CHAPTER

5

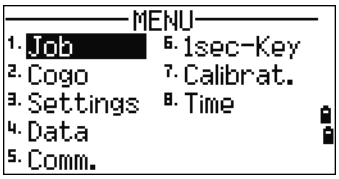
Menu Key

In this chapter:

Introduction

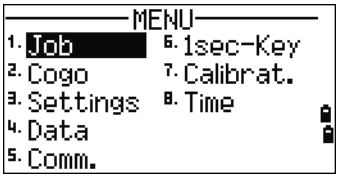
Use the MENU screen to access important functions and settings.

To display the MENU screen, press the MENU key.



Job Manager

Use the job manager to open, create, delete, and manage jobs. To open the Job Manager, press 1 or select Job on the MENU screen.



If there are jobs stored on the instrument, the job list appears, showing all the stored jobs. The newest job appears at the top of the list.

If there are no jobs stored, the Create Job screen appears. See Creating a new job, page 93.

Opening an existing job

The job list shows all the jobs stored on the instrument, in descending date order.

The following symbols may be used to provide extra information about jobs:

Symbol	Meaning
*	Current job.
@	Control job.
!	Some of the job settings are different from the current job.
?	Job was created in an older DB. Older files cannot be opened in version 1.10 or later of the software.

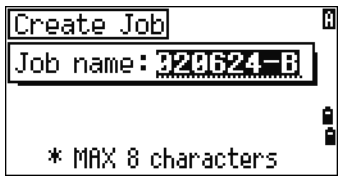
Press ^ or v to move up or down the job list. Press ENT to open the highlighted job.

When you open a job, all job settings are automatically changed to match those used in the open job.

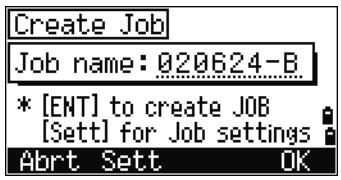
Creating a new job

1. Press the Creat softkey in the job list.

2. Enter a job name of up to eight characters. Press ENT.
3. Do one of the following:



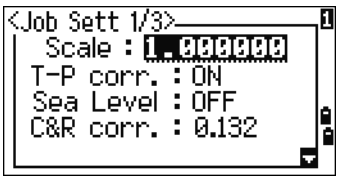
- To check the job settings, press the Sett softkey.
- To create a new job using the current job settings, press ENT or the OK softkey.



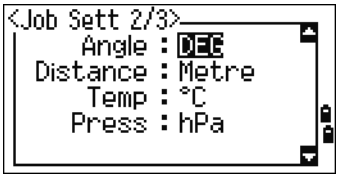
Job settings

The following settings are set when a job is created, and cannot be changed. This ensures that the data in a job is correctly stored in the database, and that all necessary corrections are applied when you store each record.

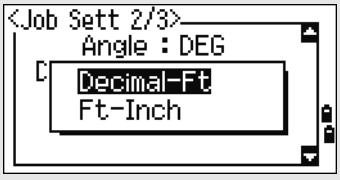
Scale Factor	0.999600 to 1.000400
T-P correction	ON/OFF
Sea Level	ON/OFF
C&R correction	OFF/0.132/0.200



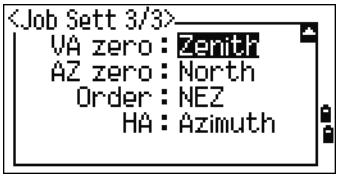
Angle unit	DEG/GON/MIL
Distance unit	Metre/US-Ft/I-Ft
Temp unit	°C/°F
Press unit	hPa/mmHg/inHg



If you select US-Ft or I-Ft, an additional settings screen appears. Use this screen to specify whether to display values in Decimal-Ft or Ft-Inch.



VA zero	Zenith/Horizon/Compass
AZ zero	North/South
Order	NEZ/ENZ
HA	Azimuth/0 to BS



To move between fields, press [^] or [v]. Alternatively, to move to the next field, press [ENT].

To change the setting in the selected field, press [<] or [>].

To confirm the job settings and create the job, press [ENT] in the last field (HA).

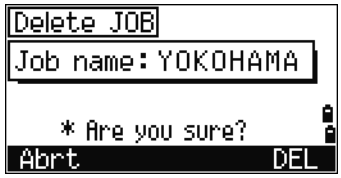
These settings are separate from other temporary settings.

Deleting a job

Tip – There is no undelete function in the Job Manager. Before you press [ENT] or select DEL, make sure that the selected job is the one that you want to delete.

1. In the job list, highlight the job that you want to delete.

2. Press the DEL softkey. A confirmation screen appears.
3. Do one of the following:
   - To delete the selected job, press [ENT] or the DEL softkey.
   - To cancel the deletion and return to the previous screen, press [ESC] or the Abrt softkey.



After you delete a job, the display returns to the job list.

Setting the control job

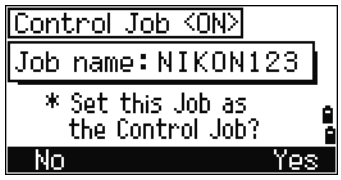
If you search for a point when a control job is specified, and the system cannot find the point in the current job, the control job is also searched. If the point is found in the control job, it is copied to the current job as a UP record.

A control job has the same format as a standard job. You can open and modify it like any other job, and you can use it to record any measured data.

To set the control job:

1. Highlight the job that you want to use.
2. Press the Ctrl softkey.

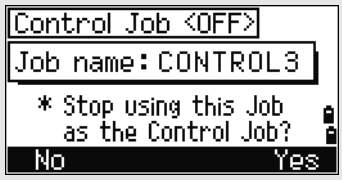
A confirmation screen appears.



3. Do one of the following:
   - To set the selected job as the control job, press [ENT] or the `Yes` softkey.
   - To cancel the process, press [ESC] or the `No` softkey.

If a control job is already assigned, the newly assigned control job replaces it as the control job.

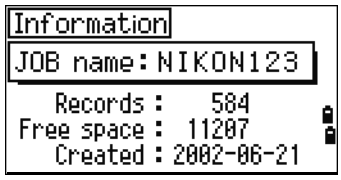
To clear the control job selected, highlight the current control job in the job list and press the `Ctrl` softkey. Then press [ENT] or the `Yes` softkey to confirm.



Displaying job Information

To display job information, highlight the job name and then press the `Info` softkey.

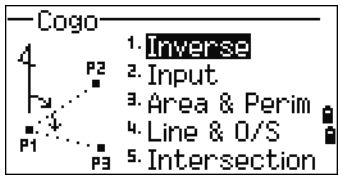
The Information screen shows the number of records in the job, the free space, and the date when the job was created. Free space indicates how many points can be stored in the job.



To return to the job list, press any key.

Cogo

Use the Cogo menu to perform coordinate geometry (COGO) calculations. You can access this menu at any time from any observation or PT input screen.



To open the Cogo menu, press 2 or select Cogo on the MENU screen.

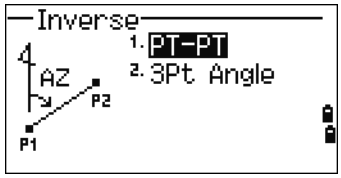
Calculating angle and distance between two coordinates

To open the Inverse menu, press 1 or select Inverse in the Cogo menu.

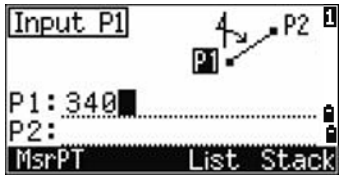
PT-PT inverse

PT-PT calculates the distance and the angle between two input points.

To calculate a PT-PT inverse:

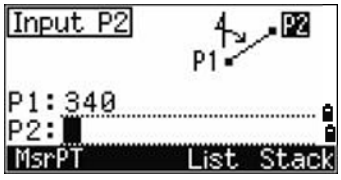


1. Press 1 or select PT-PT in the Inverse menu.

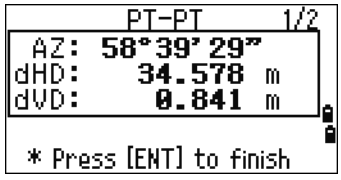


2. Enter the first point number or name. Press ENT.

If you press ENT without entering a point name, a coordinate input screen appears, and you can enter coordinates. These coordinates are ***not*** stored to the database. If you want to store the point, specify a new point name.

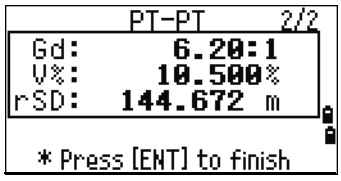


3. Type the second point number/name and press ENT. The MSR softkey allows you to shoot the point on the spot to use it in the calculation.



The azimuth, horizontal distance, and vertical distance from the first point to the second point are displayed.

