

HP-41C

Surveying

Quick Reference Card

Traverses Inverses and Side Shots

(Minimum size 016)

Place TRAV overlay on keyboard.

[XEQ] TRAV and choose output modes.

Input beginning coordinates: N1 **[R/S]**, E1 **[R/S]**.

Bearing/Azimuth Traverse

Input BRG **[B]** and QD **[R/S]**, or AZ **[B]** and horizontal distance; HD **[D]**.

Or, Field Angle Traverse

Input Ref. Azimuth away from point; AZ **[H]**

Or, Ref. Azimuth toward point; AZ **[B]**

Or, bearing toward point; BRG **[B]** and QD **[R/S]**.

Then input:

Angle right; AR **C**

Or, angle left; AL **CHS** **C**

Or, deflection right; DR **■** **C**

Or, deflection left; DL **CHS** **■** **C**

And horizontal distance; HD **D**.

Press **R/S** to display results.

Repeat for next course.

Press **A** to start new traverse.

Inverse

Input beginning coordinates **A**, N1 **R/S**, E1 **R/S**. (Not required if inverting from current point.)

Input coordinates of next point; N **ENTER** E **■** **A**.

Press **R/S** to display results.

Repeat for next course.

Press **A** to start new traverse.

Sideshots

Occupied point is last point traversed.

For different occupied point; press **A** and input coordinates. (Caution: this destroys traverse data.)

Press **J** to set side shot mode. See SS.


Make sideshots in same way as traverse or inverse.

To return to traverse mode press **I**.



Slope Distance Reduction




Input slope distance; SD   and vertical or zenith angle; .

Horizontal distance is automatically input.

Press  to display results.




Closure for Traverses


Complete the closed traverse and begin closure:
Press , Σ HD is displayed. Press ,
AREA is displayed.


Input correct closing coordinates; N , E
 and press  to display closure azimuth
(or bearing) and closure distance.


To include error course; inverse to correct
coordinates and execute closure routine again.


Curved Sides for Traverses

Traverse to PC, input the angle to PT
Begin Curved Sides routine:  , input
central angle: DELTA .

Input radius: R  and display segment area.
(Note: input negative radius to exclude the
segment area from traverse.)

Press  to display tangent (T), arc length
(L) and chord (C).

Press  to input (C) as the horizontal distance
to PT.

Press  to display results.

Traverse Adjustments

(Minimum size 016)

Choose compass rule; XEQ COMP, or transit rule; XEQ TRANSIT

Answer DATA IN?. If traverse has just been run, Y R/S.

If data must be stored manually, N R/S.

If data must be stored: input beginning N R/S, beginning E R/S, Σ HD (compass rule only) R/S, ending N R/S, ending E R/S.

Answer the prompt OPEN?; if traverse is open, answer Y R/S and input correct end N R/S and correct end E R/S.

If traverse is closed answer N R/S.

For Transit Rule only; input coordinates of each point in order, beginning with second point and including the ending point. Then

XEQ ADJUST

Then input coordinates of points in order, beginning with second point and obtain adjusted coordinates for each point by pressing R/S. Repeat for each pair of coordinates.

Intersections

(Minimum size 014)

Begin intersections program; XEQ INTER and choose type of intersection.

Bearing-Bearing (BB); press A

Bearing-Distance (BD); press B

Distance-Distance (DD); press C

Offset from point to line (OFS); press **[D]**
Follow prompting; input coordinates of points
1 and 2 and bearings or distances from the
points.
Obtain results by pressing **[R/S]**.

Curve Solutions

(Minimum size 005)

Place CURVE overlay on keyboard.

Begin curve solutions program; **[XEQ] CURVE**

Input radius (R), or press **[R/S]** and input
degree of curve (D), or press **[R/S]** and input
central angle (DELTA).

If R or D, and DELTA were input press **[R/S]**
to obtain results.

If only one of the above was input see prompt:
L T C M E.

Input:

Arc length; L, press **[A]**,
or Tangent; T, press **[B]**,
or Chord; C, press **[C]**,
or Midordinate; M, press **[D]**,
or External; E, press **[E]**.

Then press **[R/S]** to obtain results.

To start over; press **[] [A]**

To calculate L, T, C, M and E, press **[] [B]**

To calculate areas; press **[] [C]**

(Note: For D, by chord definition, set mode by
pressing **[] [E]**.)

Horizontal Curve Layout

(Minimum size 014)

Place HORIZ overlay on keyboard.

Begin horizontal curve layout; **[XEQ]** HORIZ

Input R (or D) and DELTA.

Press **[R/S]** to calculate L.

Input PC **[R/S]** or press **[R/S]** and input PI **[R/S]**.

Press **[R/S]** to display PT, PI and PC.

Input station; STA **[G]** and display prompt for type of layout: PC PI TO CO

Choose type of layout:

PC deflection; press **[A]**

PI deflection; press **[B]**

Tangent Offset; press **[C]**

Chord Offset; press **[D]**

Press **[R/S]** to display field data.

Input next desired station; STA **[G]** and proceed as above or, if automatic stationing is desired, input stationing interval; INT **[I]** and proceed as above, choosing type of layout. Then continue to press **[R/S]** and obtain field data until PT is reached.

Vertical Curves and Grades

(Minimum size 014)

Place VERT overlay on keyboard.

