Using the DrawingBoard

This chapter defines the soft menu keys, the operating modes and describes how to set up the DrawingBoard for software packages.

To learn more about:

Operating modes

Prompt or increment work in conjunction with other modes.

The operating mode sets the conditions that must be met before the tablet sends position information to the host system. One or more operating modes can be active at the same time.

Prompt	The host must send a prompt character to the tablet before a data point transmits. Prompting can operate with any mode except Mouse.
Point	The tablet sends one data point each time the pen tip or a cursor button is pressed.
Run	The tablet sends data points continuously regardless of the status of the cursor button or pen tip. This mode is also called Stream by some manufacturers.
Line	The tablet sends position data as long as the pen tip or a cursor button is pressed, and adds one point when the pen or button is released.
Track	The tablet sends data points as long as the pen tip or cursor button is pressed. This mode is also called Switch Stream by some manufacturers.
Increment	Increment can be used with Line, Run, or Track. Data points are sent only if the cursor has moved the required increment distance and has satisfied the other mode's requirements.

Halt	The tablet accepts commands, but does not send any data until a new operating mode is selected.
Mouse	The tablet emulates a Mouse Systems Mouse. Data constantly transmits when the cursor or pen is on the active area.

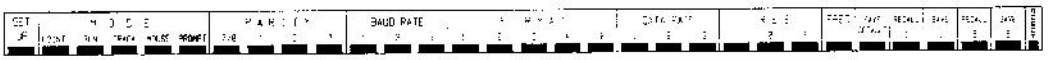
MM operating modes

Delta	The data output represents the change in the cursor's position since sending the last point, rather than the absolute position of the cursor on the tablet.
Axis Update	Axis Update is similar to the Increment mode. However, new data points transmit only for the axis that has satisfied the required increment distance. The other axis sends the last value that fulfilled the distance requirements.

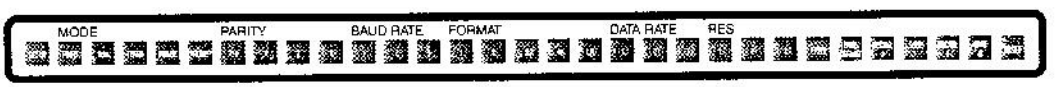
Using the menu

If the part number on your tablet reads 15877-080114, 15878-080114, or the date on the back of your tablet is prior to August 1, 1988; your tablet does not use a menu.

Depending on which model of the DrawingBoard you are using the menu is in two different locations. Models 23120, 23180, & 23240 have a plastic strip across the top of the tablet and models 23360, 23480, & 23600 have a plastic strip across the lower-left corner of the tablet. Both menus allow you to enter or change tablet settings. All menu illustrations use DrawingBoard model 23120 in this User's Guide.



Models: 23120, 23180 & 23240



Models: 23360, 23480 & 23600

Figure 4-1: DrawingBoard menus

Attaching the set up menu: models 23120, 23180, 23240

1. Slide the plastic strip under the clear plastic overlay, so that the notches in the plastic strip are up against the pegs.

2. Locate the Set Up block, (the small black rectangle inside the set up area printed on the menu), by watching the LED as you pass the center of the cursor crosshairs over it. The LED should turn off when the cursor or pen passes over the Set Up block.

3. Keep the set up menu even with the groove.

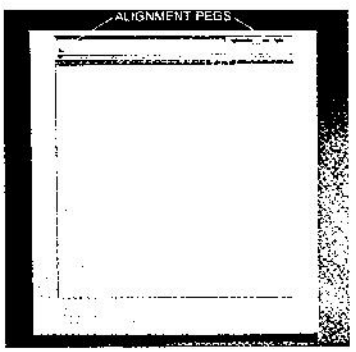


Figure 4-2: Attaching the menu:
models 23120, 23180, 23240

Menu key definitions

The following soft menu key definitions describe the function of each block on your menu.

Set Up	Turns the menu on or off. The menu must be on before you can enter, save, or change settings.
Mode	Selects Point, Run, Track, or

	Mouse. Only one of the four modes can be on at one time. Prompt operates with any one of the first three modes, and allows the host computer to control the transmission of data. For more information see page 4-14.
Data Bits	The number of data bits (7 or 8) is the number of bits per data transmission.
Parity	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.
Baud Rate	The number of bits sent per second. The lower the baud rate, the slower the speed. The baud rate must match the host's rate.
Format	The form in which data is sent.
Line Feed	Selects whether or not a line feed character transmits after each data pair. (ASCII formats only).
Data Rate	The number of coordinate pairs per second the tablet sends.
Resolution	Sets the distance increment that the tablet outputs in lines per inch or lines per millimeter.
Save Default	Saves the current settings in memory. These settings will become the power on default settings.
Recall 1	Recalls the settings stored by Save 1.

Save 1	Saves the current settings in the Save 1 memory.
Recall 2	Recalls the settings stored by Save 2.
Save 2	Saves the current settings in the Save 2 memory.
Reset	Resets the tablet to the power on setting.
Frequency	Determines whether the pen or cursor functions at a high (61.44 kHz) or low (57.6 kHz) frequency.

Tablet set up for software packages

If your software manual gives a setting for a different CalComp tablet call 1-800-CALCOMP and those settings will be converted into DrawingBoard settings.

First, you must determine whether your software directly supports the tablet. If it does, follow your software manual's instructions. If your software manual does not give you enough information to install the DrawingBoard, choose one of the following set up procedures.

Three set up procedures

Use your factory default setting

Models 23120, 23180, and 23240 have two default settings that emulate either a CalComp 2000 or a Summagraphics MM1201, models 23360, 23480, and 23660 emulate a 9X00 at power up. To determine the factory default setting of your specific tablet, match the part number on the back of your tablet with the part number in Table 4-1. If this default setting is satisfactory there are no other steps for you to complete.