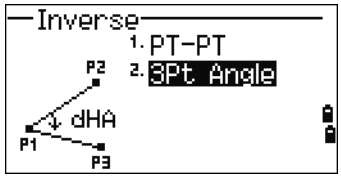
4. Do one of the following:
   - To return to the PT input screen, press ESC.
   - To return to the COGO menu, press ENT.
   - To change the contents of the result screen, press DSP.



Gd	Grade (HD/VD)
V%	100/Gd
rSD	Slope distance PT1 to PT2

3Pt angle

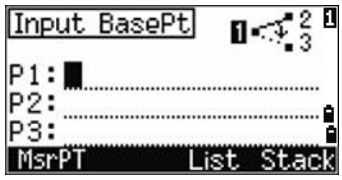
The 3Pt Angle function calculates the angle between two lines defined by three points.



To calculate a 3Pt angle:

1. Press 2 or select 3Pt Angle in the Inverse menu.

   P1 is the base point. Two lines are to be defined by P2 and P3, both from P1.



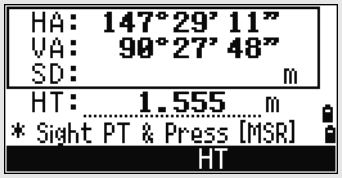
2. Enter the point name, or use the MSR softkey to take a measurement to the point.

3. Enter the second point (P2) to define the baseline (P1-P2). The angle (dHA) is measured from the baseline.

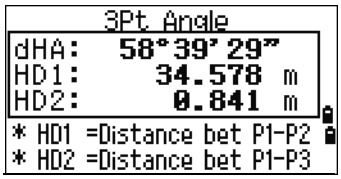
4. Enter the third point (P3) to define the second line (P1-P3).

When you press the MSR softkey, a temporary measuring screen appears. Sight the target and press MSR1 or MSR2 to take a measurement.

After the measurement, a recording point screen appears. To store the measured point, enter the PT, HT, and CD values and press ENT. To use the point without recording it, press ESC.



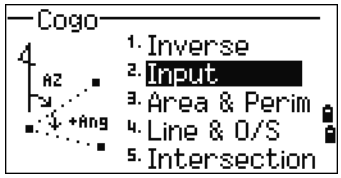
When you have entered three points, the instrument calculates the angle and distances.



5. Do one of the following:
   - To return to the Inverse menu, press ENT.
   - To return to the Input BasePt screen, press ESC.

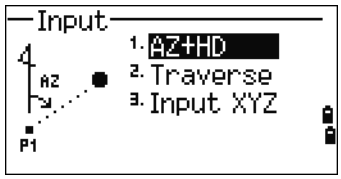
Calculating and manually inputting coordinates

To enter the Input menu, press 2 or select Input in the Cogo menu. There are three functions in this menu for recording new coordinate points.

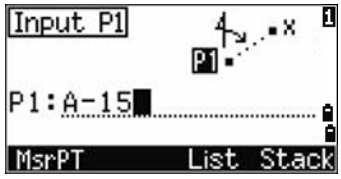


Azimuth+HD input

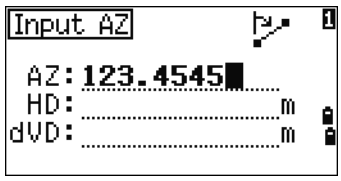
To calculate a coordinate by an angle and distance input from the base point (P1), press 1 or select AZ+HD in the Input menu.



Enter the base point (P1). Type the point name and press ENT.

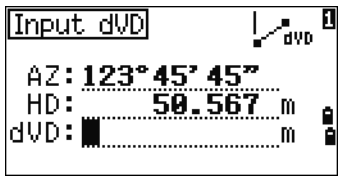


Enter the azimuth, horizontal distance, and vertical distance. Then press ENT.



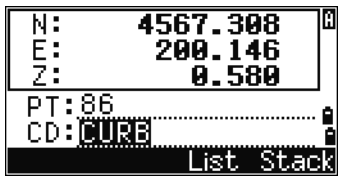
To enter 123°45'45", type 123.4545 and press ENT.

If you do not enter a value in the dVD field, the value 0.000 is used.



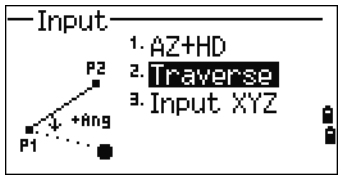
A recording point screen with the calculated coordinates appears. PT defaults to the last recorded PT + 1.

Press ENT to store the point.



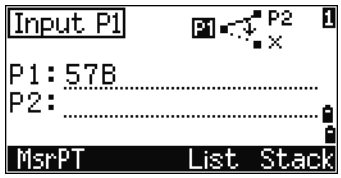
Traverse

To open the Traverse (2Pt Angle) function, press 2 or select Traverse in the Input menu.



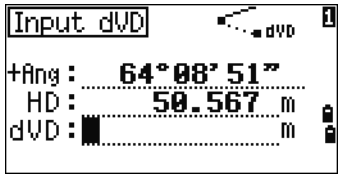
Traverse function calculates a new point based on the two defined points and angle, horizontal and vertical distances from the line defined by those two points.

To enter P1 and P2, enter point names or take measurements to targets.



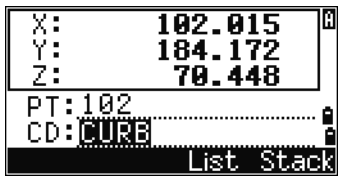
Enter the plus-minus angle, horizontal distance, and vertical distance from the baseline defined by P1-P2.

If you do not enter a value in the dVD field, the value 0.000 is used.

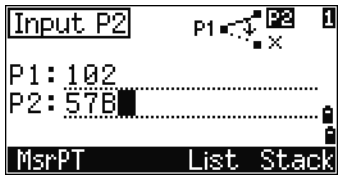


When you press ENT in the dVD field, a new point is calculated. The PT name defaults to the last recorded PT + 1.

To record the new point and return to the point input screen, press ENT.



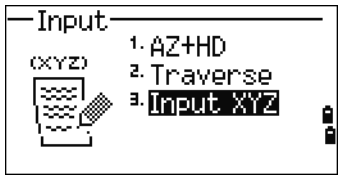
P1 (base PT) defaults to the previously recorded PT. P2 defaults to the previous P1.



To continuously calculate a new point, enter +Ang, HD, and dVD from the previous bearing line. This is a convenient way to enter Traverse points.

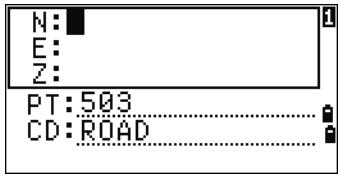
Entering coordinates

To manually enter the XYZ coordinates, press 3 or select Input XYZ in the Input menu.

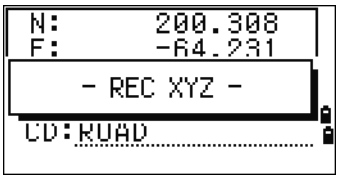


The PT name defaults to the last recorded PT + 1.

Enter the coordinates using the numeric keys. To move to the next field, press ENT or v in a field



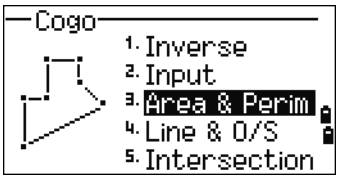
To store the point as an MP record and return to the point input screen, press ENT in the Z field. The default PT is incremented to the next value.



You can record NE, NEZ, or Z-only data to the database.

Calculating area and perimeter

To calculate an area or perimeter, press 3 or select Area & Perim in the Cogo menu.

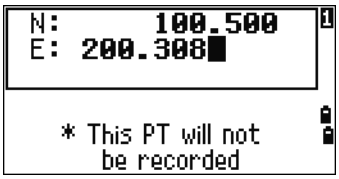


To take a measurement, enter the first point and press ENT, or press the MSR softkey.

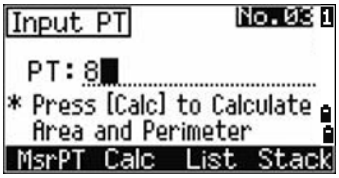
In the upper right corner of the screen, a counter indicates how many points you have entered.

To input point numbers consecutively, use the Fr/To softkey. For more information, see Advanced feature: Entering a range of points, page 101.

If you enter a new point name, you can enter new coordinates and record the point. If you do not want to record the point, press ENT without entering a value in the PT field. An XY coordinate input screen appears.

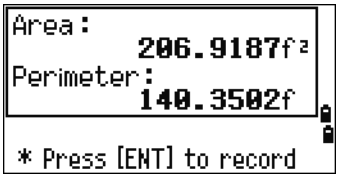


Continue to enter points until you have defined all the points in the lot. Then, press V to calculate the area and perimeter.

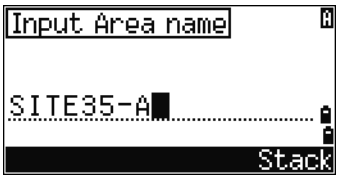


The first and last points that you enter are joined to close the area.
You must enter the points in the order in which they define the lot.
You can enter up to 99 points.

