
Universal Formatter Command Syntax

This chapter summarizes the Universal Formatter
Command Syntax.

{X|Y|Z|K} {I|i|F|f|E|B|B} width . displacement

Expression	Description
X	X Data
Y	Y Data
Z	Z Data
K	K Counter data
Iw.d	Integer Format
iw.d	Integer Format
Fw.d	Fixed Point Format
Ew.d	Exponential Format
Bw.d	Binary format
bw.d	Binary format

{T|M|P|C} {A|B|C|H}

Expression	Description
T	Tablet Status
M	Mode Status
P	Pen Status
C	Cursor Status

Expression	Description
A	ASCII Format
B	Binary Format
C	Complemented Binary
H	Hexadecimal Format
+xx	Add to byte
-xx	Subtract byte
^xx	OR byte
xx	Rotate right byte
<xx	Rotate left byte
~xx	Exclusive OR to byte
*xx	AND with byte
=xx{expression}	If byte equals xx then execute expression
#xx{expression}	If byte does not equal xx then execute expression
Bxx	Add bias to each binary byte
C4	Converts 4 button cursor to Button 0 = 0 Button 1 = 1 Button 2 = 3 Button 3 = 7

Expression	Description
Ctrl G (^G)	Tablet beeps
"h1h2...hn"	ASCII String outputs
'h1h2...hn'	ASCII String outputs
nHh1h2...hn	ASCII String outputs
Gn	Copy and get byte n
Jn	Move byte to location n
Ln	OR with byte n
Nxx	Single ASCII byte outputs
pn	n = 1 to 255, maximum value for pressure pen
PR	Ø = In proximity 1 = Out of proximity
QF	Quit format if conditions are met
QR	Quit repeat if conditions are met
Rn (format exp)	Repeat function n times
Sn	Modifies Fixed Point and Integer Formats for Ø/space fill and sign placement Ø = Leading spaces, default 1 = Leading zeros 2 = Plus sign 3 = Not used 4 = Plus sign, leading spaces 5 = Plus sign, leading zeros

9500 Standard Commands Summary

This chapter contains a summary of the 9500 standard commands.

Host	Menu	Cursor	Description	Page #
ESC% @ n command @ command ... CR	STORE IN MEMORY n COMMAND @ n COMMAND ... CR		Stores alternate command string that activates on power up, software reset, or upon request. Commands must be separated by an @ sign.	6-7
ESC% {A B} [Ø1] CR	ENABLE/DIS- ABLE I/O PORT [Ø1] CR	FF{A B}{Ø1 E	Disables/enables data output from port A or B.	6-9
ESC% C {A B} {n1} {h2} {n2} {n3} CR	COM {A B} {n1} {h2} {n2} {n3} CR		Sets communication parameters for RS 232 ports.	6-10
ESC% CG {n1} , {n2} [h1] CR	COM CG n1 , n2 [h1] CR		Sets communication parameters for GPIB	6-12
ESC% D [Ø1] CR	DISPLAY ON/OFF [Ø1] CR	FF D [Ø1] E	Enables, disables, toggles LCD display.	6-10
ESC% E [Ø1 Ø2 Ø3] CR	ECHO ON/OFF [Ø1 Ø2 Ø3] CR		Controls the communications ports transmissions.	6-13
ESC% F {format command string} CR	ENTER FORMAT {format command string} CR		Universal Formatter commands	6-13
ESC% G {h1} [h2...hn] CR	SET CHAR CONST {h1} [h2...hn] CR		Sets character constants.	6-13
ESC% H CR	HALT CR	FF 1 E	Sets operating mode to halt.	6-16
ESC% I R CR	INCR R CR		Sets operating mode to increment run.	6-16
ESC% I T CR	INCR T CR	FF 2 E	Sets operating mode to increment track.	6-16
ESC% I U CR	INCR U CR		Sets operating mode to increment line.	6-16
ESC% J [R M] n1 [n2] CR	SYSTEM FUNC 1 [R M] n1 , [n2] CR		Sets resolution in LPI and LPmm.m	6-17

