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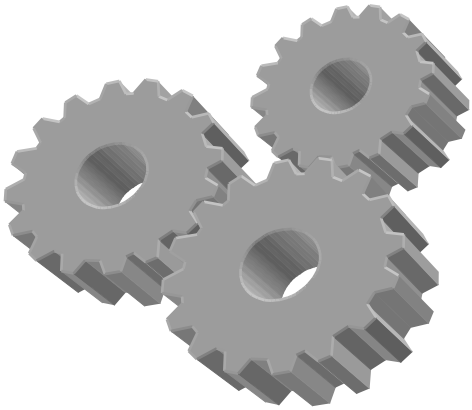


User Tip

Title	Coordinate Zone Conversion
Product	
Version	
Date	December 14, 2004
Author	Lorne G. C. Brown

Overview

This document discusses the process to convert from Latitude & Longitude to State Plane Coordinates, and from State Plane Coordinates to Local Datum Plane Coordinates.

Introduction

This document discusses the process to convert from Latitude & Longitude to State Plane Coordinates, and from State Plane Coordinates to Local Datum Plane Coordinates.

Conversion between Latitude & Longitude, and State Plane Coordinates

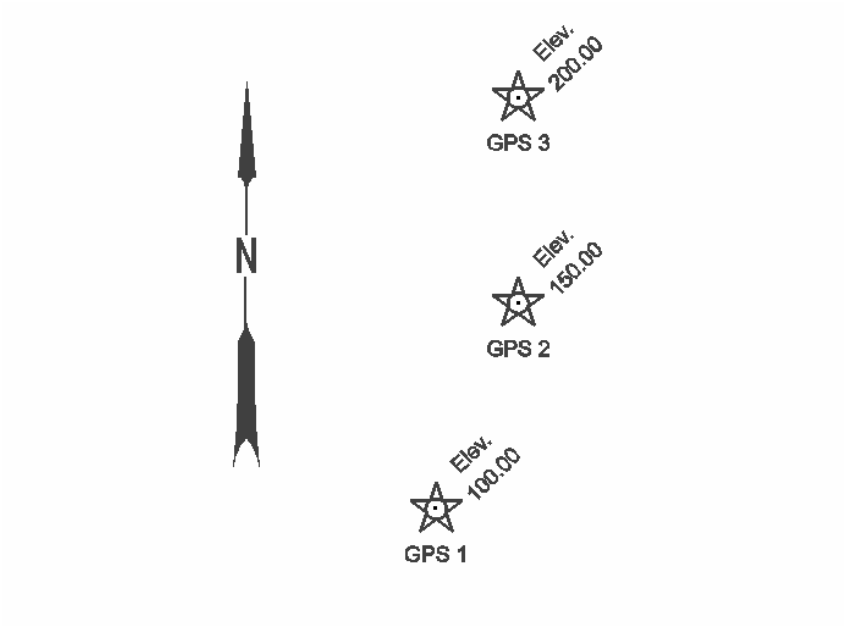
Some software applications that can be used to convert between Lat Long and State Plane Coordinates are:

- Corpscon
- CAiCE

Note: If you require any of these applications, and they are not currently installed on your computer, you should call the ODOT Computer Support Desk and request to have them installed.

Factor Computation

Two methods used to derive the factor used to convert Local Datum Plane Coordinates from Oregon State Plane Coordinates are using:



1. **the spreadsheet 'CF_Feet.xls'**

Note: The spreadsheet CF_Feet.xls is available on the Geometronics Intranet website @ http://intranet.odot.state.or.us/tsgeometronics/HQ/downloads.htm under 'English Local Datum Plane Computation Spreadsheet'.

1. Determine which OREGON STATE GRID ZONE (from the Oregon SPC Zone Map on Page 7 of 9) the project is in.
   Note: Project example shown above is from GPS 1 to GPS 3.

2. Find the approximate Northerly Latitude for the project limits from Quad Maps (or from an alternate method). It is not necessary to use the exact Northerly Latitude for the project.

3. Find the approximate Southerly Latitude for the project limits from Quad Maps (or from an alternate method). It is not necessary to use the exact Southerly Latitude for the project.

4. Mean the Latitudes from Step 2 & Step 3 to obtain an approximate Mean Latitude.

   Note: It is not necessary to interpolate an exact mean latitude but, for convenience, you

may use the nearest latitude to the mean from the Lambert conformal conic projection table. What is important is that the same Scale Factor (**k**) for that Mean Latitude is used throughout the project.