Press ENT to store the calculated values as a a comment record, or press ESC to return to the Cogo menu.



If you chose to store the area, enter a name to identify the area and then press [ENT].

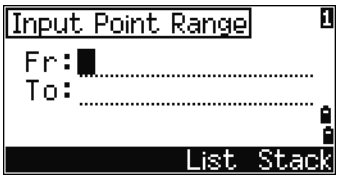


When you download data in Nikon RAW format, area (AR) records are output as comment (CO) records.

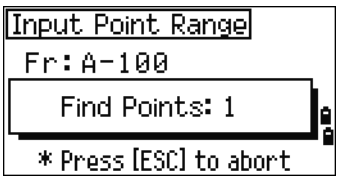
Advanced feature: Entering a range of points

To quickly enter a sequential range of points, use the range input function. To access this function, press the Fr/To softkey in the No. 01 or No. 02 input screens.

Enter the start point name in the Fr field and the end point name in the To field. You can include letters and hyphens in the point names, but the last character must be numeric.



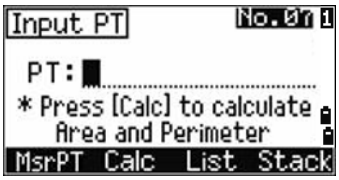
Press [ENT] in To field to start searching for matching points. The counter shows the number of matching points found.



When the search is complete, you are returned to the Input PT screen.

Press the Calc softkey to calculate the area and perimeter, or enter point names in the PT field.

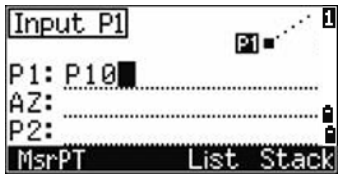
Press [ESC] to return to the Input PT screen with the preceding point name.



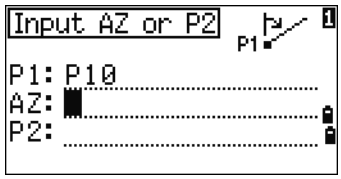
Calculating coordinates from line and offset

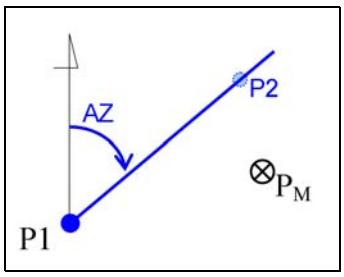
To enter the Line & offset function, press 4 or select `Line & O/S` in the Cogo menu.

Enter the base point (P1).

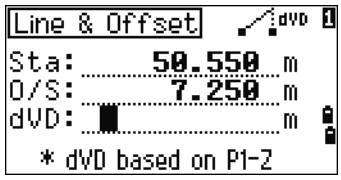


Specify the azimuth bearing. To do this, enter a value in the AZ or P2 field. P2 is a second point on the line.



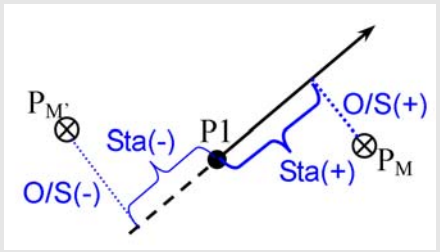


Enter the horizontal distance along the baseline (Sta), the horizontal distance perpendicular to the line (O/S), and the vertical distance (dVD).

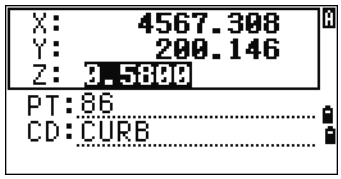


A negative value in the Sta field means the opposite direction along the defined bearing line.

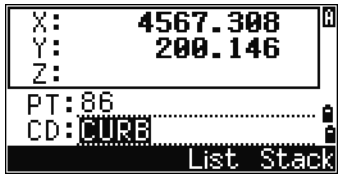
A negative value in the O/S field is for the left-hand side of the bearing line.



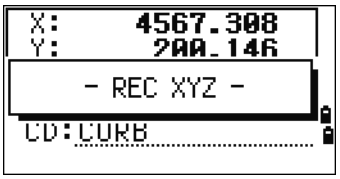
To calculate the coordinates of the point (PM), press ENT in the dVD field. You can change the Z coordinate here.



To record the point, press ENT in the CD field.



The coordinates are stored as a CC record. Line definition information and Sta, O/S, and dVD values are stored in comment (CO) records.



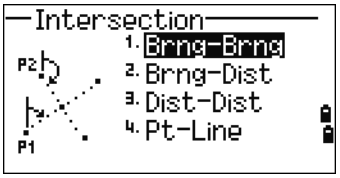
Calculating coordinates using intersection functions

To enter the Intersection menu, press 3 or select `Intersection` in the Cogo menu. There are four functions in this menu for calculating coordinates.

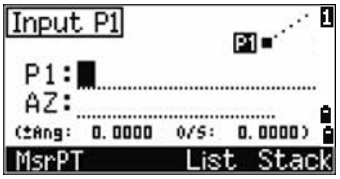
Calculating a bearing-bearing intersection

A bearing-bearing intersection is the intersection point of two lines.

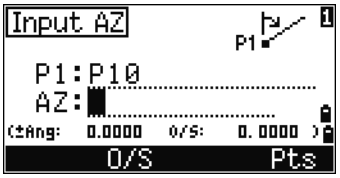
1. To calculate a bearing-bearing intersection, press 1 or select `Brng-Brng` in the Intersection menu.



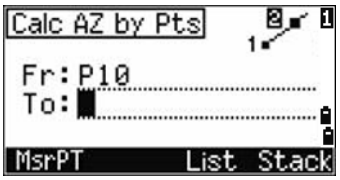
2. Enter the first point name and press ENT. Alternatively, to measure directly to the point, press the `MSR` softkey.



3. Define the first line by azimuth.



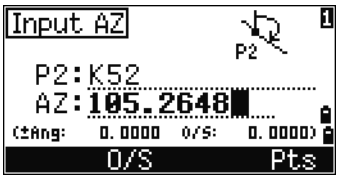
4. To define the line by two points, press the `Pts` softkey. The Fr field defaults to the P1 point, but you can change the selected point. In the To field, enter or measure to the second point.



   For more information about the `O/S` softkey, see Advanced feature: Entering angle and distance offsets, page 107.

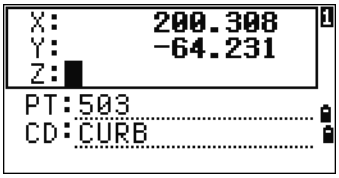
5. Do one of the following:
   - To return to the previous screen, press ESC. The calculated value appears in the AZ field.
   - To go to the next screen, press ENT.

6. Define the second line by two points or by P2 and AZ.



7. To calculate the coordinates of the intersection point, press ENT in the AZ field.

   The calculated coordinates are displayed. You can input a Z coordinate if necessary.



8. Enter a value in the PT field and in the CD field.
9. To record the point, press ENT.

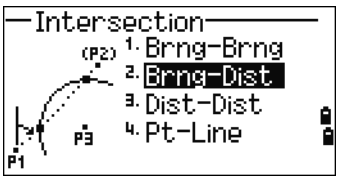
Sample records

CO,Int BB P1:P10 AZ:330.54175-90.00000
CO, P2:408 AZ:100.0000+0.0000
CC,A123,,4567.3080,200.1467,-1.2056,POT

Calculating a bearing-distance intersection

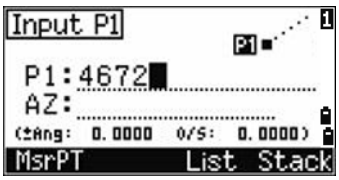
1. Press 2 or select Brng-Dist in the Intersection menu.

   Brng-Dist calculates the intersection point formed by one line and one distance (radius).



2. Enter a point on the line.

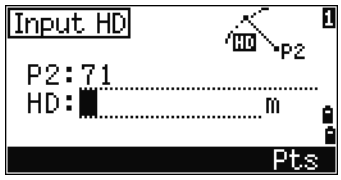
   The line can be defined by two points or by a point and an azimuth.



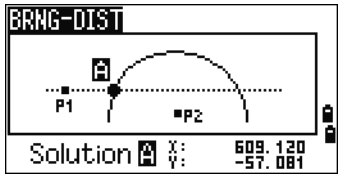
3. Enter the second point (P2) as the center of the circle.

4. Enter the distance from P2.

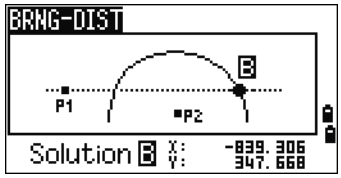
   – To define the distance (HD) by two points, press the Pts softkey.



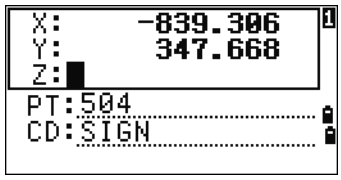
   – To calculate the coordinates of the intersection point, press ENT in the HD field.



