

HP-33S SURVEY and COGO Program

Line by Line Program Code (in RPN Mode)

Revised 12-11-09

Type in these KEY STROKES -----	This will DISPLAY -----	Comments -----
<i>[green]</i> PRGM	PRGM TOP	Get into program mode
<i>[green]</i> LBL U (5)	U0001 LBL U	Interpolation Program (Optional)
RCL Q (7)	U0002 RCL Q	
RCL T (4)	U0003 RCL T	
-	U0004 -	
RCL Q (7)	U0005 RCL Q	
RCL W (1)	U0006 RCL W	
-	U0007 -	
÷	U0008 ÷	
RCL R (8)	U0009 RCL R	
RCL X (2)	U0010 RCL X	
-	U0011 -	
x	U0012 x	
RCL R (8)	U0013 RCL R	
-	U0014 -	
+/-	U0015 +/-	
ENTER	U0016 ENTER	
<i>[purple]</i> RTN	U0017 RTN	
<i>[green]</i> LBL W (1)	W0001 LBL W	Program to STORE N and E Point 1 (Required for COGO)
STO W (1)	W0002 STO W	
X<>Y	W0003 X<>Y	
STO T (4)	W0004 STO T	
X<>Y	W0005 X<>Y	
<i>[purple]</i> RTN	W0006 RTN	
<i>[green]</i> LBL X (2)	X0001 LBL X	Program to STORE N and E Point 2 (Required for COGO)
STO X (2)	X0002 STO X	
X<>Y	X0003 X<>Y	
STO U (5)	X0004 STO U	
X<>Y	X0005 X<>Y	
<i>[purple]</i> RTN	X0006 RTN	
<i>[green]</i> LBL Y (3)	Y0001 LBL Y	INVERSE PROGRAM (Required for COGO)
XEQ R (8)	Y0002 XEQ R	
<i>[purple]</i> -->HMS	Y0003 -->HMS	
<i>[purple]</i> RTN	Y0004 RTN	
<i>[green]</i> LBL E	E0001 LBL E	SIDE SHOT FROM "A" PROGRAM (Required for COGO)
<i>[green]</i> -->HR	E0002 -->HR	
X<>Y	E0003 X<>Y	
XEQ S (9)	E0004 XEQ S	
<i>[purple]</i> RTN	E0005 RTN	
<i>[green]</i> LBL R (8)	R0001 LBL R	INVERSE Sub Routine (Required for COGO)
RCL X (2)	R0002 RCL X	
RCL W (1)	R0003 RCL W	
-	R0004 -	
RCL U (5)	R0005 RCL U	
RCL T (4)	R0006 RCL T	

-	R0007 -	
[green] --> θ , r	R0008 y, x--> θ , r	
X<>Y	R0009 X<>Y	
[purple] x?0 > (4)	R0010 x>0?	
[purple] RTN	R0011 RTN	
360	R0012 360	
+	R0013 +	
[purple] RTN	R0014 RTN	
[green] LBL S (9)	S0001 LBL S	TRAVERSE Sub Routine
[purple] -->y, x	S0002 θ , R-->y, x	(Required for COGO)
RCL T (4)	S0003 RCL T	
+	S0004 +	
X<>Y	S0005 X<>Y	
RCL W (1)	S0006 RCL W	
+	S0007 +	
[purple] RTN	S0008 RTN	
[green] LBL B	B0001 LBL B	BEARING - BEARING Program
[green] -->HR	B0002 -->HR	(Required for COGO)
STO J	B0003 STO J	
X<>Y	B0004 X<>Y	
[green] -->HR	B0005 -->HR	
STO K	B0006 STO K	
XEQ R (8)	B0007 XEQ R	
RCL J	B0008 RCL J	
-	B0009 -	
SIN	B0010 SIN	
x	B0011 x	
RCL K	B0012 RCL K	
RCL J	B0013 RCL J	
-	B0014 -	
XEQ M	B0015 XEQ M	
[purple] RTN	B0016 RTN	
[green] LBL C	C0001 LBL C	BEARING - DISTANCE Program
STO J	C0002 STO J	(Required for COGO)
X<>Y	C0003 X<>Y	
[green] -->HR	C0004 -->HR	
STO K	C0005 STO K	
XEQ R (8)	C0006 XEQ R	
RCL K	C0007 RCL K	
-	C0008 -	
[green] ABS	C0009 ABS	
STO Y (3)	C0010 STO Y	
SIN	C0011 SIN	
X<>Y	C0012 X<>Y	
STO V (6)	C0013 STO V	
x	C0014 x	
RCL J	C0015 RCL J	
÷	C0016 ÷	
[green] ASIN	C0017 ASIN	
XEQ T (4)	C0018 XEQ T	
R/S	C0019 STOP	
180	C0020 180	
RCL L	C0021 RCL L	
-	C0022 -	
XEQ T (4)	C0023 XEQ T	
[purple] RTN	C0024 RTN	

