
Operating procedures

This chapter describes the tablet's options, features, menus, and available pointing devices.

To learn more about:

- Tablet features, see page 3-3.
- Cursors, see page 3-5.
- Pens, see page 3-6.
- LCD display, see page 3-7.
- Menu, see page 3-10.
- Area 2 and Area 3, see page 3-14.
- Area 4, see page 3-16.

Power up procedure

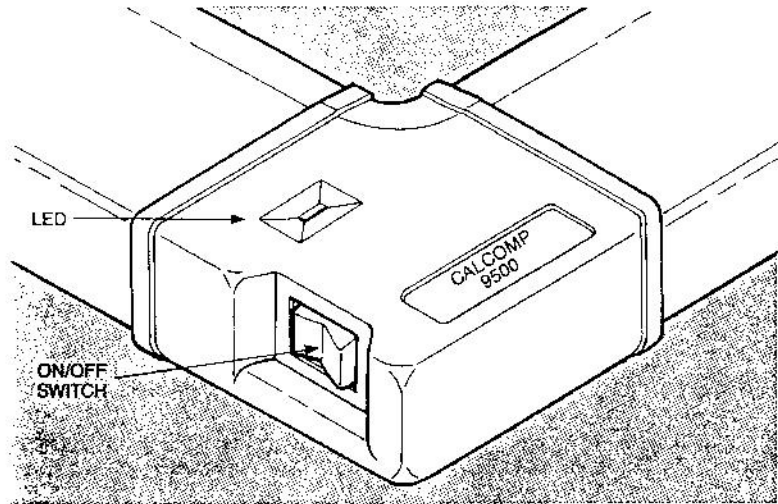


Figure 3-20: Tablet on/off switch

1. Turn on your computer and terminal.
2. Push the ON/OFF switch at the bottom left of the tablet. The green light should glow, and the tablet should issue five high beeps. If the light doesn't glow or flash, and there are no beeps, turn to Appendix F for troubleshooting advice.

If the tablet is connected to a GPIB host, turn the tablet on before you start the software. The software sends a permission to talk when it powers up. If the tablet is off, it never receives permission to talk and will not send data.

Installing the software

Follow the instructions in the software user's manual. Make sure you indicate the correct size when asked which digitizer model to use. See page 4-4 for instructions on setting up the tablet for a variety of popular software packages.

Tablet features

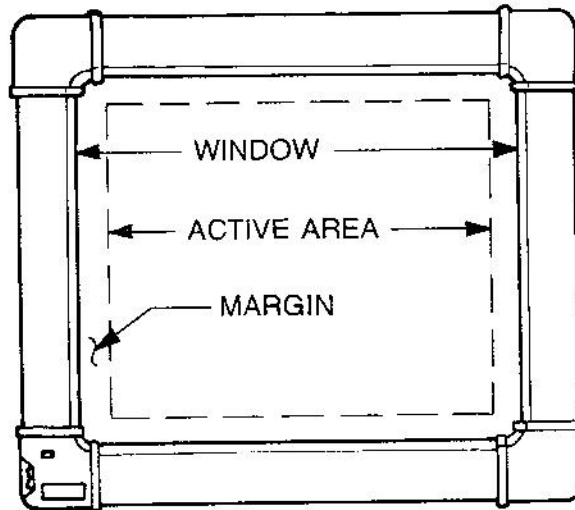


Figure 3-21: Tablet surface area defined

The window

The window opening is the entire visible surface inside the metal frame. The window consists of the active area and the surrounding margin.

The active area

All accurate digitizing occurs in the active area. The tablet detects the cursor within 0.5 inches above the active area. This allows you to digitize through non-conductive materials. Digitizing through thin metallic materials is also possible although resolution and accuracy are reduced. If the cursor is moved outside the active area, the cursor's out-of-proximity indicator LED #4, (which is above cursor button #3), flashes and the power on LED flashes. If out-of-proximity or margin data is enabled the tablet transmits data, but at reduced accuracy. Accuracy and resolution decrease as the cursor is raised from the surface.

The margin

The margin surrounds the active area. Under default conditions no data transmits when the cursor moves into the margin. However, the margin is electronically functional and may be used for less accurate digitizing such as menus, etc.. Accuracy and effective resolution specifications are not guaranteed in the margin area.

To determine the precise location of the active area's borders, use the cursor. Turn the tablet on and move the cursor from inside the active area toward the border of the active area. When the cursor or pen leaves the active area and enters the margin area, LED #4 and the power on LED flash, and the LCD (Liquid Crystal Display) status character changes to an X.

Using the cursor



Figure 3-22: Cursor

Place the material you want digitized on the active area. Then position the cursor on the material, moving it until the intersection of the crosshairs covers the point to be digitized. The cursor's crosshairs are etched on the bottom of the sighting lens to minimize parallax error.

A 1.9 X magnifying lens is available as an optional aid. The buttons on the 16 button cursor may be used to send messages to the host computer or to send commands to the digitizer. Summaries containing the cursor message features and available cursor commands are on pages 10-2, 10-3 and 10-4.

Cursor LEDs

The far left LED lights and stays lit as long as a button is down. (This is also a quick test that verifies that the cursor is plugged in). The two middle LEDs can be activated by host commands. The far right LED is the out-of-proximity indicator. It flashes when the cursor leaves the active area or if the cursor moves too far above the active area to be detected. The LED stays on while in the active area. The tablet LED also acts as an out-of-proximity detector.