Part #	Active Area	Model #	Mode	Parity	Baud	Format	Data	Resolution LPI
15134-080114	11.7" X 11.7" (297mm X 297mm)	23120-11	Track	Odd	9600	Summa Binary MM	8	500
15320-080114	12" X 12" (305mm X 305mm)	23120-9	Point	Even	9600	2000 ASCII	7	200
15404-080114	12" X 18" (305mm X457mm)	23180-1	Track	Odd	9600	Summa Binary MM	8	500
15322-080114	12" X 18" (305mm X 457mm)	23180-4	Point	Even	9600	2000 ASCII	7	200
15321-080114	18" X 24" (457mm X 610mm)	23240-04	Point	Even	9600	2000 ASCII	7	200
15321-080114	24" X 36" 610mm X 914mm	23360	Point	Odd	9600	9X00 Format 6	7	1000
15321-080114	36" X 48" 914 mmX 1219mm	23480	Point	Odd	9600	9X00 Format 6	7	1000
15321-080114	44" X 60" 1118mmX 1524mm	23600	Point	Odd	9600	9X00 Format 6	7	1000

Table 4-1: Tablet default settings

Use software set up commands

There are three ways to use software set up commands. Commands may be sent by your application software, with a batch file, or a BASIC program. See Appendices B and C for more information.

Use soft menu keys

Use the soft keys on the DrawingBoard to set the operating parameters your software requires. Table 4-2 on pages 4-10, 4-11 and 4-12 contains the menu settings for selected graphic packages.

Package	Mode P R T M P	Parity 7/8 1 2 3	Baud Rate 1 2 3	Format 1 2 3 4 LF	Data Rate 1 2 3	Resolu-tion 1 2 3
***CalComp 2000** (model #: 23120-9, 23180-4, 23240-04)	1 Ø Ø Ø Ø	Ø Ø Ø 1	Ø Ø 1	Ø Ø 1 Ø 1	1 1 1	Ø Ø 1
***Summa MM 1201** (model #: 23120-11, 23180-1) 18/2	Ø Ø 1 Ø Ø	1 Ø Ø Ø	Ø Ø 1	Ø Ø Ø 1 1	1 Ø Ø	1 Ø Ø
***CalComp 9X00** (model #: 23360, 23480, 23600)	1 Ø Ø Ø Ø	Ø Ø Ø Ø	Ø Ø 1	1 1 1 Ø Ø	1 1 Ø	1 1 Ø
ANVIL 1000 as CalComp 2000	Ø 1 Ø Ø Ø	1 Ø Ø 1	Ø Ø 1	Ø Ø 1 1 Ø	Ø 1 1	Ø Ø 1
AutoCAD **as 4 button/CalComp 2000**	Ø 1 Ø Ø Ø	Ø Ø Ø 1	Ø Ø 1	Ø Ø 1 1 Ø	1 1 1	Ø Ø 1
****AutoCAD** **as 16 button/CalComp 9100**	Ø 1 Ø Ø Ø	Ø Ø Ø 1	Ø Ø 1	1 1 Ø Ø Ø	1 1 1	1 1 Ø
AutoCAD as GTCO DP-5	Ø 1 Ø Ø Ø	1 1 Ø Ø	Ø Ø 1	1 Ø Ø Ø Ø	1 1 1	1 1 Ø
CADKEY as 4 button/MM1201	Ø Ø 1 Ø Ø	1 Ø Ø Ø	Ø Ø 1	Ø Ø Ø 1 1	1 Ø Ø	1 Ø Ø
****CADKEY** as 16 button/GTCO DP-5	Ø 1 Ø Ø Ø	1 1 Ø Ø	Ø Ø 1	1 Ø Ø Ø Ø	1 1 1	1 1 Ø
****CADVANCE** as CalComp 9100	Ø 1 Ø Ø Ø	1 1 Ø Ø	Ø Ø 1	1 1 1 Ø Ø	1 1 1	1 1 Ø
****COM-QUEST** as CalComp 9100	1 Ø Ø Ø Ø	Ø Ø Ø 1	Ø 1 1	1 1 1 Ø Ø	1 1 1	1 1 Ø
Dr Halo as CalComp 2000	Ø 1 Ø Ø Ø	Ø Ø Ø Ø	Ø Ø 1	Ø Ø 1 1 Ø	Ø 1 Ø	Ø Ø 1

Table 4-2: Selected graphic package menu settings

KEY
1 = On
Ø = Off
X = Irrelevant

** = Factory Default Setting*

*** = Recommended settings for 24" x 36", 36" x 48" and 44" x 60" tablets. If other settings are used the full surface area will not be functional.*

