

# **4957 SERIES** **GRAPHICS TABLET**

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*For current Revision Status Information, see  
the Change Information section at the rear of  
this manual.*

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This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested to comply with the limits for Class A computing devices pursuant to Subpart J 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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#### **HINWEIS für den Benutzer/Betreiber:**

Die vom Betreiber zusammengestellte Anlage, innerhalb derer dies Gerät eingesetzt wird, muss ebenfalls den Voraussetzungen nach Par. 2, Ziff. 1 der Vfg. 1046/1984 genügen.

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# CONTENTS

Section 1	GETTING STARTED	Page
	Introduction .....	1-1
	Overview.....	1-1
	The 4957 Series Tablet: What Is It?.....	1-1
	The 4957 Series Tablet: Why Use It?.....	1-4
	Installation .....	1-6
	Overview.....	1-6
	Procedure.....	1-6
	Power-Up Procedure .....	1-10
	Setting Baud Rate.....	1-10
	Parameters and Dip Switches .....	1-10
	The Tilt Mechanisms .....	1-15
	Tablet System Self Test .....	1-16
Section 2	OPERATING PROCEDURES	
	Overview.....	2-1
	Operating Modes .....	2-1
	Familiarization Exercises .....	2-2
	Preparation.....	2-2
	Tablet-Based Command Exercises .....	2-3
	Terminal-Based Command Exercises.....	2-4
	Comparing Command Sets and Modes.....	2-5
	Configuration Possibilities.....	2-5
	Tektronix Terminal-Based Tablet Modes .....	2-6
	Stroke .....	2-6
	Locate .....	2-7
	Pick .....	2-7
	A Few Words About Coordinate Systems.....	2-7
	Tablet-Based Modes .....	2-8
	Point Mode .....	2-8
	Stream Mode .....	2-8
	Switch-Stream Mode .....	2-8
	Relative Mode .....	2-8
	Absolute Mode .....	2-8
	Incremental Mode .....	2-8
	Remote Request Mode .....	2-9
	Diagnostic.....	2-10
	Using the 4-Button Cursor.....	2-10
	Using the Active Area.....	2-10

<b>Section 3</b>	<b>COMMANDS</b>	<b>Page</b>
	Overview .....	3-1
	Tektronix Terminal-Based Tablet Commands .....	3-1
	Tablet-Based Commands .....	3-3
	Overview .....	3-3
	Buffering .....	3-3
	Command Descriptions .....	3-4
	Reset/Clear .....	3-5
	Format .....	3-5
	Description .....	3-5
	Set Format to ASCII .....	3-6
	Format .....	3-6
	Description .....	3-6
	Set Data Collection Mode .....	3-7
	Format .....	3-7
	Parameters .....	3-7
	Description .....	3-7
	Set Data Rate .....	3-9
	Format .....	3-9
	Parameters .....	3-9
	Description .....	3-10
	Set ASCII Delineator .....	3-11
	Format .....	3-11
	Parameters .....	3-11
	Description .....	3-11
	Set Increment .....	3-12
	Format .....	3-12
	Parameters .....	3-12
	Description .....	3-12
	Set Axis Update .....	3-13
	Format .....	3-13
	Parameters .....	3-13
	Description .....	3-13
	Set Relocatable Origin .....	3-14
	Format .....	3-14
	Parameters .....	3-14
	Description .....	3-14
	Set Resolution .....	3-15
	Format .....	3-15
	Parameters .....	3-15

<b>Section 3 (cont.)</b>	<b>Page</b>
Set Definable Resolution X Axis.....	3-16
Format .....	3-16
Parameters.....	3-16
Description .....	3-16
Set Definable Resolution Y Axis.....	3-17
Format .....	3-17
Parameters.....	3-17
Description .....	3-17
Set Tablet ID.....	3-18
Format .....	3-18
Parameters.....	3-18
Description .....	3-18
Perform Self Test and Store Results .....	3-19
Format .....	3-19
Description .....	3-19
Self Test.....	3-20
Format .....	3-20
Description .....	3-20
XOFF .....	3-21
Format .....	3-21
Description .....	3-21
XON .....	3-21
Format .....	3-21
Description .....	3-21
Factory Test .....	3-22
Format .....	3-22
Send Code Check .....	3-22
Format .....	3-22
Description .....	3-22
Confirm Configuration .....	3-23
Format .....	3-23
Description .....	3-23
Send Point .....	3-23
Format .....	3-23
Description .....	3-23
Send Self Test Results .....	3-24
Format .....	3-24
Description .....	3-24
Send Identifier .....	3-25
Format .....	3-25
Description .....	3-25

<b>Section</b>	<b>DATA FORMATS</b>	<b>Page</b>
<b>Section 4</b>	Overview.....	4-1
	Output From Tablet to Host Using a Tektronix Terminal.....	4-1
	The General Graphic Input Report Format .....	4-1
	Graphic Input Locate Report.....	4-2
	Graphic Input Pick Report.....	4-2
	Graphic Input Stroke Report.....	4-2
	Output From Tablet Direct to Host.....	4-3
	ASCII Format .....	4-3
	Binary Format .....	4-5
	Compatibility .....	4-7
<b>Section 5</b>	<b>COMMUNICATIONS</b>	
	Overview.....	5-1
	Software .....	5-1
	Hardware .....	5-2
inserted Programming Examples from original 4957 manual old Section 6		
<b>Section 6</b>	<b>DIAGNOSTIC CHECKS</b>	
	No Data.....	6-1
	Garbled Data .....	6-1
	Self Tests .....	6-2
	Tablet-Based Self Test .....	6-2
	Tektronix Terminal-Based Tablet Self Test .....	6-3
	Self Test Results .....	6-3
	ROM Checksum .....	6-4
<b>Section 7</b>	<b>MAINTENANCE</b>	
	Cleaning the Tablet Surface .....	7-1
	Periodic Maintenance .....	7-1

	<b>Page</b>
<b>Appendix A    SPECIFICATIONS</b>	
Functional Characteristics .....	A-1
Resolution.....	A-1
Accuracy.....	A-1
Jitter.....	A-1
Proximity.....	A-1
Repeatability .....	A-1
Speed .....	A-1
Electrical Characteristics .....	A-2
Power Supply Input Voltage Requirements .....	A-2
Power Consumption .....	A-2
Environmental Specifications.....	A-2
Safety and Emissions.....	A-3
Physical Characteristics .....	A-4
Tablet.....	A-4
4-Button Cursor.....	A-4
Stylus.....	A-4
<b>Appendix B    ASCII CODE CHART</b>	
<b>Appendix C    GLOSSARY</b>	
<b>Appendix D    ACCESSORIES</b>	
Standard Accessories .....	D-1
Optional Accessories .....	D-1
Options .....	D-1

## INDEX

### CHANGE INFORMATION

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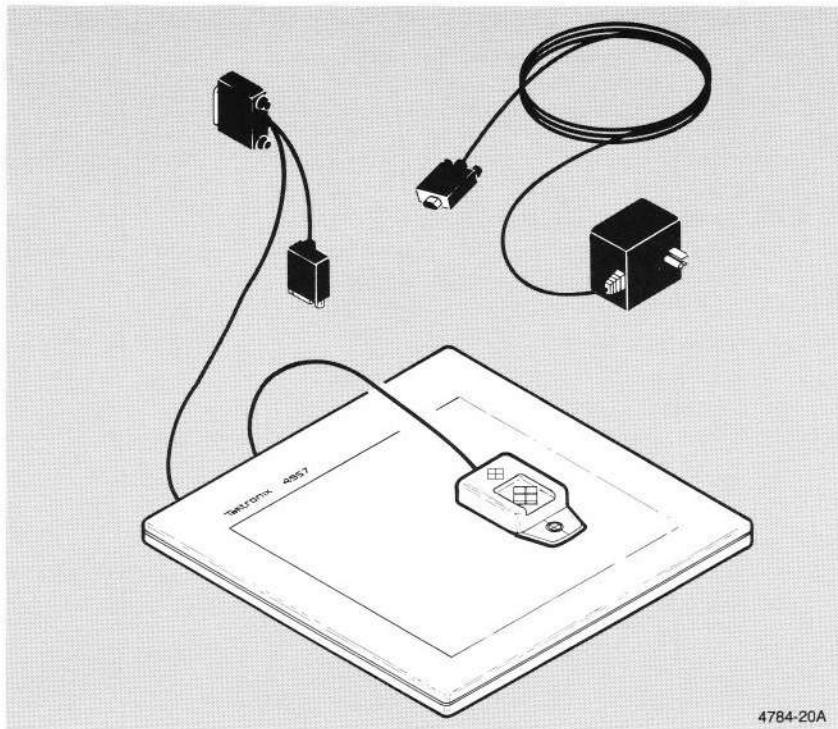
# ILLUSTRATIONS

Figure	Description	Page
1-1	The 4957 Graphics Tablet.....	viii
1-2	The 4957 Option 02 Graphics Tablet .....	viii
1-3	Parts of the 4957 Series Graphics Tablet System .....	1-3
1-4	4957 Graphics Tablet Installation .....	1-7
1-5	4957 Option 02 Graphics Tablet Installation .....	1-8
1-6	RS-232 Null Modem (Adapter) to Connect a Terminal to the Tablet .	1-9
1-7	Adjusting the Tilt On the 4957 Option 02 .....	1-14
1-8	Adjusting the Tilt On the 4957 .....	1-15
2-1	Using the 4-Button Cursor .....	2-10
2-2	The 4957 Graphic Tablet's Active Area .....	2-11
2-3	The 4957 Option 02 Tablet's Active Area.....	2-12
5-1	Data Format for 4957 .....	5-1
5-2	Data Format for 4957 Option 02 .....	5-1
5-3	Rs-232 Connector .....	5-2
A-1	The 4957 Tablet Surface Dimensions.....	A-5
A-2	The 4957 Option 02 Tablet Surface Dimensions .....	A-6
A-3	4-Button Cursor Dimensions .....	A-7
A-4	Stylus Dimensions .....	A-8
A-5	Bottom View of Tablet .....	A-9
D-1	Tektronix Power Plug Options .....	D-2

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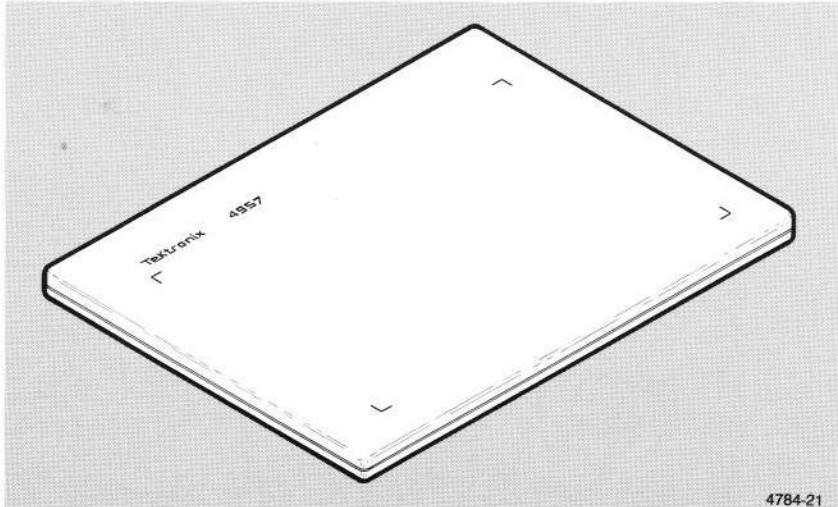
# **TABLES**

<b>Table</b>	<b>Description</b>	<b>Page</b>
1-1	DIP Switch 1 Settings .....	1-11
1-2	DIP Switch 2 Settings .....	1-12
1-3	DIP Switch 3 Settings .....	1-13
2-1	Operating Modes .....	2-5
3-1	Common Tektronix Terminal-Based Commands .....	3-2
3-2	Tablet-Based Commands Summary .....	3-2
4-1	Binary Universal Input/Output Format .....	4-5
4-2	Coding of Cursor Buttons .....	4-6
6-1	Results of the Tablet-Based Self Test .....	6-2
6-2	Self-Test Results .....	6-3



4784-20A

Figure 1-1. The 4957 Graphics Tablet.



4784-21

Figure 1-2. The 4957 Option 02 Graphics Tablet.

# **LIST OF CONTENTS**

- Section 1    GETTING STARTED**
- Section 2    OPERATING PROCEDURES**
- Section 3    COMMANDS**
- Section 4    DATA FORMATS**
- Section 5    COMMUNICATIONS**
- Section 6    DIAGNOSTIC CHECKS**
- Section 7    MAINTENANCE**

# GETTING STARTED

## INTRODUCTION

### OVERVIEW

This manual provides information for operating the 4957 and 4957 Option 02 Graphics Tablets. Included are instructions for setting up, operating, programming, and performing basic troubleshooting.

### THE 4957 SERIES TABLET: WHAT IS IT?

The Tektronix 4957 and 4957 Option 02 Graphics Tablets, hereafter referred to as simply "tablets," are very similar, except for size. Therefore this manual covers both tablets, noting where they differ.

The tablets provide a convenient method of converting graphic information into digital form for entering into a computer or automated design station. The operator places a graphic image on the tablet surface, traces over it with the cursor (or stylus), and the tablet calculates the cursor's (or stylus') digitized location coordinates.

The 4957 Series tablets include:

- The tablet body, with an active area for digitizing, and a border where an internal controller exists.

The active area of the 4957 is 11.7" x 11.7". The 4957 tablet body has a non-detachable communications cable with a 25-pin male RS-232 connection on the end, and a branching 9-pin male "D Shell" connection for the power supply cord. The 4957 body also has a modular connector port for connecting the stylus or cursor. (See Figure 1-3.)

The active area of the 4957 Option 02 is 18" × 12". The 4957 Option 02 has three ports in the body: one is a 25-pin male port for a detachable RS-232 communications cable with a branching power supply port, and the other is a modular connector port for the cursor or stylus. The third 9-pin port on the tablet body is used for connecting the power supply cord. The back of the Option 02 tablet body has three DIP switches for setting configuration parameters, such as baud rate and report format. It also has an access hole for a pushbutton reset switch on the circuit board inside.

- The cursor. A 4-button cursor is standard for choosing the coordinate locations to digitize. Also included is a decal with Z-1-2-3 labels for converting from Option 14 tablets. A pen-like stylus is optionally available for digitizing coordinate points.
- The 115 VAC 60 Hz power supply, which provides power to the tablet.
- The 4957 Option 02 comes with a separate RS-232 cord to connect the tablet with a terminal. Like the 4957, this cord has a branching 9-pin port for the power supply.

The standard and optional accessories are listed in Appendix D.