5. If there are two results, the first solution appears graphically relative to the P1-P2 line. To display the second solution, press < or >.



6. To record the point, press ENT when the required solution appears.
7. Enter a Z coordinate if necessary.
8. To move to the PT and CD fields, press ENT.

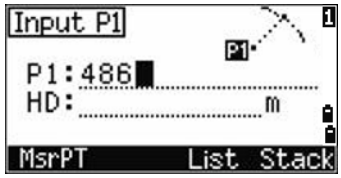


Sample records

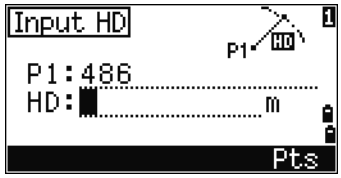
CO,Int BD P1:4672 AZ:330.54175+0.00000
CO, P2:71 HD:100.0000
CC,504,,-839.3065,347.6682,,SIGN

Calculating a distance-distance intersection

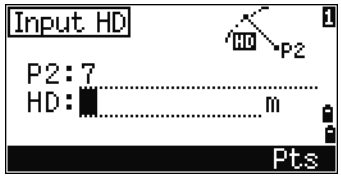
1. Press 3 or select Dist-Dist in the Intersection menu.
2. Enter the first point name and press ENT, or press the MSR softkey to measure directly to the point.



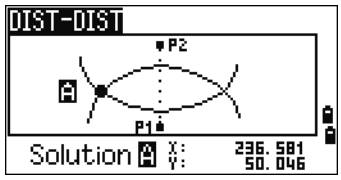
3. Enter the distance from P1 and press ENT.
4. To define the distance (HD) by two points, press the Pts softkey.



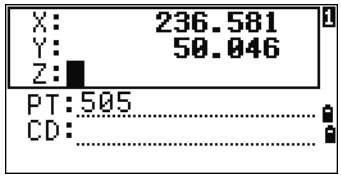
5. Enter P2 and the distance from P2 (HD).
6. To calculate the coordinates of the intersection point, press ENT in the HD field.



7. Press [<] or [>] to display the second solution.
8. To record the point, press [ENT] when the required solution appears.



9. Enter a Z coordinate if necessary. Press [ENT] to move to the PT and CD fields.

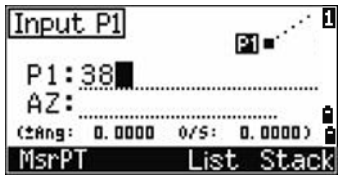


Sample records

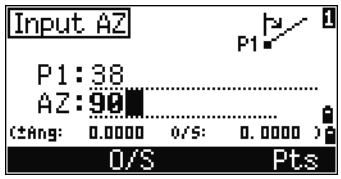
CO,Int DD P1:486 HD:330.6020
CO, P2:7 HD:100.0000
CC,505,,236.5817,50.0461,0.0000,

Calculating a point-line intersection

1. Press [4] or select `Pt-Line` in the Intersection menu.
2. Enter the first point name and press [ENT], or press the `MSR` softkey to measure directly to the point.

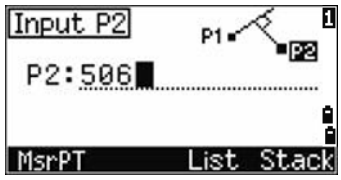


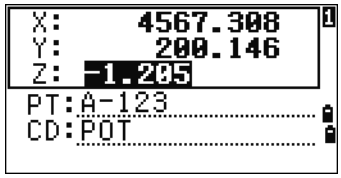
3. Enter the azimuth, or press the `Pts` softkey to enter another point name on the line.



4. Enter the perpendicular point to the line, or press the `MSR` softkey to take a measurement to the point.
5. To calculate the coordinates of the intersection point, press [ENT].

   If P1 and P2 are 3D points, the Z coordinate of the perpendicular point is calculated relative to the P1-P2 slope.
6. Enter PT and CD then press [ENT] to record the point.



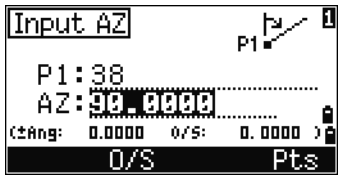


Sample records

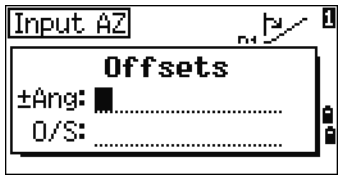
CO,Int PtLine P1:38 AZ:90.00000+0.00000
CO, P2:506
CC,A-123,,4567.3080,200.1467,-1.2056,POT

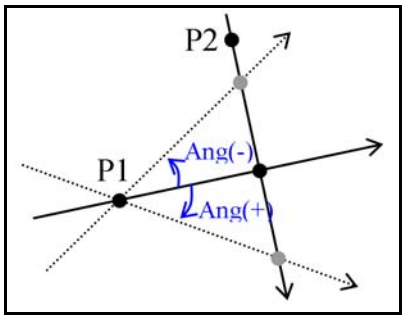
Advanced feature: Entering angle and distance offsets

To display the offset input screen, press the O/S softkey.

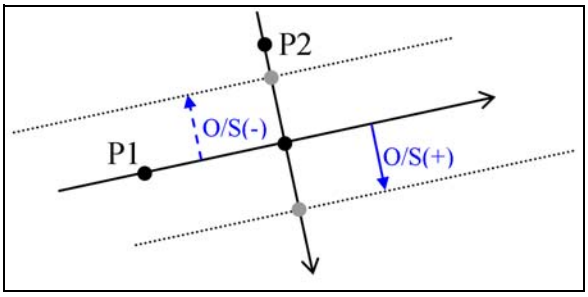


In the Ang field, enter a positive value to rotate the line clockwise. Enter a negative value to rotate the line counterclockwise.





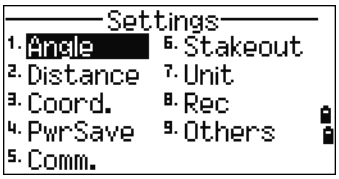
In the O/S field, enter a positive value to specify an offset to the right. Enter a negative value to specify an offset to the left.



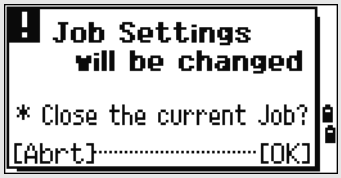
Settings

To display the Settings menu, press 2 or select Settings on the MENU screen.

Use this menu to configure the initial job settings.

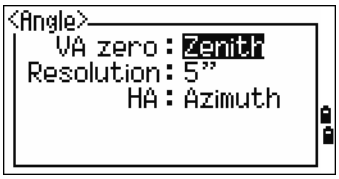


Some job settings, specified in the following sections, cannot be changed once a job is created. If any of these settings are changed while a job is open, a confirmation screen appears, asking you to create a new job with the new settings, or to work with those settings without recording any data. For more information, see Settings, page 174.



Angle

To open the Angle menu, press 1 or select Angle in the Settings menu.



VA zero	Zenith/Horizon/Compass

The VA zero job setting cannot be changed once a job is created.

Resolution	1"/5"/10" or 0.2 mgon/1 mgon/2 mgon
HA	0 to BS/Azimuth

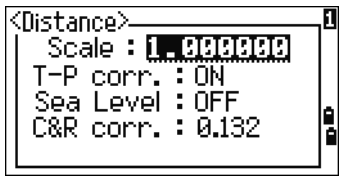
The HA job setting cannot be changed once a job is created.

When this field is set to Azimuth, the horizontal angle (HA) that appears and recorded is in Azimuth value. When this field is set to 0 to BS, HA is in HA zero to BS value.

Distance

To open the Distance menu, press 2 or select Distance in the Settings menu

Scale	Numeric value between 0.999600 and 1.000400
T-P corr.	ON/OFF
Sea Level	ON/OFF
C&R corr.	OFF/0.132/0.200



The Scale, T-P corr., Sea Level, and C&R corr. job settings cannot be changed once a job is created.

Temperature and Pressure corrections

$$K = 275 - \frac{106 \times P \times \left(\frac{10000.0}{13.5951 \times 980.665}\right)}{273 + T}$$

$$SD' = \left(R_{TM} + \frac{K}{1000000}\right) \times SD$$

SD	Slope dist. (before adj.)
SD'	Slope dist. (after adj.)
K	Compensation coefficient
P	Pressure (hPa)
T	Temperature (°C)

Sea Level correction

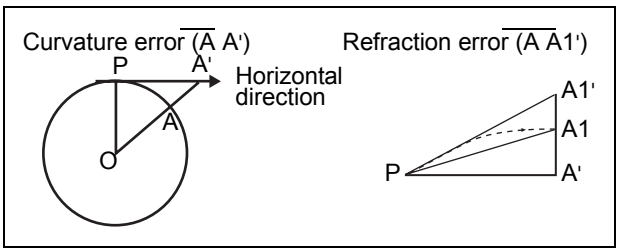
$$HD' = \frac{HD \times R_e}{R_e + Z_{STN}}$$

HD	Horizontal dist. (before adj.)
HD'	Horizontal dist. (after adj.)
Z_{STN}	Instrument-Z
R_e	6370 km

Curvature and Refraction correction

Because the surface of the earth is curved, the vertical difference (VD and Z) at the measurement point, as referenced to the horizontal plane, inevitably includes some error. This error is called ***curvature error***. Also, because the density of the air

surrounding the earth decreases with altitude, light is refracted at different rates at different altitudes. The error caused by this change in refraction is called ***refraction error***.



