

4958 GRAPHICS TABLET

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

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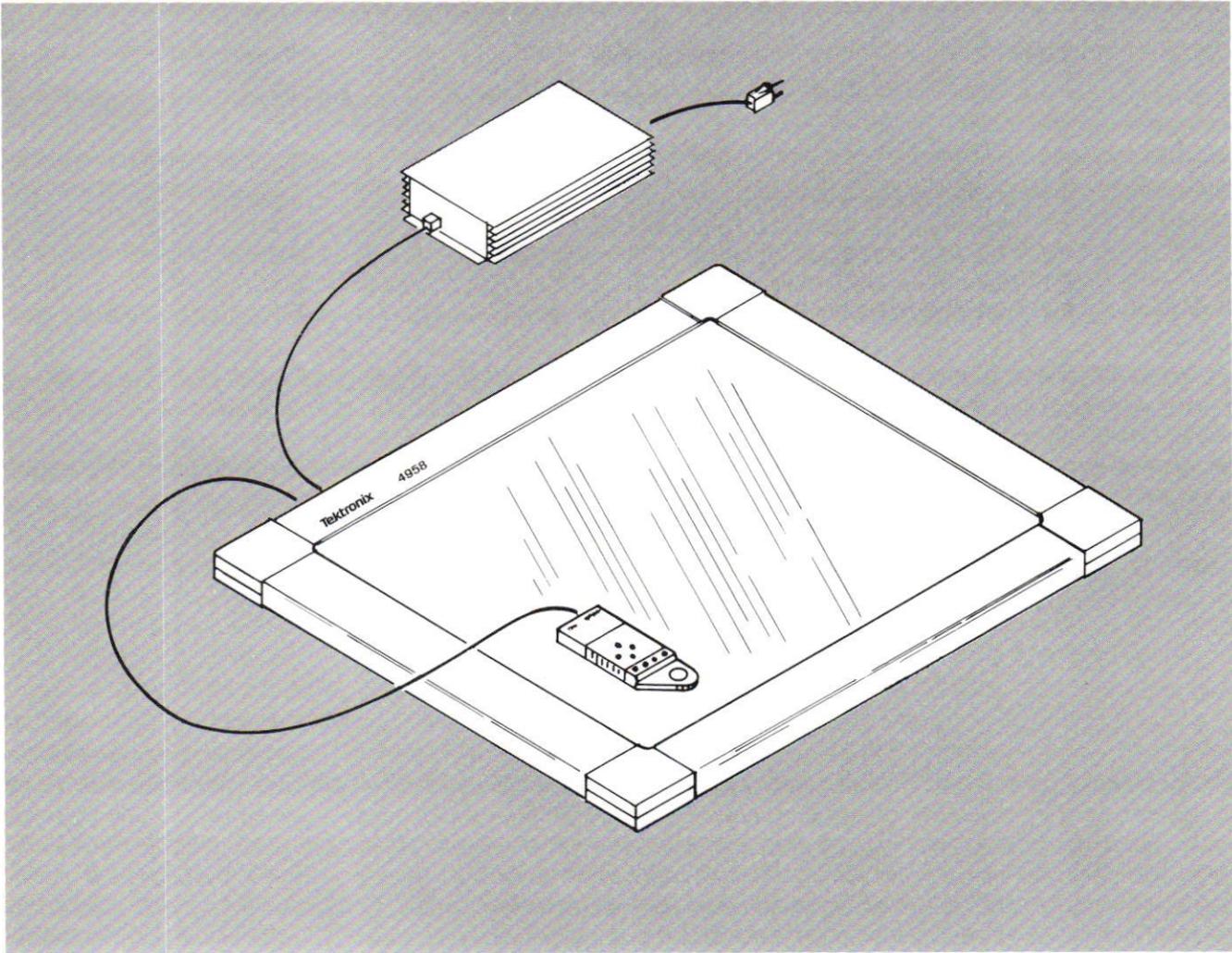


Figure 1-1. The 4958 Graphics Tablet.

Section 1

GETTING STARTED

INTRODUCTION

OVERVIEW

This manual provides you with information useful in operating the 4958. Included are instructions for setting up, operating, programming, and performing basic troubleshooting.

THE 4958: WHAT IS IT?

The Tektronix 4958 Graphics Tablet, hereafter referred to as simply "tablet", is a convenient method of entering graphic information into a computer or automated design station. By simply overlaying the tablet surface with a drawing, photograph, or sketch, and by tracing (digitizing) over it with a cursor, you can easily convert graphic figures into digital information.

- The tablet body; consisting of the active area where digitizing can occur and the border where the internal controller exists. The three optional sizes of active areas available are Option 03 (17" x 24"), Option 05 (36" x 48"), and Option 06 (44" x 60").
- The cursor: A 4-button cursor is standard in choosing the coordinate location to digitize. Additionally, a 16-button cursor or a pen-like stylus are also available for digitizing coordinate points.
- The power supply: used to supply electric energy to run the tablet.

The standard and optional accessories are listed in Appendix D.

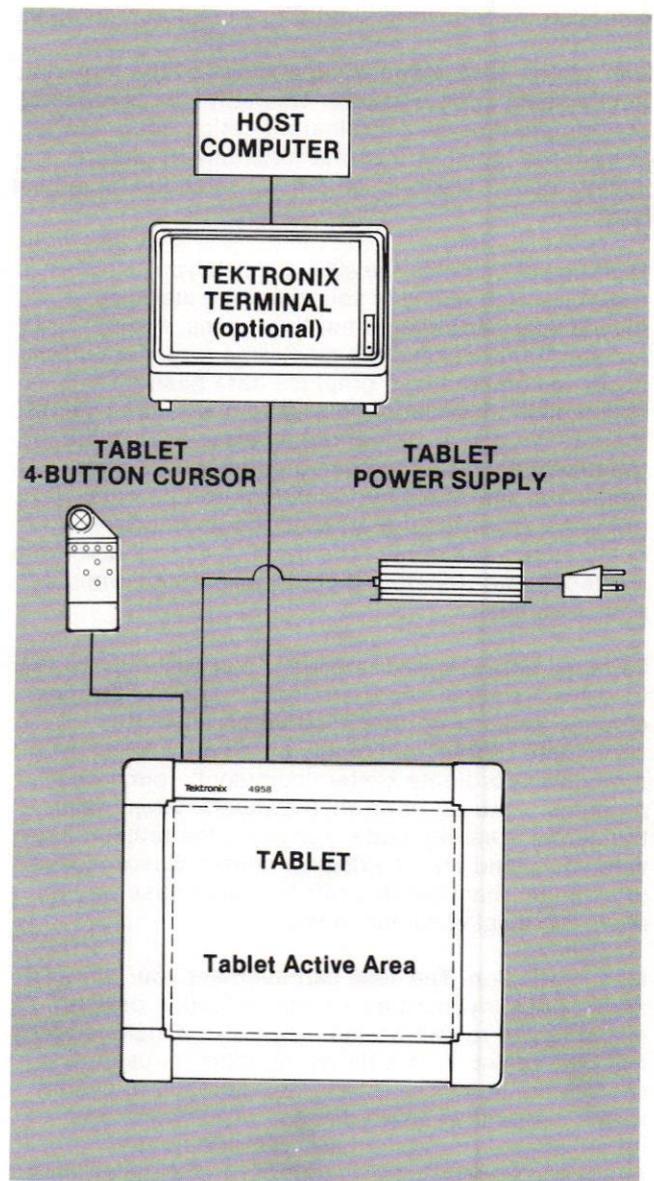


Figure 1-2. Parts of the 4958 Graphics Tablet System.

THE 4958: WHY USE IT?

The 4958 Tablet, when used with the appropriate terminal/host software application program, can accomplish the following: digitizing of pictures, terminal screen cursor steering, and menu selection. These "4958" abilities are actually capabilities of the terminal or host's application software. This software is required to manipulate the raw coordinate location data reports sent from the tablet into useful functions of picture digitizing, cursor steering, and menu selection described below:

- Digitizing of pictures. The 4958 can help you transfer a wide variety of your drawings, including mechanical parts diagrams, floor plans, maps, architectural designs and electronic schematics from paper to computerized graphics data bases. To accomplish this, place the original paper drawing on the tablet's active area and then trace the outline of the drawing, or the significant endpoints of line segments, with the 4-button cursor and its cross hairs. As you trace the drawing the appropriate applications software reads the X, Y coordinates from the tablet and transfers them to your host computer and/or terminal.
- Terminal screen cursor steering. You can use the 4958 to move a screen cursor around a computer terminal display. You can do this 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, you move the tablet cursor with your hand and the display screen cursor moves in a similar manner. This offers you an easy way to move the display screen cursor.
- Menu selection. The 4958 can augment your terminal and/or host keyboard as a menu selection device, enabling you to call a wide range of functions directly from the tablet. In this mode the tablet is used as a custom input device. That is, you can put an overlay with a custom keyboard design on the tablet and thereby have a custom menu with additional functions. Putting extra functions on the tablet leaves more room on the screen for critical design work.

INSTALLATION

OVERVIEW

This part of the manual provides information to quickly get a 4958 Tablet installed and ready to send data to the host. You may also find these procedures helpful in other circumstances such as:

- When relocating the tablet, check that the cables are correctly reinstalled.
- If digitizing problems occur, check that the tablet is properly installed before calling a service representative.

When additional operating adjustments such as internal control parameter changes are necessary refer to Appendix F.

NOTE

Tektronix 411X terminals with Option 10 (3-port peripheral interface or 3PPI) require Version 7 or higher firmware in the 3PPI. 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 [Esc]IQ10 (no spaces and no [Return]). The terminal will display "10 X", where "X" is the firmware level of the Option 10 interface.

NOTE

Tektronix 410X terminals (4107, 4109, CX4107, CX4109) with 2PPI require firmware Version 8 or higher for compatibility. To obtain the terminal's firmware version, enter Setup mode and type.

STAT GEN <CR>

All "A" model 410X terminals, e.g., 4107A, CX4109A are compatible. Firmware upgrade kits may be ordered from Tektronix.

PROCEDURE

All cable connections are to be made on the rear panel of the 4958 tablet. Once cable connections are made, be sure to tighten the screws on each plug connector with a flat head screwdriver to ensure a tight fit. The cables and receptacle connectors are properly marked for easy identification. Molded plastic covers will be placed over unused holes. Do not remove these connection covers.

1. Connect the cursor or stylus cable plug into the female connector receptacle labeled TRANSDUCER.
2. Connect the asynchronous communications cable (RS-232C) into the male RS-232C connector receptacle.
3. Connect the other end of the asynchronous communications cable to the corresponding host computer or terminal's peripheral communications port (RS-232C).
4. Connect the tablet power supply's cable plug to the male connector receptacle labeled POWER.
5. Connect the tablet power supply to a wall power outlet.