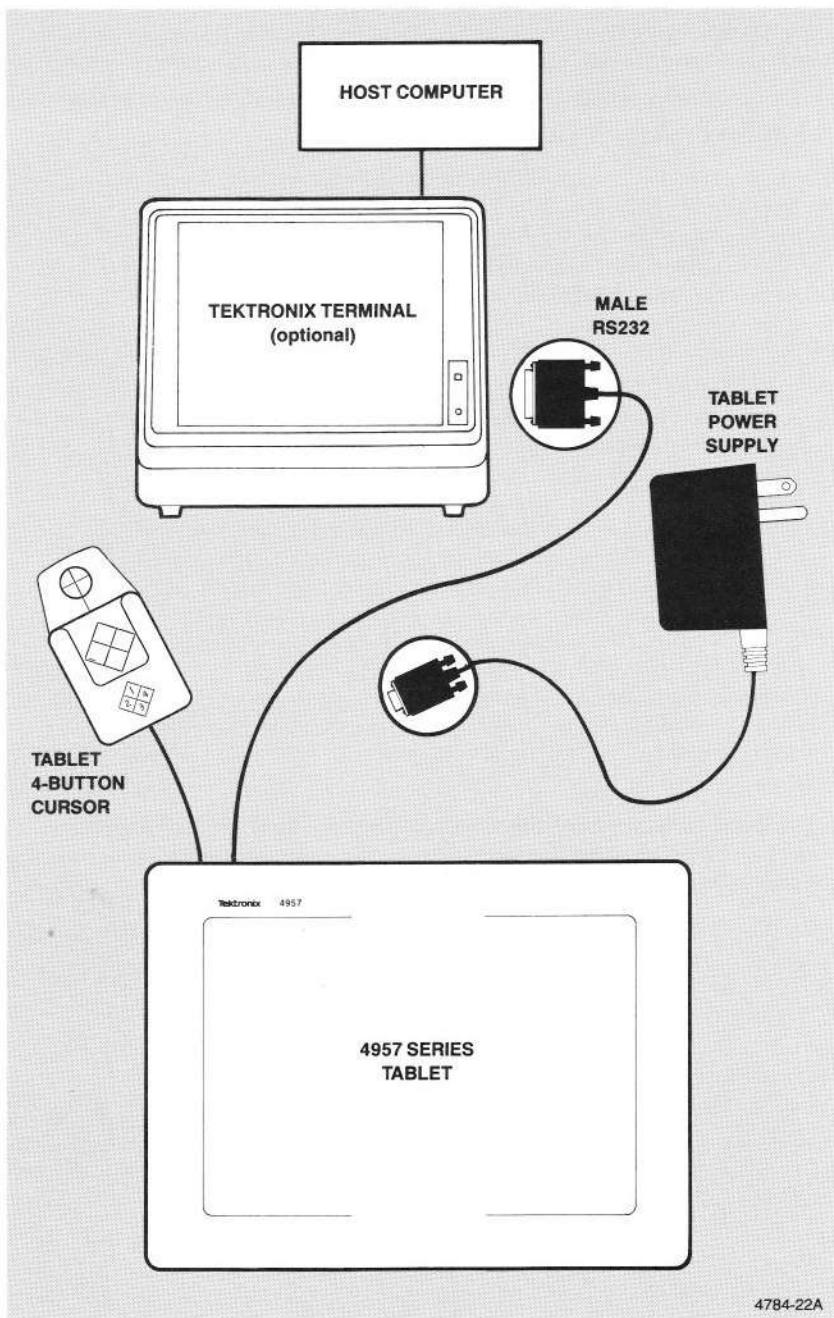


Figure 1-3. Parts of the 4957 Series Graphics Tablet System.

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## THE 4957 SERIES TABLET: WHY USE IT?

The Tablets can be used with 4170 hosts and the following Tektronix terminals, which are designed with custom 4957-compatible firmware drivers:

- 410X (except 4105), 410XA, CX410X, CX410XA series, and 4111 terminals.
- 411XB and 412X series terminals.

### NOTE

*The 410X, 410XA, CX410X, CX410XA series, and 4111 terminals all have 2-port peripheral interface (2PPI), and have no firmware version requirements for compatibility.*

### NOTE

*Used with the 4957, the Tektronix 411XB and 412X terminals with Option 10 (3-port peripheral interface or 3PPI) require Version 6 or higher firmware in the 3PPI. Used with Option 02 Tablets, the Tektronix 411XB and 412X terminals with Option 10 require Version 7 or higher. To obtain the firmware level information from the terminal, (1) enter LOCAL and DIALOG modes, (2) ensure that SET UP is turned off, and (3) type in  $\text{FcIQ10}$  (no spaces and no  $\text{c}_R$ ). The terminal will display "10 X", where "X" is the firmware level of the Option 10 interface.*

In addition, the tablet can be driven directly by any host system (such as a 405X with data communications capability, and the 4170 local programmability unit) using host software control. Refer to Section 3 for information on programming a Tablet.

The Tablet, when used with the appropriate terminal/host software application program can: digitize images, control the cursor on the terminal screen, and make menu selections.

These tablet abilities are actually capabilities of the terminal or host's application software. When raw coordinate location data reports are sent from the tablet, the host's software manipulates the data to provide digitized data for the functions described below:

- Digitizing graphic images. The tablet can help you transfer a wide variety of drawings, including mechanical parts diagrams, floor plans, maps, architectural designs and electronic schematics from paper to computerized graphics data bases.

To digitize, place the image on the tablet's active area and then trace the outline of the drawing, or the significant endpoints of line segments, with the cross hairs on the 4-button cursor. As you trace the drawing, the appropriate applications software reads the X and Y coordinates from the tablet and transfers them to your host computer and/or terminal.

- Terminal screen cursor steering. You can use the tablet to move a screen cursor around a computer terminal display. This can be done in either an absolute coordinate system commonly found on a tablet, or in a relative coordinate system commonly found on a graphics "mouse" or on thumbwheels. When using the cursor steering mode, move the tablet cursor with your hand and the display screen cursor moves in a similar manner.
- Menu selection. The terminal augments your terminal and/or host keyboard as a menu selection device, and allows you to call a wide range of functions directly from the tablet. In this mode, the tablet is used as a custom input device. Putting extra functions on the tablet leaves more room on the screen for critical design work.

# INSTALLATION

## OVERVIEW

This part of the manual explains how to install the tablet. These procedures are also helpful when moving and reinstalling the tablet, or when digitizing problems occur and you are ensuring that the tablet is properly installed before calling a service representative.

When additional operating adjustments are necessary, such as internal control parameter changes, refer to Parameters and DIP Switches, below.

## PROCEDURE

Although the 4957 looks different than the 4957 Option 02, the installation procedure is much the same. When connecting cables, be sure to tighten the screws on each plug connector with a screwdriver to ensure a tight fit. Install the tablet as follows (refer to Figure 1-4 and 1-5):

1. Connect the cursor or stylus cable plug into the modular connector port on the back of the tablet body.
2. (Option 02 Tablet only) Connect the unbranched end of the RS-232 cable to the 25-pin male RS-232 port on the back of the tablet body. (The 4957 does not require this step, since the RS-232 cable is already wired into the tablet body.)
3. Connect the other (branched) end of the RS-232 communications cable to the corresponding host computer or terminal's peripheral RS-232 communications port.

### NOTE

*If both the tablet's RS-232 port and the terminal's peripheral RS-232 port are male, you will need to use a male to male adapter to connect the tablet to the terminal.*

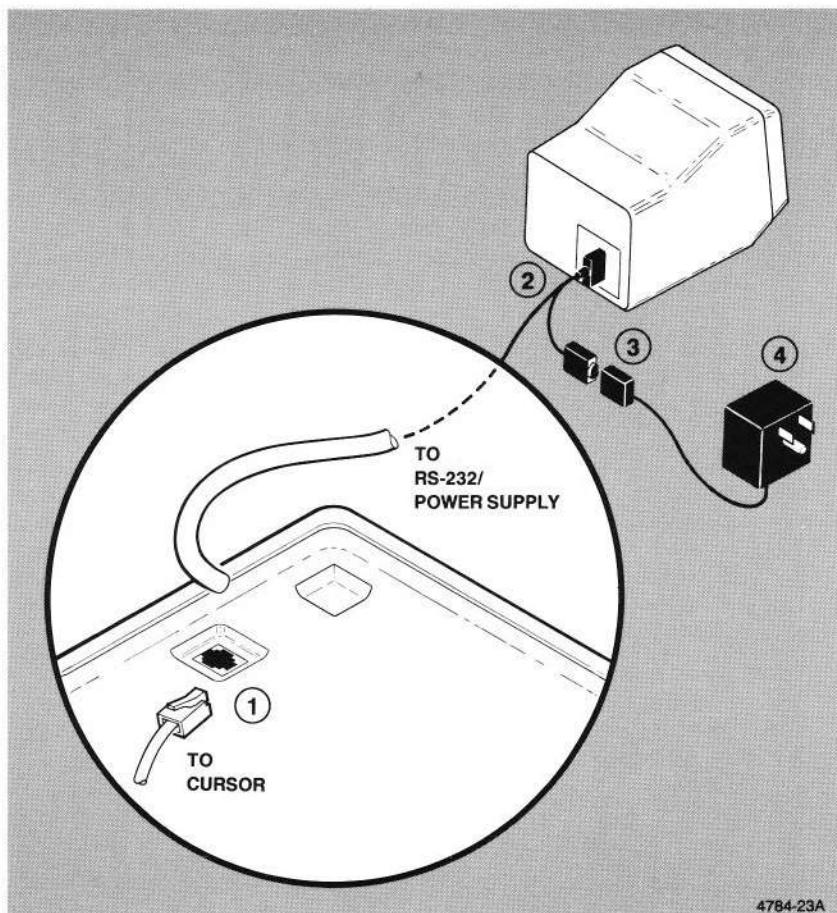
### NOTE

*The tablet transmits on Pin 2 and received on Pin 3. However, when connecting the tablet to some terminals, it may be necessary to use an adapter that reverses the RX and TX communication lines. This allows the tablet to transmit on Pin 3 and receive on Pin 2 (see Figure 1-6, below).*

4. Connect the power supply to the 9-pin power supply port.

On the 4957 Tablet, the power supply port is located on a branch of the RS-232 cable.

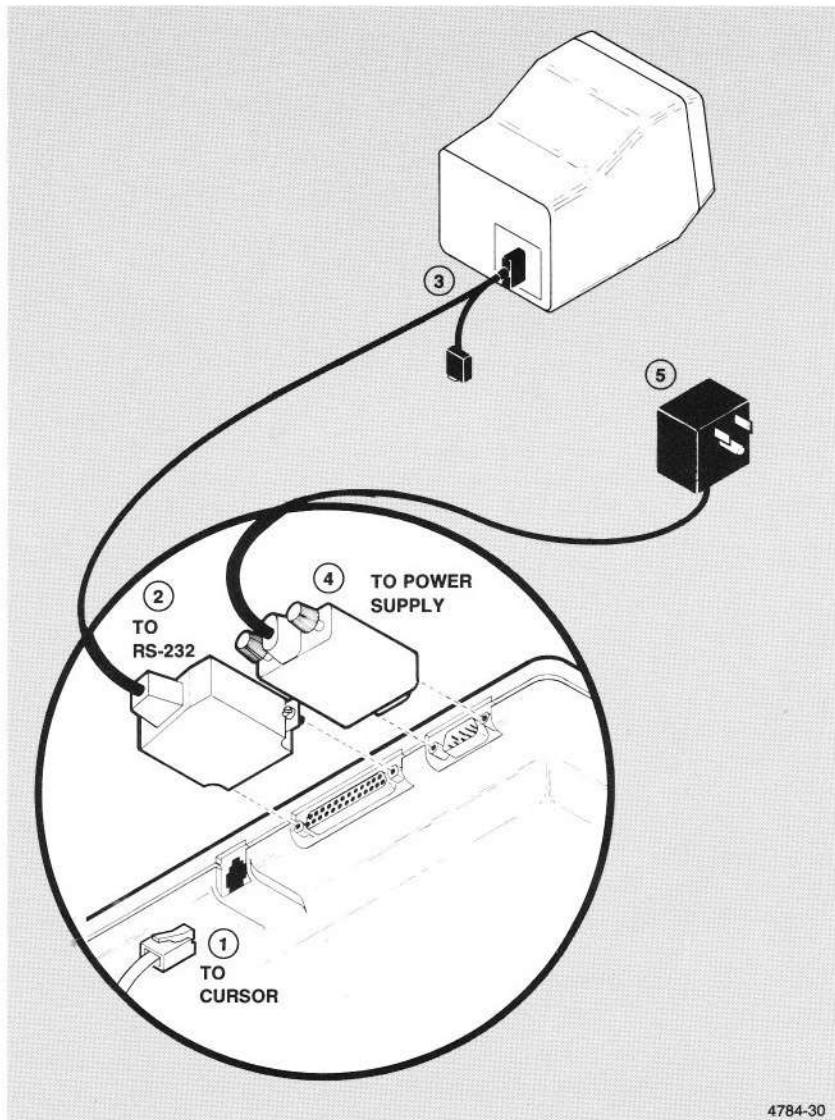
On the Option 02 Tablet, the power supply port is located on the side of the tablet base.



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Figure 1-4. 4957 Graphics Tablet Installation.

5. Connect the tablet power supply to a wall power outlet.



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Figure 1-5. 4957 Option 02 Graphics Tablet Installation.

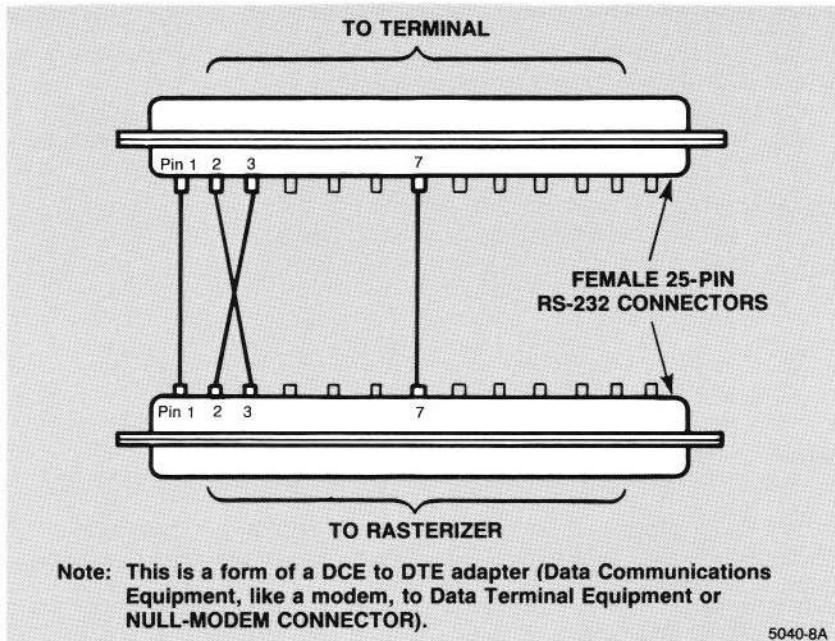


Figure 1-6. RS-232 Null Modem (Adapter) to Connect a Terminal to the Tablet.

## POWER-UP PROCEDURE

1. Turn ON the host computer and/or terminal. Enter SET UP mode if the host is a Tektronix terminal with peripheral ports.

2. Set terminal host port operating parameters. If you are using a 3PPI terminal (411XB or 412X series), check for, or make the following entries: (X is the Peripheral Port Number — 0, 1, or 2.)

PASSIGN PX: 4957 (for 4957 tablets); or  
PASSIGN PX: 4958 (for 4957 Option 02 tablets)  
PBAUD PX: 9600  
PBITS PX: 1 7  
PPARITY PX: ODD

### NOTE

*When using the 4957 Option 02 Graphics Tablet with 3PPI terminals, invoke the 4958 driver instead of the standard 4957 driver. The Option 02 tablet has increased performance capabilities, requiring this broader-based driver.*

If you are using a 2PPI terminal (410X, CX410X, 410XA, CX410XA, or 4111 series), check for, or make the following entries: (X is the Peripheral Port Number — 0 or 1.)

PBAUD PX: 9600  
PBITS PX: 1 7  
PPARITY PX: ODD

3. The tablet is now ready for use.

## SETTING BAUD RATE

The baud rate on the 4957 Series Tablet is preset at 9600, but users can change these baud rates to 19200, 4800, 2400, 1200, 600, 300, or 150 baud. The baud on the 4957 can be reset using an "autobaud" feature. On the other hand, the 4957 Option 02 baud rate is set using the DIP switches, as shown in Tables 1-1, 1-2, and 1-3.

To operate autobaud on the 4957, first open the tablet case, remove the jumper AA, and reassemble the case. Then send an ASCII SPACE ( $\$P$ ) character as the first character. The tablet will analyze the timing of the SPACE character and determine the baud rate of the host. The tablet will then expect all subsequent communications to use the same baud rate.

## PARAMETERS AND DIP SWITCHES

The tablets are shipped from the factory with predefined parameter settings to ensure compatibility with Tektronix line of terminal and workstation products. On the 4957, the settings are internal to the tablet. On the 4957 Option 02, the parameters can be changed with three DIP switches on the back of the tablet body. These DIP switches, their settings and defaults are shown in Tables 1-1, 1-2, and 1-3, below. Many of these parameters can be overridden by software commands on both tablets.

The first DIP switch controls baud rate, parity, parity setting, number of stop bits, echo, and proximity transmission.

Table 1-1 shows settings for the first DIP switch (left switch).

**Table 1-1**  
**DIP SWITCH 1 SETTINGS**

Operating Characteristics and Parameters	Factory Setting	SWT 1	SWT 2	SWT 3	SWT 4	SWT 5	SWT 6	SWT 7	SWT 8
BAUD RATE: (No Command Override)									
150	X	on	on	on					
300		off	on	on					
600		on	off	on					
1200		off	off	on					
2400		on	on	off					
4800		off	on	off					
9600		on	off	off					
19200		off	off	off					
PARITY: (No Command Override)	X					on			
enable						off			
disable									
PARITY SETTING: (No Command Override)	X						on		
even							off		
odd									
NUMBER STOP BITS: (No Command Override)								on	
two	X						off		
one									
ECHO: (No Command Override)								on	
on	X						off		
off									
Proximity Trans: (No Command Override)	X								on
always trans.								off	
only in prox.									