5. Using the Mean Latitude, determine Scale Factor (**k**) from Lambert Projection Table excerpt (on Page 6 of 9) or other appropriate software.

6. Average Elevation AMSL (above mean sea level) is the approximate average elevation for the project (in the example the Average Elevation is 150.00 ft).

7. Sea Level Factor will be calculated by the spreadsheet CF_Feet.xls (on Page 8 of 9), according to the formula shown.

8. Conversion Factor will be calculated by the spreadsheet CF_Feet.xls (on Page 8 of 9), according to the formula shown.

2. Corpscon

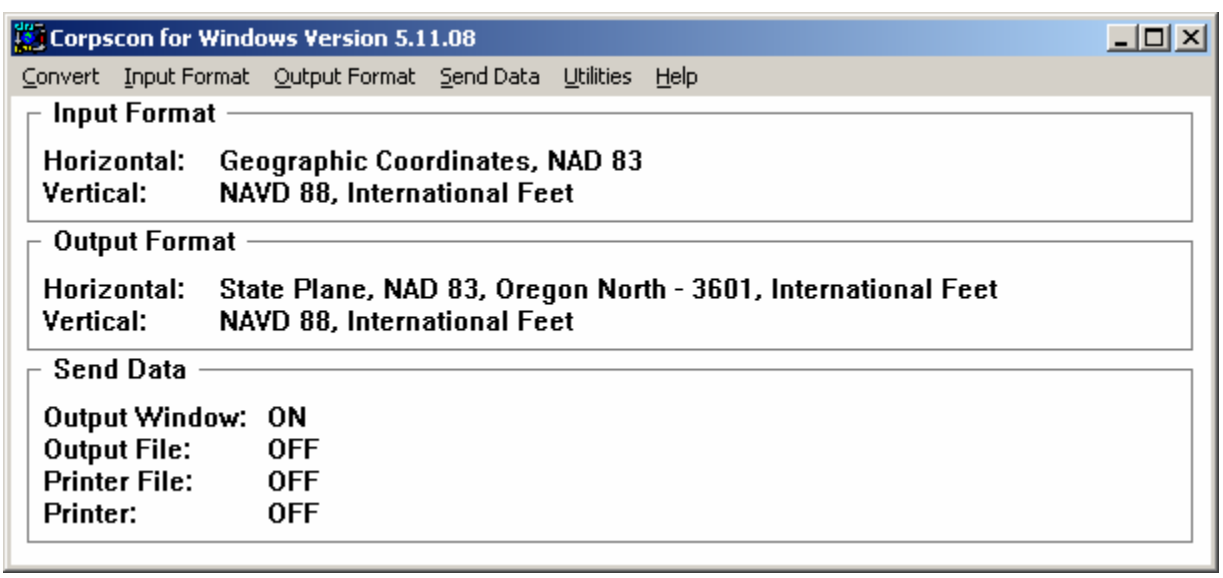
1. Open Corpscon

2. To set input format **> Input Format**

3. Select and click on input format type desired. Configure the Input dialog box as required.

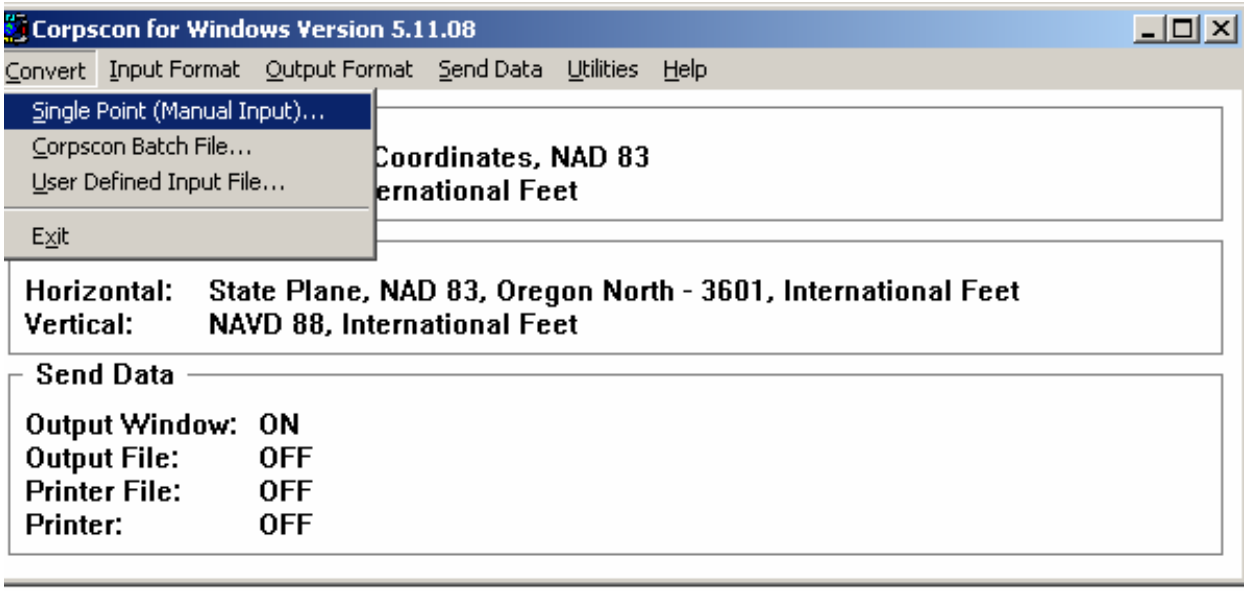
4. To set output format **> Output Format**

