Appendix A
Output formats

This appendix provides output format definitions and conversions.

Overview

The 9500 digitizer offers 26 standard formats. The Universal Formatter enables you to create unlimited numbers of customized formats.

Definitions

Key	Description
@	An ASCII @ 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 (HEX0D0 in the output.
Decimal Point (.)	An ASCII decimal point (HEX 2E).
Line Feed (LF)	A HEX ØA 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	Most significant bit, least significant bit.
N	Near proximity. In binary formats this bit is set when the cursor is out of the active area.
P	Pen Status. In ASCII formats, a character reading D when the pen tip or any cursor button is depressed, and U when the pen tip or all the cursor buttons are up.
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. In binary formats a Ø bit for positive and a 1 bit for negative.
T	Tablet Status. A single character reading A. Included for CalComp 9100 compatibility.
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

Formats 4-7 are identical to CalComp 9100 formats 1-4.

The output of the X and Y data may be altered by the resolution command.

In all the standard 9500 formats the data reads from the most significant character to the least significant. Formats 4, 5, and 6 are integer outputs, while format 7 is a floating point output. Format 23 is a high resolution binary output. The format 23 cursor output is different between 4 and 16 button cursors.

The Universal Formatter is used to produce user-defined output.

Model-to-format conversion

Builder	Model	Format Name	9500 Format
CalComp	2000	ASCII	0
CalComp	2000	Binary	28*
CalComp	2000	ASCII (special)	2
CalComp	2200	Format 1	0
CalComp	2200	Format 2	1
CalComp	2200	Format 3	28*
CalComp	4000	ASCII	1
CalComp	9100/9000	Format 1	4
CalComp	9100/9000	Format 2	5
CalComp	9100/9000	Format 3	6
CalComp	9100/9000	Format 4	7
CalComp	9100	Format 5	23

Builder	Model	Format Name	9500 Format
GTCO	DP5	ASCII	9
GTCO	DP5	Binary Low Resolution	25
GTCO	DP5	Binary High Resolution	23
GTCO	MD7	ASCII	10,11
GTCO	MD7	Binary	28*
Hitachi	HDG 1111	ASCII	12,14
Hitachi	HDG 1111	Binary Low Resolution	28*
Hitachi	HDG 1111	Binary High Resolution	27
Hitachi	HDG 1515	ASCII	12,14
Hitachi	HDG 1515	Binary Low Resolution	28*
Hitachi	HDG 1515	Binary High Resolution	27
Kurta	Series 1	Format 1	28*
Kurta	Series 1	Format 2	24
Kurta	Series 1	Format 3	26
Kurta	Series 1	Format 4 (ASCII)	10
Kurta	Series 2	ASCII	10
Kurta	Series 2	Binary	24
Numonics	2200	Binary High Resolution	23

Builder	Model	Format Name	9500 Format
Summagraphics	BitPad 1	ASCII	0
Summagraphics	BitPad 1	Binary	28*
Summagraphics	1103/BitPad 2	ASCII	0
Summagraphics	BitPad 2	Binary	28*
Summagraphics	1105/BitPad 2	ASCII	8,15,16
Summagraphics	BitPad 2	Binary	31
Summagraphics	MM	ASCII	0
Summagraphics	MM	Binary/3 byte	29
Summagraphics	MM	Binary/5 byte	30
Summagraphics	MM	Binary/18 byte	31

Format #28 allows a maximum of 4096 counts in the X and Y axis. Therfore, the resolution must be reduced to be usefull. A resolution of 100 LPI gives an active area of 40 inches.

Output formats

Format	Resolution	ASCII output
0	<1280 LPI	XXXXX,YYYYY,C CR
	>1280 LPI	XXXXXX,YYYYYY,C CR
1	<1280 LPI	C XXXXX YYYYY C
	>1280 LPI	C XXXXXX YYYYYY CR
2	ALL	@ C Sx XXXXX Sy YYYYY CR
3	RESERVED	RESERVED
4	<1280 LPI, <51 LPM	T M C XXXXX YYYYY CR
	>1279 LPI, >50 LPM	T M C XXXXXX YYYYYY CR
5	<1280 LPI, <51 LPM	XXXXX, YYYYY, T M C CR
	>1279 LPI, >50 LPM	XXXXXX, YYYYYY, T M C CR
6	<1280 LPI, <51 LPM	C P XXXXX YYYYY CR
	>1279 LPI, >50 LPM	C P XXXXXX YYYYYY CR
7	1000 LPI	SP XX.XXX, SP YY.YYY,T M C CR
	100 LPM	SP XXXX.XX, SP YYYY.YY,T M C CR
	10 LPM	SP XXXX.X, SP YYYY.Y,T M C CR
	OTHER	SP XXXXX., SP YYYYY,T M C CR
8	1000 LPI	Sx XX.XXX, Sy YY.YYY, CbCa, T0 CR
	100 LPM	Sx XXXX.XX, Sy YYYY.YY, CbCa, T0 CR
	10 LPM	Sx XXXX.X, Sy YYYY.Y, CbCa, T0 C
	OTHER	Sx XXXXX., Sy YYYYY., CbCa, T0 CR
9	<1280 LPI	C XXXXX SP YYYYY CR
	>1280 LPI	C XXXXXX SP YYYYYY CR
10	<1280 LPI	C XXXXX YYYYY CR
	>1280 LPI	C XXXXXX YYYYYY CR
11	<1280 LPI	XXXXX YYYYY C CR
	>1280 LPI	XXXXXX YYYYYY C CR
12	<1280 LPI	XXXXX , YYYYY, C CR
	>1280 LPI	XXXXXX , YYYYYY, C CR
14	<1280 LPI	Sx XXXXX Sy YYYYY C CR