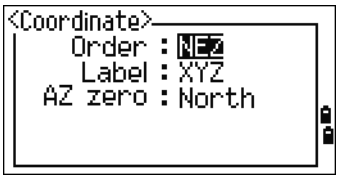
HD	Horizontal dist. (before adj.)
HD’	Horizontal dist. (after adj.)
VD	Vertical dist. (before adj.)
VD'	Vertical dist. (after adj.)
SD	Slope distance
VA	Vertical angle
Re	6370 km
k	C&R constant (0.132 or 0.200)

$$HD' = HD - \frac{SD^2 \sin(2VA)}{2R_e}\left(R_{TM} - \frac{k}{2}\right)$$

$$VD' = VD + \frac{HD^2}{2R_e}(1 - k)$$

Coordinate

To open the Coordinate menu, press 3 or select `Coord.` in the Settings menu.

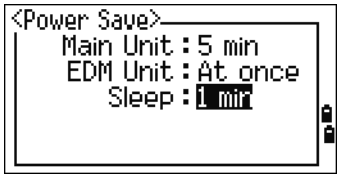


Order	NEZ/ENZ
Label	XYZ/YXZ/NEZ(ENZ)
AZ	North/South

The Order and AZ job settings cannot be changed once a job is created.

Power saving

To open the Power Save menu, press 4 or select `PwrSave` in the Settings menu.



Main Unit	OFF/5min/10min/30min
EDM Unit	OFF/At once/0.1min/0.5min/3min/10min
Sleep	OFF/1min/3min/5min

Communications

To open the Communication menu, press 5 or select Comm. in the Settings menu.

Ext.Comm	NIKON/SET
Port	Serial/Bluetooth (*)
Baud	1200/2400/4800/9600/19200/38400 bps
Length	7/8
Parity	EVEN/ODD/NONE
Stop bit	1/2

(*) Port selection field appears only when the optional Bluetooth is on-board.

Stakeout

Press 6 or select Stakeout in the Settings menu to open the Stakeout menu.

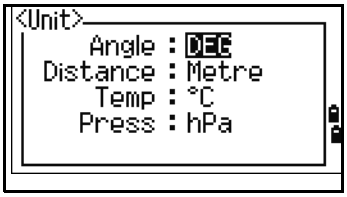
Add PT	Integer between 1 and 999,999

.

This field sets the default point number to record observed data in stakeout.

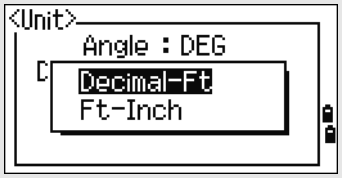
Unit

To open the Unit menu, press 7 or select Unit in the Settings menu.



Angle	DEG (Degree)
	GON (GON)
	MIL (Mil6400)
Distance	Meter/US-Ft/I-F

If you select US-Ft or I-Ft, an additional settings screen appears. Use this screen to specify whether to display values in Decimal-Ft or Ft-Inch.



Temp	°C (Celsius)
	°F (Fahrenheit)
Press	hPa/mmHg/inHg

The Angle, Distance, Temp, and Press job settings cannot be changed once a job is created.

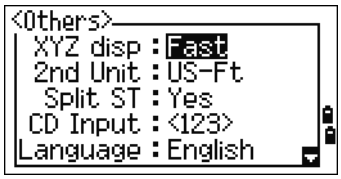
Recording

To open the Rec menu, press 8 or select Angle in the Settings menu.

Store DB	RAW/XYZ/RAW+XYZ This setting determines whether raw and/or coordinate data is stored when you record SS, CP, or SO records in the Basic Measurement Screen (BMS) or Stakeout screen.
Data Rec	Internal/COM Set this field to COM to output data on the COM port when you press ENT in the BMS or a Stakeout screen. The data is not stored to the job file. For more information, see Outputting data to the COM port, page 82

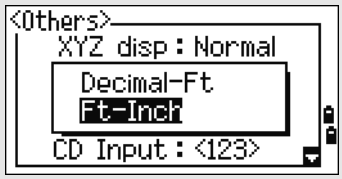
Others settings

To open the Others menu, press 9 or select Others in the Settings menu.



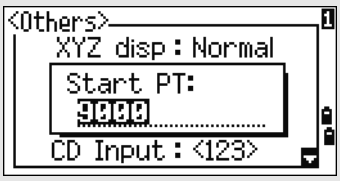
XYZ disp	Fast/Norm/Slow/+ENT Defines speed to move to the next screen after showing XYZ of the input PT
2nd Unit	None/Meter/US-Ft/I-Ft When the Secondary unit is set to a unit, an extra display screen is available in the BMS, stakeout observation screens, and 2-pt reference line screens. The extra screen shows the HD, VD, and SD in the secondary unit.

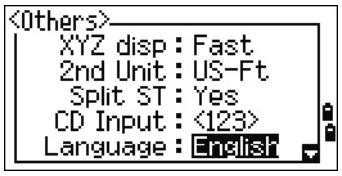
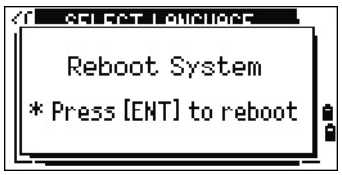
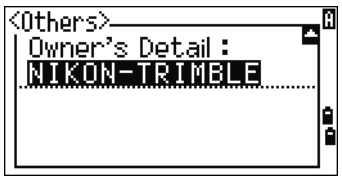
If you select US-Ft or I-Ft, an additional settings screen appears. Use this screen to specify whether to display values in Decimal-Ft or Ft-Inch.



Split ST	No/Yes Select Yes to separate the point numbers of station points from other record type point numbers

If you set the Split ST field to Yes, an additional setting screen appears. Use this screen to specify the starting ST number.



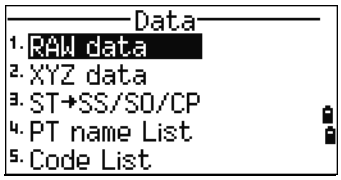
CD Input	ABC/123 Sets the default input mode when a CD field appears.	
Language	Select a language from the list. Press [<] / [>] to open the select language screen.	
	Press [^] / [v] to move the cursor to the desired language, and press [ENT] to select it.	
	Reboot confirmation screen appears. Press [ENT] and re-start the instrument, and the selected language will be available.	
Owner's Detail	Up to 20 characters. Enter your name or the name of your company. If you enter a value in this field, it appears at start-up.	

Tip – To provide easier configuration for common regional settings, you can quickly configure the Nikon total station to a pre-set combination of default regional settings. For more information, see Changing Regional Configuration Pre-sets, page 25.

Tip – The Nikon total station supports up to 3 languages on the instrument. For more information on changing the language settings, see page 113.

Data

Use the Data menu to view or edit records. To display the Data menu, press 4 on the MENU screen.



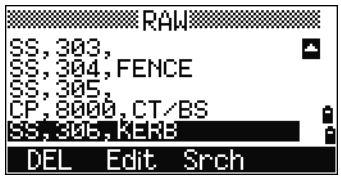
Viewing records

You can view data at any time, even in an observation screen or while entering points.

Viewing raw data

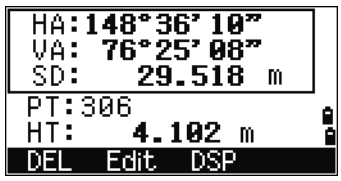
To show the raw data records in a list, press 1 on the Data menu screen.

When you first view the raw data, the last four raw records in the current job are displayed. Use ^ or v to scroll through the records.



To see detailed information for the selected records, press ENT.

To return to the record list, press ESC.



SS, CP, F1 records

Raw SS, CP and F1 records contain PT, HT, CD, HA, VA, and SD fields.

SS records are sideshots (topo shots). All shots from the Basic Measurement Screen (BMS) are stored as SS records.

CP records are shots taken in the Angle or Repeat menus, or in the BMS. For more information, see Recording a foresight point after repeat angle measurement, page 52, and Recording data from any observation screen, page 81.

When the Store DB setting is set to RAW+XYZ, press DSP to switch between the first screen (showing HA, VA, SD, PT, and HT) and the second screen (showing X, Y, Z, PT, and CD).

