PENTAX®

ELECTRONIC TOTAL STATION

PTS-V SERIES

OPERATING PROCEDURES OF SPECIAL FUNCTIONS

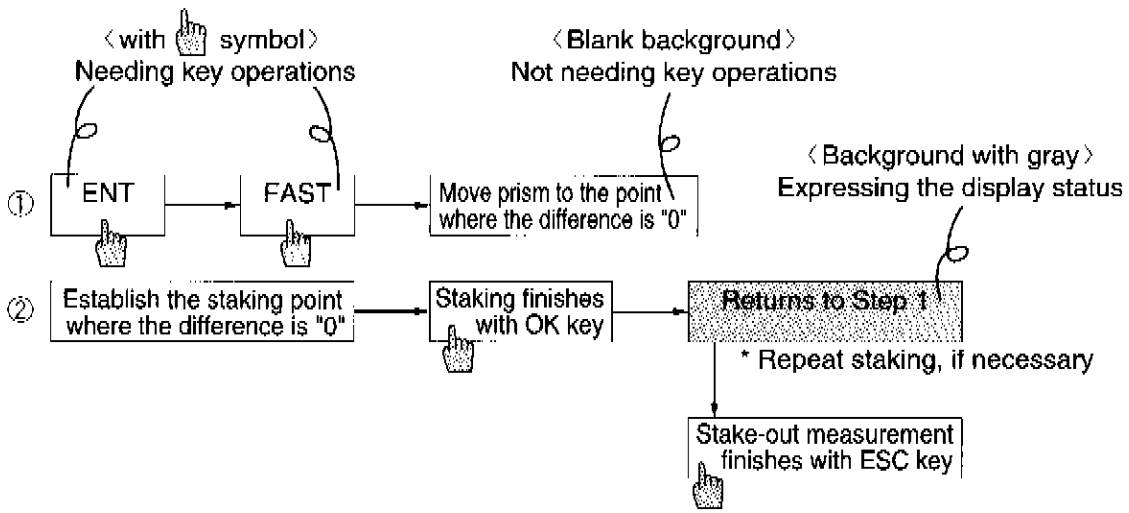
ASAHI PRECISION CO.,LTD.

Operation procedures of special functions 1

This manual is a reference for the operation procedures of the special functions (18 application programs) in the manner as described below.

1 General pictures of measurement
  This illustrates the content of the program.
2 Flow of the operation and conceptional drawings of the operation
  This illustrates the general operational flow of each operation.
3 Operation procedures
  This describes the actual operation procedures.

Since detailing the operation procedures of each program would cause unnecessary complexity and size, this manual shows detail for" Coordinate Stake-Out Measurement" only, as an example. Descriptions of the other programs are simplified. The guide messages, however, of each step of the operation help you to proceed in a proper manner for the other programs. We are confident ,therefore, that you will be able to use the other application programs once you are familiar with the operation of "Coordinate Stake-Out Measurement" program.
The flow chart, of the operation procedures, has 3 types of information as illustrated below: those needing key operations,those not needing key operations and those expressing display status.



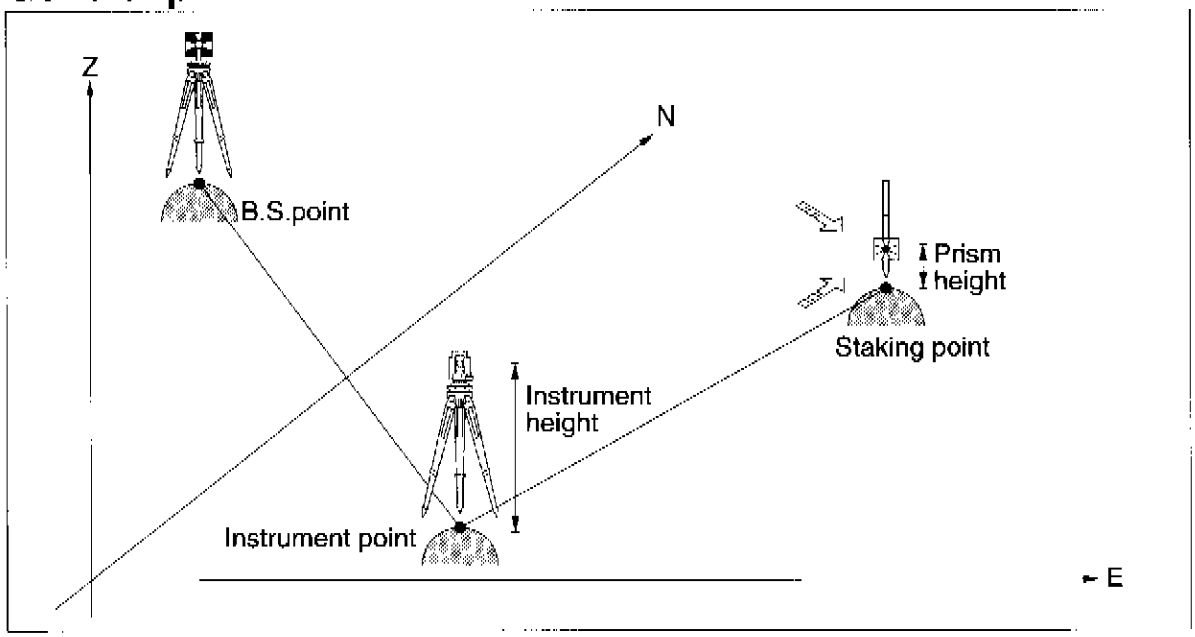
For further information, please contact your local Pentax Authorized dealer.

2 Coordinate Stake-Out Function Command No.109

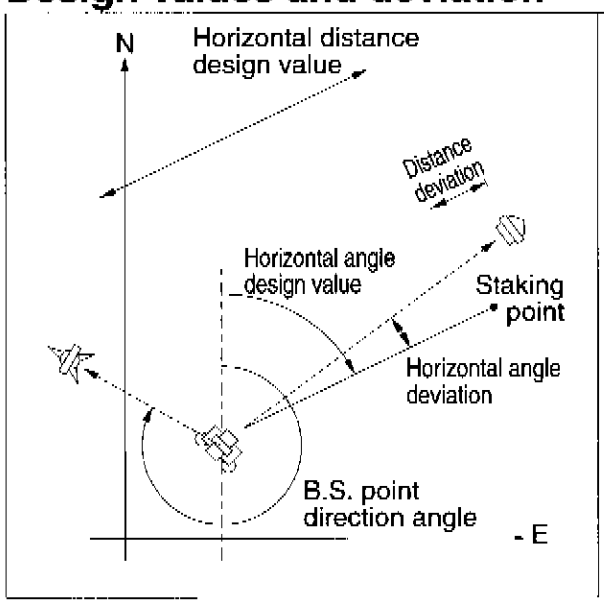
General pictures of measurement

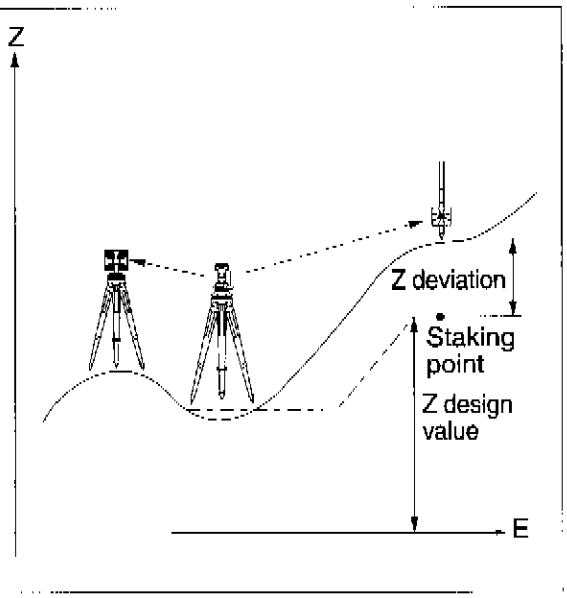
In coordinate stake-out measurement, coordinates can be staked out in three dimensions, based on the instrument coordinates and backsight coordinates which are already known, or on the back sight directional angle and the instrument point coordinates. The horizontal angle to the stake-out point and the horizontal distance are calculated automatically as the design values, and the difference between the calculated values read during measurement is displayed as the deviation. Also, with coordinate stake-out measurement, "s/S compensation" (scaling compensation towards the coordinates of the horizontal plane angle, or scale correction) can be carried out. (For more information on s/S Compensation, please refer to page 61.)

General picture



Design values and deviation

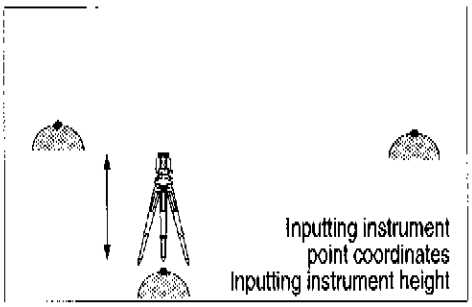




Operation procedures and Operative illustrations

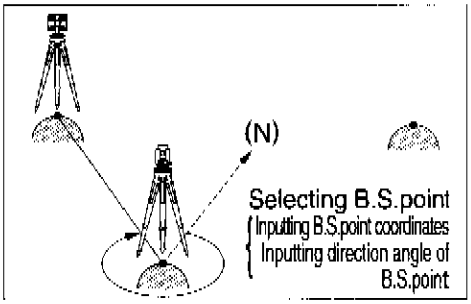
INPUT S.P

STEP 1



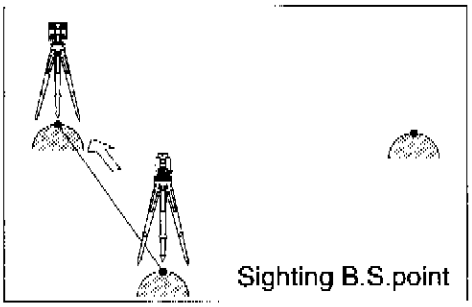
1→NEZ B.S.P

2. AZIMUTH STEP 2



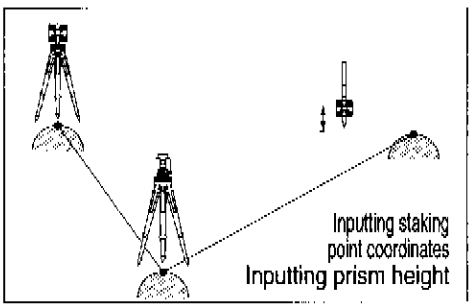
AIM B.S.POINT

PRESS ENT STEP 3



INPUT STK.P

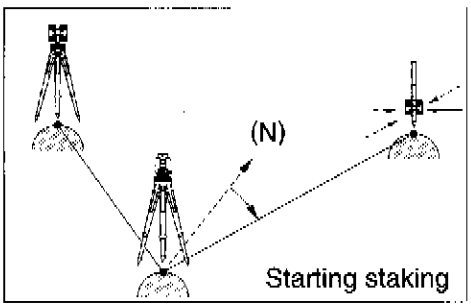
STEP 4



STAKING START

STEP 5

MEAS TRACK OK



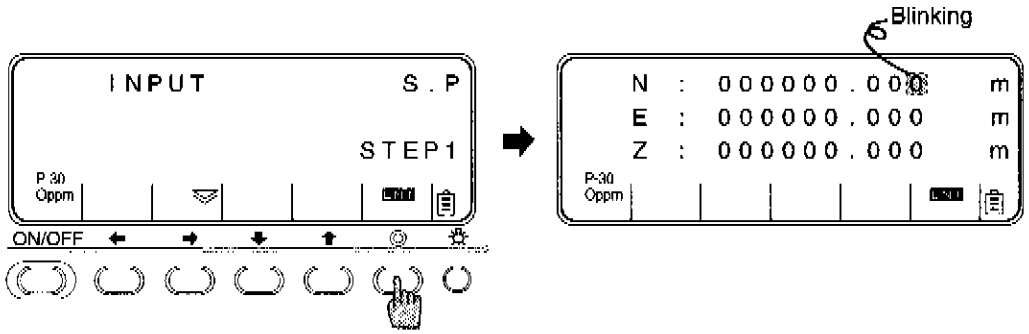
4 Coordinate Stake-Out Function Command No.109

Operation procedures

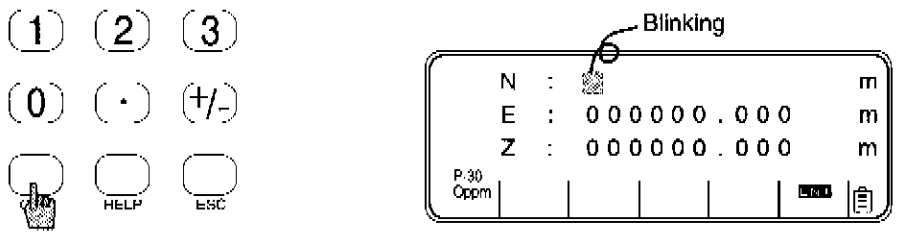
Press number keys as [007109], and press [ENT] to access STEP 1 in the coordinate stake-out measurement.

Step 1 Inputting the instrument coordinates(NEZ) and instrument height

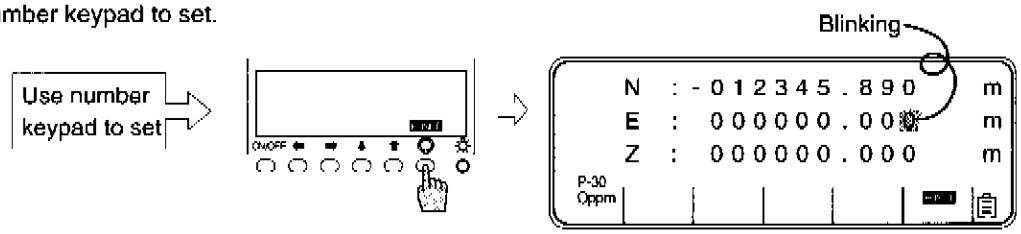
1 Press [ENT] key to display the screen where the instrument coordinates"NEZ" are entered.



2 Press [CLR] key to delete the "N" data.

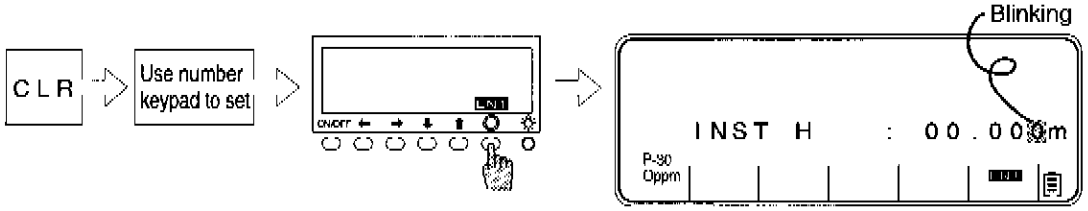


3 As an example, let's input a value of "-12345.890". To input the value for coordinate "N", press the number keys in the following order. [+/-] [1] [2] [3] [4] [5] [.] [8] [9] [0]. Press [ENT] key and move the cursor to [E]. Use number keypad to set.

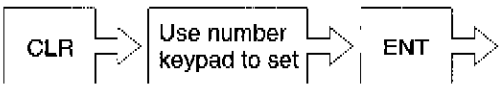


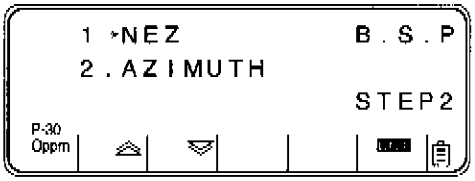
4 Set the "E" coordinate in the same way; first press [CLR] to clear and then enter a new value for the instrument coordinate "E" using the numeric keys. Then press the [ENT] key to input the setting.

5 Finally, repeat the process for the "Z" coordinate, first pressing [CLR] and then using the numeric keys to enter a new values. Then press the [ENT] key to input the setting.



6 In the same way as for the instrument height, press [CLR] to delete the previous value, and use the numeric keys to input the new value. Pressing the [ENT] key changes the screen to the "STEP 2" screen.

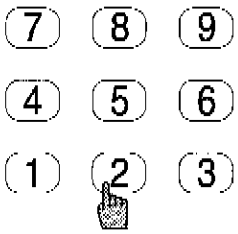


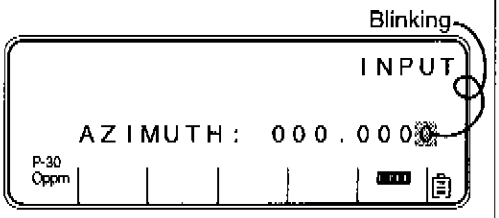


* At STEP 2, the [CLR]key should be pressed to clear the data even if the previous value is "000.000".
* At STEP 5, if there is no need to enter a Z coordinate, leave the data as "000.000", or simply press the [CLR] key and then press the [ENT] key. This sets a Z coordinate of "0".

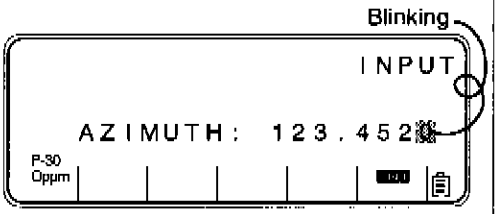
Step 2 Inputting the backsight coordinates or the backsight azimuth angle

1 As an example, we will select a backsight azimuth angle and input a value of 123° 45' 20". Use the number "2" key to select " 2. AZIMUTH ANGLE".

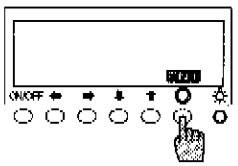


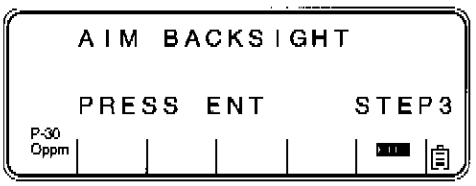


2 Press [CLR] key to delete the previous data set for azimuth angle, and then, using the numeric keys, input the following value: [1] [2] [3] [.] [4] [5] [2] [0]. This sets the backsight direction angle.



3 Pressing the [ENT] key stores the value and changes the screen to the "STEP 3" screen.



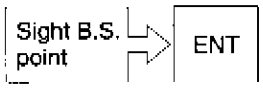


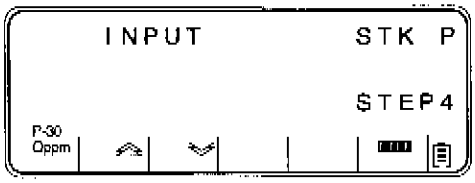
* At STEP 2, the [CLR] key should be pressed to clear the data even if the previous value is "000.000.
* In setting of 123° 45' 20" entered at STEP 2, a decimal is used where the degree mark would be, and no separation is made between the minutes and seconds.

6 Coordinate Stake-Out Function Command No.109

Step 3 Sighting the backsight point

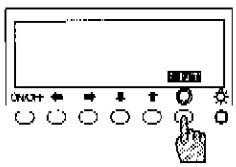
Following the guide messages on the screen, sight the back- sight point and press the [ENT] key. The screen changes to the "STEP 4" screen.

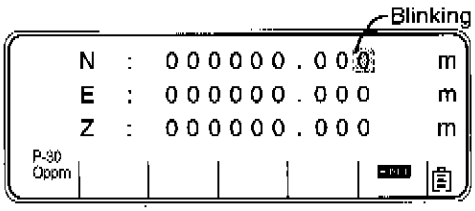




Step 4 Inputting the stake-out point coordinates (NEZ) ad the prism height

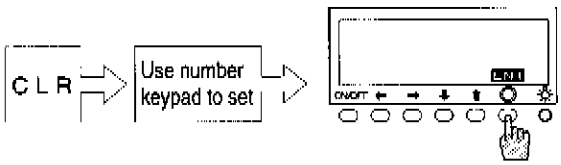
1 Press the [ENT] key to bring up the screen where the staking point coordinates "NEZ" are input.

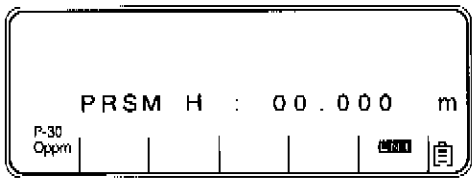




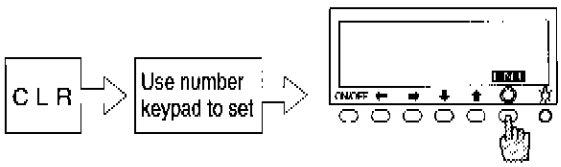
2 In the same way as for STEP 1, enter the data for the N,E, and Z coordinates.

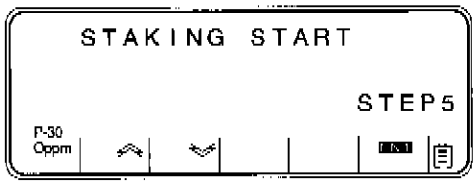
3 When the "Z" coordinate data has been entered and the [ENT] key pressed, the screen changes to the prism height input screen.





4 Input the prism height in the same way. When the [ENT] key is pressed, the screen changes to the "STEP 5" screen.

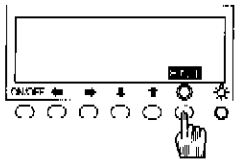


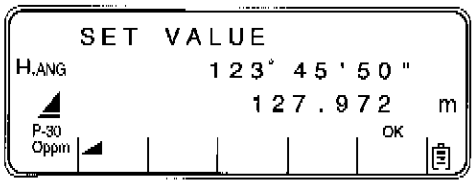


* At STEP 3, if there is no need to enter a Z coordinate, leave the data as "000.000", or simply press the [CLR] key and then the [ENT] key. This stores a Z coordinate of "0"

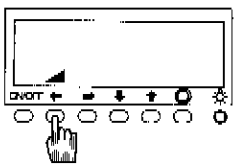
Step 5 Starting Stake-out measurement

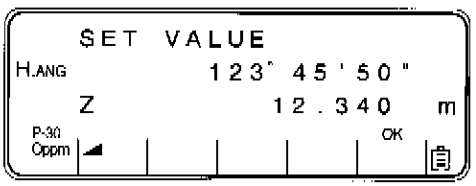
1 Press the[ENT] key to bring up the screen where the value entered for the staking point coordinates can be confirmed. The design values calculated using the data entered in STEP 1 to STEP 4 are displayed on the screen.