POWER-UP PROCEDURE

1. Turn ON your host computer and/or your terminal.
Enter SET UP mode if the host is a Tektronix terminal peripheral port and check for or make the following entries:
PASSIGN PX: 4958
PBAUD PX: 9600
PBITS PX: 1 7
PPARITY PX: ODD
PFLAG PX: NONE
PEOF PX: NONE (default)
PEOF PX: NONE (default)
"X" is the peripheral port number — 0, 1, or 2.
2. Push ON the 4958 POWER button located on the top left edge of the tablet. At power on, the green LED indicator positioned at the top left corner of the tablet will light, and a beep will be audible indicating that the system is awaiting instructions.
3. The tablet is now ready for use.

GETTING STARTED

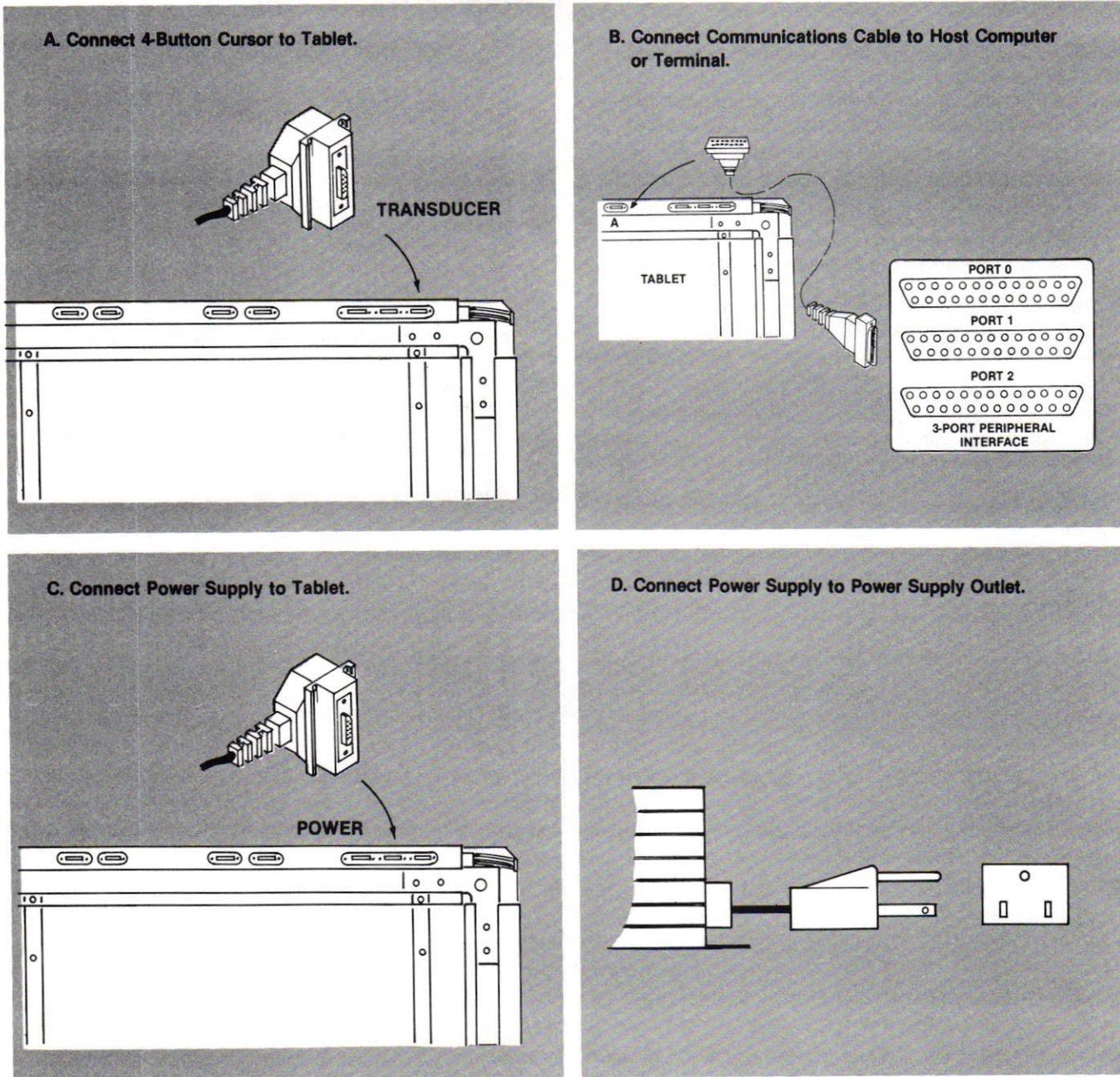


FIGURE 1-3. 4958 Installation.

PEDESTAL BASE ATTACHMENT

Refer to Appendix E for instructions on mounting the 4958 Option 05 (36" x 48") or Option 06 (44" x 60") Tablet to a pedestal.

POWER SUPPLY TO TABLET MOUNTING PROCEDURE

The power supply comes equipped with two retainer nuts and two bolts for those opting to mount the power supply to the tablet. The following steps describe this simple mounting procedure:

1. Loosen (do not remove) the bolt on each side of the power supply.
2. Align the retainer nuts of the power supply anywhere along the narrow t-slot groove underneath the tablet extrusions.
3. Turn the retainer nuts 90° and tighten the bolts.

If you do not wish to mount the power supply to the tablet remove the retainer nuts and bolts from each end of the power supply.

TABLET SYSTEM SELF TEST

Your 4958 should perform without trouble for many years. However, if you want to be sure the tablet is functioning correctly, it is very simple to run a self test procedure. There are two types of self tests. One, if the tablet is connected to a Tektronix terminal that specifically supports the 4958, such as the 411X and the 410X series, use the terminal-based tablet self test. Second, if the terminal 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.

POWER SUPPLY VOLTAGE SELECTION (EUROPEAN)

To change power supply voltage from 240V to 220V: Open cover, using small blade screwdriver or similar tool. Set aside cover/fuse block assembly.

Pull voltage selector card straight out of housing, using indicator pin.

Orient selector card so that desired voltage is readable at the bottom.

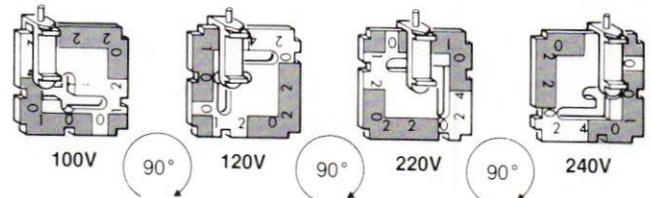
Orient indicator pin to point up when desired voltage is readable at bottom.

(Note: when indicator pin is fixed, successive voltages are selected by rotating the card 90° clockwise.)

Insert voltage selector card into housing, *printed side of card facing toward IEC connector*, and edge containing the desired voltage first.

Replace cover, and verify that indicator pin shows the desired voltage.

Voltage Selector Card Orientation



LINE FUSE SELECTION

The power cord receptacle on the power supply module has a pop-off cover that holds the line fuse. Use only the fuse specified for replacement purposes.

Table 1-1
LINE FUSE SELECTION

| Operating Voltage | Fuse Type |
|-------------------|---------------------------|
| 100/120 volts | .75A, 250V, Med-Slo Blow |
| 220/240 volts | .375A, 250V, Med-Slo Blow |

Section 2

OPERATING PROCEDURES

OVERVIEW

Operation of the 4958 graphics tablet is simple and straightforward. The five-step procedure is shown below:

1. Power ON the 4958.
2. Set up the terminal operating parameters as follows: Baud = 9600, Parity = Odd, Echo = Off, Data Bits = 7, Start Bits = 1, Stop Bits = 1.
3. Select and enable the desired operating mode(s) as defined further in Section 3. The operating mode determines how data is sent from the tablet.
4. Place material to be digitized on the active surface of the tablet. You may want to tape it down.
5. Position the cursor (or stylus) over the desired locations to be digitized on the surface. Look through the sighting lens from directly over the cursor and move the cursor so that the intersection of the cross-hairs covers the point to be digitized. In some modes, it is necessary to depress buttons on the cursor to digitize a point (location). Selected points are easily digitized when using the pen stylus by pressing the stylus down lightly against the tablet surface.

OPERATING MODES

The 4958 uses two operating modes: the Tektronix terminal-based modes and the tablet-based modes.

If you have a host computer that communicates with the tablet via any of the Tektronix terminals that support the 4958 then you can use tablet modes similar to those available on the TEKTRONIX 411X and 410X Series terminals. These modes consist of the terminal's translation of tablet-based modes into standard Tektronix terminal modes.

If you have another system, such as a TEKTRONIX 4170 computer, you can use the set of modes native to the tablet to communicate directly between the tablet and that system.

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. Table 2-1 lists the modes in each class.

Table 2-1
OPERATING MODES

| Tektronix Terminal-Based Tablet Modes | Tablet-Based Modes |
|--|---------------------------|
| Stroke | Point |
| Locate | Stream |
| Pick | Switch-Stream |
| | Delta |
| | Incremental |
| | Remote Request |

TEKTRONIX TERMINAL-BASED TABLET MODES

The 4958 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. Operating procedures are usually found in the software users documentation. Tektronix GIN operations and commands are described in detail in the following manuals:

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

TABLET-BASED MODES

Point Mode

A single coordinate pair is sent from the tablet only when a 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 then back to either Stream, Switch-Stream, or Remote Request.

Stream Mode

The tablet 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.

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.

Delta Mode

Only the change in coordinate values will be sent by the tablet. The new point reflects relative cursor movement rather than sending absolute coordinates. A report is also generated when a cursor button is either pressed or released. Negative numbers (indicating left and/or downward cursor movement) are distinguished from positive numbers only by the value of the sign bit (refer to Table 4-1). This mode may be used in conjunction with the Stream and Switch-Stream data collection modes, and may be used for steering a terminal's cursor. By using the SET DATA RATE command, one can control the fineness or coarseness of the movement of a display's cursor.

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. You may enter different values for X and Y (refer to Set Increment Command in Section 3).

Remote Request Mode

A single coordinate point will be determined by the tablet and returned to the host after receiving a SEND POINT command ($E_C G^C R$).

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. Depress one of the four cursor buttons. The tablet recognizes which button is pressed and outputs that information in a useable format. (If you want more details on the output format, please see Section 4.) To activate the optional pen stylus, press the pen down lightly against the tablet surface.

The lower left corner of the tablet 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.

There are four LED light indicators above the 4-button keypad. The leftmost LED will light whenever any button is depressed and will stay lit as long as the button is down. The middle two LEDs are user definable and are lit and extinguished by cursor light command. (See Tablet-Based Commands in Section 3.) The rightmost LED is the out-of-proximity indicator. It lights whenever the cursor is in the margin (outside of the active area) and when the cursor is sufficiently above the surface to cause the 4958 not to detect it.

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.

Figure 2-2 shows the position of the active area on the tablet. The dashed line in the figure identifies the invisible border of the active area.

The division between the active area and the margin area is marked by a black dot affixed to the lower left default origin point. Another way to find this division is to operate the tablet and use the proximity indicator (rightmost LED) located on the cursor to show when the cursor crosses into the margin area.

The 4-button cursor may be held a small distance above the actual surface and still be in the active area during operation. The 4958 will operate properly even when the cursor is positioned $\frac{1}{2}$ " above the tablet surface.