Format	Resolution	ASCII output
	>1280 LPI	Sx XXXXXX Sy YYYYYY C CR
15	ALL	Sx XXXXX, Sy YYYYY, CbCa, T0 CR
16	ALL	Sx XXXX.XXX, Sy YYYY.YYY, CbCa, T0 CR
17 to 21	RESERVED	

16 button cursor output

	Button Pressed	Ø, 1Ø	4,5,6 and 7	14, 12
Pen up	None	Ø	U	SP
Pen dn	Ø	1	Ø	Ø
Sw1	1	2	1	1
Sw2	2	3	2	2
	3	4	3	3
	4	5	4	4
	5	6	5	5
	6	7	6	6
	7	8	7	7
	8	9	8	8
	9	:	9	9A
	A	;	A	*
	B	<	B	#
	C	=	C	Ø
	D	>	.	1
	E	?	E	2
	F	@	F	3

	Button Pressed	8,15,16 In Prox	8,15,16 Out of Prox	1 Run Mode	1 Other Modes
Pen up	none	ØØ	32	9	8
Pen dn	Ø	Ø1	33	1	Ø
	1	Ø2	34	3	2
	2	Ø3	35	5	4
	3	Ø3	36	7	6
	4	Ø5	37	1	Ø
	5	Ø3	38	3	2
	6	Ø7	39	5	4
	7	Ø8	4Ø	7	6
	8	Ø9	41	1	Ø
	9	1Ø	42	3	2
	A	11	43	5	4
	B	12	44	7	6
	C	13	45	1	Ø
	D	14	46	3	2
	E	15	47	5	4
	F	16	48	7	6

4 button cursor output

ASCII Formats

	Button Pressed	Ø,2,9 1Ø and 11	12,14
Pen up	None	Ø	SP
Pen dn	Ø	1	1
	1	2	2
	2	4	3
	3	8	4

The following formats duplicate the first four buttons of the 16 button cursor output with the 4 button cursor: 1,4,5,6,7,8,13,15, and 16.

Format 22

	MSB							LSB
BYTE	B7	B6	B5	B4	B3	B2	B1	B0
1	P7	P6	P5	P4	P3	P2	P1	P9
2	1	C4	C3	C2	C1	C0	X15	X14
3	0	X13	X12	X11	X10	X9	X8	X7
4	0	X6	X5	X4	X3	X2	X1	X0
5	0	0	0	PR	X16	Y16	Y15	Y14
6	0	Y13	Y12	Y11	Y10	Y9	Y8	Y7
7	0	Y6	Y5	Y4	Y3	Y2	Y1	Y0

Format 23: 9500 Format #5

	MSB						LSB	
BYTE	B7	B6	B5	B4	B3	B2	B1	B0
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 24

	MSB						LSB	
BYTE	B7	B6	B5	B4	B3	B2	B1	B0
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 25

	MSB							LSB
BYTE	B7	B6	B5	B4	B3	B2	B1	B0
1	0	1	C3	C2	C1	C0	C4	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 26

	MSB							LSB
BYTE	B7	B6	B5	B4	B3	B2	B1	B0
1	1	PR	0	C4	C3	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 27

	MSB)					LSB		
BYTE	B7	B6	B5	B4	B3	B2	B1	B0
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

	MSB							LSB
BYTE	B7	B6	B5	B4	B3	B2	B1	B0
1	0	1	C3	C2	C1	C0	M	PR
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

	MSB							LSB
BYTE	B7	B6	B5	B4	B3	B2	B1	B0
1	1	N	T0	1	1	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 31

