

HP-33S SURVEY and COGO PROGRAM - INPUT /OUTPUT QUICK INSTRUCTIONS

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| TASK | INPUT PROCEDURES | OUTPUT DISPLAY |
|---|--|--|
| Store coordinates for Point 1 | Input the Northing Value of Point 1 Press ENTER Input the Easting Value of Point 1 Press XEQ 1 | Top number = N of Point 1 Bottom number = E of Point 1 |
| Store coordinates for Point 2 | Input the Northing Value of Point 2 Press ENTER Input the Easting Value of Point 2 Press XEQ 2 | Top number = N of Point 2 Bottom number = E of Point 2 |
| INVERSE from Point 1 to Point 2 | Store coordinates in XEQ 1 and XEQ 2 As outlined above then Press XEQ 3 | Top number = Distance Bottom Number = Azimuth (in D.MS) |
| SIDE-SHOT (from Point 1) Create coordinates of a Side-Shot (SS) point | Store coordinates for point 1 in XEQ 1 Input the DISTANCE from Point 1 Press ENTER Input the SS AZIMUTH direction (in D.MS) Press XEQ E To continue traversing from the SS point store it as Point 1 by Pressing XEQ 1 | Top number = N of SS Point Bottom number = E of SS Point |
| BEARING-BEARING INTERSECTION (BB) Create coordinates of a BB intersection point | Store coordinates in XEQ 1 and XEQ 2 Input the AZIMUTH direction (in D.MS) from Pt 1 Press ENTER Input the AZIMUTH direction (in D.MS) from Pt 2 Press XEQ B | Top number = N of BB Point Bottom number = E of BB Point |
| BEARING-DISTANCE INTERSECTION (BD) Create coordinates of a BD intersection point | Store coordinates in XEQ 1 and XEQ 2 Input the AZIMUTH direction (in D.MS) from Pt 1 Press ENTER Input the Distance from Pt 2 Press XEQ C Press R/S for second possible solution | Top number = N of 1 st BD Point Bottom number = E of 1 st BD Point Top number = N of 2 nd BD Point Bottom number = E of 2 nd BD Point |
| DISTANCE-DISTANCE INTERSECTION (DD) Create coordinates of a DD intersection point | Store coordinates in XEQ 1 and XEQ 2 Input the DISTANCE from Pt 1, then Press ENTER Input the DISTANCE from Pt 2, then Press XEQ D Press + if solution is Right of line 1 to 2 or Press - if solution is Left of line1 to 2 Then Press R/S | Top number = N of DD Point Bottom number = E of DD Point |

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| <p>View Coordinates Stored in Point 1 and Point 2</p> <p>SWAP coordinates (the 2nd R/S will activate this function, otherwise the swap will not take place)</p> | <p>Press XEQ Z to view coordinates of Point 1</p> <p>Press R/S to view coordinates of Point 2 (optional)</p> <p>Press R/S to swap Point 1 and Point 2 (optional)</p> | <p>Top number = N of Point 1 Bottom number = E of Point 1</p> <p>Top number = N of Point 2 Bottom number = E of Point 2</p> <p>Top number = N of Point 1 Bottom number = E of Point 1</p> |
| <p>Area by Coordinates (this program can only handle a maximum 7 sided polygon. Split a larger polygon into parts and sum the parts for the total area)</p> | <p>Input the Northing of the first polygon point, then Press ENTER Input the Easting of the first polygon point, then Press XEQ A</p> <p>Input the Northing of the 2nd polygon point, then Press ENTER Input the Easting of the 2nd polygon point, then Press R/S</p> <p>Continue in a similar fashion entering N and E of each point consecutively around the polygon always pressing R/S</p> <p>Important: End the boundary by re entering the N and E of the first polygon point and then Press R/S</p> | <p>All values shown in the display are meaningless until the last R/S is pressed after closing on the first point</p> <p>Top number = Area in SF Bottom number = Area in Acres</p> |
| <p>INTEPOLATION (and EXTRAPOLATION)</p> | <p>Store data range upper limit values in keys 7 and 8 With STO 7 and STO 8</p> <p>Store data range lower limit values in keys 1 and 2 With STO 1 and STO 2</p> <p>Store intermediate value in key 4 with STO 4</p> <p>Press XEQ 5 for the solution</p> <p>Note the key layout below:</p> <p>STO 7 STO 8 STO 4 XEQ 5 STO 1 STO 2</p> | <p>Both the Top number and Bottom Numbers = Answer</p> |