Host	Menu	Cursor	Description	Page #
ESC% J {h} CR	SYSTEM FUNC 1 {n} CR		Sets origin. LL = lower left LR = lower right UL = upper left UR = upper right C = center	6-18
ESC% J O CR <d point>	SYSTEM FUNC 1 O CR <d point>		Sets origin at the next <d point> you pick.	6-19
ESC% J W CR <d point 1> <d point 2>	SYSTEM FUNC 1 W CR <d point 1> <d point 2>		Creates window opening. <d point 2> must be above and to the right of <d point 1>.	6-20
ESC% J w CR	SYSTEM FUNC 1 w CR		Clears current window and res- tores active area to the margins.	6-21
ESC% J B {n} CR	SYSTEM FUNC 1 B n CR		Sets buffer limit n = 0 to 127.	6-23
ESC% J S n CR			Scan rate controls the rate the tablet resolves coordinates. 100 < n <900. Maximum data rate after command is n/4.	D-4
ESC% K {n} CR	CURSOR FUNC ON/OFF n CR	FF Ø E	Enables, disables, or toggles cur- sor functions.	6-23
ESC% L {n} CR	LINE FEED ON/OFF {n} CR		Determines Line Feed control. n = Ø, 1, 2, 3, or no entry. Ø = Disables Port B 1 = Enables Port B 2 = Disables Port A 3 = Enables Port A No entry = Toggles Port B.	6-24
ESC% M h1...hn CR	MESSAGE h1...hn CR	Fh1...h99 {FIE}	Sends messages from the host to the LCD display. 32 character maximum.	6-25
ESC% N {Ø1} CR	MARGIN DATA {Ø1} CR		Enables, disables, or toggles mar- gin data.	6-27
ESC% O h1 h2 CR	DATAQUEUE h1 h2 CR		Enables DATAQUEUE. Sets start and stop transmission characters.	6-28
ESC% O CR	DATAQUEUE CR		Disables DATAQUEUE.	6-28
ESC% P CR	POINT CR	FF 3 E	Sets operating mode to point.	6-16

Host	Menu	Cursor	Description	Page #
ESC% Q {h1} {h2} CR	SET PROMPT {h1} {h2} CR		Sets prompt and resend characters, and enters prompt mode.	6-29
ESC% Q CR	SET PROMPT Q CR		Cancel prompt.	6-30
ESC% R CR	Run CR		Run mode.	6-15
ESC% S {h1} {h2} {h3} CR	SET COMD CHAR {h1} {h2} {h3} CR		Sets command prefix, 1 to 3 characters. @, BS, RUB, AND ? may not be used.	6-30
ESC% T CR	TRACK CR	FF 5 E	Sets operating mode to TRACK.	6-16
ESC% U CR	LINE CR	FF 6 E	Sets operating mode to LINE.	6-16
ESC% V {n} CR	SYSTEM FUNC 2 {n} CR		Sets cursor LED #2 and #3. 0 = LED #2 turns off 1 = LED #2 turns on 2 = LED #3 turns off 3 = LED #3 turns off.	6-31
ESC% V {4 5 8 9 : ;} CR	SYSTEM FUNC 2 {4 5 8 9 : ;} CR		Tones sound when an invalid com- mand, hardware error, or and inac- curate cursor function is received.	6-31
ESC% V E CR	SYSTEM FUNC 2 E CR		Clears the non-volatile memory.	6-32
ESC% V {h} CR <d point>	SYSTEM FUNC 2 {h} CR <d point>		Sets Large Menu. L = Locates Large Menu. M = Erases Large Menu. N = Restores Large Menu.	6-34
ESC% V K CR	SYSTEM FUNC 2 K CR		Resets the K counter.	6-35
ESC% V R CR	SYSTEM FUNC 2 R CR		Resets tablet.	6-35
ESC% V S CR	SYSTEM FUNC 2 S CR		Sends tablet size.	6-36
ESC% W n CR	DATA RATE n CR		Sets data rate; n = 0 to 100 points per second.	6-36
ESC% X n CR	SET X INC n CR	FF 8 n E	Sets X increment; n = 0 to 65,535.	6-37

Host	Menu	Cursor	Description	Page #
ESC% Y n CR	SET Y INC n CR	FF 9 n E	Sets Y increment	6-38
ESC% Z [Ø1] CR	PROX DATA ON/OFF [Ø1] CR		Sets data proximity	6-39
ESC% ^ n CR	SELECT FOR-MAT n CR		Changes operating formats, n = Ø to 31 (number of desired format).	6-39