Begin program; **[XEQ]** VERT and answer

CURVE? prompt **Y** **[R/S]** for vertical curves or **N** **[R/S]** for straight grades.

For Grades:

Input beginning station; STA1 **[R/S]**, elevation at beginning station; EL1 **[R/S]** and GRADE % **[R/S]**.

For Vertical Curves:

Input PC **[R/S]**, or press **[R/S]** and input PI **[R/S]**.

Input elevation of PC or PI (whichever was input above), EL **[R/S]**.

Input beginning grade; GRADE BEG% **[R/S]** and ending grade; GRADE END% **[R/S]**.

Input horizontal length of curve; L **[R/S]** or press **[R/S]** and input elevation of the high or low point of the curve; EL0 **[R/S]**, or press **[R/S]** and input station and elevation through which the curve passes; STA **[R/S]**, EL **[R/S]**.

For Either Case:

Input station; STA **[G]** and press **[R/S]** to find its elevation.

Or, input elevation; EL **[H]** and press **[R/S]** to find station (2 stations for curves).

Or (for vertical curves only), press **[J]** to find max. or min. station; press **[R/S]** for corresponding elevation.

For Automatic Stationing:

Input stationing interval; INT **[I]** and press **[R/S]** to display results. (For curve, automatic stationing will halt at PT.)

Resection

(Minimum size 016)

Begin resection program; **[XEQ] RESECT** and answer **Y [R/S]** if coordinates are known or **N [R/S]** if they are not known.

If Coordinates Are Known:

Input coordinates of points 1 through 3 in clockwise order, pressing **[R/S]** after each.

Or, if Coordinates Are Not Known:

Input distances between points 1 and 2 and points 2 and 3, then input angle C, pressing **[R/S]** after each.

In Either Case:

Input angles A and B, pressing **[R/S]** after each; press **[R/S]** to obtain answers.

Predetermined Area

(Minimum size 014)

Begin predetermined area program; **[XEQ] PREAREA** and see prompt: **TRIΔ?**

Answer **Y [R/S]** if land parcel is a triangle, **N [R/S]** if a trapezoid. Press **[R/S]** and see prompt: **COORDS?**

Answer prompt; **Y [R/S]** if coordinates are known, **N [R/S]** if unknown.

For Triangular Parcels:

Input coordinates of points 1 and 2 and bearing from point 2 to 3, or, (if coordinates are not known), input angle at point 2 and horizontal distance from point 1 to point 2, pressing **R/S** after each.

See prompt: AREA=?

Input the desired area, press **R/S** to obtain the results.

For Trapezoidal Parcels:

Input coordinates of point 1, bearing of line from 1 to 3, coordinates of point 2, bearing of line from 2 to 4. Or, (if coordinates are not known), input angles at points 1 and 2 and the distance from point 1 to point 2, pressing **R/S** after each.

See prompt: AREA=?

Input the desired area, press **R/S** to obtain the results.

Volume by Average End Area

(Minimum size 014)

Begin program; **XEQ** **ENDVOL** and see prompt: CU YDS?

Choose volume output:

Y **R/S** if in cubic yards;

N **R/S** if in cubic feet.

Press **R/S**, see STA#, then press **R/S** for prompt: EL↑D=?

Input elevation; EL **ENTER** and distance; D **R/S** for each point on the cross-section.

Continue around section until all points have been input, including reinput of the beginning point.

(Note: If a section has zero area press **R/S** without entering data.)

Press **R/S** and input interval between stations: INT **R/S**. Press **R/S** to obtain results.

(Note: Input INT=0 for first station.)

Volume of a Borrow Pit

(Minimum size 014)

Begin program; **XEQ** PIT and see prompt: CU YDS?

Choose volume output;

Y **R/S** if in cubic yards,

N **R/S** if in cubic feet.

Press **R/S** see STA#, then press **R/S** for prompt B↑H=?

Input base (or width); B **ENTER** and height (or length) H **R/S** of the triangular (or rectangular) section.

Input elevation at each corner; EL **R/S**.

After last elevation (third for triangular, fourth for rectangular) is input, press **R/S**, *without data entry*, to obtain results. Then go to the next station by pressing **R/S**.

Coordinate Transformation

(Minimum size 014)

Begin program; **XEQ** **COORD** , see prompt
ROT.Δ=?

If Rotation Angle is Known:

Input rotation angle (negative for clockwise rotation); **R/S**, and scale factor (if other than 1), press **R/S**.

Input coordinates of a point in the old system; N1 OLD **R/S**, E1 OLD **R/S** and coordinates of same point in new system; N1 NEW **R/S**, E1 NEW **R/S**.

Or, if 2 Points in Each System Are Known:

At prompt; ROT.Δ=? press **R/S**, *without prior data entry*. Then input coordinates of points 1 and 2 in the old system; N1 OLD **R/S**, E1 OLD **R/S**, N2 OLD **R/S**, E2 OLD **R/S** and coordinates of same points in new system; N1 NEW **R/S**, E1 NEW **R/S**, N2 NEW **R/S**, E2 NEW **R/S**.

To Transform Coordinates From Old to New System:

Input coordinates in old system; N **ENTER**
E **A** and obtain coordinates in new system.
(Press **R/S** to obtain E.)

To Transform Coordinates From New to Old System:

Input coordinates in new system; N **ENTER**
E **B** and obtain coordinates in old system,
(press **R/S** to obtain E).



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