Using the pen

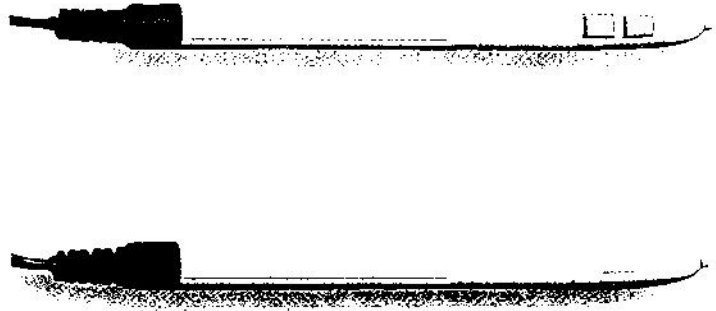


Figure 3-23: Pens

The 9500 digitizer can be used with a standard pen, a side switch pen, or a pressure pen.

You can connect a pen and a cursor to the tablet at the same time. The tablet detects which one is in proximity and transmits the appropriate signal.

However, they do not operate simultaneously. Even if you place both in close proximity, the tablet locks on to the first one it detects and ignores the other one. For example, if the pen goes out of the active area, the tablet switches to the cursor and follows it until it is out of proximity.

The pen is intended for rapid sketch-like digitizing. It is limited in its accuracy by the width of the ball point and your ability to hold it steady. Holding the pen perpendicular to the surface produces the most accurate data. The pen tip is similar to a cursor button. Place the pen on the point to be digitized and press down gently. You will feel a click. Release by lifting up.

the LCD display

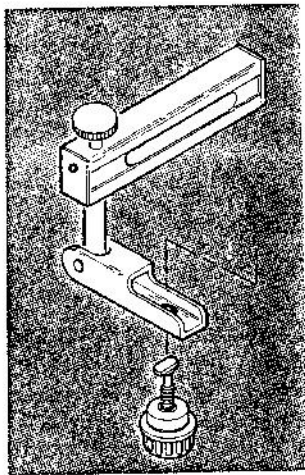


Figure 3-24: LCD display

The optional Liquid Crystal Display (LCD) provides a readout of the digitizer's numeric output, operating mode, and host messages. The display initially shows the power-on banner message. This message remains

until the display is enabled by command or soft switch setting. (Communication commands are described on page F-7). Adjusting the screw on the left side of the display changes the display's contrast. Contrast is also affected by the viewing angle. For the best contrast, view the display head-on. Loosen the lock knob on top of the display head to adjust the tilt and elevation. Then adjust the display head and retighten the lock knob. There are three ways to disable the LCD display:

1. Reset the tablet with a command. The banner message returns to the display. (ESC% VR)
2. Disable the display with a command. This freezes the last data point on display. (ESC% D)
3. The host sends a message to the tablet operator. The message appears on the display. In all these cases, the display must be reenabled to return it to the active data format.

In all these cases, the display must be reenabled to return it to the active data format.

Display format

The format of the data presented on the display is:
SXXXXXXXX YYYYYYY T M C P.

Parameters

Where S is System Status, continuously updated:

Space	Transducer is on the active area.
X	Transducer is out of proximity or in the margin area.
M	Transducer is over the large

W menu and the menu is active.
 Transducer is out of the
 windowed area.

Where T, Tablet status, is represented by A.

Where M is Mode Status; updated each time a new
data point transmits.

M	Menu
R	Run
T	Track
P	Point
U	Line
I	Increment, any of the possible types
X	Transducer in margin, and mar- gin data enabled

Where C is Cursor or Pen up/down; updated each
time a new data point is transmitted:

U	Pen up (or no cursor button pushed)
Ø	Pen down
Ø-9, A-F	Indicates which cursor button is pressed. If the keys have been reassigned, the new value is displayed.

Where P is button status.

U	Button up
D	Button down

Where X and Y are the digits of the X and Y
transducer position.

These numbers are updated each time a new coor-
dinate point is transmitted. They may be expressed as

inches, millimeters, or counts, depending on the resolution setting.

The format of the displayed X and Y numbers is related to, but not always identical to, the format of the transmitted coordinate pair data. Any resolution or format command which moves digits to the right of the decimal point in the transmitted data format affects the display also. Whenever the X or Y display field overflows, the display fills with asterisks (*) rather than erroneously truncate either number.