Smart commands summary - optional

Host	Menu	Cursor	Description	Page #
ESC% ' CR	AREA ANSWER CR	A	Terminates area calculations and sends answer.	11-3
ESC% a CR	AREA CR	FFF A E	Calculation of any polygon	11-4
ESC% b eexp CR	VOLUME FACTOR EEXP CR	FFFB eexp E	Enter a volume factor.	11-5
ESC% c CR	CLEAR ALL	FFF C E	Clear all SMART functions and factors.	11-6
ESC% d CR	DISPLAY FACTORS CR		Display active SMART factors.	11-6
ESC% e CR	X/Y ON AREA/LINE CR		Transmits X,Y points during area or line length calculations.	11-7
ESC% g exp CR	GRID exp CR		Rounds off output to the nearest integer unit.	11-8
ESC% h EEXP1, EEXP2, EEXP3, EEXP4 CR <dpoint1> <dpoint2>	SCALE TRANSL EEXP1, EEXP2, EEXP3, EEXP4 CR <dpoint1> <dpoint2>		Does scaling and translation functions.	11-21
ESC% i eexp1, eexp2, eexp3, eexp4 CR <d point> <d point>	ROTA ORTHO SCALE TRANSL EEXP1, EEXP2, EEXP3, EEXP4, CR <d point> <d point> <d point> <d point>	FFF2 eexp1 C eexp2 C eexp3 C eexp4 E <d point> <d point> <d point>	Combines rotation, orthogonal correction, scaling of axes, and translation or origin.	11-8

Host	Menu	Cursor	Description	Page #
ESC% j EEXP1, EEXP2, EEXP3, EEXP4 CR <d point1> <d point2>	ROTA SCALE TRANSL EEXP1, EEXP2, EEXP3, EEXP4 CR <d point1> <d point2>		Does rotation, scaling, and translation functions.	11-19
ESC% k CR	ANSWER LINE LENGTH CR	A	Gives answer to line length calculations.	11-10
ESC% l CR	LINE LENGTH CR	FFF0E	Enables length calculations	11-11
ESC% m eexp CR	LENGTH FAC- TOR EEXP CR	FFF 1 eexp E	Enters a line length factor.	11-12
ESC% o CR <d point1> <d point2>	ORTHO CR <d point1> <d point2>	FFF 3 E <d point1> <d point2>	Orthogonal correction of data.	11-12
ESC% r CR <d point1> <d point2>	ROTATION CR <d point1> <d point2>	FFF 4 E <d point1> <d point2>	Rotate X, Y axes.	11-13
ESC% s eexp CR	SCALE eexp CR	FFF 6 eexp E	Scale both axes by the same factor.	11-13
ESC% t eexp1, eexp2, CR <d point>	TRANSL eexp1, eexp2 CR <d point>	FFF 5 eexp C eexp2 E <d point>	Translate origin.	11-15
ESC% w CR <d point1> <d point2>	WINDOW CR <d point1> <d point2>	FFF 7 E <d point1> <d point2>	Create SMART window.	11-16
ESC% ww CR	WINDOW w CR		Clear window.	11-17
Esc% x eexp CR	XSCALE eexp CR	FFF 6 eexp E	Scale X axis.	11-17
Esc% y eexp CR	YSCALE eexp CR	FFF 9 eexp E	Scale Y axis.	11-18
ESC% X eexp CR	SET X INCR eexp CR	FF 8 eexp E	Set X axis increment.	11-17
ESC% Y eexp CR	SET Y INCR eexp CR	FF 9 eexp E	Set Y axis increment.	11-18
ESC% z eexp CR	Z DATA FACTOR eexp CR	FF D eexp E	Enter Z data	11-18

16 Button Cursor Command Summary

The 4 button cursor can not be used for commands.

The 16 button cursor uses a limited subset of the tablet commands. The FF serves as the command prefix.

To disable the cursor commands, either issue the command or use the menu and turn off the cursor.

Standard commands

Cursor Code	Command Description
FF 0 E	Disable Cursor Commands

Set operating mode

FF 1 E	Halt
FF 2 E	Increment Track
FF 3 E	Point
FF 4 E	Run
FF 5 E	Track
FF 6 E	Line

Set data rate

FF 7 n E	n may be from 1 to 100 points per second
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Increment value

FF 8 n E	Set X increment value
FF 9 n E	Set Y increment value

Set output ports

FF A [Ø 1] E	Enable/disable or toggle Port A
FF B [Ø 1] E	Enable/disable or toggle Port B
FF D [Ø 1] E	Enable/disable or toggle Display
FF E [Ø 1] E	Enable/disable or toggle Echo