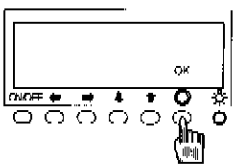


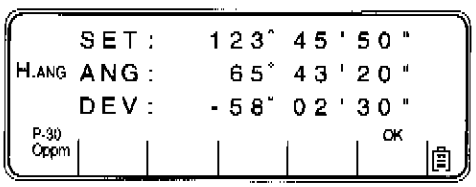
2 Press the [◢] key to confirm the Z value.



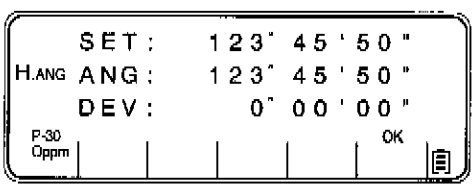


3 Pressing [OK] changes to the horizontal angle setting screen, with the "SET", "ANG", and "DEV" displayed.

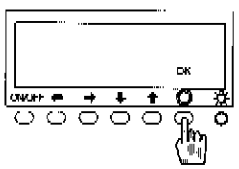


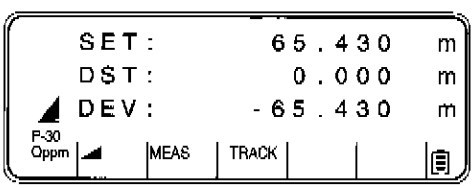


4 Rotate the instrument,using the upper H. motion, until the "DEV" reads "0" (or as close to "0" as possible), and lock the rotation of the horizontal direction of the instrument.



5 Press [OK] to move to the distance measurement screen, where "SET", "DST" and "DEV" are displayed.





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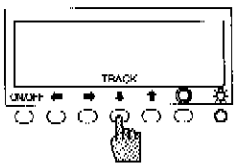
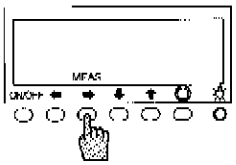
6 Move the prism to the sighting direction of the telescope, and press the [TRACK] key to measure to the prism.

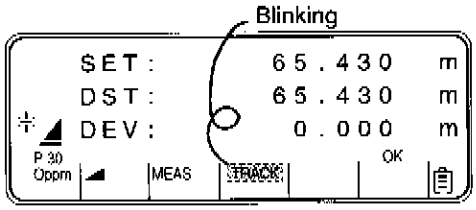


⇒ Sight to prism

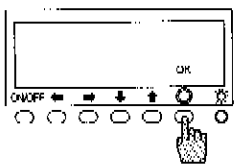
7 Move the prism in the direction in which the "DEV" approaches "0".

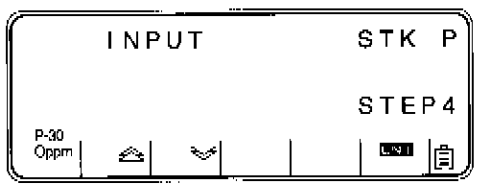
8 When the "DEV" has come close to "0", press [MEAS] key to switch to normal distance measurement. Continue measuring until you find the exact point where "DEV" becomes "0". This concludes stake-out of the No.1 point.





9 Pressing [OK] key takes you back to STEP **4**. Repeat the process for the No.2 and No.3 points if there are any.



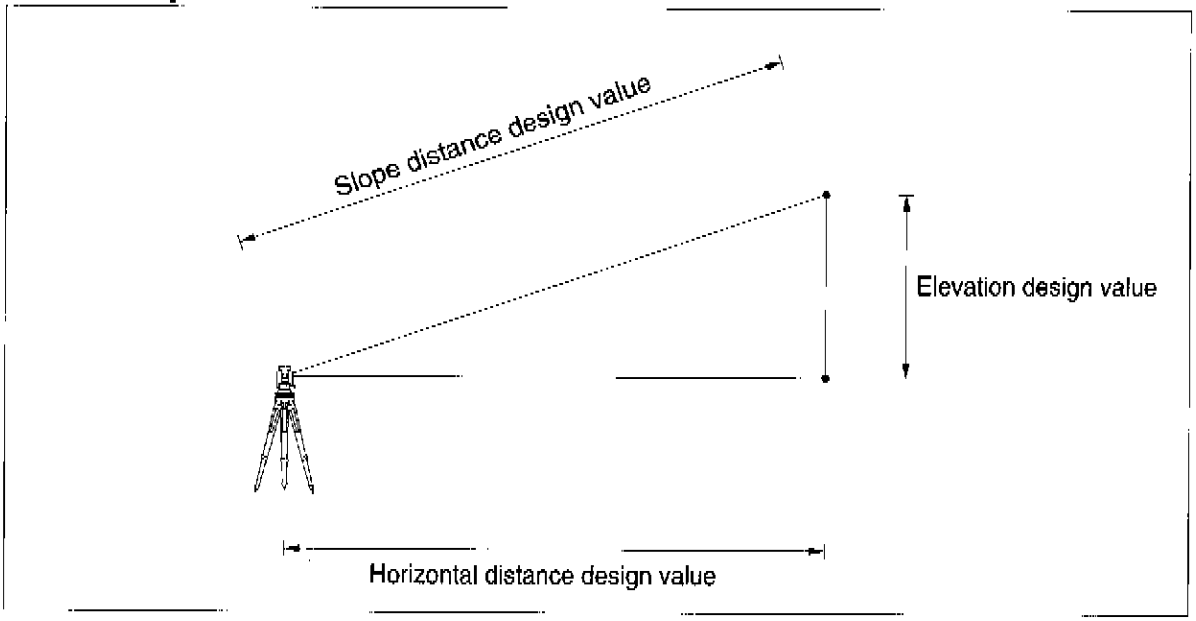


* If the minimum angle unit is not set to (1"/2cc), there may be times when you can not get a value that is exactly "0".
* When tracking the prism in STEP **6**, continuous measurement is carried out once the [TRACK] key has been pressed after the ground position of the prism has been determined. Using shot measurement in normal distance measurement mode is the most efficient way to find the precise position of the prism.
* Each time the [◢] is pressed, the display changes in sequence from "Horizontal distance" to "Height Z" to "Horizontal design value". Data input using this function is retained in the memory when the power is turned off, and all data except the staking point coordinates can be used in common with other functions.
* To exit a special function, or to interrupt it and go back to the [A MODE] screen, press the [ESC] key several times, until the screen returns to the [A MODE] screen. (The number of times the [ESC] key has to be pressed varies depending on the point at which the key is pressed.)

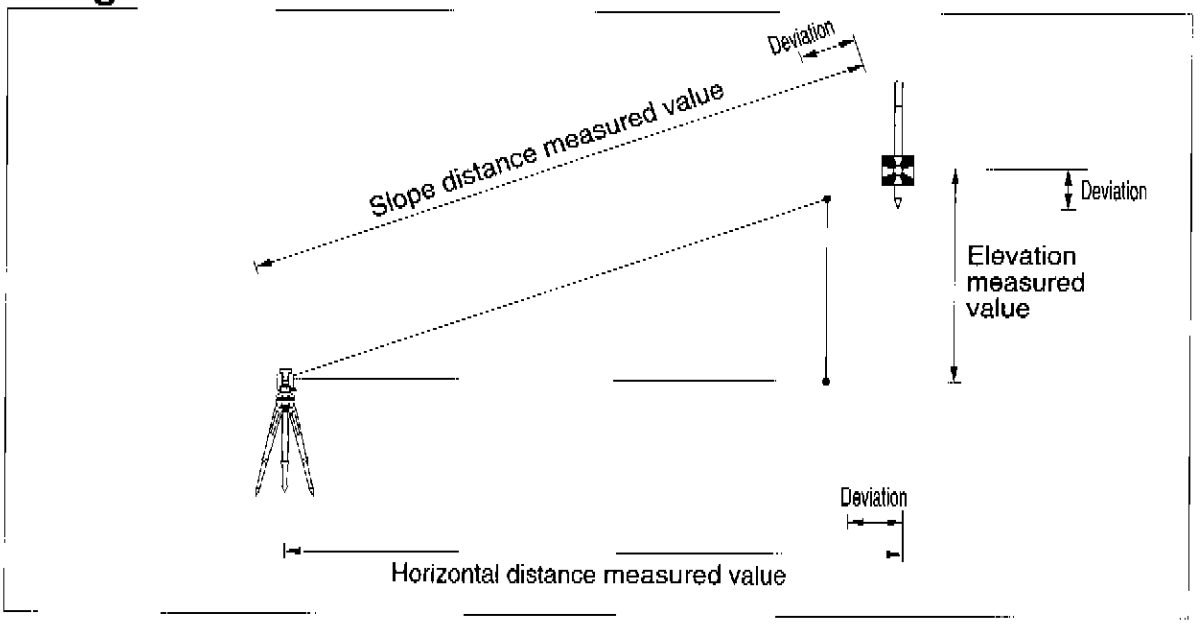
General pictures of measurement

With distance stake-out measurement, the difference between the input design values (specified distance) and the distance to the prism is displayed, making it easier to stake a point.

General picture

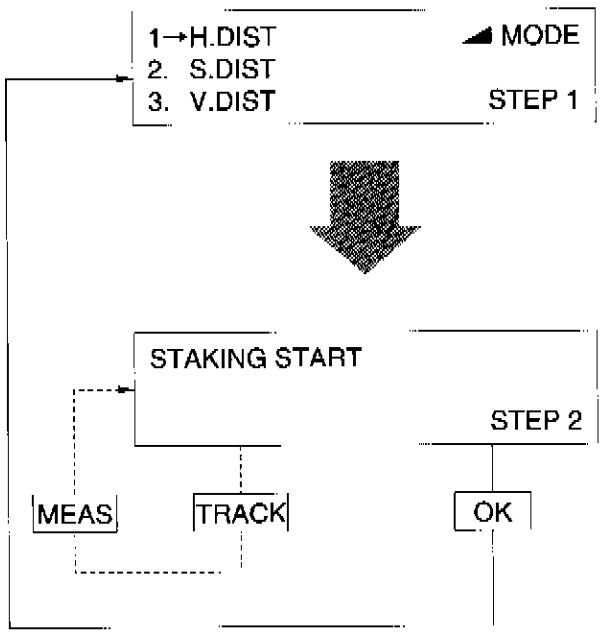


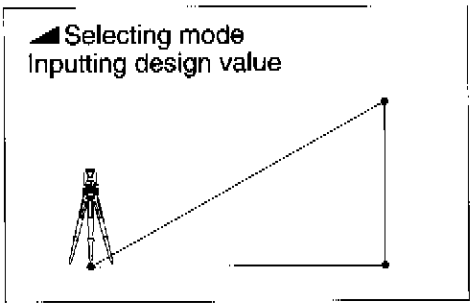
Design values and deviation

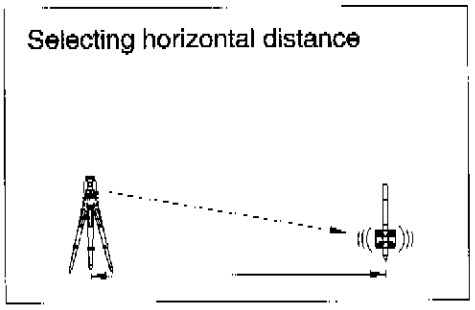


10 Distance Stake-Out Function Command No.101

Operation procedures and operative illustrations







* When the deviation is "minus", move the prism backwards, and move it forwards when the deviation is "plus" to make the deviation to "0".
* When interrupting the function, press [ESC] a couple of times. The screen returns to special function menu screen.

Distance Stake-Out Function Command No.101 11

Operation Procedures

Press number keys as [007101], and then press [ENT] to access STEP 1 of the distance stake-out function.

Step 1 Selecting the distance to be displayed and inputting the design values

① Select "1. Horizontal Distance" with the number (1) key

② Input the stake-out value → ENT → Go to Step 2

Step 2 Starting the measurement

① ENT → Fast distance measurement → Move the prism to the ground point where the difference is "0"

② Use the ground point where the difference is "0" as the stake- out point

③ Use the [OK] key to exit the distance stake-out function → Go back to Step 1 → If necessary, repeat the measurement

Use the [ESC] key to exit the distance stake-out function

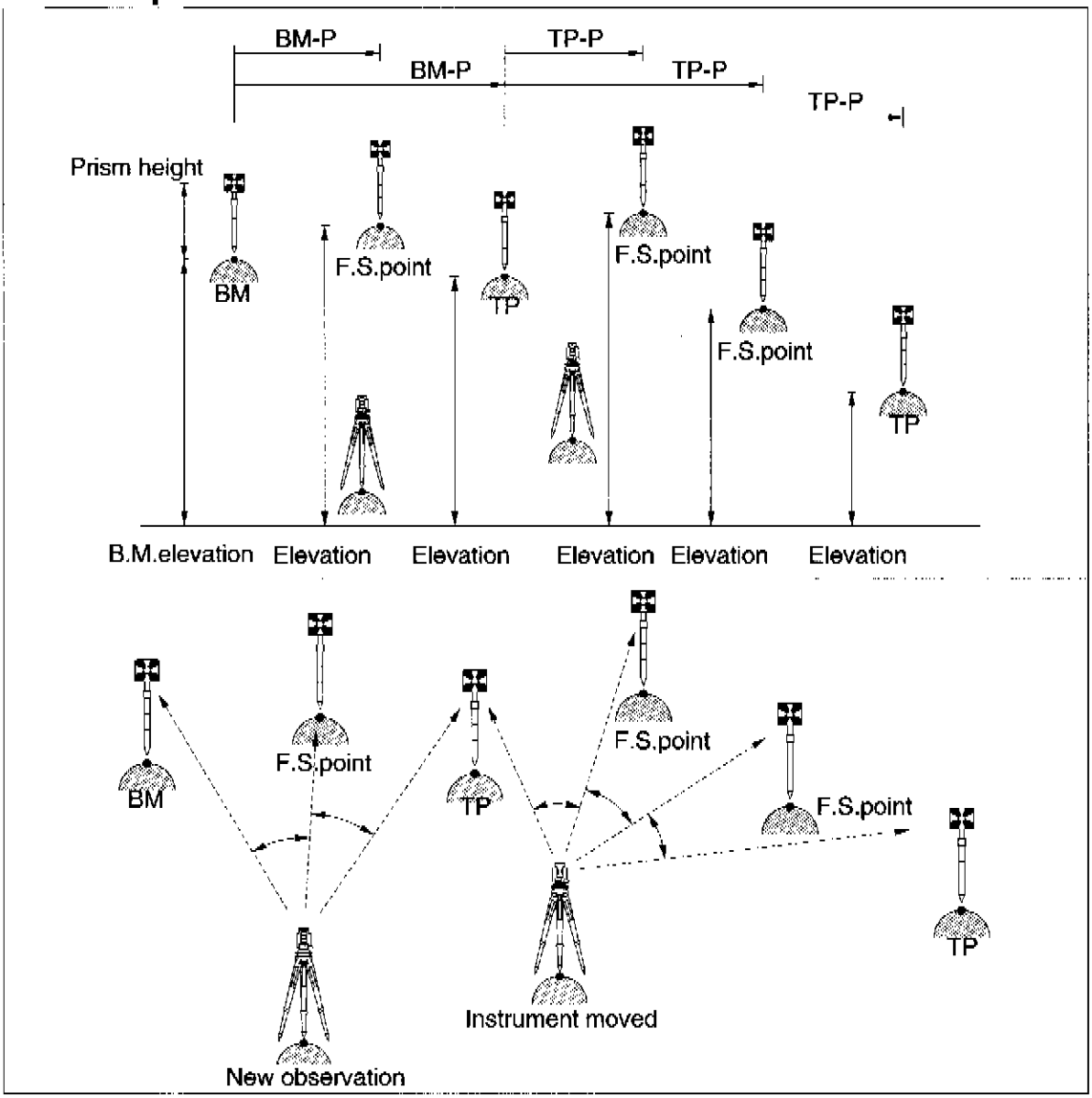
* In STEP 2, the [◢] key can also be used to change to the angle display.

12 Leveling Function Command No.102

General pictures of measurement

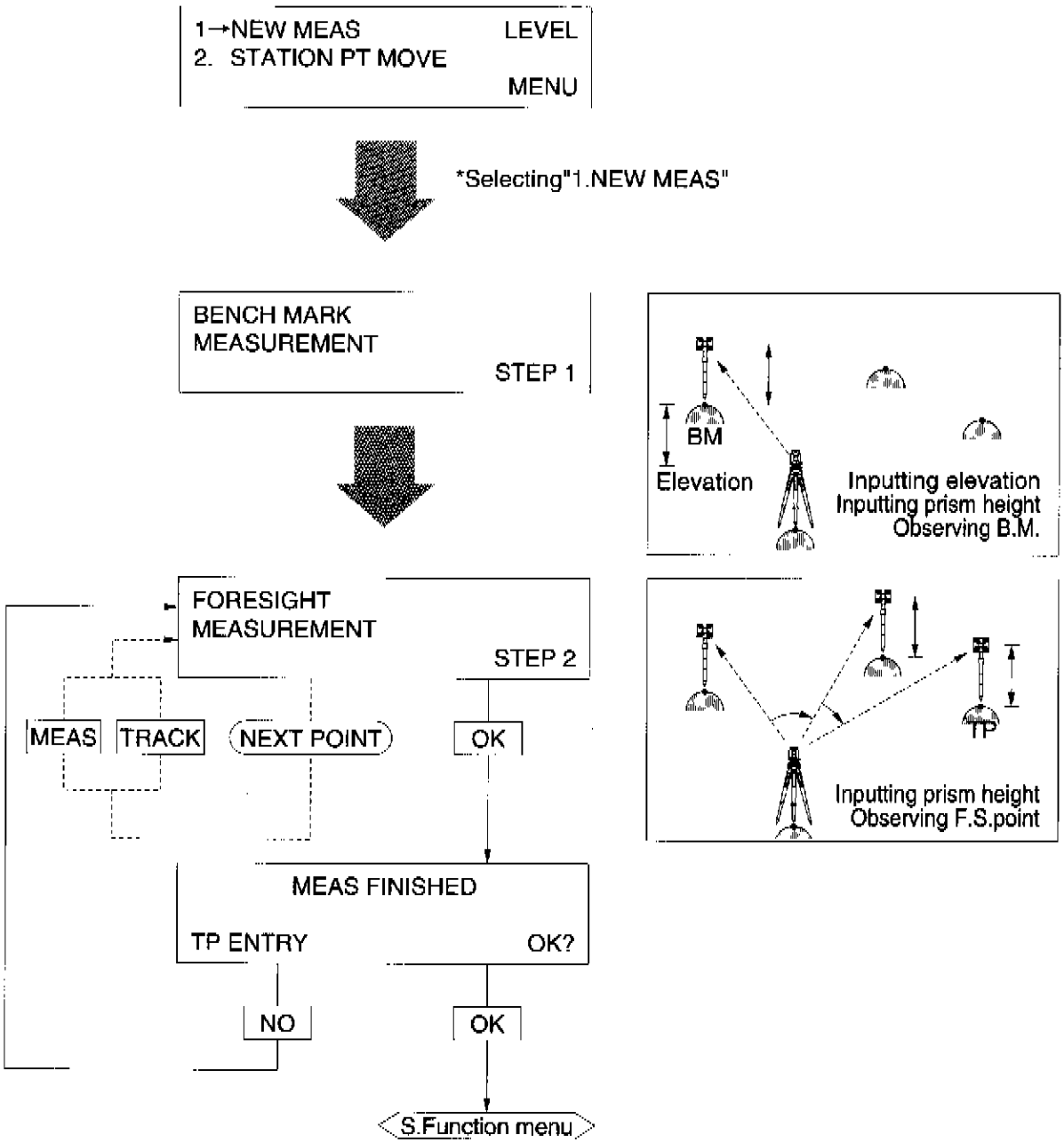
With the leveling measurement , the elevation of the observation point , and the horizontal distances to the bench mark and the various observation points can be calculated and displayed by entering the elevation of the bench mark (BM).

General pictures



Operation procedures and operative illustrations

[When selecting the new observation point]

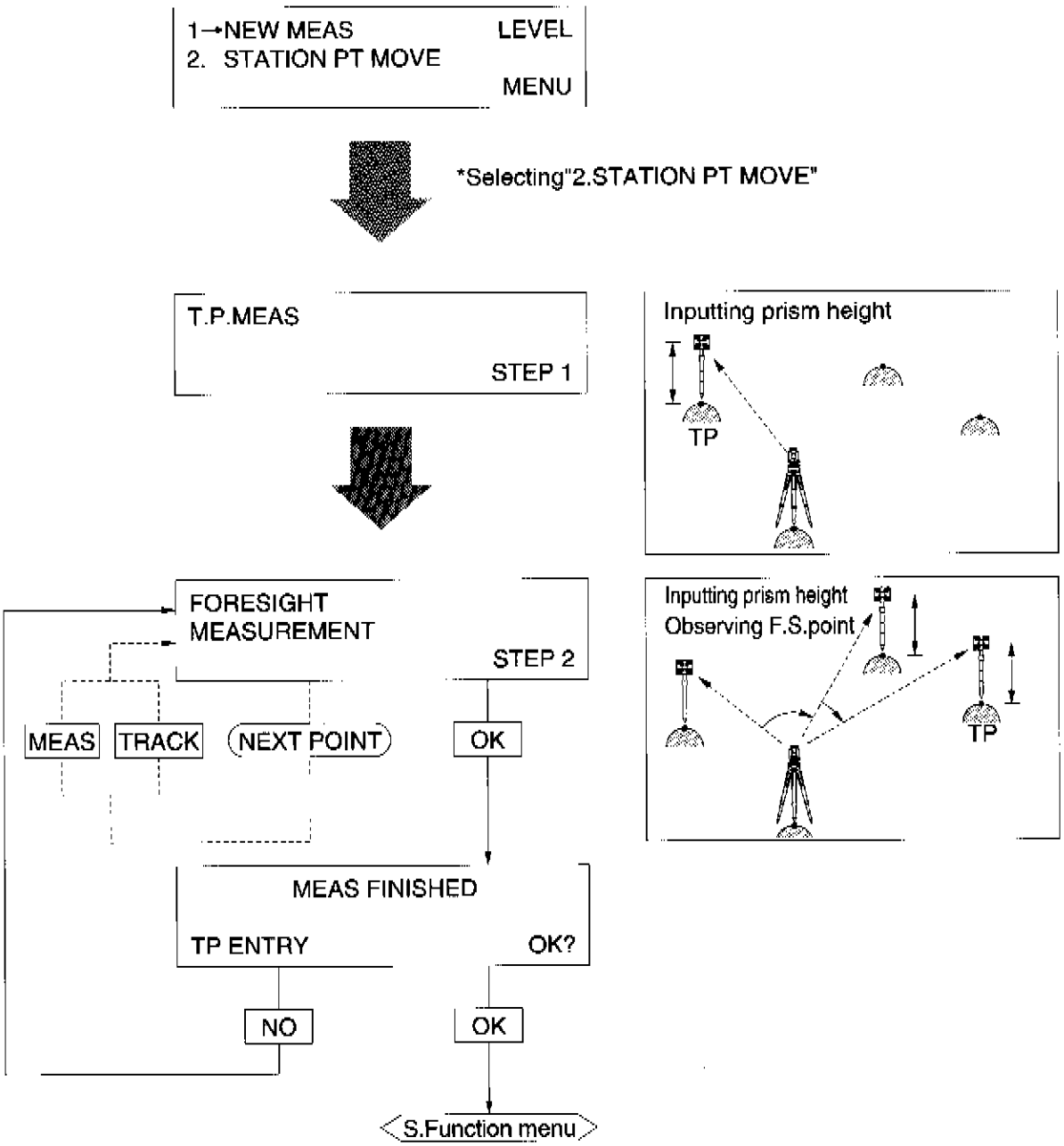


* Any number of foresight points can be observed by repeatedly pressing [MEAS] in STEP 2. When moving the instrument, press [OK] key to register the TP after observing the point which will be the turning point.
* Pressing [ESC] key a couple of times interrupts the function. The screen returns to the special function menu screen.

