
Appendix A

Output Formats

This appendix defines key format terms and describes output formats.

- Model-to-format conversion, see page A-5 & A-6.
- ASCII output formats, see page A-7 & A-8.
- 23240 Output formats, see page A-9.
- Binary formats, see page A-10 and A-11.

Definitions

The following definitions describe terms used in output formats.

Key	Description
@	An ASCII A symbol, HEX 40 in the output.
C	Cursor status character; in Binary formats the highest number, Cn, is the most significant bit. C0 is the least significant bit. In ASCII Formats C represents a single character.
Comma (,)	An ASCII comma (HEX2C) in the output.
CR	An ASCII carriage return (HEX0D) in the output.
Decimal point (.)	An ASCII decimal point (HEX 2E).
Line Feed (LF)	A Line Feed character (HEX 0A) is added to the ASCII output format.
LPI	Lines per inch.
LPmm	Lines per millimeter.
M	Mode status character; in ASCII formats M is a single character representing the current operating mode. For example, R is for run.
MSB, LSB	MSB = Most significant bit. LSB = Least significant bit.
N	Near proximity. In binary formats

	this bit is set when the cursor is off of the active area.
P	Pen status; in ASCII formats represented by D when the pen tip or any cursor button is pressed, and a U when the pen tip or all the cursor buttons are up.
PR	In binary formats this bit (1) is set when the cursor is out-of-proximity.
Space, SP	In ASCII formats SP represents a literal space character (HEX 20) when in output format.
Sx and Sy	In ASCII formats a + for positive and a – for negative.
T	Tablet status is represented by an A.
X or Y	Data digit; in ASCII formats a numeric character representing coordinate data. The number of X or Y symbols represents the allowable number of digits in any output.
Xn or Yn	Data bit; in binary formats a bit representing coordinate data. The highest numbered n is the most significant bit.

Standard formats

In all the standard 9X00 formats the data reads from the most significant character to the least significant.

- Formats 4, 5, and 6 are integer outputs.
- Format 7 is a floating point output.
- Format 23 is a high resolution binary output, and its 4 button cursor output is different than its 16 button cursor output.
- Formats 4-7 are identical to CalComp's 9X00 Formats 1-4. Format 23 is identical to CalComp's 9X00 Format #5.

The formats differ in the following ways: the output of the X and Y data use the resolution command.

Model-to-format conversion

Manufacturer	Model	Format Name	Format Number	Format Command
CalComp	2000	ASCII	0	2A
**CalComp	2000	Binary	28	2B
CalComp	Wedge	ASCII	1	2C
CalComp	9X00	Format 1/ASCII	4	
CalComp	9X00	Format 2/ASCII	5	
CalComp	9X00	Format 3/ASCII	6	
CalComp	9X00	Format 4/ASCII	7	
CalComp	9X00	Format 5/Binary High Resolution	23	2G
GTCO	DP5	Binary High Resolution	23	2G
GTCO	MD7	ASCII	10	2F
Hitachi	HDG 1111	ASCII	12	2E
Hitachi	HDG 1515	ASCII	12	2E
**Hitachi	HDG 1515	Binary LowResolution	28	2B
Hitachi	HDG 1515	Binary High Resolution	23	2G
Houston Instruments	Hi Pad	ASCII	13	2D
**Kurta	Series 1	Format 1	28	2B
Kurta	Series 1	Format 2	23	
Kurta	Series 1	Format 3	30	mB
Kurta	Series 1	Format 4/ASCII	10	2F
Kurta	Series 2	ASCII	10	2F
Mouse Systems Mouse			M	2M

Table A-1: Format conversions

Manufacturer	Model	Format Name	Format Number	Format Command
Numonics	2200	Binary	23	2G
Summagraphics	BitPad 1	ASCII	0	2A
Summagraphics	BitPad 1	Binary	28	2B
Summagraphics	BitPad 2/1103	ASCII	0	2A
Summagraphics	Bitpad 2	Binary	28	2B
Summagraphics	MM	ASCII	3	mA
Summagraphics	MM	Binary/5 byte	30	mB

Table A-1: Format conversions cont'd

Format #28 allows a maximum of 4096 counts (20" @ 200 LPI) in the X and Y axis. The resolution must be reduced if you are using the DrawingBoard model 23240, 23360, 23480 and 23600. For example a resolution of 200 LPI gives an active area of 20 inches.

***Format #30 allows a maximum of 16,000 counts (32" @ 500 LPI) in the x and y axis. Using these formats on DrawingBoard models 23360, 23480, 23600 causes number wrapping. Number wrapping can cause software conflicts. Lowering your resolution can resolve this conflict.*

ASCII output formats

Format Number	Format Command	Resolution	ASCII Outputs
0	2A	<508 LPI >508 LPI	XXXX,YYYY,C CR LF XXXXX,YYYYY,C CR LF
1	2C	<508 LPI/21LPmm >508 LPI/20LPmm	C XXXX YYYY CR LF C XXXXX YYYYY CR LF
3	mA	<508 LPI >508 LPI	XXXX,YYYY C CR LF XXXXX,YYYYY C CR LF
3 (Delta)	mA	<508 LPI >508 LPI	±XXXX,±YYYY, C CR LF ±XXXXX,±YYYYY, C CR LF
4		<1280 LPI >1279 LPI	TMC XXXXX YYYYY CR LF TMC XXXXXX YYYYYY CR LF
5		<1280 LPI >1279 LPI	XXXXX, YYYYY, TMC CR LF XXXXXX, YYYYYY, TMC CR LF
6		<1280 LPI >1279 LPI	CP XXXXX YYYYY CR LF CP XXXXXX YYYYYY CR LF
7		1000 LPI 100 LPmm 10 LPmm Other	SPXX.XXX, SPYY.YYY, TMC CR LF SPXXXX.XX, SPYYYY.YY, TMC CR LF SPXXXX.X, SPYYYY.Y, TMC CR LF SPXXXXX., SPYYYYY., TMC CR LF
10	2F	<508 LPI >508 LPI	C XXXX YYYY CR LF C XXXXX YYYYY CR LF
12	2E	<508 LPI >508 LPI	XXXX,YYYY,C CR LF XXXXX,YYYYY, C CR LF
13	2D	<508 LPI >508 LPI	C+XXXX+YYYY CR LF C+XXXXX+YYYYY CR LF