QN ABO 7059

Package	Mode PRTMP	Parity 7/8 1 2 3	Baud Rate 1 2 3	Format 1 2 3 4 LF	Data Rate 1 2 3	Resolution 1 2 3
Drafix Cad Ultra as 4 button/MM1201	Ø Ø 1 Ø Ø	1 Ø Ø Ø	Ø Ø 1	Ø Ø Ø 1 1	1 Ø Ø	1 Ø Ø
DesignCAD as MM1201	Ø Ø 1 Ø Ø	1 Ø Ø Ø	Ø Ø 1	Ø Ø Ø 1 Ø	Ø Ø Ø	1 Ø Ø
****Drawbase** as 9100	Ø 1 Ø Ø Ø	1 Ø Ø Ø	Ø Ø 1	1 1 Ø Ø Ø	1 1 1	1 1 Ø
****EASYCAD** as GTCO DPS	Ø 1 Ø Ø Ø	1 1 Ø Ø	Ø Ø 1	1 Ø Ø Ø Ø	1 1 1	1 1 Ø
****EASYDIJ** as CalComp 9100	Ø 1 Ø Ø Ø	Ø Ø Ø 1	Ø Ø 1	1 1 Ø Ø 1	1 1 1	1 1 Ø
Freelance as 4 button/MM1201	Ø Ø 1 Ø Ø	1 Ø Ø Ø	Ø Ø 1	Ø Ø Ø 1 1	1 Ø Ø	1 Ø Ø
FastCAD as GTCO DPS	Ø 1 Ø Ø Ø	1 1 Ø Ø	Ø Ø 1	1 Ø Ø Ø Ø	1 1 1	1 1 Ø
Generic Cadd as 4 button/MM1201	Ø Ø 1 Ø Ø	1 Ø Ø Ø	Ø Ø 1	Ø Ø Ø 1 1	1 Ø Ø	1 Ø Ø
****Generic Cadd** as 16 button/CalComp 9100	Ø 1 Ø Ø Ø	Ø Ø Ø 1	Ø Ø 1	1 1 1 Ø Ø	1 1 1	1 1 Ø
Impressionist as Kurta	Ø 1 Ø Ø Ø	Ø Ø Ø 1	Ø Ø 1	Ø 1 1 1 Ø	1 1 1	Ø Ø 1
Map Edit as GTCO DPS	Ø 1 Ø Ø Ø	1 1 Ø Ø	Ø Ø 1	1 Ø Ø Ø Ø	1 1 1	1 1 Ø
MICRO CADAM as MM1201	Ø 1 Ø Ø Ø	1 Ø Ø Ø	Ø Ø 1	Ø Ø Ø 1 1	1 Ø Ø	Ø 1 Ø
****MicroStation** as CalComp 9100	Ø 1 Ø Ø Ø	1 1 Ø Ø	Ø Ø 1	1 1 Ø 1 Ø	1 1 1	1 1 Ø

Table 4-2: Selected graphic package menu settings cont'd

KEY
1 = On
Ø= Off
X = Irrelevant

** = Factory Default Setting*

*** = Recommended settings for 24" x 36", 36" x 48" and 44" x 60" tablets. If other settings are used the full surface area will not be functional.*

Package	Mode P R T M P	Parity 7/8 1 2 3	Baud Rate 1 2 3	Format 1 2 3 4 LF	Data Rate 1 2 3	Resolu-tion 1 2 3
Personal Architect as Kurta	Ø 1 Ø Ø Ø	1 1 Ø Ø	Ø Ø 1	Ø Ø 1 1 Ø	1 1 1	Ø Ø 1
Personal Designer as Kurta	Ø 1 Ø Ø Ø	Ø Ø Ø 1	Ø Ø 1	Ø Ø 1 1 Ø	1 Ø Ø	Ø Ø 1
Personal Machinist as Kurta	Ø 1 Ø Ø Ø	1 1 Ø Ø	Ø Ø 1	Ø Ø 1 1 Ø	1 1 1	Ø Ø 1
****QuickDIRT** as GTCO DP-5	Ø 1 Ø Ø Ø	1 1 Ø Ø	Ø Ø 1	1 Ø Ø Ø Ø	1 1 1	1 1 Ø
SmartCAM as Kurta Series III	Ø 1 Ø Ø Ø	1 1 Ø Ø	Ø Ø 1	1 Ø Ø Ø Ø	1 1 1	1 1 Ø
Sigma-Scan as MM1201	Ø Ø 1 Ø Ø	1 Ø Ø Ø	Ø Ø 1	Ø Ø Ø 1 1	1 Ø Ø	1 Ø Ø
Ventura Publisher as Mouse Systems Mouse	Ø Ø Ø 1 Ø	X X X X	X X X	X X X X Ø	1 Ø Ø	X X X
****VersaCAD** as 4 or 16 button/ CalComp 9100	Ø 1 Ø Ø Ø	Ø Ø Ø Ø	Ø Ø 1	1 1 Ø Ø Ø	1 1 1	1 1 Ø

Table 4-2: Selected graphic package menu settings cont'd

KEY
1 = On
Ø = Off
X =Irrelevant

** = Factory Default Setting*

*** = Recommended settings for 24" x 36", 36" x 48" and 44" x 60" tablets. If other settings are used the full surface area will not be functional.*

ing the soft menu keys

Follow these 5 steps to use the soft menu keys.

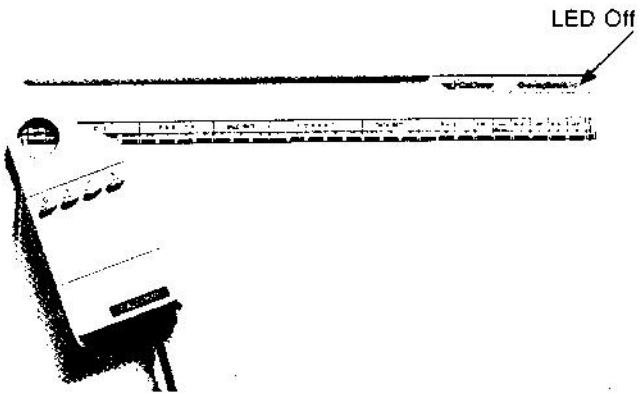


Figure 4-3: Locating the Set Up block

1. Enter Set Up mode by placing the crosshairs of the cursor, or the pen tip, in the Set Up block. The LED turns off when entering this block.

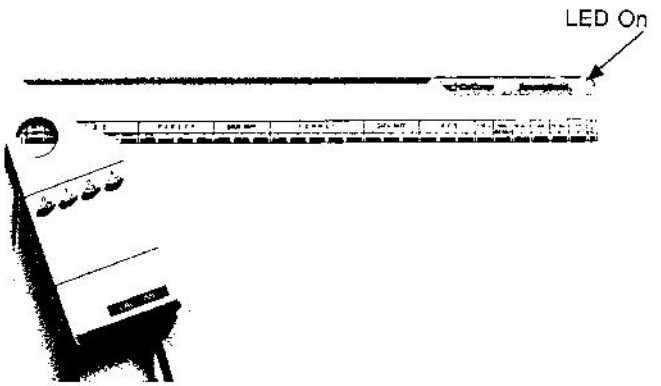


Figure 4-4: Entering Set Up Mode

2. Press the Ø button or press down on the pen tip. The yellow LED should turn on. If this does not happen, readjust your tablet menu.