14 Leveling Function Command No.102

Operation procedures and operative illustrations

[When selecting the instrument moved]

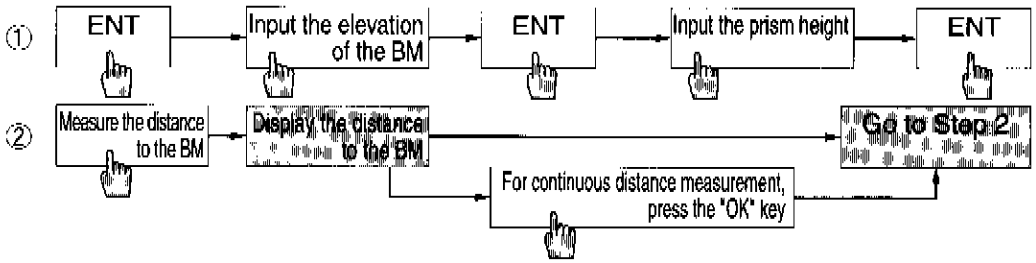


* Pressing [ESC] key interrupts the function. The screen returns to the special function menu screen.

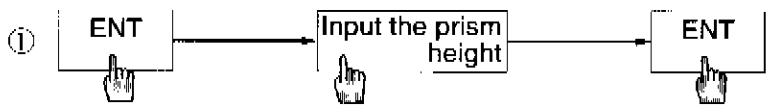
Operation procedures

Press number keys as [007102], and then press [ENT] key to initiate [Leveling Function]. Select "1. New Observation " with the number (1) key to access STEP **1**.

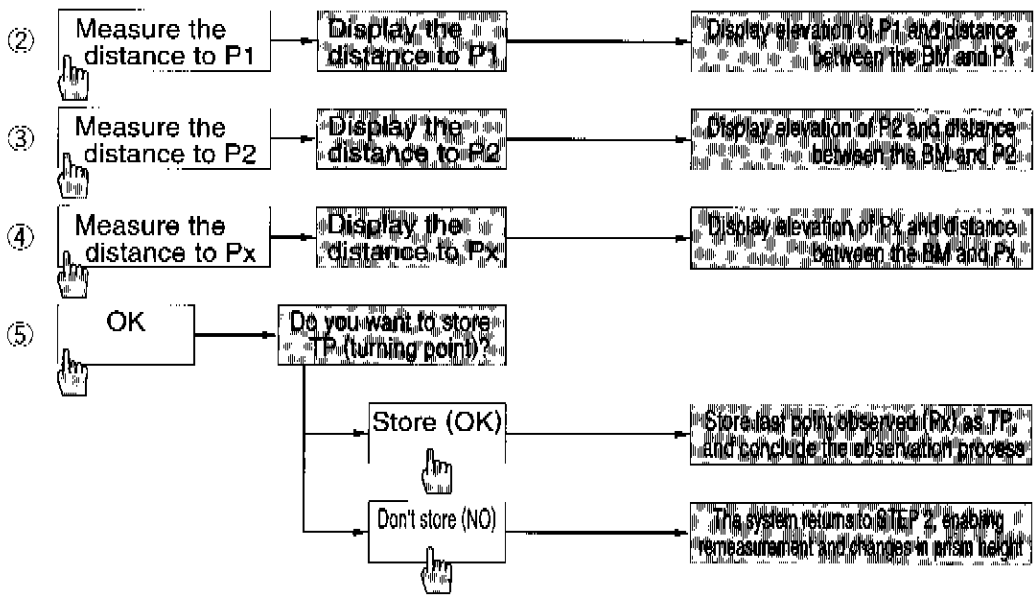
Step 1 Observing the bench mark (BM)



Step 2 Observing the foresight point (P1)



* If the prism height is the same as that in Step 1, simply press the "ENT" key.



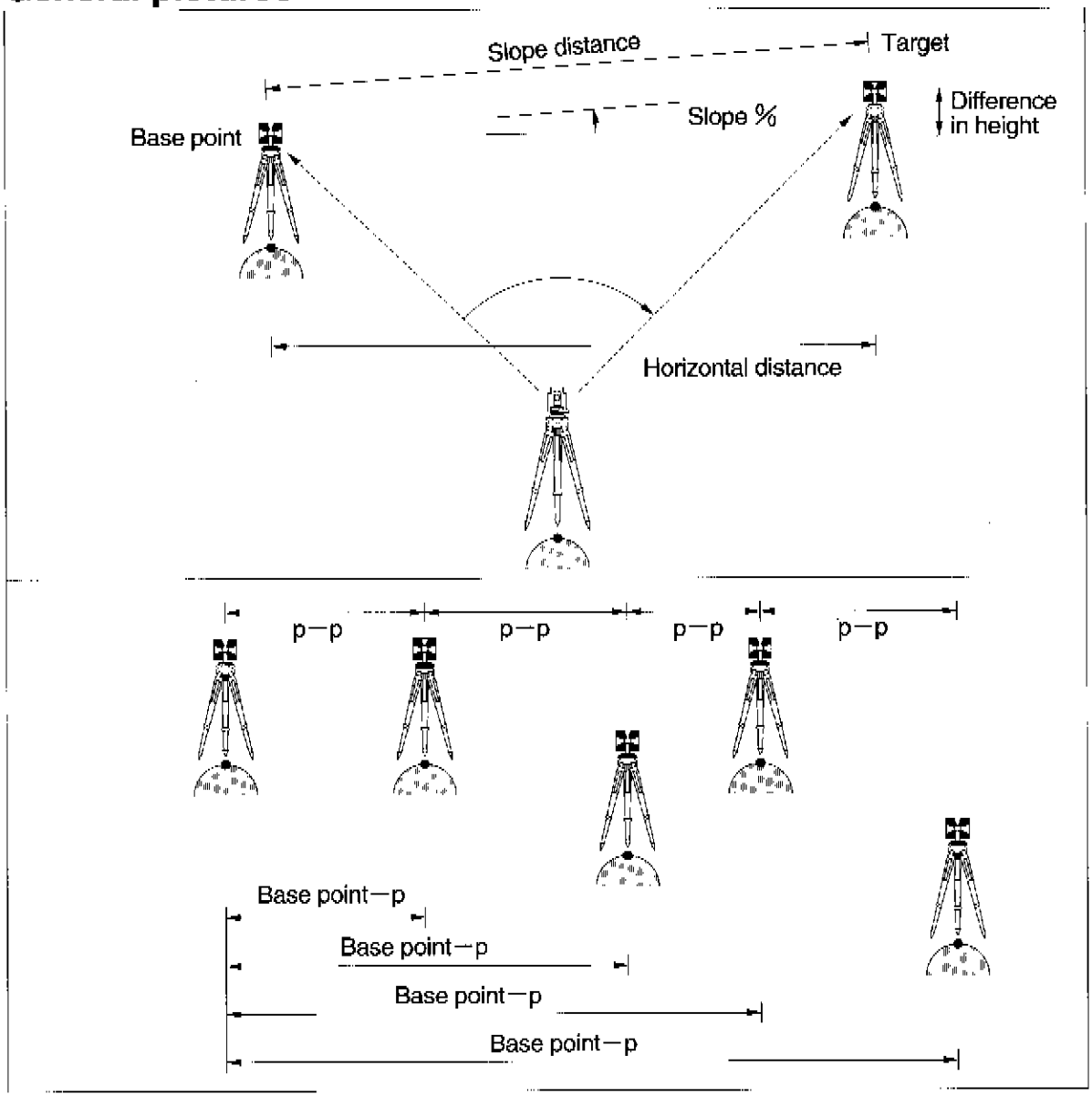
* If the instrument will be moved from one point to another, first select new observation, and then, after the instrument point is moved, select "Instrument Moved". If the instrument will be moved after a measurement, always make sure the last turning point (TP) is always stored.

16 RDM Function Command No.103

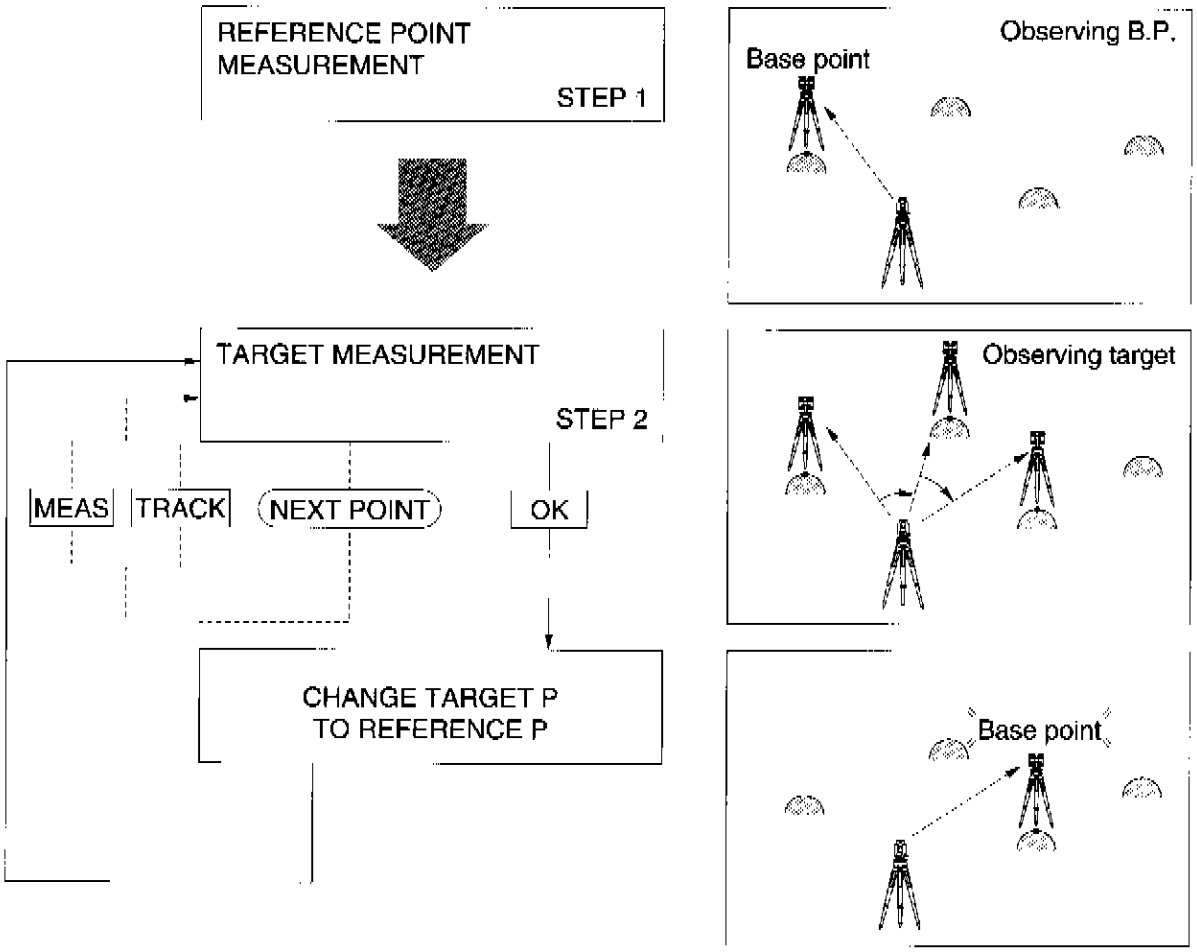
General pictures of measurement

With RDM measurement, the horizontal distance, vertical distance, the slope distance and the percentage of slope between the base point and the prism at the observation point are measured. The base point can be changed to any desired observation point.

General pictures



Operation procedures and operative illustrations



* Use [◢] to select the desired distance mode ,horizontal distance, slope distance, vertical distance or percentage of slope, in STEP 2.
* Pressing [ESC] key a couple of times interrupts the function. The screen returns to the special function menu screen.

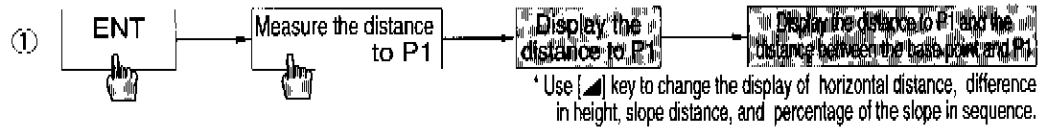
18 RDM Function Command No.103

Operation procedures

Press the number keys as [007103],and press [ENT] to access RDM Function.

Step 1 Observation of the target point

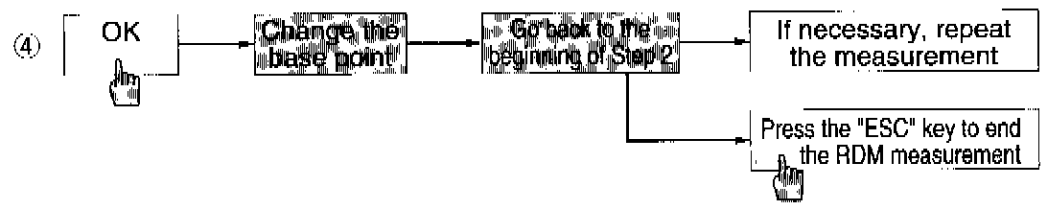
Step 2 Observation of the distance to the target point (P1)



* Use [◢] key to change the display of horizontal distance, difference in height, slope distance, and percentage of the slope in sequence.

* Use [◢] key to change the display of horizontal distance, difference in height, slope distance, and percentage of the slope in sequence.

* Use [◢] key to change the display of horizontal distance,difference in height,slope distance, and percentage of the slope in sequence.

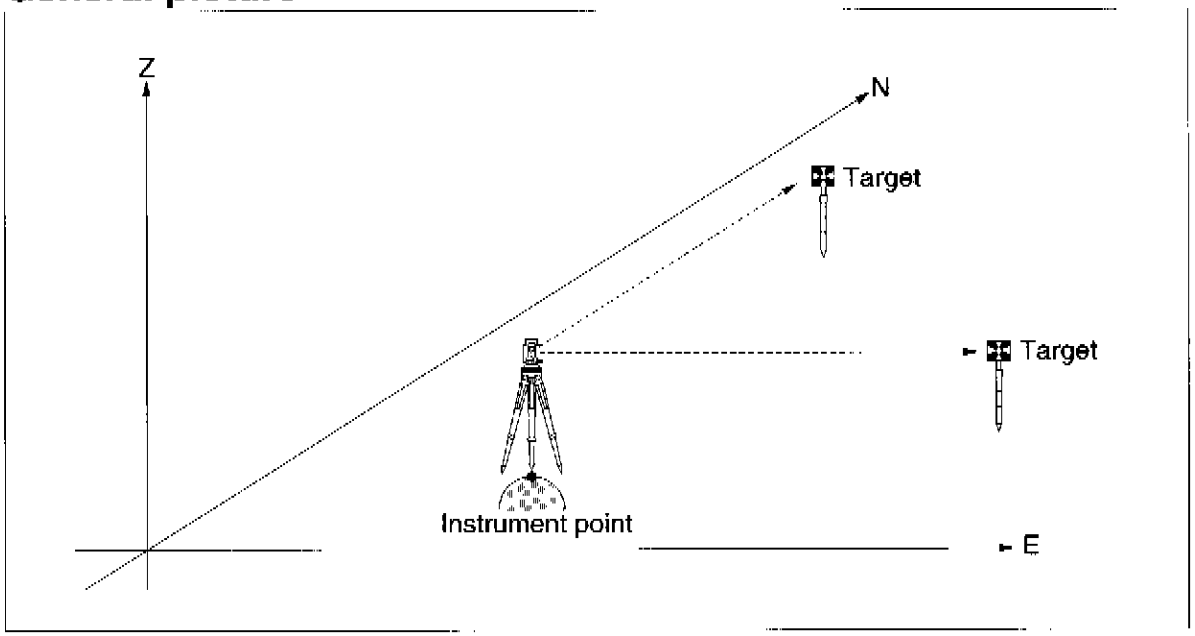


* The slope that can be calculated and displayed with the RDM function is ±200.00%.
* The difference in height is indicated in ±.

General pictures of measurement

With coordinates measurement, the instrument point serves as the datum station, and the coordinates of any desired target point can be determined. Even if the instrument point is not used as the datumstation, the coordinate values can be determined from the coordinate datum station by inputting the coordinate values of the instrument point.

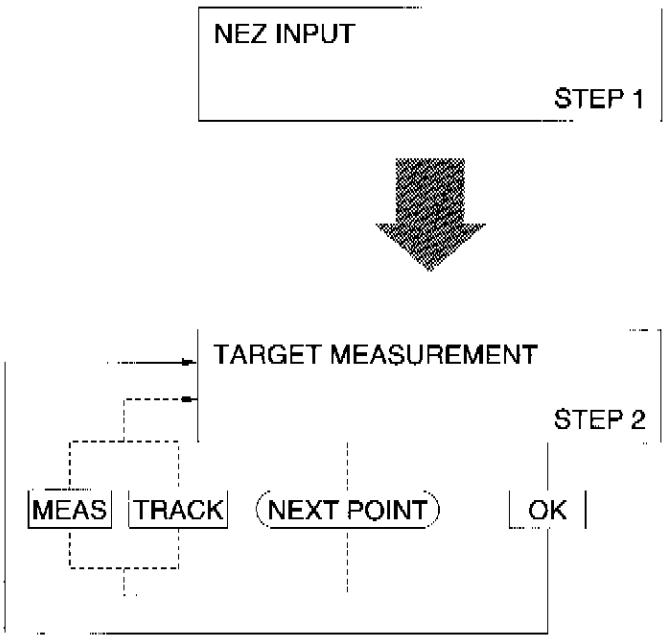
General picture

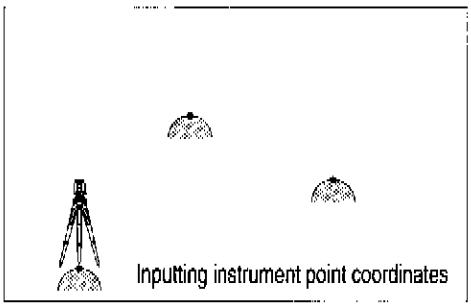


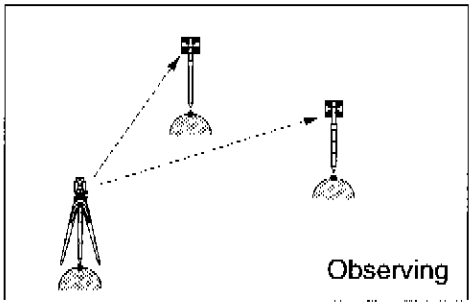
* When coordinates measurement is done by setting the direction angle to the backsight point, use the Inverse/Azimuth Distance Function to orient the direction angle to the backsight point before measurement.

20 Coordinates Measurement Function Command No.104

Operation procedures and operative illustrations





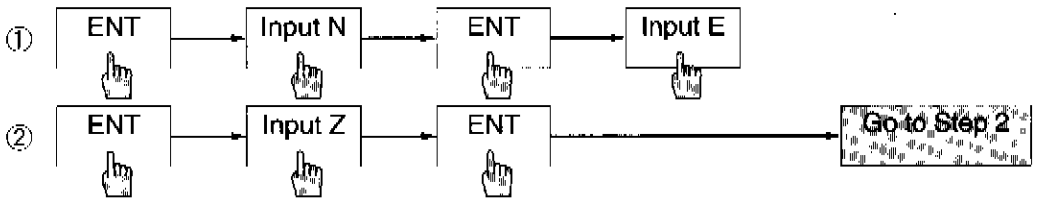


* Pressing [ESC] key a couple of times interrupts the function. The screen returns to the special function menu screen.

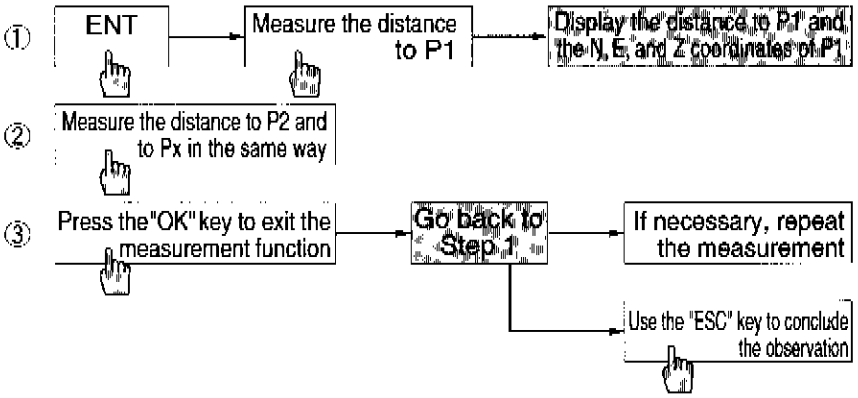
Operation procedures

Use the number keys as [007104], and press [ENT] to access Coordinates Measurement.