Coordinates are not available in F1 records.

When you take more than one measurement to the same point and choose to overwrite the XYZ data, the old raw record becomes raw data only. As a result, only one SS(RAW) record keeps its corresponding SS(XYZ) record. Other SS(RAW) records to the same point no longer have coordinates available.

ST records

ST (station) records contain ST, HI, BS, and AZ fields.

Press [DSP] to switch between the first screen (showing ST, HI, BS, and AZ) and the second screen (showing X, Y, Z, PT, and CD).

When you assign a new ST point name in `MENU > Stn Setup > Quick`, the coordinates of the station is recorded as (0, 0, 0).

SO records

SO records are stakeout shots. These are shots recorded in stakeout functions.

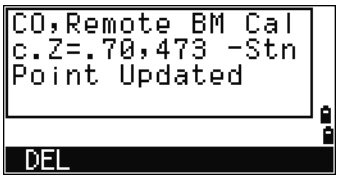
When the Store DB setting is set to RAW+XYZ, press [DSP] to switch between the first screen (showing HA, VA, SD, PT, and HT), the second screen (showing X, Y, Z, PT, and CD), and the third screen (showing dX, dY, dZ, PT, and CD).

The dX, dY, and dZ fields store the difference between the stakeout shot's actual position and its planned position. These fields are downloaded as comment records in Nikon RAW format.

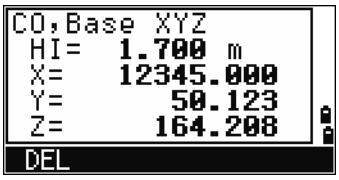
CO records

A CO record is a comment added to the job from the system.

For example, when you change the Stn-Z using the Remote Benchmark function, or you reset the horizontal angle using the BSCheck function, the system writes a comment record.

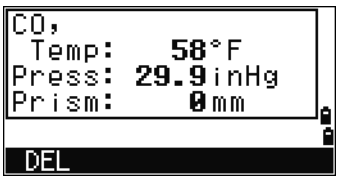


When you input a Stn-XYZ by Base-XYZ function, the recorded station appears as a comment record.



SY records

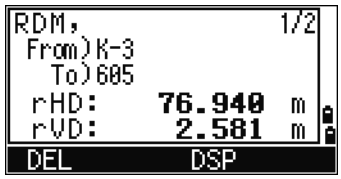
When you complete a station setup, a SY record is stored. This record contains the Temperature, Pressure, and Prism Constant values.



RM records

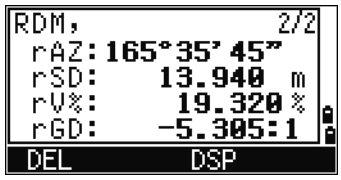
When you record measurements in RDM (Cont) or RDM (Rad), they are labeled as RM records.

Each RM record consists of two screens.



Press DSP to switch between the first screen (showing From, To, rHD, and rVD) and the second screen (showing rAZ, rSD, rV%, and rGD).

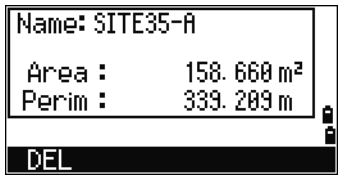
When you download data in Nikon RAW format, RM records are output as comment (CO) records.



AR records

An AR record stores an area and perimeter calculation.

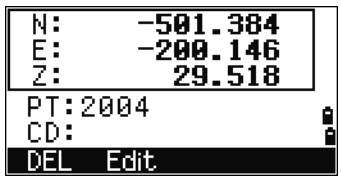
When you download data in Nikon RAW format, AR records are output as comment (CO) records.



View coordinate data

When you press 2 or select `XYZ data` in the Data menu, coordinate data appears in a list, with the newest record at the bottom of the screen. Use ^ or v to scroll through the records. Use < or > to move up or down one page.

Press ENT to see more detailed information about the selected record.



The header (XYZ,YXZ,NEZ, or ENZ) depends on the Coord. Label setting in `MENU > Settings > Coord.` For more information, see Coordinate, page 110.

UP, MP, CC, and RE records

All coordinate records contain PT, CD, X, Y, and Z fields.

UP records are uploaded point coordinates. MP records are manually input point coordinates. CC records are points calculated in Cogo, and RE records are points calculated in Resection.

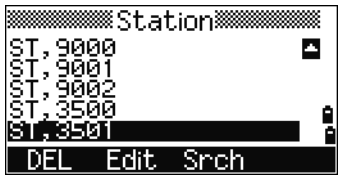
When the Store data setting is set to RAW+XYZ or to XYZ, shots in the BMS (SS records), in various O/S functions (SS records), in 2Pt-RefLine and Arc-RefLine in PRG (SS records) and in some Stakeout functions (SO records) store coordinate records as well. The format of the data is the same as other coordinate records.

View records by station

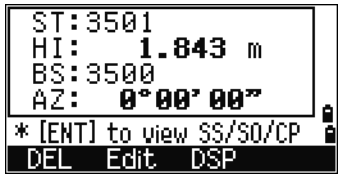
To view records by station, press 3 or select ST->SS/SO/CP in the Data menu.

A list of all stations appears.

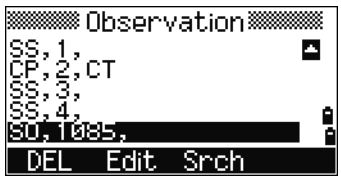
Use ^ or v to highlight the station name that you want to view. Use < or > to move up or down one page.



To view detailed information about the selected station, press ENT.



To display all the observation data from the selected station in chronological order, press ENT again.

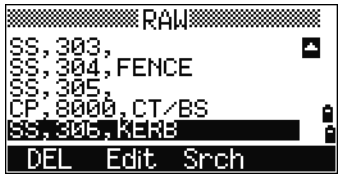


Detailed data is as for raw data. For detailed information about each point type and format, see Viewing raw data, page 114.

Deleting records

Deleting raw records

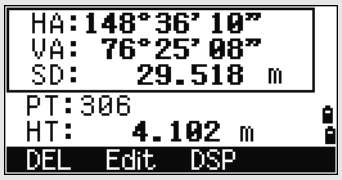
In the RAW screen, use ^ or v to highlight the record that you want to delete. Then press the DEL softkey.



A confirmation screen appears. To delete the selected record, press ENT or the Yes softkey.

If the Store DB setting is set to Both, the system also deletes the corresponding coordinate data when you delete an SS, SO, or CP record.

You can also delete raw data by pressing the DEL softkey in the detailed display screen for the record.



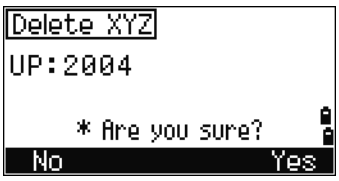
Deleting coordinate records

In the XYZ screen, use ^ or v to highlight the record that you want to delete. Then press the DEL softkey.

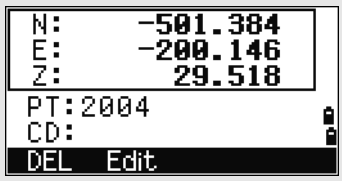
A confirmation screen appears.

To delete the selected record, press ENT or the Yes softkey.

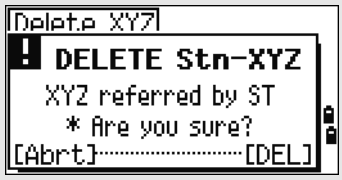
To cancel the deletion of data, press ESC or the No softkey.



You can also delete coordinate data by pressing the DEL softkey in the detailed display screen for the record.

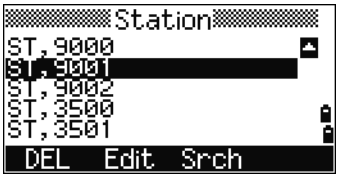


If the record that you want to delete is referred by an ST record, a confirmation message appears.



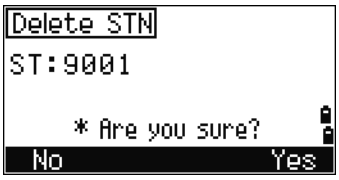
Deleting station records

In the Station screen, use ^ or v to highlight the record that you want to delete. Then press the DEL softkey.



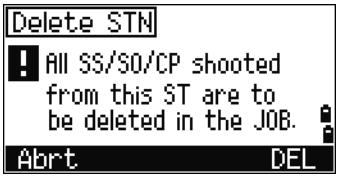
A confirmation screen appears.

Press ENT or the Yes softkey to delete the selected record.



A reconfirmation screen appears. Press the DEL softkey to confirm deletion.

There is no undelete function on the instrument. Before you press the DEL softkey, make sure that you have selected the correct station record. You cannot press ENT in this screen.



All observations from the station that you selected are deleted.

When you delete a ST record in the raw data view or the station data view, all the observation data from the station is also deleted.

