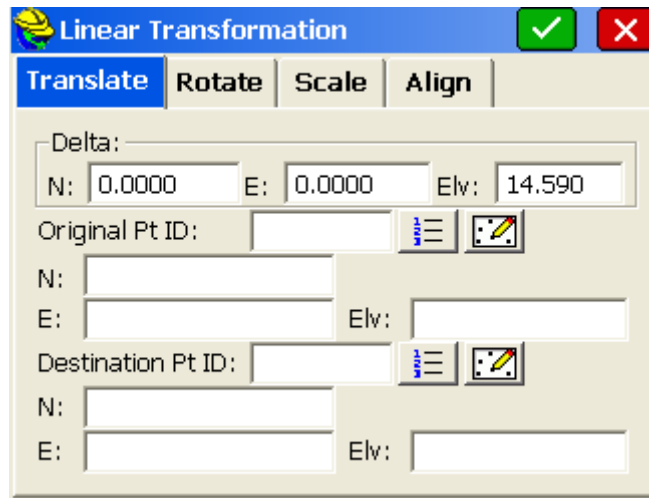


Transformation

This command allows you to translate, rotate, and/or scale points and linework in the current job. The Align option does all 3 (translate, rotate, scale) at once. Any point drawn on the map screen will be updated automatically in addition to updating the coordinates in the file.

The three transformations of Translate, Rotate and Scale can be performed individually or all at once if desired. You first fill out the options in one or more of the tabs (Translate, Rotate and Scale), and then you press Enter and obtain a second screen where you fill out the range of points to transform. Note that you can transform a range of points by elevation only by Translating the Elevation (shown below), to adjust a set of points to a new benchmark or elevation reference, in addition to moving them in the x,y plane.



The screenshot shows the 'Linear Transformation' dialog box with the 'Translate' tab selected. The 'Delta' section has input fields for N: 0.0000, E: 0.0000, and Elv: 14.590. Below this are two sections for 'Original Pt ID' and 'Destination Pt ID', each with N and E coordinate fields and an 'Elv' field. There are also small icons for point selection and list management next to the ID fields.

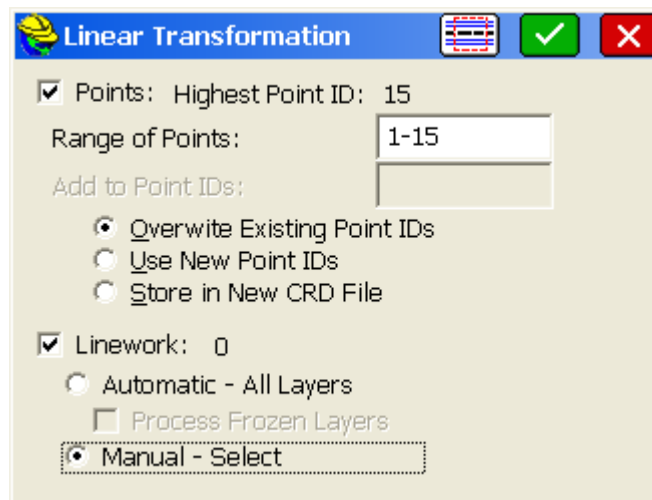
Range of Points: Enter the range of points to translate. Ranges can be entered in the following format: 1-20,32,40-45, etc..

Add to Point Numbers: Enter a number to add to existing point numbers when creating new point numbers. This option is not available when overwriting your existing point numbers.

Overwrite Existing Point Numbers: Overwrites the existing point coordinate data with the new coordinate data.

Use New Point Numbers: Uses new point numbers for the new coordinate positions while keeping the existing point numbers and coordinate data. Each time a point is to be overwritten, you will be prompted whether to overwrite or use a new point number. This method is only recommended when you are transforming very few points and wish to give each a specific point number assignment.

Store in New CRD File: This option writes the transformed points to a new CRD file while keeping the existing point numbers and coordinate data. You may also choose to input a number for Add to Point Numbers, but this is not required.