Smart commands-optional

A	Give Answer to Area or Line Length, (depending on which is active)
FFF A E	Enable Area calculations
FFF B eexp E	Enter a Volume factor
FFF C E	Clear all SMART functions and factors
FFF Ø E	Enable Line Length calculations
FFF 1 eexp E	Enter Line Length factor
FFF 2 eexp1 C eexp2 C eexp3 C eexp4 E	Combined command for Rotate, Ortho, Scaling and Translation
<dpoint1> <dpoint2> <dpoint3>	
FFF 3	Orthogonal correction of data
<dpoint 1> <dpoint 2>	
FFF 4 E	Rotate X, Y Axis

<dpoint 1>	
<dpoint 2>	
FFF 5 eexp1 C eexp2 E	Translate Origin
<dpoint 1>	
FFF 6 eexp E	Scale Both Axes
FFF 7 E	SMART Window
<dpoint1>	
<dpoint2>	
FFF 8 eexp E	Enter X Axis Scale
FFF 9 eexp E	Enter Y Axis Scale
FFF D eexp E	Enter Z Data Factor

Message from the cursor to the host

Key	Character	Description
0-9	0-9	Numbers
A	-	Minus Sign
B	Rubout	Delete
C	,	Comma
D	.	Period or decimal point
E	CR	Ends message
F	,	Ends message

t

This chapter explains the Smart option.

Overview

The Smart option is a preprocessor which calculates area, line length, and volume before transmitting the answers to the host, thus saving calculation time in the host. Smart will also rotate the tablet axes, correct for non-orthogonal drawings, change scaling in either or both axes, and translate the origin of a drawing. These functions may be combined. Smart processing can reduce data rate, due to the complexity of the calculations involved.

A menu is included with the Smart firmware. The top two rows of menu blocks on the large menu are the Smart function blocks.

The Smart option outputs its calculated answers in exponential format when it is active. If the Smart option is installed the tablet outputs data in Integer of Fixed point formats. Tablets with the Smart option installed do not produce binary output at any time.

All numbers, such as factors or coordinates, entered for the Smart operations must follow the exponential format: [+/-] [n] [.n] [E [+/-] n].

The following are all valid ways to input the number 32,500: +.325E +05 or 3.25E4 or 3.25E + 04 or 32500. If you do not enter a decimal point, the default is a trailing decimal. If you do not enter an exponent, the default is one.

Exponential input is always designated by eexp. Enter eexp from the cursor by entering the number without an exponent, because E ends the cursor command string.

Length, area, and volume calculations

The SMART option calculates line lengths, area, and volume. The 9500 Digitizer does the calculations before outputting the answers to the host, thus saving calculation time in the host. Functions and/or calculations may be combined. Any user defined format includes a Mode Status Character, which acts as a flag for answers.

Example:

Dummy data coordinates	11.208, 1.598, AAU
Answer	.23071440E + 03, = AREA

A dummy data point is sent first with its Mode Status Character changed to the letter A, for Answer, (the second A in AAU). This lets the host know that an answer follows. The answer outputs in exponential format as shown, labelled AREA or LINE LENGTH. The software distinguishes between line, area, and volume answers.

Area answer

Host: ESC% ' CR

Description

This command terminates area calculations, the command is the ascii code 96 or 60 hexadecimal, it appears on your keyboard as an accent grave like the mark over the è in grave or as a reversed single quote '.

Menu: AREA ANSWER CR

Description

This command terminates area calculations and sends answer.

Cursor: A

Description

Press the A button at the last point in the polygon. This generates an answer for the area and line length, and allows further calculations. The area is output in square data units. The units depend on the scaling factors currently in use.

Area

Host: ESC% a CR

Menu: AREA CR

Cursor: FFF A E

Description

Calculation of any polygon.

Parameters

1. Select mode (point, track, or line) <CR>.
2. Enter the AREA command from the host, cursor, or menu. <CR>
3. Trace area (clockwise).

Moving in a counterclockwise direction will produce a negative area, or the negative area will be subtracted.

Lines must not be crossed on a polygon. For example, to obtain the area of a figure eight, first trace one side, meeting the center. Then trace the other side, meeting the center again without crossing lines.

Area factor/volume

Host: ESC% b eexp CR

Menu: VOLUME FACTOR EEXP CR

Cursor: FFFB eexp E

Description

*Example: To set volume factor 3.14, enter:
ESC% b 3.14 CR*

All area calculation results are multiplied by this factor before being output. The factor calculates a cylindrical or cubic volume, not a pyramidal or irregular volume.

Clear all factors

Host: ESC% c CR
Menu: CLEAR ALL CR
Cursor: FFF C E

Description

All SMART calculation factors previously entered are cleared. Return to power-on state.

Display all factors

Host: ESC% d CR
Menu: DISPLAY FACTORS CR
Cursor: None

Description

Displays all factors currently in effect.