The second DIP switch controls report format, ASCII report terminator, and report collection modes.

The settings for the second DIP switch are shown in Table 1-2, below.

**Table 1-2**  
**DIP SWITCH 2 SETTINGS**

Operating Characteristics and Parameters	Factory Setting	SWT 1	SWT 2	SWT 3	SWT 4	SWT 5	SWT 6	SWT 7	SWT 8
		not used	not used	not used					
REPORT FORMAT: (Command Override to ASCII format) binary ASCII	X				on off				
ASCII REPORT TERMINATOR: (No Command Override) LF No LF	X					on off			
							not used		
REPORT COLLECTION MODES: (Command Override Avail) Remote Request Switch Stream Point Stream	X							off on off on	off off on on

The third DIP switch controls ASCII report terminator, tablet identifier, and report rate.

The settings for the third DIP switch (right switch) are shown in Table 1-3, below.

**Table 1-3  
DIP SWITCH 3 SETTINGS**

Operating Characteristics and Parameters	Factory Setting	SWT 1	SWT 2	SWT 3	SWT 4	SWT 5	SWT 6	SWT 7	SWT 8
		not used							
ASCII REPORT TERMINATOR: (No Command Override) $c_R$ No $c_R$	X		on off						
TABLET ID: (Command Override Available) 1 0	X			on off					
					not used	not used			
REPORT RATE: (Command Override Available) 1 rps 2 rps 5 rps 10 rps 30 rps 60 rps 75 rps 80 rps	X						off on off on off on off on	off off on on off off on on	off off off on off on on on

## THE TILT MECHANISMS

The tilt mechanism for the 4957 is different from that on the 4957 Option 02.

To adjust the 4957 Option 02 tilt mechanism, pull out the metal bail as shown in Figure 1-7.

The tilt mechanism on the 4957 allows a 0 to 20 degree tilt orientation, and can be adjusted as follows (refer to Figure 1-8):

- For a zero degree tilt attach the four black mounting feet to each of the four corners of the tablet. Remove the adjustable tilt mechanism by pulling it all the way forward towards the tablet end where the cursor and the main cables attach.
- For a 5 degree tilt, remove the mounting feet, position the side supports flush with the tablet case and extend the longitudinal support as far as possible towards the rear of the tablet (i.e. towards the end with the cables).
- For a greater than 5 degree tilt, first move the longitudinal support towards the front (i.e. the X-axis) of the tablet. If an even greater tilt is desired, also move the side supports from their horizontal to their vertical orientation.

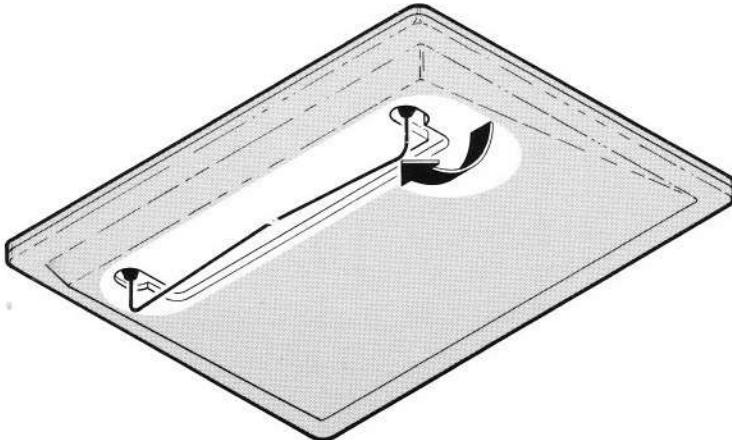
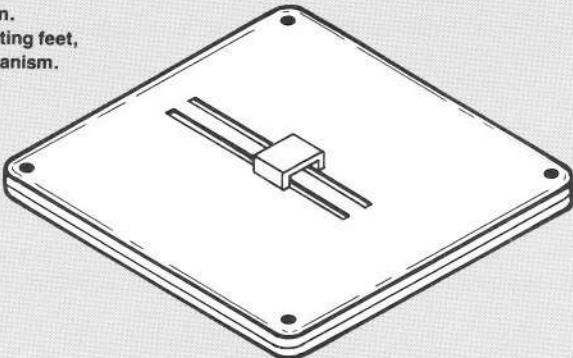
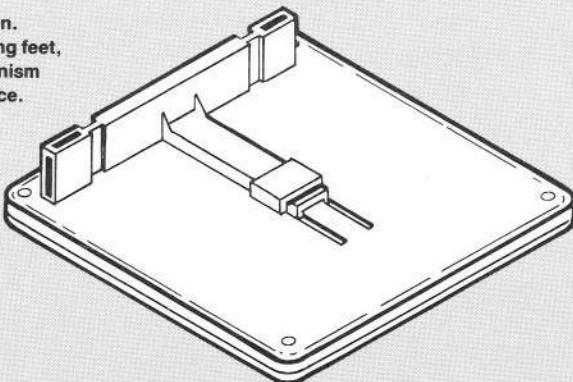


Figure 1-7. Adjusting the Tilt on the 4957 Option 02.

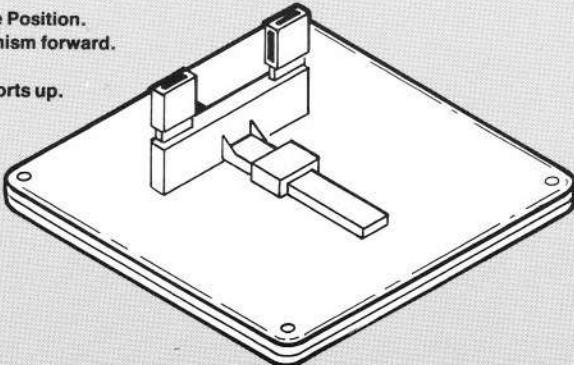
**A. 0 Degree Position.**  
Insert four mounting feet,  
remove tilt mechanism.



**B. 5 Degree Position.**  
Remove mounting feet,  
insert tilt mechanism  
minimum distance.



**C. 5 + to 20 Degree Position.**  
Push tilt mechanism forward.  
For more tilt  
move side supports up.



4784-24

Figure 1-8. Adjusting the Tilt on the 4957.

## TABLET SYSTEM SELF TEST

If you want to check that the tablet is functioning correctly, run one of the following self test procedures:

- If the tablet is connected to a Tektronix terminal that specifically supports the 4957 series tablet (such as the 410X, 411XB, and the 412X series) use the terminal-based tablet self test.
- If the tablet is connected directly to a host computer (such as the 405X series or the 4170 unit) use the tablet-based self test.

For instructions on running either self test as well as on performing various other diagnostic routines, refer to Section 6, Diagnostic Checks.

# OPERATING PROCEDURES

## OVERVIEW

This section explains how to use the tablet. It provides familiarization exercises using both terminal-based and tablet-based commands; it also explains the available terminal and tablet modes and commands.

You should find the 4957 Series tablet simple to operate. To operate, merely do the following:

1. Use terminal-based or tablet-based commands to enable one of the corresponding operating modes described below.
2. Move the cursor or stylus over the tablet surface.

The operating modes determine when data is sent, how much data is sent, and whether it is necessary to press a cursor button to transmit data.

Cursor manipulation determines what data is sent.

## OPERATING MODES

You can control the tablet using tablet-based modes and the tablet-based command set, or using terminal-based modes and the terminal-based command set.

The tablet-based command set uses commands native to the tablet. The terminal-based command set automatically sends groups of tablet-based commands to the tablet. Refer to "Comparing Command Sets and Modes," below, for details about these command sets and their use in your system environment.

The familiarization exercises are different for tablet-based and terminal-based command sets.

# FAMILIARIZATION EXERCISES

## PREPARATION

1. Do power-up procedure as detailed in Section 1, Installation, with terminal host port operating parameters as follows:

Baud Rate = 9600  
Parity = Odd  
Echo = Off  
Data Bits = 7  
Start Bits = 1  
Stop Bits = 1

2. The tablet is now ready for use.

### *NOTE*

*The 4957 series tablets are factory set at 9600 baud. See Section 1, Installation, for details on setting baud rates other than 9600.*

### *NOTE*

*You may need to use an RX-TX reversing adapter if you are using a terminal other than the 41XX series.*

### *NOTE*

*You may need to use a male to male adapter if both the terminal and tablet ports are male.*

3. Exercise the tablet with either tablet-based or terminal-based commands, as described below.

## **TABLET-BASED COMMAND EXERCISES**

If you are going to control your tablet with tablet-based commands, follow this tablet-based familiarization procedure to exercise several features of the tablet.

1. Send the following preliminary commands to tablet:
  - a. `EcZ` (reset)
  - b. `EcQ` (set to ASCII data format)
  - c. `EcX` (ROM Checksum code check printed on screen)
  - d. `EcC7` (set to 100 points/inch)
2. Exercise Remote Request Mode:
  - a. Enter `EcM3` (remote request)
  - b. Set cursor on "active area" of tablet.
  - c. Enter `EcG` (send coordinates)  
(Coordinates and switch status should be printed on screen at this point.)
  - d. Move cursor and while pressing any cursor button, repeat step "c" of this procedure as many times as you like, noting the affect on coordinates and switch status on screen.
3. Exercise Point Mode:
  - a. Enter `EcM1` (sets tablet in point mode)
  - b. Move cursor around tablet's active area and periodically press any of the cursor's buttons.  
(Coordinates and switch status should be printed on screen each time a cursor button is pressed.)
4. Exercise Stream Mode:
  - a. `EcR1` (sets tablet to 2 coordinates/sec when in stream mode)
  - b. Enter `EcM0` (places tablet in stream mode)  
(Coordinates and switch status should be printed on screen at the rate of 2 per second.)
  - c. While in stream mode, move cursor around tablet and periodically press different cursor buttons.
  - d. Lift cursor off tablet. If using the 4957, the terminal screen stops printing coordinates and cursor status. If using the 4957 Option 02 and DIP Switch 1, #8 is set to its default (always transmitting), the tablet will continue to send data with a flag showing 32.
  - e. Place cursor back on tablet. Screen resumes printing coordinates, cursor button status, and proximity status.
5. To reset the tablet to defaults and complete the familiarization exercise, enter `EcZ`. At this point you may refer to Commands, Section 3 if you want to explore tablet-based commands in more depth.

## TERMINAL-BASED COMMAND EXERCISES

If you are going to control your tablet with terminal-based commands, follow this terminal-based familiarization procedure to exercise several features of the tablet. This exercise takes place with the terminal in Setup mode.

To exercise the tablet using terminal-based commands, you need a 41XX TEKTRONIX terminal, and a TEKTRONIX 4957 Series Graphics Tablet.

### NOTE

*If connected to a 410X terminal Port 1, replace the number 10 with a 16 in commands 1, 2, and 5. If the 410X terminal is connected to Port 0, replace the 10 with an 8 in commands 1, 2, and 5.*

1. Enter **GININK 10 1** on the terminal to enable inking.
2. Enter **GINENABLE 10 X** on the terminal, where X specifies the number of points the terminal will accept. This enables the tablet for multiple points.
3. Press the **SETUP** button on the terminal to turn off the Setup mode. (GIN is suspended in Setup mode.)
4. Write a name (or anything else) on the screen by moving the tablet cursor and pressing any cursor button.
5. Re-enter Setup mode by pressing **SETUP** to disable GIN. Then end the exercise by typing: **GINDISABLE 10**. Press **RETURN**. (Pressing **CANCEL** has the same affect as entering **GINDISABLE**.)

For more details about the terminal-based commands, refer to the specific Tektronix terminal's Command Reference or Programming manual.

## COMPARING COMMAND SETS AND MODES

The terminal-based command set is simpler to use than the tablet-based command set, but is less specific and versatile. The terminal-based command set controls the terminal-based modes, and can be used with Tektronix 410X, 411X, and 412X terminals. It has software compatibility with previous Tektronix tablet offerings, such as 411X Option 13 and 14.

Tablet-Based Commands are used with computing systems which do not support the tablet. These commands control the tablet-based modes, offering more tablet flexibility (such as resolution and speed) which the terminal-based command set does not allow.

Table 2-1 shows the commands available under terminal-based and tablet-based control.

**Table 2-1  
OPERATING MODES**

Tektronix Terminal-Based Tablet Commands	Tablet-Based Commands
Stroke	Point
Locate	Stream
Pick	Switch-Stream
	Relative
	Incremental
	Remote Request

## CONFIGURATION POSSIBILITIES

Your system environment determines whether you use the tablet-based or terminal-based command sets. The tablet can be used in several different system configurations. It can be:

1. Under local control of a "smart" terminal (a terminal which can support terminal-based modes and commands). Only terminal-based modes and commands can be used with this configuration.
2. Under host control, with a "dumb" terminal (a terminal which does not support terminal-based modes and commands) placed between the host and the tablet. This configuration will only accommodate tablet-based modes and commands.
3. Under host control, with a "smart" terminal placed between the host and the tablet. This configuration will support both terminal-based and tablet-based modes and commands.
4. Under dual line host control, with the host placed between the tablet and either a "smart" or a "dumb" terminal. This configuration will only support tablet-based commands and modes.

## TEKTRONIX TERMINAL-BASED TABLET MODES

The tablet operates as a GIN (Graphic INput) device when connected to a Tektronix graphic terminal. Tablet modes are controlled by the operator and/or the software applications program that is being used.

The terminal-based commands are entered in either Setup or GIN mode. In Setup mode, the commands are entered manually, independent of host control. In GIN mode, the commands are programmed for execution under host control.

Following is a brief description of the Tektronix terminal-based tablet modes. For more details, see the software users documentation for operating procedures; for details about Tektronix GIN operations and commands, see the following manuals:

- 4110 Series Host Programmers Manual
- 4110/4120 Series Command Reference Manual
- 4106/4107/4109/CX Programmers Reference Manual

### *NOTE*

*The exact Tektronix terminal-based tablet modes available on any system may vary between terminal models. Check the appropriate terminal manual for more information on the exact modes available on your own system.*

### **Stroke**

Begin a stroke by pressing any button on the tablet cursor. Then move the cursor across the tablet surface and end the stroke by releasing pressure on the cursor button. Each stroke consists of many graphic input events. Each event causes the terminal to send a report to the host computer.

## **Locate**

When using the Locate mode, move the cursor to a point on the tablet and press a button on the cursor. In response, the terminal sends a report to the host that describes which key was pressed and the location of the cursor in the active area.

## **Pick**

When the display cursor touches a desired segment (or part of a segment) on the screen, press a button on the tablet cursor. This signals a graphic input event. A report is sent from the terminal to the host about: (1) which key was pressed, (2) where the cursor was when you pressed that key, (3) which segment was picked, and (4) what part of that segment was picked.

## **A Few Words About Coordinate Systems**

You can use the modes described above with either an absolute or a relative coordinate system.

Generally speaking, the position and movement of the screen's display cursor corresponds to the position of the tablet's cursor on the active area. The absolute provides a one-to-one relationship between the tablet's active area and the terminal's display. If the tablet cursor is in the lower left corner of the tablet, the display cursor will also be in the lower left corner of the display.

The relative mode proves a relative relationship between the tablet cursor and the display cursor. If you move the tablet cursor to the right, the display cursor also moves to the right. However, the display cursor can be anywhere on the screen independent of the location of the tablet cursor.

## TABLET-BASED MODES

### Point Mode

A single coordinate pair is sent from the tablet only when a stylus or cursor button is pushed. The **SET INCREMENT** command is not operative in Point mode. However, previous increment mode settings are not affected by going to Point mode and then back to either Stream, Switch-Stream, or Remote Request.

### Stream Mode

The 4957 outputs coordinates continuously as long as the cursor is within the active area and in proximity of the tablet, and the Increment mode is set to **000**. If the cursor leaves the active area, the tablet will send three additional coordinate pairs with the out-of-proximity bit set before stopping point transmission. Once out-of-proximity, the last valid point taken will be sent as long as a button is pushed. For the 4957 Option 02, this is only true if DIP Switch 1 #8 is set to **OFF**.

### Switch-Stream Mode

This mode is identical to Stream mode except that data is transmitted from the tablet only when a cursor button is pushed.