The setting of the menu keys are indicated by the state of the LED when the cursor or the pen is over the menu block. A glowing LED indicates on or 1. Off or Ø is indicated when the LED turns off. If the LED flashes, the cursor is out of the active area.

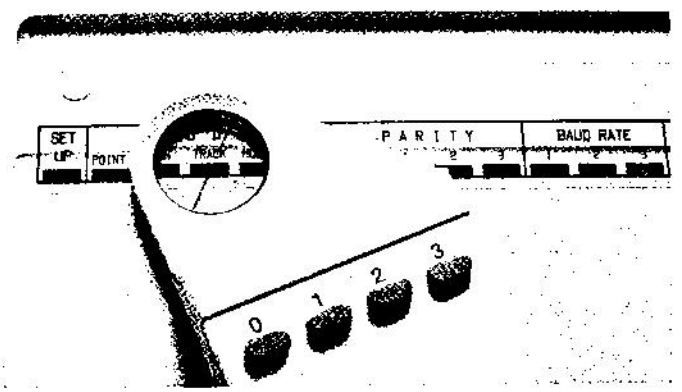


Figure 4-5: Changing a Menu Setting

3. Change a switch setting by placing the crosshairs of the cursor, or the pen tip, over the menu block, and pressing a cursor button or the pen tip. The LED should change state.

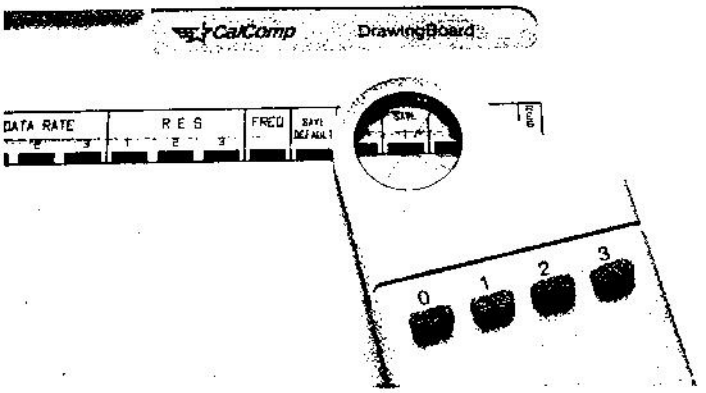


Figure 4-6: Saving settings-Save and Recall blocks

4. Save settings by placing the cursor crosshairs or the pen tip over one of the Save blocks and pressing the Ø button or the pen tip. The LED flashes confirming that the new settings have been saved in memory. Any setting previously saved in that location is overwritten.

   The tablet has three locations for saving settings. They are labelled Save Default, Save 1, and Save 2. The settings in Save Default are active at each power up. Save the program you use most often in Save Default.

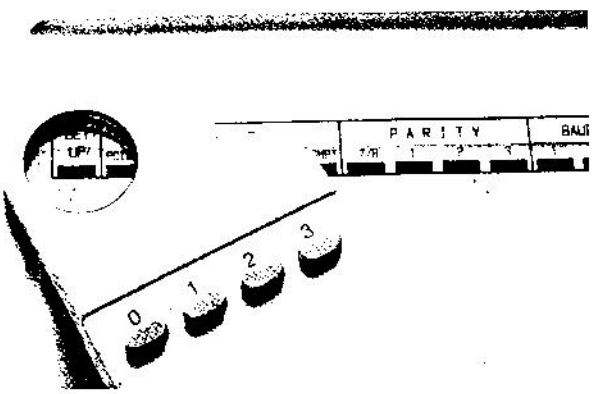


Figure 4-7: Exiting Set Up

5. To exit Set Up, place the cursor crosshairs or pen tip over the Set Up block and press the Ø cursor button or pen tip. The LED should turn off.

   - If you exit Set Up without saving the settings, the new settings are lost when you turn off the tablet. Settings previously stored remain in memory.

Recall menu blocks

Recall 1 is preset for 2300 Format #23 (9100 Format #5/GTCO DP5) binary. It operates at run mode, 1000 LPI, 9600 baud, 8 data bits, no parity, and 1 stop bit. A 16 button cursor can be used with this set up. These settings emulate GTCO with EasyCAD, FastCAD, CADKEY, and Mapedit.

Recall 2 is preset for 2300 Format #4 (9100 Format #1). It operates at run mode, 1000 LPI, 9600 baud, 7 data bits, even parity, and 1 stop bit. A 16 button cursor can also be used with this set up. These settings emulate the 9100 with AUTOCAD and SIGMASCAN.

Changing save and recall settings

Steps	
1	Digitize Set Up.
2	Digitize Recall #1 Or Recall #2.
3	Digitize Set Up.
This set up is operational until the power turns off.	

Table 4-3: Recalling a Set Up

Steps	
1	Digitize Set Up.
2	Digitize new operating parameters.
3	Digitize Save (1, 2, or Default).
4	Digitize Set Up.
The new operating parameters are now permanently saved for future use. If you store the new parameters set in Save Default, they become the tablet default setting and activate at power up.	

Table 4-4: Saving a New Set Up in a Recall Location

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

Table 4-5: Changing from Recall to Save Default

Choosing your mode setting

1. Select the mode you want to use: Point, Track, Run, or Mouse.

Unless specified keep prompt and mouse modes turned off.

2. When you choose Point, Track, or Run you change modes by selecting your next mode. Your previous operating mode turns off automatically. The Mouse mode overrides every menu block, except for prompt and data rate.