Table A-2: 23120 and 23180 output formats

Randy
9/22/00

Format Number	Format Command	Resolution	ASCII Outputs
0	2A	<1280 LPI >1279 LPI	XXXXX,YYYYY,C CR LF XXXXXX,YYYYYY, C CR LF
1	2C	<1280 LPI >1279 LPI	CXXXXXXXXYYYYY CR LF CXXXXXXXXYYYYY CR LF
3	mA	<1280 LPI >1279 LPI	XXXXX,YYYYY,C CR LF XXXXXX,YYYYYY, C CR LF
4	9100 1	<1280 LPI >1279 LPI	TMC XXXXX YYYYY CR LF TMC XXXXX YYYYY CR LF
5	9100 2	<1280 LPI >1279 LPI	XXXXX,YYYYY,TMC CR LF XXXXXX,YYYYYY,TMC CR LF
6	9100 3	<1280 LPI >1279 LPI	CPXXXXXXXXYYYYY CR LF CPXXXXXXXXYYYYY CR LF
7	9100 4	1000 LPI 100 LPmm 10 LPmm LC	SP XX.XXX,SP YY.YYY,TMC CR LF SP XXXX.XX,SP YYYY.YY,TMC CR LF SP XXXX.X,SP YYYY.Y,TMC CR LF SP XXXXX.,SP YYYYY.,TMC CR LF
10	2F	<1280 LPI >1279 LPI	CXXXXXXXXYYYYY CR LF CXXXXXXXXYYYYY CR LF
12	2E	<1280 LPI >1279 LPI	XXXXX,YYYYY,C CR LF XXXXXX,YYYYYY, C CR LF
13	2D	<1280 LPI >1279 LPI	C+XXXXX+YYYYY CR LF C+XXXXX+YYYYYY CR LF

Table A-3: 23360, 23480, 23600 Output Formats

Format Number	Format Command	Resolution	ASCII Outputs
0	2A	<400 LPI >400 LPI	XXXX,YYYY,C CR LF XXXXX,YYYYY,C CR LF
1	2C	<400 LPI >400 LPI	C XXXX YYYY CR LF C XXXXX YYYYY CR LF
3	mA	<400 LPI >400 LPI	XXXX,YYYY C CR LF XXXXX,YYYYY C CR LF
3 (Delta)	mA	<400 LPI >400 LPI	±XXXX,±YYYY, C CR LF ±XXXXX,±YYYYY, C CR LF
4		<1280 LPI >1279 LPI	TMC XXXXX YYYYY CR LF TMC XXXXXX YYYYYY CR LF
5		<1280 LPI >1279 LPI	XXXXX, YYYYY, TMC CR LF XXXXXX,YYYYYY, TMC CR LF
6		<1280 LPI >1279 LPI	CP XXXXX YYYYY CR LF CP XXXXXX YYYYYY CR LF
7		1000 LPI 100 LPmm 10 LPmm Other	SPXX.XXX, SPYY.YYY, TMC CR LF SPXXXX.XX, SPYYYY.YY, TMC CR LF SPXXXX.X, SPYYYY.Y, TMC CR LF SPXXXXX., SPYYYYY., TMC CR LF
10	2F	<400 LPI >400 LPI	C XXXX YYYY CR LF C XXXXX YYYYY CR LF
12	2E	<400 LPI >400 LPI	XXXX,YYYY,C CR LF XXXXX,YYYYY, C CR LF
13	2D	<400 LPI >400 LPI	C+XXXX+YYYY CR LF C+XXXXX+YYYYY CR LF

Table A-4: 23240 Output formats

Binary formats

Format 23: 9100 Format #5, Command 2G

BYTE	MSB						LSB	
	7	6	5	4	3	2	1	0
1	1	C4	C3	C2	C1	C0	X15	X14
2	0	X13	X12	X11	X10	X9	X8	X7
3	0	X6	X5	X4	X3	X2	X1	X0
4	0	0	PR	0	X16	Y16	Y15	Y14
5	0	Y13	Y12	Y11	Y10	Y9	Y8	Y7
6	0	Y6	Y5	Y4	Y3	Y2	Y1	Y0

Format 28: Command 2B

BYTE	MSB						LSB	
	B7	B6	B5	B4	B3	B2	B1	B0
1	0	1	C3	C2	C1	C0	0	0
2	0	0	X5	X4	X3	X2	X1	X0
3	0	0	X11	X10	X9	X8	X7	X6
4	0	0	Y5	Y4	Y3	Y2	Y1	Y0
5	0	0	Y11	Y10	Y9	Y8	Y7	Y6

Format 30: Command mB

BYTE	MSB						LSB	
	B7	B6	B5	B4	B3	B2	B1	B0
1	1	PR	T0	X14	Y14	C2	C1	C0
2	0	X6	X5	X4	X3	X2	X1	X0
3	0	X13	X12	X11	X10	X9	X8	X7
4	0	Y6	Y5	Y4	Y3	Y2	Y1	Y0
5	0	Y13	Y12	Y11	Y10	Y9	Y8	Y7

Format 30: Delta, Command mB

BYTE	MSB						LSB	
	B7	B6	B5	B4	B3	B2	B1	B0
1	1	PR	T0	Sx	Sy	C2	C1	C0
2	0	X6	X5	X4	X3	X2	X1	X0
3	0	Y6	Y5	Y4	Y3	Y2	Y1	Y0

Sx and Sy are 0 for negative output and 1 for positive in this format.