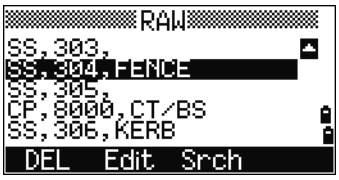
Editing records

For any point record, you can edit the point name (PT), feature code (CD), height of target (HT), height of instrument (HI), backsight point (BS), and backsight azimuth (AZ).

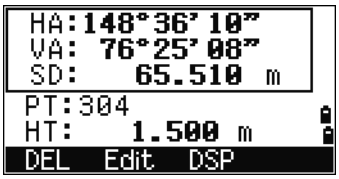
You cannot edit the CD field for SO or F1 records.
You cannot edit the HA, VA, or SD values.

Editing raw records

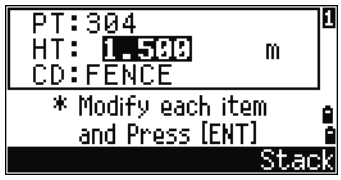
1. Do one of the following:
   - In the RAW screen, highlight the record that you want to edit. Then press the Edit softkey.



   - In the detailed data screen, press the Edit softkey.

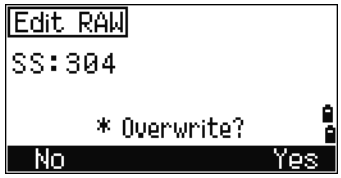


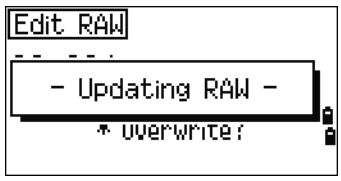
2. Use ^ or v to highlight a field. Then modify the value in the selected field.



When you change the HT of an SS, SO, or CP measurement record, its Z coordinate is recalculated.

3. When you press ENT on the last line of the edit screen, a confirmation screen appears.
4. Do one of the following:
   - To accept the changes and return to the data view screen, press ENT or the `Yes` softkey.
   - To return to the edit screen, press ESC or the `No` softkey.





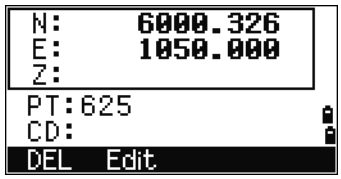
Editing coordinate records

You can edit PT, CD, and coordinate values in coordinate records.

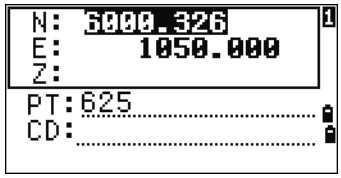
You cannot edit the coordinate record for the current station.

1. Do one of the following:
   - In the XYZ screen, use ^ or v to highlight the record that you want to edit. Then press the `Edit` softkey.

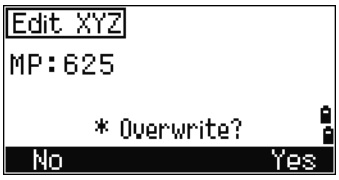
   - In the detailed data screen, press the `Edit` softkey.



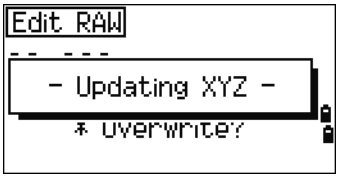
2. Use ^ or v to highlight a field. Then modify the value in the selected field.
3. To finish editing, press ENT in the CD field.



A confirmation screen appears.



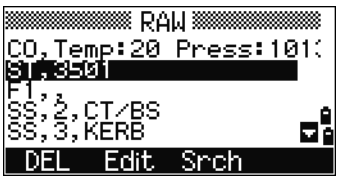
4. Do one of the following:
   - To accept the changes and return to the data view screen, press ENT or the Yes softkey.
   - To go back to the edit screen, press ESC or the No softkey.



Editing station records

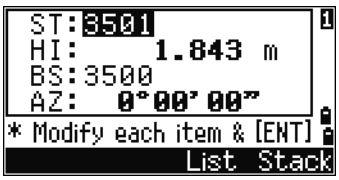
***Note** – The system will not recalculate measurements if you change the station record. All coordinate and raw data observed from an edited station record must be recalculated in your postprocessing software.*

In the RAW screen, use ^ or v to highlight the station record that you want to edit. Then press the Edit softkey.



You can edit any field in the ST record, but the instrument does not recalculate any measurements from this station.

Press ENT in the AZ field to confirm the change.



If you change the ST or HI values, the coordinates of observation points are not recalculated. A comment record is stored to record the change. The following example shows a comment record for a changed HI value:

CO,HI changed at ST:9012 Old HI= 1.345m

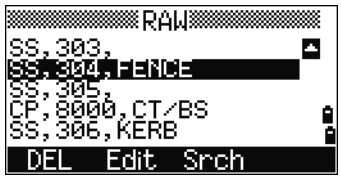
If you change the BS or AZ values, raw records are not recalculated. A comment record is stored to record the change.

Searching records

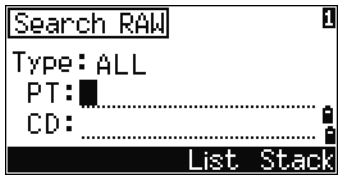
You can search for records by their type, point name, code, or by any combination of these values.

Searching raw records

In the RAW screen, press the Srch softkey to access the raw data search function.

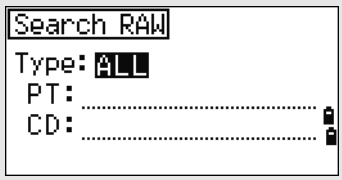


To find a point by name, enter the name in the PT field and press ENT twice.



You can use the asterisk (*) as a wildcard. For example, when you enter 30* in the PT field, the search matches the points named 300, 301, 302, 3000A2, and 3010.

To search by point type, move to the Type field and use < or > to change the selected point type. The options are ALL, ST, SS, SO, CP, CO, CO(SY), and CO(RDM).

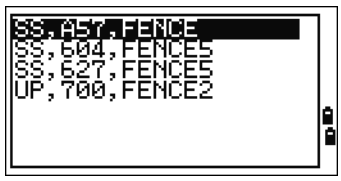


If you selected ST, SO or F1 in the Type field, you do not have to enter a value in the CD field. Press ENT in the PT field to start the search.

If you selected CO, CO(SY), or CO(RDM) in the Type field, you cannot enter a value in the PT or CD fields. Press ENT in the Type field to start the search.

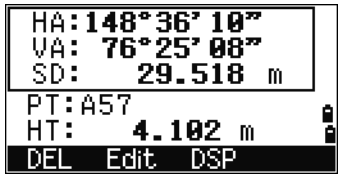
If more than one point matches the search criteria, the matching points are displayed in a list.

Use ^ or v to highlight the point you want to use. Then press ENT to select it.



Detailed data for the selected record appears. Press the DSP softkey to change the fields shown.

Press ESC to return to the list.



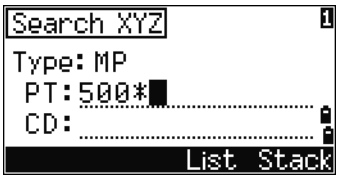
If no point matches the specified criteria, an error screen appears. Press any key to return to the data screen.

Searching coordinate records

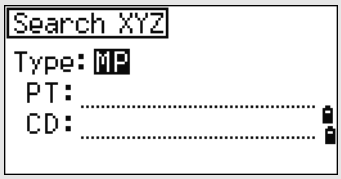
In the XYZ screen, press the Srch softkey to access the XYZ data search function.

To find a coordinate by name, enter the name in the PT field and press ENT twice.

You can use the asterisk (*) as a wildcard. For example, when you enter 500* in the PT field, the search matches the points named 500, 500-1, 500-A, and 5000.

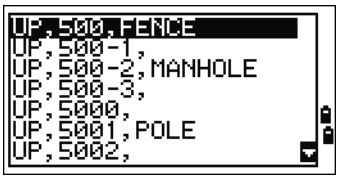


To search by point type, move to the Type field and use < or > to change the selected point type. The options are ALL, MP, UP, CC, and RE.



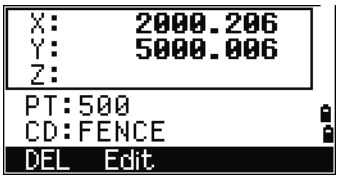
If more than one point matches the search criteria, the matching points are displayed in a list.

Use ^ or v to highlight the point you want to use. Press ENT to select it.

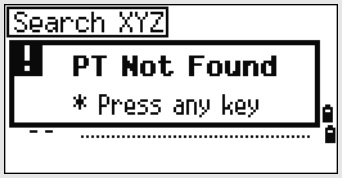


Detailed data for the selected record appears. Press the DSP softkey to change the fields shown.

Press ESC to return to the list.



If no point matches the specified criteria, an error screen appears. Press any key to return to the data screen.