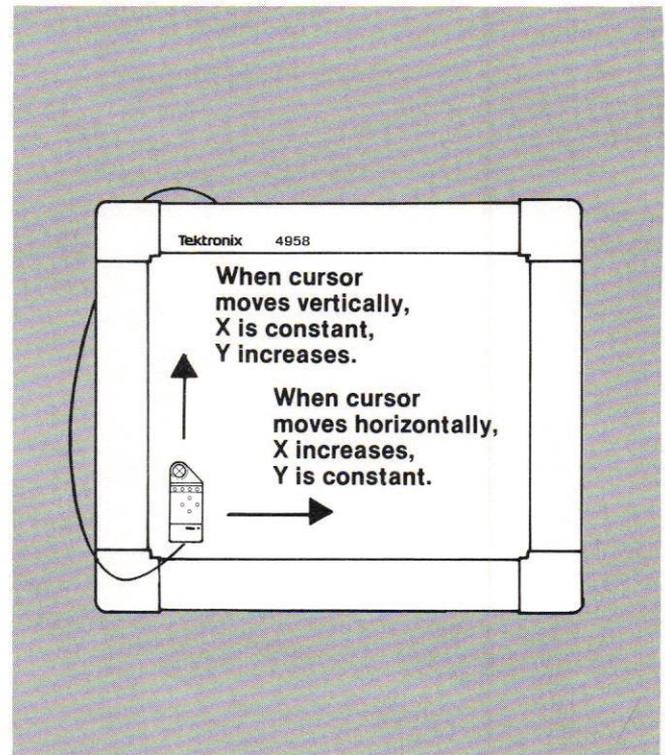


Figure 2-1 Using the 4-Button Cursor.

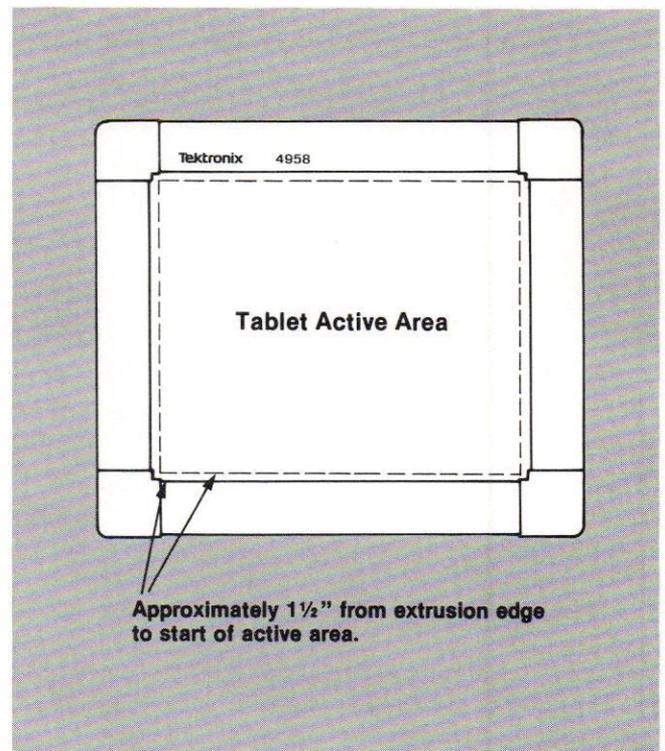


Figure 2-2. The Tablet's Active Area.

Section 3

COMMANDS

OVERVIEW

This section is to assist the user in writing application programs for the 4958 Tablet. If the tablet is connected to a Tektronix graphic terminal, certain tablet setup commands and the GIN (Graphic INput) commands are used — through the terminal — to activate and control the tablet. User programming may not be necessary as considerable software is available from Tektronix and other sources. However, if the tablet is connected to a non-Tektronix host, the tablet-based command set is used and the following command descriptions will be helpful to the host programmer.

TEKTRONIX TERMINAL-BASED TABLET COMMANDS

A complete listing of Tektronix GIN commands may be found in the Tektronix terminal's Command Reference or Programming manual. 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 changes may be needed for best results.

If you are still having problems after studying the Host Programmers and Command Reference (or terminal Programmers) manuals, consult your Tektronix Systems Analyst for assistance.

COMMANDS

TABLET-BASED COMMANDS

OVERVIEW

Your 4958's internal firmware is programmed to respond to commands sent directly from a host computer or terminal. 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:

$E_C ab \{ C_R \}$

where:

E_C = ASCII character sent from the host, or the "ESCAPE" key on the terminal keyboard.

a = a function code.

b = an option of the function.

$\{ C_R \}$ = Sent by the host computer or the "CARRIAGE RETURN" key of a terminal keyboard. This character is optional and is not a requirement for command execution.

BUFFERING

The 4958 has an input buffer of approximately 100 bytes. This capability assures the user that commands will not overflow the buffer and be lost.

COMMAND DESCRIPTIONS

Table 3-1 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 3-1
TABLET-BASED COMMANDS SUMMARY

| Command | Syntax |
|---|--|
| Parameter Set-Up Commands: RESET/CLEAR SET FORMAT TO ASCII SET DATA COLLECTION MODE SET DATA RATE SET ASCII DELINEATOR SET INCREMENT SET RELOCATABLE ORIGIN SET RESOLUTION SET TABLET ID PERFORM SELF TEST AND STORE RESULTS XOFF XON CURSOR LIGHT ANNUNCIATOR | $E_C Z$ $E_C Q$ $E_C Mb$ $E_C Rb$ $E_C Db$ $E_C lbbb$ $E_C Fb$ $E_C Cb$ $E_C Tb$ $E_C t$ CONTROL S CONTROL Q $E_C Lb$ $E_C A$ |
| Send-Data Commands: SEND CODE CHECK SEND CONFIGURATION SEND POINT SEND SELF TEST RESULT | $E_C x$ $E_C a$ $E_C G$ $E_C w$ |

RESET/CLEAR

$$^E_C Z \{ ^C_R \}$$

Description

This reset command sequence erases/clears/resets the command input buffer (all volatile memory parameters). The tablet will revert to the default settings that are pre-set when the tablet powers up. The default settings are listed below:

| | |
|--------------------|------------------------------|
| Resolution | = 500 points per inch |
| Mode | = Remote Request |
| Increment | = 000 |
| Output Sample Rate | = 90 coordinate pairs/second |
| Tablet ID | = 0 |
| Origin | = Lower left corner |
| ASCII Delineator | = , |
| Format | = Binary |
| LED's | = OFF |
| Annunciator | = ON for 0.5 second then OFF |

NOTE

A Command character shown inside braces, i.e. { C_R } is optional and is not a requirement for command execution.

NOTE

Allow at least 20 milliseconds after sending $\langle EC \rangle Z$ to the tablet before sending another command. The tablet's interface is disabled during the reset process.

SET FORMAT TO ASCII

$$^E_C Q \{ ^C_R \}$$

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 ($^E_C Z$) command must be sent.

Reference Section 4 for ASCII and Binary Formats.

COMMANDS

SET DATA COLLECTION MODE

$$^E_C Mb \{ ^C_R \}$$

Parameters

Where b can equal 0 to 4.

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 = Delta

Description

- **Stream mode:** In this mode the tablet outputs coordinates continuously as long as the cursor is within the active area and in proximity of the tablet. 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.
- **Point mode:** A single coordinate pair is sent from the tablet only when a cursor button is pushed. SET INCREMENT command is not operative in Point mode. However, previous settings are not affected by going to point mode then back to either Stream, Switch-Stream, or Remote Request.
- **Switch-Stream mode:** Identical to Stream mode except that data is transmitted from the tablet only when a cursor button is pushed.
- **Remote Request.** A single coordinate point will be determined by the tablet and returned to the host after receiving a SEND POINT command ($^E_C G ^C_R$).
- **Delta mode:** Only the change in coordinate values will be sent by the tablet. The new point location reflects "relative" movement of the cursor rather than locating "absolute" coordinates. A report is generated when a cursor button is either pressed or released, regardless of whether the cursor is in or out of proximity. 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 "Output From Tablet Direct To Host" in Section 4).

SET DATA RATE

Format

$E_C Rb \{ C_R \}$

Parameters

Where b can equal 1, 3, 4, 5, 6 or 7.

If b = 1, then data rate = 2 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.

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

If b = 7, then data rate = 45 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.

The tablet may not achieve, but will still accept, all the data rates selectable by the SET DATA RATE command. Below is a list of the maximum data rates achievable with the given baud rates:

| Baud Rate | Maximum Achievable Data Rate |
|-----------|---------------------------------|
| 19200 | 100 coordinate pairs per second |
| 9600 | 50 coordinate pairs per second |
| 4800 | 25 coordinate pairs per second |
| 2400 | 12 coordinate pairs per second |
| 1200 | 6 coordinate pairs per second |
| 600 | 3 coordinate pairs per second |

SET ASCII DELINEATOR

Format

$E_C Db \{ C_R \}$

Parameters

Where b is the desired delineator character. The delineator can be any ASCII character from $\langle NU \rangle$ through $\langle DT \rangle$ (ADE 0 through ADE 127) (see Appendix B).

Description

This command defines the character that separates fields of information contained in the ASCII report format. This character defaults at power-up and at the RESET/CLEAR command to an ASCII “,” and may be observed in the report format:

SXXXXX,SYYYYY,FF,T $\langle L_F \rangle$ $\langle C_R \rangle$ CR

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

COMMANDS

SET INCREMENT

Format

$$E_C I bbb \{ C_R \}$$

Parameters

Where bbb can equal 000 to 999 coordinate units. Leading zeroes are required.

Description

This instruction sets the distance in resolution elements, at the resolution determined by the SET RESOLUTION command, that the cursor must be moved before a new coordinate is sent from the tablet (i.e., for a RESOLUTION of 1000 ppi, a SET INCREMENT of 025 means the cursor must move 25/1000 or .025 inches). When the change in the position of the cursor satisfies the distance parameter of the SET INCREMENT command in either the X and/or Y direction, a new coordinate pair is sent to the host with the new X and/or Y position. A new point is also sent if a cursor/stylus button is either pressed or released.

INCREMENT mode is susceptible to the speed at which the operator moves the cursor versus the DATA RATE set by the user. With slower data rates it is possible to move the cursor faster (obtaining more points) than the tablet's data rate will allow to be sent. These points are lost, as only the point that is valid at the time of transmission will be sent and the tablet's data transmissions will NOT increase dependent on the speed of the cursor movement. If it is important that these increments are not lost (such as for curve tracing operations) a data rate of 90 coordinate pairs per second should be used. Primarily, however, the SET INCREMENT command is used for reducing the amount of data sent from the tablet.

SET RELOCATABLE ORIGIN

Format

$$E_C Fb \{ C_R \}$$

Parameters

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

If b = 0, the tablet sets the 0,0 coordinate origin to the lower left corner of the active area.

If b = 1, the tablet sets the 0,0 coordinate origin where the next point is digitized. No more commands should be sent until that point is digitized.

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

If b = 3, the tablet sets the 0,0 coordinate origin to the upper left corner of the active area.