Mouse systems mouse: Command 2M

BYTE	MSB							LSB
	B7	B6	B5	B4	B3	B2	B1	B0
1	1	0	0	0	0	R	M	L
2	X7	X6	X5	X4	X3	X2	X1	X0
3	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0
4	X7	X6	X5	X4	X3	X2	X1	X0
5	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0

16 button cursor output

Button	Formats						4,5,6,7	3, 30
	0	28	12	10	23	M		
Up	0	0	SP	0	0	7	U	0
0	1	1	0	1	10H	3	0	1
1	2	2	1	2	11H	5	1	2
2	3	3	2	3	12H	1	2	3
3	4	4	3	4	13H	6	3	3
4	5	5	4	5	14H	2	4	3
5	6	6	5	6	15H	4	5	3
6	7	7	6	7	16H	0	6	3
7	8	8	7	8	17H	6	7	4
8	9	9	8	9	18H	2	8	5
9	:	0AH	9	:	19H	4	9	6
A	;	0BH	#	;	1AH	0	A	7
B	<	0CH	*	<	1BH	6	B	7
C	=	0DH	0	=	1CH	2	C	7
D	>	0EH	1	>	1DH	4	D	7
E	?	0FH	2	?	1EH	0	E	7
F	@	0	3	@	1FH	7	F	7

Table A-5: 16 button cursor outputs

Format 13/Button	Run	Track	Point	1 st Track
Pen Up	3			
Pen DN 0,4,8,C	4	1	2	0
(SW1) 1,5,9,D	D	A	B	@
(SW2) 3(2*), 6, A,E	T	Q	R	P
2(3*), 7, B, F	d	a	b	,

Table A-6: Format 13 cursor codes

** A number in parentheses indicates that the button reads differently depending on the cursor used.*

4 button cursor and pen outputs

Button	Format							
	0	28	12	10	23	M	4,5,6,7	3, 30
Up	0	0	SP	0	0	7	U	0
Pen Dn or 0	1	1	1	1	1	3	0	1
(SW 1) 1	2	2	2	2	2	5	1	2
(SW 2) 2	4	4	4	4	4	6	2	3
3	8	8	8	8	8	6	3	4
0+1	3	3	3	3	3	1		3
0+2	5	5	5	5	5	2		3
0+3	9	9	9	9	9	2		5
1+2	6	6	6	6	6	4		3
1+3	:	0AH	#	:	0AH	4		6
2+3	<	0CH	0	<	0CH	6		7
0,1+2	7	7	7	7	7	0		3
0,1+3	;	0BH	*	;	0BH	0		7
0,2+3	=	0DH	1	=	0DH	2		7
1,2+3	>	0EH	2	>	0EH	4		7
0,1,2,+3	?	0FH	3	?	0FH	0		7

Table A-7: 4 button cursor and pen outputs

Format 1	Run	Other
Up	9	8
Pen Dn 0, 4,8,6	1	0
(SW1) 1,5,9,0	3	7
(SW2) 2,6,A,E	5	4
3 7,B,F	7	6

Table A-8: 4 and 16 button cursors and pen outputs

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Appendix B

BASIC Program To Check Installation

This appendix describes a Microsoft BASIC program that you can use to determine if your DrawingBoard and computer system are correctly installed.

Creating a BASIC program

The following Microsoft BASIC program causes the IBM PC or compatible systems to accept and display data from the tablet. Your computer must have Microsoft BASIC installed. If you are using a different version of BASIC, change this program accordingly.

This program will run if the tablet and computer are correctly set up. If the tablet is in binary output mode, the data appears as meaningless characters on the screen. If the tablet is set for ASCII output, readable X and Y data appears. An overflow message can appear when the tablet is in Run mode. If the overflow message appears, change to Point mode.

If an I/O ERROR message appears, reload the program.

The program sets the computer to accept data through communication port 1 at 9600 baud, no parity, 8 data bits, 2 stop bits, and without handshaking signals. If your digitizer is connected to port 2, make the first statement COM 2 instead of COM 1.

1. Load the BASIC program.
2. Type the following program:

```
10 OPEN "COM 1:9600, N, 8, 2, CS, DS" AS #1
20 PRINT INPUT $ (1, 1)
30 GO TO 20
```

3. To reset the tablet unplug it, then replug it into an outlet.
4. Type RUN to start the program.
5. Press and hold one of the cursor keys or press the pen tip against the tablet surface on the active area.

6. To end this program, press the CTRL and BREAK keys simultaneously.

To keep the program short, we did not include error checking; the computer and tablet don't always communicate on the first try.

If nothing appears on the screen first check your typing for errors. If the program was entered correctly, turn to the troubleshooting section for more help.

If you are not familiar with MS/DOS, read the sections in your MS/DOS manual that explains files, tree-structured directories, the path command, the autoexec. bat file and batch files.