3. Prompt mode is used with Run or Track.

Soft menu key settings

If your software package is not listed in Table 4-2, use the following tables to help you select your program settings.

Mode and Parity settings

Figure 4-8: Mode and Parity menu blocks

Mode	Point	Run	Track	Mouse	Prompt
Point	1	Ø	Ø	Ø	Ø
Run	Ø	1	Ø	Ø	Ø
Track	Ø	Ø	1	Ø	Ø
Mouse	Ø	Ø	Ø	1	Ø
Run Prompt	Ø	1	Ø	Ø	1
Point Prompt	1	Ø	Ø	Ø	1
Track Prompt	Ø	Ø	1	Ø	1

Table 4-6: Mode settings

7/8 Data Bits	
7	Ø
8	1

Table 4-7: Data bit settings

Parity	1	2	3
None	1	X	X
Mark	Ø		1
Space	Ø	1	Ø
Even	Ø	Ø	1
Odd	Ø	Ø	Ø

Table 4-8: Parity settings

Key:
Ø = Off
1 = On
X = Irrelevant

Baud Rate

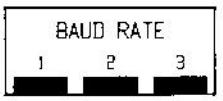


Figure 4-9: Baud Rate menu block

Baud Rate	1	2	3
19200	Ø	Ø	Ø
9600	Ø	Ø	1
4800	Ø	1	Ø
2400	Ø	1	1
1200	1	Ø	Ø
600	1	Ø	1
300	1	1	Ø
150	1	1	1

Table 4-9: Baud Rate

Key:
Ø = Off
1 = On
X = Irrelevant

Format settings

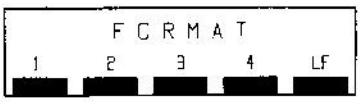


Figure 4-10: Format menu block

	Number	Commands	1	2	3	4
AGRAPHICS MM ASCII	3	mA	Ø	Ø	Ø	Ø
AGRAPHICS MM Binary	30	mB	Ø	Ø	Ø	1
np 2000 ASCII	0	2A	Ø	Ø	1	Ø
np 2000 Binary	28	2B	Ø	Ø	1	1
np 2000 Wedge	1	2C	Ø	1	Ø	Ø
n Instruments 111/HDG1515	13	2D	Ø	1	Ø	1
i ASCII	12	2E	Ø	1	1	Ø
MD7 ASCII	10	2F	Ø	1	1	1
DP5 Binary	23	2G	1	Ø	Ø	Ø
np 9100 Format 1/ASCII	4		1	1	Ø	Ø
np 9100 Format2/ASCII	5		1	1	Ø	1
np 9100 Format 3/ASCII	6		1	1	1	Ø
np 9100 Format 4/ASCII	7		1	1	1	1
np 9100 Format 5/Binary	23	2G	1	Ø	Ø	Ø

-10: Format Settings

Line Feed /LF: ASCII Formats only	
No Line Feed	Ø
Add Line Feed	1

Table 4-11: Line Feed settings

Data Rate settings

Figure 4-11: Data Rate menu block

Data Rate	1	2	3
1 PPS	Ø	Ø	Ø
5 PPS	Ø	Ø	1
10 PPS	Ø	1	Ø
20 PPS	Ø	1	1
40 PPS	1	Ø	Ø
75 PPS	1	Ø	1
100 PPS	1	1	Ø
125 PPS	1	1	1

Table 4-12: Data Rate for all formats except 3 and 28

Data Rate	1	2	3
7 PPS	X	1	1
25 PPS	X	1	Ø
75 PPS	X	Ø	1
150 PPS	X	Ø	Ø

Table 4-13: Data Rate for format 30

Key:
Ø = Off
1 = On
X = Irrelevant

Data Rate	1	2	3
7 PPS	X	1	1
20 PPS	X	1	Ø
50 PPS	X	Ø	1
100 PPS	X	Ø	Ø

Table 4-14: Data Rate for Format 3

Resolution settings

Figure 4-12: Resolution menu block

Resolution	1	2	3
100 LPI*	Ø	Ø	Ø
200 LPI	Ø	Ø	1
254 LPI/10 LP mm	Ø	1	Ø
400 LPI	Ø	1	1
500 LPI	1	Ø	Ø
508 LPI/20 LPmm	1	Ø	1
1000 LPI	1	1	Ø
50 LPmm	1	1	1

***When Formats 4,5,6, and 7 are used, 100 LPI becomes 50 LPmm times 2.**

Table 4-15: Resolution settings

Key:
Ø = Off
1 = On
X = Irrelevant

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Commands

This chapter describes the following commands:

DrawingBoard command sets

The DrawingBoard supports CalComp 2000, CalComp 9X00, and Summagraphics MM commands.

When a tablet emulates Summagraphics MM in formats 3 and 30, it ignores CalComp 2000 commands. In the CalComp 2000 emulation, the tablet ignores MM commands. The following chart describes the compatible formats and directs you to more information about each command.

The following tables describe each format and direct you to more information about each command.

Driver development information

For compatibility with current and future CalComp products we recommend that you use Format #23 and CalComp compatible commands to write a driver.

mmagraphics MM commands

Character	Description		
Null	Resets tablet to its power on default; ends wrap mode		
Ø	Sets tablet ID to Ø, (tablet default)		
1	Sets tablet ID to 1		
@	Run mode		
A	Track mode		
B	Point mode		
D	Remote/Prompt mode		
E	Delta mode		
F	Clear Delta mode		
G h	Axis Update mode*		
I h	Increment mode*		
P	Prompt character		
Character	**Description**	**Binary Format**	**ASCII Format**
Q	Maximum rate	140	100
R	Subsequent rate 1	75	50
S	Subsequent rate 2	25	20
T	Minimum rate	7	7
k	Wrap mode repeats the characters sent by the host.		