Step 1 Inputting the instrument point coordinates



Step 2 Observation of target points (P1 to Px)



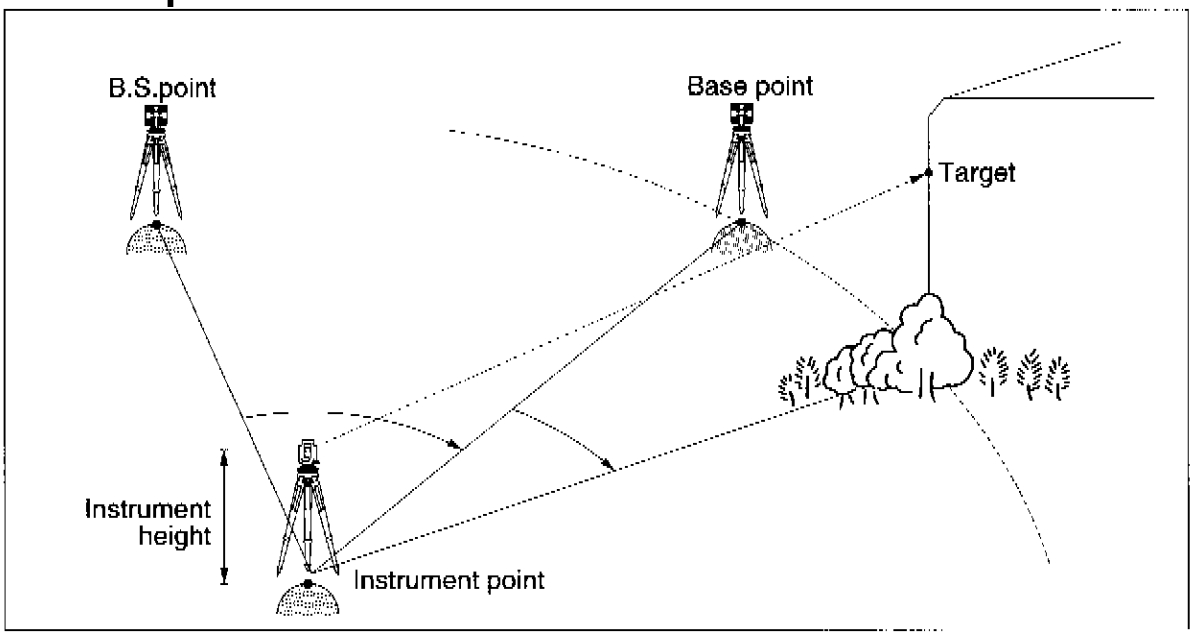
* When using a known point as the backsight point for coordinate measurement, the "Inverse Azimuth/Distance" function can be executed first, to have the azimuth angle of the backsight point already entered.

22 Offset Point Measurement Function Command No.105

General pictures of measurement

Offset point measurement can be used when the prism cannot be positioned because of an obstacle in the way. With this type of measurement, the target coordinates are measured indirectly.

General picture

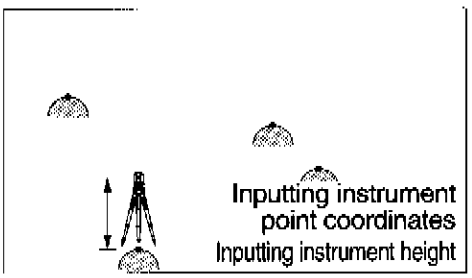


* Set the base point (prism) at a ground point which is adjacent to the target and at the same distance from the instrument as the target is.

Operation procedures and operative illustrations

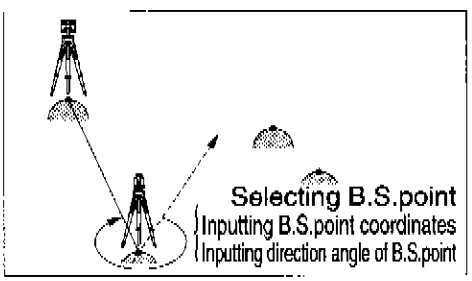
INPUT S.P

STEP 1



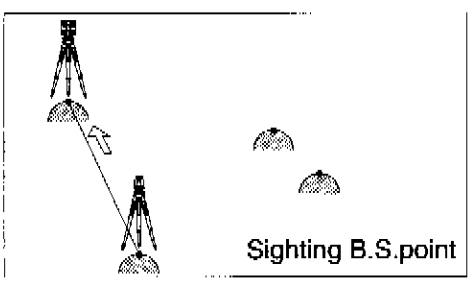
1→NEZ B.S.P
2. AZIMUTH

STEP 2



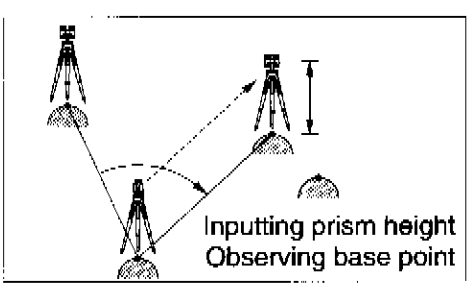
AIM B.S.POINT

PRESS ENT STEP 3



REFERENCE POINT MEASUREMENT

STEP 4



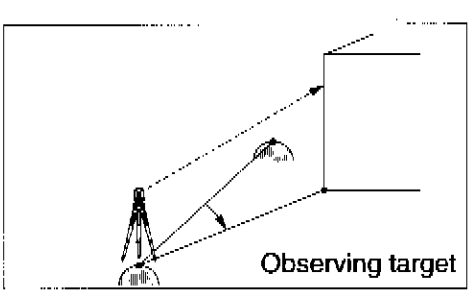
TARGET MEASUREMENT

STEP 5

TARGET SIGHT

REPEAT

OK



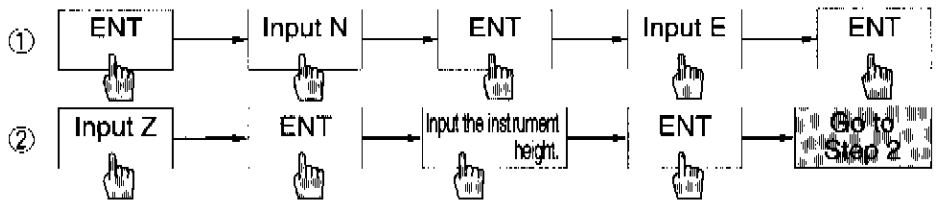
* Prism needs not to be positioned for the target sighting.
* Pressing [ESC] key a couple of times interrupts the function. The screen returns to the special function menu screen.

24 Offset Point Measurement Function Command No.105

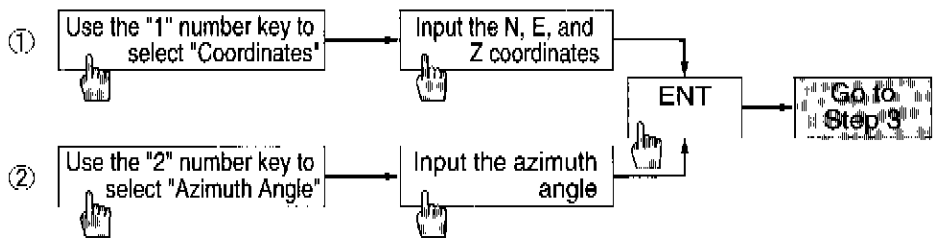
Operation procedures

Press the number keys as [007105],and press [ENT] to access STEP **1** of Offset Point Measurement function.

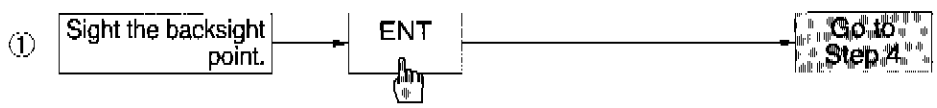
Step 1 Inputting the instrument point coordinates and the instrument height



Step 2 Inputting the backsight point coordinates or the azimuth angle of the backsight point

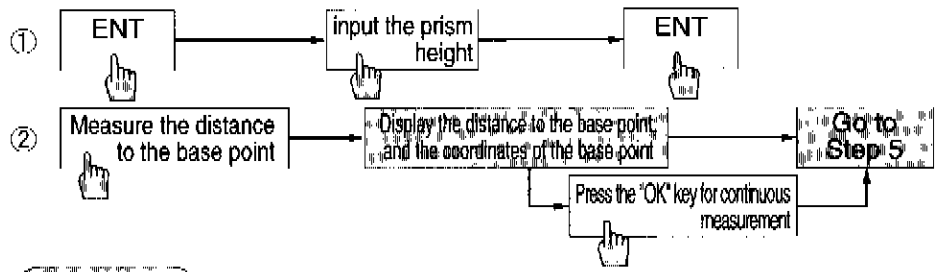


Step 3 Sighting the backsight point

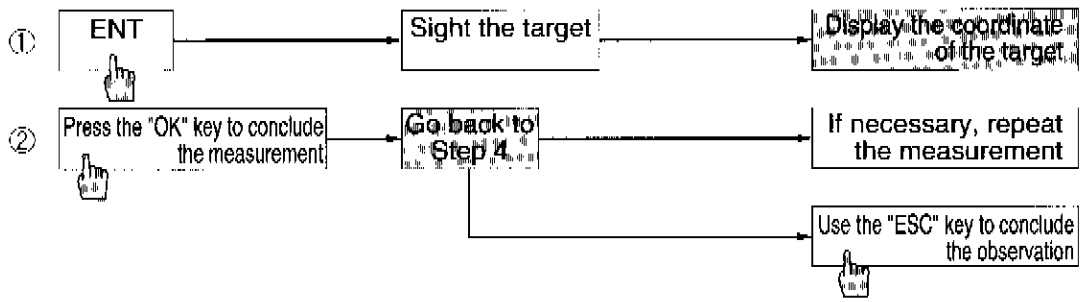


Step 4 Inputting the prism height and observing the base point

Set the base point (prism) at a ground point which is adjacent to the target and at the same distance from the instrument as the target is.



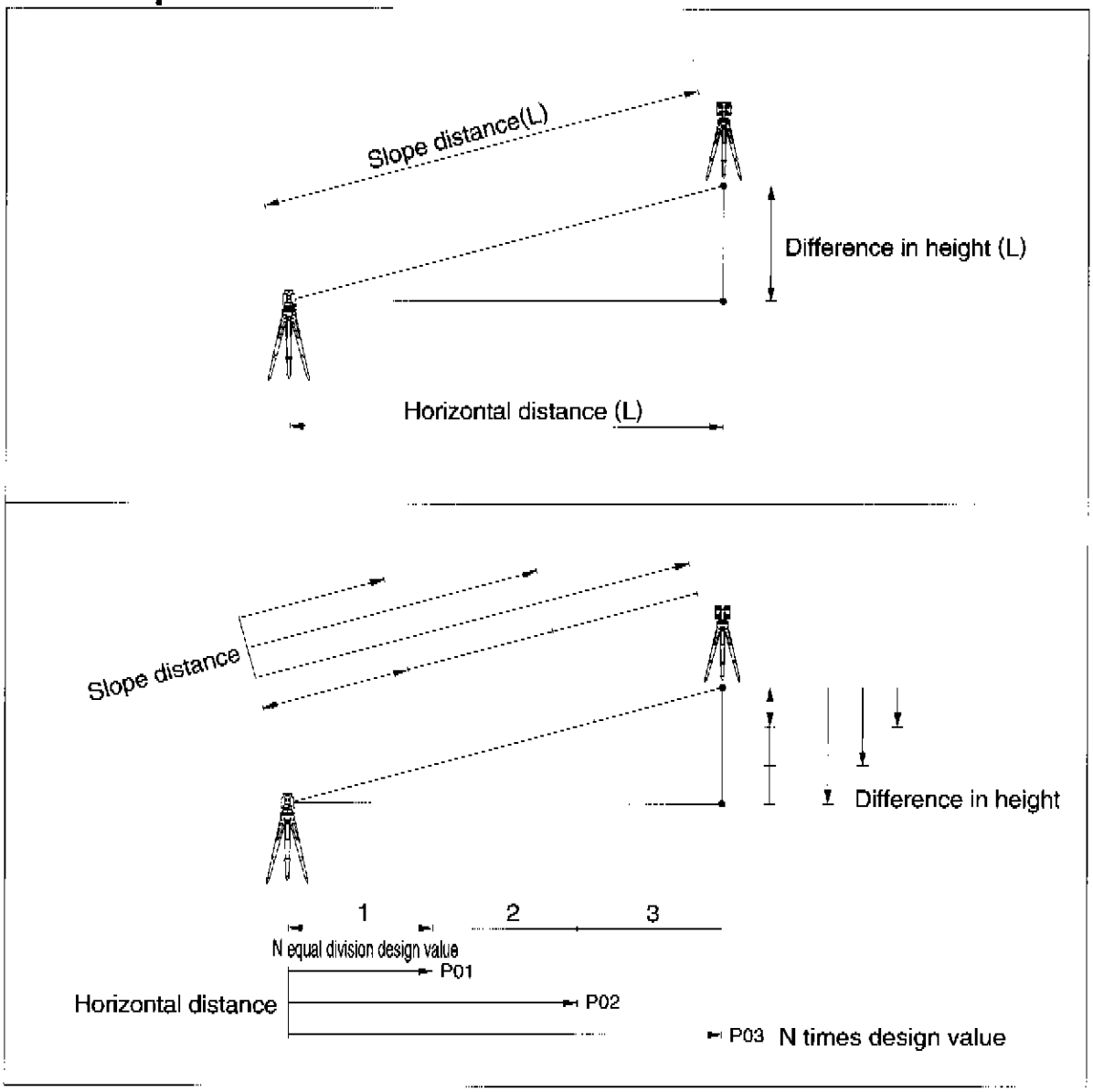
Step 5 Observing the target



General pictures of measurement

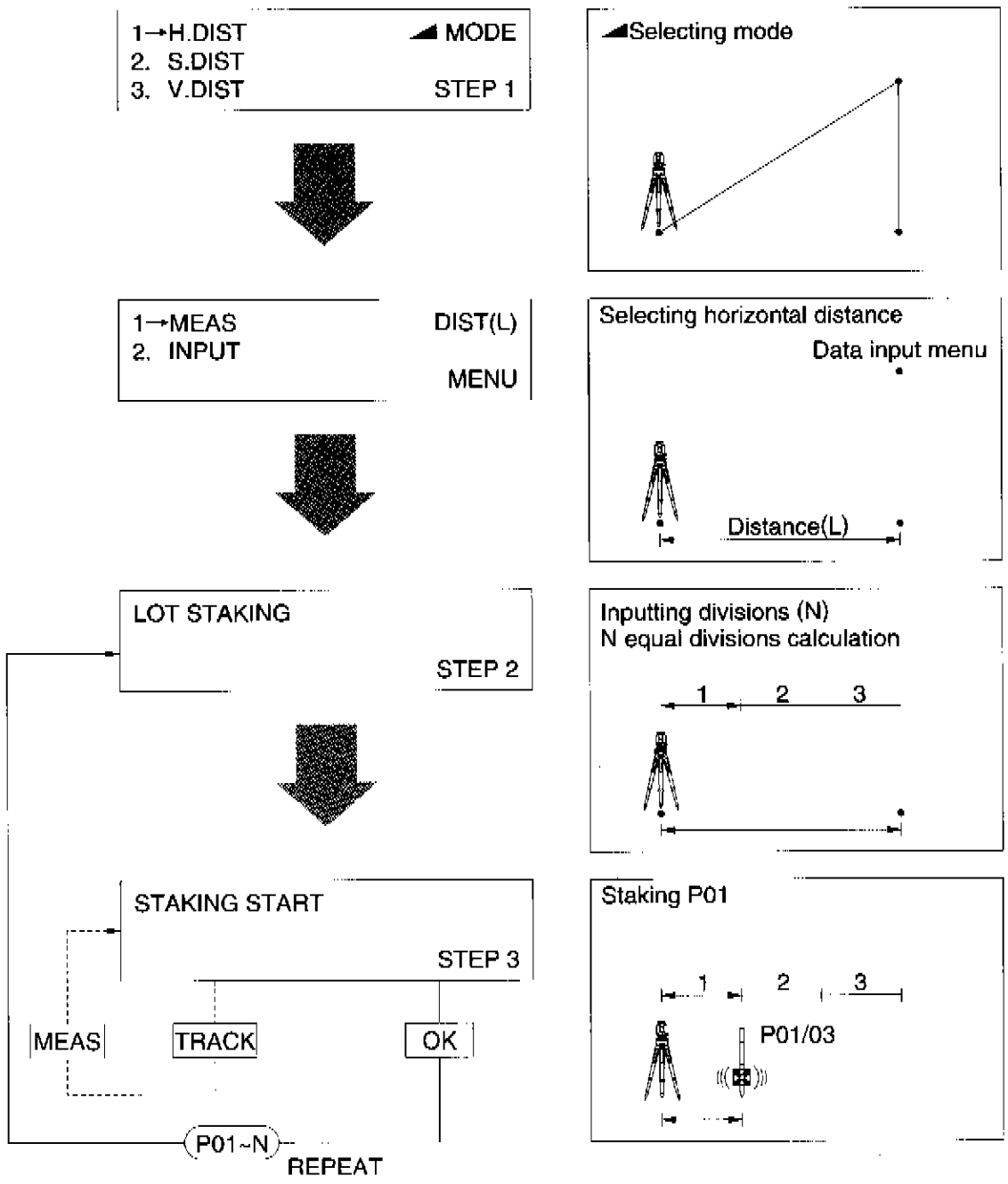
With the lot staking function, the design values for an input distance, or a distance between two points which have already been specified, can be divided into a number (N) of equal segments.

General pictures



26 Lot Staking Function Command No. 106

Operation procedures and operative illustrations



* Pressing [ESC] a couple of times interrupts the function. The screen returns to the special function menu screen.

Operation procedures

Press the number keys as [007106],and press [ENT] to access STEP 1 of Lot Staking Function.

Step 1 Selecting the distance display

① Use the "1" number key to select "1. Horizontal Distance"

② Use the "1" number key to select "1. Observation"

* The distance to a measured point is divided into N equal segments.

Measure the distance to the point → Display the distance to the point

Use the "2" number key to select "2. Input"

* The specified value (distance) which is input will be divided into N equal segments.

Input the distance → ENT → Go to Step 2

Step 2 Calculating the N segments

① ENT → Specify the number of divisions

② ENT → Display the calculated values for 1 division → OK → Go to Step 3

Step 3 Starting the measurement

① ENT → Display the design values, distance, and difference

② Move the prism → Fast distance measurement → Set the 1st stake-out point where difference is at "0"

③ OK → Specify the 2nd and 3rd stake-out points in the same way → Specify the last stake-out point

④ End lot staking by pressing [OK] → Go back to Step 1 → If necessary, repeat the measurement

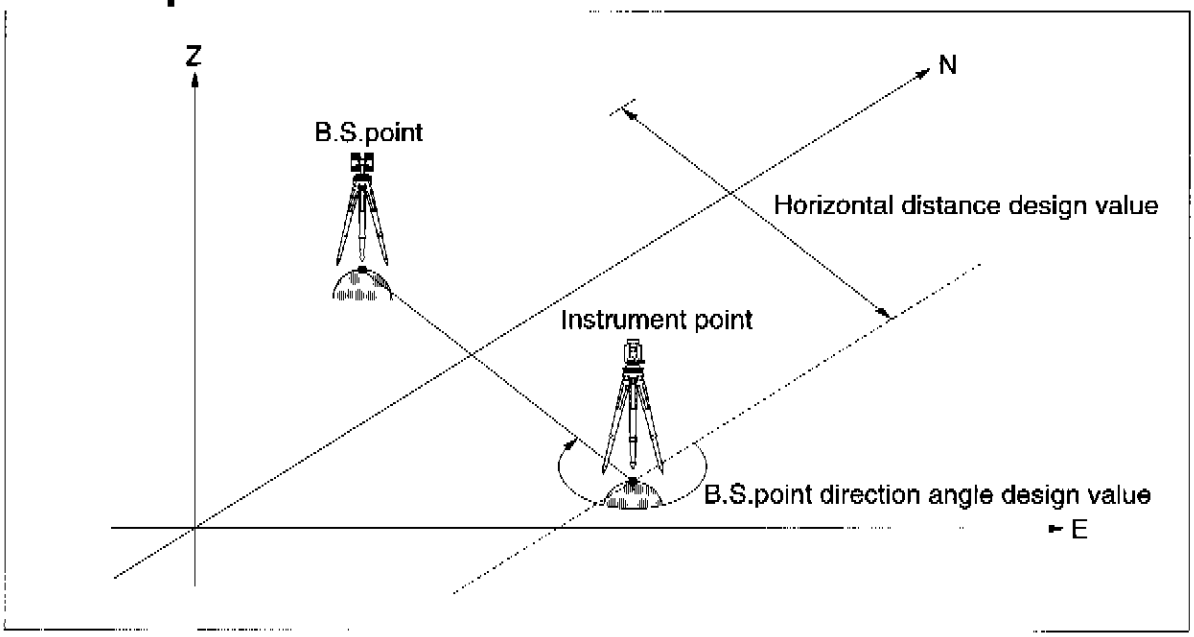
Press the "ESC" key to conclude the lot staking measurement.

28 Inverse Azimuth/Distance Measurement Function Command No.107

General pictures of measurement

With inverse azimuth/distance measurement, the azimuth angle and distance to a backsight point can be calculated and displayed by inputting known instrument point coordinates and the backsight point coordinates. The azimuth angle calculated here is displayed in the [A MODE] as the horizontal angle. The scaling function can also be used with inverse azimuth/distance measurement.