Example of a Microsoft BASIC program set up

This program allows you to use the DrawingBoard to emulate the 9100 in AutoCAD. Use the following operating parameters: run mode, 7 data bits, even parity, 125 pairs per second (pps), and 1000 lines per inch (LPI) resolution. Enter:

```
10 OPEN "COM1: 9600, N, 8, 2" AS#1
20 PRINT#1, CHR$ (27) "%C1E71"
30 PRINT#1, CHR$ (27) "%W125"
40 PRINT# 1, CHR$ (27) "% JR1000, 3"
50 PRINT#1, CHR$ (27) "%R"
60 PRINT #1, CHR$ (27) "%^4"
```

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Appendix C

Batch Files

This appendix describes how to write a batch file.

What is a batch file?

You can also create batch files using editors, such as EDLIN or your word processing program.

A batch file links a series of DOS commands and executes them one after another. This allows you to perform a series of commands with just one command. You can use a batch file to configure the tablet, load, and run the software, because your batch file can include the tablet's operating parameters, and the command that initiates your software application program.

Writing a batch file

Determine the following information before you write a batch file to configure your tablet:

1. As you install your software, keep a record of the drive where you installed the software; any directories you made; the tablet you selected from the option list; and the command you entered to start the software.
2. Review DOS commands and how they operate.
3. Determine the commands your batch program requires and their order. You can use only one command per line.
4. Type **COPY CON filename.BAT** and press enter. This command creates a batch file.
5. Type your first required batch command and press enter. Repeat this step for every batch command in your file.
6. Control Z or F6 saves your batch file and displays the system prompt. If you need to stop a batch file while running use Control C or Control Break.

GTCO example

This example describes a sample batch file that causes the DrawingBoard to operate in a GTCO, high resolution format.

Commands	Description
<code>COPY CON filename.BAT</code>	Create a batch file with the following commands.
<code>MODE COM1:9600,N,8,2</code>	Sets the serial port (COM1) to 9600 baud, no parity, 8 data bits, 2 stop bits.
<code>ECHO 2GOj>COM1:</code>	Sends GTCO high resolution binary, run mode, 125 pps, 1000 LPI commands to COM1.
F6 or Control Z.	Saves file.

AutoCAD example

This example describes a sample batch file that sets up AutoCAD as a CalComp 9X00.

To set up AutoCad as a CalComp 9X00, 16 button cursor, run mode , 9600 baud, 7 data bits, even parity, 125 pps , and 1000 LPI, enter:

DOS requires that batch files use double percentages.

```
MODE COM1:9600,N,8,2
ECHO %%C1E71> COM1
ECHO %%W125> COM1
ECHO %%JR1000,3> COM1
ECHO %%R> COM1
ECHO %%^4> COM1:
```

Commands**Description**

C1E71

Represents 9600 baud,
even parity, and 7 data
bits.

W125

Represents 125 pps.

JR1000,3

Represents 1000 LPI

R

Represents Run mode.

^4

Represents 9X00 Format #1.

Appendix D Specifications

This appendix covers DrawingBoard specifications.

Factory default settings

Emulation	Summasketch	CalComp 2000	CalComp 9X00
Output Format	Summagraphics Binary	2000 ASCII	Format 6
Operating Mode	Track	Run	Point
Baud Rate	9600	9600	9600
Parity	8 Odd	7 Even	7 odd
Data Rate	140 PPS	125 PPS	100 PPS
Resolution	500 LPI	200 LPI	1000 LPI

Table D-1: Factory default settings

Functional specifications

Resolution	Variable, user selectable up to 1279 LPI, 50 LPmm
Accuracy	± 0.025 in/.635 mm ± 0.010 /.254mm*
Jitter	$\pm \frac{1}{2}$ least significant digit
Proximity	0.4 in/10 mm minimum
Output Rate	Variable, user selectable up to 125 coordinate pairs per second

Table D-2: Functional specifications

*Accuracy rating for DrawingBoard models 23460, 23480 and 23600.

Electrical specifications

Power Source	Wall mount power supply or use RS-232C connector
Minimum Input Voltage	12 to 17 VDC
Current Draw	Maximum 400 mA

Table D-3: Electrical specifications, 23120, 23180 and 23240

Input Voltage	180 - 250 VAC @ 50/60 Hz
Current Draw	maximum 50 ma
Input Voltage	90 - 125 VAC @ 50/60 Hz
Current Draw	maximum 100 ma

Table D-4: Electrical specifications, 23360, 23480 and 23600

Regulatory specifications

Safety	UL478
Electromagnetic	FCC Class B, VDE 0871 Class B VCCI Class II, DOC Class B

Table D-5: Regulatory specifications, 23120, 23180 and 23340

Safety	UL478, EN60950/09.87 ZH1/618/10.80, CSA C22.2 NO. 220
Electromagnetic	FCC Class A, DOC Class A VCCI Class I

Table D-6: Regulatory specifications, 23360, 23480 and 23600

Environmental specifications

Operating Temperature	50° to 104° F (10° to 40° C)
Storage Temperature	-67° to 167° F (-55° to 75°C)
Humidity Range	0% to 95% non-condensing
Operating Altitude	Up to 15,000 feet ASL
Storage Altitude	Up to 50,000 feet ASL

Table D-7: Environmental specifications

Communications specifications

RS-232C	Standard single port, Optional: dual port adapter box
 GPIB	Optional: GPIB adapter box

Table D-8: Communication specifications

Physical specifications

	Model 23120	Model 23180	Model 23240
Active Area	12" x 12" (305mm x 305mm)	12" x 18" (305mm x 457mm)	18" x 24" (457mm x 610mm)
Height/Front	0.56 " (14.2mm)	0.75" (19mm)	0.75" (19mm)
Height/Back	1.54' (39.1mm), 2.5" (63.5mm) with legs ex- tended	2.5" (63.5mm)	0.75" (19mm)
Depth	15.9" (404mm)	16.4" (417mm)	22.7" (577mm)
Width	14.9" (378mm)	20.5" (521mm)	26.7" (678mm)
Weight	4.125 lbs (1.87 kg)	9.5 lbs (4.31kg)	15.5 lbs (7.03kg)