Table 5-1: Summagraphics MM commands

**The increment command sets the number of resolution lines (0 to 90) on each axis that the cursor must cross before the tablet sends its new X and Y positions. Because the increment mode counts lines instead of measuring distances, if you change the number of lines per ASCII control characters, the increment distance is biased by 32 (20H) and transmitted as an ASCII character from SP to z.*

CalComp 2000 commands

Character	Description/Parameters
Track mode	
@	1 pps
A	5 pps
B	10 pps
C	20 pps
D	40 pps
E	75 pps
F	100 pps
G	125 pps
Run mode	
H	1 pps
I	5 pps
J	10 pps
K	20 pps
L	40 pps
M	75 pps
N	100 pps
O	125 pps
Point mode	
P	Point Mode
Prompt mode	
Q	Point Prompt mode
R	Run Prompt mode
S	Halt or Stop mode
T	Track Prompt mode
?	Prompt character

Table 5-2: CalComp 2000 commands

Dual command settings: Summagraphics MM and CalComp 2000

Characters	Description	Page Number
a	Send size	5-9
b	Set origin to upper left	5-11
c	Set origin to lower left	5-11
d	100 LPI	
e	200 LPI	
f	10 LPmm	
g	400 LPI	
h	500 LPI	
i	20 LPmm	
j	1000 LPI	
l	1 LPI	
n	2 LPI	
o	50 LPmm/1270LPI	
p	4 LPI	
q	1016 LPI/40 LPmm	
r	Set resolution	5-6
t	Self test	5-9
w	Send self test results	5-9
x	Send checksum of tablet in .#xxxx CR LF	5-10
DC1/X on	Start transmission	5-10
DC1/ X off	Stop transmission	5-10

Table 5-3: Dual command settings: Summagraphics MM and CalComp 2000

Dual command definitions

The following commands are available with Summagraphics MM and CalComp 2000 settings.

Resolution

When the cursor is on the active area of the tablet, the tablet calculates its X and Y position relative to the origin. The calculations are not in inches, millimeters or any other standard units. The numbers represent *counts* or lines of resolution. The tablet keeps track of the number of counts between the origin and the cursor. The digitizer always outputs counts, which can be sized to represent millimeters or inches. You choose the resolution your work requires.

Lines per Inch	Command
1	l (lowercase L)
2	n
4	p
100	d
200	e
400	g
500	h
1000	j
Lines per Millimeter	**Command**
10	f
20	i
40	q

Table 5-4: Resolution commands

Changing resolution with the x,y scale*

Description

With this command the tablet's resolution can match the resolution of another two dimensional object. Different resolutions can be defined for each tablet axis. You can select a resolution between 1 and 508 lines per inch.

This command transmits in an 8 bit format. Most of the available output formats of the 2000 group have a 7 bit data frame. To use the variable resolution with these output formats, you must change to an 8 bit format, send the resolution command, and then return to the desired output format.

Parameters

To define the resolution required for each axis follow these steps:

1. Determine the resolution for each axis of the object.

2. Multiply the object's resolution by the length of the corresponding axis (11.7 inches, 297.18mm.). This equals the axis resolution. Always round off this number to the next whole number.

3. Change the number of the axis resolution into a hexadecimal number. Add zeros to the left of the number if it holds less than four places.

4. Divide the hex number into two parts; its most significant byte (MSB) and its least significant byte (LSB).

5. Repeat steps 2-4 for the second axis.

6. Send the resolution command. Where: r is an ASCII character followed by four characters representing four bytes.

Basic program example:

Resolution can also be changed using the 9X00 command on page 5-7.

```
INPUT X size, Y size
XLSB = X size MOD 256
XMSB = X size \ 256
YLSB = X size MOD 256
YMSB = X size \ 256

PRINT #1 "r";CHR$(XLSB); CHR$(XMSB);

PRINT #1 CHR$(YLSB); CHR$(YMSB);
```

Send tablet size and ID

The tablet sends a position point as if the cursor was at the point farthest from the origin. It is the maximum X,Y value from the tablet at its current resolution. The format is the same as the Summagraphics ASCII output.

Self tests

At power up the tablet performs a series of self-tests. You can perform these tests at any time with this command.

Where:

t	Performs self test.
w	Sends test results.
Where:	Results are sent as an 8 bit binary coded number; t Ø Ø Ø pr d 1 1.
t	overall test results • 1 = pass and 0 = fail ØØØ = always
pr	proximity • 1 = cursor on active area 0 = cursor off active area
d	digital test • 1 = pass 0 = fail

Check sum results

The check sum results from internal calculations which verifies the integrity of the tablet's ROM.

Where: Results are sent as .#HHHH; the period and # are always present. HHHH represents four ASCII coded hexadecimal digits which can vary among tablets, but should not change for an individual tablet.

X on and X off

This command stops and starts data transmissions. Any points digitized after X off and before X on are lost. *Where:*

X off	ASCII DC1 (Ctrl S)
X on	ASCII DC3 (Ctrl Q)

Relocate origin

The default origin is in the lower-left corner of the active area. The tablet coordinates follow the cartesian coordinates when the origin is in this corner.

Using the command: b moves the origin to the upper-left corner of the active area.

Using the command: c returns the origin to the lower-left corner.

The Y axis coordinates will not go negative. The Y axis rotates so that the 0,0 point is at the upper left and the positive values increase as the cursor moves away from the origin.