### Relative Mode

Relative mode: Only changes in coordinate values are sent by the tablet. A new point location reflects "relative" movement of the cursor rather than locating "absolute" coordinates. This mode may be used in conjunction with all other modes, and will give relative coordinate values, useful for steering a terminal's cursor.

Negative numbers (indicating left and/or downward cursor movement) can only be distinguished from positive numbers by the value of the sign bit (refer to Table 4-1). If there is no cursor movement, coordinate values of zero will be sent (refer to "Output From Tablet Direct to Host" in Section 4).

## Absolute Mode

Absolute mode: Gives coordinate values which reflect absolute position relative to the active area. Like the relative mode, it can be used with all other modes. On the 4957 and on the 4957 Option 02, absolute mode is the default mode for the tablet. On the 4957, absolute mode is not specifically selectable by command; on the 4957 Option 02, it is selectable by command. (Refer to Section 3, Commands, **SET DATA COLLECTION MODE.**)

## Incremental Mode

The Incremental mode sets the distance (in resolution elements) that the cursor must be moved before the tablet sends a new coordinate location report, and may be used in conjunction with Stream, Switch-Stream, or Remote Request data collection modes. When the change in the position of the cursor satisfies the increment set in either the X or Y direction or both, the tablet sends a new coordinate pair with the new X, Y position. This mode is especially useful in curve tracing operations. The incremental mode reduces the amount of data sent from the tablet.

## Remote Request Mode

A single coordinate point will be determined by the tablet and returned to the host after receiving a **SEND POINT** command (**E<sub>c</sub> G**).

## Diagnostic

In this mode the tablet can record and/or send various pieces of information on the status of the tablet.

## USING THE 4-BUTTON CURSOR

To activate the cursor, place the cursor flat on the top of the drawing to be digitized and look through the sighting lens from directly over the cursor. Move the cursor so the intersection of the cross-hairs covers the point to be digitized. Press one of the four cursor buttons. The tablet recognizes which button is pressed and outputs that information in a usable format. (If you want more details on the output format, please see Section 4.) An optional stylus is also available.

The lower-left corner of the tablet's active area is the default coordinate origin. That means if you move the cursor to the lower left corner and have the tablet digitize the coordinates of that location, the tablet will read the X, Y coordinates 0,0. If you move the cursor to the right, the X value will increase and the Y value will remain constant. If you move the cursor up, the X value will remain constant and the Y value will increase. This is illustrated in Figure 2-1.

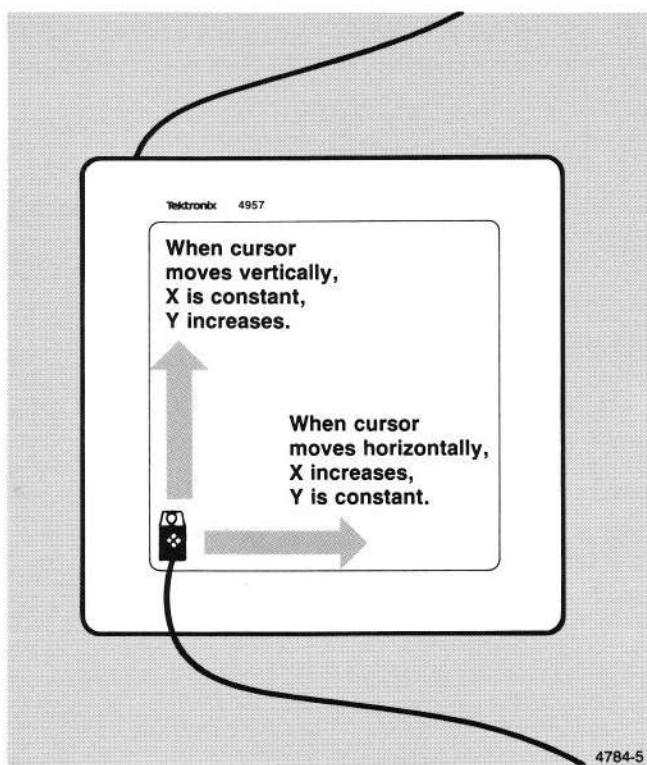


Figure 2-1. Using the 4-Button Cursor.

## USING THE ACTIVE AREA

You should know where on the tablet surface the cursor can actually measure points. This location is known as the tablet's active area.

The active area on the 4957 is bordered by a groove. The active area on the 4957 Option 02 is indicated by corner marks (see Figures 2-2 and 2-3). One way to find the division between the active area and the margin area is to operate the tablet and note the coordinate points.

The 4-button cursor may be held a small distance above the actual surface and still be in the active area during operation. The 4957 will operate properly even when the cursor is positioned 1/2" above the tablet surface.

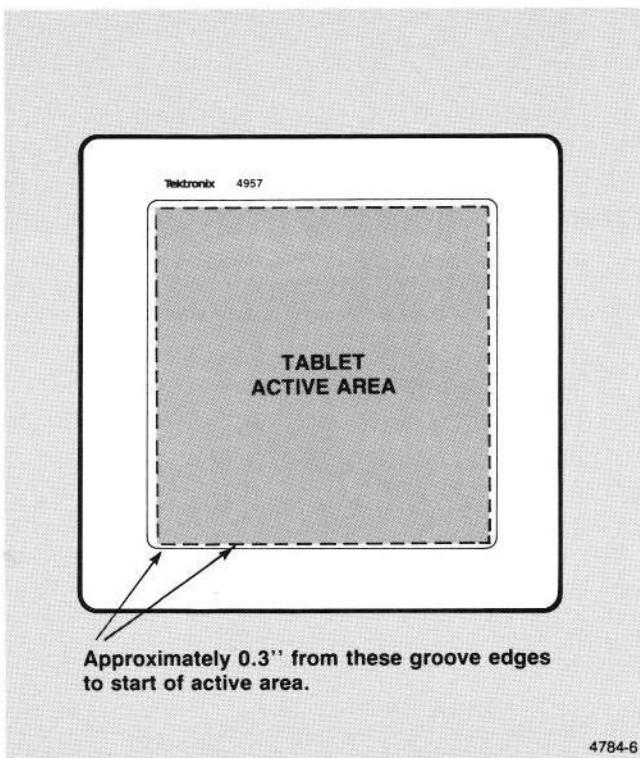
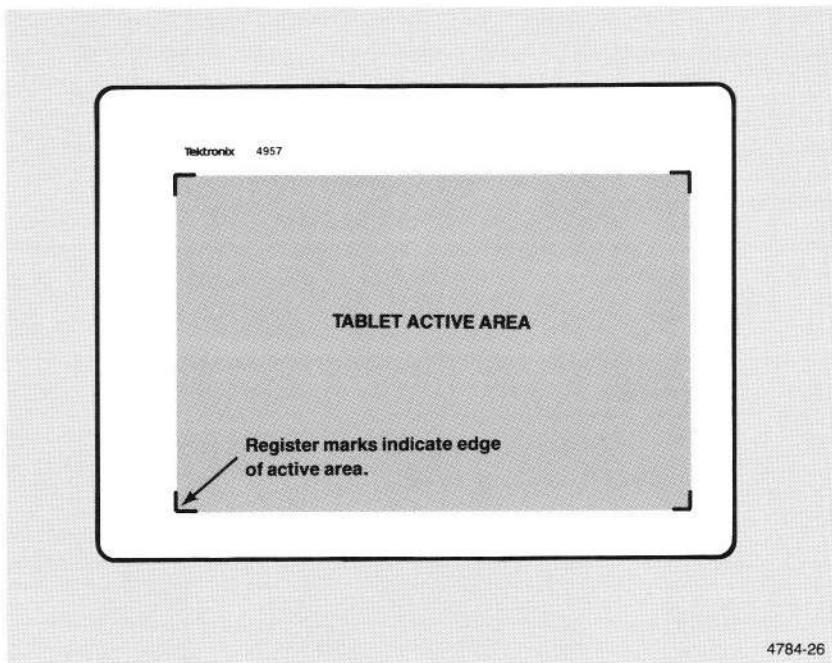


Figure 2-2. The 4957 Graphic Tablet's Active Area.

4784-6



4784-26

Figure 2-3. The 4957 Option 02 Tablet's Active Area.

# **COMMANDS**

## **OVERVIEW**

This section will help you write applications programs for the 4957 Series Tablet. There are two types of commands: terminal-based and tablet-based commands. Section 2 (Operating Procedures) gives details about which commands are used with your operating environment.

In general, if the tablet is used with a Tektronix terminal having 4957 Series Tablet driver (such as the 410X, 410XA, CX410X, CX410XA or 4111 , a 411XB Option 10, or a 412X Option 10) you can activate and control the tablet with terminal-based commands.

If the tablet is connected to a host and a terminal not supporting terminal-based commands, then you can use the tablet's internal tablet-based commands to communicate directly with the host. (See Tablet-Based Commands, described below.)

## **TEKTRONIX TERMINAL-BASED TABLET COMMANDS**

Terminal-based commands send chains of tablet-based commands to the tablet. Terminal-based commands can be entered in a Setup or in GIN (Graphic INput) mode. In Setup, users manually execute terminal-based commands independently from a host. In GIN, users can program the host to execute a set of terminal-based commands.

Section 2 "Familiarization Exercises" briefly describes how to use the terminal-based commands in setup mode to control the tablet.

Table 3-1 shows some common terminal-based commands as they would be entered in Setup mode, and as they would be entered in GIN mode.

**Table 3-1**  
**COMMON TEKTRONIX TERMINAL-BASED COMMANDS**

Setup Command	GIN Command	Description
ENABLE GRAPHICS INPUT	EclEab	Enables graphics input function on the tablet.
SET GRAPHIC INPUT FILTERING	EclEfabc	Enhances the operation of the stroke function by defining units of distance that a cursor must be moved or time between successive reports.
SET GRAPHIC INPUT GRIDMING	EclGabc	Causes the application of gridding to further operations of specified LOCATE or PICK functions.
SET GRAPHIC INPUT RUBBERBANDING	EclRab	Turns rubberbanding on or off for all further operations of the LOCATE function.
DISABLE GRAPHIC INPUT	EclDab	Permits disabling the graphic input from the terminal/host and device function combination before all the graphic input events called for in the last ENABLE GRAPHICS INPUT command have occurred.
SET INPUT INKING	EclIab	Enables the tablet to draw line tablet strokes.

**NOTE**

*In terminal-based operation, data rates are fixed at 30 rps.*

For more details, study the Tektronix terminal's Command Reference or Programming manual, which has a complete listing of Tektronix GIN commands. Check the "Index of Commands by Function" section to obtain the complete listing of GIN commands; then refer to the specific command descriptions to obtain the command syntax and parameter(s) to use.

Some setup parameters not listed in the GIN section may also be useful. Check the commands — **SET PICK ID**, **SET PICK APERTURE**, **SET TABLET HEADER CHARACTERS**, **SET TABLET SIZE**, and **SET TABLET STATUS STRAP**. The default parameters for these setup commands will not inhibit operation, but you may want to change them for the best results. If you are still having problems consult your Tektronix Systems analyst for assistance.

# TABLET-BASED COMMANDS

## OVERVIEW

Your tablet's internal firmware is programmed to respond to commands sent directly from a host computer or terminal. The tablet is able to ignore ambiguous, unidentifiable, or muddled command sequences without "hanging up." Users can correct mistakes by starting over with the correct command sequence. Functions can be set or changed remotely with the tablet-based command set. The command sequence consists of a group of ASCII characters in the form:

`$\text{Esc}$ ab}`

where:

- $\text{Esc}$  = ASCII character sent from the host, or the "ESCAPE" key on the terminal keyboard.
- a = function code.
- b = an option of the function.

### NOTE

*Sending an  $\text{Esc}$  command to the tablet after the function code has been typed will cause the tablet to abort processing any partially sent command.*

## BUFFERING

The tablet has an input buffer of approximately 16 bytes. When sending commands to the tablet, avoid overflowing the buffer, so that commands are not lost. Send no more bytes at one time than there is room for in the buffer, and allow enough delay for the tablet to free up space in the buffer.

## COMMAND DESCRIPTIONS

Table 3-2 lists the tablet-based commands (tablet functions that are externally controllable) and their command sequences. Detailed descriptions of the commands, their functions, and options are given in the remainder of this section.

**Table 3-2**  
**TABLET-BASED COMMANDS SUMMARY**

Command	Syntax
Parameter Set-Up Commands:	
RESET/CLEAR	EcZ
SET FORMAT TO ASCII	EcQ
SET DATA COLLECTION MODE	EcMb
SET DATA RATE	EcRb
SET ASCII DELINEATOR	EcDb
SET INCREMENT	Eclbbb
SET AXIS UPDATE (4957 only)	Ecgbbb
SET RELOCATABLE ORIGIN	Ecfb
SET RESOLUTION	Eccb
SET DEFINABLE RESOLUTION X AXIS (Opt. 02 only)	EcPXbbbb
SET DEFINABLE RESOLUTION Y AXIS (Opt. 02 only)	EcPYbbbb
SET TABLET ID	Ectb
PERFORM SELF TEST AND STORE RESULTS (4957 only)	Ect
SELF TEST (Opt. 02 only)	Ecw
XOFF	CNTL S
XON	CNTL Q
FACTORY TEST (4957 only)	EczEcz
Send-Data Commands:	
SEND CODE CHECK	Ecx
CONFIRM CONFIGURATION	Eca
SEND POINT	EcG
SEND SELF TEST RESULTS (4957 only)	Ecw
SEND IDENTIFIER (Opt. 02 only)	CNTL E

## **RESET/CLEAR**

### **Format**

**$\text{EcZ}$**

### **Description**

This **RESET** command will erase all entered command sequences and reset the command input buffer. The tablet will revert to the preset default settings listed below when the tablet powers up. These defaults are internally set on the 4957, and set with DIP switches on the 4957 Option 02. The reset switch on the 4957 Option 02 has the same affect as the **RESET** command.

Resolution = 500 points per inch

Mode = Remote

Increment = 000 (Increment Mode is off)

Output Sample Rate = Max RPS

Tablet ID = 0

Self Test = Performs a self test

Origin = Lower left corner

ASCII Delineator = Comma

Format = Binary

Report Content = Absolute coordinates

### **NOTE**

*Allow at least .05 seconds after sending  $\text{EcZ}$  to the tablet before sending another command. The tablet's interface is disabled during the reset process.*

## SET FORMAT TO ASCII

### Format

`EcQ`

### Description

This command causes the tablet to send data in an ASCII format. To change the tablet's data output format from ASCII back to binary, a **RESET/CLEAR** (`EcZ`) command must be sent. (See Section 4 for ASCII and Binary Formats.)

#### *NOTE*

*When using the 4957 Option 02, this command only operates when the Report Format (Binary/ASCII) switch (DIP switch 2, position 4) is ON, as a partial override function. If the switch is OFF no operation occurs.*

## SET DATA COLLECTION MODE

### Format

```
%cMb
```

### Parameters

Where b can equal 0 to 5.

- If b = 0 then mode = Stream
- If b = 1 then mode = Point
- If b = 2 then mode = Switch-Stream
- If b = 3 then mode = Remote Request
- If b = 4 then mode = Relative
- If b = 5 then mode = Absolute (4957 Option 02 only)

Data collection mode can be set with DIP switches on the 4957 Option 02, and will power up to this default mode.

### Description

This command establishes whether the operating mode is stream, point, switch-stream, remote request, relative or absolute. (Absolute mode is only command-selectable with the 4957 Option 02.)

- Stream mode: In this mode the tablet outputs coordinates continuously. DIP switch 1 position 8 setting determines if transmission will end when the cursor is out of proximity, or if transmission will continue.  
For 4957 Tablets, when the cursor leaves the active area, the tablet will send three additional coordinate pairs with the out of proximity bit set, and then stop sending data points to the host, unless a cursor button is pushed. In that case, the last valid point taken will stream in with the out of proximity flag set as long as the button is pushed. This is also true of the 4957 Option 02 if the DIP switch has been set for transmitting only in proximity.
- Point mode: A single coordinate pair is sent from the tablet only when a cursor button is pushed.

### NOTE

*SET INCREMENT does not operate in Point mode on the 4957. However, a previous SET INCREMENT setting is not affected by going to point mode, and then back to a mode where it does operate, such as stream mode.*

- Switch-Stream mode: Identical to Stream mode except that data is transmitted from the tablet only when a cursor or stylus button is pushed.
- Remote Request. A single coordinate point at the cursor location is identified by the tablet and sent to the host after you enter a **SEND POINT** command (**EcG**). On the 4957 Option 02, you can solicit reports with this command even if the tablet is in Point, Stream, or Switch Stream mode.
- Relative mode: Only changes in coordinate values are sent by the tablet. A new point location reflects “relative” movement of the cursor rather than locating “absolute” coordinates. This mode may be used in conjunction with all other modes, and will give relative coordinate values, useful for steering a terminal’s cursor.