Table D-9: Physical Specifications

	Model 23360	Model 23480	Model 23600
Active Area	24" x 36" 610mm x 914mm	36" X 48" 914mm x 1219mm	44" X 60" 1118mm x 1524mm
Outside Dimension	38"(965mm)x* 47"(1205mm)x .900"(23mm)	50"(1270mm)x* 59"(1513mm)x .900"(23mm)	55" (1410mm)x* 71" (1821mm)x .900" (23mm)
Weight	42.9lbs (19.5kg)	56.5lbs (25.7kg)	72.3lbs (32.8kg)

Table D-10: Physical specifications

* These dimensions include accessory tray. If tray is deleted, subtract 3" (80mm).

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Appendix E

Options and Accessories

This appendix lists the tablet and their corresponding parts and numbers so that you can easily order new or replacement items for the DrawingBoard.

Ordering information

To order any of these items, contact your CalComp dealer or call 1-800-CALCOMP (1-800-225-2667) and ask for order entry.

Model Number	Item
Pointing Device	
23034	4 button cursor (buttons in a straight line)
23035	4 button cursor (buttons in diamond pattern)
23036	16 button cursor
23093	Standard pen (without ink)
23092	Pressure Pen, specify voltage (external box included)
23091	Side-switch pen
Tablet	
Active Area	
23120	12" X 12" (305mm X 305mm)
23180	12" X 18" (305mm X 457mm)
23240	18" X 24" (457mm X 610mm)
23360	24" X 36" (610mm X 914mm)
23480	36" X 48" (914mm X 1219mm)
23600	44" X 60" (1118mm X 1524mm)

Table E-1: Pointing devices and tablets

Model Number	Item	DrawingBoard	
		23120, 23180, 23240	23360, 23480 23600
23041	RS-232C, 25 pin	✓	✓
23051	100 V Power Supply	✓	
23052	120 V Power Supply	✓	
23054	220 V Power Supply	✓	
23086	Dual Transducer Wye Box	✓	
23003	GPIB Interface, specify voltage	✓	
23001	RS-232C Dual Port, specify voltage	✓	
50305	User's Guide	✓	✓
23041	I/O cable	✓	✓
23046	Macintosh adaptor cable	✓	✓

Table E-2: Accessories

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Appendix F

Product Support and Troubleshooting

This appendix describes how to clean the DrawingBoard's surface, and what steps you should take before calling CalComp's Technical Assistance Line. It also explains the different procedures for returning a tablet depending on whether you live in the USA, Canada, or Europe.

Cleaning the tablet's surface

To clean the tablet's surface, use the following materials

- Denatured alcohol (methyl, isobutyl, etc.)
 - Mild soap and water
 - Isopropyl alcohol (rubbing alcohol)
- ◆ Abrasive cleaners, acrylic or lacquer paint thinners, and cleansers with an acetone or solvent base such as MDC or EDC, should not be used on the tablet surface.

Use a soft, non-abrasive cloth to clean dust from the tablet surface. Hardened dirt may be removed with a cloth dampened in soapy water. To remove ink or pencil smudges follow these cleaning methods:

- Clean pen ink with denatured alcohol.
- Clean pencil lines with a soft cleanser or pencil eraser. This may create an undesirable shiny spot on the tablet's surface.
- Clean black smudges with denatured alcohol.

Pen maintenance

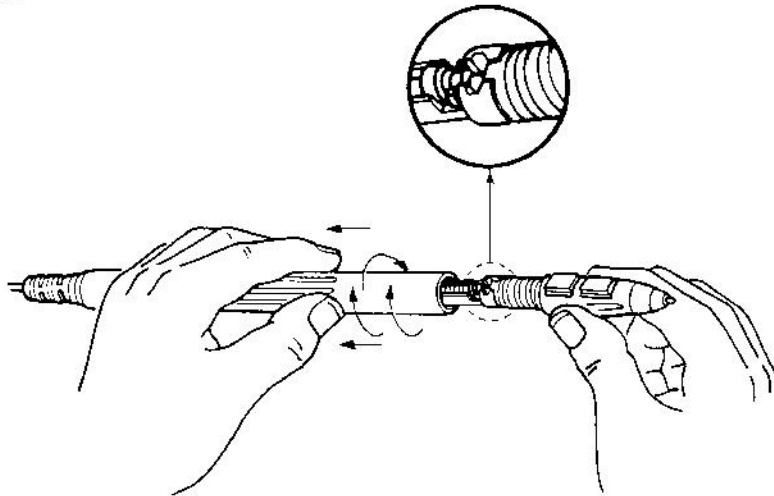


Figure F-1: Replacing the ink cartridge

Replacing the ink cartridge

To replace the ink cartridge in the Side-Switch pen:

1. Hold the pen's front housing and unscrew the rear housing.
2. Pull out the front nose until the slot extends past the rear housing.
3. Replace the ink cartridge.
4. Slide the tab into the slot on the inside housing.
5. Hold the pen's front housing and screw on the rear housing.

To replace the ink cartridge in the standard pen:

1. Unscrew and disconnect the front and rear outside housings.
2. Draw out the ink cartridge and replace it with a new ink cartridge.
3. Connect and screw together the outside front and rear pen housings.
4. To order parts see page E-2.