Parameters

The factors are displayed as an exponential number, followed by a label.

Default settings

+ .0000000E-20, = X INC FACTOR

+ .0000000E-20, = Y INC FACTOR

+ .0000000E-20, = ROTA COS

+ .0000000E-20, = ROTA SIN

+ .0000000E-20, = ORTHO COT
+ .0000000E-20, = ORTHO CSC
+ .0000000E+01, = X SCALE
+ .0000000E+01, = Y SCALE
+ .0000000E-20, = X TRANSLATION
+ .0000000E-20, = Y TRANSLATION
+ .0000000E-20, = GRID FACTOR

Send X,Y on area/line

Host: ESC% e CR
Menu: X/Y ON AREA/LINE CR
Cursor: None

Description

This command transmits X,Y points during area or line length calculations. For example, this allows the corners or a rectangle to be recorded at the same time its area is measured.

Parameters

Where: e = [Ø | 1].

Ø	Disables
1	Enables
No entry	Toggles current state

Grid snap

Host: ESC% g exp CR

Menu: GRID exp CR

Description: This command rounds off digitizer output to the nearest integer unit. Perform gridding after Rotation, Orthogonality, Scaling, or Translate corrections need to be done.

Parameters

Where: exp = Ø(disables function).

To set up a grid follow these steps:

1. Digitize the GRID menu block or enter cp g from an I/O port.
2. Enter the grid width (eexp1) from the Menu or I/O port.
3. CR.

Combining rotate, ortho, scale, and translate

Host: ESC% i eexp1, eexp2, eexp3, eexp4 CR
<dpoint1> <dpoint2> <dpoint3>

Menu: ROTA ORTHO SCALE TRANSL
EEXP1, EEXP2, EEXP3, EEXP4 CR
<dpoint1> <dpoint2> <dpoint3>

Cursor: FFF2 eexp1 C eexp2 C eexp3 C eexp4 E
<dpoint1> <dpoint2> <dpoint3>

Description

This command does rotation, orthogonality, correction, scaling, and translation functions all at once. This process redefines the digitizer's coordinate system. All successive points digitized will be identified in relation to the new origin and scale.

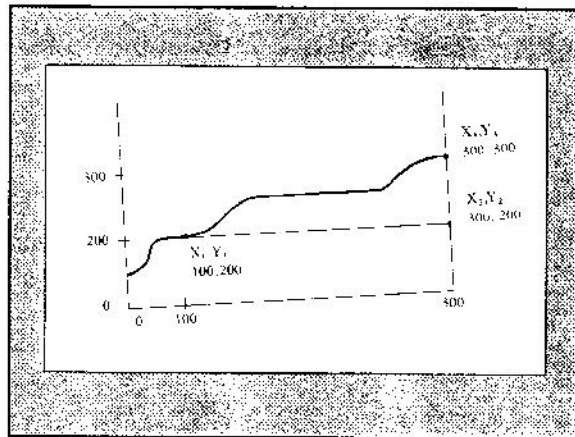


Figure 11-41: Combined transformations

Parameters

1. Digitize the ROTA ORTHO SCALE TRANSL menu block, or enter ESC% i, or enter FFF2 on the cursor. See example: Figure 11-39.
2. Enter the first X,Y, coordinates. Enter: 100, 200. The new origin is calculated from this point. It is also one of the two points used for the X axis transformations.
3. Enter the coordinates of the second point located at X,Y. Enter: 300, 300. This establishes the new X axis and X scaling factor and is the first point of the Y axis transformations.

The Y axis and Y scaling are calculated from points Y1 and Y2.

4. Enter CR, or E to end the command if you are using a cursor.
5. Digitize the first point, X1,Y1 on the tablet's surface.
6. Digitize the second point, X2,Y2.
7. Digitize the third point, X3,Y3.

The points to be digitized must meet the following criteria:

- *X1,Y1 must be closer to the tablet's default origin than X2,Y2.*
- *X1 cannot equal X2, Y2 cannot equal Y3.*
- *X1,Y1 and X2,Y1 must be on the desired X axis.*
- *X2,Y1 must be perpendicular to X2,Y2.*

The CLEAR ALL command cancels this command.

Send line length

Host: ESC% k CR

Menu: ANSWER LINE LENGTH CR

Cursor: A

Description

This command outputs the answer to the most recent line length calculation.

Parameters

The line length outputs in the current data units.

When you press the A button at the last point of the line being measured, this generates an answer for the line length and allows further line length calculation to be made.