The screenshot shows the 'Linear Transformation' dialog box with the 'Range of Points' section. The 'Points' checkbox is checked, and the 'Highest Point ID' is 15. The 'Range of Points' field contains '1-15'. The 'Add to Point IDs' field is empty. There are three radio button options: 'Overwrite Existing Point IDs' (selected), 'Use New Point IDs', and 'Store in New CRD File'. The 'Linework' checkbox is checked, and the 'Linework' value is 0. There are three radio button options for linework: 'Automatic - All Layers', 'Process Frozen Layers', and 'Manual - Select' (selected).

Linework: This will transform the linework as well as the points. For example, if Translate is selected, then any selected linework would also translate to the new positions.

Automatic: Clicking on "Automatic" would transform all visible layers, and if Process Frozen Layers is clicked, the program will additionally move the frozen or not seen layers in the drawing as well.

Manual: Clicking Manual (instead of Automatic) requires that you select the line and symbol entities to transform. The



option allows you to crossing select by 2 picks any region of linework and entities for inclusion.

Translate

On the translate dialog, enter in the Delta North, Delta East, and the Delta Elevation. These values represent the change in the original coordinate values and the desired coordinate values. When complete, select the **OK** button on the dialog, or navigate to the ROTATE or SCALE Tabs for further data input.

The lower portion of the screen shows an alternate method of defining a translation by comparing an original point to a destination point. Data entered here, as point ID or directly entered northing, easting and elevation, will lead to computation and display of the delta N, delta E and delta Z in the upper portion of the screen.

When **OK** is pressed, a second screen appears which controls the range of points to be translated.

Assuming you have 55 points in your file numbered 1 through 55, you could "preserve" these 55 points by adding 100 to the point numbers, and saving the transformed points as 101 through 155. If you choose **Overwrite Existing Point IDs**, the Add to Point Numbers option is not available. If you choose **Use New Point Numbers**, then you will be prompted to enter a new point number for each existing point to be overwritten (recommended only when you are overwriting a few points). You can even store the transformed points in a completely new CRD file by selecting **Store in New CRD File**.

Raising and Lowering Elevations: Users often ask, "How do I raise or lower elevations on a range of points?" The answer is the **Translate** option in the **Transformation** routine. To adjust elevation only, enter only the delta elevation (leave Northing and Easting at 0 translation).

Rotate

The ROTATE tab is used to rotate points in a coordinate file. Enter the desired degree of rotation into the degree of rotation data field. Specify the rotation base point. This can be accomplished by either entering the point number of the desired point manually, or by selecting the point using the **List** or **Map** icon. You may also enter in coordinates for the rotation point if the point is not present in the coordinate file. Lastly, you can define the rotation by referencing two points (such as "From 1, To 2"), then specifying the desired new bearing for these points. Even the new bearing itself can be computed from two points used as a reference.

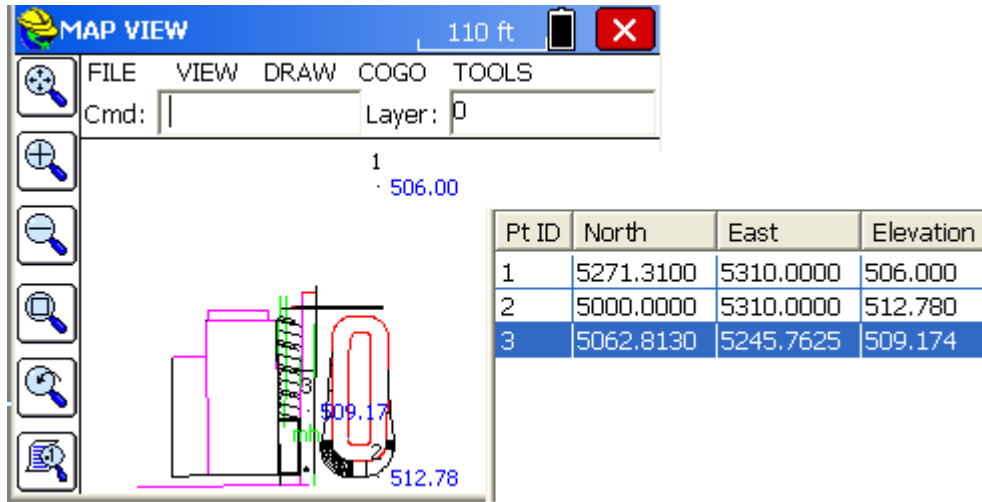
The second screen appears, which allows you to set the range of points to transform and choose how to store the newly calculated points. For all rotations, the rotation value is written into the RW5 file as dd.mmss (the current angle format).