	MSB							LSB
BYTE	B7	B6	B5	B4	B3	B2	B1	B0
1	0	1	0	0	T2	T1	T0	N
2	0	0	0	C4	C3	C2	C1	C0
3	0	0	X5	X4	X3	X2	X1	X0
4	0	0	X11	X10	X9	X8	X7	X6
5	0	0	0	Sx	X15	X14	X13	X12
6	0	0	Y5	Y4	Y3	Y2	Y1	Y0
7	0	0	Y11	Y10	Y9	Y8	Y7	Y6
8	0	0	0	Sy	Y15	Y14	Y13	Y12

Binary 16 button cursor output formats

Button Pressed	Format 24,26,28	Format 27, 31	Format 29, 30	Format 23, 25
None	0000	00000	000	00000
0	0001	00001	001	10000
1	0010	00010	010	10001
2	0011	00011	011	10010
3	0100	00100	100	10011
4	0101	00101	101	10100
5	0110	00110	110	10110
6	0111	00111	111	10110
7	1000	01000	000	10111
8	1001	01001	001	11000
9	1010	01010	010	11001
A	1011	01011	011	11010
B	1100	01100	100	11011
C	1101	01101	101	11100
D	1110	01110	110	11101
E	1111	01111	111	11110
F	0000	10000	000	11111

4 button cursor output

Button Pressed	Format 24,26,28	Format 27, 31	Format 28, 30	Format 23, 25
None	0000	00000	000	00000
0	0001	00001	001	00001
1	0010	00010	010	00010
2	0100	00100	100	00100
3	1000	01000	000	01000

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Appendix B
BASIC Program to Make IBM PC Act as a Dumb Terminal

This appendix describes a program that causes an IBM PC or compatible system to accept and display the 9500 digitizer's data.

Overview

This MICROSOFT BASIC program causes the IBM PC or other compatible systems to accept and display the 9500 digitizer's data. Your computer must have MICROSOFT BASIC installed. If you are using a different version of BASIC, change this program accordingly.

Enter the following soft switch settings in Area 1 and Area 2:

Area 1				Area 2		
Mode		Res	Format	Baud	Parity	STLPE
100000	00	011	00100	001	0001	01010

The tablet is now set up for Point mode, format #4, 9600, E, 7,1 and Port A. To use Port B, move the area 2 soft switch settings to area 3.

The program sets the PC to accept data at 9600 baud, even parity, 7 data bits, 1 stop bit, and without handshaking signals. The X and Y data are displayed every time a button is depressed while the cursor is on the tablet.

```
10 OPEN "COM 1:9600, E, 7, 1, CS, DS" AS #1
20 PRINT INPUT $(1,1);
30 GO TO 20
```

To end this program, press the control and break keys simultaneously.

If you get an I/O ERROR message when you try to run the program, try again. To keep the program short, we left out error checking.

There is no sequence of MS/DOS commands that makes a PC or co... display the ir... the tablet.

If the terminal displays data from this program but not the program you want to use, reinstall the software, and double check the soft switch settings. If the software still doesn't work, and the 9500 is specifically supported by the software, call the software vendor.

The digitizer output must be in one of the ASCII output formats in order to get meaningful data with the above BASIC program.

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Appendix C
9100 Switch Bank Settings

This appendix lists the 9100 digitizer's switch settings.

Overview

You may want to refer to the 9100 switch settings if the software package you are using supports the CalComp 9100 but not the 9500. This comparison should help you determine the 9500's settings.

Switch settings

The settings for Switch Bank Two on the Communication Interface Board vary with the type of board. GPIB boards have different settings on Switch Bank Two than RS-232.

The switches are marked Closed and Open, corresponding to C and O in these tables. An X means the switch may be open or closed.

A table of all possible GPIB addresses may be found on page 4-11. The addresses count up in binary.

Digitizing processor board (SB1)

SWITCH	1	2	3	4	5	6	7	8
OPERATING MODE								
Halt	C	C	—	—	—	—	—	—
Point+	C	O	—	—	—	—	—	—
Track	O	C	—	—	—	—	—	—
Run	O	O	—	—	—	—	—	—
OUTPUT FORMAT								
Format 1	—	—	C	C	—	—	—	—
Format 2	—	—	C	O	—	—	—	—
Format 3+	—	—	O	C	—	—	—	—
Format 4	—	—	O	O	—	—	—	—
Format 5 (16 Button)	—	—	C	O	O	O	—	—
Format 5 (4 Button)	—	—	O	C	O	O	—	—
RESOLUTION								
1000 LPI+	—	—	—	—	C	C	—	—
40 LPmm	—	—	—	—	C	O	—	—
50 LPmm	—	—	—	—	O	C	—	—
Reserved	—	—	—	—	O	O	—	—
TABLET SIZE								
91140*	—	—	—	—	—	—	C	O
91170*	—	—	—	—	—	—	C	C
91250*	—	—	—	—	—	—	O	C
91240	—	—	—	—	—	—	C	C
91360	—	—	—	—	—	—	C	O
91480	—	—	—	—	—	—	O	C
91600	—	—	—	—	—	—	O	O