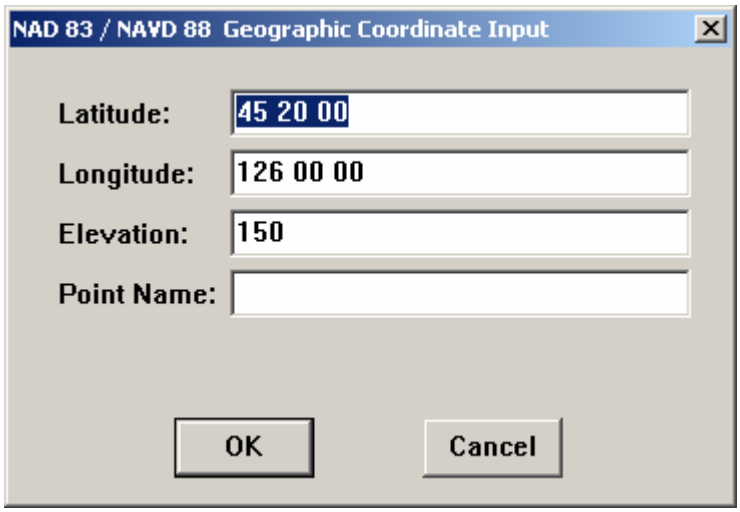
5. Select and click on output format type desired. Configure the Output dialog box as required.



6. **Convert**

7. **Single Point (Manual Input)**

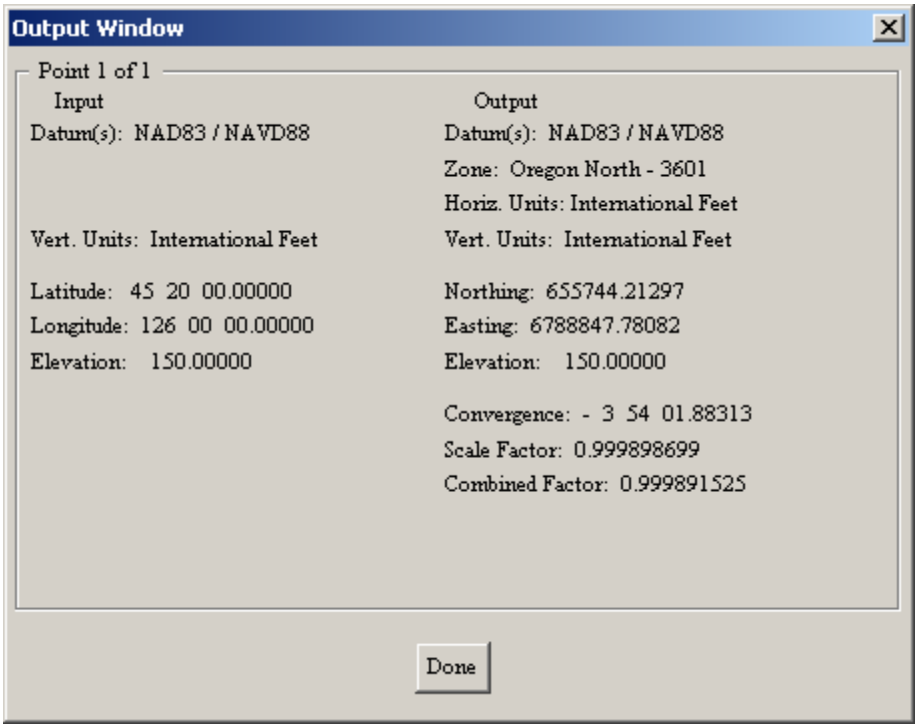




8. The Mean Latitude, Longitude and the Elevation are required.

   Note: The Longitude entry can be approximate only, as it does not seem to affect the Scale Factor and the Combined Factor output.