Troubleshooting

Before calling CalComp's Technical Assistance Line consult the Index or refer to the following tablet, computer, and software check lists. Specific problems are listed along with their possible causes and solutions in Table F-1. Keep in mind that the problem may be your computer, your software, or your display instead of the tablet.

Tablet check list

1. Is the tablet power supply plugged into the tablet and into a live outlet?
2. Is the LED glowing when the cursor is on the active area? Does it flash when the cursor is off the active area? If the light doesn't flash, try another cursor or pen.

3. Are all cable connections tight?
 - Cursor to tablet?
 - Tablet to communications cable?
 - Communications cable to computer? Software requires use of a certain port. Check that the cable is in the correct serial port of the computer.
 - Power supply to tablet?
4. Are the tablet's operating parameters set for values the software expects?
5. Are any of the connector cables or receptacles damaged? Check for bent pins, cut insulation and loose wires.

Computer check list

1. Is the computer plugged into a live outlet? Did you turn on the computer?
2. Does the computer work with any software? Try one of your other programs. If the computer has a diagnostic diskette, use it.
3. Was the software installed correctly? Does the software require you to install a security device or enter a security code before it runs?
4. Does the serial port work? The only way to test the port without special equipment is to reinstall something that has worked in the past and test if it still works.

Does the tablet work with some software?

If your tablet currently works with some software packages, you know that the tablet, serial port, computer and display work.

1. Even if the software you're trying to install supports the same tablets as the software that is working, it does not always mean that you can use the same tablet settings. The output format may be the same, but the communications protocol, resolution, operating mode and data rate may be different. Check your software's requirements.
2. Call the software manufacturer. Perhaps the software has a problem with another component of your system. Does the software require you to install a security device before it will work?

Did the software work in the past?

1. Check all the connectors. Is the tablet still plugged into the same port? Then reset the tablet by unplugging and replugging the power supply and restart the software.
2. Did you reset or power down the computer? During reset and power on the computer can send meaningless characters out the tablet port and can disable the tablet. Reset the tablet again.
3. Have you installed any new software or hardware? Remove it from your system and see if the problem goes away. Did you move any cables or remove the software security device? Did the new software alter your AUTOEXEC.BAT file?
5. Have you updated the software or its drivers?

6. Did you reinstall the software, perhaps after a problem with your hard drive? Then, double check your installation procedure and the driver you selected.
7. Reinstall the software from its master diskettes. The program files may have been corrupted.

Calling for help

Where you live determines which procedure you follow when calling for help. In the United States and Canada if you need assistance, CalComp's technical support staff answer tablet questions. Dial CalComp's Technical Support Line at 1-800-CALCOMP (1-800-225-2667) or use CalComp's FAX number: 602-948-5508. Please determine the following information before you call:

- Description of problem
- Name of software package and version
- Type of computer
- Serial number*
- Part number*
- Date of manufacture*
- Type of pointing device—4 or 16 button cursor or pen

Serial number, part number, and date of manufacture are located on the label on the back of the digitizer.

In Europe refer to your local CalComp office or dealer.

Problems	Causes	Solutions
Frozen display screen crosshairs.	<ol style="list-style-type: none"> 1. Incorrect parity, framing, and/or format settings. 2. Chose incorrect tablet driver. 3. Tablet is plugged into the wrong connector in the back of the computer. 4. Tablet was not powered on correctly, or it was configured incorrectly. 	<ol style="list-style-type: none"> 1. Check that you have installed the correct settings. 2. Change to the correct tablet driver. 3. Change cable to the connector that the driver requires. 4. Exit drawing and check tablet set up, power, and cables. Then, enter new drawing.
Cannot determine which driver to choose for the tablet.	<ol style="list-style-type: none"> 1. No listing for the DrawingBoard in your software package. 	<ol style="list-style-type: none"> 1. Look for a list of operating parameters in the manual. 2. Call the software company.
Cannot determine which tablet settings to use for a 16 button cursor.		See pages 4-10, 4-11, and 4-12 for possible tablet settings.
Screen crosshairs appear to shake or jitter.	<ol style="list-style-type: none"> 1. Tablet is set too close to the screen monitor. 2. The tablet's frequency setting may conflict with the display. 	<ol style="list-style-type: none"> 1. Move the tablet further away from the screen. 2. Change the tablet's frequency. 0 = 57.6 kHz and 1 = 61.44 kHz <p>Note: If #1 improves conditions, then follow step 2. If #1 does not improve conditions, there is a hardware problem.</p>
Keyboard won't respond.	<ol style="list-style-type: none"> 1. Operating parameters are not properly set. 	<ol style="list-style-type: none"> 1. Remove pen or cursor from active area and recheck tablet settings.
Tablet does not respond.	<ol style="list-style-type: none"> 1. The Set Up menu block may not have been turned off. 2. Plugged cable into the wrong communication port of the computer. 3. Chose an incorrect driver. 	<ol style="list-style-type: none"> 1. Turn off Set Up block after setting operating parameters. 2. Move cable to the correct com port. 3. Select a compatible driver for your software. See pages 4-10, 4-11, and 4-12.
Unable to use the entire tablet surface.	<ol style="list-style-type: none"> 1. Incorrect format used. 	<ol style="list-style-type: none"> 1. See note on page A-6.

Table F-1: Problems and solutions

Returning a tablet for repair

Do not ship a tablet to CalComp without a Return Authorization Number. Any tablets received without a Return Authorization Number are returned to the sender immediately. Call Digitizer Customer Service at 1-800-CALCOMP for a Return Authorization Number.

In Europe refer to your local CalComp office or dealer.