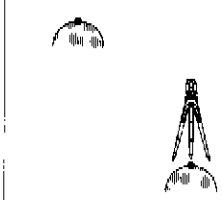
General picture



Operation procedures and operative illustrations

INPUT S.P

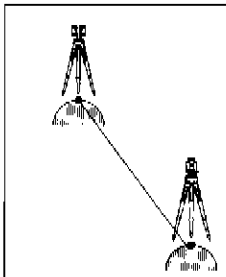
STEP 1



Inputting instrument point coordinates

INPUT B.S.P

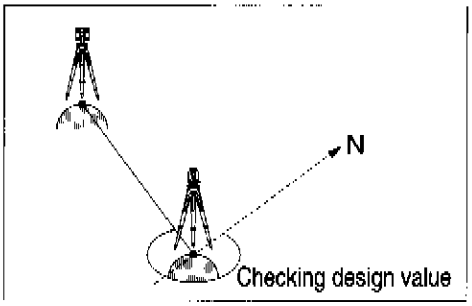
STEP 2



Inputting B.S.point coordinates

CHECK SET VALUE

STEP 3

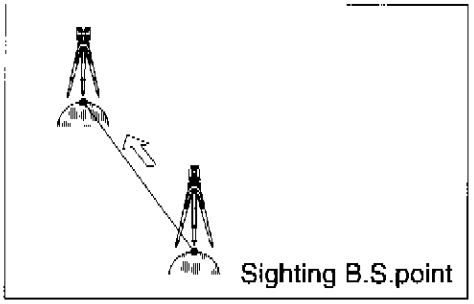


Checking design value

AIM B.S.POINT

PRESS ENT STEP 4

ENT



Sighting B.S.point

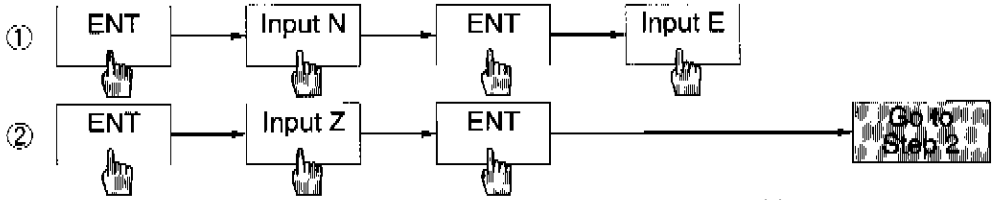
* Pressing [ESC] key interrupts the function. The screen returns to the special function menu screen.

30 Inverse Azimuth/Distance Measurement Function Command No.107

Operation procedures

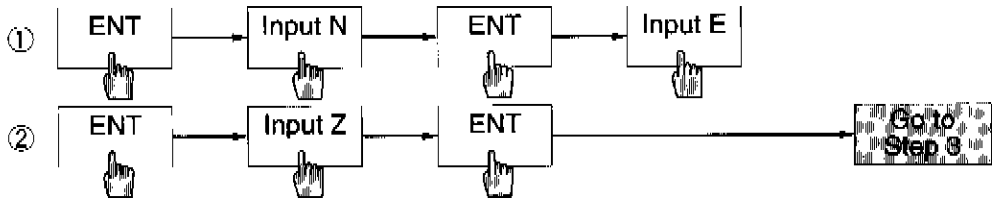
Press the number keys as [007107], and press [ENT] to access STEP 1 of Inverse/Azimuth Measurement Function.

Step 1 Inputting the instrument point coordinates



* The values for the Z coordinate are not directly related to this measurement, and can be omitted here (simply press [ENT] without entering a value).

Step 2 Inputting the backsight point coordinates

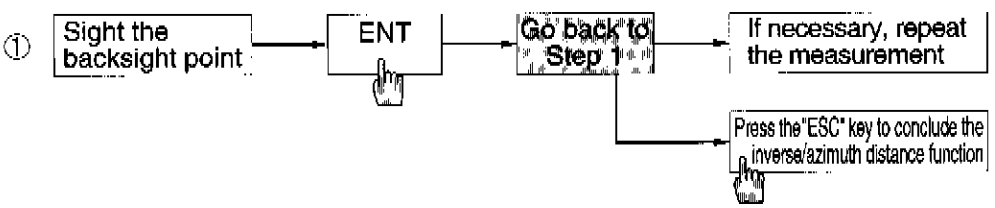


* The Z coordinate may be omitted.

Step 3 Confirming the calculated values

* When you go back to the [A MODE], the design values calculated here(the backsight point azimuth angle)will be displayed as the horizontal angle.

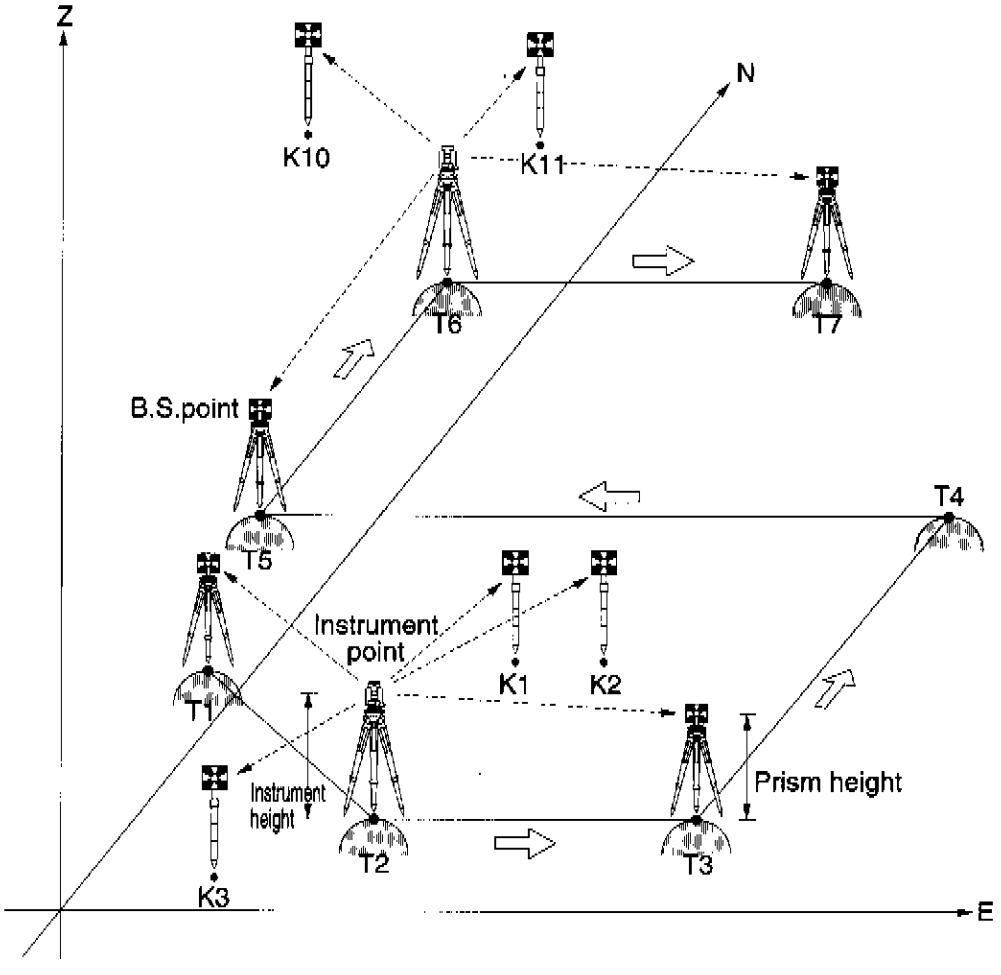
Step 4 Sighting the backsight point



General pictures of measurement

With traverse measurements, the coordinate values of a new point can be determined, based on the given "instrument point coordinates and backsight point coordinates" or the "instrument point coordinates and direction angle". There are two methods used in traverse measurements: "New Observation" and "Instrument Moved". With the "New Observation" , when a new traverse is begun, the coordinates of a known point are input as the backsight point, while with the "Instrument Moved", the instrument is moved, and the coordinates of the previous instrument point are observed as the backsight point, while the coordinates of the previous new point become the instrument point. Scaling can also be used with traverse measurements.

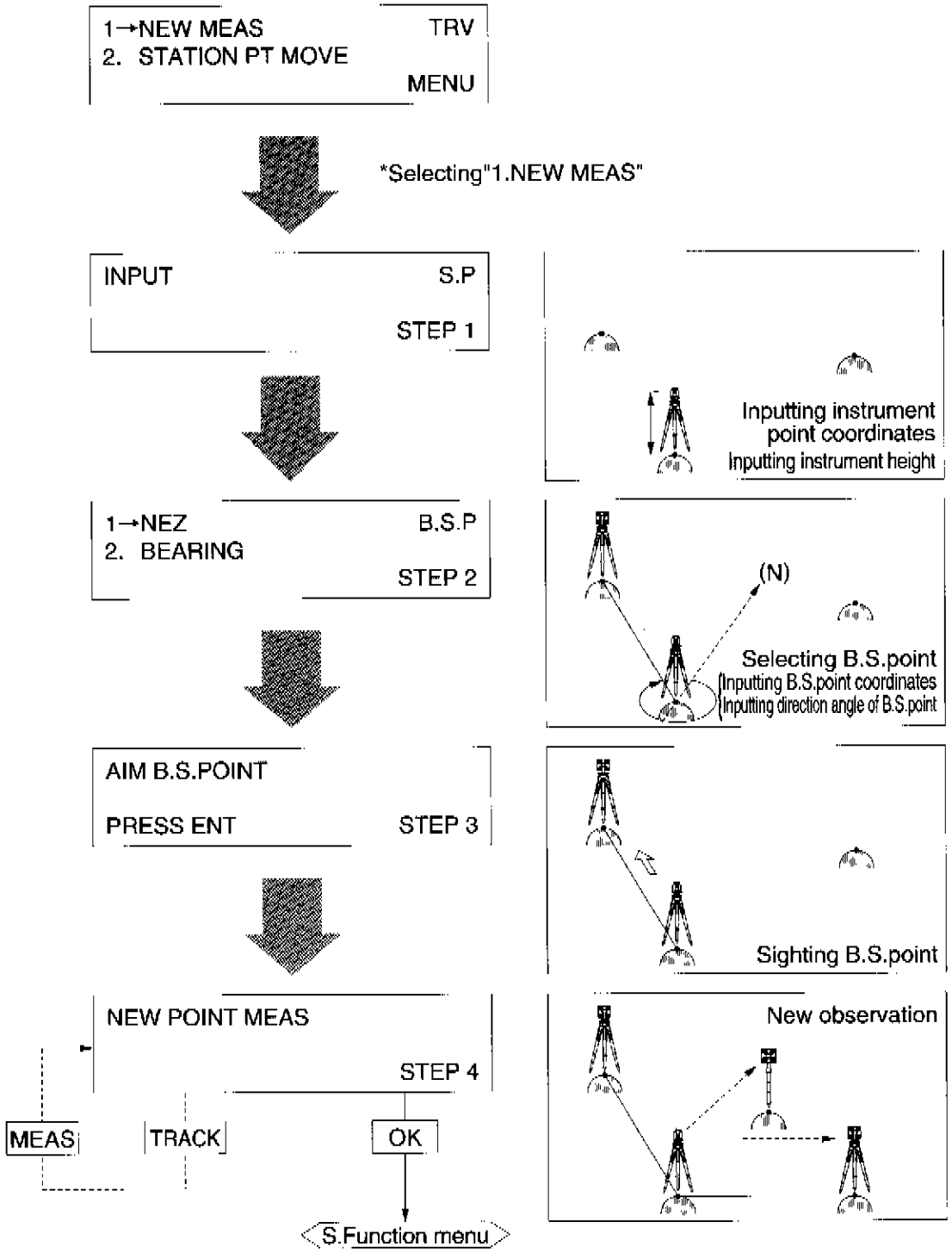
General picture



32 Traverse Measurement Function Command No.108

Operating procedures and operative illustrations

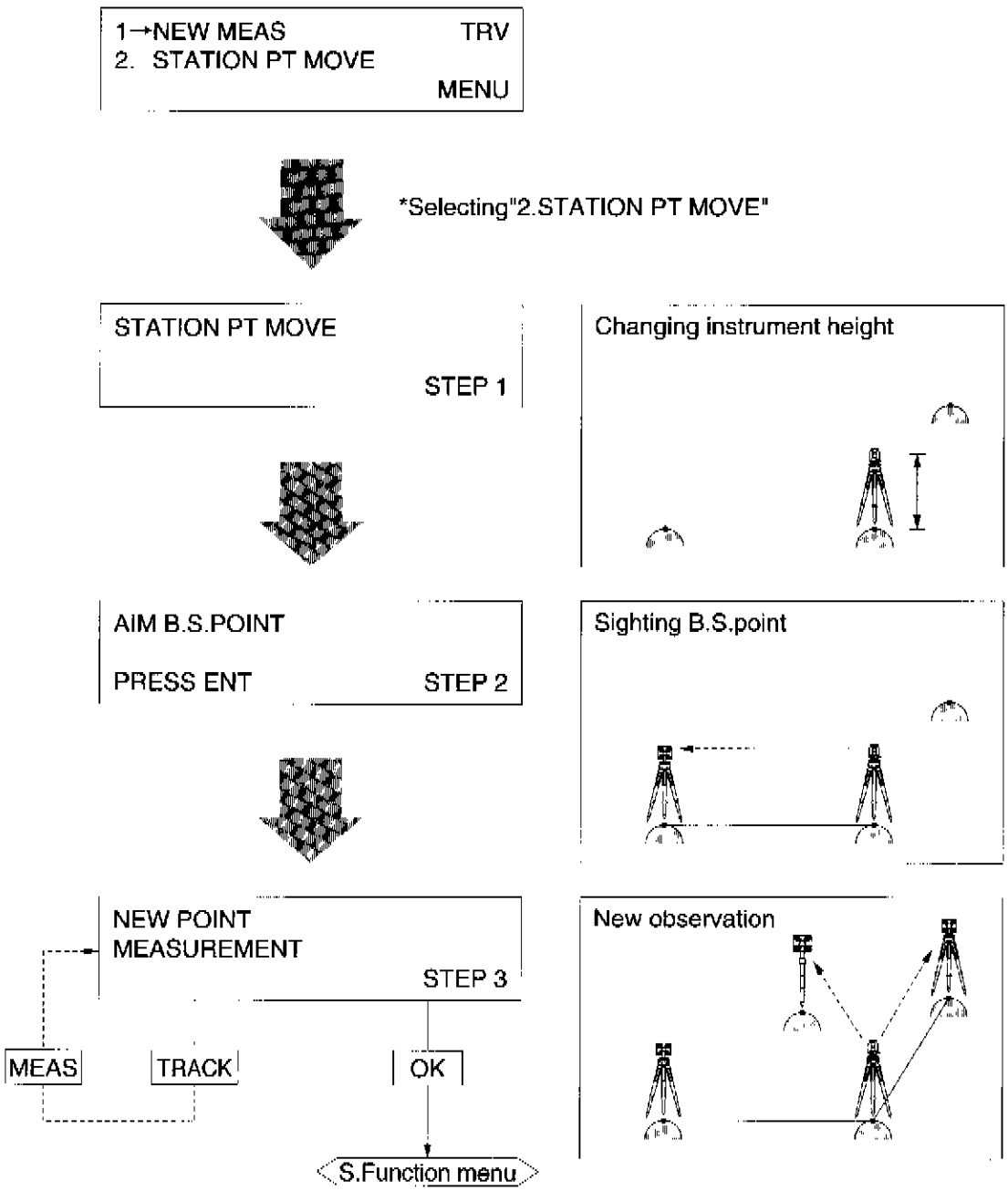
[When selecting the new observation]



* Pressing [ESC] key a couple of times interrupts the function. The screen returns to the special function menu screen.

Operation procedures and operative illustrations

[When the Instrument moved]



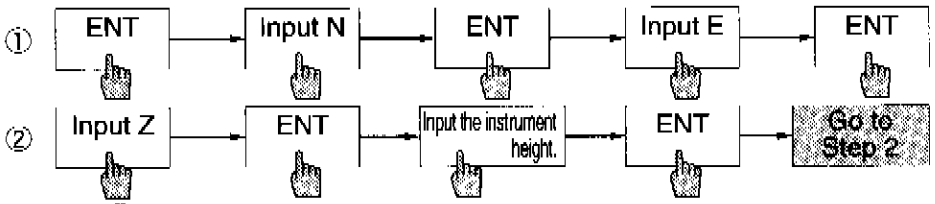
* Pressing [ESC] key a couple of times interrupts the function. The screen returns to the special function menu screen.

34 Traverse Measurement Function Command No.108

Operation procedures

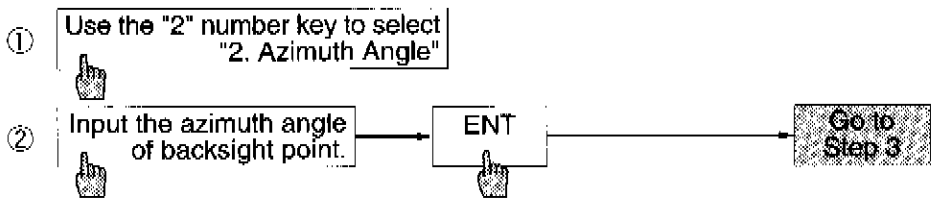
Press the number keys as [007108], and press [ENT] to access Traverse Measurement Function. Then, use "1" number key to select "1. New observation" to proceed to STEP 1.

Step 1 Inputting the instrument point coordinates (N, E, and Z) and the instrument height

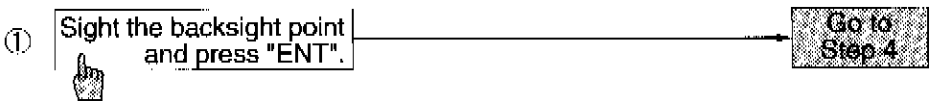


* At ②, If there is no need to enter a Z coordinate, leave the data as "000.000", or simply press the [CLR] key and then the [ENT] key. This stores a Z coordinate of "0".

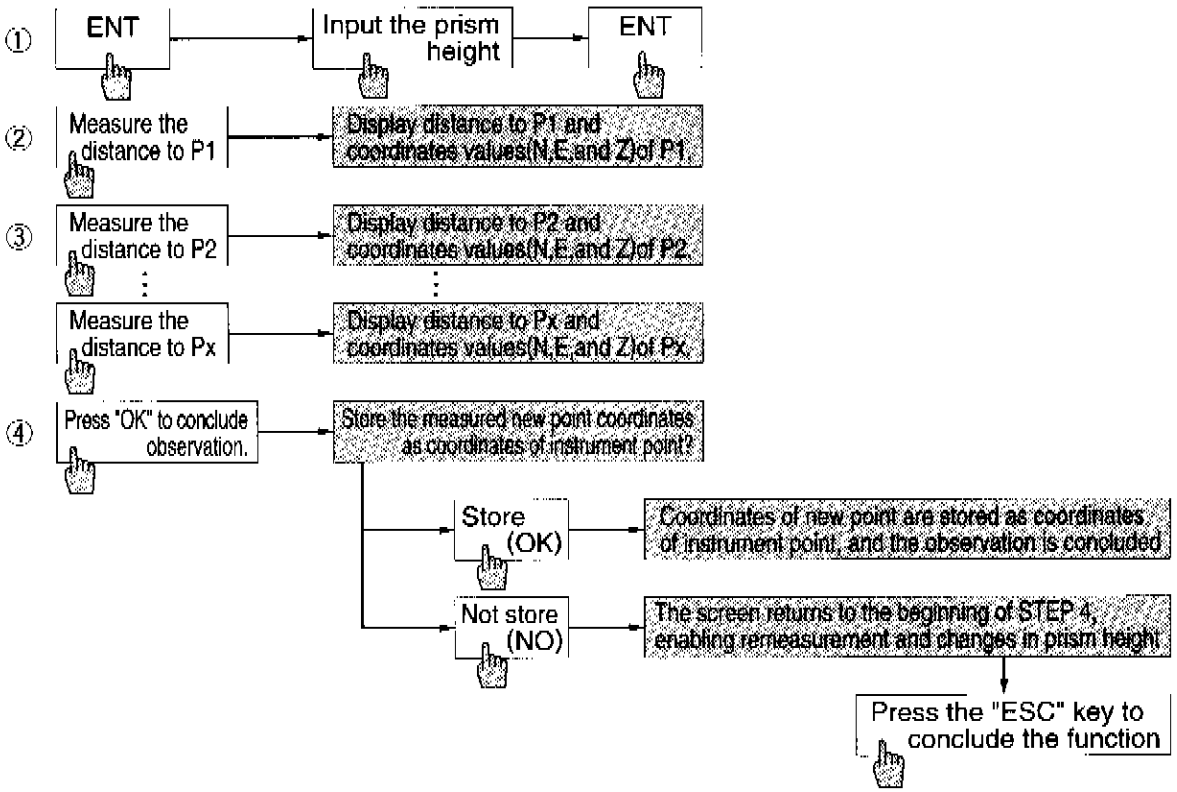
Step 2 Inputting the backsight point coordinates or the azimuth angle



Step 3 Sighting the backsight point



Step 4 Observation of the new points (P1 to Px)



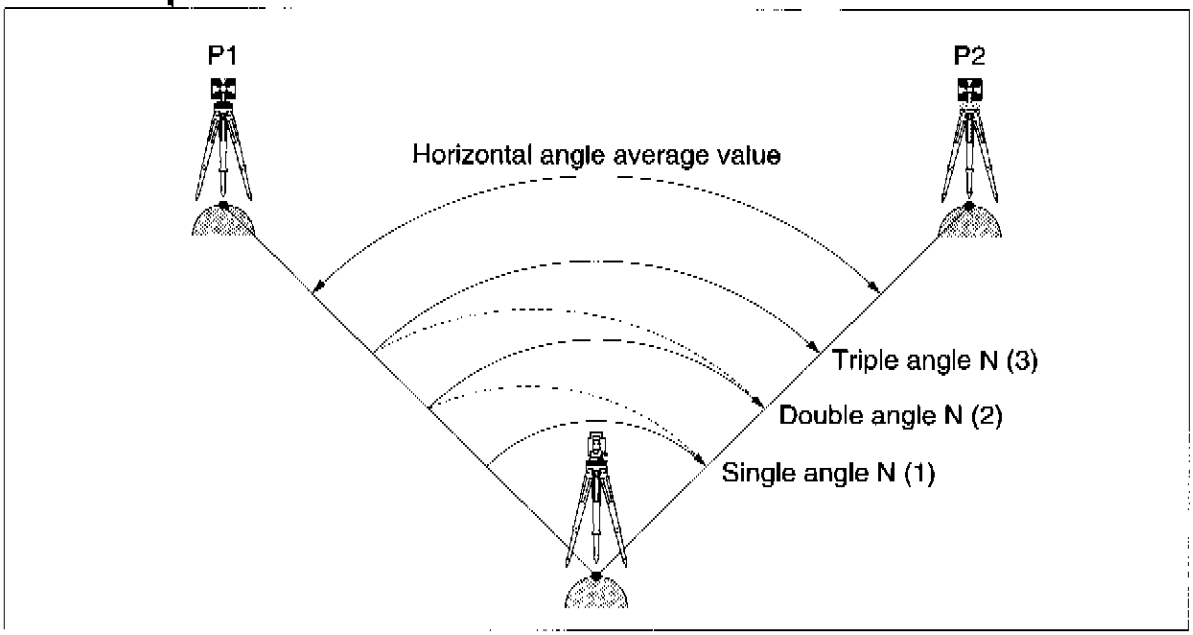
* If the instrument is moved and a traverse route is to be measured, first select "New Observation", and then, after the instrument point is moved, select "Instrument Moved".
* When using traverse measurement while moving the instrument point, always measure the target which will serve as the next instrument point, and register it. Also, if several points are being measured at once, the point which has to be registered as the new point should be observed last of all, in order to reduce the chances of forgetting to register it.
* When "2. Instrument Moved" is entered, the coordinates of the new point stored here are automatically changed to the coordinates of the instrument point, and the coordinates of the instrument point are automatically changed to those of the backsight point. The data input as the prism height is also changed to the instrument height. If the current instrument height is different from the previous prism height, use STEP 1 of "2. Instrument Moved" to change the instrument height. If the height does not need to be changed, press the "↘" key to advance to the next page, and start from STEP 2.
* If the prism height ③ has been changed at STEP 4, go on to ④ and enter [Don't Store (NO)] to return to the beginning of STEP 4 and change the prism height.

