

# HP-33S SURVEY and COGO Program

## Line by Line Program Code (in RPN Mode)

Revised 02-09-11

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	<b>Interpolation Program</b> (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	<b>Program to STORE N and E Point 1</b> (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	<b>Program to STORE N and E Point 2</b> (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	<b>INVERSE PROGRAM</b> (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	<b>SIDE SHOT FROM "A" PROGRAM</b> (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	<b>INVERSE Sub Routine</b> (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] --> $\theta$ ,r	R0008 y,x--> $\theta$ ,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	<b>TRAVERSE Sub Routine</b>
[purple] -->y,x	S0002 $\theta$ ,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	<b>BEARING - BEARING Program</b>
[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	<b>BEARING - DISTANCE Program</b>
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)      V0001 LBL V
0                     V0002 0
STO J                 V0003 STO J
RCL E                 V0004 RCL E
2                     V0005 2
÷                     V0006 ÷
STO G                 V0007 STO G
RCL C                 V0008 RCL C
x                     V0009 x
100                   V0010 100
÷                     V0011 ÷
+/-                   V0012 +/-
RCL B                 V0013 RCL B
+                     V0014 +
STO I                 V0015 STO I
RCL A                 V0016 RCL A
RCL G                 V0017 RCL G
-                     V0018 -
STO H                 V0019 STO H
RCL F                 V0020 RCL F
÷                     V0021 ÷
[purple] FP           V0022 FP
[purple] X?0 = (6)    V0023 X=0 ?
[green] GTO Q (7)     V0024 GTO Q
1                     V0025 1
-                     V0026 -
+/-                   V0027 +/-
RCL F                 V0028 RCL F
x                     V0029 x
STO J                 V0030 STO J
RCL H                 V0031 RCL H
RCL I                 V0032 RCL I
R/S                   V0033 STOP

[green] LBL Q (7)     Q0001 LBL Q
RCL D                 Q0002 RCL D
RCL C                 Q0003 RCL C
-                     Q0004 -
50                     Q0005 50
x                     Q0006 x
RCL E                 Q0007 RCL E
÷                     Q0008 ÷
RCL J                 Q0009 RCL J
100                   Q0010 100
÷                     Q0011 ÷
X2                 Q0012 X2
x                     Q0013 x
RCL C                 Q0014 RCL C
RCL J                 Q0015 RCL J
x                     Q0016 x
100                   Q0017 100
÷                     Q0018 ÷
+                     Q0019 +
RCL I                 Q0020 RCL I
+                     Q0021 +
RCL H                 Q0022 RCL H
RCL J                 Q0023 RCL J

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**Vertical Curve Program**  
(Optional)

+	Q0024	+
X<>Y	Q0025	X<>Y
R/S	Q0026	STOP
RCL J	Q0027	RCL J
RCL E	Q0028	RCL E
-	Q0029	-
<i>[purple]</i> X?0 = (6)	Q0030	X=0 ?
<i>[green]</i> GTO U	Q0031	GTO U
RCL J	Q0032	RCL J
RCL F	Q0033	RCL F
+	Q0034	+
STO J	Q0035	STO J
RCL E	Q0036	RCL E
<i>[green]</i> X?Y >	Q0037	X>Y ?
<i>[green]</i> GTO Q (7)	Q0038	GTO Q
-	Q0039	-
<i>[purple]</i> X?0 = (6)	Q0040	X=0 ?
<i>[green]</i> GTO Q (7)	Q0041	GTO Q
RCL E	Q0042	RCL E
STO J	Q0043	STO J
<i>[green]</i> GTO Q (7)	Q0044	GTO Q
<i>[green]</i> 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
<i>[green]</i> GTO Q (7)	H0010	GTO Q
<i>[green]</i> LBL P	P0001	LBL P
RCL H	P0002	RCL H
-	P0003	-
STO J	P0004	STO J
<i>[green]</i> GTO Q (7)	P0005	GTO Q
<i>[purple]</i> RTN	P0006	RTN
<i>[green]</i> 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
<i>[green]</i> 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] $\pi$ (pi)	J0007 $\pi$
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] $\pi$ (pi)	K0009 $\pi$
÷	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] $\pi$ (pi)	L0008 $\pi$
÷	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> $\pi$ (pi)	G0024 $\pi$
÷	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 <sup>2</sup>	G0047 X <sup>2</sup>
<i>[purple]</i> $\pi$ (pi)	G0048 $\pi$
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 <sup>2</sup>	G0058	X <sup>2</sup>
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
[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

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

**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)