Negative numbers (indicating left and/or downward cursor movement) can only be distinguished from positive numbers by the value of the sign bit. If there is no cursor movement, coordinate values of zero will be sent (refer to “Output From Tablet Direct to Host” in Section 4).

- Absolute mode: Gives coordinate values which reflect absolute position relative to the active area. Like the relative mode, it can be used with all other modes. Absolute mode is the default. On the 4957 absolute mode is not selectable. On the 4957 Option 02 it is selectable as a value of 5 for b.

## **SET DATA RATE**

### **Format**

```
Ec Rb
```

### **Parameters**

Where b can equal 0 through 7.

For both the 4957 and the 4957 Option 02:

- If b = 0, then data rate = 1 coordinate pair per second.
- If b = 1, then data rate = 2 coordinate pairs per second.
- If b = 2, then data rate = 5 coordinate pairs per second.
- If b = 3, then data rate = 10 coordinate pairs per second.
- If b = 4, then data rate = 30 coordinate pairs per second.
- If b = 5, then data rate = 60 coordinate pairs per second.

For the 4957:

- If b = 6, then data rate = 90 coordinate pairs per second.

For the 4957 Option 02:

- If b = 6, then data rate = 75 coordinate pairs per second.
- If b = 7, then data rate = 80 coordinate pairs per second.

## Description

This command determines the rate at which coordinate pairs are sent to the host computer or terminal from the tablet. This can be set with DIP switches on the 4957 Option 02.

These rates are valid for output in binary format at the standard 9600 baud rate. If the output is in ASCII format, or sent at slower baud rates, RS-232 baud rate limitations may cause the tablet to accept, but not achieve all the data rates selectable by DIP switches or **SET DATA RATE** command. Below is a list of the maximum data rates achievable with the given baud rates:

Baud Rate	Maximum Binary Data Rate	Maximum ASCII Data Rate
19200	240	96 coordinate pairs/sec.
9600	120	48 coordinate pairs/sec.
4800	60	24 coordinate pairs/sec.
2400	30	12 coordinate pairs/sec.
1200	15	6 coordinate pairs/sec.
600	7.5	3 coordinate pairs/sec.

### NOTE

*The **SET DATA RATE** command used with any mode will control the fineness or coarseness of the display's cursor movements.*

## SET ASCII DELINEATOR

### Format

```
EcDb
```

### Parameters

Where b is the desired delineator character. The delineator can be any ASCII character from  $\text{^u}$  through  $\text{^T}$ , except the  $\text{Ec}$  character. (ADE 0 through ADE 127). (see Appendix B).

### Description

This command defines the character that separates field of information contained in the ASCII report format. This character defaults at power-up and at the **RESET/CLEAR** command to an ASCII “.”. For 4957 Tablets set to resolutions of 1 to 508 points per inch, the report format is:

**SXXXX,SYYYY,FF,T<sub>C</sub>R<sub>L</sub>F**

For 4957 Tablets set to resolutions of 1,000 and 1,016 points per inch, and for all 4957 Option 02 Tablets, the report format is:

**SXXXXX,SYYYYY,FF,T<sub>C</sub>R<sub>L</sub>F**

This report format is explained in greater detail in Data Formats, Section 4 of this manual.

## SET INCREMENT

### Format

```
Eclbbb
```

### Parameters

Where bbb can equal 000 to 255 coordinate units. Leading zeroes are required.

### Description

**SET INCREMENT** sets the distance (in resolution elements) that the cursor must be moved before new coordinates are sent from the tablet. Primarily, the **SET INCREMENT** command is used for reducing the amount of data sent from the tablet.

The increment distance is expressed in resolution elements. This is calculated by using the points per inch specified in the **SET RESOLUTION** command. For example, given a **RESOLUTION** of 1000 ppi, a **SET INCREMENT** of 025 means the cursor must move 25/1000 or .025 inches in either X or Y direction before a new coordinate pair will be sent to the host.

A coordinate pair is also sent to the host each time the cursor button is depressed or released, in effect, defeating the **SET INCREMENT** command. The tablet repeats the last valid report twice: once when you press the button, and again when you release it. The first report includes the button flag. The second report has a flag value of zero.

Data captured will be affected by baud rate, **SET INCREMENT**, **DATA RATE**, and the speed of the cursor movement. If the **SET INCREMENT** is very fine, it is possible to move the cursor faster than the data rate will allow the data to be sent. If it is important that these increments are not lost (such as for curve tracing operations) **DATA RATE** should be set to maximum coordinate pairs per second.

## **SET AXIS UPDATE**

### **Format**

```
Ecgbbb
```

### **Parameters**

Where bbb can equal 000 to 255 coordinate units. Leading zeros are required. For example, when resolution is set to 1000 points per inch, write five thousandths of an inch as 025 instead of 25.

### **Description**

This is similar to the **SET INCREMENT** command except that direction must be satisfied in addition to distance. A new point is sent to the terminal or host when the cursor/stylus has been moved far enough in the X and Y directions to satisfy the increment parameter (bbb) of the **SET AXIS UPDATE** command, or if a cursor/stylus button is either depressed or released.

#### *NOTE*

*This command is only available for the 4957 Tablet, and not for the 4957 Option 02.*

## SET RELOCATABLE ORIGIN

### Format

```
EcFb
```

### Parameters

Where b = 0, 1, 2, or 3.

For both the 4957 and the 4957 Option 02 Tablets:

If b = 0, the tablet's 0,0 coordinate origin is the lower left corner of the active area.

If b = 3, the tablet's 0,0 coordinate origin is the upper left corner of the active area.

For the 4957 Option 02 Tablet only:

If b = 1, the tablet's 0,0 coordinate origin is user defined. The point is defined when a cursor or stylus button is pressed inside the active area. No more commands should be sent until that point is digitized.

If b = 2, the tablet's 0,0 coordinate origin is in the center of the active area.

### Description

This command defines where on the tablet's active area the 0,0 coordinate origin begins.

#### NOTE

*Negative coordinate locations may be distinguished from positive numbers only by the sign bit/character. (See Data Formats, Section 4.)*

## SET RESOLUTION

### Format

**EcCb**

### Parameters

Where b can equal 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A or B.

b	Points per Inch	mm/Point	Inches per Point
0	200 <sup>a</sup>		0.005
1	254 (10 pts/mm <sup>b</sup> )	0.1	
2	1000 <sup>c</sup>		0.001
3	1016 (40 pts/mm <sup>d</sup> )	0.025	
4	500		0.002
5	508 (20 pts/mm)	0.05	
6	400		0.0025
7	100		0.01
8	1		1
9	2		0.5
A	4		0.25
B	4957: X,Y = 350 <sup>e</sup> 4957 Option 02: X = 228, Y = 341 <sup>e</sup>		X,Y = .03 X = .07, Y = .03

<sup>a</sup> U.S. low

<sup>b</sup> Metric low

<sup>c</sup> U.S. high

<sup>d</sup> Metric high

<sup>e</sup> This is the resolution used by the TEKTRONIX 4106/4107/4109 Terminals. The terminal's maximum limit is 4096 addressable points over the entire active area. This translates into a maximum of 228 points per inch for the X axis, and 341 points per inch for the Y axis.

## SET DEFINABLE RESOLUTION X AXIS

### Format

```
EcPXbbbb
```

### Parameters

Where b = any number from 0001 to 1016. (Leading zeros are necessary.)

### Description

#### *NOTE*

*This command is available only with the 4957 Option 02 tablet,  
and not for the 4957.*

This command sets the resolution of the X axis to any value from 0001 points per inch to 1016 points per inch. These settings remain in effect until you redefine the resolution, issue a **RESET** command, press the reset button, or turn off the tablet. At that point, the 4957 Option 02 Tablet returns to its default state of 500 points per inch.

## SET DEFINABLE RESOLUTION Y AXIS

### Format

```
EcPYbbb
```

### Parameters

Where b = any number from 0001 to 1016. (Leading zeros are necessary.)

### Description

#### *NOTE*

*This command is available only with the 4957 Option 02 tablet,  
and not for the 4957.*

This command sets the resolution of the Y axis to any value from 0001 points per inch to 1016 points per inch. These settings remain in effect until you redefine the resolution, issue a **RESET** command, press the reset button, or turn off the tablet. At that time, the 4957 Option 02 Tablet returns to its default state of 500 points per inch.

## SET TABLET ID

### Format

```
EcTb
```

### Parameters

- If b = 0, the tablet ID is set to 0.
- If b = 1, the tablet ID is set to 1.

### Description

This command gives the tablet an identification number. This is useful in helping distinguish between tablets in a multiple tablet set up. The information is contained in the first byte of the binary tablet output and the third from the last character of the ASCII format. See Data Formats, Section 4 for more details on the output format. Tablet ID can be set by command or switch.

## PERFORM SELF TEST AND STORE RESULTS

### Format

```
Ect
```

### Description

This command will activate the tablet self test and store the resultant data in its memory. No data is sent to the host. The description of the **SEND SELF TEST RESULTS** command given later in this section explains the format of these self test results.

#### NOTE

*The **PERFORM SELF TEST AND STORE RESULTS** command is available for the 4957 only, and is intended to be used with **SEND SELF TEST RESULTS**,  $E_{CW}$ . There are two versions of the  $E_{CW}$  command; on the 4957 it sends the results only. On the 4957 Option 02, it both performs and sends the test results, and is called **SELF TEST**.*

## SELF TEST

### Format

`ECW`

### Description

This command causes the tablet to execute a self test and transmit the results. It is sent as a single byte, followed by a byte for a carriage return, and uses the format shown below. If the report byte is an ASCII 0, the digitizer passed all the tests. Any other character denotes a problem.

Bit #	Pass/Fail		Definition
0	1	0	Analog circuitry test
1	1	0	Cursor conn/oper test
2	1	0	Digital circuitry/EPROM test
3	1(on)	0(off)	Cursor on/off tablet
4	0		Always transmitted as 0
5	1		Always transmitted as 1
6	1	0	Total test results
7	either 1 or 0		parity bit, if used

### NOTE

*There are two versions of the `ECW` command. This version, SELF TEST, is available on the 4957 Option 02 only. See SEND SELF TEST RESULTS command for the 4957 version of this command.*

### NOTE

*To do SELF TEST on the 4957 Option 02, the cursor or stylus must be within the active area of the tablet when you initiate self test. Otherwise the test results are invalid.*

## XOFF

### Format

```
CTRL S (ASCII {D3}) (See Appendix B)
```

### Description

This command places the tablet in an immediate standby or “pause” condition that stops internal scanning and transmission to the host. This gives the host processor time to empty its buffer, preventing data loss. It is particularly useful in Stream and Switch-Stream data collection mode applications where the tablet transmits data faster than the host can process it.

When **XOFF** is entered on the 4957, the tablet will not stop in the middle of an eight-byte report, but will stop at the beginning of the very next eight-byte record. When **XOFF** is entered on the 4957 Option 02, the tablet will stop transmission part way through a coordinate pair. Then when **XON** is entered, it will transmit the remainder of the coordinate pair.

The **XON** and **RESET** commands, as well as power down and reset switches (on the 4957 Option 02) will all terminate an **XOFF** condition.

## XON

### Format

```
CTRL Q (ASCII {D1}) (See Appendix B)
```

### Description

This command immediately restarts the tablet after it has been put into standby by the **XOFF** command.

## FACTORY TEST

### Format

```
EczEcz
```

To execute this command, enter two Ecz's within 10 seconds of each other. This command is for factory test and should only be used by qualified service technicians. If this command is run, the tablet will not transmit any data. To continue to use the tablet after it has hung up, pull the power plug and then put the plug back in the power socket.

#### NOTE

*This command is available only on the 4957, and not on the 4957 Option 02.*

## SEND CODE CHECK

### Format

```
Ecx
```

### Description

This command transmits the value of the ROM (on the 4957) or the EPROM (on the 4957 Option 02) checksum. The output is the two's complement check sum for the code in the microcontroller's external ROM (or EPROM) memory. The 4956 uses an 8051 microcontroller. The 4957 Option 02 uses an 8032 microcontroller. The tablet will respond with data in the format .#HHHH<sup>c</sup>R. Where H can be any ASCII hex character (0-9 or A-F).

The report sent from the tablet is a six byte record (in both ASCII and binary formats), with the last four bytes representing the value of the checksum.

## CONFIRM CONFIGURATION

### Format

```
Eca
```

### Description

The tablet will transmit a coordinate pair that contains the maximum values for the **X** and **Y SET RESOLUTION**, and flags that give additional information and status of the tablet. The report can be sent in either binary or ASCII format depending on the current tablet's Set Format condition. For example, if resolution = 100 points per inch, **Eca** will return 1800 points per inch for X and 1200 points per inch for Y. ( $X = 18.0"$  and  $Y = 12.0"$ ;  $18 \times 100 = 1800$ ,  $12 \times 100 = 1200$ .)

## SEND POINT

### Format

```
EcG
```

### Description

This command can only be used in remote request mode on the 4957, and it can be used in all modes on the 4957 Option 02. **SEND POINT** causes one graphic input location report to be sent to the host or terminal using standard coordinate location report format.

## SEND SELF TEST RESULTS

### Format

```
EcW
```

### Description

This command causes the tablet to send self test results from the **PERFORM SELF TEST AND STORE RESULTS** command entered on the 4957.

#### *NOTE*

*There are two versions of the EcW command. This version is available on the 4957 only, and is intended to be used with the PERFORM SELF TEST AND STORE RESULTS command. See SELF TEST for the 4957 Option 02 version of this command.*

It sends the data as a single byte, followed by a byte for a carriage return, and uses the format shown below. If the report byte is an ASCII O, the digitizer passed all the tests and the cursor/stylus was in proximity. On the 4957, if the report byte is an ASCII G, the tablet passed the test, but the cursor/stylus was out of proximity. Any other character denotes a problem.

Bit #	Pass/Fail		Definition
0	1	0	Analog circuitry test
1	1	0	Cursor conn/oper test
2	1	0	Digital circuitry/ROM test
3	1(on)	0(off)	Cursor on/off tablet
4	0		Always transmitted as 0
5	1		Always transmitted as 1
6	1	0	Total test results
7	either 1 or 0		parity bit, if used

#### *NOTE*

*The cursor or stylus does not have to be within the active area of the tablet when you do PERFORM SELF TEST AND STORE RESULTS on the 4957.*

## SEND IDENTIFIER

### Format

```
CNTL E
```

### Description

This command sends a report to the host that identifies tablet model and its software version. When entered, the following message will appear on the terminal screen:

TEKTRONIX 4957 OPT. 2 18" × 12" TABLET. FIRMWARE VERSION N.N

#### *NOTE*

*The command is available for the 4957 Option 02 Tablet only.*

# DATA FORMATS

## OVERVIEW

The tablet interface facilitates data exchange between the tablet and its environment.

This section describes the data which the tablet sends to a host computer an/or display terminal. The host may receive either of the following two types of output reports:

1. Output from tablet to host using a Tektronix terminal.
2. Output from the tablet directly to the host.

## OUTPUT FROM TABLET TO HOST USING A TEKTRONIX TERMINAL

The tablet can use a series of Tektronix standard graphic input reports to communicate to a host computer by way of Tektronix terminals that offer tablet support.

- The general graphic input report format
- The specific Pick report format
- The specific Locate report format
- The specific Stroke report format

### THE GENERAL GRAPHIC INPUT REPORT FORMAT

The tablet sends the graphic input report to the host after the terminal receives a message from the tablet. The report contains the tablet's reply to an **ENABLE GRAPHIC INPUT** command sent from the host to the tablet by way of the terminal.

The general graphic input report comes in three forms. A tablet can cause a terminal to send a Graphic Input Locate report, a Graphic Input Pick report, or a Graphic Input Stroke report. The following descriptions explain these reports in more detail.

## **GRAPHIC INPUT LOCATE REPORT**

The terminal sends this report to the host computer in response to a tablet Locate graphic input event.

## **GRAPHIC INPUT PICK REPORT**

The terminal sends this report to the host computer in response to a tablet Pick graphic input event.