36 Horizontal Angle Repeat Function Command No.110

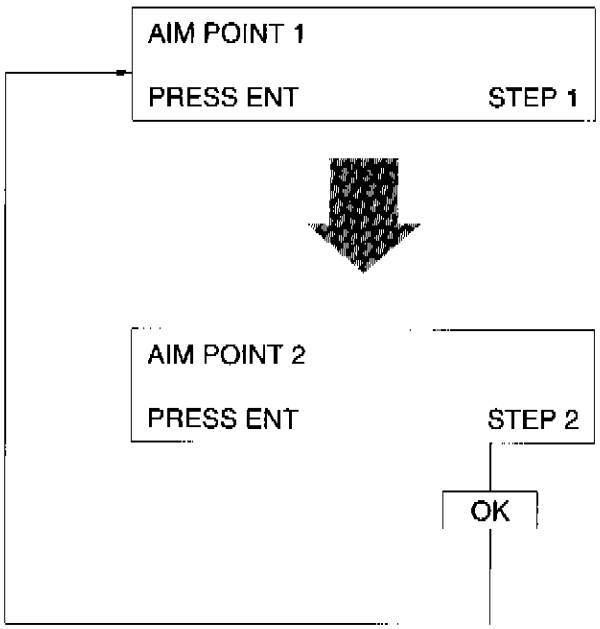
General pictures of measurement

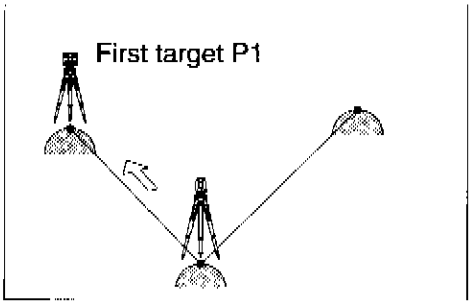
With the horizontal angle repeat function, the horizontal angle between the No.1 target (P1)and the No.2 target (P2) is measured number of N times, and the cumulative values and averaged values can be determined.

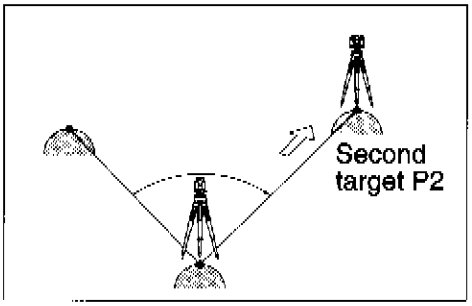
General picture



Operation procedures and operative illustrations







* Pressing [ESC] key a couple of times interrupts the function. The screen returns to the special function menu screen.

38 Horizontal Angle Repeat Function Command No.110

Operation procedures

Press the number keys as [007110], and press [ENT] to access STEP 1 of Horizontal Angle Repeat Function.

Step 1

① Sight P1 → ENT → OK

Step 2

① Sight P2 → ENT → Display the average angle and cumulative angle for N (1) → OK

* When sighting P2, use the upper clamp and tangent screws.

Sight P1 → ENT → OK

* When returning the telescope to P1, use the lower clamp and tangent screws. Never at the same time use the upper clamp and tangent screws.

② Sight P2 → ENT → Display the average angle and cumulative angle for N (2)

* When sighting P2, use the upper clamp and tangent screws.

③ OK → Repeat the same procedures N times, displaying the averaged angle and cumulative angle of the Nth time each time.

Press the "ESC" key to conclude the function.

* The number of times (N) that the angle can be measured in this function is from 1 to 9.
* The cumulative value for the horizontal angle can be a value -2700° to + 2700°. If the value exceeds ±2000°, a warning beep sounds.
* When bringing the telescope back to P1, the following message will be displayed if the upper clamp and tangent screws are mistakenly used or if incorrect measurement is taken.

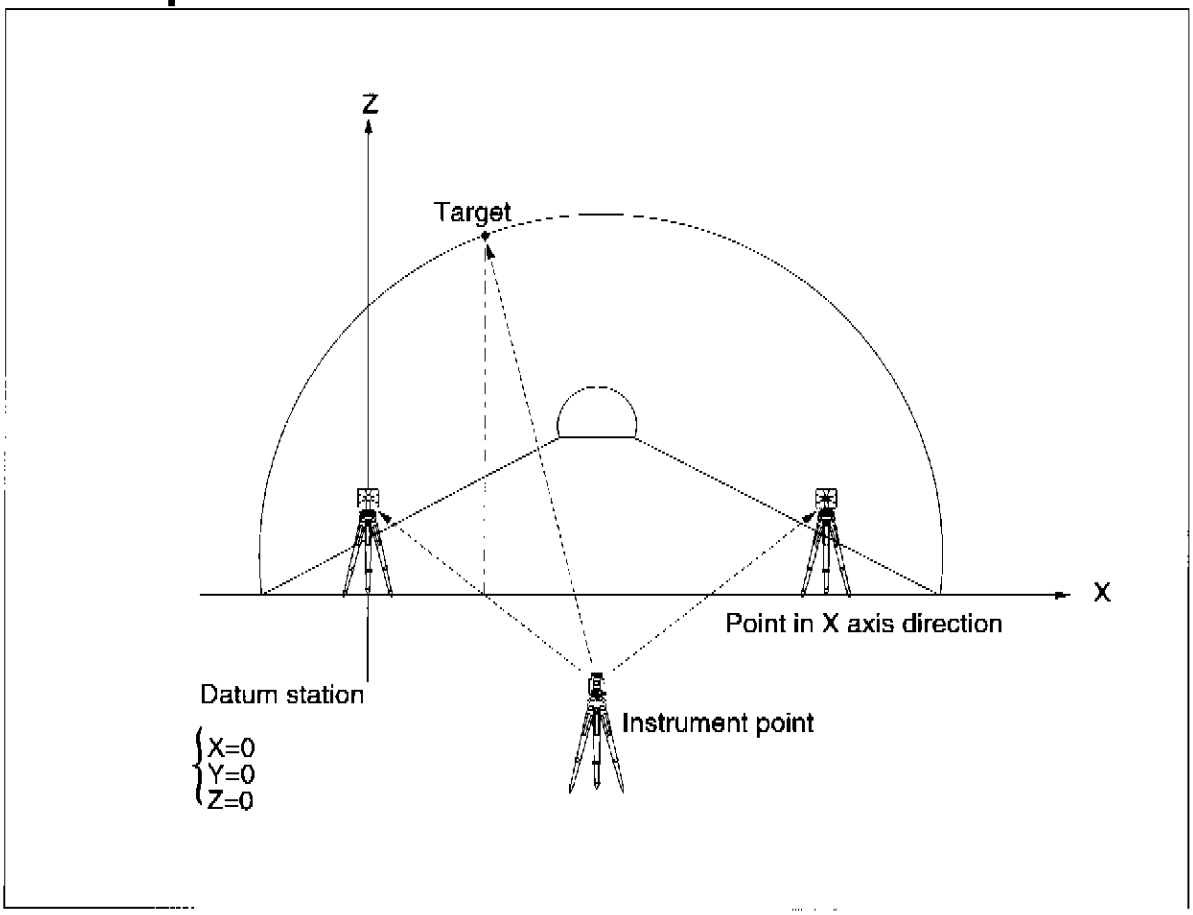
```
*NG!!
AVG-ERROR
REMEASURE
```

Remeasurement is needed when the above message is on the display.

General pictures of measurement

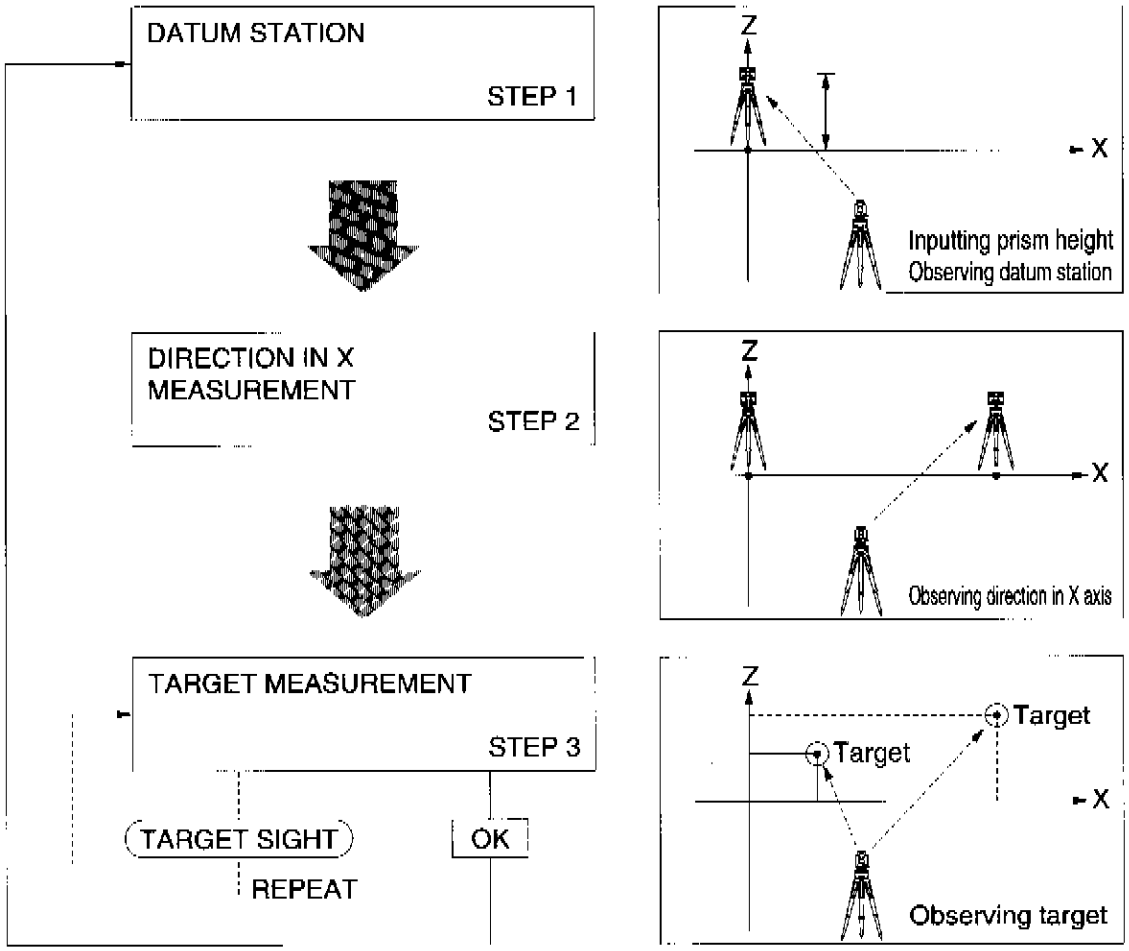
With the 3D cross section measurement function, prisms are placed at 2 points almost directly below the place to be measured,and these prisms are measured. The coordinates of the perpendicular plane formed along the straight line extending between the two prisms are determined, so that it is easy to measure the coordinates of locations where prisms can not be placed directly such as on the walls of objects being constructed , and cross sections of tunnels. With this type of measurement, the X and Z coordinates are measured, but the Y coordinate is fixed at 0.

General picture



40 3D Cross Section Measurement Function Command No.111

Operation procedures and operative illustrations



* Pressing [ESC] key a couple of times interrupts the function. The screen returns to the special function menu screen.

Operation procedures

Press the number keys as [007111], and press [ENT] key to access STEP 1 of 3D Cross Section Measurement Function.

Step 1 Observing the datum station

① ENT → Input the height of the prism of the datum station → ENT

② Measure the distance to the datum station → Display the coordinates of datum station → Go to Step 2

Step 2 Observing in the X direction

① ENT → Measure in the X direction → Display the X, Y, and Z coordinates values → Go to Step 3

Step 3 Observing the target

① ENT → Sight the target point (the point whose coordinate values are to be determined) → Display the X, Y, and Z coordinate values of the target point

② Sight the No.2 target point → Sight the No.3 target point → Display the coordinate values of each of the sighted targets

③ Press "OK" to conclude the observation → Go back to Step 1 → If necessary, repeat the measurement

Press the "ESC" key to conclude the 3D cross section function.

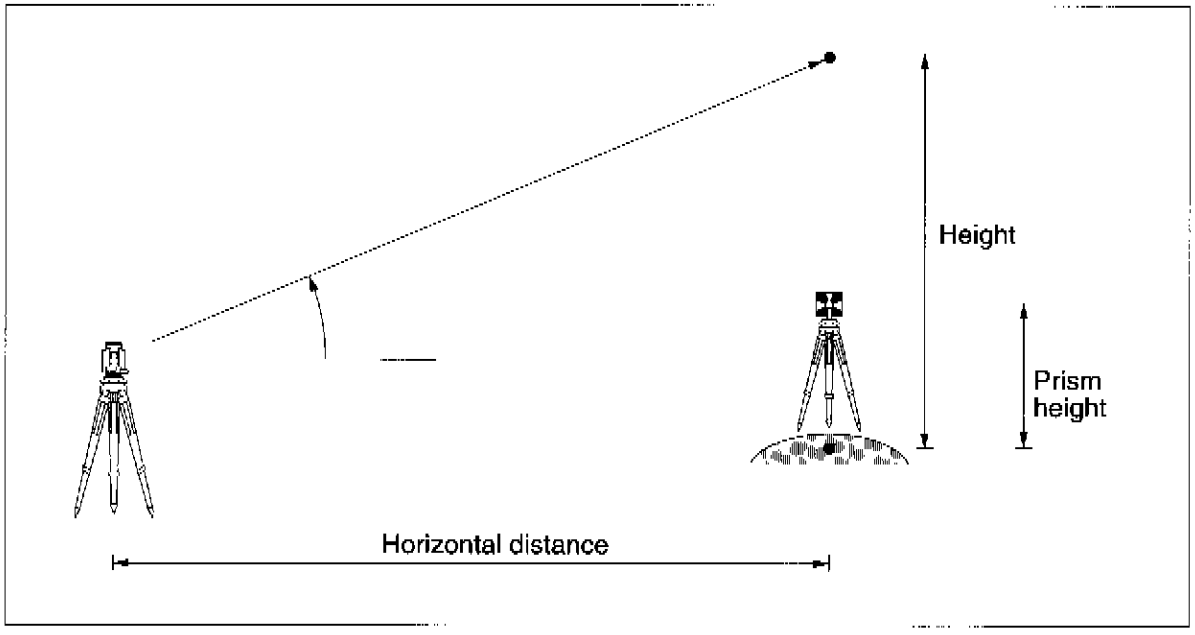
* Perpendicular planes are the only items that can be measured with the 3D cross section measurement function. Convex and concave sections of perpendicular planes cannot be measured.

42 REM Function Command No.112

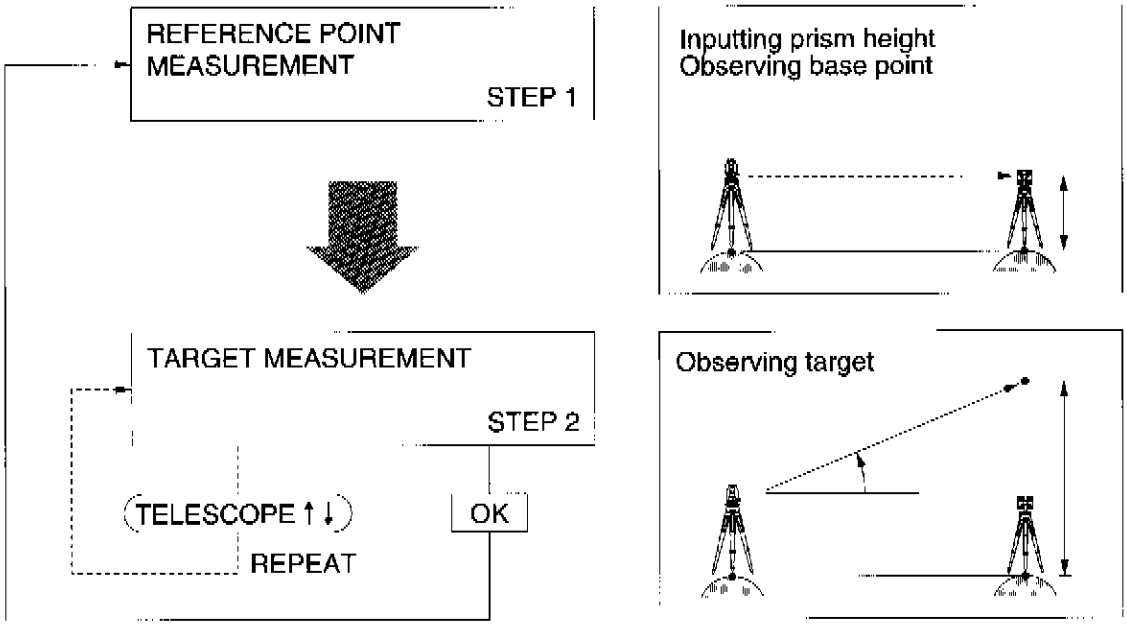
General pictures of measurement

With REM measurement, a prism (base point) is set directly below the place to be measured, and by measuring the prism, the height to the target object can be measured. This makes it easy to determine the heights of electric power lines, bridge suspension cables, and other large items used in construction.

General picture



Operation procedures and operative illustrations



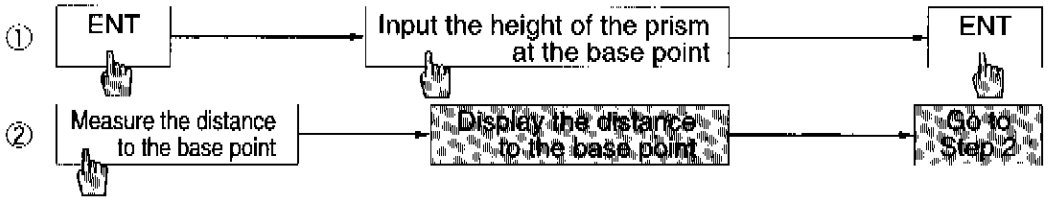
* Pressing [ESC] key a couple of times interrupts the function. The screen returns to the special function menu screen.

44 REM Function Command No.112

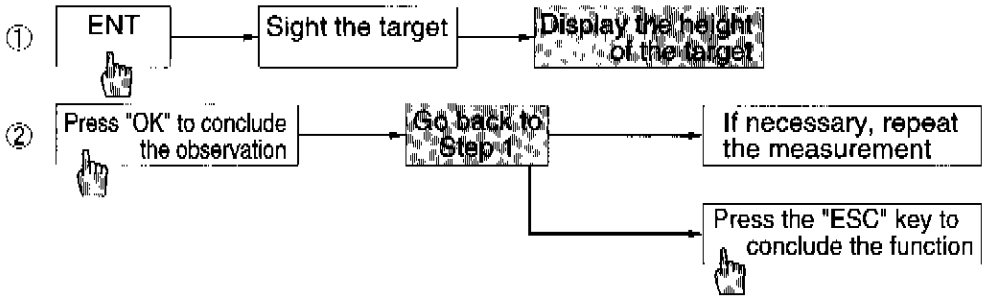
Operation procedures

Press the number keys as [007112], and press [ENT] to access STEP 1 of REM function.

Step 1 Observing the base point



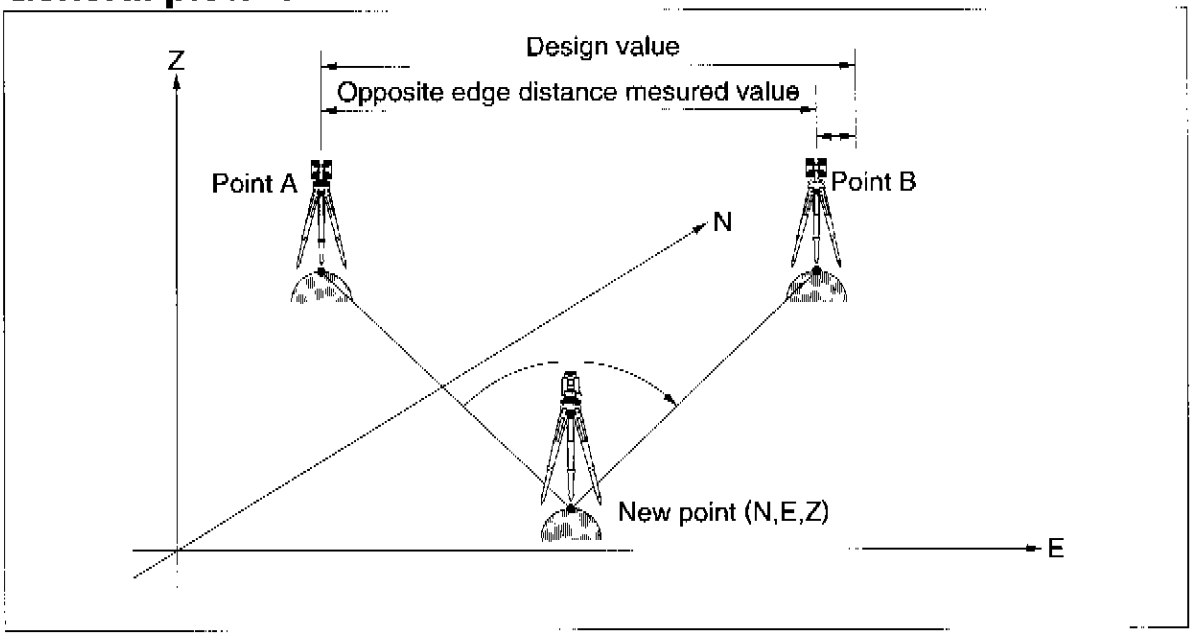
Step 2 Observing the target



General pictures of measurement

With resection measurement, two known points (Points A and B) are measured in order to determine the coordinates of the instrument point.
The scaling function can also be used with the resection function.