Description

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

SET RESOLUTION

Format

$E_C Cb \{ C_R \}$

Parameters

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

| b | POINTS PER INCH | mm PER POINT | INCHES PER POINT |
|------|-----------------|--------------|------------------|
| 0 | 200 | | 0.005 |
| 1 | 254 | 0.1 | |
| *2 | 1000 | | 0.001 |
| 3 | 1016 | 0.025 | |
| 4 | 500 | | 0.002 |
| 5 | 508 | 0.05 | |
| 6 | 400 | | 0.0025 |
| 7 | 100 | | 0.01 |
| **8 | 1 | | 1 |
| **9 | 2 | | 0.5 |
| **A | 4 | | 0.25 |
| ***B | 4096/long axis | | |

- * This is the parameter set by the 3PPI in the Tektronix 411X terminals.
- ** When b = 8, 9, or A, the tablet is in "GRID ROUND OFF MODE." For example: if b = 8, the tablet is divided into 1-inch blocks; if b = 9, the tablet is divided into 0.5-inch blocks; and if b = A, the tablet is divided into 0.25-inch blocks.
- *** This is the resolution used by the TEKTRONIX 4106/4107/4109 Terminals. The terminal's maximum limit of 4096 addressable points in the X-axis sets the following tablet resolution parameters:
 4958, Option 05 (36x48 inches)
 — 85 points per inch.
 4958, Option 03 (17x24 inches)
 — 170 points per inch.
 4958, Option 06 (44x60 inches)
 — 68 points per inch.

SET TABLET ID

Format

$E_C Tb \{ C_R \}$

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 information is contained in the first byte of the binary tablet output and the last character of the ASCII format. See Section 4 for more details on the output format.

COMMANDS

PERFORM SELF TEST AND STORE RESULTS

Format

$E_C t \{ C_R \}$

Description

This command initiates a tablet self test and causes the results to be stored in its memory. No data is sent from the tablet. The description of the SEND SELF TEST RESULTS command given later in this section explains the format of these self test results.

NOTE

Allow at least 250 milliseconds after sending $\{ E_C \} t$ to the tablet before sending any other commands. The tablet may not respond at all or may respond erroneously if not allowed time to complete its internal self-tests.

XOFF

Format

CTRL S (ASCII $\{ D_3 \}$) (See Appendix B)

Description

This command places the tablet in a standby or "pause" condition that stops internal scanning and transmission to the host, and is particularly useful in Stream and Switch-Stream data collection mode applications where the tablet transmits data faster than the host processor can utilize it. The command will temporarily stop the tablet's transmissions at the beginning of the very next eight byte record (the tablet will not stop in the middle of an eight byte report) to give the host processor time to empty its buffer.

XON

Format

CTRL Q (ASCII {^D₁}) (See Appendix B)

Description

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

SEND CODE CHECK

Format

^E_{C X} {^C_R}

Output Format

.#XXXX ^C_R

Description

This command transmits the value of the ROM checksum which was calculated and stored in memory at power on, or during a tablet self test (^E_{C t}).

COMMANDS

SEND CONFIGURATION

Format

$$E_C a \{ C_R \}$$

Description

The tablet will transmit, using the coordinate location report format described in Section 4, a report word that contains the maximum values for the X and Y SET RESOLUTION, and flags that give additional information and status of the tablet. For example, if the tablet is an Option 05 (36x48 inches) and RESOLUTION = 100 points per inch, $E_C a C_R$ will cause the tablet to return an X value of 4800 and a Y value of 3600 (plus cursor flag and tablet ID).

SEND POINT

Format

$$E_C G \{ C_R \}$$

Description

This command will cause one graphic input location report to be sent to the host or terminal.

SEND SELF TEST RESULTS

Format

$$E_C W \{ C_R \}$$

Description

When the host is ready to examine the results of the self test, this command causes the tablet to transmit the self test result data, followed by a carriage return, and turns the annunciator on for a short beep if the self test failed. The self test result is sent by a single byte (shown below), followed by a byte for a carriage return.

| BIT # | PASS/FAIL | DEFINITION |
|-------|--------------|------------------------------|
| 0 | 1 | Always transmitted as 1 |
| 1 | 1 0 | Cursor conn/oper test result |
| 2 | 1 0 | Digital memory test result |
| 3 | 1(on) 0(off) | Cursor on/off tablet |
| 4 | 1 | Transmitted as 1 for a 4958 |
| 5 | 0 | Always transmitted as 0 |
| 6 | 1 0 | Total test results |
| 7 | either | Odd parity bit |

CURSOR LIGHTS

Format

$$E_C Lb \{ C_R \}$$

Parameters

Where b can be 0, 1, 2, or 3.

If b = 0, red cursor light #2 is turned Off.

If b = 1, red cursor light #2 is turned On.

If b = 2, red cursor light #3 is turned Off.

If b = 3, red cursor light #3 is turned On.

Remember that only cursor lights #2 and #3 are user definable. Light #4 is the proximity light, and Light #1 is the switch down light.

COMMANDS

ANNUNCIATOR

Format

$E_C A \{ C_R \}$

Description

When this command is sent from the computer, the annunciator will emit a half second audible beep.

Section 4

INTERFACING

OVERVIEW

The function of the tablet report formats is to facilitate data exchange between the tablet and its environment.

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

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 4958 can use a series of Tektronix standard graphic input reports to communicate to a host computer by way of Tektronix terminals that offer 4958 support. Command reference manuals of various Tektronix terminals describe these reports in greater detail.

OUTPUT FROM TABLET DIRECT TO HOST

The 4958 communicates in this direct class with a format known as the Universal Input Output Format (UIOF).

The 4958 uses either of two types of UIOF formats. These are (1) ASCII format and (2) binary format. The ASCII format offers the advantage of having no ASCII control characters like <ET> sent to a host. Binary requires only 8-bytes per coordinate, whereas the ASCII format requires 20 bytes.

ASCII FORMAT

ASCII data format has a 20-byte, 8-bit output with a format syntax as follows:

SXXXXX,SYYYYY,FF,T{^{C_R}} {^{L_F}}

Where:

- S = The coordinate sign. It is positive (i.e. +) for all modes except Delta mode. When using Delta mode the coordinate sign may be positive or negative (i.e. + or -).
- 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 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:

| Flag | 4-Button Cursor Status |
|------|--|
| 00 | No buttons pressed |
| 01 | Button #1 pressed |
| 02 | Button #2 pressed |
| 03 | Button #3 pressed |
| 04 | Button #4 pressed |
| 32 | Cursor is out of proximity, no buttons pressed |
| 33 | Out of proximity, button #1 pressed |
| 34 | Out of proximity, button #2 pressed |
| 35 | Out of proximity, button #3 pressed |
| 36 | Out of proximity, button #4 pressed |

T = Tablet ID, either 0 or 1, as set by the SET TABLET ID command.

{^{C_R}} = Carriage return
{^{L_F}} = 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 20 with ASCII.

Tablet 4-1 shows the binary format syntax:

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

| Byte ^a | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1 ^b | P | 1 | 0 | 0 | TYPE1 | TYPE2 | ID | PROX |
| 2 ^c | P | 0 | 0 | F4 | F3 | F2 | F1 | F0 |
| 3 ^d | P | 0 | X5 | X4 | X3 | X2 | X1 | X0 |
| 4 ^d | P | 0 | X11 | X10 | X9 | X8 | X7 | X6 |
| 5 ^d | P | 0 | 0 | Xs | X15 | X14 | X13 | X12 |
| 6 ^d | P | 0 | Y5 | Y4 | Y3 | Y2 | Y1 | Y0 |
| 7 ^d | P | 0 | Y11 | Y10 | Y9 | Y8 | Y7 | Y6 |
| 8 ^d | P | 0 | 0 | Ys | Y15 | Y14 | Y13 | Y12 |

^aAll bytes: P = Parity Bit.

^bByte 1: TYPE 1 and TYPE 2 indicate the graphic input peripheral that is attached. If TYPE 1 = 1 and TYPE 2 = 0 then a 4958 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. PROX = Bit that indicates if the data being collected is in or out of tablet proximity.
0 = in proximity
1 = out of proximity

^cByte 2: = F0 through F4 = the coding of the cursor buttons. Table 4-2 shows the exact codes used.

^dBytes 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**

| Cursors 16-Button 4-Button Stylus | BINARY | | | | | | | ASCII | | | |
|---|--------|-------|---|----|----|----|----|-------|-----|----|----|
| | P | 6 | 5 | F4 | F3 | F2 | F1 | F0 | FF | FF | |
| | | | 4 | 3 | 2 | 1 | 0 | IN | OUT | | |
| None | None | None | P | 0 | 0 | 0 | 0 | 0 | 0 | 00 | 32 |
| Z | Z/1 | TIP/O | P | 0 | 0 | 0 | 0 | 0 | 1 | 01 | 33 |
| 1 | 1/2 | | P | 0 | 0 | 0 | 0 | 0 | 1 | 02 | 34 |
| 2 | 2/3 | | P | 0 | 0 | 0 | 0 | 0 | 1 | 03 | 35 |
| 3 | 3/4 | | P | 0 | 0 | 0 | 0 | 1 | 0 | 04 | 36 |
| 4 | | | P | 0 | 0 | 0 | 0 | 1 | 0 | 05 | 37 |
| 5 | | | P | 0 | 0 | 0 | 0 | 1 | 1 | 06 | 38 |
| 6 | | | P | 0 | 0 | 0 | 0 | 1 | 1 | 07 | 39 |
| 7 | | | P | 0 | 0 | 0 | 1 | 0 | 0 | 08 | 40 |
| 8 | | | P | 0 | 0 | 0 | 1 | 0 | 1 | 09 | 41 |
| 9 | | | P | 0 | 0 | 0 | 1 | 0 | 1 | 10 | 42 |
| A | | | P | 0 | 0 | 0 | 1 | 0 | 1 | 11 | 43 |
| B | | | P | 0 | 0 | 0 | 1 | 1 | 0 | 12 | 44 |
| C | | | P | 0 | 0 | 0 | 1 | 1 | 0 | 13 | 45 |
| D | | | P | 0 | 0 | 0 | 1 | 1 | 1 | 14 | 46 |
| E | | | P | 0 | 0 | 0 | 1 | 1 | 1 | 15 | 47 |
| F | | | P | 0 | 0 | 1 | 0 | 0 | 0 | 16 | 48 |

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

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.

INTERFACE STANDARD

This section covers the standard for which the 4958 communicates with its environment (i.e., the host computer and/or terminal).

SOFTWARE

The 4958 communicates with asynchronous serial RS-232C transmissions. It receives commands in 7-bit ASCII data format and sends in 7-bit binary or ASCII format, as shown in Figure 4-1. All of the 4958's communications use an eight bit as an odd parity bit. Commands are ignored if the parity bit is wrong.

The 4958 normally transmits at 9600 baud. Tektronix terminal-based tablet commands support this rate. It is the rate set at the factory and the only rate most users should require from their 4958.

For requirements other than 9600, the following baud rates are available by switch selection (see Appendix F for further details):

19200, 4800, 2400, 1200, 600, 300 baud.

: 1 Start Bit/7 Data Bits/Odd Parity Bit/1 Stop Bit :

Figure 4-1. The Data Format.