Repacking for shipment

Whenever electronic equipment needs to be shipped, try to ship it in its original packing materials. If the original packing material is not available, call the nearest CalComp representative for packing instructions.

To pack:

1. Unplug all the cables from the DrawingBoard.
2. Due to the static-charged packing materials, ship the cursor or any extra electronics boards inside approved anti-static plastic bags. Do not use ordinary plastic bags. If no other material is available, wrap items in household aluminum foil prior to shipment.
3. Return the tablet and all the accessories to their proper compartments within the tablet carton.
4. Reclose the tablet carton.
5. If you are shipping the tablet or accessories to a CalComp Service Center for repair, attach a tag to

the equipment with the following information:

- Model number
- Serial number
- The unit's maintenance contract number
- Return authorization number
- A detailed description of the problem

Tablet storage

Store the tablet in its carton in an upright position on one of the frame edges. Do not place heavy weights on the carton. Do not exceed storage temperature or humidity limits of the DrawingBoard specifications listed on page D-1.

Appendix G

Major Changes to the 23240

This appendix describes the major changes to the 23240 DrawingBoard model since June 1989.

New or redefined features

All 23240 DrawingBoard models built since June, 1989 have added or redefined the following features: menu, format block, resolution block, and command sets.

Menu

The menu with its pre-set blocks has been replaced with user definable set up blocks. The new menu adds Save, Recall, and Save Default blocks which allow you to save up to three settings.

Resolution

Different settings are used to provide the same function. The following chart shows old and new settings.

Resolution	Current Settings			Original Settings		
200 LPI	Ø	Ø	Ø	Ø	Ø	1
400 LPI	Ø	Ø	1	Ø	1	1
500 LPI	Ø	1	Ø	1	Ø	Ø
1000 LPI	Ø	1	1	1	1	Ø
10 LPmm	1	Ø	Ø	Ø	1	Ø
40 LPmm	1	Ø	1	1	Ø	1
50 LPmm	1	1	Ø	1	1	1
*100 LPmm	1	1	1	Ø	Ø	Ø
* 50 LPmm times 2; not a true 100 LPmm						

Table G-1: 23240 original and current resolution settings

Command sets

Model 23240 has added the Summagraphics MM command sets and the Dual Command sets. See pages 5-3 and 5-5 for more information.

Format

Different settings are used to provide the same function. The following chart shows old and new settings. Page A-7 lists the output formats available for the 23240 DrawingBoard.

Format	Original				Current			
CalComp 2000 ASCII	Ø	Ø	Ø	Ø	Ø	Ø	1	Ø
CalComp 2000 Wedge	Ø	Ø	Ø	1	Ø	1	Ø	Ø
GTCO DP5 Binary	Ø	Ø	1	Ø	1	Ø	Ø	Ø
CalComp 2000 Binary	Ø	Ø	1	1	Ø	Ø	1	1
CalComp 9X00, Format 1	Ø	1	Ø	Ø	1	1	Ø	Ø
CalComp 9X00, Format 2	Ø	1	Ø	1	1	1	Ø	1
CalComp 9X00, Format 3	Ø	1	1	Ø	1	1	1	Ø
CalComp 9X00, Format 4	Ø	1	1	1	1	1	1	1

Table G-2: Original and current format settings

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ndix H

AutoCAD 10 with the Macintosh

This appendix explains how to use the DrawingBoard with AutoCAD 10 on the Macintosh.

Tablet set up with AutoCad 10

To set up your tablet with AutoCAD 10 on the Macintosh use the following soft menu key setting:

MODE					PARITY			BAUD RATE			FORMAT					DATA RATE			RESOLUTION			FREQ	
POINT	RUN	TRACK	MOUSE	PROMPT	2/8	1	2	3	1	2	3	1	2	3	4	LF	1	2	3	1	2	3	FREQ
0	1	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	1	1	1	1	1	0	1

Figure H-1: Menu (Key: 0 = Off, 1 = On)

When you connect a Macintosh to a serial digitizer, it requires a special serial-to-Macintosh adapter; CalComp part number 16211-000001, to order see page E-2. Figure I-2 describes the pin assignment in detail.

Then, enter AutoCAD and select the AutoCAD Utilities Menu; choose Configure AutoCAD. When you are prompted for your digitizer selection, select the CalComp 9100 driver and continue your installation process.

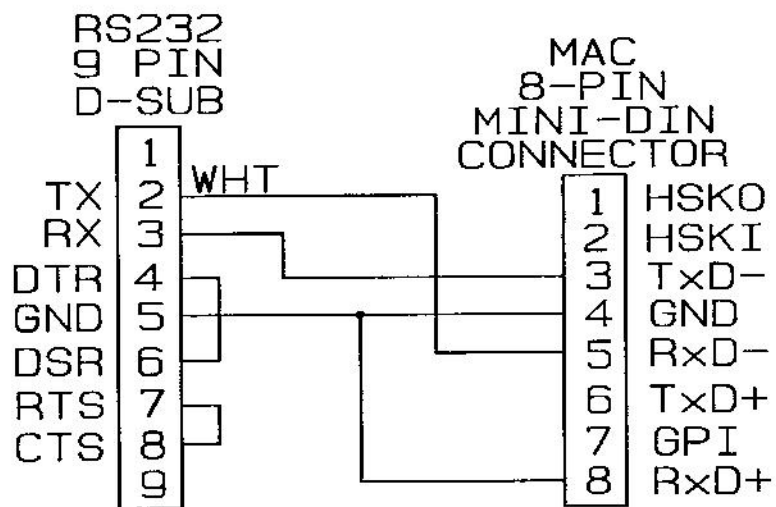


Figure H-2: Pin assignment

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Appendix I

ASCII chart

This chapter contains the American National Standard Code for Information Interchange (ASCII chart).