Menu definitions

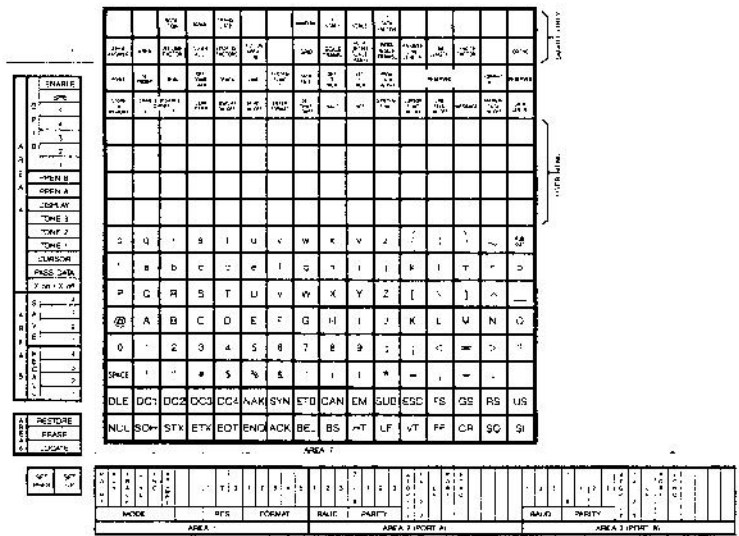


Figure 3-25: Tablet menus

The digitizer's menu allows you to quickly and easily enter commands or select the tablet's operating parameters from the tablet's surface. This section covers the seven areas for the 9500. Each menu controls different aspects of the tablet's operations. When

the menus are enabled, the menu region of the tablet surface does not transmit position data. The parameters for the soft switches begin on page 4-1.

With Area 7, the mylar overlays are only a visual aid for the operator. The region of the tablet surface that sends commands can be active whether or not the overlay is in position.

Operating mode

The operating mode of the digitizer determines the conditions under which the digitizer sends data to the host system. The following mode descriptions assume that the cursor is within the active area, any exceptions are noted. Data points are never sent when the cursor is in the margin or off the active area unless permitted by host or operator commands. Transmitted data points follow the output format selected. Additional information about data formats is in Appendix A.

The 9500 will power up in Run, Point, Line, or Track modes, depending on the position of the soft switches. Any mode may be selected by commands issued by the host, the menu or the 16-button cursor. The digitizer immediately assumes the new mode as soon as the command is received.

Area 1

This section describes the functions of each setting in Area 1.

Point

The digitizer transmits one coordinate data point when a cursor button or the pen tip is depressed. To transmit another coordinate pair, the button or pen tip must be released and pressed again.

Run

The digitizer transmits coordinate data points continuously, regardless of the status of the cursor buttons or the pen tip. The cursor status character changes when the cursor buttons or the pen tip is pressed.

Track

The digitizer continuously transmits coordinate data points while the cursor button or the pen tip is pressed.

Line

The digitizer transmits coordinate data points continuously, while the pen tip or a cursor button is pressed, and one additional point when the pen tip or cursor button is released.

Increment modes

Coordinates are transmitted after the cursor moves at least a set distance in either the X or Y direction. These increment distances are set separately for each

axis. See pages 6-37 and 6-38 for more information about determining increment distances.

The 9500 system features three Increment modes: Increment Track, Increment Run, and Increment Line.

Prompting

Prompting is a feature which can be activated in any mode. The Set Prompt command causes the digitizer to transmit one coordinate pair each time the host computer sends a prompt character to the unit.

The normal rules of the digitizer's current operating mode still apply during prompting. For example, if the digitizer is in Point mode, the digitizer will not send a coordinate pair until a cursor button or the pen tip is pressed and the host sends a prompt. The normal data rate limitation still applies. The digitizer sends data only as fast as the command rate, even if prompting characters come in more quickly than that.

Halt

The digitizer accepts commands, but transmits no data until a new mode is selected. (Selected by software commands only).

Resolution

When the cursor is placed on the active area of the tablet, the tablet calculates its X and Y position relative to the origin. Those calculations are not in inches, millimeters or any other standard units. Those numbers represent counts, arbitrary units of measure-

ment calculated by the digitizer. If the cursor is moved to the right until the X value output increases by one, the cursor has been moved over by one count. The digitizer keeps track of how many counts lie between the tablet origin and the cursor position. It outputs the number of counts as the coordinate pair. The digitizer always outputs counts, although they may be sized to represent millimeters or inches. The number of counts per inch or millimeter may be varied.

Any number of lines, counts per inch or millimeter may be selected, up to the maximum resolution. The counts are sized accordingly. A round number need not be selected.

Output format

The output format selects the style in which data is transmitted. The digitizer uses either an ASCII format or a binary format to represent the position of the cursor, the operating mode and other information. Appendix A, describes formats in greater detail.

Area 2 and Area 3

This section describes the functions of each setting in Area 2 and Area 3.

Baud rate

The baud rate is the number of bits transmitted per second. The lower the baud rate, the slower the speed. The baud rate must match the host's rate.

Parity

The number of data bits (7 or 8) is the number of bits per data transmission that is data. Parity refers to a type of error detection. A parity bit is inserted into every character the digitizer sends. The status of the parity bit confirms that the data was not altered during transmission.

Stop Bits

The number of stop bits (1 or 2) transmitted with each byte of data. They indicate that the transmission is finished

TX 2/3

This allows you to change the pins on which the RS-232 ports transmit and receive. See page 5-2 for more information.

Line Feed

Depending on the soft switch settings, each output format coordinate pair terminates with a line feed. The two interface ports operate independently. The line feed may be changed by command.

Port on/off

Controls data transmission from either or both ports. May also be changed by command. No data transmits from the port while disabled, although commands are still recognized.

Echo

The tablet sends all characters it receives back (via port A or port B) to the sending terminal if echoing is enabled. This may be changed by command or with the Set Up menu.

Area 4

This section describes the functions of each setting in Area 4.