9. **OK**



Note:

- The Scale Factor (shown in the Output Window above) is the value of the **SCALE FACTOR** in the spreadsheet on Page 8 of 9.
- The Combined Factor (shown in the Output Window above) is the value of the **CONVERSION FACTOR** in the spreadsheet on Page 8 of 9.

Conversion of Points to Local Datum Plane

1. Enter Station Name, Northing, Easting (State Plane Coordinates) as on Page 9 of 9.
2. (If CF_Feet.xls is protected go to 'Tools - Protection - Unprotect Sheet'.)
3. The spreadsheet (CF_Feet.xls) will calculate Northing LDP and Easting LDP (on Page 9 of 9) using the Conversion Factor, according to the formula shown (on Page 8 of 9).

Notes:

- Local Datum Plane Coordinates, not assumed, are required for significant R/W purchases.
- Assumed Coordinates may be used for small slivers of R/W (purchases) or easements.
- Regions should compute their own LDP factor(s).

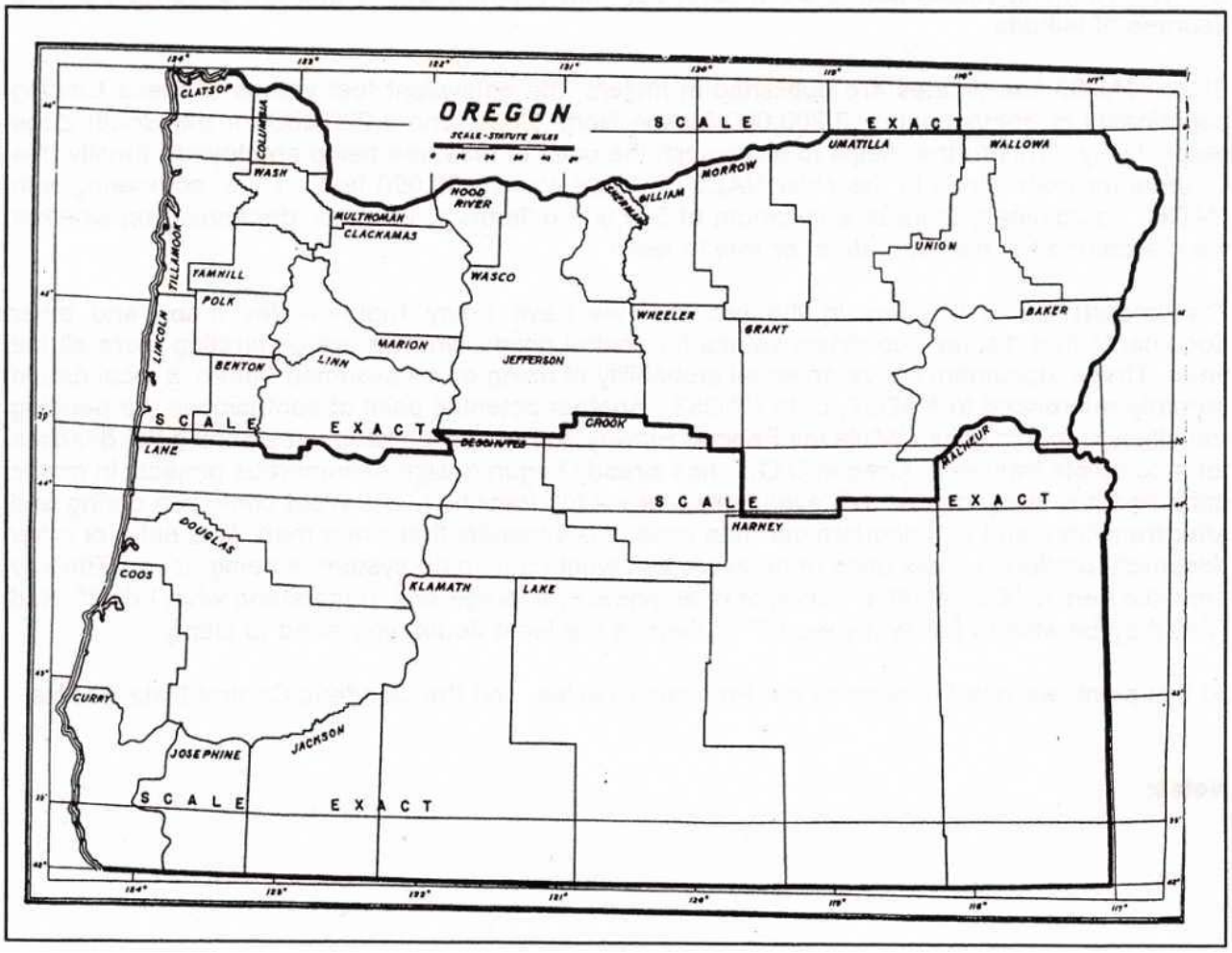
Lambert Projection Table (excerpt)