HARDWARE

The tablet and host communicate through a 25-pin "D" shell connector. The connector at the tablet side is a male connector and has pins. The connector at the host side should have sockets (a female connector). An adapter is required if the gender of these connectors are the same. Figure 4-2 shows the purpose of each pin in the tablet's 25-pin connector. The tablet is configured to function as Data Terminal Equipment (DTE).

| Pin # | Wire Name | Description |
|-------|---------------|--|
| 1 | Frame GND | |
| 2 | Transmit Data | Serial Data from Tablet to Host |
| 3 | Receive Data | Serial Data and Commands From Host to Tablet |
| 4-6 | Spares | |
| 7 | Ground | Return for Logic Data and Control Signals |
| 8-25 | Spares | |

NOTE

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

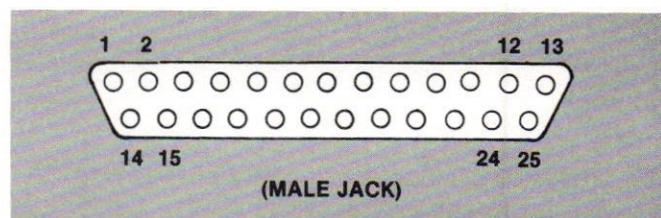


Figure 4-2. RS-232C Connector.

COMPATIBILITY

The tablet is compatible with TEKTRONIX 411X terminals equipped with an Option 10, 3-port peripheral interface. Option 10 interfaces manufactured prior to 1985 may need a firmware update (to Version 7 or higher) to be compatible. TEKTRONIX 4106, 4107, and 4109 terminals will be compatible with the 4958 beginning in late 1985. A firmware update will be necessary on units manufactured prior to that time. With either terminal series, the tablet is operated as a GIN (Graphic INput) peripheral to the terminal using the Terminal-Based Command set.

The 4958 is compatible with the TEKTRONIX 405X series and the 4170 using the tablet-based command set.

The 4958 is also compatible with software that runs with the 4957 Graphics Tablet.

Section 5

PROGRAMMING EXAMPLES

The following section contains sample programs that use the 4958 Graphics Tablet. These are useful for testing your system or demonstrating how you can program the 4958.

The sample programs include:

- Tablet to Local TEKTRONIX 41XX 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 41XX TERMINAL EXAMPLE

EQUIPMENT REQUIRED

- TEKTRONIX 41XX Terminal
- TEKTRONIX 4958 Graphics Tablet

INSTRUCTIONS

1. Connect the tablet to the terminal as described in Section 1 of this manual.

Turn on the power to the 41XX terminal.
3. Power Up the 4958 Tablet.
4. On the 41XX press the button labeled: Setup.

NOTE

Steps 5, 6, and 9 are valid as written if the tablet is connected to the 41XX via Port O. If connected to a 410X terminal Port 1, replace the number 10 in the command with an 18. If connected to any port (P0, P1, or P2) on a 411X terminal, the command is valid provided the connected port is the first port to receive a "PASSIGN PX: 4958" setup command after power up of the terminal."

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

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

TEKTRONIX 4052 EXAMPLE

EQUIPMENT REQUIRED

- TEKTRONIX 4052 Desktop Computer with Option 01 Data Communications
- TEKTRONIX 4958 Graphics Tablet

INSTRUCTIONS

1. Connect the 4958 graphics tablet to the 4052 Desktop Computer as described in Section 1 of this manual.
2. Turn on the power to the computer.
3. Turn on power to the 4958 Tablet.
4. Type in the program given on the following page or insert a tape with the program already input and load in the program.
5. Type: RUN and press RETURN.
6. 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. One button even erases the screen.

TEKTRONIX 4052 EXAMPLE PROGRAM

```

INITIALIZATION
100 PAGE ;clears 4050 screen
110 INIT ;sets 4050 parameters to a known state
120 CALL "CMINIT" ;sets 4050 Opt 1 parameters to default
130 DELETE A#,C# ;initializes string variables
140 CALL "RATE",9600,3,2 ;baud = 9600, parity = odd, stop bits = 1
150 PRINT @40:" " ;enables 4957 autobaud feature
160 PRINT @32,18:5 ;sets 4050 character font to "graphics"
170 PRINT @40,30: ;clears the 4050's buffer
180 CALL "WAIT",0.2 ;wait awhile
190 A*="[Z[Q[R4[C2[a" ;setup tablet operating parameters
200 GOSUB 550 ;subroutine to send parameters one at a time
210 INPUT @40:X,Y,F,T ;tablet sends max. X and Y coordinate values
220 WINDOW 0,X,0,Y ;set 4050's window to the tablet's dimensions
230 A*="[M0" ;tell the tablet to "stream" data points
240 GOSUB 550 ;subroutine to send parameters one at a time
250 INPUT @ 40:X,Y,F,T ;tablet now sends its first actual
260 J=X ; coordinate location report to
270 K=Y ; initialize variables J and K

DISPLAY REFRESHED POINTER
280 INPUT @40:X,Y,F,T ;sends x/y position, cursor status flag, & ID
290 MOVE X,Y ;updates 4050 cursor to x,y position
29 PRINT @40,30: ;clears the buffer
300 PRINT @32,24:"I"; ;prints a refreshed pointer on 4050 screen

MONITOR CURSOR STATUS
310 INPUT @40:X,Y,F,T ;find out what the cursor status ("F") is?
320 IF F=1 THEN 380 ;if button #1 (yellow) is pressed
330 IF F=2 THEN 430 ;if button #2 (white) is pressed
340 IF F=3 THEN 460 ;if button #3 (blue) is pressed
350 IF F=4 THEN 490 ;if button #4 (green) is pressed
360 IF F>32 THEN 310 ;if out of prox. & no/any/all buttons pressed
370 GO TO 280 ;if no flags go back and update position

YELLOW BUTTON (DRAW A LINE OR A SEGMENT)
380 MOVE J,K ;provides segment draw capability
390 J=X ;updates value (X coordinate location) for J
400 K=Y ;updates value (Y coordinate location) for K
410 DRAW X,Y ;draws lines or segments (between J,K & X,Y)
420 GO TO 310 ;update X,Y, and check on cursor flag status

WHITE BUTTON (STORE A POINT FOR A SEGMENT OR RUBBERBANDING DRAW)
430 J=X ;store X location for a new segment
440 K=Y ;store Y location (use with button #1 and #3)
450 GO TO 310 ;update X,Y, and check on cursor flag status

BLUE BUTTON (PERFORM AN UNREFRESHED "RUBBERBANDING" DRAW)
460 DRAW J,K ;draws to a point stored in J,K
470 MOVE X,Y ;moves to a new position
480 GO TO 310 ;update X,Y, and check on cursor flag status

GREEN BUTTON (ERASE THE SCREEN)
490 PRINT @40:"SSSS" ;stop tablet transmissions
500 PRINT @40,30: ;clear the 4050's RS232 buffer
510 PAGE ;erase the 4050's screen
520 CALL "WAIT",0.5 ;wait for the 4050
530 PRINT @40:"QQQQ" ;restart tablet transmissions
540 GO TO 280 ;resume updating X, Y, and the 4050 screen

SUBROUTINE (TO SEND COMMANDS TO THE TABLET ONE AT A TIME)
550 FOR I=1 TO LEN(A*)
560 C#=SEG(A#,I,1)
570 PRINT @40,30:
580 PRINT @40:C#;
590 CALL "WAIT",0.2
600 NEXT I
610 DELETE A#,C#
620 RETURN

```

NOTE:

When using this program on a 4051 it will be necessary to substitute a "FOR/NEXT" loop, or other means of providing a time out, for each occurrence of the CALL "WAIT" command in this listing. This is because a 4051 does not support a CALL "WAIT" command. A loop of 1000 is the most needed (in line 510).

Section 6

DIAGNOSTIC CHECKS

This section includes information to aid in locating faults. Three topics are covered: No Data, Garbled Data, and the 4958 self tests. The 4958 Service Manual provides information for the qualified service person who may be required to perform component level repairs.

NO DATA

In case 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. The green LED will light at the upper left tablet corner when the tablet receives power.
4. Check that the tablet transmissions haven't been stopped by an XOFF command.
5. Lift the cursor and check for that rightmost light to turn on, which indicates that the cursor is out of proximity. This is a good indication that the tablet is functioning normally. Try turning off the tablet's power and then turning it back on if the light does not come on and check it again.

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 proper format to use with the 4958 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.

SELF TESTS

You can run two types of self tests. If the tablet is connected to a Tektronix terminal that specifically supports the 4958, such as the model 4106, 4107, 4109, or 4115, run the terminal-based tablet self test. You can also run the tablet-based self test directly from a host computer or terminal.

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. Press the ESC key and then the letter "t" on the computer keyboard. This tells the tablet to run the self test.
3. Press the ESC key and then the letter "w". This causes the tablet to transmit 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 | 1 | Always transmitted as a 1 |
| 1 | 1 | 0 | Always transmitted as a 1 |
| 2 | 1 | 0 | Digital test result |
| 3 | 1(on) | 0(off) | Cursor/stylus/on/off tablet |
| 4 | 0 | | Internal use only |
| 5 | 0 | | Always transmitted as 0 |
| 6 | 1 | 0 | Total test results |
| 7 | — | | Parity-Odd is standard |

The diagnostic word is sent least significant bit first.

DIAGNOSTIC CHECKS

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. 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 terminals, select 3-PPI and then 495X Tablet tests. 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

5F (HEX) or _ (ASCII) - self test passed, cursor on tablet.

57 (Hex) or W (ASCII) - self test passed, cursor off tablet.

1B (Hex) or <EC> - self test failed.

13 (Hex) or <DC3> - self test failed.

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.

Section 7

MAINTENANCE

CLEANING THE TABLET SURFACE

PERIODIC MAINTENANCE

Use a dry cloth to remove dust or dirt.

The 4958 requires no periodic adjustments.

Use only the proper cleaning materials listed below to clean the tablet surface:

- Denatured alcohol (methyl, isobutyl, etc.)
- Mild soap and water
- Isopropyl alcohol
- VM & P naphtha
- Freon T.F

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

To remove ink or pencil smudges use the following cleaning substances:

Pen Ink — Clean with denatured alcohol
Pencil — Clean with "SOFTSCRUB" cleanser

NOTE

"SOFTSCRUB" cleanser may create an undesirable shiny spot on the tablet surface.

Appendix A

SPECIFICATIONS

FUNCTIONAL CHARACTERISTICS

Resolution

Stand-alone user selectable at 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 X-axis active area; or 1, 2, or 4 points per inch.

Accuracy

± .254 mm (.010 inch) nominal over active area.

Jitter

± 1 least significant digit.

Proximity

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

Repeatability

± .254 mm (0.010 inch)

Speed

Stand alone user selectable at 10, 30, 45, 60 or 90 X, Y coordinate pairs per second.

ELECTRICAL CHARACTERISTICS

Tablet Input Power Requirements

+ 5 VDC @ 1.0A, + 12VDC @ 150mA, - 12VDC @ 150mA, 5% regulation.