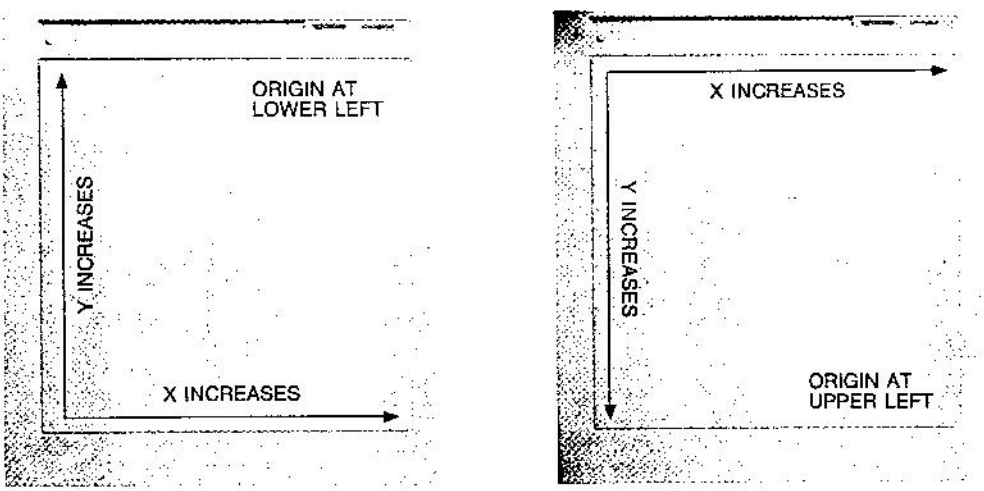

Figure 5-1: Relocating the origin

Select output format, framing, and baud rate

As soon as you enter a command, the DrawingBoard changes output formats and framing immediately. The framing and baud rates vary according to the output format selected. If the command to select an output begins with a 2, the tablet uses CalComp 2000 commands while producing that output. If the command begins with an m, the tablet uses Summagraphics MM commands. The mouse only responds to the command to change to another output format.

Commands	Format	Baud Rate	Parity	Data Bits
mA	MM ASCII	9600	Odd	8
mB	MM Binary	9600	Odd	8
2A	CalComp2000 ASCII	9600	Even	7
2B	CalComp 2000 Binary	9600	Even	7
2C	CalComp 2000Wedge	9600	Even	7
2D	Houston Instruments HDG1111, HDG1515	4800	Even	7
2E	Hitachi ASCII	9600	Even	7
2F	GTCO MD7 ASCII	9600	Even	7
2G	GTCO DP5 Binary	9600	None	8
2M	Mouse Systems Mouse	1200	None	8
2l	Remove Line Feed off ASCII formats			

Table 5-5: Format, framing and baud rate

9X00 commands

Host Command	Description	Page Number
ESC% h [Ø | 1] CR	Disables/enables data from Ports A and B.	5-15
ESC% C n1 {h1} {n2} {n3} CR	Sets serial communication parameters.	5-16
ESC% H CR	Sets operating mode to halt.	5-17
ESC% I R CR	Sets operating mode to increment run.	5-17
ESC% I T CR	Sets operating mode to increment track.	5-17
ESC% I U CR	Sets operating mode to increment line.	5-17
ESC% J h n1 , Ø CR	Sets Resolution.	5-18
ESC% L [Ø | 1] CR	Sets Line Feed.	5-19
ESC% N [Ø | 1] CR	Sets margin data.	5-20
ESC% P CR	Sets operating mode to Point.	5-17
ESC% Q {h} CR	Sets Prompt.	5-20
ESC% Q CR	Cancels Prompt.	5-22
ESC% R CR	Sets operating mode to Run.	5-17
ESC% T CR	Sets operating mode to Track.	5-17
ESC% U CR	Sets operating mode to Line.	5-17
ESC% V F [n} CR	Saves current settings and resets tablet.	5-22
ESC% V R CR	Resets tablet.	5-23
ESC% V S CR	Sends tablet size.	5-23
ESC% W n CR	Sets data rate.	5-24
ESC% X n CR	Sets X increment value.	5-25
ESC% Y n CR	Sets Y increment value.	5-26
ESC% Z [Ø | 1] CR	Sets data proximity.	5-27
ESC% ^ n CR	Changes format.	5-28
ESC% ^ M CR	Sets operating mode format to mouse.	5-17

Table 5-6: 9X00 commands

Enter 9X00 commands by typing them on a dumb terminal or by customizing a program on your host computer. New commands take effect immediately after you enter the carriage return. A command from the host follows this general format:
ESC% h {h1} [h2] CR.

Where:

Key	Description
ESC%	The command prefix. The ESC key followed by the % key.
n	An integer, (numeric variable).
h	An ASCII character to invoke the command.
[Ø | 1]	Ø or 1 sets the function to a definite state. No entry toggles the function.
{ }	Required variable of the command.
{n1 | n2}	One of the variables separated by the | character *must* be chosen.
[n1 | n2]	One of the variables separated by the | character *may* be chosen.
[ ]	Optional variable of the command.
CR	An ASCII carriage return character, HEX ØD.

ESC% h [Ø|1] CR

Enable/disable data from ports A and B

Description

This command controls the tablet's data output from the RS-232C port. Incoming commands from the host are not affected. Normal messages from the terminal to the host, or from the host to the terminal will pass through the digitizer whether the ports are disabled or not.

Example: To disable Port A, enter:
ESC% A Ø CR.
To toggle Port B, enter:
ESC% B CR.

The DrawingBoard has only one output port. This command includes two ports for compatibility with 9X00 application programs.

Parameters

Where:	h = A or B.
A	Port
B	Port B
Where:	[Ø | 1] = Ø, 1, or no entry.
Ø	Disable output port
1	Enable output port
No entry	Toggles current state

ESC% C n1 {h1} {n2} {n3} CR

Set serial communication parameters

Example: To set the output port for 1200 baud, even parity, 7 data bits, and 1 stop bit enter:
ESC% C 4 E 7 1 CR.

Description

This command sets communication parameters for the output port and can override the soft menu keys.

Parameters

Where: n1 = baud rate.

Ø 19200
1 9600
2 4800
3 2400
4 1200
5 600
6 300
7 150

Where: h1 = parity code letters; E, M, N, O, S.

E . . . . . Even
M . . . . . Mark
N . . . . . None
O . . . . . Odd
S . . . . . Space

Where: n2 = the number of data bits; 7 or 8.