*Jumper Installed

+9100 Factory Default

Interface board settings, switch bank one (SW1)

SWITCH	1	2	3	4	5	6	7	8
PARITY								
Odd+	C	C	O	—	—	—	—	—
Even	C	O	O	—	—	—	—	—
Mark	O	C	O	—	—	—	—	—
Space	O	O	O	—	—	—	—	—
Disabled	X	X	C	—	—	—	—	—
FRAMING								
2 Stop Bits	—	—	—	O	—	—	—	—
1 Stop Bit+	—	—	—	C	—	—	—	—
8 Data Bits	—	—	—	—	O	—	—	—
7 Data Bits+	—	—	—	—	C	—	—	—
BAUD RATE								
19200	—	—	—	—	—	C	C	C
SWITCH	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
9600+	—	—	—	—	—	C	C	O
4800	—	—	—	—	—	C	O	C
2400	—	—	—	—	—	C	O	O
1200	—	—	—	—	—	O	C	C
600	—	—	—	—	—	O	C	O
300	—	—	—	—	—	O	O	C
Reserved	—	—	—	—	—	O	O	O

+9100 Factory Default

RS 232 settings for switch bank two (SW2)

SWITCH	1	2	3	4	5	6	7	8
Port B/D on	O	—	—	—	—	—	—	—
Port B/D off+	C	—	—	—	—	—	—	—
LF Port A/C on	—	—	O	—	—	—	—	—
LF Port A/C off+	—	—	C	—	—	—	—	—
Port A/C on+	—	—	—	O	—	—	—	—
Port A/C off	—	—	—	C	—	—	—	—
Small Menu on	—	—	—	—	O	—	—	—
Small Menu off	—	—	—	—	C	—	—	—
Cursor on+	—	—	—	—	—	O	—	—
Cursor off	—	—	—	—	—	C	—	—
Echo B/D on+	—	—	—	—	—	—	O	—
Echo B/D off	—	—	—	—	—	—	C	—
LFB/D on+	—	—	—	—	—	—	—	O
LFB/Doff	—	—	—	—	—	—	—	C

GPIB board settings for switch bank two (SW2)

SWITCH	1	2	3	4	5	6	7	8
Enable Port B/D	O	—	—	—	—	—	—	—
Disable Port B/D+	C	—	—	—	—	—	—	—
Serial Port on	—	O	—	—	—	—	—	—
Serial Port off+	—	C	—	—	—	—	—	—
CR LF+	—	—	O	—	—	—	—	—
CR	—	—	C	—	—	—	—	—
GPIB Address	—	—	—	MSB				LSB
Address 1+	—	—	—	C	C	C	C	O

+9100 Factory Default

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Appendix D
Specifications

This appendix covers the 9500 digitizer's specifications.

Functional specifications

Resolution	Up to 10,160 LPI/400 LPmm (cursor only)
Proximity	.5 inch
Accuracy	±.005 inch (.127mm)
Hi-accuracy (optional)	±.002 inch (.0508mm)
Repeatability	±1 LSB
Data Rate	Variable, user selectable up to 200 coordinate pairs per second.
MTBF	30,000 hours
MTTR	15 minutes

Table D-10: Functional specifications

Electrical specifications

Power	15 watts maximum
Input voltage	90-100 VAC @ 50/60 Hz 110-130 VAC @ 50/60 Hz 190-210 VAC @ 50/60 Hz 210-250 VAC @ 50/60 Hz
Input current	125ma max @ 90-110 VAC 110ma max @ 110-130 VAC 50ma max @ 200-230 VAC 45ma max @ 230-260 VAC

Table D-11: Electrical specifications

Regulatory specifications

Safety	UL478 and DIN IEC 950/VDE Ø8Ø6/8.81 and CSA Standard 22.2 No. 220
Electromagnetic	FCC Class A
VCCI	Class I
DOC	Class A

Table D-12: Regulatory specifications

Environmental specifcations

Environmental specifications	
Operating Temperature	50 to 105 degress F 10 to 40 degrees C
Storage Temperature	-58 to 167 degrees F -50 to 75 degrees C
Humidity Range	0% to 95% non-condensing
Operating Altitude	Up to 15,000 feet ASL (4573m)
Storage Altitude	Up to 50,000 feet ASL (15244m)

Table D-13: Environmental specifications

Physical specifications

Model	Active Area	Frame size	Weight
95360	24" x 36"	36.7" x 48.7"	47 lbs
	610mm x 914mm	932mm x 1237mm	21 Kg
95480	36" x 48"	46.7 x 58.7	74 lbs
	914mm x 1219mm	1186mm x 1491mm	33 Kg
96500	44" x 60"	55.2" x 70.7"	93 lbs
	1219mm x 1524mm	1402mm x 1796mm	42 kg

Table D-14: Physical specifications

Controlling resolution

At power up the limit on resolution is 2540 LPI/100LPmm at 100 pairs per second (PPS). LPI/LPmm and PPS cannot be increased at the same time. If one is raised past the limit; the other must be lowered.