Power Supply Input Voltage Requirements

Standard = 104 to 127 VAC at 58 to 62 Hz.

Options A1 to A5 = 200 to 260 VAC at 48 to 52 Hz.

Option 48 = 100V at 50 Hz.

Power Consumption

50 watts.

Power plug options for various locales are available with the 4958. Figure D-1 provides further details on these options.

Environmental Specifications

Operating Temperature: 15 to 40 degrees C, (60 to 105 degrees F)

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

Operating Humidity: 75% R.H.

Non-Operating Humidity: 75% RH

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 resonant frequency found in each axis, or if none at 50 Hz.

SPECIFICATIONS

Safety and Emissions

The 4958 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.

PHYSICAL CHARACTERISTICS

Tablet

Option 03 (17" x 24")

Size: 978 mm x 724 mm x 56 mm (38.50 inch x 28.50 inch x 2.2 inch)

Weight: 18 kg (40 lbs.)

Active Area: 432 mm x 610 mm (17 inch x 24 inch)

Option 05 (36" x 48")

Size: 1118 mm x 1422 mm x 56 mm (44 inch x 56 inch x 2.2 inch)

Weight: 40 kg (90 lbs.)

Active Area: 914 mm x 1219 mm (36 inch x 48 inch)

Option 06 (44" x 60")

Size: 1397 mm x 1791 mm x 56 mm (55 inch x 70.5 inch x 2.2 inch)

Weight: 52 kg (115 lbs.)

Active Area: 1117 mm x 1524 mm (44 inch x 60 inch)

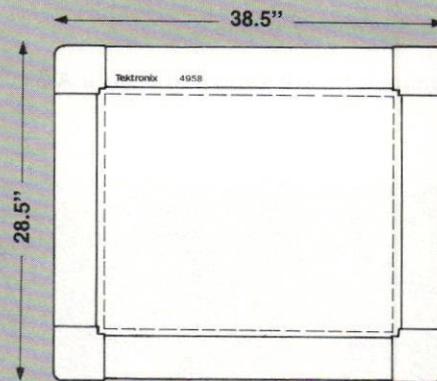


Figure A-2. Option 03 Tablet Surface Dimensions

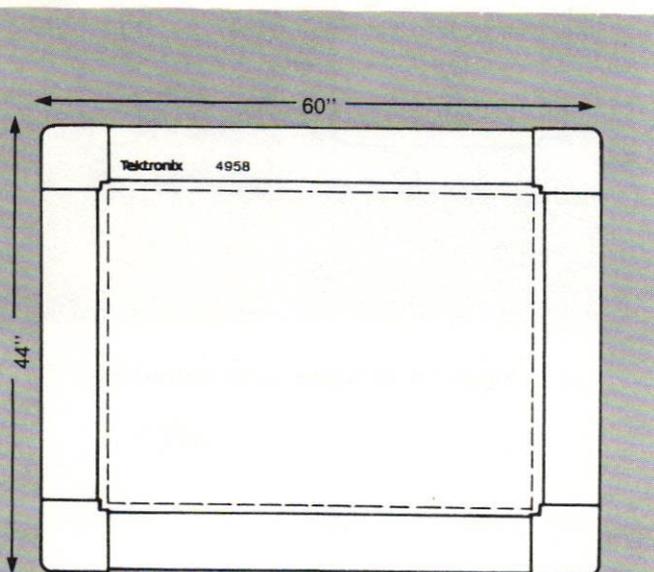


Figure A-1. Option 06 Tablet Surface Dimensions

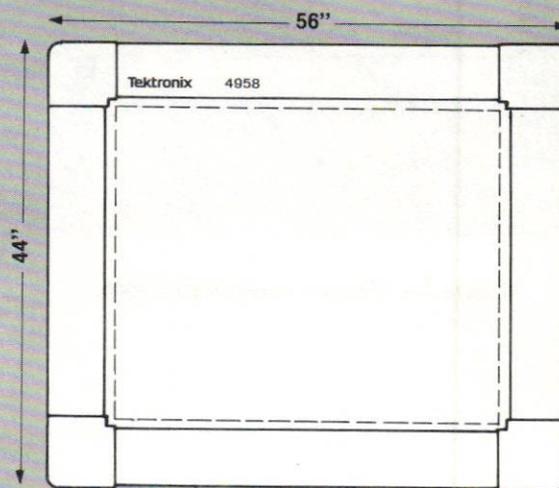


Figure A-3. Option 05 Tablet Surface Dimensions

SPECIFICATIONS

4-Button Cursor

Size: 135 mm x 59 mm x 16 mm (5.3 inch x 2.3 inch x .6 inch)

Weight: 213 grams (7.5 oz.)

Physical dimensions are shown in Figure A-3.

16-Button Cursor

Size: 135 mm x 59 mm x 16 mm (5.3 inch x 2.3 inch x .6 inch)

Weight: 213 grams (7.5 oz.)

Physical dimensions are shown in Figure A-4.

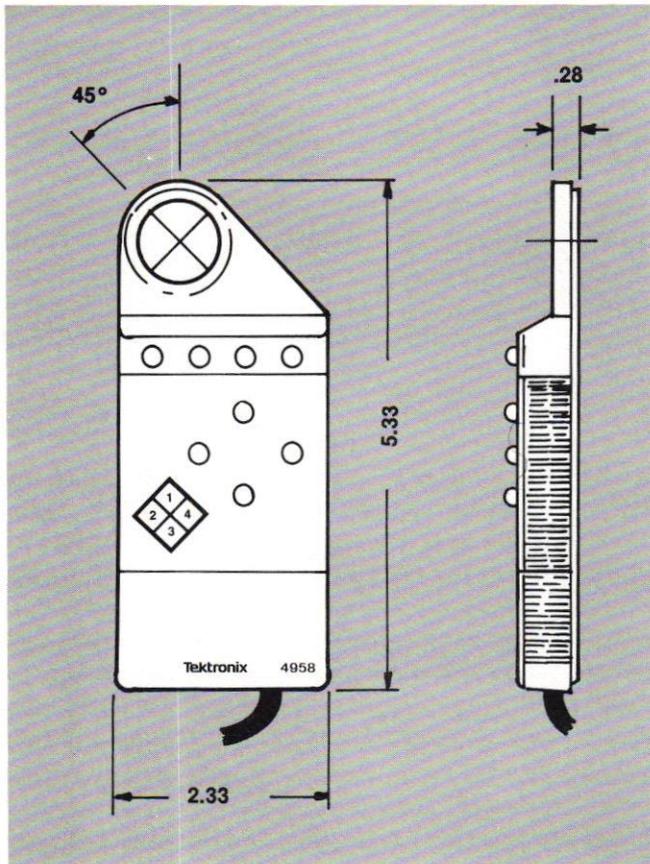


Figure A-4. 4-Button Cursor Dimensions

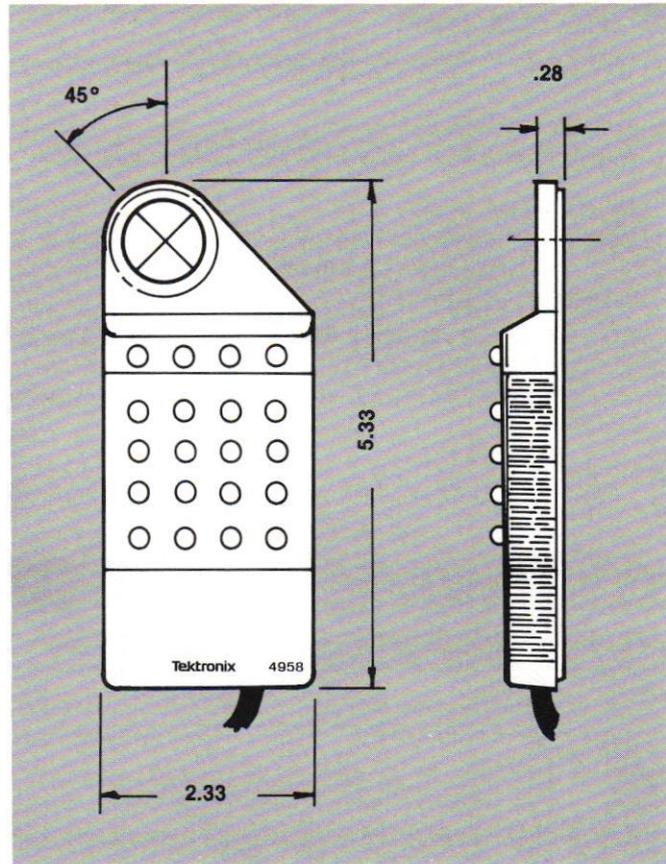


Figure A-5. 16-Button Cursor Dimensions

Stylus

Size: 12 mm x 158 xx (.5 inch x 6.2 inch)

Weight: 114 grams (4 oz.)

Physical dimensions are shown in Figure A-5.