When the operator signals a pick event, the terminal returns a Graphics Input Pick Report to the host computer. This occurs regardless of whether there actually is a visible, detectable segment with the current Pick aperture. If there is no such segment to be picked, the terminal returns zero as the segment number.

## **GRAPHIC INPUT STROKE REPORT**

The terminal sends this report to the host computer in response to a Stroke graphic input event. For each stroke that the operator performs at the tablet, many graphic input stroke reports are usually generated and sent to the host computer.

Command reference manuals of 41XX Tektronix terminals describe these reports in greater detail.

## OUTPUT FROM TABLET DIRECT TO HOST

The tablet communicates in this direct class with a format known as the Universal Input Output Format (UIOF).

The tablet uses two types of UIOF formats. These are ASCII format and binary format. The ASCII format offers the advantage of being universally accepted and easy to use. In addition, it will not accidentally transmit any undesired ASCII control characters (like  $\text{E}_r$ ) to a host.

Binary format is faster and therefore more efficient because it requires only 8-bytes per coordinate, whereas the ASCII format requires up to 20 ASCII character bytes.

### ASCII FORMAT

ASCII data format has an 8-bit output.

For 4957 Tablets set to resolutions of 1 to 508 points per inch, the report format is:

**SXXXX,SYYYY,FF,T<sup>c</sup>R<sup>l</sup>F**

For 4957 Tablets set to resolutions of 1,000 and 1,016 points per inch, and for all 4957 Option 02 Tablets, the report format is:

**SXXXXX,SYYYYY,FF,T<sup>c</sup>R<sup>l</sup>F**

Where:

- S = The coordinate sign. It is positive (i.e. +) for all modes except Relative mode, and when the origin has been relocated. When using Relative mode, the coordinate sign may be positive or negative (i.e. + or -) depending on the direction of the cursor movement. Up/right = +, and down/left = -.
- X = A digit of the X coordinate. Each digit is an ASCII character in the range of 0 through 9.
- Y = A digit of the Y coordinate. Each digit is an ASCII character in the range of 0 through 9.
- , = The default delineator character. It serves to distinguish between fields. The exact character used can be changed using the SET DELINEATOR command (see Section 3, Commands for more details).
- FF = The flag being used. That is the status of the cursor key or stylus being used. FF can equal any of the following ASCII codes:

<b>Flag</b>	<b>Cursor Button Pressed</b>	<b>Proximity of Cursor</b>
00	NONE	IN PROXIMITY
01	1 (Z)	IN PROXIMITY
02	2 (1)	IN PROXIMITY
03	3 (2)	IN PROXIMITY
04	4 (3)	IN PROXIMITY
32	NONE	OUT OF PROXIMITY
33	1 (Z)	OUT OF PROXIMITY
34	2 (1)	OUT OF PROXIMITY
35	3 (2)	OUT OF PROXIMITY
36	4 (3)	OUT OF PROXIMITY

T = User definable tablet identifier. User may set it to either 0 or 1 to distinguish between tablets. See SET TABLET ID command in Section 3 for more details.

c<sub>R</sub> = Carriage return

l<sub>F</sub> = Line feed

## BINARY FORMAT

Binary data format has an 8-byte, 8-bit output. An advantage of the binary format over ASCII format is speed. Eight characters are transmitted in lieu of up to 20 with ASCII.

Table 4-1 shows the binary format syntax:

**Table 4-1  
BINARY UNIVERSAL INPUT/OUTPUT FORMAT**

Byte <sup>a</sup>	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
1 <sup>b</sup>	P	1	0	0	TYPE1	TYPE2	ID	PROX
2 <sup>c</sup>	P	0	0	0	F4	F3	F2	F1
3 <sup>c</sup>	P	0	X5	X4	X3	X2	X1	X0
4 <sup>c</sup>	P	0	X11	X10	X9	X8	X7	X6
5 <sup>c</sup>	P	0	0	Xs	X15	X14	X13	X12
6 <sup>c</sup>	P	0	Y5	Y4	Y3	Y2	Y1	Y0
7 <sup>d</sup>	P	0	Y11	Y10	Y9	Y8	Y7	Y6
8 <sup>d</sup>	P	0	0	Ys	Y15	Y14	Y13	Y12

<sup>a</sup> All bytes: P = Parity Bit.

<sup>b</sup> Byte 1: TYPE 1 and TYPE 2 indicate the graphic input peripheral that is attached. If TYPE 1 = 0 and TYPE 2 = 1 then a 4957 tablet is attached.

ID is used to help identify which tablet is which in a multiple tablet set up. You can set the ID with the SET TABLET ID command described in Section 3, or using DIP switches (on the 4957 Option 02). PROX = Bit that indicates if the data being collected is in or out of tablet proximity.

0 = in proximity

1 = out of proximity

<sup>c</sup> Byte 2: = F0 through F4 = coding of the cursor buttons. Table 4-2 shows the exact codes used.

<sup>d</sup> Bytes 3 through 8: Xs = Sign Bit for X coordinate: 0 is + value

1 is - value

Ys = Sign Bit for Y Coordinate:

0 is + value

1 is - value

X0 - X15 = Location for X coordinate

Y0 - Y15 = Location for Y coordinate

Digit subscript priority is 0 for the Least Significant Bit (LSB) to 15 for the Most Significant Bit (MSB).

**Table 4-2**  
**CODING OF CURSOR BUTTONS**

Cursor Button	Stylus	BINARY								ASCII	
		7	6	5	4	3 F4	2 F3	1 F2	0 F1	FF	FF
None	None	P	0	0	0	0	0	0	0	00	32
1 (Z)	TIP/0	P	0	0	0	0	0	0	1	01	33
2 (1)		P	0	0	0	0	0	1	0	02	34
3 (2)		P	0	0	0	0	0	1	1	03	35
4 (3)		P	0	0	0	0	1	0	0	04	36

**NOTE**

*In binary format the coordinate reports may contain all the ASCII control characters. You must program your host computer not to react to control characters when using binary format.*

**NOTE**

*When using the optional 2-Button Stylus, the tablet should be powered down, the stylus plugged in, and then the tablet powered up again. This enables the tablet to give maximum performance with the stylus. When changing back to the 4-button cursor, the power-down power-up procedure should be repeated.*

## **COMPATIBILITY**

The 4957 Series Graphics Tablet is compatible with the 410X (except 4105), 410XA, CX410X, CX410XA, and 4111 terminals. These terminals have a 2-port peripheral interface, and are compatible with all versions of firmware.

The tablet is also compatible with the 411XB and 412X terminals, which have Option 10 (3-port peripheral interface) tablet firmware drivers providing a complete terminal/tablet graphic input system. Option 10 interfaces manufactured prior to 1985 may need a firmware update (to Version 6 or higher) to be compatible.

Option 10 is able to emulate the 411X and 412X Option 14 series; that is, any software that is used with the 411X or 412X Option 14 tablets is able to run with 411X or 412X Option 10 4957 Series Tablet configuration.

With either terminal series, the tablet is operated as a GIN (Graphic INput) peripheral to the terminal using the Terminal-Based Command set.

The tablet is compatible with the TEKTRONIX 405X series, the 4170, and other host systems using the tablet-based command set in ASCII format.

The tablet is also compatible with software that runs with the 4957 and 4958 Graphics Tablet, with the exception of those added capabilities unique to the 4958 and 4957 Option 02.

# COMMUNICATIONS

## OVERVIEW

This section covers the standard for which the tablet communicates with its environment (i.e., the host computer and/or terminal). There are two parts to this section: the communications software and the communications hardware.

## SOFTWARE

The tablet communicates with asynchronous serial RS-232 transmissions. It receives commands in 7-bit ASCII data format, and sends in 7-bit binary format, as shown in Figures 5-1 and 5-2.

1 Start Bit	7 Data Bits	Odd Parity Bit	1
-------------	-------------	----------------	---

**Figure 5-1. Data Format for 4957.**

1 Start Bit	7 Data Bits	None, Odd, or Even Parity Bit	1 or 2 Stop Bits
-------------	-------------	-------------------------------	------------------

**Figure 5-2. Data Format for 4957 Option 02.**

All the tablet communications use bit eight as an odd parity bit. Commands are ignored if the parity bit is wrong.

The tablet is factory set for 9600 baud. Users can also select baud rates of 19200, 4800, 2400, 1200, 600, 300, and 150. This is done on the 4957 using an "autobaud" feature; on the 4957 Option 02, users can set DIP switches, as described in Section 1, Getting Started.

## HARDWARE

The tablet and host communicate through a 25-pin "D" shell RS-232 cable. The connector going into the tablet is male and has pins. The connector going into the host should be female and have sockets. An adapter is required if the gender of these connectors are the same.

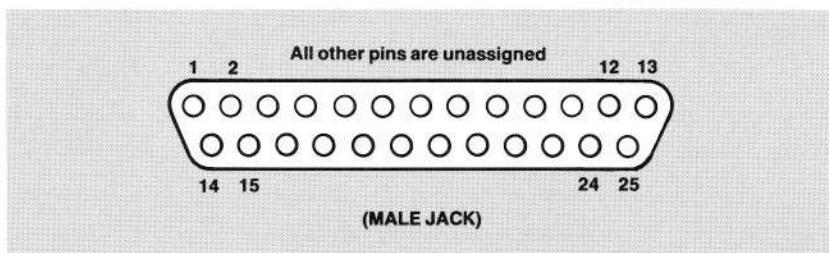
Figure 5-3 shows the purpose of each pin in the tablet's 25-pin connector.

### NOTE

*The tablet is configured to function as a Data Terminal Equipment (DTE) device, which transmits on Pin 2 and receives on Pin 3. However, when connecting the tablet to some terminals, it may be necessary to use an adapter that reverses the RX and TX communication lines. This allows the tablet to functions like a Data Communications Equipment (DCE) device, transmitting on Pin 3 and receiving on Pin 2.*

### NOTE

*25-pin D plug connector mates with Amp #205207-1 female socket. Shield to Frame Ground appears on cable (Pin 1) only.*



### PIN/SIGNAL DESCRIPTIONS

Pin#	Wire Name	Description
1	Shield	Frame Ground
2	Transmit Data	Serial Data from Tablet to Host
3	Receive Data	Serial Data from Host to Tablet
4	RTS	Request to Send Asserted*
5	CTS	Clear to Send*
6		-12 Volts at Tablet end only
7	Signal Ground	Return Serial Data
9		+ 12 Volts at Tablet end only
20	DTR	Data Terminal Asserted*

\* 4957 Option 02 only

4784-27

Figure 5-3. RS-232C Connector.

## Section 6

from original 4957 user manual

# PROGRAMMING EXAMPLES

The following section contains sample programs that use the 4957 Graphics Tablet. These are useful for testing your system or as examples to help demonstrate how you can program the 4957.

The sample programs include:

- Tablet to Local TEKTRONIX 4107 Terminal Demonstration. The Tektronix terminal-based tablet instruction set is demonstrated with a simple set of commands entered from the keyboard. No host processing is required.
- Tablet to TEKTRONIX 4052 Computer Demonstration. The direct tablet-based instruction set is demonstrated.

### TEKTRONIX 4107 TERMINAL EXAMPLE

#### EQUIPMENT REQUIRED

- TEKTRONIX 4107 Terminal
- TEKTRONIX 4957 Graphics Tablet

#### INSTRUCTIONS

1. Connect the tablet to the terminal as described in Section 1 of this manual.
2. Turn on the power to the 4107 terminal.
3. On the 4107 press the button labelled: Setup.

#### NOTE

*Steps 4, 5, and 8 are valid as written if the tablet is connected to the 4107 via port 0. If the tablet is connected to port 1, replace the number 10 with 18.*

4. Enable inking by typing: GININK 10 1. Press RETURN.
5. Enable the tablet for multiple points by typing: GINENABLE 10. Press RETURN.

6. Turn off the set up mode by pressing the button labelled: Setup. (Be sure to leave Setup mode. GIN is suspended in Setup mode.)
7. Write a name (or anything else) on the screen by moving the tablet cursor and pressing any cursor button.
8. To disable GIN re-enter set up mode by pressing Setup. Then type: GINDISABLE 10. Press RETURN.

#### NOTE

*To type the character  $^E$ C, press the 410X key labelled ESC.*

### TEKTRONIX 4052 EXAMPLE

#### EQUIPMENT REQUIRED

- TEKTRONIX 4052 Desktop Computer with Option 01 Data Communications
- TEKTRONIX 4957 Graphics Tablet

#### INSTRUCTIONS

1. Connect the 4957 graphics tablet to the 4052 Desktop Computer as described in Section 1 of this manual.
2. Turn on the power to the computer.
3. Type in the program given on the following page or insert a tape with the program already input and load in the program.
4. Type: RUN and press RETURN.
5. Write a name (or anything else) on the screen by moving the tablet cursor and pressing one of the tablet cursor buttons. Notice each button does something different. Several buttons use different symbols for the screen cursor. One button even erases the screen.

## Tektronix 4052 Example Program

```
100 REM 4957 TABLET DRIVER PROGRAM FOR 4050 SERIES
110 INIT
120 REM INITIALIZE THE 4050 COMMUNICATIONS INTERFACE (OPTION 1)
130 CALL "CMINIT"
140 REM SET BAUD RATE TO 9600, 7 DATA BITS, 1 STOP BIT AND ODD PARITY
150 CALL "RATE",9600,3,2
160 REM NOTE THAT THE 4051 SHOULD USE:
170 REM      CALL "RATE",2400,3,2
180 REM AND THE AUTOBAUD FEATURE OF THE TABLET SHOULD BE ENABLED
190 REM (REFER TO SECTION 5 OF THE 4957 MANUAL)
200 REM RESET THE COMMUNICATIONS INTERFACE BUFFER
210 PRINT #40,30:
220 REM IF USING A 4052A OR 4054A INCLUDE THE FOLLOWING:
230 REM CALL "CMFLAG",1
240 REM THE CMFLAG SETS INPUT FLAGGING FROM THE TABLET
250 REM PRINT A SPACE TO THE TABLET TO SET AUTOBAUD FOR THE 4051
260 PRINT #40:" "
270 REM SEHD RESET/CLEAR COMMAND
280 PRINT #40:["Z"]
290 REM WAIT A FRACTION OF A SECOND FOR THE RESET OPERATION
300 CALL "Wait",0.2
310 REM SEND SET FORMAT TO ASCII COMMAND
320 PRINT #40:["Q"]
330 REM SET RATE TO 10 COORDINATE PAIRS PER SECOND
340 PRINT #40:["R3"]
350 REM IF USING A 4052A/4054A THE RATE CAN BE SET AT 90 PAIRS/SEC:
360 REM PRINT #40:["R6"]
370 REM SET DATA COLLECTION MODE TO STREAM MODE
380 PRINT #40:["M0"]
390 WINDOW 0,5850,0,5850
400 REM RING BELL
410 PRINT "G";
420 REM SET THE 4050 CHARACTER FONT TO 5 (GRAPHIC)
430 PRINT #32,18:5
450 INPUT #40:X,Y,F,T
460 MOVE X,Y
470 INPUT #40:X,Y,F,T
480 GOSUB F+1 OF 510,550,580,620,660
490 GO TO 470
500 REM NO KEY PRESSED - PRINT CHARACTER (IN REFRESH)
510 MOVE X,Y
520 PRINT #32,24:"I"
530 RETURN
540 REM KEY #1 - DRAW LINE
550 DRAW X,Y
560 RETURN
570 REM KEY #2 - PRINT ASTERISK
580 MOVE X,Y
590 PRINT "*";
600 RETURN
610 REM KEY #3 - PRINT A DOT
620 MOVE X,Y
630 PRINT ".";
640 RETURN
650 REM KEY #4 - PRINT X
660 MOVE X,Y
670 PRINT "X";
680 RETURN
```

# DIAGNOSTIC CHECKS

This section includes information to aid in locating faults. Three topics are covered: No Data, Garbled Data, and the 4957 self test. The 4957 Service Manual provides information for the qualified service person who may be required to perform modular level repairs.

## NO DATA

If no data is being received by the host computer/terminal, you can:

1. Check that all connections are tight including:
  - Tablet to cursor connection
  - Tablet to RS-232C connection
  - Tablet to power supply connection
2. Check that the terminal is on and is not in Setup mode.
3. Check that the power socket has power.
4. Check that the tablet transmissions haven't been stopped by an XOFF command.