General picture



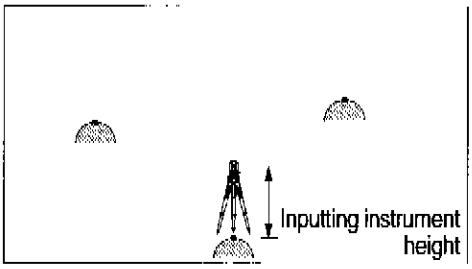
Point ZA: Z coordinate value of the new point obtained by measuring
Point ZB: Z coordinate value of the new point obtained by measuring
Difference(Z): Value (Point ZA)- (Point ZB)

46 Resection Function Command No.113

Operation procedures and operative illustrations

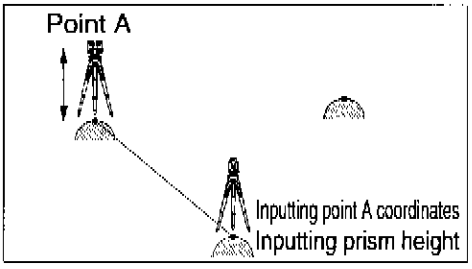
INST.H INPUT

STEP 1



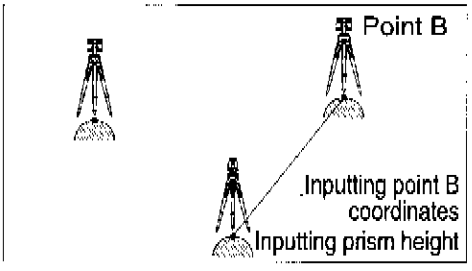
INPUT PNT A

STEP 2



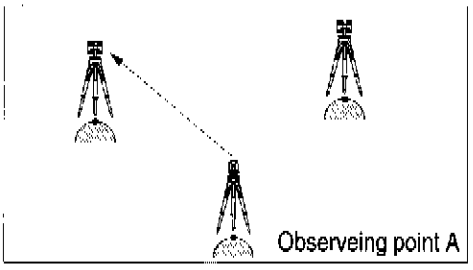
INPUT PNT B

STEP 3



POINT A
MEASUREMENT

STEP 4



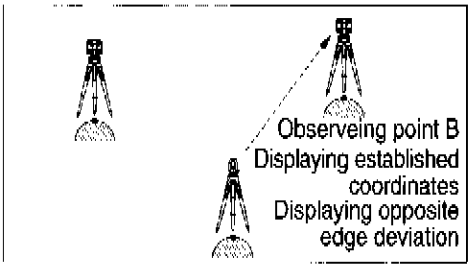
POINT B
MEASUREMENT

STEP 5

OK

ENTER AS NEW POINT
COORDINATES

OK ?



NO

OK

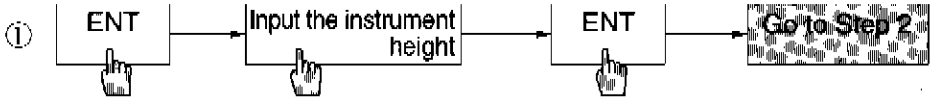
S.Function menu

* Pressing [ESC] key a couple of times interrupts the function. The screen returns to the special function menu screen.

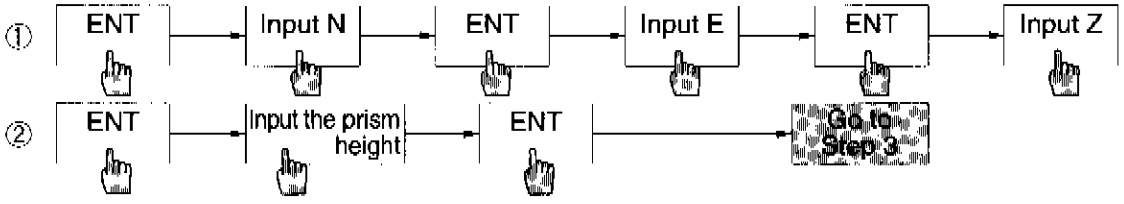
Operation procedures

Press the number keys as [007113], and press [ENT] to access STEP 1 of Resection function.

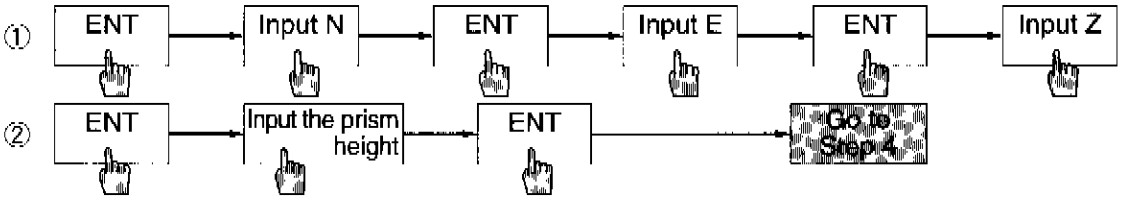
Step 1 Inputting the instrument height



Step 2 Inputting the Point A coordinates and the prism height

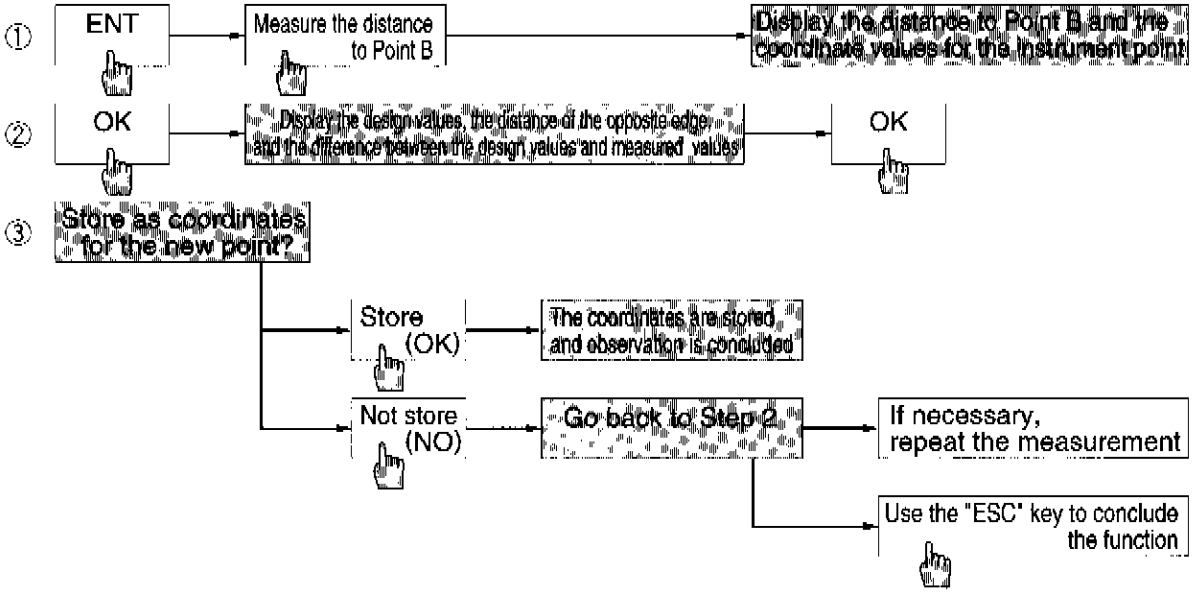


Step 3 Inputting the Point B coordinates and the prism height



Step 4 Observing Point A

Step 5 Observing Point B

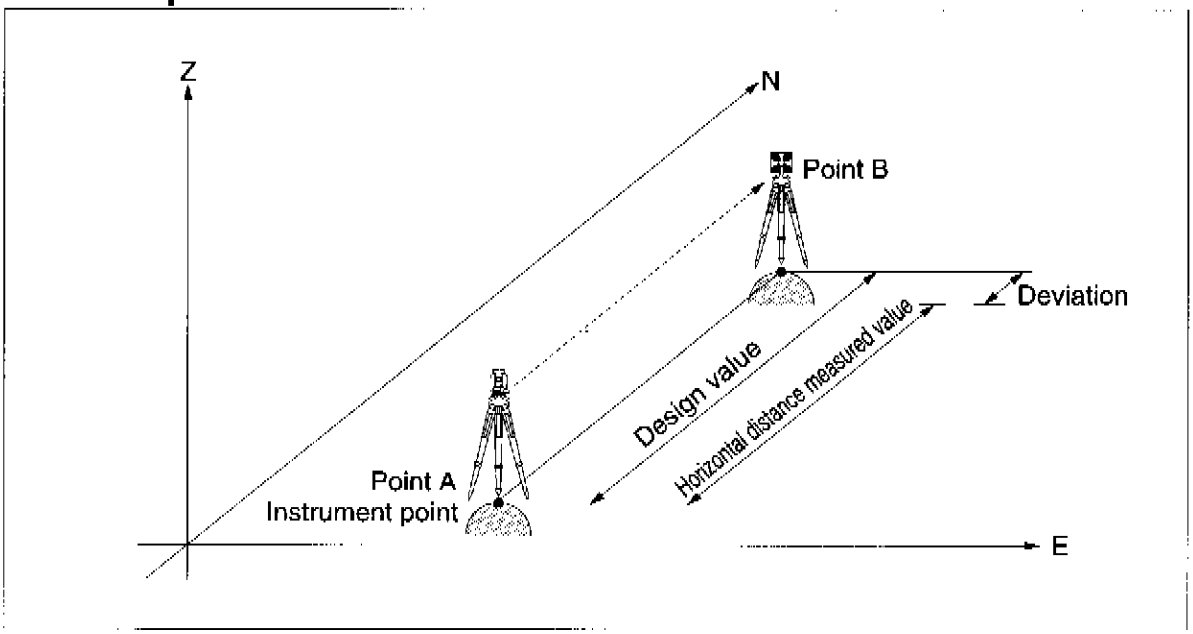


* If the difference at ② in Step 5 is excessively large, do the measurement again.

General pictures of measurement

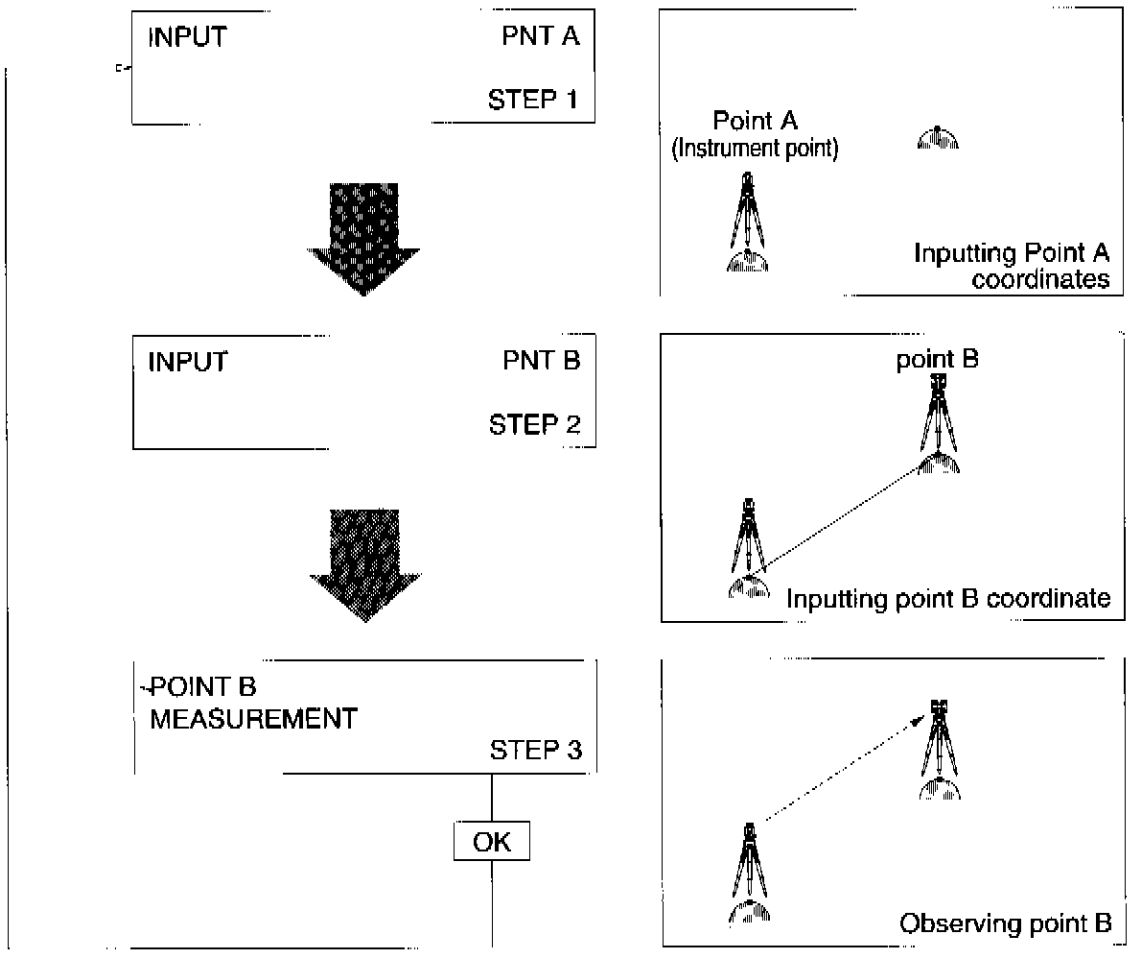
In the direct stake check , the difference between the design values for a horizontal distance, calculated using inverse calculation from the coordinate values of a known point (Point A) and a target point (Point B), and the horizontal distance actually measured between A and B is displayed. The scaling function can also be used with the direct stake check.

General picture



50 Direct Stake Check Function Command No.114

Operation procedures and operative illustrations

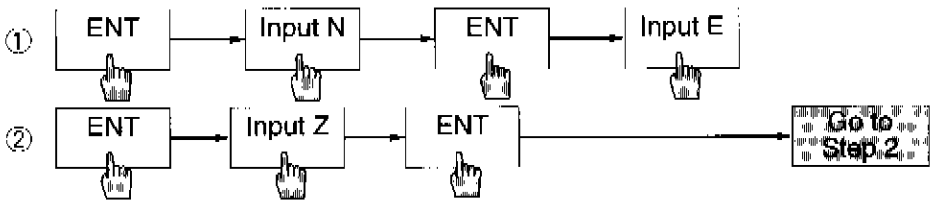


Pressing [ESC] key a couple of times interrupts the function. The screen returns to the special function menu screen.

Operation procedures

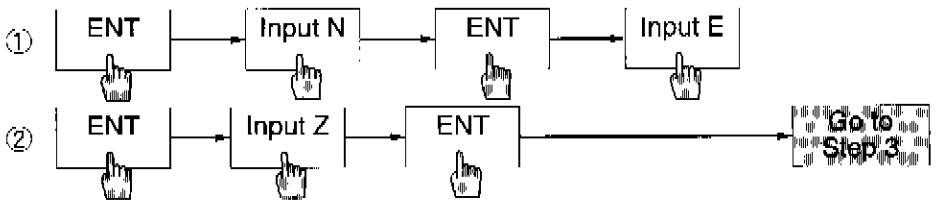
Press the number keys as [007114], and press [ENT] to access STEP 1 of Direct Stake Check Function.

Step 1 Inputting the coordinates for the instrument point (Point A)



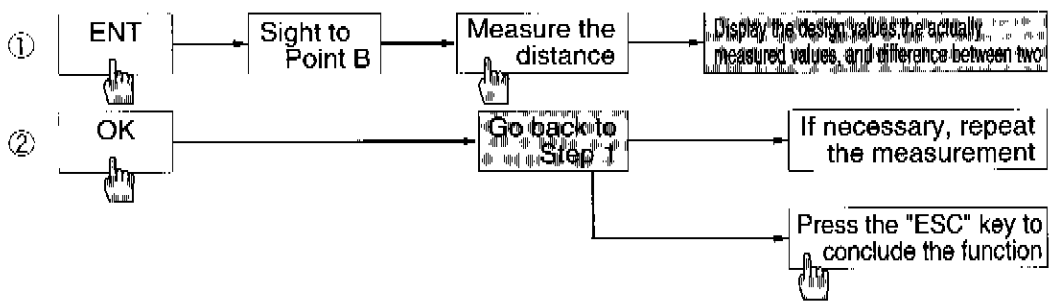
* The values for the Z coordinate are not directly related to this calculation, and can be omitted here (simply press [ENT] without entering a value).

Step 2 Inputting the coordinates for the target point (Point B)



* The Z coordinates may be omitted.

Step 3 Observing the target point (Point B)

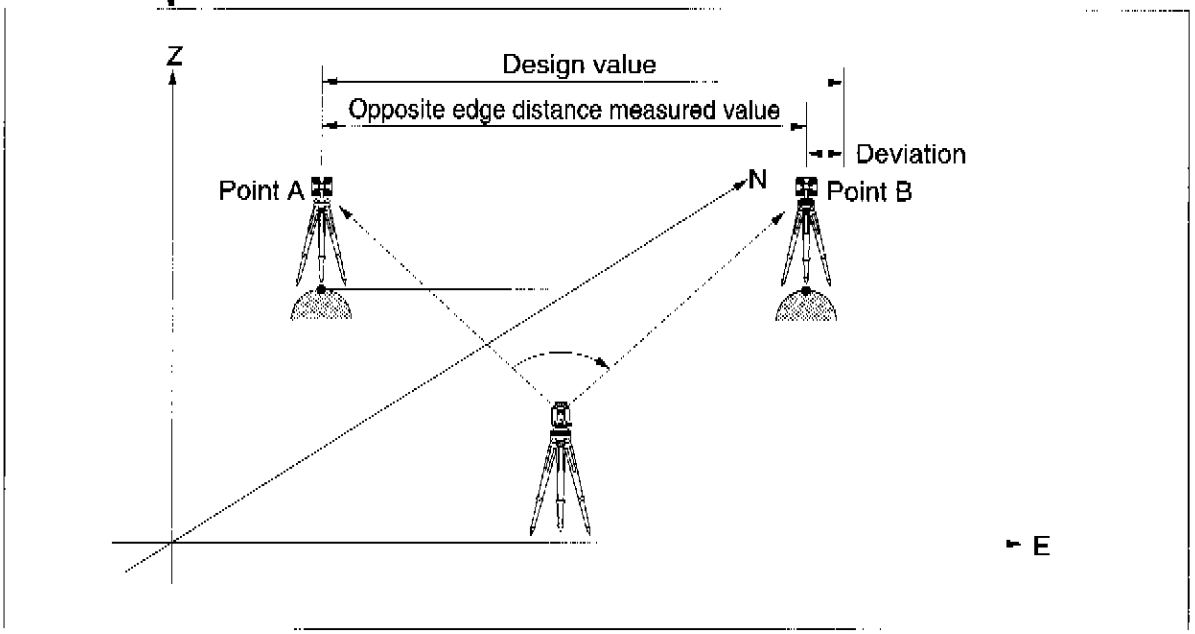


52 Remote Stake Check Function Command No.115

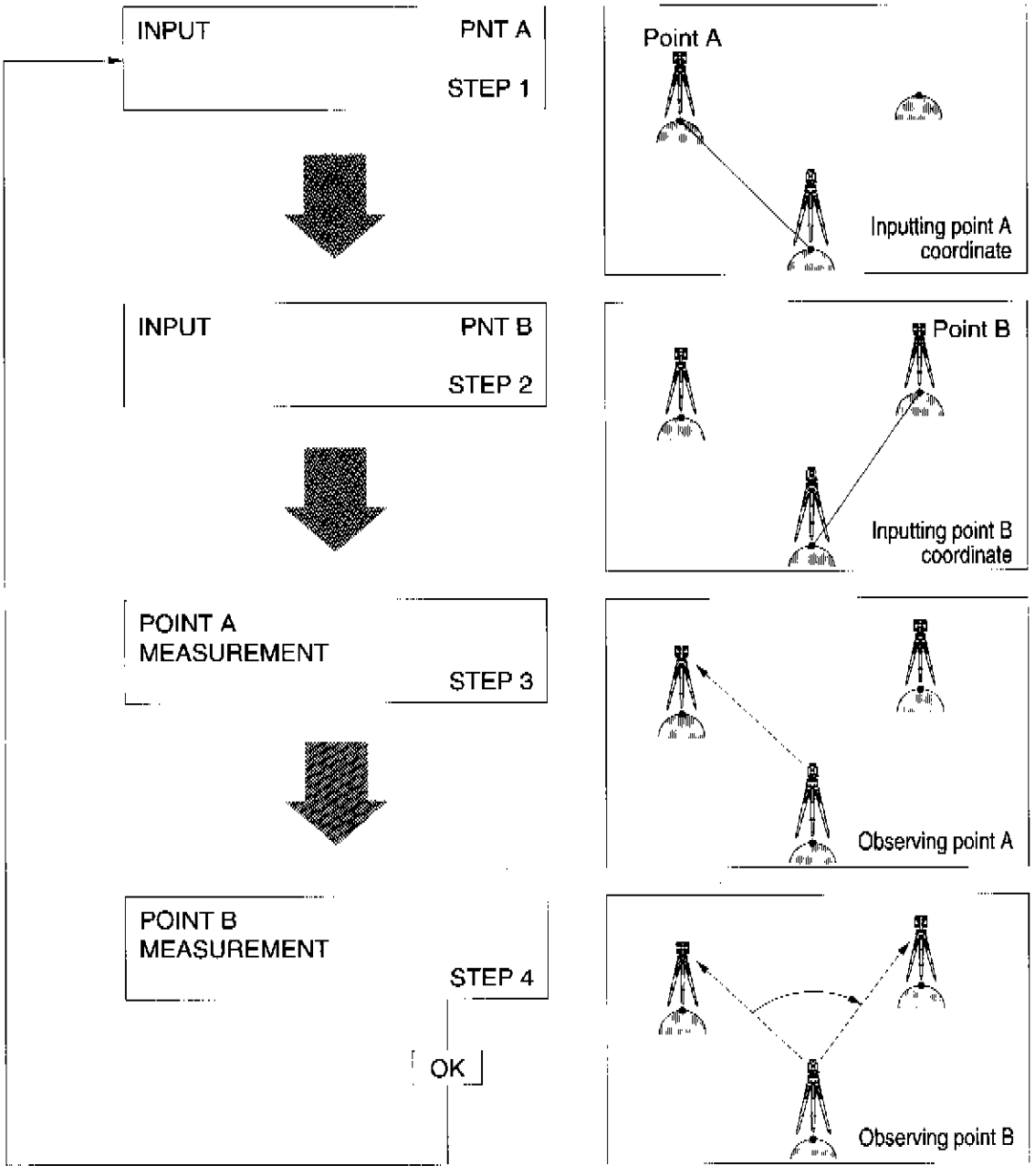
General pictures of measurement

In the remote stake check function, the difference between the design values for a horizontal distance, calculated using inverse calculation from the coordinate values of two known points (Points A and B), and the horizontal distance actually measured between A and B is displayed. The scaling function can also be used with the remote stake check.