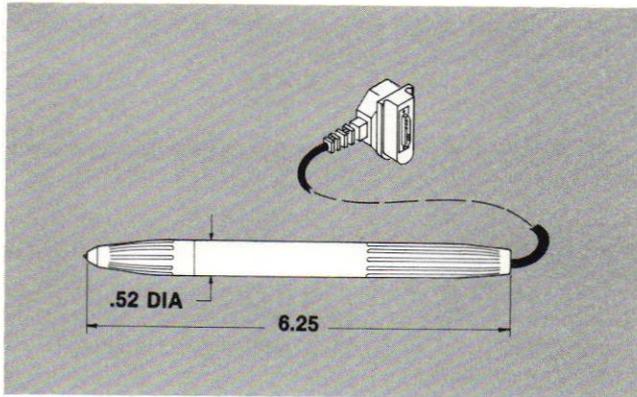


Figure A-6. Stylus Dimensions

Appendix B

ASCII CODE CHART

| BITS | | 0 0 | | 0 0 1 | | 0 1 0 | | 0 1 1 | | 1 0 0 | | 1 0 1 | | 1 1 0 | | 1 1 1 | |
|------|----|-----|---------|-------|-------|--------------------|------|-----------|----------------------|---------|--------|----------------------|--|-------|--|-------|--|
| B7 | B6 | B5 | CONTROL | | | NUMBERS SYMBOLS | | | UPPERCASE SYMBOLS | | | LOWERCASE SYMBOLS | | | | | |
| B4 | B3 | B2 | B1 | | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | 0 NU | 20 DL | 40 Sp | 60 0 | 100 @ | 120 P | 140 ' i | 160 p | | | | | | |
| 0 | 0 | 0 | 1 | 1 SH | 21 D1 | 41 ! | 61 1 | 101 A | 121 Q | 141 a | 161 q | | | | | | |
| 0 | 0 | 1 | 0 | 2 SX | 22 D2 | 42 " | 62 2 | 102 B | 122 R | 142 b | 162 r | | | | | | |
| 0 | 0 | 1 | 1 | 3 EX | 23 D3 | 43 # | 63 3 | 103 C | 123 S | 143 c | 163 s | | | | | | |
| 0 | 1 | 0 | 0 | 4 ET | 24 D4 | 44 \$ | 64 4 | 104 D | 124 T | 144 d | 164 t | | | | | | |
| 0 | 1 | 0 | 1 | 5 EQ | 25 NK | 45 % | 65 5 | 105 E | 125 U | 145 e | 165 u | | | | | | |
| 0 | 1 | 1 | 0 | 6 AK | 26 SY | 46 & | 66 6 | 106 F | 126 V | 146 f | 166 v | | | | | | |
| 0 | 1 | 1 | 1 | 7 BL | 27 EB | 47 ' , | 67 7 | 107 G | 127 W | 147 g | 167 w | | | | | | |
| 1 | 0 | 0 | 0 | 8 BS | 30 CN | 50 (| 70 8 | 110 H | 130 X | 150 h | 170 x | | | | | | |
| 1 | 0 | 0 | 1 | 9 HT | 31 EM | 51) | 71 9 | 111 I | 131 Y | 151 i | 171 y | | | | | | |
| 1 | 0 | 1 | 0 | 10 LF | 32 SB | 52 * | 72 : | 112 J | 132 Z | 152 j | 172 z | | | | | | |
| 1 | 0 | 1 | 1 | 11 VT | 33 EC | 53 + | 73 ; | 113 K | 133 [| 153 k | 173 { | | | | | | |
| 1 | 1 | 0 | 0 | 12 FF | 34 FS | 54 , | 74 < | 114 L | 134 \ | 154 l | 174 | | | | | | |
| 1 | 1 | 0 | 1 | 13 CR | 35 GS | 55 - | 75 = | 115 M | 135] | 155 m | 175 } | | | | | | |
| 1 | 1 | 1 | 0 | 14 SO | 36 RS | 56 . | 76 > | 116 N | 136 ^ | 156 n | 176 ~ | | | | | | |
| 1 | 1 | 1 | 1 | 15 SI | 37 US | 57 / | 77 ? | 117 UNL O | 137 UNT | 157 o | 177 DT | | | | | | |

¹ on some keyboards or systems

KEY

| | | | | | |
|-------|----|----|-----|----|---------|
| octal | 25 | NK | NAK | 21 | decimal |
| hex | 15 | | | | |

mnemonic graphic representation

Appendix C

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 ^Lc (linefeed) and ESC (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 4958, 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 4958.

byte

A group of bits that acts as a single unit of information. In the 4958 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. With the 4958 the cursor 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 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 — perhaps 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 4958, 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 transmitted.

proximity

The distance outside 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.

Appendix D

ACCESSORIES

STANDARD ACCESSORIES

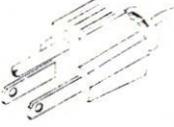
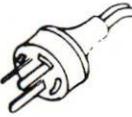
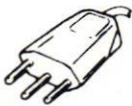
Power Supply (119-1974-00)
 Power Cord (depends on option)
 Standard (119-1979-00)
 Option A1 (119-1978-00)
 Option A2 (119-1977-00)
 Option A3 (119-1976-00)
 Option A5 (119-1975-00)
 Option 48 (119-1979-00)
 4-Button Cursor (118-4146-00)
 Users Manual (070-5488-01)
 Adjustable Base Mounting Kit
 (Furnished with Option 05 or Option 06 (118-3993-00)
 RS-232-C Cable, 12 feet long (118-4145-00)

OPTIONAL ACCESSORIES

Service Manual (070-5489-01)
 16-Button Cursor (119-1980-00)
 Stylus (119-1981-00)
 Pedestal, Hamilton (4110F15)

OPTIONS

Option 03 17" x 24" Active Area
 Option 05 36" x 48" Active Area
 Option 06 44" x 60" Active Area
 Power Supply/Set Up and Power Cord Assembly
 Option A1, Universal Europe
 Option A2, United Kingdom
 Option A3, Australian
 Option A5, Swiss
 Option 48, Japan

| Plug Configuration | Usage | Nominal Line Voltage (AC) | Reference Standards | Used with 015-0596 | Option Number |
|---|--------------------------------|------------------------------|---|--------------------|--------------------|
|  | North American Japanese | 120V, 60Hz 100V, 50Hz | ANSI C73.11 ¹ NEMA 5-15-P ² IEC 83 ³ | -00 | STANDARD 48 |
|  | Universal European | 220V, 50Hz | CEE (7), II, IV, VII ⁴ IEC 83 ³ | -01 | A1 |
|  | United Kingdom | 240V, 50Hz | BS 1363 ⁵ IEC 83 ³ | -02 | A2 |
|  | Australian | 240V, 50Hz | AS C112 ⁶ | -03 | A3 |
|  | Swiss | 220V, 50Hz | SEV | -05 | A5 |

¹ANSI—American National Standards Institute
²NEMA—National Electrical Manufacturer's Association
³IEC—International Electrochemical Commission

⁴CEE—National Commission on Rules for the Approval of Electrical Equipment
⁵BS—British Standards Institution
⁶AS—Standards Association of Australia

Figure D-1. Tektronix Power Plug Options.

Appendix E

MOUNTING TABLET TO A PEDESTAL

The 4958 Option 05 (36" x 48") Graphics Tablet is designed for mounting to Tektronix-supplied Hamilton (R) pedestal, 4110F15; or one of two pedestals available from Mayline (R), models 10440GA (110V) or 10440IA (220V). The 4958 Option 06 (44" x 60") Graphics Tablet can only be mounted to the "Mayline" pedestals. The 4110F15 is not designed to support the larger weight and size of the Option 06 tablet surface. All assembly and adjustment instructions provided by these pedestal manufacturers must be followed to provide adequate and safe support for the weight of the tablet.

The following assembly and adjustment procedures are for the Mayline pedestal only. If you are attaching your 4958 digitizer tablet to something other than a Mayline pedestal, please refer to their appropriate assembly instructions.

Each Mayline pedestal mounting kit contains the following hardware:

| Number | Quantity | Item |
|--------|----------|---|
| 1 | 14 | #10 Flat Washers |
| 2 | 14 | 10-32 x 3/8" Pan Head Screws |
| 3 | 2 | 10-32 x 1" Pan Head Screws |
| 4 | 6 | 10-32 x 1-1/2" Pan Head Screws |
| 5 | 4 | Rubber Feet (for table mount only) |
| 6 | 6 | Spacers |
| 7 | 2 | Spacers (counter board) |
| 8 | 6 | 1/4" Cap Screws |
| 9 | 4 | 1/4" Diameter Bolts |
| 10 | 12 | 10-32x1 1/4" Truss Head Screw (Option 06 only) |

A 3/16" flat blade screwdriver will be needed to mount the 4958 Option 05 or 06 to the pedestal.

NOTE

Do not depress foot pedal before reading assembly instructions provided by manufacturer. All warning and cautionary recommendations are to be followed carefully as Tektronix cannot be held liable for any damages incurred from misuse of manufacturer's pedestal equipment.

Assembly Instructions

1. Remove all inside packing and parts from drafting base carton. Place power cord and cord with control box on ribbed rubber pad of base.
2. Remove outside banding from around bottom of carton.
3. Open reinforcing flaps from around bottom of carton to release sides from the bottom.
4. Remove sides and top of carton from bottom skid by lifting upward. This should expose the base supported by the skid portion of carton.

NOTE: Do not remove any tape from base until the following assembly instructions are complete.
5. Carefully roll the base backwards (back side is opposite to the side with the wood grain panel with nameplate) until the base rests on its cap. (Refer to Figure E-1.)
6. Remove legs from shipping box and remove the 4 (four) 1/4" diameter bolts from each leg.
7. Fasten the legs to the base, using the 1/4" diameter bolts provided. Refer to Figure E-1 for proper positioning of legs. Legs and base are marked to indicate front of tablet.
8. Carefully roll base until it rests on legs.
9. Remove 3 (three) 1/4" diameter cap screws from tilt bracket (each side).
10. Fasten the board brackets to the tilt brackets with the bolts provided (Figure E-2).
11. Remove all tape from base.
12. Unwrap electric cord with attached switch box and drape over front side of tubular member "B" (Figure E-4). This must be done before digitizer tablet is mounted.
13. Start two #10 Pan Head screws in tablet support straps, located on the underside of tablet, opposite from tilt lever. Leave screw heads project about 1/4" from support straps.

MOUNTING TABLET TO A PEDESTAL

14. Hang tablet on board bracket by sliding two screws (Par. 13) into slots in top end of board brackets. Fasten tablet support straps to board brackets by centering screws in remaining slots. Tighten all screws.

Refer to Figure E-3 — A, B, C for detailed illustrations on mounting the 4958 Option 05 or Option 06 tablets. The numbered indicators reference the items supplied with the pedestal mounting kit. Note that spacers are used for the Option 05 Tablet mounting, as in this case, the aluminum framing rests directly on the pedestal base board brackets.

When all screws are securely fastened, the tablet may be unlocked and swiveled into any position. It should not be necessary to remove the tablet from the base again for operation or troubleshooting.

15. Fasten electrical control box "C" (Figure E-4) to underside (front, left) of tablet using two #10 Pan Head screws. Use predrilled holes if available.
16. With digitizer tablet in position for use, use levelers to be sure unit stands firmly.
17. Digitizer tablet is elevated by activating the rocker switch. Movement continues only while switch is depressed. Drive mechanism automatically goes into neutral position, (or clutch will chatter), when either upper or lower maximum is reached.
18. Tilt of tablet is controlled by hand lever. Lift up on handle with fingers and tilt to desired position. Releasing handle locks tablet in place.

MOUNTING TABLET TO A PEDESTAL

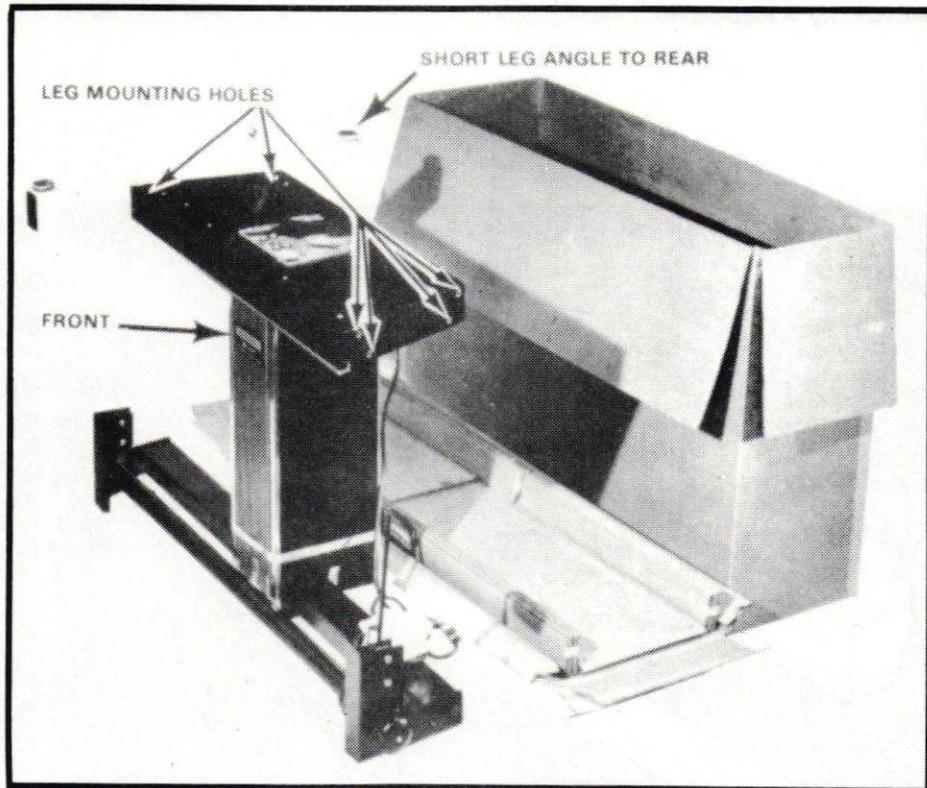


Figure E-1. Drafting Base Assembly.