Line length

Host: ESC% 1 CR

Menu: LINE LENGTH CR

Cursor: FFF0E

Description

The LINE LENGTH function measures the distance between two or more points.

Parameters:

1. Digitize the LINE LENGTH block and the CR block, or enter ESC% 1 CR, or enter FFF0E on the cursor.
2. Select mode (point, track, or line).
3. Digitize the end points of a straight line, the point of each turn along an angled line, or trace a curved line.

To place the coordinate data information on the screen, digitize X,Y ON AREA/LINE menu block.

Set length factor

Host: ESC% m eexp CR

Menu: LENGTH FACTOR EEXP CR

Cursor: FFF 1 eexp E

Description

This command multiplies the line length calculation before it is output.

Parameters

The line length is multiplied by the factor before it transmits to the host.

Orthogonality correction

Host: ESC% o cr <dpoint 1> <dpoint 2>

Menu: ortho cr <dpoint 1> <dpoint 2>

Cursor: FFF 3 E <dpoint 1> <dpoint 2>

Parameters

1. Digitize ORTHO block and the CR block, or enter ESC% o CR, or enter FFF 3 E on the cursor.
2. Digitize two points parallel to the desired Y axis on the tablet's surface.
3. Cancel the orthogonal correction by entering the CLEAR ALL command.

Rotation

Host: ESC% r CR <dpoint 1> <dpoint 2>
Menu: ROTATION CR <dpoint 1> <dpoint 2>
Cursor: FFF 4 E <dpoint 1> <dpoint 2>

Description

This command enables the tablet's axes to be rotated, making exact placement of material on the tablet unnecessary. The Y axis rotates to stay perpendicular to the X axis. Rotating the axes does not effect the tablet's origin or menus.

Parameters

1. Digitize the ROTATION block and the CR block, or enter ESC% CR, or enter FFF 4 E on the cursor.
2. Digitize two points on the desired X axis line. The first <dpoint 1> must be to the left of <dpoint 2>.
3. Cancel the rotation by entering the CLEAR ALL command.

Scaling the X and Y axes

X,Y, scaling

Host: ESC% s eexp CR
Menu: SCALE eexp CR
Cursor: FFF 6 eexp E

Description

Scaling multiplies or divides the digitizer output by a factor. The X and Y axes may be scaled simultaneously or separately.

Parameters

1. From the host, menu, or cursor enter the command for scaling an axis.
2. Enter the scale factor desired.
3. Enter CR.
4. Cancel SCALING by entering the CLEAR ALL command.

X scaling

Host: ESC% x eexp CR

Menu: X SCALE eexp CR

Cursor: FFF 8 eexp E

Y scaling

Host: ESC% y eexp CR

Menu: Y SCALE eexp CR

Cursor: FFF 9 eexp E

Example: To make a physical 10 inch line digitize as 20 inches long, enter:

1. Digitize the X SCALE menu block or enter ESC% x, or FFF 8 on the cursor.

2. For a scale of 2:1 enter 2.
3. Enter CR or E.

Translate

Host: ESC% t eexp1, eexp2 CR <dpoint>
Menu: TRANSL eexp1, eexp2 CR <dpoint>
Cursor: FFF5 eexp1 C eexp2 E <dpoint>

Description

This command moves the tablet origin to some other point. Translate is used when there is a known point on the drawing being digitized, and due to the size of the tablet or the drawing the drawing's origin does not coincide with the tablet's origin. Unlike the RELOCATE ORIGIN COMMAND, it is not necessary for the origin to fall on the tablet surface. Drawings larger than the tablet may be digitized in sections.

Parameters

To relocate the tablet origin:

1. Digitize the TRANSLATE block, or enter ESC% t, or enter FFF5 on the 16 button cursor.
2. Enter the coordinates of a known point. Enter the X coordinate (eexp1) first, then the Y (eexp2), then CR.
3. Digitize that point, <dpoint 1>, on the drawing. The origin relocates relative to the point selected. If a scale factor has been entered, the origin relocates with respect to that scale.

Example: A known point on your drawing is at 10.5, 32.7. Enter 10.5 as eexp1 and 32.7 as eexp2 then digitize the known point. The origin shifts to a point -10.5, -32.7 from the point you digitizes, whether or not the new origin is on the tablet surface.

Window

Host: ESC% w CR <dpoint 1> <dpoint 2>
Menu: WINDOW CR <dpoint 1> <dpoint2>
Cursor: FFF7 E <dpoint1> <dpoint2>

Description

This command decreases the size of the active area by putting a window on the tablet's surface.