## GARBLED DATA

In case garbled data is being received by the host, you can:

1. Check that the host is using the proper data format. The default format used with the tablet is odd parity with 1 start bit, 7 data bits, and 1 stop bit at 9600 baud.
2. Check that the host is running at the same baud rate as the tablet. If you have a 4957, check to see if autobaud is on. If the autobaud is in use, you can reset it by turning the power off and then on again, and then sending an ASCII space ( $\text{ }_p$ ) character to the tablet. If you have a 4957 Option 02, you can check the DIP switch which sets baud. For details, see Section 2, Operating Procedures.

## SELF TESTS

You can run two types of self tests. If the tablet is connected to a Tektronix terminal that specifically supports the 4957, such as the model 4106, 4107, 4109, 4115, or 412X, use the terminal-based self test.

If the tablet is connected directly to a host computer (such as the 405X series or the 4170 unit) use the tablet-based self test.

The instructions for running both tests are given below.

### TABLET-BASED SELF TEST

Run this self test by doing the following:

1. Connect the tablet to the host computer as described earlier in this section.
2. The 4957 Option 02 cursor must be in proximity for the self test to work.
3. If you are testing a 4957, do the `Ect` command, **PERFORM SELF TEST AND STORE RESULTS**. Then do `Ecw`, which on the 4957 initiates the **SEND SELF TEST RESULTS** command, sending the self test results to the host in the form of a single 8-bit byte.

If you are testing a 4957 Option 02, just do the `Ecw` command. On the 4957 Option 02 Tablet this initiates **SELF TEST**, which both performs the self test and sends the self test result to the host in the form of a single 8-bit byte.

4. Examine the self test results. A description of what they should look like is shown in Table 6-1.

**Table 6-1  
RESULTS OF THE TABLET-BASED SELF TEST**

Bit #	Pass/Fail	Definition
0	1	0
1	1	0
2	1	0
3	1(on) 0(off)	Digital circuitry/EPROM test
4	0	Cursor/stylus/on/off tablet
5	0	Always transmitted as 0
6	1	Always transmitted as 1
7	either	Total test results Parity bit, if used

## TEKTRONIX TERMINAL-BASED TABLET SELF TEST

If your Tektronix terminal contains supporting firmware for your tablet, it also contains a self test routine as part of the terminal's extended self test menu. Each terminal's test routine will vary. Refer to the appendix of your terminal Operator Manual for instructions on how to enter extended self test mode, and the use of instructions to call up the self test menu (it is automatic on some terminals, or requires a **CONTROL C** from the keyboard on other models).

On 411X and 412X terminals, select 3PPI and then 495X Tablet test. On 410X terminals, select **ADJUSTMENT PROCEDURE MENU** and **GRAPHIC TABLET**. The tests may ask which port to test or instruct you to connect the cable. When you respond as prompted, the test will run automatically.

### SELF TEST RESULTS

**Table 6-2**  
**SELF-TEST RESULTS**

4957		Option 02		Description
Hex	ASCII	Hex	ASCII	
00	NUL	Cursor must be in active area for Option 02 Self Test to function properly.		Cursor off tablet, analog, cursor conn/oper and digital test failed.
01	SOH			Cursor off tablet, cursor conn/oper end digital test failed.
02	STX			Cursor off tablet, analog and digital test failed.
03	ETX			Cursor off tablet, digital test failed.
04	EOT			Cursor off tablet, analog and cursor conn/oper test failed.
05	ENQ			Cursor off tablet, cursor conn/oper test failed.
06	ACK			Cursor off tablet, analog test failed.
47	G			Cursor off tablet, test passed.
08	BS	28	(	Cursor on tablet, analog, cursor conn/oper and digital test failed.
09	HT	29	)	Cursor on tablet, cursor conn/oper and digital test failed.
0A	LF	2A	*	Cursor on tablet, analog and digital test failed.
0B	VT	2B	+	Cursor on tablet, digital test failed.
0C	FF	2C	,	Cursor on tablet, analog and cursor conn/oper test failed.
0D	CR	2D	-	Cursor on tablet, cursor conn/oper test failed.
0E	SO	2E	.	Cursor on tablet, analog test failed.
4F	O	5F	—	Cursor on tablet, test passed.

If there is no response from the tablet, the terminal will signal with an error indication or "No Response from Tablet."

## **ROM CHECKSUM**

The terminal-based self test may also report a “code-check” or ROM checksum from the tablet. This will be in the form **.#XXXX** (ASCII) or **2E23XXXXXXXX** (Hex). Not all Tektronix terminals support this function.

# **MAINTENANCE**

## **CLEANING THE TABLET SURFACE**

Use a dry cloth to remove dust or dirt.

Periodically clean the surface with a soft cloth dampened in a gentle detergent solution and well wrung out.

Never use an abrasive cleaner as it can scratch the active area.

## **PERIODIC MAINTENANCE**

The 4957 requires no periodic adjustments.

# **SPECIFICATIONS**

## **FUNCTIONAL CHARACTERISTICS**

### **RESOLUTION**

Stand-alone user selectable at 1, 2, 4, 100, 200, 400, 500, or 1000 points per inch; 10, 20, or 40 points per mm (254, 508, or 1016 points per inch); or 4096 points across the entire active area. For the 4957, this is about 350 points per inch, and for the 4957 Option 02 it is about 228 points per inch across the X axis, and 341 points per inch along the Y axis.

### **ACCURACY**

$\pm$  .254 mm (.025 inch) nominal over active area.

### **JITTER**

$\pm$  1 least significant digit.

### **PROXIMITY**

12.7 mm (or .5 inch) nominal cursor distance above the active area of the tablet.

### **REPEATABILITY**

$\pm$  .254 mm (0.010 inch)

### **SPEED**

The 4957 is stand alone user selectable at 2, 10, 30, 45, 60 or 90 X Y coordinate pairs per second. The 4957 Option 02 is stand alone user selectable at 1, 2, 5, 10, 30, 60, 75, and 80 X, Y coordinate pairs per second.

## ELECTRICAL CHARACTERISTICS

### POWER SUPPLY INPUT VOLTAGE REQUIREMENTS

U.S.: 100 to 123 VAC at 58 to 62 Hz.

Europe: 191 to 257 VAC at 48 to 52 Hz.

Japan: 87 to 107 VAC at 48 to 62 Hz.

Power plug options for various locales are available with the 4957 Series Tablet. Figure D-1 provides further details on these options.

### POWER CONSUMPTION

10 watts.

### ENVIRONMENTAL SPECIFICATIONS

Operating Temperature: 0 to 40° C  
(32 to 105° F)

Non-Operating Temperature: -55 to +75° C  
(-131 to 167° F)

Operating Humidity: 75% R.H.

Non-Operating Humidity: 75% R.H.

Operating Altitude: 4.5 km (15,000 ft.)

Non-Operating Altitude: 15 km (50,000 ft.)

Shock: 30 G's. Halfsine of 11 Ms duration. 6 shocks, 2 for each of three axes.

Vibration: No failures induced by 0.015 inch displacement after 15 min. along each of the three major axes with a frequency varied from 10 to 50 to 10 Hz. Hold for 10 min. at the frequency found in each axis, or if none at 50 Hz.

## **SAFETY AND EMISSIONS**

The 4957 Series Graphics Tablet complies with the following safety standards:

- UL 114: Standard for Office Appliances and Business Equipment.
- UL 478: Standard for Electronic Data-Processing Equipment.
- IEC 380: Standard for Safety of Business Machines.
- IEC 435: Standard for Safety of Data-Processing Equipment.
- CSA Standard C22.2 Number 154-1975: For Data-Processing Equipment.
- FCC Rules, Part 15 Subpart J; Class A Requirements.
- VDE 0871/6.78, 0875.
- IEEE 587-1980, IEC 664-1980 for Power Line Transient Susceptability.
- ANSI/IEEE Standard 28-1974
- MIL Class 6 for Electrostatic Immunity and Bench Handling.

## **PHYSICAL CHARACTERISTICS**

### **TABLET**

Size: The 4957 is 15.50" x 16.50" x .80" (393.70 mm x 419.10 mm x 20 mm). The 4957 Option 02 is 22.5" x 17.0" x .75" (571.5 mm x 431.8 mm x 19.1 mm).

Weight: The 4957 is 2.7 kg (6 lbs); the 4957 Option 02 is 3.2 kg (7 lbs).

Active Area: The 4957 is 11.7" x 11.7" (297 mm x 297 mm); the 4957 Option 02 is 18" x 12" (441 mm x 294 mm).

Physical dimensions are shown in Figures A-1 and A-2.

### **4-BUTTON CURSOR**

Size: 111.3 mm x 63.5 mm x 21.0 mm (4.38" x 2.50" x .825")

Weight: 113 grams (5 oz.)

Physical dimensions are shown in Figure A-3.

### **STYLUS**

Size: 15.24 mm x 138.18 mm (.6" x 5.44")

Weight: 37 grams (1.30 oz.)

Physical dimensions are shown in Figure A-4.

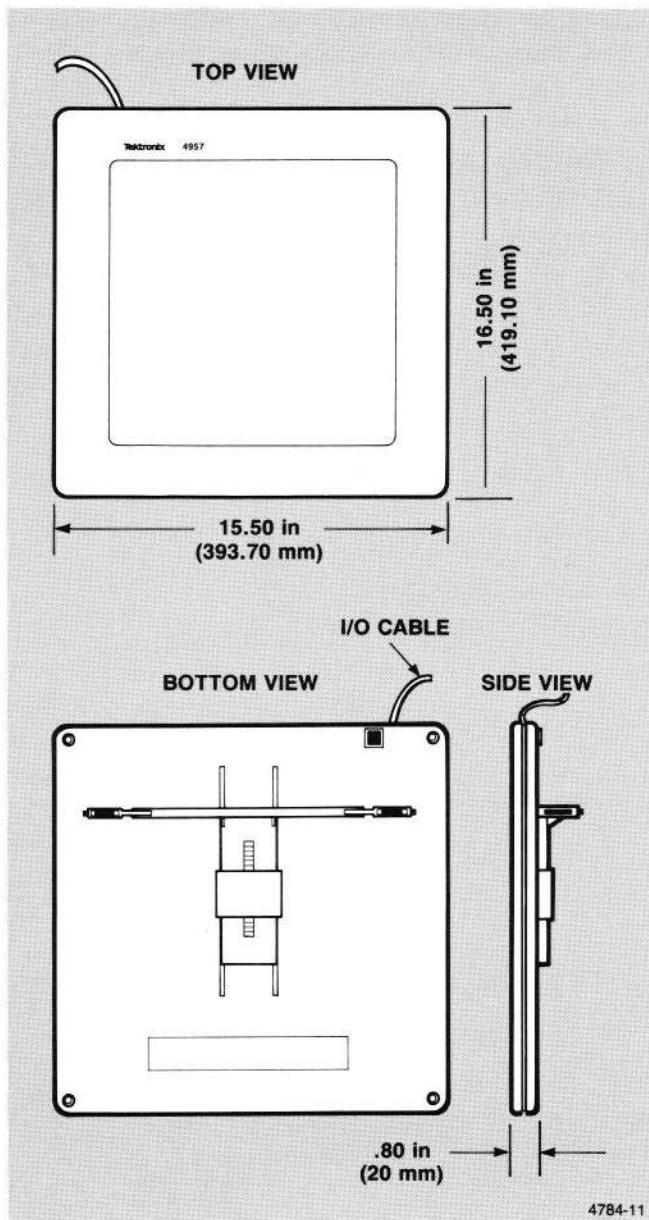
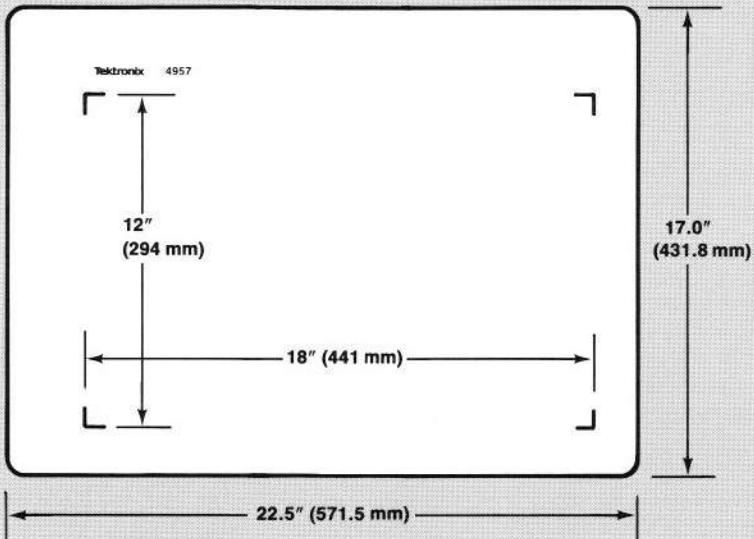
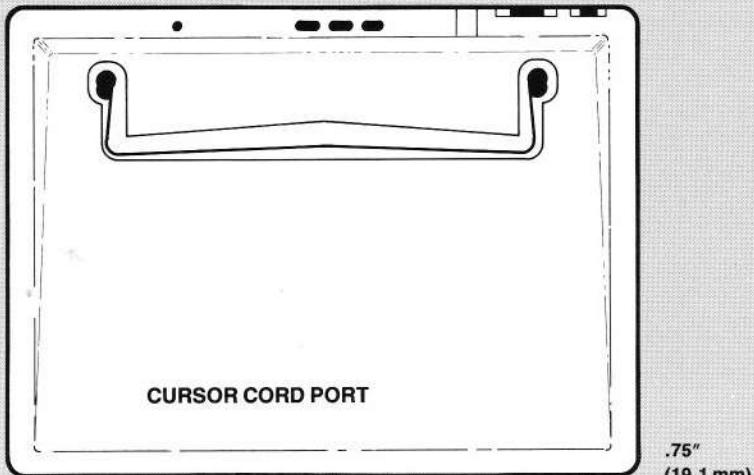


Figure A-1. The 4957 Tablet Surface Dimensions.