Enable (GPIB)

This command enables the GPIB port if installed. When the GPIB Port is enabled, Port A, (RS-232), is disabled, while Port B may remain active. Only two ports can be active at any one time.

Serial poll enable (SPE)

This command enables the GPIB tablet to activate the service request line every time a data pair is loaded for output.

GPIB 1-5

Selectable addressing. See page 4-11 for GPIB addresses.

PPEN B and A

Activates when the Pressure Pen (stylus) is installed in transducer Port B or Port A. The pressure is set via the SET PRES block next to SET UP. See the Pressure Side/Switch Pen section for more information.

Display

Enables the optional LCD display.

Tone 3

A tone sounds every time a cursor button or the pen tip is pressed.

Tone 2

Enables or disables the tablet's error tone. An error tone sounds when commands are not recognized or self test errors occur on power up. This is a low tone.

Tone 1

Acknowledges the tablet's acceptance of a proper command. This is a high tone.

Cursor

Enables or disables the 16 button cursor to send commands to the tablet. Cursor command summary begins on page 10-1.

Pass data

Enables or disables the passing of data between Port A and Port B. This permits a terminal to talk to a host, through the digitizer.

Xon/Xoff

Transmission of data from the tablet may be halted and restarted with X/on or X/off. (Any points digitized between the receipt of the X off, the command that stops transmission, and X on, the command that restarts transmission, are lost).

X off is ASCII DC3 (CTRL S) and X on is ASCII DC1 (CTRL Q).

Soft switch settings

This chapter explains quick set up instructions for selected graphic packages and describes each section of the menu and their possible settings.

Overview of tablet menus

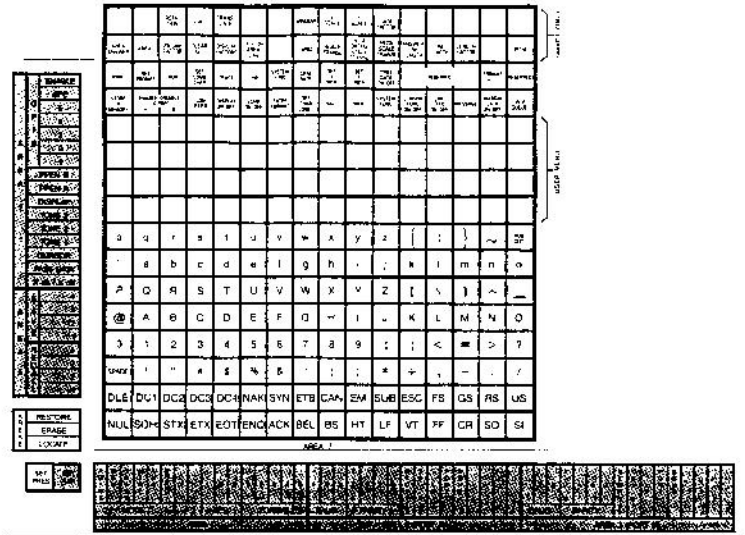


Figure 4-25: Tablet menus

Use menu Areas 1-5 to select the operating parameters your software needs. The tablet's inside edge acts as a guide when you move the cursor to digitize menu blocks. Enter Set Up mode by placing the crosshairs of the cursor, or the pen tip in the Set Up block, which is in the lower left corner. (The Set Up blocks only activate menu areas 1-5). The power on LED will turn off. Then, press the \emptyset button or pen tip. The tablet LED and the cursor's far right LED should glow. The menu is now active.

The settings of the switches are indicated by the state of the tablet LED when the cursor is over that switch's menu block. On or 1 is indicated by a glowing LED. Off or \emptyset is indicated when the LED is off. If the LED flashes, the cursor is off the menu area.

To change the setting of a switch, place the point of the pen or the crosshairs of the cursor, over the switch

block and depress the pen or a cursor button. The LED should change state.

Only the standard pen or the cursor can be used to initiate the Set Up menu blocks.

The settings can be saved, or used without saving. The Save and Recall sections in Area 5 allow you to save and recall tablet settings from memory. These blocks have been pre-set for some of the most popular software packages. All Recall blocks on the chart on page 4-4 instruct both RS-232 ports to transmit on pin 3.

To exit Set Up, place the cursor over the Set Up block again and press the tip or cursor button. If you exit Set Up without saving the settings, the new settings are lost when you turn off the tablet. Any settings already stored remain intact. See page 4-13 for details.

Set up instructions for selected graphic packages

Use the Menu Switch Settings on page 4-4 to quickly set up your tablet. First, locate the software package you are using. Then set up menu Area 1 and Area 2 according to the table listings. The emulation column contains the name you use during your software installation procedure. To save new tablet settings as the new power up default parameters, digitize the Save 1 block in Area 5, after the new settings have been selected. Exit the menu by digitizing the Set Up block again.

The table provides set up instructions for Port A. Port B uses the same settings, except they are placed in Area 3.