The scan rate controls the rate the tablet resolves coordinates. To change the scan rate enter this command: ESC% J S n CR.

Parameters

Resolution times scan rate is 1,024,000.

100<n<900. The maximum data rate after this command is n/4.

Example #1: To set: 10000 LPI at 25 PPS, enter:
ESC% J S 1 0 0 @ J R 1 0 0 0 0 , 4 @ W 2 5 CR

Example #2: To set 1000 LPI at 200 PPS, enter:
ESC% J S 9 0 0 @ J R 1 0 0 0 , 3 @ W 2 0 0 CR

The settings you determine for the following operating parameters (baud rate, framing, format, scan rate, SMART, mode, and active display) can limit the maximum output rate.

Example #3: To set 2450 LPI at 100 PPS, enter:
ESC% J S 4 0 0 @ J R 2540, 0 @ W 1 0 0 CR

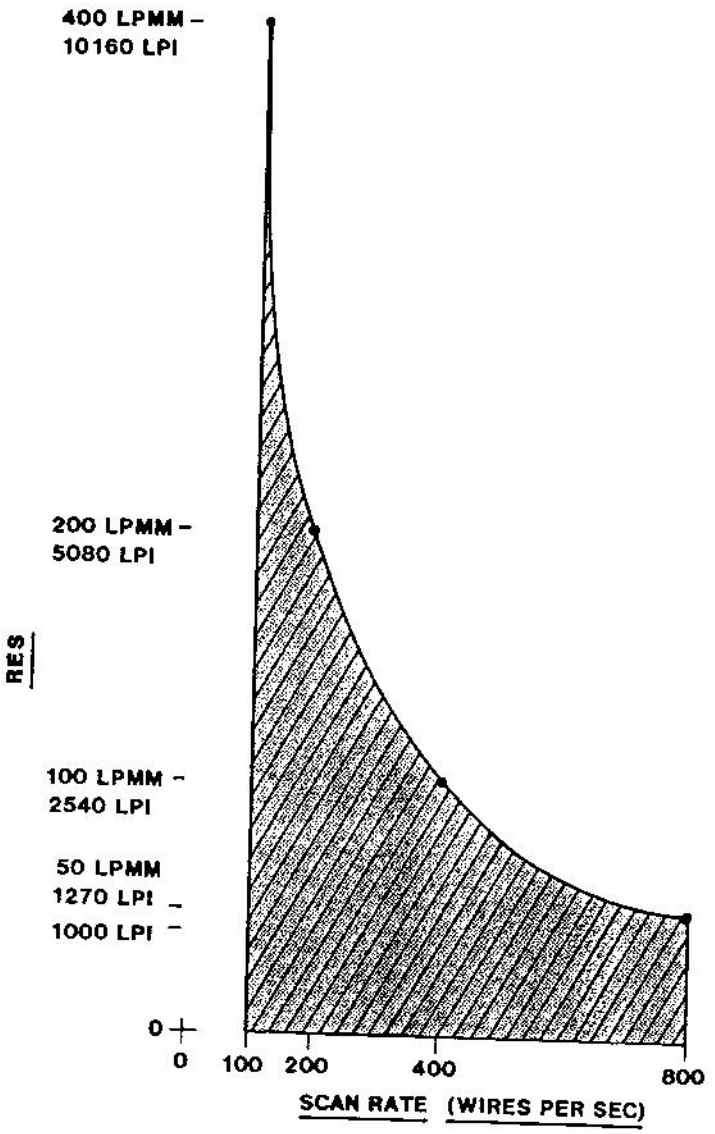

Figure D-46: Data rate graph

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Appendix E
Options and Accessories

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

Ordering Information

To order any of the items below, either contact your CalComp dealer or call 1-800-CalComp (1-800-225-2667) and ask for Order Entry.

Model number	Description
Pointing Device	
95034	4 button cursor, straight pattern
95035	4 button cursor, diamond pattern
95036	16 button cursor
95091	2 button stylus
95092	Pressure pen with side switches
95093	Pen assembly without marking tip
Accessories	
95020	Magnifier lens assembly (1.9 x magnification)
95021	High accuracy tablet option (±.002 inch)
95061	Tablet menu, standard
95070	10V/60Hz Power lift pedestal
95071	220V/50Hz Power lift pedestal
95084	LCD Display
95082	Cursor/accessory tray
50333	Operator's manual

Table E-15: Pointing devices and accessories

Model number	Description
Firmware options	
95112	SMART
Communication interface options	
95008	GPIB (field service upgrade)
Interface cable options	
95041-02	RS 232 single port, 12' female
95041-03	RS 232 single port, 12' male
95043-01	GPIB cable
61320-1	25(m) to 9 (fm) pin adaptor
Tablet active area	
95360	24" x 36" surface 610mm x 914mm
95480	36" x 48" surface 914mm x 1219mm
95600	48" x 60" surface 1219mm x 1524mm

Table E-16: Tablets and options

Marking cartridges are available with blue or red innk.

