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

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 1st BD Point Bottom number = E of 1st BD Point Top number = N of 2nd BD Point Bottom number = E of 2nd 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

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

TASK	INPUT PROCEDURES	OUTPUT DISPLAY

Vertical Curve Program
  (Solves for Stations and Elevations of a
  vertical curve based on the increment
  distance desired, like ½ stations, 50' or
  ¼ stations, 25')
	Input the following data by storing them in the specified storage
	registers.
	  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 ½ sta.)
	
	Press **XEQ V**
	
	R/S (answer based on the station increment you entered)
	
	R/S (keep pressing R/S to see each station on the VC)
	      |
	      |
	      |
	      V
	R/S (eventually the PVT of the VC will be displayed)
	
	R/S (if you hit too many R/S's and go past the PVT
	      the program will display meaningless numbers)
		
		Top number = Station of PVC
		Bottom number = Elevation of PVC
		
		Top number = Station of next point on VC
		Bottom number = Elevation of this Station
		
		Top number = Station of next point on VC
		Bottom number = Elevation of this Station
		      |
		      |
		      V
		Top number = Station of PVT
		Bottom number = Elevation of PVT
		
		If NOEXISTENT is displayed with one to may
		R/S keys hit after the PVT, then press **C** to
		return back to normal display mode)

Vertical Curve Solution (for High or Low Point)	First 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) **Press XEQ H**	 Top number = Sta. of High or Low Point Bottom number = Elev. Of High or Low Point
Vertical Curve Solution (for Any Point)	First 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) Input the **Staton** of the VC point desired Press **ENTER** **Press XEQ P**	 Top number = Sta. of the Specified Point Bottom number = Elev. of the Specified Point

TASK	INPUT PROCEDURES	OUTPUT DISPLAY
Horizontal Curve Solutions When the Central Angle and Radius are known	Input the **Central Angle** in D.MS Press **ENTER** Input the **Radius** Press **XEQ J** **R/S** Not all R/S keys need to be pressed if you do not need the following curve data **R/S** **R/S** **R/S**	Top number = Central Angle Bottom number = Radius Top number = Arc Length Bottom number = Tangent Length Top number = Chord Bottom number = Degree of Curvature (Arc) Top number = External Distance Bottom number = Mid Ordinate Top number = Sector Area (SF) Bottom number = Arc to Chord Area (SF)
Horizontal Curve Solutions When the Central Angle and Arc Length are known	Input the **Central Angle** in D.MS Press **ENTER** Input the **Arc Length** Press **XEQ K** **R/S** as above between answer sets	All answers in the same order as above.
Horizontal Curve Solutions When the Radius and Arc Length are known	Input the **Radius** Press **ENTER** Input the **Arc Length** Press **XEQ L** **R/S** as above between answer sets	All answers in the same order as above.

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TASK	INPUT PROCEDURES	OUTPUT DISPLAY
Station and Offset Solution	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) Input the Northing of the offset point Press **ENTER** Input the Easting of the offset point Press **XEQ F**	Top number = Distance along Line 1-2 in feet from Point 1 Negative distances are in the back direction from Point 1 Bottom number = Offset Distance perpendicular to Line 1-2 Positive offsets are RT of centerline and Negative offsets are LT of centerline
Stake out a 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 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) Input the Northing of the stake out point Press **ENTER** Input the Easting of the stake out point Press **XEQ I**	Top number = Distance from instrument (Point 1) to stake out point Bottom number = Angle right (or CW angle) from the backsight Point 2 to the stakeout point

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Revised 12/11/09

TASK	INPUT PROCEDURES	OUTPUT DISPLAY
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 or foresight point) Input the **DISTANCE** from Point 1to 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
Traverse to the newly created point and backsight to the previous point 1. Then repeat the above process to create a new point. The process of traversing (or moving up) and creating new points can be repeated over and over.	Press **R/S** (for the newly created point to become point 1 and for the previous point 1 to now become point 2)	Top number = N of SS Point Bottom number = E of SS Point