Printed 1/10/82

Menu settings for selected graphic packages

*Package	Mode Area 1	Res	Format	Baud	Parity	STLPE	Emulation	
	Area 1			Area 2 (Port A)				
AutoCad	010000	00	011	00100	001	0001	01010	CalComp 9100
CADKEY	010000	00	011	10111	001	1100	01010	GTCO
CADVANCE	010000	00	011	00110	001	1100	01010	CalComp 9100
Com-Quest	100000	00	011	00110	011	0001	11010	CalComp 9100
DrawBase	010000	00	011	00100	001	1100	01010	CalComp 9100
EasyCAD	010000	00	011	10111	001	1100	01010	GTCO
FASTCAD	010000	00	011	10111	001	1100	01010	GTCO
MicroStation	010000	00	011	00101	001	1100	01010	CalComp 9100
Quick Dirt	010000	00	011	10111	011	1100	01010	GTCO
Quick Est.	010000	00	011	10111	011	1100	01010	GTCO
SigmaScan	010000	00	011	00100	001	0001	01010	CalComp 9100
SmartCAM	010000	00	011	10111	001	1100	01010	Kurta Series III
VersaCAD	010000	00	011	00100	001	0000	01110	CalComp 9100
Map Edit	010000	00	011	10111	001	1100	01010	GTCO
9100(Port A)	100000	00	011	00110	001	0000	00010	Default Setting
9100(Port B)	(Area 3)				001	0000	01111	
ARC/INFO	100000	00	011	00110	001	1100	01010	

Area 4: Verify that Area 4 settings have been changed as follows, when using one of the above software packages.

	9100 Default	Change to:		9100 Default	Change to:
Enable	0	0	Display	0	0
SPE	0	0	Tone 3	0	0
5	1	1	Tone 2	1	1
4	0	0	Tone 1	1	1
3	0	0	Cursor	1	0
2	0	0	Pass Data	1	0
1	0	0	Xon/Xoff	1	0
PPEN B	0	0			
PPEN A	0	0			

Set Up blocks



Figure 4-27: Set up blocks

Activates menu areas 1-5. The menu must be active in order to enter, save, or change any settings. Only the standard pen or the cursor can be used to initiate the Set Up menu blocks.

Soft switch menu areas

ON	RUN	TRACK	LINE	INCR	PROMPT			1	2	3	1	2	3	4	5
MODE							RES			FORMAT					
AREA 1															

Figure 4-28: Mode menu, Area 1

Area 1: Determines mode, resolution and format

Operating Mode	1	2	3	4	5	6
Point	1	Ø	Ø	Ø	Ø	Ø
Run	Ø	1	Ø	Ø	Ø	Ø
Track	Ø	Ø	1	Ø	Ø	Ø
Line	Ø	Ø	Ø	1	Ø	Ø
Incr Run	Ø	1	Ø	Ø	1	Ø
Incr Track	Ø	Ø	1	Ø	1	Ø
Incr Line	Ø	Ø	Ø	1	1	Ø
Prompt Point	1	Ø	Ø	Ø	Ø	1
Prompt Run	Ø	1	Ø	Ø	Ø	1
Prompt Track	Ø	Ø	1	Ø	Ø	1
Prompt Line	Ø	Ø	Ø	1	Ø	1

P O I N T	R U N	T R A C K	L I N E	I N C	P R O M P T			1	2	3	1	2	3	4	5
MODE					RES					FORMAT					
AREA 1															

Figure 4-29: Resolution menu, Area 1

Resolution	1	2	3
200 LPI	0	0	0
400 LPI	0	0	1
500 LPI	0	1	0
1000 LPI	0	1	1
10 LPmm (254LPI)	1	0	0
40 LPmm(1016LPI)	1	0	1
50 LPmm(1270LPI)	1	1	0
100 LPmm(2540LPI)	1	1	1

P O I N T	R U N	T R A C K	L I N E	I N C	P R O M P T			1	2	3	1	2	3	4	5
MODE					RES					FORMAT					
AREA 1															

Figure 4-30: Format menu, Area 1

ASCII Formats	1	2	3	4	5
Ø 2000 ASCII	Ø	Ø	Ø	Ø	Ø
1	Ø	Ø	Ø	Ø	1
2	Ø	Ø	Ø	1	Ø
3	Ø	Ø	Ø	1	1
4 9100 #1	Ø	Ø	1	Ø	Ø
5 9100 #2	Ø	Ø	1	Ø	1
6 9100 #3	Ø	Ø	1	1	Ø
7 9100 #4	Ø	Ø	1	1	1
8	Ø	1	Ø	Ø	Ø
9	Ø	1	Ø	Ø	1
1Ø	Ø	1	Ø	1	Ø
11	Ø	1	Ø	1	1
12	Ø	1	1	Ø	Ø
13	Ø	1	1	Ø	1
14	Ø	1	1	1	Ø
15	Ø	1	1	1	1
16	1	Ø	Ø	Ø	Ø
Reserved formats					
17	1	Ø	Ø	Ø	1
...					
21	1	Ø	1	Ø	1
Binary Formats					
22	1	Ø	1	1	Ø
23 (9500 Format #5)	1	Ø	1	1	1
24	1	1	Ø	Ø	Ø
25	1	1	Ø	Ø	1
26	1	1	Ø	1	Ø
27	1	1	Ø	1	1
28	1	1	1	Ø	Ø
29	1	1	1	Ø	1
3Ø	1	1	1	1	Ø
31	1	1	1	1	1

See Appendix A for detailed information on output formats.