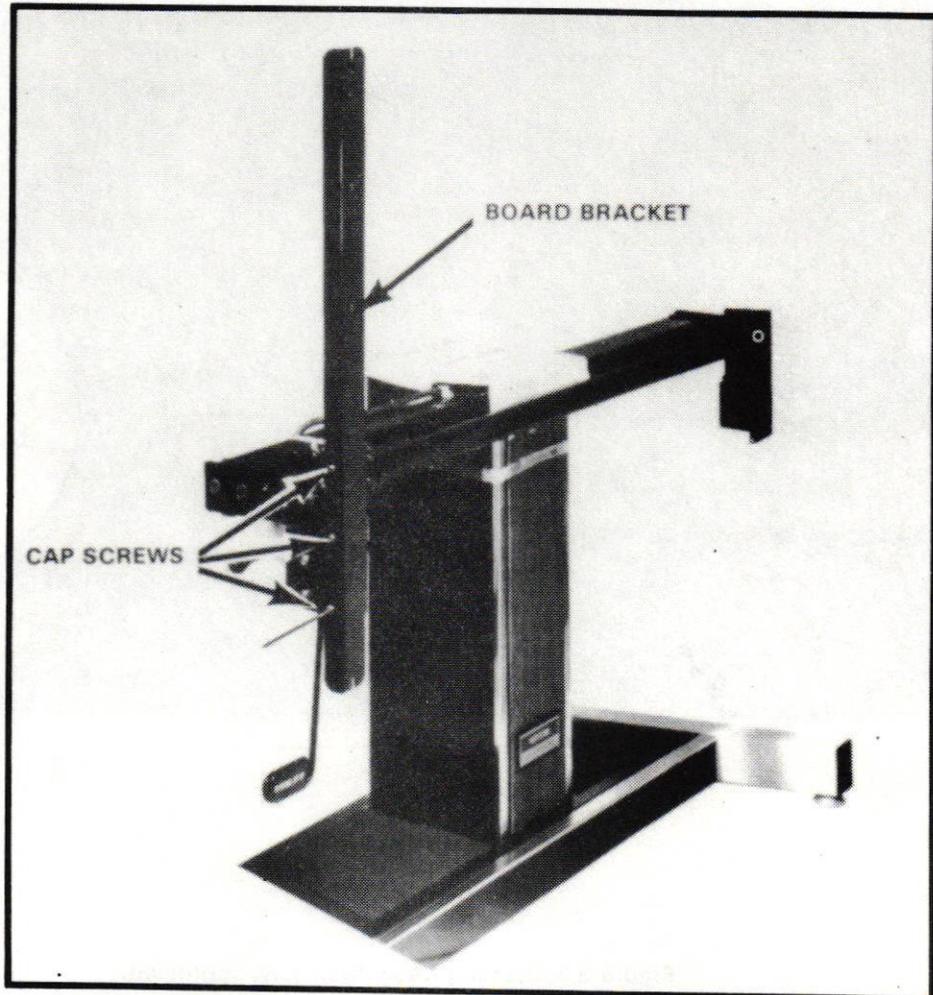


Figure E-2. Drafting Base Assembly, continued.

MOUNTING TABLET TO A PEDESTAL

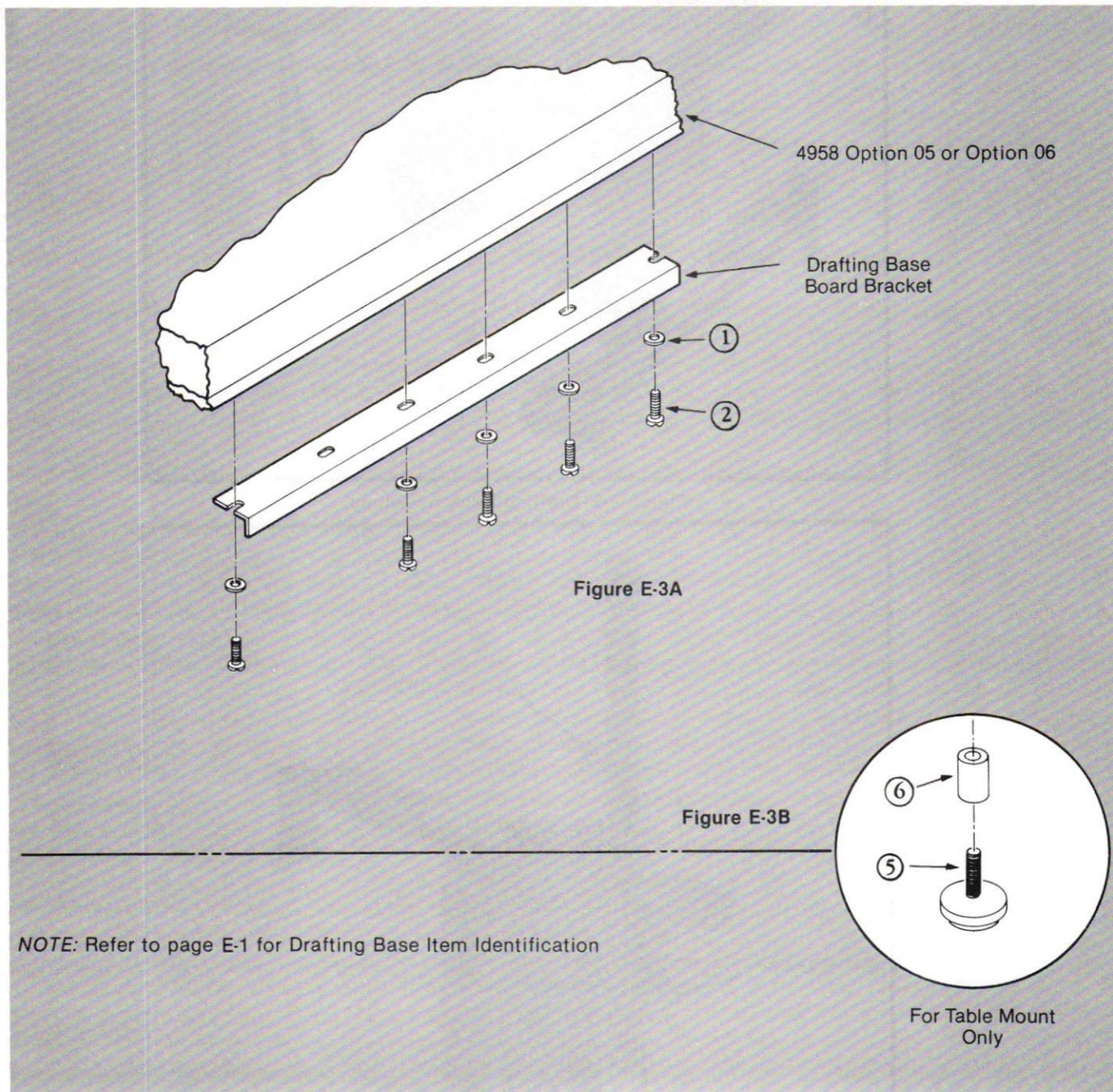


Figure E-3. Drafting Base Assembly, continued.

Appendix F

SETTING SWITCHES

The 8-pin DIP Switch on the Digitizing Processor Board, located inside the top frame of the 4958, allows the user to select various baud rates and alternate tablet size options.

To set the switches on the DIP switch:

1. Remove all external cables (RS-232-C, Cursor, and Power) from the tablet's rear panel.
2. Access the Digitizing Processor Board:

Remove the upper, left corner of the tablet by unscrewing the two phillips-head screws located in the bottom cover of the two-piece molded corner. The Digitizing Processor Board rests in the slot below the notched steel sheet. The near edge of the board extends about an inch beyond the frame and just below the permanently mounted tablet drive electronics. These two bays of electronics are connected together by a ribbon cable. The component side of the Digitizing Processor Board will be facing down.

Place a thumb on each release tab of the ribbon cable connector. Push these tabs out toward their respective edges and back toward the frame. The tabs will swing back and release the ribbon connector.

Loosen and remove the phillips-head lock screw, located on the side surface of the framing, next to the power on button. Set the tablet power button in the "ON" or depressed position. Make sure all external cables are disconnected from the tablet. Grasp the ribbon cable connector and pull straight out from the frame. The Digitizing Processor Board and the attaching RS-232C Communications Board will now slide out.

3. Locate the DIP Switch on the Digitizing Processor Board. This 8-pin DIP switch is found below the transducer connector.
4. Select the switch positions desired for baud rate and/or tablet size (see Table F-1 and F-2). The DIP switch has 8 positions, with position 8 being the extreme right. Note that O = Open and C = Closed for each switch.

NOTE: Switches 1 and 2 are reserved for testing and should remain CLOSED.

BAUD RATE

Selection of Baud Rate is determined by the OPEN/CLOSED position of switches 4, 5, and 6. The Baud Rate selected for the 4958 must match the rate used by the host equipment. Consult the host system's documentation if in doubt about this number.

Table F-1
Baud Rate Switch Selection.

| Function | 1 | 2 | *3 | *4 | *5 | 6 | 7 | 8 |
|-----------|---|---|----|----|----|---|---|---|
| Baud Rate | | | | | | | | |
| 19200 | C | C | C | C | C | C | — | — |
| 9600 | C | C | C | C | C | O | — | — |
| 4800 | C | C | C | C | O | C | — | — |
| 2400 | C | C | C | C | O | O | — | — |
| 1200 | C | C | C | O | C | C | — | — |
| 600 | C | C | C | O | C | O | — | — |
| 300 | C | C | C | O | O | C | — | — |
| Reserved | C | C | C | O | O | O | — | — |

* On Module #138-16-000001, Rev. 5, the order of this table heading should be: 1 2 5 3 4 6 7 8. The module number may be found on the **back** of the board.

TABLET SIZE

Selection of tablet size is determined by the OPEN/CLOSED position of switches 7 and 8. These settings are shown for verification use only. The switches should always be set for the proper tablet size.

Table F-2
Tablet Size Switch Selection.

| Function | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---------------------|---|---|---|---|---|---|---|---|
| Tablet Size | | | | | | | | |
| 17"x24" (Option 03) | C | C | C | — | — | — | C | C |
| 36"x48" (Option 05) | C | C | C | — | — | — | O | C |
| 44"x60" (Option 06) | C | C | C | — | — | — | O | O |

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