

# HP-33S SURVEY and COGO Program

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

Melbard 10-21-08

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 >	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	

```

[green] LBL D (3)
X<>Y
STO K
X<>Y
XEQ R (8)
X<>Y
STO J
[purple] R↑
+
RCL K
+
2
÷
STO Y (3)
RCL J
-
RCL Y (3)
RCL K
-
x
RCL J
RCL K
x
÷
√ X (square root key)
[green] ASIN
2
x
R/S
RCL K
XEQ S (9)
[purple] RTN

[green] LBL T (4)
STO L
RCL Y (3)
+
180
X<>Y
-
SIN
RCL V (6)
x
RCL L
XEQ M
[purple] RTN

[green] LBL M
SIN
÷
[green] ABS
RCL K
X<>Y
XEQ S (9)
[purple] RTN

```

```

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

T0001 LBL T
T0002 STO L
T0003 RCL Y
T0004 +
T0005 180
T0006 X<>Y
T0007 -
T0008 SIN
T0009 RCL V
T0010 x
T0011 RCL L
T0012 XEQ M
T0013 RTN

M0001 LBL M
M0002 SIN
M0003 ÷
M0004 ABS
M0005 RCL K
M0006 X<>Y
M0007 XEQ S
M0008 RTN

```

**DISTANCE - DISTANCE Program**  
(Required for COGO)

```

[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 =
[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

```

```

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

```

```

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

```

**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	-
[purple] X?0 =	Q0030	X=0 ?
[green] GTO I	Q0031	GTO I
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 =	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

### VC High/Low Program

(Required only if you load the Vertical Curve Program)

### Area Program (Optional)

-	N0010 -
STO + E	N0011 STO+ E
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

**Horizontal Curve Program**  
when I and R are Known  
(Optional)

[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

**Horizontal Curve Program**  
when I and L are Known  
(Optional)

[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**  
when R and L are Known  
(Optional)

```

[green] LBL G
RCL A
[purple] -->HMS
RCL B
R/S
RCL C
RCL A
2
÷
TAN
RCL B
x
STO D
R/S
RCL A
2
÷
SIN
RCL B
x
2
x
18000
[purple]  $\pi$  (pi)
÷
RCL B
÷
[purple] -->HMS
R/S
RCL A
4
÷
TAN
RCL D
x
STO E
RCL A
2
÷
COS
RCL E
x
RCL E
X<>Y
R/S
RCL B
 $X^2$ 
[purple]  $\pi$  (pi)
x
RCL A
x
360
÷
STO F
RCL A
SIN

```

```

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

```

**Horizontal Curve Program**  
**Sub Routine** (Required, only  
if any Horizontal Curve  
Program above is loaded)

```

RCL B          G0057 RCL B
X2           G0058 X2
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  
(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**  
(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 >
[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)
[purple] RTN

```

```

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 RTN

```

**Stake out a Point Program**  
(Optional)

**Side Shot with Angle and Dist Program**(Optional)

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

C

to exit PRGM mode