Parameters

Data points are sent only when the cursor is in the window. Using the WINDOW feature will not deactivate the CalComp menu even if it falls outside the active window. User menus may be affected.

To set up WINDOWING, enter:

1. Digitize the WINDOW block and the CR block on the menu, or enter ESC% w CR, or enter FFF 7 E on the 16 button cursor.
2. Digitize the lower left corner of the desired window.
3. Digitize the upper right corner of the desired window.

There are two possible windows with a SMART 9500.

To cancel the WINDOW by entering ESC% ww CR.

The SMART window will rotate and scale with any subsequent rotation and scaling commands. The standard function window is defined relative to the tablet surface and will not scale or rotate.

et increment value

X Axis

Host: ESC% X eexp CR

Menu: SET X INCR eexp CR

Cursor: FF 8 eexp E

Description

This command sets the minimum number of lines of resolution that must be crossed to cause the tablet to output a new data point.

Parameters

The SMART tablet multiplies the number of resolution lines crossed by the scaling factors in use before it calculates whether the increment requirement has been satisfied. The value entered for eexp must, therefore take both the current resolution and scaling factors into account.

It is easiest to adjust scaling and resolution so that the tablet output is in units that correspond to the measurements of the material being digitized. Then the increment distance corresponds to the units of measure.

Y Axis

Host: ESC% Y eexp CR
Menu: SET Y INCR eexp CR
Cursor: FF 9 eexp E

Example: Assume you are digitizing an aerial survey photograph with scaling or 1:10,000 and you want the tablet to output a data point every time the cursor has moved the equivalent of 50 units of measure on the ground that was photographed. Enter:

1. Set the resolution to 1000 LPI.
2. Enter scaling factors of 10 for each axis. This gives output in units. Now a move of one unit along either axis on the photograph produces 10,000 data points (1000 LPI X 10 scaling factor). The output now has a 1:1 correspondence to the survey's units of measure.
3. Enter a value of 50 for eexp in the SET INCREMENT command. The tablet will output one data point every time the cursor moves a distance on the photograph which is the equivalent of 50 units on the ground.

Z data factor

Host: ESC% z eexp CR
Menu: Z DATA FACTOR eexp CR
Cursor: FF D eexp E

Description

This command enters Z values (height) for the host's calculations.

Parameters

The tablet doesn't use the Z DATA FACTORS in its internal calculations. It transmits the Z DATA FACTOR to the host. The format must be a user defined one that includes z as one of the defined data types.

Combining rotate, scale, and translate

Host: ESC% j eexp1, eexp2, eexp3, eexp4 CR
<dpoint1> <dpoint2>

Menu: ROTA SCALE TRANSL
EEXP1, EEXP2, EEXP3, EEXP4 CR
<dpoint1> <dpoint2>

Description

*The X and Y scale
should be equal.*

This command does rotation, scaling, and translation functions all at once. This process redefines the digitizer's coordinate system. All successive points digitized will be identified in relation to the new origin and scale.

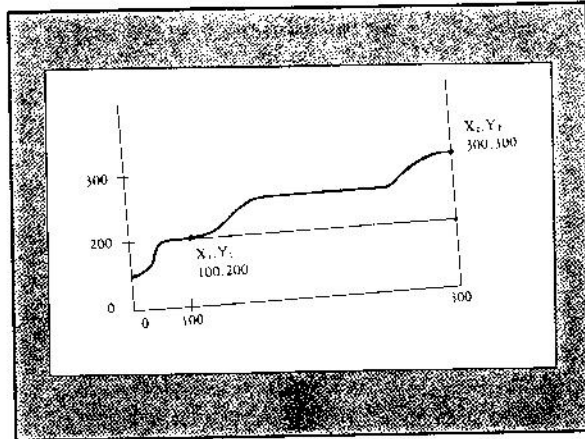


Figure 11-42: Combined transformations

Parameters

1. Digitize the ROTA SCALE TRANSL menu block, or enter ESC% j. See example: Figure 11-40.
2. Enter the first X,Y, coordinates. Enter X = 100, Y = 200. The new origin is calculated from this point. It is also one of the two points used for the X axis transformations.
3. Enter the coordinates of the second point located at X,Y. Enter X = 300 and Y = 300. This establishes the new X axis and X,Y scaling factor.
4. Enter CR to end the command.
5. Digitize the first point, X1,Y1 on the tablet's surface.
6. Digitize the second point, X2,Y2.