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[green] LBL D          D0001 LBL D
X<>Y                 D0002 X<>Y
STO K                D0003 STO K
X<>Y                 D0004 X<>Y
XEQ R      (8)      D0005 XEQ R
X<>Y                 D0006 X<>Y
STO J                D0007 STO J
[purple] R↑          D0008 R↑
+                    D0009 +
RCL K                D0010 RCL K
+                    D0011 +
2                    D0012 2
÷                    D0013 ÷
STO Y      (3)      D0014 STO Y
RCL J                D0015 RCL J
-                    D0016 -
RCL Y      (3)      D0017 RCL Y
RCL K                D0018 RCL K
-                    D0019 -
x                    D0020 x
RCL J                D0021 RCL J
RCL K                D0022 RCL K
x                    D0023 x
÷                    D0024 ÷
√ X (square root key) D0025 √ X
[green] ASIN         D0026 ASIN
2                    D0027 2
x                    D0028 x
R/S                 D0029 STOP
RCL K                D0030 RCL K
XEQ S      (9)      D0031 XEQ S
[purple] RTN         D0032 RTN

[green] LBL T (4)    T0001 LBL T
STO L                T0002 STO L
RCL Y      (3)      T0003 RCL Y
+                    T0004 +
180                  T0005 180
X<>Y                 T0006 X<>Y
-                    T0007 -
SIN                  T0008 SIN
RCL V      (6)      T0009 RCL V
x                    T0010 x
RCL L                T0011 RCL L
XEQ M                T0012 XEQ M
[purple] RTN         T0013 RTN

[green] LBL M        M0001 LBL M
SIN                  M0002 SIN
÷                    M0003 ÷
[green] ABS          M0004 ABS
RCL K                M0005 RCL K
X<>Y                 M0006 X<>Y
XEQ S      (9)      M0007 XEQ S
[purple] RTN         M0008 RTN

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DISTANCE - DISTANCE Program
(Required for COGO)

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[green] LBL V (6)
0
STO J
RCL E
2
÷
STO G
RCL C
x
100
÷
+/-
RCL B
+
STO I
RCL A
RCL G
-
STO H
RCL F
÷
[purple] FP
[purple] X?0 = (6)
[green] GTO Q (7)
1
-
+/-
RCL F
x
STO J
RCL H
RCL I
R/S

[green] LBL Q (7)
RCL D
RCL C
-
50
x
RCL E
÷
RCL J
100
÷
X2
x
RCL C
RCL J
x
100
÷
+
RCL I
+
RCL H
RCL J

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V0001 LBL V
V0002 0
V0003 STO J
V0004 RCL E
V0005 2
V0006 ÷
V0007 STO G
V0008 RCL C
V0009 x
V0010 100
V0011 ÷
V0012 +/-
V0013 RCL B
V0014 +
V0015 STO I
V0016 RCL A
V0017 RCL G
V0018 -
V0019 STO H
V0020 RCL F
V0021 ÷
V0022 FP
V0023 X=0 ?
V0024 GTO Q
V0025 1
V0026 -
V0027 +/-
V0028 RCL F
V0029 x
V0030 STO J
V0031 RCL H
V0032 RCL I
V0033 STOP

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Vertical Curve Program (Optional)

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Q0001 LBL Q
Q0002 RCL D
Q0003 RCL C
Q0004 -
Q0005 50
Q0006 x
Q0007 RCL E
Q0008 ÷
Q0009 RCL J
Q0010 100
Q0011 ÷
Q0012 X2
Q0013 x
Q0014 RCL C
Q0015 RCL J
Q0016 x
Q0017 100
Q0018 ÷
Q0019 +
Q0020 RCL I
Q0021 +
Q0022 RCL H
Q0023 RCL J