ASCII chart

BITS		B7	B6	B5	B4	B3	B2	B1											
		0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
		CONTROL				NUMBERS SYMBOLS				UPPERCASE SYMBOLS				LOWERCASE SYMBOLS					
		0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		NU	DL	Sp	0	@	P	i	p										
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		SH	D1	!	1	A	Q	a	q										
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		SX	D2	"	2	B	R	b	r										
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		EX	D3	#	3	C	S	c	s										
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		ET	D4	\$	4	D	T	d	t										
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		EQ	NK	%	5	E	U	e	u										
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		AK	SY	&	6	F	V	f	v										
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		BL	EB	'	7	G	W	g	w										
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		BS	CN	(8	H	X	h	x										
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		HT	EM)	9	I	Y	i	y										
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		LF	SB	*	10	J	Z	j	z										
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		VT	EC	+	11	K	I	k	{										
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		FF	FS	,	12	L	\	l											
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		CR	GS	-	13	M	J	m	}										
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		SO	RS	.	14	N	^	n	~										
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		SI	US	/	15	O	_	o	DT										

1 On some keyboards or systems

KEY

octal	25	NK	graphic representation	
hex	15			NAK
mnemonic				

Appendix J

Glossary

This appendix contains the glossary.

Glossary

Accuracy: The similarity of a distance measured by the tablet with the actual distance. When we specify that the accuracy of a tablet is +/- .025 inch (.635mm) we mean that every point in the active area is within .025 inch (.635mm) of where it should be.

Active area: The area on the tablet surface intended for digitizing.

ASCII: Abbreviation for American Standard Code for Information Interchange. Appendix J contains a chart of the ASCII character codes.

Baud Rate: The rate of speed that data flows between a host computer and the digitizer. It is the number of bits transmitted per second. The lower the baud rate, the slower the speed.

Bit: The basic unit of information in the binary system; is either 1 or 0.

Byte: A group of bits that acts as a single unit of information.

Coordinate pair: A pair of numbers representing a unique point on the digitizer surface; usually the distance across and up from the tablet origin.

Cursor: A pointing device for selecting specific points on the tablet surface.

Data bits: Each transmission contains 7 or 8 data bits.

Default settings: Preset software parameters that activate at power up until changed by the user.

Echo: Incoming characters are sent back to the sender.

GPB: Abbreviation for General Purpose Interface Bus. It is commonly used for connecting digital measurement instruments.

Halt mode: The tablet accepts commands but transmits no data until a new mode is selected.

Host: Another name for the user's computer. The host receives data from the tablet and sends commands to the tablet.

Increment modes: Coordinates are transmitted after the cursor moves a set distance in either the X or Y direction. These increment distances are set separately for each axis.

Jitter: A repeatability error of short duration caused by electrical noise.

LED: Abbreviation for light-emitting-diode. The yellow light in the upper right corner indicates power and proximity.

Line mode: The tablet sends coordinate data points continuously, while the pen tip or a cursor button is depressed, and one additional point when the pen tip or cursor button is released.

Line Feed: Optional character added to the end of an output format.

LPI: Lines per Inch; English unit of measurement for resolution measuring the number of separate, distinguishable locations that may be found within the distance of one inch.

LPmm: Lines per Millimeter; metric unit of measurement for resolution measuring the number of separate, distinguishable locations that may be found within the distance of one millimeter.

Margin: Area surrounding the active area on the tablet. The digitizer does not transmit accurate coordinate pairs if the pen or cursor is placed in this region. This area can be used for menu picking.

Menu: A portion of the tablet surface available to the user for sending that block's unique character.

Mode: Determines the conditions under which the digitizer transmits data to the host.

NVRAM: Non-volatile-random-access-memory

Origin: The point on the tablet which is designated as point (0,0), relative to a grid of conductors positioned in the horizontal, X, and vertical, Y, directions.

Output format: The system of characters used by the DrawingBoard for outputting data.

Parallax error: The error in alignment perceived by the tablet user if the cursor cross-hairs are elevated from the digitizing media.

Parameters: The special modes and settings used by the DrawingBoard system, like, baud rate, or parity, et-cetera. These modes may be entered and changed by the user at any time.

Parity: Refers to a type of error detection. A parity bit is inserted into every character the digitizer transmits. The status of the parity bit confirms that the data was not altered during transmission.

Point mode: The digitizer transmits one coordinate data point when a cursor button or the pen tip is depressed.

Prompt mode: The digitizer transmits one coordinate pair each time the host computer sends a prompt character to the unit.

Proximity: The greatest distance above the work surface that the cursor can be raised and still be sensed by the tablet.

RAM: Random Access Memory.

Resolution: The smallest increment of distance which the tablet is capable of sensing.

ROM: Read-only Memory.

Run mode: The digitizer transmits coordinate data points continuously, regardless of the status of the cursor buttons or the pen tip status.

Serial transmission: Data transmission protocol where each bit of the data character is sent one at a time over a single circuit. This system saves on transmission circuitry, but is usually slower than parallel transmission.

Stop bits: 1 or 2 stop bits transmit with each data byte. They mark a completed transmission.

Toggle: Switches current state.

Track mode: The digitizer transmits coordinate data points continuously, but only while the cursor button or the pen tip is depressed.

Transducer: A pointing device which may be either a pen or a cursor.

X direction: The horizontal direction across the face of the tablet.

Y direction: The vertical distance up and down the face of the tablet.

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