The points to be digitized must meet the following

criteria:

- X1,Y1 must be closer to the tablet's default origin than X2,Y2.
- X1 cannot equal X2, Y1 cannot equal Y2.

The CLEAR ALL command cancels this command.

Combining scale and translate

Host: ESC% h eexp1, eexp2, eexp3, eexp4 CR
<dpoint1> <dpoint2>

Menu: SCALE TRANSL
EEXP1, EEXP2, EEXP3, EEXP4 CR
<dpoint1> <dpoint2>

Description

*You may want to do
ROTATION first.*

This command does scaling and translation functions all at once. This process redefines the digitizer's coordinate system. All successive points digitized will be identified in relation to the new origin and scale.

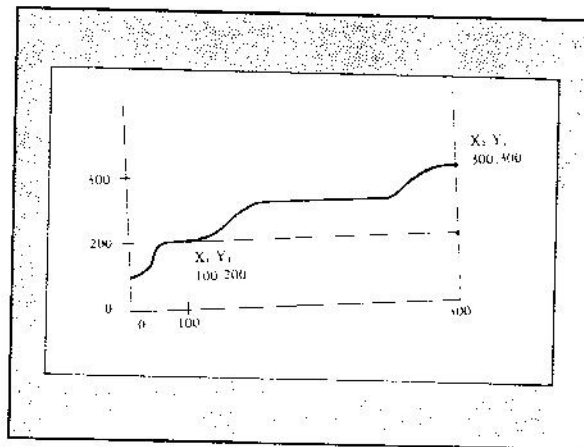


Figure 11-43: Combined transformations

Parameters

1. Digitize the SCALE TRANSL menu block, or enter ESC% h. See example: Figure 11-41.
2. Enter the first X,Y, coordinates. Enter X = 100, Y = 200. The new origin is calculated from this point.
3. Enter the coordinates of the second point located at X,Y. Enter X = 300 and Y = 300. This establishes X,Y scaling factors.
4. Enter CR to end the command.
5. Digitize the first point; X1,Y1 on the tablet's surface.
6. Digitize the second point; X2,Y2.

The points to be digitized must meet the following criteria:

- X1 cannot equal X2, Y1 cannot equal Y2.

The CLEAR ALL command cancels this command.

Smart and binary formats

The switch setting for 1000 LPI, 100 LPmm, and 10 LPmm have their offsets set to 3, 2, 1 respectively.

The Smart firmware will only output the integer portion of the number when using binary formats. For example, you are at 1.024 inches in X and the resolution is 1000 LPI (ESC% JR1000,3); the binary output would be 1 (0001H). If you wanted 1000 LPI in counts (ESC% JR1000,0) the binary output would be 1024 (0400H).

The Pressure/Side-switch Pen

This chapter covers how to use and calibrate the pressure/side-switch pen.



Figure 12-44: Pressure side-switch pen

This pen can be used as a pressure pen, as a side-switch pen, or as both. The CalComp pressure format, (Format #2), is the only format that is able to transmit the information from switches and pressure simultaneously. You can use the Universal Formatter to create your data output format.

Using the pen

1. Plug in the pen to either Transducer/DisplayPort A or Transducer/DisplayPort B.
2. Digitize the SET UP block. The tablet LED should begin blinking.
3. In Area 4's soft switch menu block, use a different transducer button to set PPEN A or PPEN B. The digitizer must be told which port the pen is in so it can process the data.
4. Use the SET PRES menu block to set the pen's pressure. Push the lower side button to set the minimum pressure. Push the upper side button to set the maximum pressure.



Figure 12-45: Set Pressure Menu Block

5. Digitize the SET UP block again.

Calibrating the pressure

The pressure sensitivity must be adjusted to give the pen the feel you want. If you want a response to minimum pressure, ensure that nothing is touching the pen tip and press the lower button once. Any pressure, even touching the tip to the tablet surface, is detected.

If you want the tablet to ignore light pressure, such as the pressure of resting the pen tip on the tablet, apply the pressure you want the tablet to ignore and press the lower button. Only pressures above this threshold transmit. To set maximum pressure, press the tip against the tablet until you achieve what you consider maximum pressure and press the upper button. Any pressure above the threshold is considered maximum.

Setting maximum pressure while you apply light pressure gives you rapid changes in output with small changes in pressure. Setting the maximum while you apply heavier pressure makes the pen less sensitive and perhaps easier to control.

◆ **Caution:**

The buttons on the side of the pen can be replaced. If it is necessary to replace them, unscrew the body of the pen, not the nose/switch section.