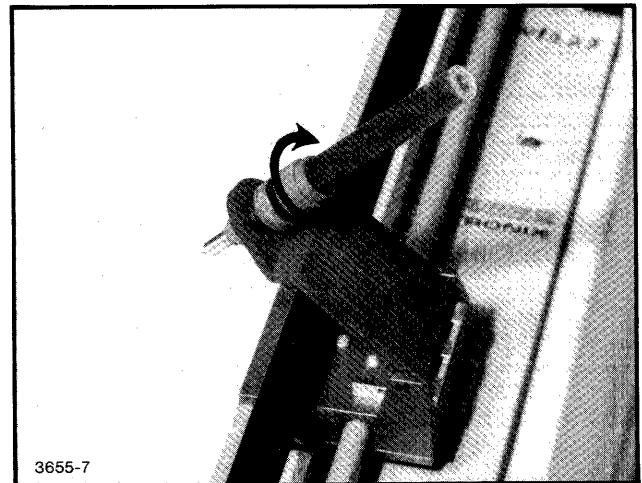


Figure E-5. Inserting 4662 Wet-Ink Pen into Pen Holder.

PEN MAINTENANCE

Proper pen maintenance prolongs pen life considerably and provides much better plots. The pen maintenance procedures are divided into four parts: Checking Tips for Wear, Cleaning Wet-Ink Pens, Starting Ink Flow, and Storage.

CHECKING TIPS FOR WEAR

The amount of tip wear depends on the type of pen and media used. The matte side of polyester is very abrasive and wears down pen tips at a much faster rate than paper or the smooth side of films.

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

Some visible signs of tip wear are the following:

- Line width increases or becomes erratic.
- Residue forms on the pen tip.
- The ink starts to skip or stops completely.

NOTE

Ink skipping or very light lines may also be a sign that the pen is running out of ink.

Wet-ink pens are more expensive than fiber-tips 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 and is available from Tektronix (see Appendix D). This magnifier is very simple to operate and allows one to check wet-ink pen tips quickly and accurately. See Figure E-6 for examples of good and worn tips as shown through the magnifier. If a tip is worn excessively, replace it.

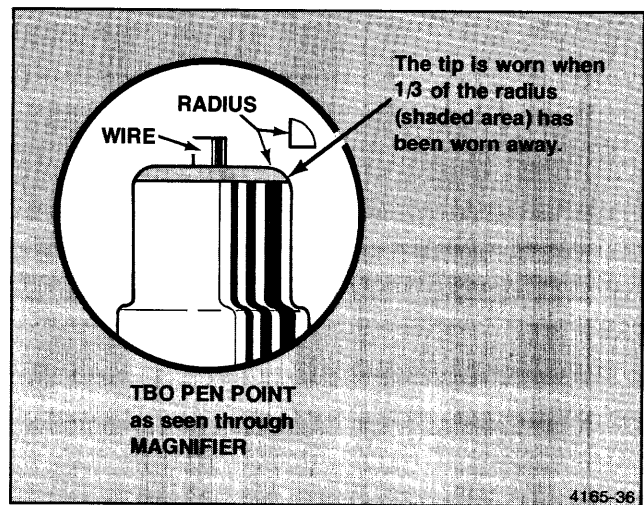


Figure E-6. Good and Worn 4662 Wet-Ink Pen Tips.

CLEANING WET-INK PENS

Wet-ink pens should be cleaned thoroughly 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 will dry inside the tip. Once the ink dries, the pen becomes much more difficult to clean.

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

The first method is to disassemble the pen as shown in Figure E-7 and place the parts into an ultrasonic cleaning tank (see Appendix D). The ultrasonic cleaning tank cleans better than other cleaning systems, especially in cases where thorough cleaning is important.

The second method is to disassemble the pen as shown in Figure E-7 and soak the parts in the parts strainer that comes with the 5.2 oz bottle of Tektronix-recommended cleaning fluid (see Appendix D). Leave the parts in the cleaning fluid until the dried ink is dissolved. Rinse with clear water and dry, making sure that the air channel and vent holes are thoroughly cleaned. Air dry all parts thoroughly before reassembly. (A pressure/suction bulb or a bellows is a handy aid for decreasing drying time.)