Scale

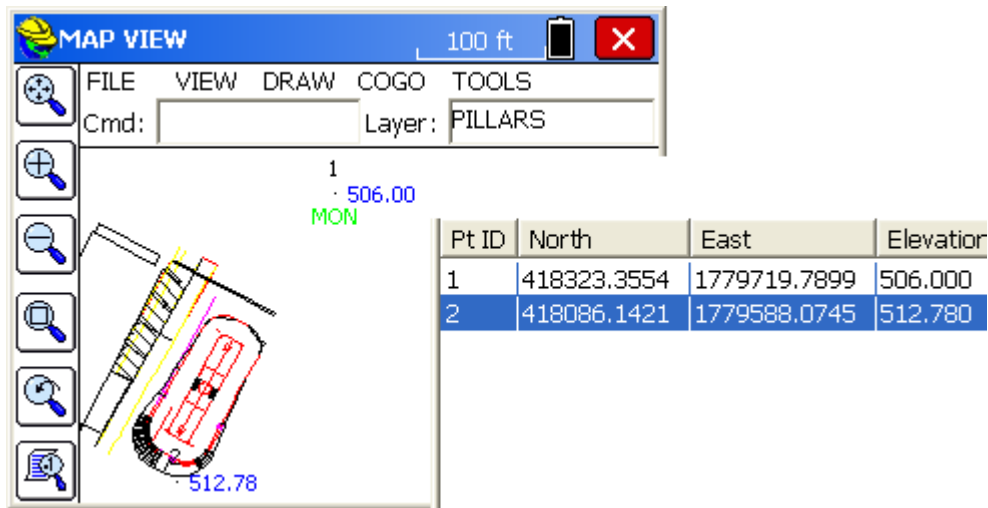
The scale tab is used to scale the points in a coordinate file. The northing, easting, and optionally, the elevation, are multiplied by the specified scale factor. Enter the desired scale factor in the scale factor field. Select the base point by entering the point number of the desired point manually, or by selecting the point using the **List** or **Map** icon. You may also enter coordinates for the scale base point if the base point for scaling is not present in the coordinate file. The coordinate of the base point will remain unchanged. All other points will scale. If the **Ignore Elevations** toggle is enabled, then only the northing and easting values are scaled. Note that you can scale your points from base coordinate 0,0,0 by entering a scale factor and answering Yes to the warning screen.

Align

The align tab accomplishes rotate, scale and translate in one operation. It also has the ability to align a site that is not georeferenced to the true grid coordinates by referencing any multi-point GPS localization file. Consider the 5000,5000 site below, where points 1 and 2 have been aligned arbitrarily due N and S.

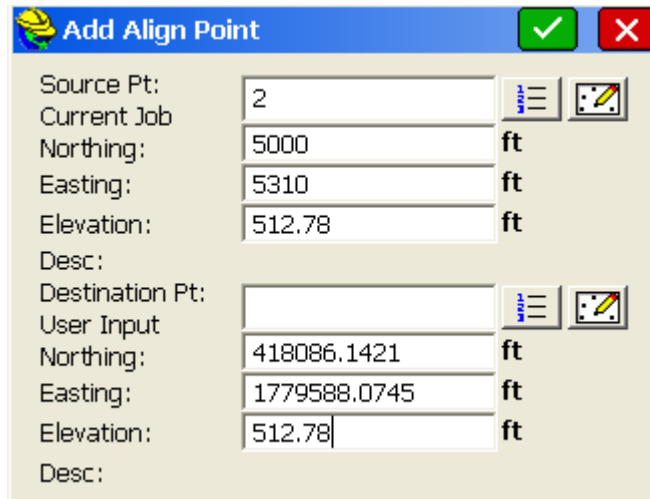


The goal might be to transform this site to state plane coordinates as shown in the end result below (additional layers are shown):