1	2	3	7	1	2	3	STOP	TX	LF	PORT	ECHO				
BAUD			PARITY			1 / 2	2 / 3								
AREA 2 (PORT A)															

Figure 4-32: Area 2 menu

Stop Bit

- 1 bit
- 2 bits

TX2/3

Selects RS-232. Transmit/receive connector pins.

- Pin 2 transmits
- Pin 3 transmits

Line Feed

- Off
- On

Port A

- Disable
- Enable

Echo

The tablet sends back all characters it receives.

- Disable
- Enable

1	2	3	7	1	2	3	STOP	TX	LF	PORT	ECHO				
BAUD			PARITY			1	2	3							
AREA 3 (PORT B)															

Figure 4-33: Area 3 menu

Area 3: Identical to Area 2, except for Port B

A R E A 4	ENABLE
	SPE
	G 5
	P 4
	i 3
	B 2
	1
	PPEN B
	PPEN A
	DISPLAY
	TONE 3
	TONE 2
	TONE 1
	CURSOR
	PASS DATA
X on / X off	

Area 4: GPIB interface-optional

The General Purpose Interface Bus (GPIB) routes input and output signals and is commonly used for connecting digital measurement instruments. The digitizer is issued a specific address. You can select addresses, 0-31; address 31 disables the GPIB output.

When GPIB is enabled, RS-232 Port A is disabled. Port B continues to function.

Figure 4-34: Area 4 menu

Enable					
GPIB disable	Ø				
GPIB enable	1				
Address	1	2	3	4	5
Ø	Ø	Ø	Ø	Ø	Ø
1 Default	Ø	Ø	Ø	Ø	1
2	Ø	Ø	Ø	1	Ø
3	Ø	Ø	Ø	1	1
4	Ø	Ø	1	Ø	Ø
5	Ø	Ø	1	Ø	1
6	Ø	Ø	1	1	Ø
7	Ø	Ø	1	1	1
8	Ø	1	Ø	Ø	Ø
9	Ø	1	Ø	Ø	1
10	Ø	1	Ø	1	Ø
11	Ø	1	Ø	1	1
12	Ø	1	1	Ø	Ø
13	Ø	1	1	Ø	1
14	Ø	1	1	1	Ø
15	Ø	1	1	1	1
16	1	Ø	Ø	Ø	Ø
17	1	Ø	Ø	Ø	1
18	1	Ø	Ø	1	Ø
19	1	Ø	Ø	1	1
20	1	Ø	1	Ø	Ø
21	1	Ø	1	Ø	1
22	1	Ø	1	1	Ø
23	1	Ø	1	1	1
24	1	1	Ø	Ø	Ø
25	1	1	Ø	Ø	1
26	1	1	Ø	1	Ø
27	1	1	Ø	1	1
28	1	1	1	Ø	Ø
29	1	1	1	Ø	1
30	1	1	1	1	Ø
31 Disabled	1	1	1	1	1

S/B 5 TONES ALL THE SAME LOUDNESS

<u>Xon/Xoff Protocol</u>	
Off	Ø
On	1

Area 5: Contains Save and Recall functions.

S A V E	S	4
	A	3
	V	2
	E	1
R E C A L L	R	4
	E	3
	C	2
	L	1

Figure 4-36: Save and Recall Menu, Area 5

This section allows you to save and recall tablet settings from the tablet's memory. For fast installation, these blocks have been pre-set to run with some of the most popular software packages and also enables you to switch between different software packages very quickly. If your software package is not listed below, see section 4's description about using the menu and the table of soft switch settings for other software packages on page 4-4.

The Recall menu blocks are preset for the following packages:

- Recall 4: EasyCad, FastCad, CadKey, MapEdit (GTCO emulation).
- Recall 3: VersaCAD (9100 emulation)
- Recall 2: AutoCad, SigmaScan (9100 emulation)
- Recall 1: 9100 default setting.

To recall a predefined parameter set

1. Digitize Set Up.
2. Digitize Recall, numbers 1-4.
3. Digitize Set Up.

The tablet now operates with these parameters until the power is turned off.

To save a new set of parameters in a Recall location

1. Digitize Set Up.
2. Digitize new parameter requirements.
3. Digitize Save, numbers 1-4.
4. Digitize Set Up.

The new parameters are now permanently saved for future use in the corresponding Recall menu block. If you save the new parameter set in Save # 1, they become the tablet default setting and activate at power up.

To transfer a parameter set from Recall, numbers 2, 3, or 4 to Recall #1 (power up default):

1. Digitize Set Up.
2. Digitize Recall, numbers 2, 3, or 4.
3. Save number 1.
4. Digitize Set Up.

Area 6: Contains Locate, Erase and Restore menu blocks.

A	RESTORE
R	ERASE
E	
A	LOCATE
A	
6	

Figure 4-37: Area 6 menu

The region left of the origin contains three menu blocks that control the large menu, Area 7. Area 6 is enabled at power up and remains active. There are commands that duplicate the three menu block functions, although there are no host or menu commands that control the Fixed Menu. The Large Menu requires the use of Area 6.

Locate

The menu becomes active at the next point on the tablet surface, in the active area, that you digitize. This point will be the lower left of the 9500 menu.

Erase

Deactivates the large menu, freeing its position for normal digitizing.

Restore

Reactivates the large menu at its last location.

Area 7: Contains the large menu.