50' RS 232 cables are available upon request.

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endix F
ubleshooting and Maintenance

This appendix covers how to clean the digitizer's surface, how to replace the pen's ink cartridge 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 U.S.A., Canada, or Europe.

Cleaning the surface

The 9500 tablet surface is sealed with a lexan polycarbonate film. Use only the cleaning materials listed below to clean the tablet surface:

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

Caution:
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

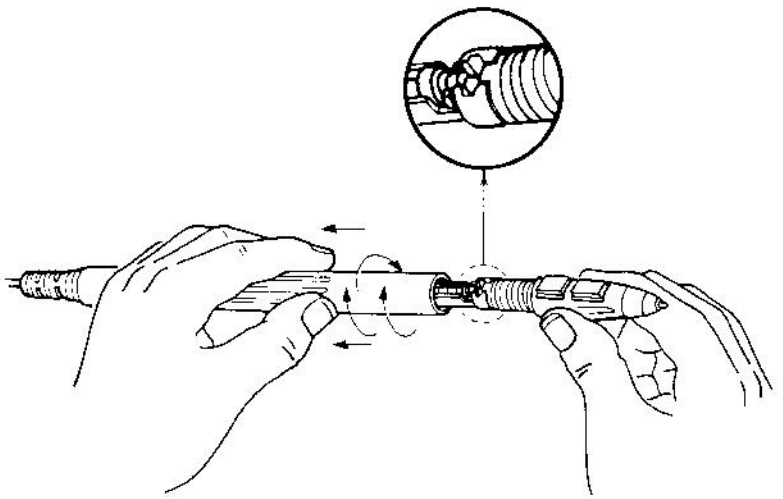

Figure F-47: Replacing the ink cartridge

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.

Accessing tablet electronics

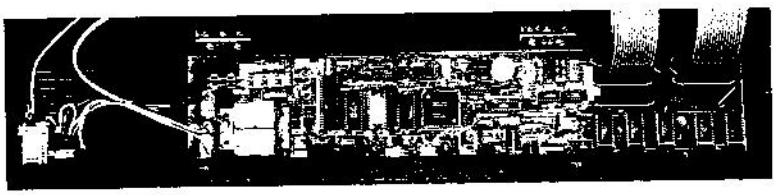

Figure F-48: Accessing tablet electronics

The flipdown electronics tray is mounted on the back of the digitizer. To expose the electronics board, remove one screw from each side of the tray. As you unfasten the screws, support the tray with one hand.

Warning:
Unplug the digitizer before accessing the tablet's electronics.

Installing integrated circuits (IC's)

Caution:
If you install the IC backwards, it may be damaged when you power up. If you break the legs, the IC is not repairable.

Removing the old IC

Insert a small flat blade screwdriver under one end of the IC to be removed. Make sure you are between the IC and its socket, not under the socket. Pry that end up a little bit, then insert the screwdriver under the other end and pry gently. Repeat this several times until the IC is free of the socket.

Notice in which direction the notch on the old IC is oriented. The new IC must be installed in the same position.

Inserting the new IC

Align all the legs on one side with the holes in the socket and insert them partially. The legs on the other side may need to be pressed inward to fit into the socket. If so, press them into alignment and partially insert them.

Check now to be sure none of the legs are bent under the IC or outside the socket. If a leg is bent, remove the IC from the socket and carefully straighten the leg.

If all the legs are correctly aligned in the socket, place your thumbs on the IC and press it firmly into the socket. Apply the pressure equally on both ends of the IC.

Reinstall the board train and test your new features.

Install the new IC in exactly the same direction as the old one. The notches must be facing the same way.

Troubleshooting

First, consult the index to find references to common problems or questions. Second, check the following conditions before calling CalComp's Technical Assistance Line.

If the 9500 has never worked with the software, check the soft switch settings and reinstall the software. The BASIC program in Appendix B may help with problem installations.

Problem: host not receiving data

1. Is the tablet power cord plugged into the tablet and a live socket?

2. Is the tablet power switch on?

   - Do you hear five short, high tones when the tablet powers on? If not, one or more of the self tests has failed. Contact Field Service.

     First tone low = RAM error.
     Second tone low = ROM error.
     Third tone low = NVRAM error.
     Fourth tone low = Grid error.