This transformation of both any point range and all selected screen entities can be accomplished using the Align tab, option "Add" (twice, once for each matching set of coordinates), filled out as shown below:

Add Align Point		✓	✗
Source Pt:	1		
Current Job			
Northing:	5271.31	ft	
Easting:	5310	ft	
Elevation:	506	ft	
Desc:			
Destination Pt:			
User Input			
Northing:	418323.3554	ft	
Easting:	1779719.7899	ft	
Elevation:	506	ft	
Desc:			



Add Align Point [OK] [Cancel]

Source Pt: 2 [List] [Edit]

Current Job: []

Northing: 5000 ft

Easting: 5310 ft

Elevation: 512.78 ft

Desc: []

Destination Pt: [] [List] [Edit]

User Input: []

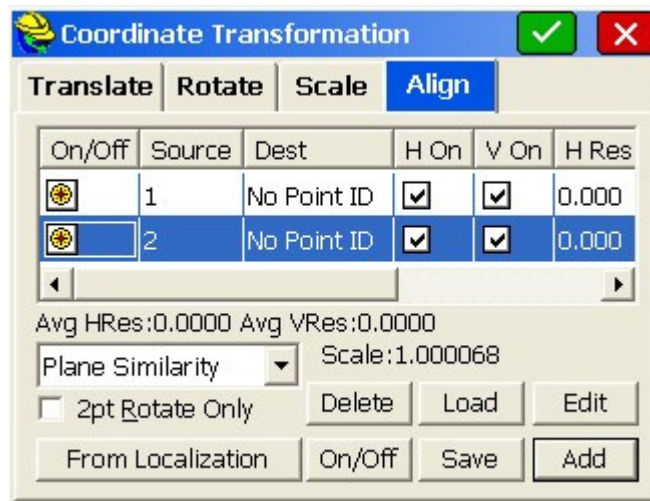
Northing: 418086.1421 ft

Easting: 1779588.0745 ft

Elevation: 512.78 ft

Desc: []

This leads to the summary dialog below. Note that if the destination coordinates are not entered in the original CRD file, they are noted as "No Point ID". Tap OK to continue.



Coordinate Transformation [OK] [Cancel]

Translate | Rotate | Scale | **Align**

On/Off	Source	Dest	H On	V On	H Res
<input checked="" type="checkbox"/>	1	No Point ID	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0.000
<input checked="" type="checkbox"/>	2	No Point ID	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0.000

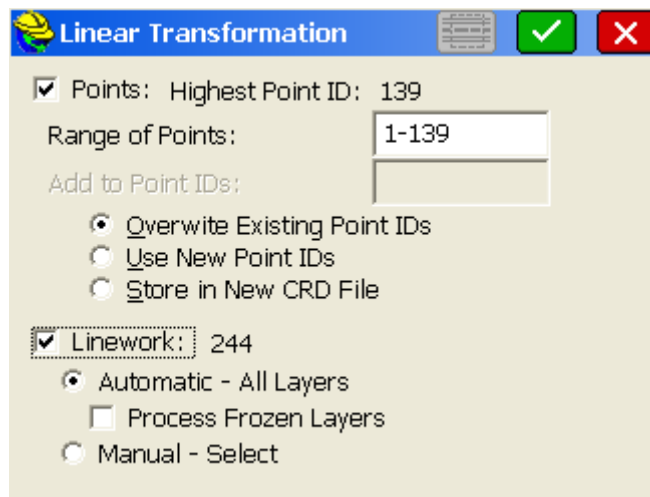
Avg HRes:0.0000 Avg VRes:0.0000

Plane Similarity [v] Scale:1.000068

2pt Rotate Only [Delete] [Load] [Edit]

[From Localization] [On/Off] [Save] [Add]

Notice that you have the option to process Linework and even layers that are frozen (not visible).