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+	Q0024	+
X<>Y	Q0025	X<>Y
R/S	Q0026	STOP
RCL J	Q0027	RCL J
RCL E	Q0028	RCL E
-	Q0029	-
[purple] X?0 = (6)	Q0030	X=0 ?
[green] GTO I	Q0031	GTO U
RCL J	Q0032	RCL J
RCL F	Q0033	RCL F
+	Q0034	+
STO J	Q0035	STO J
RCL E	Q0036	RCL E
[green] X?Y >	Q0037	X>Y ?
[green] GTO Q (7)	Q0038	GTO Q
-	Q0039	-
[purple] X?0 = (6)	Q0040	X=0 ?
[green] GTO Q (7)	Q0041	GTO Q
RCL E	Q0042	RCL E
STO J	Q0043	STO J
[green] GTO Q (7)	Q0044	GTO Q
[green] LBL H	H0001	LBL H
RCL E	H0002	RCL E
RCL C	H0003	RCL C
x	H0004	x
RCL C	H0005	RCL C
RCL D	H0006	RCL D
-	H0007	-
÷	H0008	÷
STO J	H0009	STO J
[green] GTO Q (7)	H0010	GTO Q
[green] LBL P	P0001	LBL P
RCL H	P0002	RCL H
-	P0003	-
STO J	P0004	STO J
[green] GTO Q (7)	P0005	GTO Q
[purple] RTN	P0006	RTN
[green] LBL A	A0001	LBL A
STO B	A0002	STO B
X<>Y	A0003	X<>Y
STO A	A0004	STO A
0	A0005	0
STO E	A0006	STO E
RCL A	A0007	RCL A
RCL B	A0008	RCL B
R/S	A0009	STOP
[green] LBL N	N0001	LBL N
STO D	N0002	STO D
X<>Y	N0003	X<>Y
STO C	N0004	STO C
RCL B	N0005	RCL B
x	N0006	x
RCL D	N0007	RCL D
RCL A	N0008	RCL A
x	N0009	x
-	N0010	-
STO + E	N0011	STO+ E

VC High/Low Program

(Optional, but LBL V and LBL Q must be loaded for the High/Low Program to run)

VC Any Station Elev Program

(Optional, but LBL V and LBL Q must be loaded for this Program to run)

Area Program (Optional)

RCL C	N0012 RCL C
STO A	N0013 STO A
RCL D	N0014 RCL D
STO B	N0015 STO B
RCL E	N0016 RCL E
2	N0017 2
÷	N0018 ÷
[green] ABS	N0019 ABS
ENTER	N0020 ENTER
ENTER	N0021 ENTER
43560	N0022 43560
÷	N0023 ÷
R/S	N0024 STOP
XEQ N	N0025 XEQ N
[purple] RTN	N0026 RTN
[green] LBL J	J0001 LBL J
STO B	J0002 STO B
X<>Y	J0003 X<>Y
[green] -->HR	J0004 -->HR
STO A	J0005 STO A
x	J0006 x
[purple] π (pi)	J0007 π
x	J0008 x
180	J0009 180
÷	J0010 ÷
STO C	J0011 STO C
XEQ G	J0012 XEQ G
[purple] RTN	J0013 RTN
[green] LBL K	K0001 LBL K
STO C	K0002 STO C
X<>Y	K0003 X<>Y
[green] -->HR	K0004 -->HR
STO A	K0005 STO A
÷	K0006 ÷
180	K0007 180
x	K0008 x
[purple] π (pi)	K0009 π
÷	K0010 ÷
STO B	K0011 STO B
XEQ G	K0012 XEQ G
[purple] RTN	K0013 RTN
[green] LBL L	L0001 LBL L
STO C	L0002 STO C
X<>Y	L0003 X<>Y
STO B	L0004 STO B
÷	L0005 ÷
180	L0006 180
x	L0007 x
[purple] π (pi)	L0008 π
÷	L0009 ÷
STO A	L0010 STO A
XEQ G	L0011 XEQ G
[purple] RTN	L0012 RTN

Horizontal Curve Program

LBL J, LBL K, LBL L and
 LBL G are all needed for the
 Horz. Curve Program
 (Optional)

<i>[green]</i> LBL G	G0001 LBL G
RCL A	G0002 RCL A
<i>[purple]</i> -->HMS	G0003 -->HMS
RCL B	G0004 RCL B
R/S	G0005 STOP
RCL C	G0006 RCL C
RCL A	G0007 RCL A
2	G0008 2
÷	G0009 ÷
TAN	G0010 TAN
RCL B	G0011 RCL B
x	G0012 x
STO D	G0013 STO D
R/S	G0014 STOP
RCL A	G0015 RCL A
2	G0016 2
÷	G0017 ÷
SIN	G0018 SIN
RCL B	G0019 RCL B
x	G0020 x
2	G0021 2
x	G0022 x
18000	G0023 18000
<i>[purple]</i> π (pi)	G0024 π
÷	G0025 ÷
RCL B	G0026 RCL B
÷	G0027 ÷
<i>[purple]</i> -->HMS	G0028 -->HMS
R/S	G0029 STOP
RCL A	G0030 RCL A
4	G0031 4
÷	G0032 ÷
TAN	G0033 TAN
RCL D	G0034 RCL D
x	G0035 x
STO E	G0036 STO E
RCL A	G0037 RCL A
2	G0038 2
÷	G0039 ÷
COS	G0040 COS
RCL E	G0041 RCL E
x	G0042 x
RCL E	G0043 RCL E
X<>Y	G0044 X<>Y
R/S	G0045 STOP
RCL B	G0046 RCL B
X ²	G0047 X ²
<i>[purple]</i> π (pi)	G0048 π
x	G0049 x
RCL A	G0050 RCL A
x	G0051 x
360	G0052 360
÷	G0053 ÷
STO F	G0054 STO F
RCL A	G0055 RCL A
SIN	G0056 SIN
RCL B	G0057 RCL B