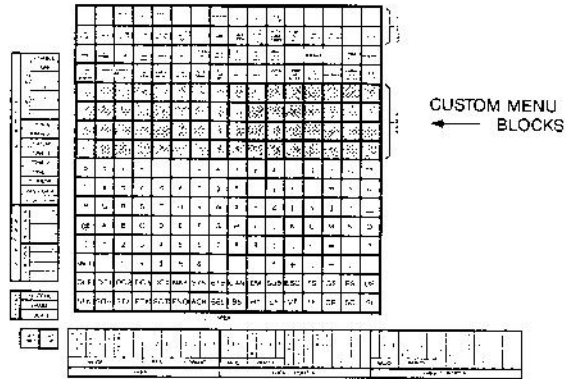


Figure 4-38: Large menu, Area 7

The Large Menu sends commands to the tablet or messages to the host. Entering commands from the menus is described in detail on page 6-5.

Custom menu blocks

49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Figure 4-39: User menu blocks, number assignment

The four rows of blocks between the tablet commands and the ASCII characters are reserved for user-defined commands. Each block has an assigned number which is transmitted by the tablet. The host must be programmed to respond to the numbers.

When one of the user menu blocks is picked, the tablet transmits the block identification number as part of a normal coordinate pair. The mode status is M indicating Menu. The X data equals the number of the user menu block picked times 10n. The Y data is not significant.

The output format must include a mode status character. Without that character the output is indistinguishable from normal digitizing data.

Example: To use Format 1, digitize the block which corresponds to block 28 of the user menu. The tablet transmits the information as if it were a normal data point, using the format: 1000 LPI

T M C 28000 YYYYYY CR

where:

T	T is the Tablet character, represented by the letter A.
M	M represents the Mode character and is a Menu choice not a data point.
C	C represents Cursor status, and varies depending on which button is pressed.
28	The block you picked.
Y	Y data, not significant.
CR	ASCII carriage return character.

The output format must contain a Mode Status character or the software does not recognize that the custom menu is in use.

Communications

This chapter explains the RS-232C interface, the GPIB interface, and the steps required to reduce radio frequency emissions.

Communication interface

The 9500 can have three interface ports. The two RS-232C ports are labelled Port A and Port B. The board also has an optional IEEE488 parallel port.

The tablet interface ports are controlled through the soft switch menu on the tablet's surface. See the Soft Switch section for additional information.

RS-232C interface

The 9500 RS-232C interface supports some of the handshaking circuitry of the RS-232C standard. However, the 9500 can function with only the three-wire subset of Transmit, Receive and Signal Ground, (pins, 2, 3, and 7).

Port A is factory configured as Data Terminal Equipment (DTE). Port A has only one active handshake output, pin 20 (DTR). All the other handshake lines have a passive pull up. A passive pull up will hold the handshake line in the high state until pulled low. Port A stops outputting when handshake line pin 5 (CTS) is pulled low.

Only the transmit and receive lines are swapped by the soft switches. The handshaking remains fixed as DTE for Port A and DCE for Port B.

Port B is factory configured as Data Communication Equipment (DCE) Port B has only one active handshake output, pin 6 (DSR). All the other handshake lines have a passive pull up. Port B stops outputting data when handshake line pin 4 (RTS) is pulled low.

The 9500 can be ordered with two different power up settings. The 9100 default setting enables Port A to transmit on pin 2, and Port B to transmit on pin 3. The Autocad default setting enables both Port A and B to transmit on pin 3.

- ◆ Compliance with the RS-232C standard does not guarantee compatibility between the 9500 and the host equipment. Please make a pin-by-pin comparison of the host's RS-232C port specifications if you have interfacing problems.

Connector types

Two RS-232 cables are shipped with the Digitizer: one male cable and one female cable. They can be used with either Port A or Port B. If the IEEE488 GPIB option is ordered a standard IEEE488 GPIB type cable is supplied.

Data routing: RS-232C

Input from	Port A	Output to Port B	Display	Commands
Port A	Echo on	If pass thru on	On command	Yes
Port B	If pass thru on	If Echo on	On command	Yes
Data	If enabled	If enabled	If enabled	No
Menu	If enabled	If enabled	On command	Yes
Cursor	If enabled	If enabled	Messages	Yes

Table 5-1: Data routing: RS-232C

RS-232C pin assignment

Pin	Description	DTE Port A	DCE Port B
1	Chassis Ground
2	Data	Output/Input	Input/Output
3	Data	Input/Output	Output/Input
4	RTS (Request to send)	Output*	Input*+
5	CTS (Clear to send)	Input*+	Output*
6	DSR (Data set ready)	Output*	Output*
7	Single ground
8	RLSD (received line signal detected)	Output*	Output*
20	Data terminal ready	Output*	Output*

Table: 5-2: RS-232C pin assignment

**Note: Passive pull up.*

+Note: Stops transmitting when pulled low.

Grounding scheme of RS-232

Each port on the 9500 has two grounding lines: Signal Ground, which completes the circuit between the 9500 and the host, and Chassis Ground. In the 9500, Signal Ground and Chassis Ground are connected.