Linear Transformation [OK] [Cancel]

Points: Highest Point ID: 139

Range of Points: 1-139

Add to Point IDs: []

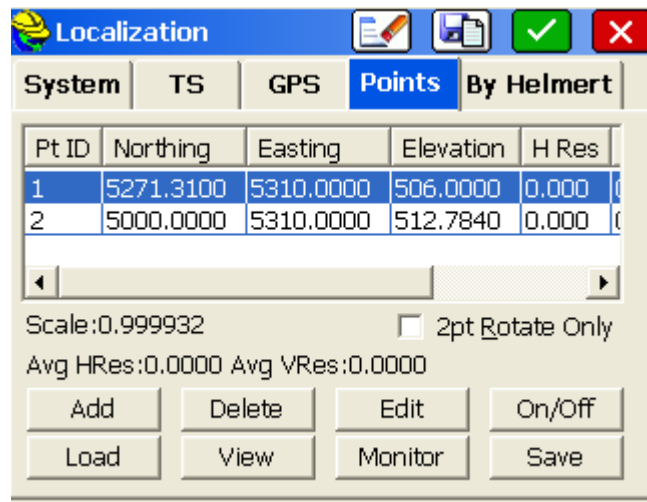
Overwrite Existing Point IDs
 Use New Point IDs
 Store in New CRD File

Linework: 244

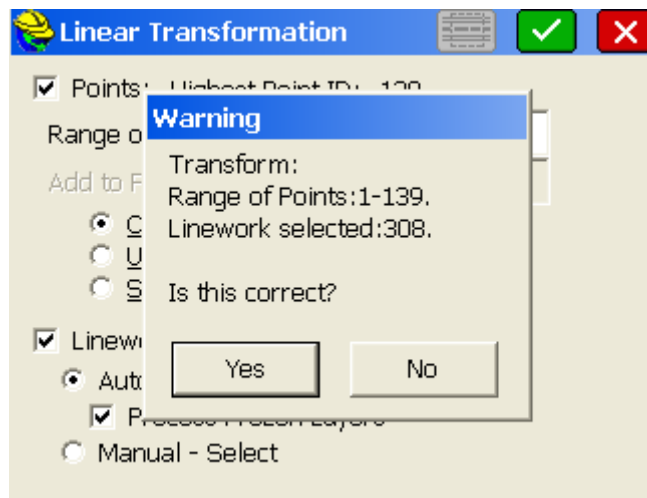
Automatic - All Layers
 Process Frozen Layers
 Manual - Select

Align "From Localization"

The same alignment above could also be accomplished "From Localization" if a 2-point localization by GNSS were conducted on original points 1 and 2. Since the localization file contains the Lat/Long "pairing" with the original N,E coordinates, then as long as the correct projection is set, the 5000,5000 region coordinates and map can be transformed to grid coordinates. First go to Equip, Localization and Load and review the correct localization file, making that file "current". Click View to see the associated Lat/Long.



Then back in Transformation, Align, select "From Localization". You should verify that the same number of matching points are found (here 2). Then confirm the various warning screens (as below) and proceed. This accomplishes the same graphical transformation shown above.



Raw Data Records

The transformation raw data records are expressed as one string per command with the values separated by spaces. These records will be recorded to the raw data file for processing purposes so that all Carlson processors will recognize the records and perform the transformation during re-processing.

- **TRANSLATE:** Range Dx Dy Dz Process_Zero_Z
- **ROTATE:** Range Angle Base_Y Base_X
- **SCALE:** Range Scale Base_Y Base_X Use_Z
- **ALIGN:** Range From1 To1 From2 To2

Example

CC,Translate,8-9 200 50 0 0

CC,Rotate,7 33.1234 79613.662 15619.725

CC,Scale,7 1.5 79613.662 15619.725

CC,Align,8-9 8 6 9 7