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| <p>Vertical Curve Program (Solves for Stations and Elevations of a vertical curve based on the increment distance desired, like 1/2 stations, 50' or 1/4 stations, 25')</p> | <p>Input the following data by storing them in the specified storage registers.</p> <p>PVI Sta. value STO A (omit the + sign when entering stations) PVI Elevation STO B Grade 1 STO C Grade 2 STO D VC Length STO E Station Increment for output STO F (example, use 50 if 1/2 sta.)</p> <p>Press XEQ V</p> <p>R/S (answer based on the station increment you entered)</p> <p>R/S (keep pressing R/S to see each station on the VC)</p> <p style="text-align: center;"> V</p> <p>R/S (eventually the PVT of the VC will be displayed)</p> <p>R/S (if you hit too many R/S's and go past the PVT The program will display NONEXISTENT)</p> <p>C (press C to return to a normal display)</p> | <p>Top number = Station of PVC Bottom number = Elevation of PVC</p> <p>Top number = Station of next point on VC Bottom number = Elevation of this Station</p> <p>Top number = Station of next point on VC Bottom number = Elevation of this Station</p> <p style="text-align: center;"> V</p> <p>Top number = Station of PVT Bottom number = Elevation of PVT</p> <p>NONEXISTENT</p> |
| <p>Vertical Curve Solution (for High or Low Point)</p> | <p>Store all VC data in the above format and Run the above Vertical Curve Program (you do not need to press the R/S's if incremental points are not needed)</p> <p>Press XEQ H</p> | <p>Top number = Sta. of High or Low Point Bottom number = Elev. Of High or Low Point</p> |
| <p>Vertical Curve Solution (for Any Point)</p> | <p>Store all VC data in the above format and Run the above Vertical Curve Program (you do not need to press the R/S's if incremental points are not needed)</p> <p>Input the Staton of the VC point desired Press ENTER Press XEQ P</p> | <p>Top number = Sta. of the Specified Point Bottom number = Elev. of the Specified Point</p> |

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| <p>Horizontal Curve Solutions When the Central Angle and Radius are known</p> | <p>Input the Central Angle in D.MS Press ENTER Input the Radius Press XEQ J</p> <p>R/S</p> <p>R/S</p> <p>R/S</p> <p>R/S</p> | <p>Top number = Central Angle Bottom number = Radius</p> <p>Top number = Arc Length Bottom number = Tangent Length</p> <p>Top number = Chord Bottom number = Degree of Curvature (Arc)</p> <p>Top number = External Distance Bottom number = Mid Ordinate</p> <p>Top number = Sector Area (SF) Bottom number = Arc to Chord Area (SF)</p> |
| <p>Horizontal Curve Solutions When the Central Angle and Arc Length are known</p> | <p>Input the Central Angle in D.MS Press ENTER Input the Arc Length Press XEQ K</p> <p>R/S as above between answer sets</p> | <p>All answers in the same order as above.</p> |
| <p>Horizontal Curve Solutions When the Radius and Arc Length are known</p> | <p>Input the Radius Press ENTER Input the Arc Length Press XEQ L</p> <p>R/S as above between answer sets</p> | <p>All answers in the same order as above.</p> |

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| <p>Station and Offset Solution</p> | <p>Store the coordinates of two points on the station line in XEQ 1 and XEQ 2 (the point stored in XEQ 1 is where the station distance is measured from)</p> <p>Input the Northing of the offset point Press ENTER Input the Easting of the offset point Press XEQ F</p> | <p>Top number = Distance along Line 1-2 in feet from Point 1 Negative distances are in the back direction from Point 1</p> <p>Bottom number = Offset Distance perpendicular to Line 1-2 Positive offsets are RT of centerline and Negative offsets are LT of centerline</p> |
| <p>Stake out a Point</p> | <p>Store the coordinates of the two points on the backsight line in XEQ 1 and XEQ 2 (the point stored in XEQ 1 is where the instrument would be for stake out, also this is where the distance is measured from to the stake out point. The point stored in XEQ 2 is the backsight point, this is where you would zero out the instrument before turning the angle)</p> <p>Input the Northing of the stake out point Press ENTER Input the Easting of the stake out point Press XEQ I</p> | <p>Top number = Distance from instrument (Point 1) to stake out point</p> <p>Bottom number = Angle right (or CW angle) from the backsight Point 2 to the stakeout point</p> |

SIDE-SHOT (from Point 1)
With an angle and a distance
Create coordinates of a Side-Shot (SS) point

Store the coordinates of the two points on the backsight line in **XEQ 1** and **XEQ 2** (the point stored in XEQ 1 is where the instrument is setup, also this is where the distance is measured from to the side shot point. The point stored in XEQ 2 is the backsight point, this is where you would zero out the instrument before turning the angle to the side shot point)

Input the **DISTANCE** from Point 1 to the Sideshot Point
Press **ENTER**
Input the **ANGLE (in D.MS)**
Press **XEQ O (letter O not zero)**

Top number = N of SS Point
Bottom number = E of SS Point