HP-33S Calculator Program Closure 1

Traverse Closure with Area Calculation

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Date: March, 2005. *Store 360 in Register Z before starting*

Line	Instruction	Display	User Instructions
A0001	LBL A		Enter starting bearing. Press XEQ A
A0002	CL Σ		(Bearing entered in DDD.MMSS format)
A0003	ENTER		
A0004	CL x		
A0005	STO A		
A0006	R↓		
W0001	LBL W		
W0002	→HR		
W0003	STO W	Bg in dec. deg.	
W0004	STOP		Enter length of side. Press R/S
W0005	STO T		
W0006	θ,r → y,x		
W0007	Σ+		
W0008	Σy		(Enter using SUMS Σx)
W0009	Σx		(Enter using SUMS Σy)
W0010	y,x → θ,r		
W0011	STOx T		
W0012	x < > y		
W0013	RCL– W		
W0014	+/–		
W0015	SIN		
W0016	RCLx T		
W0017	2		
W0018	÷		
W0019	STO+ A		
W0020	RCL A		
W0021	Σy		
W0022	Σx		
W0023	y,x → θ,r		
W0024	x < > y		
W0025	x < 0 ?		
W0026	RCL+ Z		
W0027	→HMS		
W0028	x < > y		Stack contains output data (see Note 2)
W0029	n	No. of sides	
W0030	STOP		Enter bearing of next side. Press R/S
W0031	GTO W		(Bearing entered in DDD.MMSS format)

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Notes

(1) General closure program that computes misclosure and area to each point around the traverse.

(2) After each side (bearing and distance) has been entered, the stack holds the following data:

Stack Register	Contents
T	Area of the traverse thus far
Z	Bearing from start
Y	Distance from start
X	Number of sides entered

(3) The value 360 should be stored in the Z memory register before running the program. It is used to correct negative bearings.

(4) Area may be negative. Take the absolute value of the area if necessary.

(5) Bearings are entered and displayed in HP notation, i.e., DDD.MMSS

(6) The misclosure components in X (or E) and Y (or N) can be displayed by recalling Σy and Σx using the SUMS menu. (Note these are back-to-front.) Reversing their order using x<>y sets them up for conversion to polar.

(7) This program forms the basis of the two missing distances program. Enter the known sides using this program to begin the 2MD computation process.

Theory

The traverse closure works using conventional resolving of the sides (vectors) into orthogonal components. The area is computed by triangles developed by each new side of the traverse and is updated with each new side. So the area is that of the polygon formed by the traverse entered thus far and the line from the start to the current point. This allows areas to be incremented for lot split calculations.

The bearing and distance of the line from the start to the current point is also placed on the stack after each line. This allows a connecting line to be computed easily between two points. The final bearing and distance is the traverse misclosure and the area is that of the traverse.

Whole circle bearings in HP notation are used. An arbitrary azimuth is satisfactory. Plane surveying assumptions apply. The program uses no error checking on entered data.

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Sample Computation

Bearing	Distance
6° 53' 10"	72.00
112° 37' 20"	102.23
185° 39' 50"	29.04
181° 30' 00"	27.88
283° 54' 30"	102.38

Results

DE	=	0.023
DN	=	–0.002
Misclosure Length	=	0.023
Misclosure Bearing	=	95° 24' 15"
Area	=	6378.4660

Storage Registers Used

A Area

W Bearing of Last Side

T Length of Last Side

Z 360

Statistical Registers: Σx = Current ΔY or ΔN from starting point

Σy = Current ΔX or ΔE from starting point

n = Number of sides entered from start

Labels Used

Label **A** Length = 18 Checksum = FD31

Label **W** Length = 105 Checksum = 9789

Use the length (LN=) and Checksum (CK=) values to check if program was entered correctly. Use the sample computation to check proper operation after entry.