General picture



Operation procedures and operative illustrations



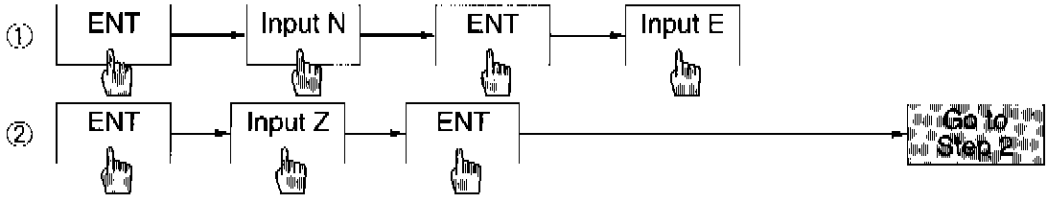
Pressing [ESC] a couple of times interrupts the function. The screen returns to the special function menu screen.

54 Remote Stake Check Function Command No.115

Operation procedures

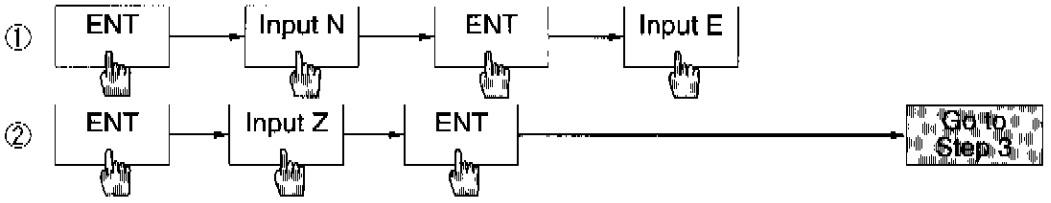
Press the number keys as [007115], and press [ENT] to access STEP 1 of Remote Stake Check Function

Step 1 Inputting the coordinates for Point A



* The values for the Z coordinate are not directly related to this calculation, and can be omitted here (simply press [ENT] without entering a value).

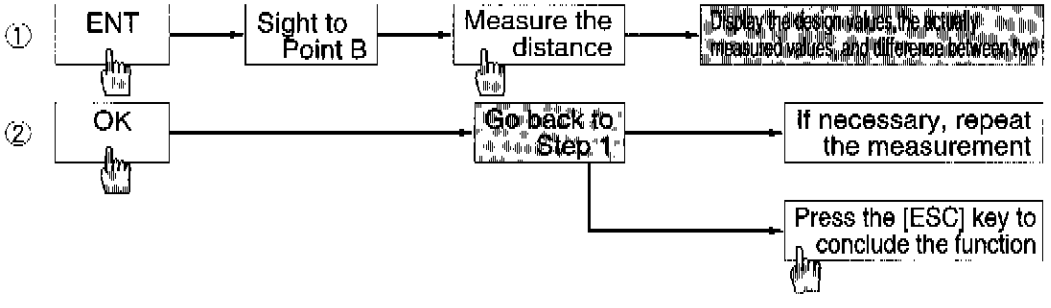
Step 2 Inputting the coordinates for Point B



* The Z coordinates may be omitted.

Step 3 Observing Point A

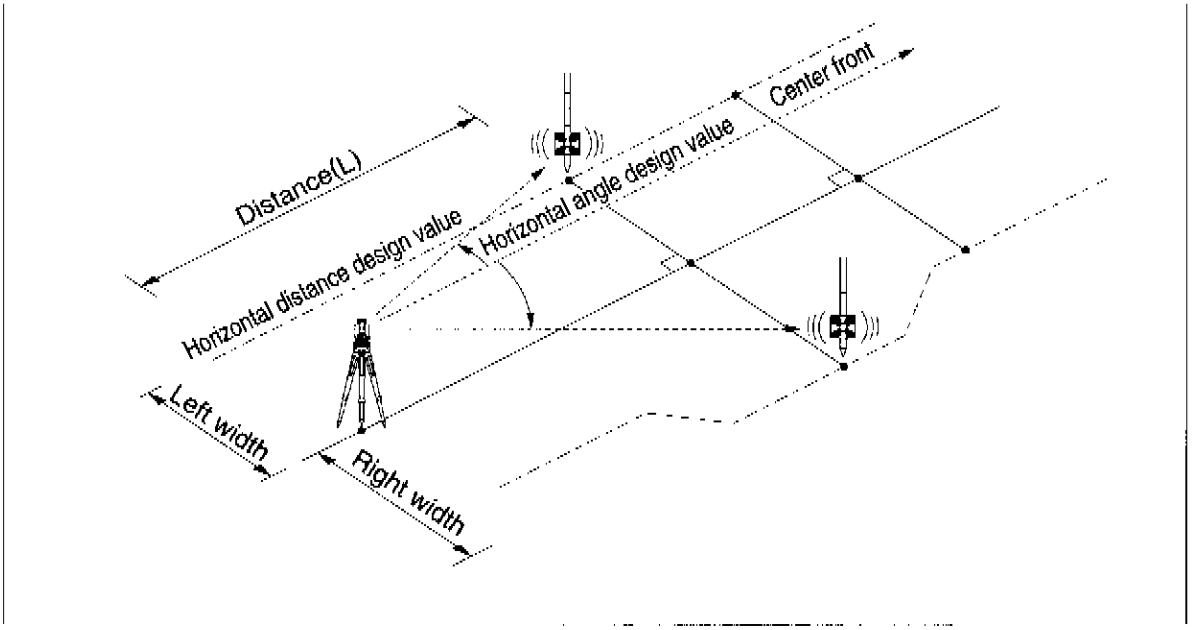
Step 4 Observing Point B



General pictures of measurement

With offset station measurement, a PTS set on a center line is used for easy setting of the stake-out points to the left and right of the center line.

General picture

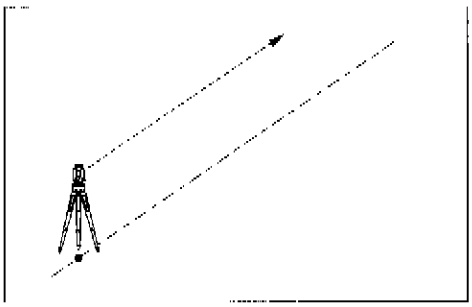


56 Offset Station Function Command No.116

Operation procedures and operative illustrations

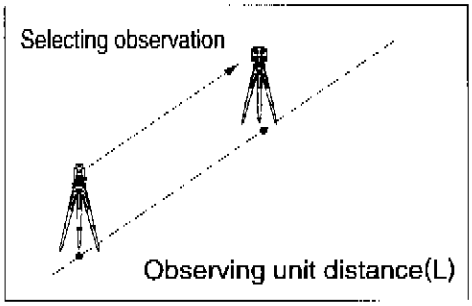
AIM CENTER FRONT

PRESS ENT STEP 1



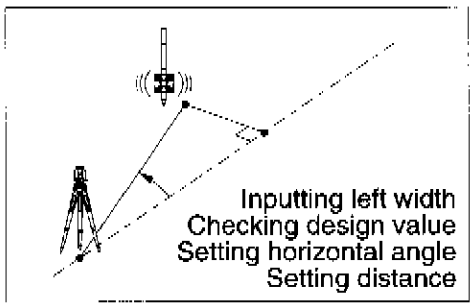
1→MEAS LOT
2. INPUT

STEP 2



OFFSET ST(LEFT)

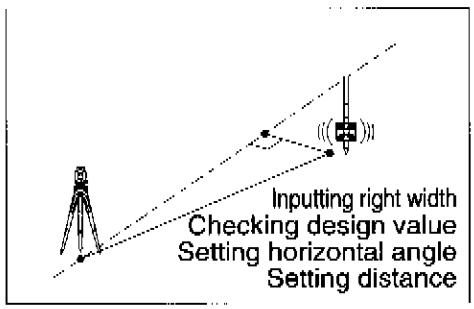
STEP 3



OFFSET ST(RIGHT)

STEP 4

OK



Pressing [ESC] key a couple of times interrupts the function. * The screen returns to the special function menu screen.

Offset Station Function Command No.116

Operation procedures

Press the number keys as [007116], and press [ENT] to access STEP 1 of Offset Station Function.

Step 1 Sighting the center station

① Sight the center station at the front → ENT → Go to Step 2

Step 2 Selecting either observation or input

① Select "1. Observation" → Measure the distance to the center station → Display the distance to the center station → Go to Step 3

Select "2. Input" → Specify the design values (distance) → ENT → Go to Step 3

Step 3 Stake-out of the left station

① ENT → Specify the width on the left → ENT → Check the design value

② OK → Display the difference between the current angle and the calculated angle → Rotate the instrument,using the upper H motion, and lock when the difference is "0"

③ OK → Display the difference between the current distance and the calculated distance → Sight the prism → Measure the distance

④ Move the prism to the ground point where the difference is "0" and set that as the point to be staked → OK → Go to Step 4

Step 4 Stake-out of the right station

① Measure the width on the right in the same way as STEP 3 → OK → Go back to Step 2 → If necessary, repeat the measurement

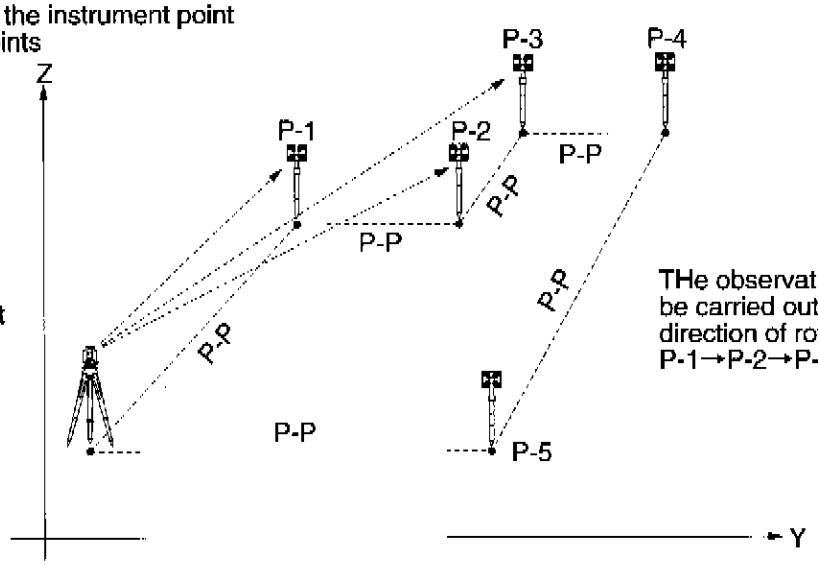
Go back to Step 2 → Press the "ESC" key to conclude the function

General pictures of measurement

With the area measurement function, the area is calculated and displayed in real time as each target point is measured, and the horizontal distance between two prisms is displayed as well.

General pictures

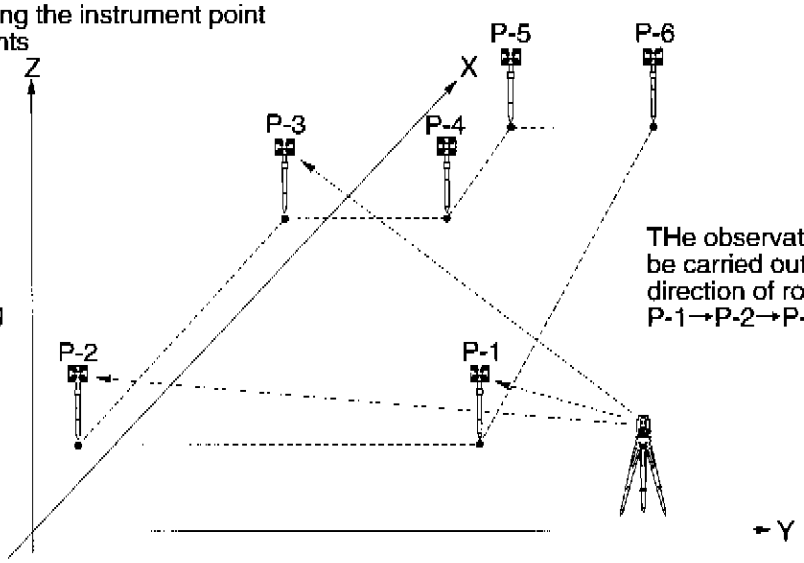
When including the instrument point in multiangle points



Measurement points
: 10 including instrument point

THe observation should be carried out in the same direction of rotation.
P-1→P-2→P-3→P-4→P-5

When not including the instrument point in multiangle points



Measurement points
: 10 not including instrument point

THe observation should be carried out in the same direction of rotation.
P-1→P-2→P-3→P-4→P-5

* When making the coordinate measurement by setting the direction angle to the backsight point, use the inverse azimuth/distance measurement function to set the direction angle of the backsight point.

Operation procedures and operative illustrations

INPUT S.P

STEP 1

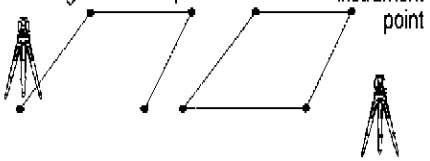
Inputting instrument point coordinates

TARGET MEASUREMENT

STEP 2

INCLUDE STATION POINT IN TRV POINT FOR AREA OK ?

Selecting multiangle points

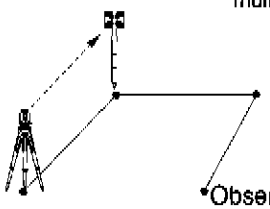


N: 346.172 m
E: 100.000 m
Z: 43.407 m

OK

(P1~N) REPEAT

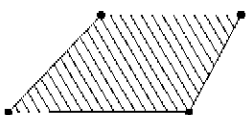
When selecting inclusion of instrument point in multiangle points



AREA 0.000 ㎡

P-P 246.171 m

MEAS TRACK NEXT POINT OK



Area calculation
Opposite edge distance calculation

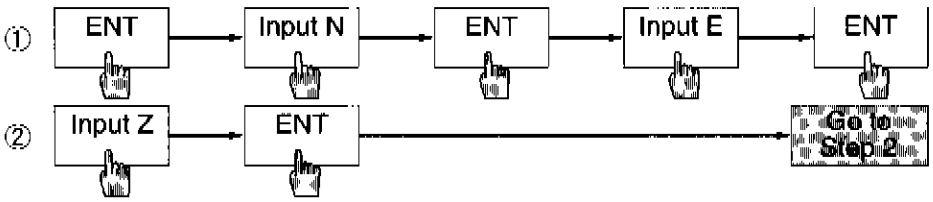
* Pressing [ESC] key a couple of times interrupts the function. The screen returns to the special function menu screen.

60 Area Function Command No.117

Operation procedures

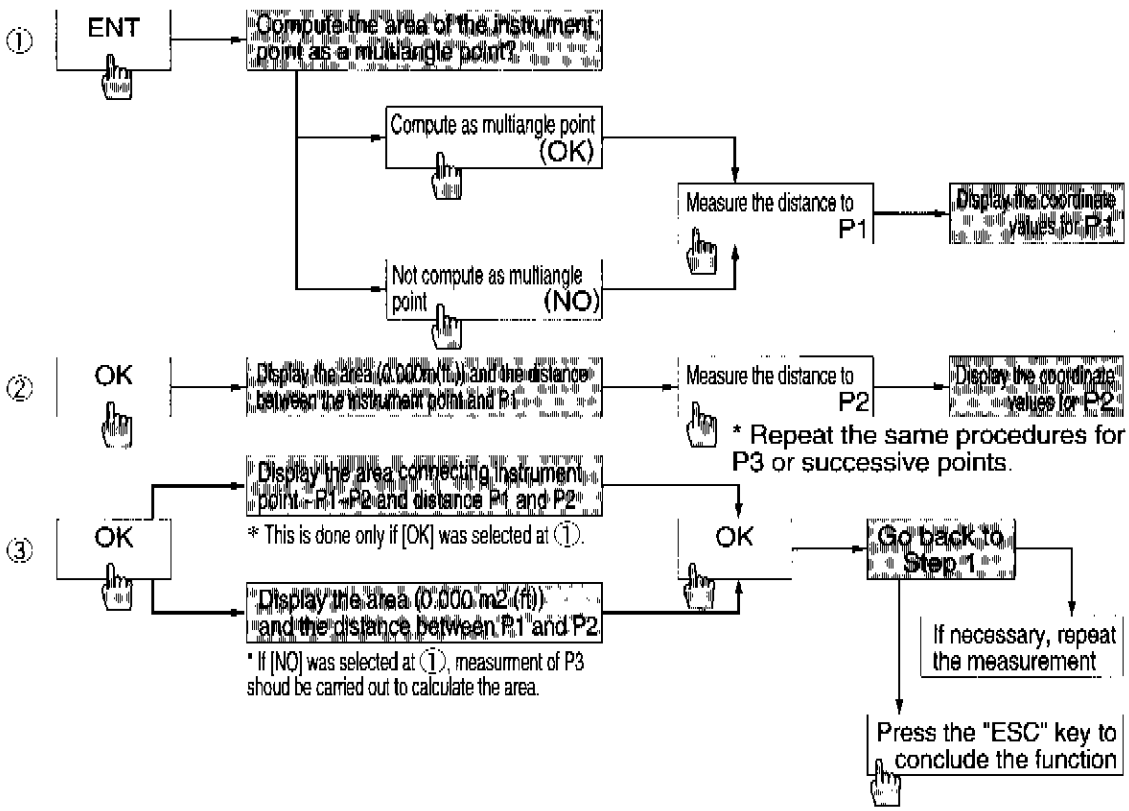
Press the number keys as [007117], and press [ENT] to access STEP 1 of the Area Function.

Step 1 Inputting the instrument point coordinates



* The values for the Z coordinate are not directly related to this calculation, and can be omitted here (simply press [ENT] without entering a value).

Step 2 Observing the target

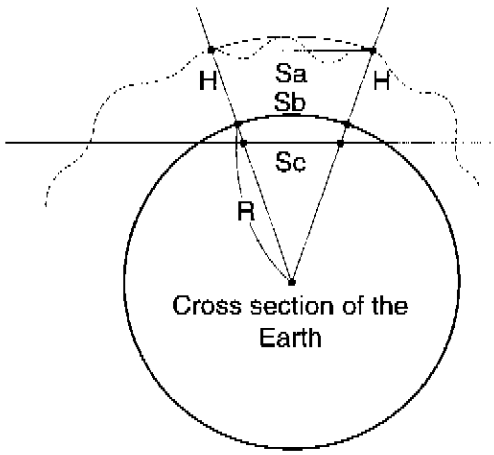


* With area measurement, observation and calculation can be carried out for up to ten targets.
* With area measurement, observation should be carried out in the same direction of rotation.

Scaling Correction

"Scaling" as used here refers to scaling and perspective correction carried out as part of the measurement process among the special functions. It is effective only with coordinate stake-out, traverse measurement, inverse azimuth/distance calculation, direct stake check, remote stake check, and resection measurement. Of these, reverse perspective correction is carried out with coordinate stake-out, inverse azimuth/distance, direct stake check, and remote stake check.

* When the unit is shipped from the factory, the correction coefficient is set to "1" and the elevation to "0", so that no correction is carried out. If correction is necessary, input the appropriate values for the scaling coefficient and the averaging elevation.

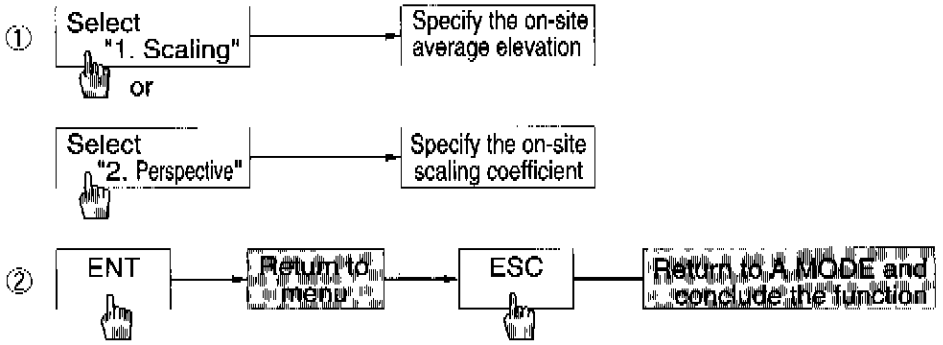


1. Perspective correction
   Average(H)=Averaged on-site elevation
   Input range: -9999.99~+9999.99m
2. Scaling coefficient
   Scaling=On-site scaling coefficient
   Input range: +0.90000000~+1.19999999

62 Scaling Function Command No.118

Operation procedures

Press the number key as [007118], and press [ENT] to access the Scaling Function.



The Equation of Perspective Correction

* The perspective correction for the scaling function is determined using the following equation.

Perspective Correction Equation

This equation is used when the on-site slope distance is to be corrected to the distance for the horizontal value angle coordinates.

$$Sb = Sa\ (R/R + H)$$

Sb : Horizontal distance (distance on surface of standard ovalshaped object)
Sa : Horizontal distance (distance on surface of actual site)
R : Averaged datum station for radius of earth (6370 km(20,898,906.21ft))
H : Average on-site elevation (input value)

$$Sc = m\ (Sb)$$

Sc : Horizontal distance (distance between horizontal angle coordinates)
m : Scaling coefficient (input value)
Sb : Horizontal distance (distance on surface of standard ovalshaped object)
This horizontal distance Sc is used to calculate the coordinates.

Reverse Perspective Correction Equation

This equation is used when the distance between horizontal angle coordinates is being corrected to a horizontal distance on the actual site.

$$Sa = Sc / m\ x\ (1 + H/R\ )$$

Sa : Horizontal distance (distance on actual site)
m : Scaling coefficient (input value)
Sc : Horizontal distance (distance between horizontal angle coordinates)
R : Averaged datum station for radius of earth (6370 km(20,898,906.21ft))
H : Average on-site elevation (input value)

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