3. If the tablet power light isn't on, check the power supply fuses. See page 2-21.

4. Check all the cable connections.

- Are the connections tight?
- Is each cable in the correct port of the tablet and host?
- Do the connector cables have bent pins, cut insulation, or loose wires?

5. Is the tablet disabled by a command?

6. Is the host turned on and ready to receive data?

7. Check the technical information in the software user's manual.

   - Is the software installed correctly?
   - Are the operating parameters set for the values the software expects?

8. If the tablet uses a GPIB interface, did you power on the tablet before loading the software?

9. Is the cursor in the active area?

Problem: data transmits, but is garbled or intermittent.

1. Check the soft switch settings.

   - Are the operating parameters set for values the host expects?

2. Are the connector cables loose?

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 or use CalComp's FAX number: 602-948-5508. Our Technical Support Specialists are better able to help you if you are at your computer when you call for assistance. 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 of 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.

CalComp's bulletin board

CalComp's bulletin board covers helpful hints, technical notes and new product information. You can access the bulletin board with your modem by calling 714-821-2359.

Contacting Field Service

To contact Field Service, call 1-800-451-7568. the dispatcher arranges service calls.

In Europe refer to your local CalComp office or dealer.

Banner messages

At power up the 9500 displays a Banner Message on the LCD display and Port B. This message gives the digitizer model number, firmware identification, and the results of the built-in diagnostic checks.

Diagnostics

If the tablet displays a banner message with an error condition, write down the exact sequence of characters and call CalComp service. There are four possible error messages: RAM ERROR, ROM ERROR, NVRAM ERROR, and GRID ERROR.

Five, short, high tones indicate that all self tests are successfully completed.

Returning a tablet for repair

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

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 digitizer tablet.

2. It is recommended, due to the highly static-charged packing materials, that the cursor or any extra electronics boards be shipped 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 crate.

4. Reclose the tablet crate.

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
   - Maintenance contract number under which the unit was purchased
   - Return authorization number, if applicable

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 9500 specifications listed on page D-3.

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Appendix G
Glossary

This appendix contains the glossary.

Accuracy: The similarity of a distance measured by the digitizer with the actual distance. When we specify that the accuracy of a digitizer is ±.005 inch we mean that every point in the active area is within .005 inch 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 H 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. It can either be a 1 or a Ø.

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 selcting specific points on the tablet surface.

Data bits: The number of data bits, 7 or 8, is the number of bits per transmission that is data.

Dataqueue: 16K of temporary storage for digitized data. Data points are stored on a first in, first out basis for host computer use.

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

Echo: Incoming characters are sent back to the sender.

EMI/RFI Radiation: Electromagnetic energy given off by electronic equipment which may interfere with other equipment, especially signal receivers such as televisions and radios. Such energy may be radiated through the air or conducted along power lines.

Field width: The number of characters allotted to or required by a number value for output. For example, the number 1234 has a field width of four characters; adding the decimal point to make the number12.34 brings the field width to five.

Fixed-point: The format used for representing whole numbers and fractional numbers within a limited range of values. In this format, the decimal point occupies a predetermined position, with numeric digits occurring to the left and right of the point according to the value of the number.

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

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

Host: The user's computer which takes data from the digitizer for its own use. May also send commands to the digitizer.

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.

Integer: The format used for representing whole numbers. This format uses no decimal point. The numbers 2, 32, and 1006 are examples of whole number integers.

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

LCD: Abbreviation for Liquid Crystal Display.

LED: Abbreviation for Light Emitted Diode. The green light in the lower left corner indicates power and proximity.

Line mode: The digitizer transmits 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 separtate, 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 the transmission of ASCII characters, commands, and special messages. Digitizing over a block transmits that block's unique character or message.

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

NVRAM: Non Volatile Random Access Memory

Origin: The point at the lower, left corner of 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 9500 for outputting data. The user may select from one of twenty-six ASCII and binary formats, or use the optional Universal Formatter to customize one.

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 9500 system, e.g., baud rate, parity, etc.. These 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 digitizer 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.

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.

SMART: Allows accurate and high-speed performance of complex calculations, such as area, line length, volume, etc. Functions and/or calculations may be combined, e.g., axis rotation, scale factor(s), and origin translation, depending on the desired operating conditions.

Stop Bits: The number of stop bits, 1 or 2, transmitted with each data byte. They indicate that the transmission is finished.

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.

Universal Formatter: Allows the user to customize ASCII and binary formats.

Window: A user-definable area on the tablet surface. Only points digitized inside the window are reported by the digitizer.