X ²	G0058	X ²
x	G0059	x
2	G0060	2
÷	G0061	÷
-	G0062	-
RCL F	G0063	RCL F
X<>Y	G0064	X<>Y
[purple] RTN	G0065	RTN

[green] LBL Z	Z0001	LBL Z
RCL T (4)	Z0002	RCL T
RCL W (1)	Z0003	RCL W
R/S	Z0004	STOP
RCL U (5)	Z0005	RCL U
RCL X (2)	Z0006	RCL X
R/S	Z0007	STOP
STO W (1)	Z0008	STO W
R↓	Z0009	R↓
STO T (4)	Z0010	STO T
R↓	Z0011	R↓
STO X (2)	Z0012	STO X
R↓	Z0013	R↓
STO U (5)	Z0014	STO U
RCL T (4)	Z0015	RCL T
RCL W (1)	Z0016	RCL W
[purple] RTN	Z0017	RTN

VIEW Stored Coordinates Program
and SWAP Coordinates Program
(For use with COGO, but Optional)

[green] LBL F	F0001	LBL F
STO R (8)	F0002	STO R
X<>Y	F0003	X<>Y
STO Q (7)	F0004	STO Q
XEQ R (8)	F0005	XEQ R
STO S (9)	F0006	STO S
RCL U (5)	F0007	RCL U
STO A	F0008	STO A
RCL X (2)	F0009	RCL X
STO B	F0010	STO B
RCL Q (7)	F0011	RCL Q
STO U (5)	F0012	STO U
RCL R (8)	F0013	RCL R
STO X (2)	F0014	STO X
XEQ R (8)	F0015	XEQ R
RCL S (9)	F0016	RCL S
X<>Y	F0017	X<>Y
STO V (6)	F0018	STO V
X<>Y	F0019	X<>Y
-	F0020	-
X<>Y	F0021	X<>Y
[purple] -->y,x	F0022	θ,R-->y,x
X<>Y	F0023	X<>Y
RCL A	F0024	RCL A
STO U (5)	F0025	STO U
RCL B	F0026	RCL B
STO X (2)	F0027	STO X
R↓	F0028	R↓
R↓	F0029	R↓
[purple] RTN	F0030	RTN

Station and offset Program
(For use with COGO, but Optional)

```

[green] LBL I
STO R (8)
X<>Y
STO Q (7)
XEQ R (8)
STO A
RCL X (2)
STO J
RCL U (5)
STO K
RCL Q (7)
RCL R (8)
XEQ X (2)
XEQ R (8)
RCL A
-
STO A
X<>Y
STO S (9)
RCL J
STO X (2)
RCL K
STO U (5)
RCL S (9)
RCL A
[purple] -->HMS
[purple] x?0 > (4)
[purple] RTN
[green] -->HR
360
+
[purple] -->HMS
[purple] RTN

[green] LBL O
[green] -->HR
STO S (9)
X<>Y
STO Q (7)
XEQ R (8)
RCL S (9)
+
RCL Q (7)
XEQ S (9)
R/S
STO A
X<>Y
STO B
RCL T (4)
RCL W (1)
XEQ X (2)
RCL B
RCL A
XEQ W (1)
[purple] RTN

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C

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I0001 LBL I
I0002 STO R
I0003 X<>Y
I0004 STO Q
I0005 XEQ R
I0006 STO A
I0007 RCL X
I0008 STO J
I0009 RCL U
I0010 STO K
I0011 RCL Q
I0012 RCL R
I0013 XEQ X
I0014 XEQ R
I0015 RCL A
I0016 -
I0017 STO A
I0018 X<>Y
I0019 STO S
I0020 RCL J
I0021 STO X
I0022 RCL K
I0023 STO U
I0024 RCL S
I0025 RCL A
I0026 -->HMS
I0027 x>0?
I0028 RTN
I0029 -->HR
I0030 360
I0031 +
I0032 -->HMS
I0033 RTN

O0001 LBL O
O0002 -->HR
O0003 STO S
O0004 X<>Y
O0005 STO Q
O0006 XEQ R
O0007 RCL S
O0008 +
O0009 RCL Q
O0010 XEQ S
O0011 STOP
O0012 STO A
O0013 X<>Y
O0014 STO B
O0015 RCL T
O0016 RCL W
O0017 XEQ X
O0018 RCL B
O0019 RCL A
O0020 XEQ W
O0021 RTN

```

to exit PRGM mode

Stake out a Point Program

(For use with COGO, but Optional)

Side Shot with Angle and Dist Program

(For use with COGO, but Optional)

This program uses label
"O" (the letter O, not zero)