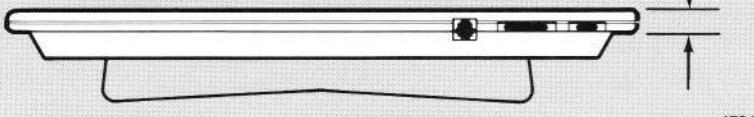
### TOP VIEW



### BOTTOM VIEW

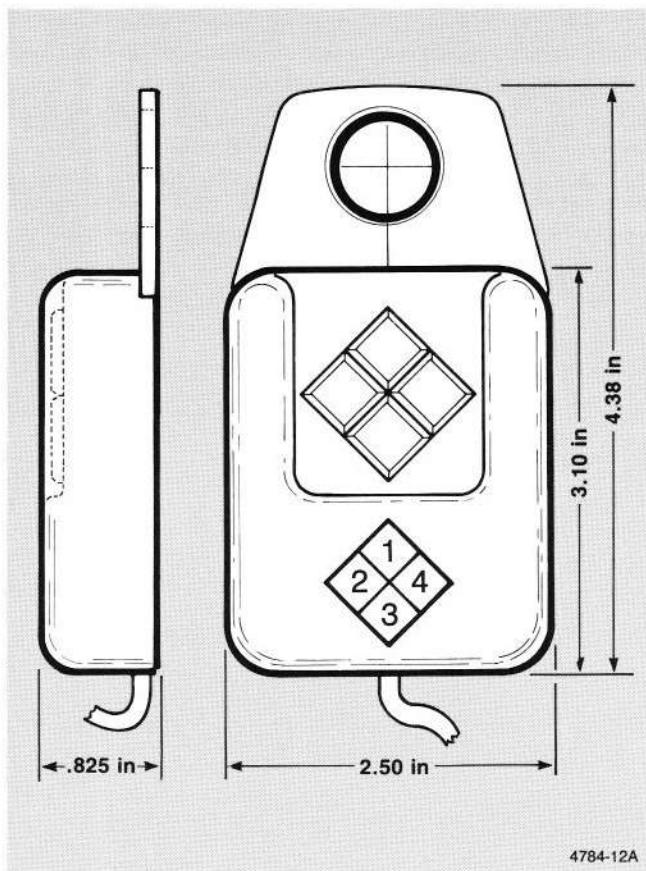


### TOP EDGE VIEW



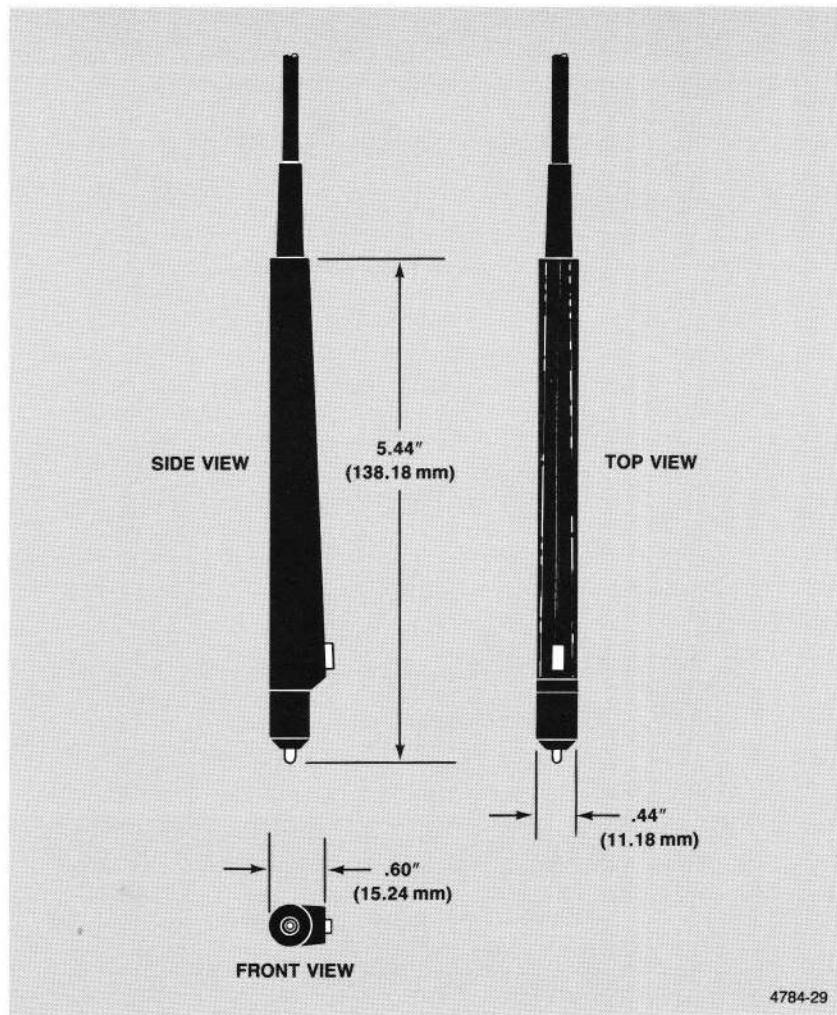
4784-28

Figure A-2. The 4957 Option 02 Tablet Surface Dimensions.



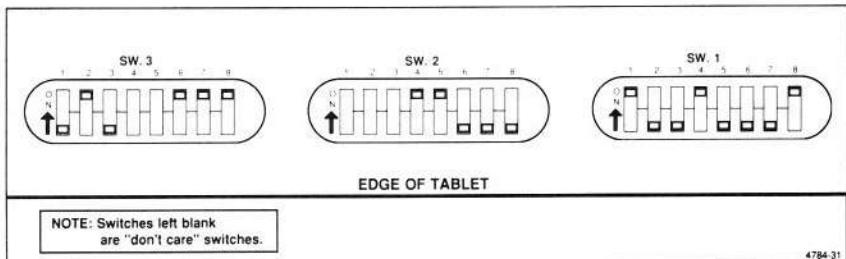
4784-12A

Figure A-3. 4-Button Cursor Dimensions.



4784-29

Figure A-4. Stylus Dimensions.



**Figure A-5. Bottom View of Tablet.**

**ASCII CODE CHART**

BITS	B7	B6	B5	0 0 0 0	0 0 0 1	0 1 0 0	0 1 0 1	1 0 0 0	1 0 0 1	1 1 0 0	1 1 0 1	1 1 1 0	1 1 1 1	
				CONTROL				NUMBERS SYMBOLS		UPPERCASE SYMBOLS		LOWERCASE SYMBOLS		
0 0 0 0	0	NU	20	DL	40	Sp	60	0	100	@	120	P	140	'
		NUL	0	DLE 16	20		32	30	48	40	64	50	80	p
0 0 0 1	1	SH	21	D1	41	!	61		101	A	121	Q	141	161
		SOH	1	DC1 17	21		33	31	49	41	65	51	81	a
0 0 1 0	2	SX	22	D2	42	"	62		102	B	122	R	142	162
		STX	2	DC2 18	22		34	32	50	42	66	52	82	b
0 0 1 1	3	Ex	23	D3	43	#	63		103	C	123	S	143	163
		ETX	3	DC3 19	23		35	33	51	43	67	53	83	c
0 1 0 0	4	ET	24	D4	44	\$	64		104	D	124	T	144	164
		EOT	4	DC4 20	24		36	34	52	44	68	54	84	d
0 1 0 1	5	EQ	25	NK	45	%	65		105	E	125	U	145	165
		ENQ	5	NAK 21	25		37	35	53	45	69	55	85	e
0 1 1 0	6	AK	26	Sy	46	&	66		106	F	126	V	146	166
		ACK	6	SYN 22	26		38	36	54	46	70	56	86	f
0 1 1 1	7	BL	27	EB	47	,	67		107	G	127	W	147	167
		BEL	7	ETB 23	27		39	37	55	47	71	57	87	g
1 0 0 0	10	BS	30	CN	50	(	70		110	H	130	X	150	170
			8	CAN 24	28		40	38	56	48	72	58	88	h
1 0 0 1	11	HT	31	EM	51	)	71		111	I	131	Y	151	171
			9		29		41	39	57	49	73	59	89	i
1 0 1 0	12	LF	32	SB	52	*	72		112	J	132	Z	152	172
	A		10	1A SUB 26	2A		42	3A	58	4A	74	5A	90	j
1 0 1 1	13	VT	33	EC	53	+	73		113	K	133	{	153	173
	B		11	1B ESC 27	2B		43	3B	59	4B	75	5B	91	k
1 1 0 0	14	FF	34	FS	54	,	74		114	L	134	]	154	174
	C		12	1C ,28	2C		44	3C	60	4C	76	5C	92	l
1 1 0 1	15	CR	35	GS	55	-	75		115	M	135	]	155	175
	D		13	1D ,29	2D		45	3D	61	4D	77	5D	93	m
1 1 1 0	16	SO	36	RS	56	.	76		116	N	136	^	156	176
	E		14	1E ,30	2E		46	3E	62	4E	78	5E	4	n
1 1 1 1	17	SI	37	US	57	/	77		117	O	137	UNT	157	177
	F		15	1F ,31	2F		47	3F	63	4F	79	5F	—	DT
													DEL RUBOUT	127

\* On some keyboards or systems.

**KEY**

octal 25

NK

hex 15 NAK 21

graphic representation

decimal

mnemonic

3806-60

# **GLOSSARY**

This section explains many of the more technical terms you may come across while reading this manual.

**active area.**

The area on the tablet surface that can measure points. The area of the coordinate system.

**accuracy.**

The similarity of a distance measured across the surface of the digitizer with a reference distance.

**ASCII.**

A representation of characters in computer storage. This format gives each character a unique number between 0 and 127. The first 32 of these numbers stand for control characters such as `\r` (linefeed) and `\e` (escape). The remaining 96 are displayable characters. Each control or displayable character is stored in a single 8-bit byte. One of those bits is the parity bit and the other seven code the character. Appendix B contains a chart of the ASCII character codes.

**baud.**

The rate of speed at which data can flow between a computer device and the tablet. Baud refers to the number of discrete signal events or discrete conditions each second. In the 4957, baud is stated in bits per second.

**bit.**

A binary digit. It can be either a 1 or a 0. It is the smallest unit of information in the 4957.

**byte.**

A group of bits that acts as a single unit of information. In the 4957, a byte includes seven data bits, one parity bit, one start and one stop bit.

**cursor.**

The tablet cursor is the device that you can hold in one hand and move over the graphic information you wish to digitize. The cursor for the 4957 Series tablet has 4 buttons. It also has a clear window with cross hairs called a reticle that you may use for viewing graphics information. The screen or display cursor is a symbol on the display screen. A common display cursor is an underline character. The cursor serves as a pointer. Many times the tablet cursor and the display cursor are used in conjunction with each other. As you move the tablet cursor, the display cursor may also move in a related manner.

**electromagnetic technology.**

A tablet technology that uses a principle of magnetic coupling between the cursor and a grid of wires on a printed circuit board that makes up the active area.

**GIN mode.**

An interactive mode in which a computer request causes the terminal to respond with graphic information. Status information and/or control characters may be part of the transmission.

**jitter.**

One form of repeatability error. It is usually caused by electrical noise. Jitter is a form of error of relatively short duration — usually of no more than a few seconds.

**linearity.**

The straightness of a line obtained by moving the cursor across the active area. In particular the straightness of a line drawn from one corner to the opposite corner, such as from the lower left to the upper right corner.

**parity check.**

A technique to help locate errors in the transmission of data between computer devices and the tablet. In the 4957, which uses odd parity, if the total number of bits in a byte with value 1, including the parity bit, is odd, the tablet records the byte as being correctly received.

**proximity.**

The distance above the active area that the cursor or stylus can still detect tablet coordinates.

**repeatability.**

The tablet's ability to report the same position on the active area repeatedly with the same coordinates.

**resolution.**

The smallest distance that the tablet can detect and output. It's a measure of how fine a distinction can be made between adjacent points. This is usually expressed as the number of points per millimeter or per inch.

**stylus.**

A tablet accessory used to input data and which looks like a pen with a cable attached.

**tablet-based command set.**

The command set native to the 4957 Series and 4958 Graphics Tablet. These tablets can be controlled using either tablet-based or terminal-based command sets. Tablet-based commands are typically used in system environments which do not have the 410X, 4111, 411BX, or 412X Tektronix terminals. These commands are not as easy to use as the terminal-based commands, but offer more flexibility.

**terminal-based command set.**

The command set used on 410X, 4111, 411BX, and 412X Tektronix terminals when operating a 4957 Series or 4958 Graphics Tablet. These tablets can be controlled using either tablet-based or terminal-based command sets. Terminal-based commands send groups of tablet-based commands to the tablet. These commands are simpler to use, but not as flexible as tablet-based commands.

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# **ACCESSORIES**

## **STANDARD ACCESSORIES**

Standard Power Cord (119-1748-00)

4-Button Cursor (119-1775-00)

Users Manual (070-4784-01)

## **OPTIONAL ACCESSORIES**

Service Manual (070-4984-01)

Stylus (119-1776-00)

## **OPTIONS**

### **Power Cord**

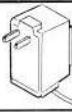
Option A1 (119-1748-01)

Option A2 (119-1748-02)

Option A3 (119-1748-03)

Option A5 (119-1748-05)

Option 48 (119-1748-06)

Plug/Power Supply Configuration	Usage	Nominal Line Voltage (AC)	Reference Standards	Option Number
	North American	120V, 60Hz	ANSI C73.11 <sup>1</sup> NEMA 5-15-P <sup>2</sup> IEC 83 <sup>3</sup>	STANDARD
	Universal European	220V, 50Hz	CEE (7), II, IV, VII <sup>4</sup> IEC 83 <sup>3</sup>	A1
	United Kingdom	240V, 50Hz	BS 1363 <sup>5</sup> IEC 83 <sup>3</sup>	A2
	Australian	240V, 50Hz	AS C112 <sup>6</sup>	A3
	Swiss	220V, 50Hz	SEV	A5
	Japanese	100V, 50/60Hz	ANSI C73.10 <sup>1</sup> NEMA 1-15-P <sup>2</sup> IEC 83 <sup>3</sup>	48

<sup>1</sup> ANSI—American National Standards Institute<sup>2</sup> NEMA—National Electrical Manufacturer's Association<sup>3</sup> IEC—International Electrochemical Commission<sup>4</sup> CEE—National Commission on Rules for the Approval of Electrical Equipment<sup>5</sup> BS—British Standards Institution<sup>6</sup> AS—Standards Association of Australia

Figure D-1. Tektronix Power Plug Options.

# INDEX

- ASCII format, 4-3
- ASCII code chart, B-1
- Accuracy, C-1
- Accessories, D-1
  - optional, D-1
  - standard, D-1
- Active area, 2-11, C-1
  
- Baud rate-procedure for setting, 1-10
- Binary format, 4-5
- Bit, C-1
- Buffering, 3-3
- Byte, C-1
  
- Command exercises, 2-2
  - tablet-based, 2-3
  - terminal-based, 2-4
- Command sets and modes, 2-5
- Commands-overview, 3-1
- Commands-tablet based, 3-3
  - CONFIRM CONFIGURATION, 3-23
  - FACTORY TEST, 3-22
  - PERFORM SELF TEST AND STORE RESULTS, 3-19
  - RESET/CLEAR, 3-5
  - SELF TEST, 3-20
  - SEND CODE CHECK, 3-22
  - SEND IDENTIFIER, 3-25
  - SEND POINT, 3-23
  - SEND SELF TEST RESULTS, 3-24
  - SET ASCII DELINEATOR, 3-11
  - SET AXIS UPDATE, 3-13
  - SET DATA COLLECTION MODE, 3-7
  - SET DATA RATE, 3-9
  - SET DEFINABLE RESOLUTION X AXIS, 3-16
  - SET DEFINABLE RESOLUTION Y AXIS, 3-17
  - SET FORMAT TO ASCII, 3-6
  - SET INCREMENT, 3-12
  - SET RELOCATABLE ORIGIN, 3-14
  - SET RESOLUTION, 3-15
  - SET TABLET ID, 3-18
  - XOFF, 3-21
  - XON, 3-21
  - summary, 3-4

- Commands-terminal-based, 3-1
- Communications-hardware, 5-2
- Communications-software, 5-1
- Compatibility, 4-7, 1-4
- Configuration possibilities, 2-5
- Cursor, C-2, 1-2, 2-10, A-4, 4-6
- Cursor coding, 4-6
  
- DIP switch settings, 1-11
- Data formats, 4-1, 5-1
  - ASCII, 4-3
  - binary, 4-5
  - graphic input reports, 4-1
- Diagnostic checks, 6-1
  - no data, 6-1
  - garbled data, 6-1
  - self-tests, 6-2
  
- Electromagnetic technology, C-2
  
- GIN mode, C-2, 2-6, 3-1
- Glossary, C-1
  
- Installation procedure, 1-6
  
- Jitter, C-2
  
- Linearity, C-2
  
- Maintenance, 7-1
- Modes, 2-1
  - GIN, 2-6, 3-1, C-2
  - Setup, 2-6, 3-1
    - operating, 2-1
- Modes-tablet based, 2-8, 3-7
  - absolute mode, 2-9, 3-8
  - diagnostic, 2-9
  - incremental mode, 2-9, 3-12
  - point mode, 2-8, 3-7
  - relative mode, 2-8, 3-8
  - remote request mode, 2-9, 3-8
  - stream mode, 2-8, 3-7
  - switch-stream mode, 2-8, 3-8
- Modes-terminal based tablet, 2-6
  - coordinate systems, 2-7
  - locate, 2-7
  - pick, 2-7
  - stroke, 2-6
  
- Operating procedures, 2-1
- Optional accessories, D-1

Parameters and DIP switches, 1-10  
Parity check, C-2  
Power plug options, D-2  
Power-up procedure, 1-10  
Proximity, C-2

RS-232 null modem (adapter), 1-6, 1-9  
RS-232 connector, 5-2, 1-2  
Repeatability, C-3  
Report formats, 4-1

- general graphic input report, 4-1
- graphic input locate report, 4-2
- graphic input pick report, 4-2
- graphic input stroke report, 4-2

Resolution, C-3

Safety and emissions, A-3  
Self tests, 6-2

- ROM checksum, 6-4
- self test results, 6-2
- tablet-based self test, 6-2, C-3
- terminal-based tablet self test, 6-3, C-3

Setup mode, 2-6, 3-1  
Specifications-electrical characteristics, A-2

- power consumption, A-2
- power supply input voltage requirements, A-2

Specifications-environmental, A-2  
Specifications-functional characteristics, A-1

- accuracy, A-1
- jitter, A-1
- proximity, A-1
- repeatability, A-1
- resolution, A-1
- speed, A-1

Specifications-physical characteristics, A-4

- cursor, A-4
- stylus, A-4
- tablet, A-4

Stylus, C-3, A-4

Tilt mechanisms, 1-14