The third method cleans pens with the ink cartridge removed. First remove the cartridge, then screw the pen tip into the pressure/suction cleaning bulb and force cleaning fluid through the pen, as shown in Figure E-8. This method is good for cleaning pens that have not been allowed to dry and works well as a flushing agent. This method is not, however, recommended as a means of cleaning pens that have had ink in them for a long period of time.

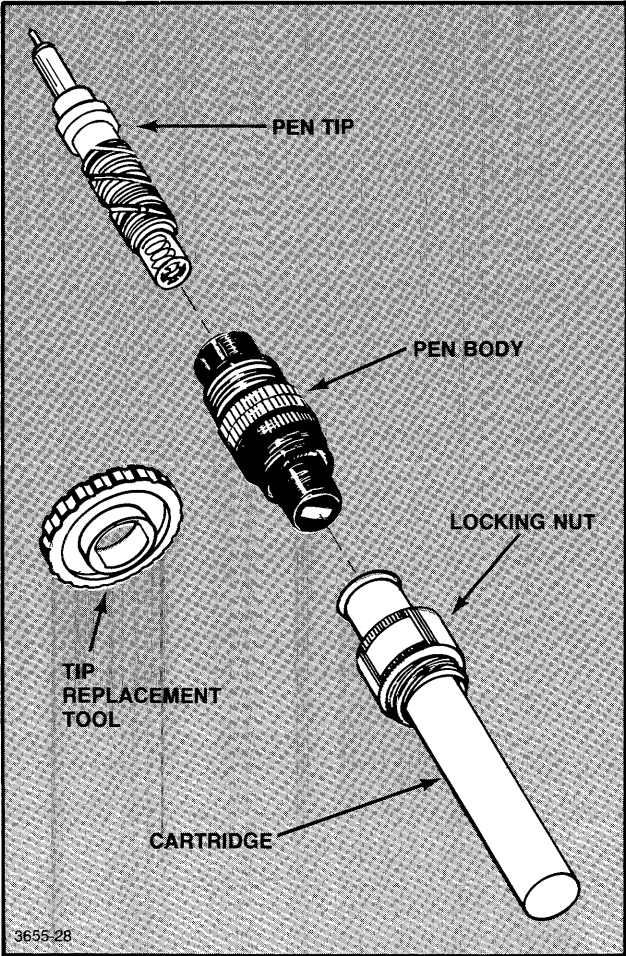


Figure E-7. Disassembling the 4662 Wet-Ink Pen.

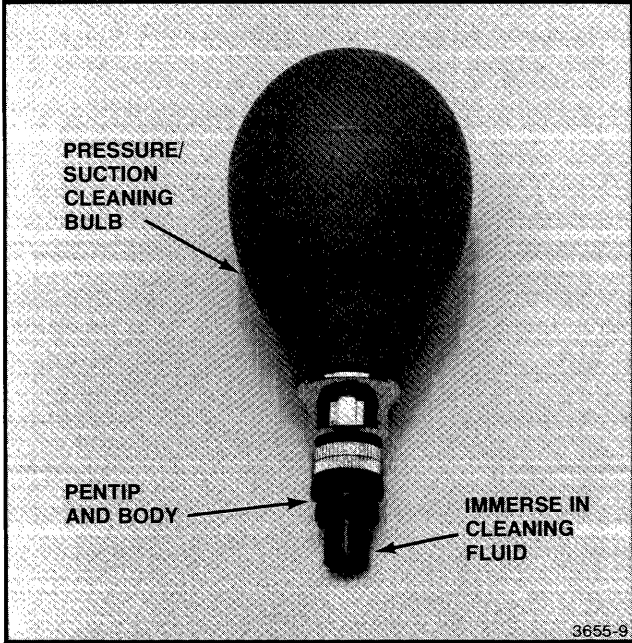


Figure E-8. Using the Pressure/Suction Cleaning Bulb to Clean Pens.