Where: n3 = the number of stop bits; 1.

Set operating modes

Mode	Host Command	Menu Blocks
Point	ESC% P CR	Point
Run	ESC% R CR	Run
Halt	ESC% H CR	Halt
Track	ESC% T CR	Track
Line	ESC% U CR	
Mouse	ESC% ^M CR	Mouse
Increment Mode		
Run	ESC% IR CR	
Track	ESC% IT CR	
Line	ESC% IU CR	

Table 5-7: Operating mode commands

Description

Increment commands control the sending of coordinates.

Operating and increment modes are changed by commands from the host or menu.

Set Resolution

Description

The digitizer keeps track of the distance between the tablet origin and the cursor position. This command determines the resolution of the coordinate data that is transmitted.

Parameters

Where:	h = R or M.
R	Inches
M	Millimeters

If the resolution is > than 1279 LPI or 50 LPmm then the tablet counts by twos.

Where:	n1 = 1 to 2540 lines per inch or 1 to 100 lines per millimeter.

Where: a "," separates the resolution digits from the offset digits in the command.

Example: The cursor is at a point five inches to the right (X) and 10 inches above (Y) the origin.

Command	Output
ESC% J R 500 , Ø CR	2500, 5000, T M C CR
ESC% J R 1000, Ø CR	5000,10000, TM C CR
ESC% J M 20. Ø CR	2540, 5080, TMC CR

Set Line Feed

Description

This command can add or subtract a Line Feed character after every CR character to advance the paper in a printer or add a line on the host's display screen.

Parameters

Example: To disable line feed , enter: ESC% L Ø CR.	*Where:*	n = Ø, 1, or no entry.
	Ø	Disables Line Feed
	1	Enables Line Feed
	No entry	Toggles current state

Margin data

The margin area has lower resolution and accuracy than the active area. Do not attempt to use it for high accuracy digitizing.

Description

This command sends margin data to the host when the cursor moves into the margin. During this time the Mode Status character reads X in the output format and the tablet LED flashes.

Parameters

Where:	[Ø ! 1] = Ø, 1, or no entry.
Ø	Enables margin
1	Disables margin
No entry	Toggles current state

Set Prompt

Description

The DrawingBoard sends data as soon as all the normal operating mode requirements are satisfied. A prompt character is sent by the host to the tablet requesting transmission of a coordinate pair. A tablet sends one coordinate pair each time it receives a prompt character from the host

Parameters

The tablet sends data at the maximum rate set even if prompting characters arrive at a faster rate. A tablet sends data as fast as the maximum rate.

Example: To set up prompting mode using the ? for the prompt character enter:
`ESC% Q ? CR.`

The default prompt character is a ? with the CalComp 2000 emulation, a P with the Summagraphics MM emulation, and user definable with the 9X00 emulation.

Where: h = the desired prompting character.
Where: h ≠ CR, BS, RUB, or @.

ESC% Q CR

Cancel Prompt

Example: To cancel prompting, enter:
ESC % Q CR

Description

This command cancels prompting. The tablet resumes operation in its current mode.

ESC% V F [n] CR

Save current settings description

This command saves current settings and resets the tablet.

Parameters

Where:	n = Ø, 1, 2, or no entry.
Ø	SAVE menu block (power on default)
1	SAVE 1
2	SAVE 2
No entry	Ø or power on default

ESC% V R CR

Reset tablet

Description

This command resets the tablet to the default operating settings.

ESC% V S CR

Send tablet size

Description

This command causes the tablet to transmit a data point that represents the upper-right corner of the active area. The coordinates of the point represent the length of the axis multiplied by the current resolution and origin.

Set Data Rate

Description

This command sets the rate that coordinate pairs are sent to the host. The tablet can produce more data than can be physically transmitted over the communications interface. When the tablet runs faster than the interface, some data points are lost. When the output port becomes free, the tablet sends the last pair made. Any previous pairs waiting for transmission are lost.

Parameters

Where: n = 0 to 100.

The maximum useable data rate depends on the speed of the interface; on the number of characters in the coordinate pair output format; and the number of bits in each byte frame.The following chart shows the maximum useable data rates for the seven RS-232C baud rates, based on a 6 character format and a 10 bit frame.

Baud Rate	Maximum Data Rate (points per second)
19200	100+
9600	100+
4800	80
2400	40
1200	20
600	10
300	5

Example: To set 100 pps, enter:
ESC% W 100 CR

Set x increment value

Description

This command sets the minimum distance the X increment must move before a new data point transmits. This command sets the X increment's value; it does not initiate the increment mode.

Parameters

The resolution setting determines the value of n. Changing the resolution changes the size of the lines and changes the increment distance.

Where: n = 0 to 65,535

Example: You want the increment distance to be 0.1 inch. The current resolution is 20 LPI. Multiply the desired increment by the resolution to calculate the increment. 20 X 0.1 = 2 (enter this number in the increment command).

Set y increment value

Description

This command sets the minimum distance the Y increment must move before a new data point transmits. Although this command sets the Y increment's value, it does not initiate the increment mode.

Parameters

The resolution setting determines the value of n. Changing the resolution changes the size of the lines and changes the increment distance.

Where: n = 0 to 65,535.

ESC% Z [Ø|1] CR

Set data proximity

Description

This command allows the tablet to transmit coordinate pairs when the cursor is off the active area or in the margin. The X and Y data transmitted may be invalid when the cursor is out-of-proximity.

Parameters

Where:	[Ø | 1] = Ø, 1, no entry.
Ø	Coordinate pairs transmit whether the cursor is on or off the active area.
1	Coordinate pairs transmit when the cursor is on the active area.
No entry	Toggles current state.

Change format

Description

This command changes data output formats, but it does not change communication parameters.

Parameters

Where: *n = Ø to 31, (number of desired format).*
Appendix A contains format number descriptions.