4

Lambert conformal conic projection tables
OREGON NORTH

Lat	R (meters)	tab diff.	k
45° 0'	6369463.074	30.86685	0.99989890
45 1	6367611.063	30.86692	0.99989809
45 2	6365759.048	30.86699	0.99989736
45 3	6363907.029	30.86706	0.99989672
45 4	6362055.006	30.86713	0.99989616
45 5	6360202.978	30.86721	0.99989569
45 6	6358350.945	30.86729	0.99989530
45 7	6356498.908	30.86737	0.99989499
45 8	6354646.866	30.86746	0.99989477
45 9	6352794.818	30.86754	0.99989464
45 10	6350942.766	30.86763	0.99989458
45 11	6349090.708	30.86773	0.99989461
45 12	6347238.644	30.86782	0.99989473
45 13	6345386.575	30.86792	0.99989493
45 14	6343534.500	30.86802	0.99989522
45 15	6341682.418	30.86812	0.99989559
45 16	6339830.331	30.86823	0.99989604
45 17	6337978.237	30.86834	0.99989658
45 18	6336126.137	30.86845	0.99989720
45 19	6334274.030	30.86856	0.99989791
45 20	6332421.916	30.86868	0.99989870
45 21	6330569.795	30.86880	0.99989958
45 22	6328717.667	30.86892	0.99990054
45 23	6326865.532	30.86904	0.99990158
45 24	6325013.390	30.86917	0.99990271
45 25	6323161.240	30.86930	0.99990393
45 26	6321309.082	30.86943	0.99990523
45 27	6319456.916	30.86957	0.99990661
45 28	6317604.742	30.86970	0.99990808
45 29	6315752.560	30.86984	0.99990963
45 30	6313900.369	30.86998	0.99991127
45 31	6312048.170	30.87013	0.99991300
45 32	6310195.962	30.87028	0.99991480
45 33	6308343.746	30.87043	0.99991670
45 34	6306491.520	30.87058	0.99991868
45 35	6304639.285	30.87074	0.99992074
45 36	6302787.041	30.87089	0.99992289
45 37	6300934.787	30.87105	0.99992512
45 38	6299082.524	30.87122	0.99992744
45 39	6297230.251	30.87138	0.99992984

Oregon SPC Zone Map



CF_Feet.xls spreadsheet

FACTOR COMPUTATION FOR LOCAL DATUM PLANE COORDINATES

DATE: 12/14/2004 **FILE NO:**

PROJECT:
HIGHWAY:
COUNTY:

		Enter Values
OREGON STATE GRID ZONE:		NORTH
NORTHERLY LATITUDE:		45 21 00
SOUTHERLY LATITUDE		45 19 00
MEAN LATITUDE:		45 20 00
SCALE FACTOR:		0.99989870
Average Elevation AMSL (ft):		150
	1-(AMSL/20906000)	0.999992825
Sea Level Factor	(Rounded to 8 places) =	0.99999283
CONVERSION FACTOR		
Scale Factor X Sea Level Factor		0.99989153

Grid Coordinates/Conversion Factor = L.D.P. Coordinates

Computed By:
Checked By:

Saved file is V:\PROJECTS\

CONVERSION OF POINTS TO LOCAL DATUM PLANE

Project: 0
Highway 0

CONVERSION FACTOR: 0.99989153

Conversion by:
Date: 12/14/2004

DATUM:

Station Name		***Northing***	***Easting***	***Northing LDP***	***Easting LDP***
GPS 1		650700.000	6786850.000	650770.589	6787586.249
GPS 2		655700.000	6788850.000	655771.131	6789586.466
GPS 3		660700.000	6788850.000	660771.674	6789586.466