The metal tablet frame of the 9500 is not connected to Pin 1 of the output port connectors, as is sometimes done. Also, Chassis Ground is kept isolated from the connector bodies and the shielding of the cables. The 9500 cables have metal connector bodies on both ends which connect to the braided shield of the cable with a full-coverage RFI plumbing connection. They also include a connection from the cable shield to Pin 1 of

the connector at the user end. This makes Chassis Ground available, at the user's end, on Pin 1 to support the grounding pinout.

Radio frequency interference may occur when a 25-to-9 pin RS-232 adapter cable is used between the digitizer and the host computer. This occurs because Chassis Ground from the digitizer, Pin 1, is not carried through the adapter to the host. If it is necessary to talk to Field Service concerning this problem, please refer to CalComp's technical bulletin DTB 050.

Each situation may require some experimentation on the part of the user. Contact your CalComp Field Service Representative for more information on grounding the 9500 system.

GPIB interface

The 9500 supports the GPIB interface. The General Purpose Interface Bus (GPIB) routes input and output signals and is commonly used for connecting digital measurement instruments. The host has a specific address for the GPIB. You may select addresses, 0-31, using the soft switches on the tablet's surface. See page 4-10 for the soft switch settings. Address 31 disables the GPIB output.

Connector types

The connector for the GPIB port is a 24-pin female GPIB connector.

Using the GPIB interface

Be sure the tablet is powered up before the application software is initialized. The software sends an address to talk signal. If the tablet doesn't receive this signal, it never receives permission to send data.

Using the GPIB/RS-232 interface

When the GPIB option is installed you can use either the GPIB Port or the RS-232 Port A to communicate with the host or hosts. Even with the GPIB installed, the tablet functions as a dual port system. When GPIB is enabled, the RS-232 Port is disabled and visa versa. RS-232 Port B is independent of the GPIB Port.

Disable the GPIB Port by one of the following methods before you use the RS-232 Port. You don't have to disable the RS-232 Port to use the GPIB Port.

Host: ESC% A Ø CR

Menu: Enable/Disable I/O Port A Ø CR

Cursor: FF A Ø E

GPB pin assignments

Pin	Acronym	Description
1	DB1	Data Bit
2	DB2	Data Bit
3	DB3	Data Bit
4	DB4	Data Bit
5	EOI	End or identify
6	DAV	Data Valid
7	NRFD	Not ready for data
8	DNAC	Not data accepted
9	IFC	Interface Clear
10	SRQ	Service request
11	ATN	Attention
12	To M1	
13	DB5	Data Bit
14	DB6	Data Bit
15	DB7	Data Bit
16	DB8	Data Bit
17	REN	Remote Enable
18-24	Ground

Table 5-3: GPB pin assignments

Data routing

Input from	GPB Port A	Output to Port B	Display	Commands
Port A	No	If pass thru on	On command	Yes
Port B	If pass thru on	If Echo on	On command	Yes
Data	If enabled	If enabled	If enabled	No
Menu	If enabled	If enabled	On command	Yes
Cursor	If enabled	If enabled	Messages	Yes

Table 5-4: Data routing

GPB addresses: see page 4-11.

Reducing radio frequency emissions

The following actions are suggested to alleviate reception interference caused by the 9500.

The 9500 complies with the RFI emission requirements in Part 15, Subpart J of FCC rules (CRF 47) for a Class A computing device. This version is intended for industrial use only. Operation of this version in a residential area may cause unacceptable interference to radio and TV reception. It is the responsibility of the 9500 operator to take whatever steps are necessary to correct the interference.

Check the digitizer

Examine all the connectors. They should be tightly fastened on the digitizer and the host.

Any cables added by the user must be shielded.

Separate the cables

Separate the power cable, especially the length between the wall socket and the tablet, from the cable leading to the host as far as possible. Make sure the transducer cable does not hang down behind the tablet surface.

Keep the cursor on the tablet surface.

Coil the cables

Coil all excess cable lengths into either circular or figure eight looping piles, use 15 to 24 inches per loop.

Move the tablet, host, or receiver

Changing the direction the tablet, host equipment, or the effected receiver is facing may alleviate the problem. Bear in mind that the radio frequency emissions are not decreased by this. They are only directed away from the receiving equipment.

Moving the receiver farther from the tablet decreases the strength of the emissions reaching the receiver.

Plug the host or tablet into a different outlet, so that they are on circuits controlled by different fuses or circuit breakers.

Protect the receiver

RFI filters which protect receivers from emissions conducted through the power cables are commercially available. Radiated emission can be attenuated by placing conductive shielding material between the tablet and the receiver.

Grounding

Changing the grounding scheme of the 9500 or host system may be effective. However, this can cause a loss of accuracy or induce ground noise into the digitizing system. Some experimentation is usually

digitizing system. Some experimentation is usually needed to determine the best emission operation tradeoff. See page 5-4 for more information on 9500 grounding.

Large metal objects can cause apparent position shifts if they are brought close to the cursor.

▶ **Caution:**
The tablet uses magnetic coupling to detect the position of the cursor. The performance may be degraded, resulting in excessive jitter, by the presence of strong magnetic fields produced by AC sources. Potential sources of AC magnetic fields include some television sets and monitors with minimum shielding around their horizontal sweep circuits.

If this is a problem, increase the distance between the digitizer and the source of the magnetic fields. Changing the direction that the monitor is facing can also minimize the interference.

If the above actions do not correct the noise problem, contact CalComp customer service for further steps in reducing this noise.