WET INK PENS

The fourth method is used when several pens are being used intermittently and complete disassembled cleaning is not needed. Turn on the ultrasonic cleaning tank and dip the pen tip into the cleaning fluid, as shown in Figure E-9. This loosens dried ink or residue that builds up in the pen 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.



Figure E-9. Using the Ultrasonic Tank to Clean Pen Tips.

When using the ultrasonic cleaning tank to clean the pen tip, you can conserve cleaning fluid by using this method. Partially fill the ultrasonic cleaning tank with water, immerse a paper cup of cleaning fluid in the water (as shown in Figure E-10), and dip the pen tip into the cleaning fluid.



Figure E-10. Conserving Cleaning Fluid.

STARTING INK 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 by writing on paper in a normal manner until ink begins to flow.

NOTE

Never shake or tap pen in an upright position, as this may plug up the vent holes and render the pen inoperative.

- Turn the pen **UPSIDE DOWN** and tap the ink cartridge sharply on a hard surface (see Figure E-11). Then, try writing on paper. Repeat if necessary.

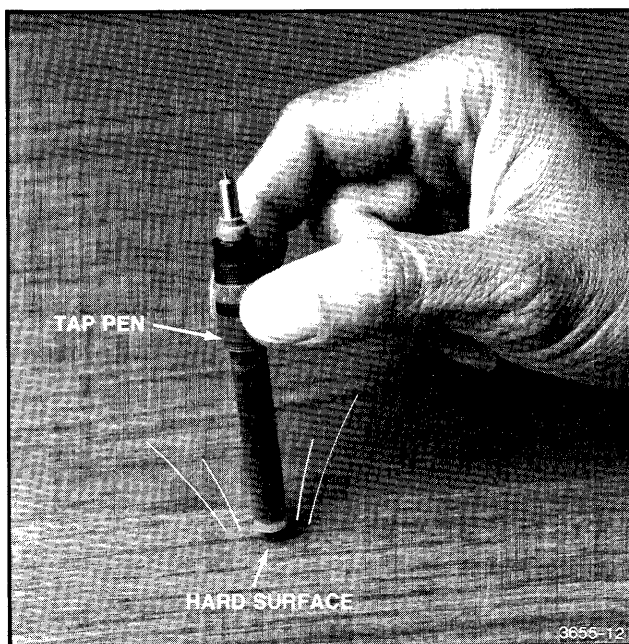


Figure E-11. Starting Ink Flow by Tapping the Ink Cartridge.

- Squeeze the pressure/suction cleaning bulb slightly and insert the tip of the pen 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 E-12).

STORING PENS

There are two different methods for 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 the pens are to be stored for extended periods of time, they should be thoroughly cleaned before storing. Remove all ink and cleaning fluid, and then store the pens at room temperature with the cap firmly in place.

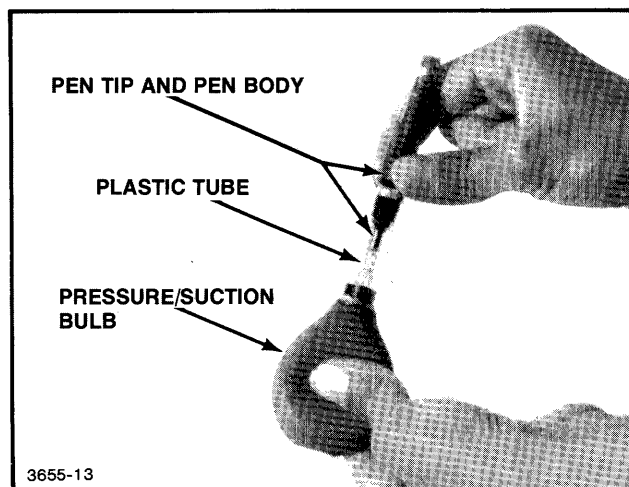


Figure E-12. Starting Ink Flow with the Pressure/Suction Bulb.

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