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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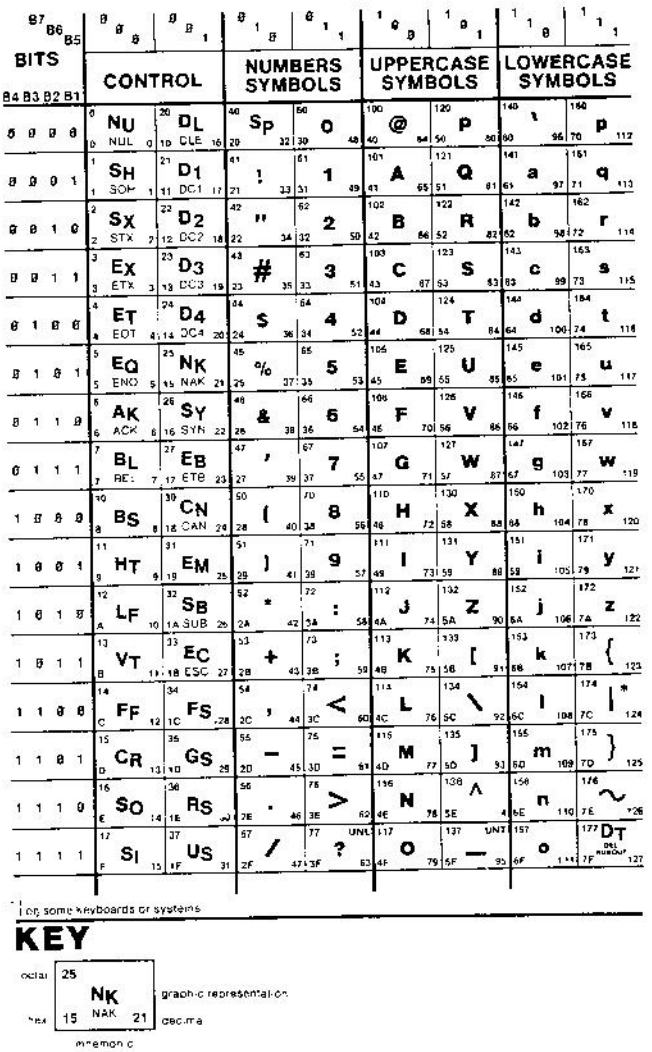
Appendix H
ASCII Chart



B7 B6 B5 / BITS B4 B3 B2 B1	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
	CONTROL		NUMBERS SYMBOLS		UPPERCASE SYMBOLS		LOWERCASE SYMBOLS	
0 0 0 0	0 NU NUL 0	20 DL DLE 16	40 SP 32	60 0 48	100 @ 64	120 P 80	140 ` 96	160 p 112
0 0 0 1	1 SH SOH 1	21 D1 DC1 17	41 ! 33	61 1 49	101 A 65	121 Q 81	141 a 97	161 q 113
0 0 1 0	2 SX STX 7	22 D2 DC2 18	42 " 34	62 2 50	102 B 66	122 R 82	142 b 98	162 r 114
0 0 1 1	3 EX ETX 3	23 D3 DC3 19	43 # 35	63 3 51	103 C 67	123 S 83	143 c 99	163 s 115
0 1 0 0	4 ET EOT 4	24 D4 DC4 20	44 $ 36	64 4 52	104 D 68	124 T 84	144 d 100	164 t 116
0 1 0 1	5 EQ ENQ 5	25 NK NAK 21	45 % 37	65 5 53	105 E 69	125 U 85	145 e 101	165 u 117
0 1 1 0	6 AK ACK 6	26 SY SYN 22	46 & 38	66 6 54	106 F 70	126 V 86	146 f 102	166 v 118
0 1 1 1	7 BL BEL 7	27 EB ETB 23	47 ' 39	67 7 55	107 G 71	127 W 87	147 g 103	167 w 119
1 0 0 0	10 BS 8	30 CN CAN 24	50 (40	70 8 56	110 H 72	130 X 88	150 h 104	170 x 120
1 0 0 1	11 HT 9	31 EM 25	51) 41	71 9 57	111 I 73	131 Y 89	151 i 105	171 y 121
1 0 1 0	12 LF 10	32 SB SUB 26	52 * 42	72 : 58	112 J 74	132 Z 90	152 j 106	172 z 122
1 0 1 1	13 VT 11	33 EC ESC 27	53 + 43	73 ; 59	113 K 75	133 [91	153 k 107	173 { 123
1 1 0 0	14 FF 12	34 FS 28	54 , 44	74 < 60	114 L 76	134 \ 92	154 l 108	174 | 124
1 1 0 1	15 CR 13	35 GS 29	55 - 45	75 = 61	115 M 77	135] 93	155 m 109	175 } 125
1 1 1 0	16 SO 14	36 RS 30	56 . 46	76 > 62	116 N 78	136 ^ 94	156 n 110	176 ~ 126
1 1 1 1	17 SI 15	37 US 31	57 / 47	77 ? 63	117 O 79	137 _ 95	157 o 111	177 DT DEL RUBOUT 127

† For some keyboards or systems

KEY

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