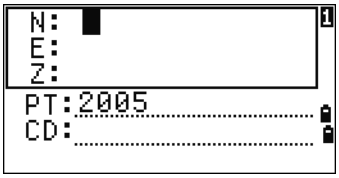


Entering coordinates

In the XYZ screen, press the Input softkey to display a new input point screen.

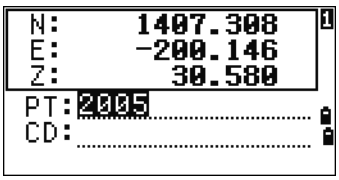
The PT field defaults to the last recorded PT + 1, but you can change the value shown.

Enter the PT and CD and then press ENT to enter coordinates.

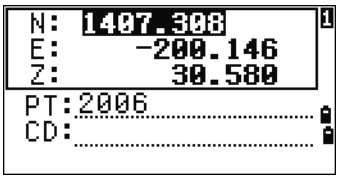


Use the numeric keys to enter the coordinates. Press ENT or ∨ in each field to move to the next field.

When you press ENT in the CD field, the point is stored as an MP record.



After you have recording a point, the next point input screen is shown with the updated default PT.



You can record NE, NEZ, or Z-only data to the database.

Point name list and code list

The instrument stores two list files: a list of PT names and a list of CD names. The structure and functionality of these files is the same.

- The ***PT name list*** is useful if you have to handle more than one patterns of point names in the field. For example, you may need to use points named 1, 2, 3 …, as well as points named A1, A2, A3 ….
- The ***code list*** is a prepared list of feature codes. You can use it to store your own codes.

Press 4 or select PT name List in the Data menu to open the point name list.

Press 5 or select Code list to open the code list.

The point or code names and layers are shown in alphabetic order. Use the four softkeys to customize the list.

You can store up to 254 points, codes, or layers in each list.

Each list entry can be up to 16 characters long.

You can use the first character search to find a point, code, or layer in the list. In the list screen, enter the first character of the name you want to find to jump to that part of the list. For more information, see Advanced feature: Searching for a code by using the first character, page 44.

Deleting points, codes, or layers

In the point or code list, use ^ or v to highlight the item you want to delete. Then press the DEL softkey.

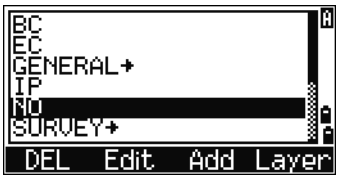
A confirmation screen appears. Press ENT or the Yes softkey to delete the item.

Press ESC or the No softkey to cancel the deletion.

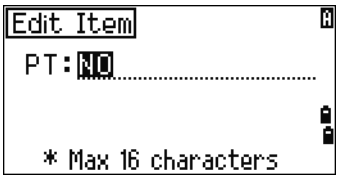
To delete a whole layer, highlight the layer name in the list and press the DEL softkey. All codes and layers in the selected layer are deleted.

Editing an item in the point list or code list

Use ^ or v to highlight the item that you want to edit. Then press the Edit softkey.

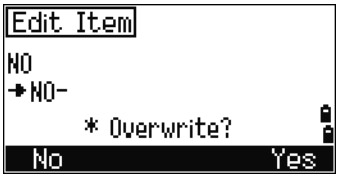


An editing screen appears. For points, the Edit Item screen appears. It contains only the PT field. For codes, the Edit Code screen appears, containing the CD field and the REC field.



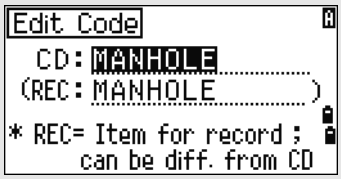
Edit the text shown and then press ENT.

A confirmation screen appears. Press ENT or the Yes softkey to accept the changes and update the list.

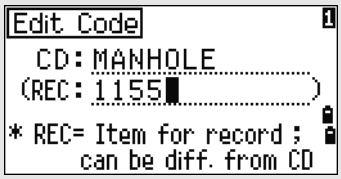


Edit code list

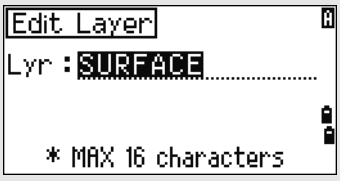
- The Edit Code screen has two fields. The CD field contains the text that appears in the list screen. The REC field is optional. It contains the text that is stored in the job. If you leave the REC field blank, the value in the CD field is used.



- You can use the REC field to use familiar words or codes on the screen, but store a numeric code in the job. For example, if you set the CD field to MANHOLE and the REC field to 1155, the text MANHOLE appears on the screen, but the code 1155 is stored.



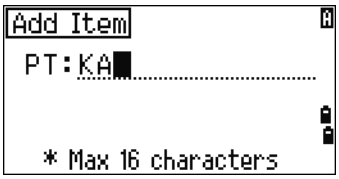
If you press the Edit softkey when a layer name appears, only the Lyr field appears. To save changes to the layer name, press ENT in the Lyr field.



Adding a point name

In the point list, press the Add softkey to add a new point name to the current layer.

Enter a new point name and then press ENT.

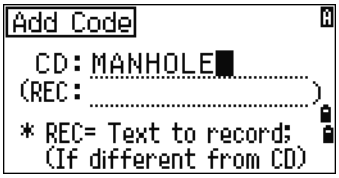


The point name is added to the current layer and the list is updated.

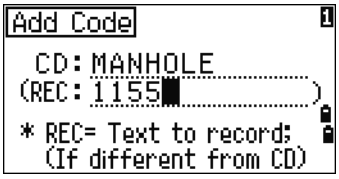
Adding a code

In the code list, press the Add softkey to add a new feature code to the current layer.

Enter the feature code in the CD field. Press MODE to change between alphabetic and numeric input mode.



You can use the REC field to define a numeric identifier for each feature code. This is optional: If there is a value in the REC field, this value is stored. If you leave the REC field blank, the CD value is stored.

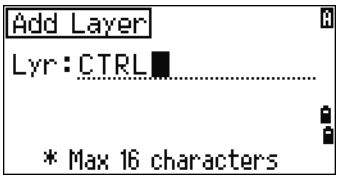


Press ENT to add the new code and update the code list.

Adding a layer

1. In the point or code list, press the Layer softkey.

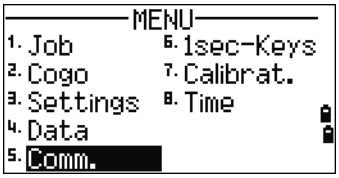
2. Enter the name of the new layer.
3. To change between alphabetic and numeric input mode, press [MODE]. To store the new layer, press [ENT].



The new layer is added to the list in alphabetic order.

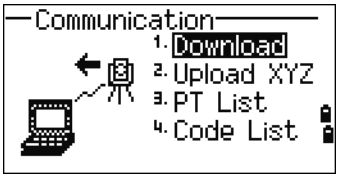
Communication

Use the Communication menu to download or upload data. To display the Communication menu, press [5] or select Comm. on the MENU screen.



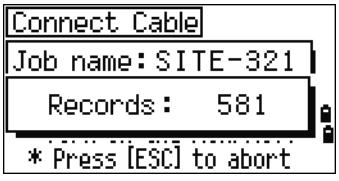
Downloading data

To go to the download settings screen, press [1] or select Download in the Communication menu.



Format	NIKON
	SDR2x
	SDR33
Data	RAW
	Coordinate

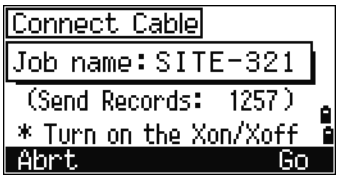
To display the total number of records that will be downloaded, press [ENT] in the Data field.



Optional Bluetooth function

When the optional Bluetooth is installed, Port selection screen appears when pressing the Comm softkey.

As each record in the current job is output from the instrument (downloaded), the current line number is updated.

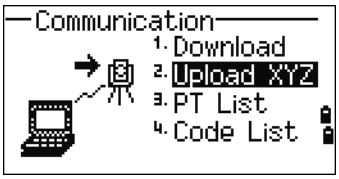


After downloading is completed, you can choose to delete the current job.

To delete the current job, press 4. To return to the Basic Measurement Screen (BMS), press ESC or the Abrt softkey.

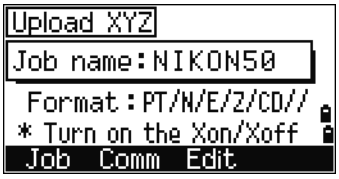
Uploading coordinate data

To upload coordinate data from a computer, press 2 or select Upload XYZ in the Communication menu.



The default data format appears. To change the order of data fields, press the Edit softkey. For more information, see Advanced feature: Editing the data order for upload, page 130.

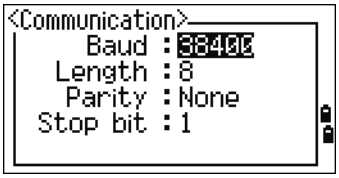
Otherwise, just press ENT.

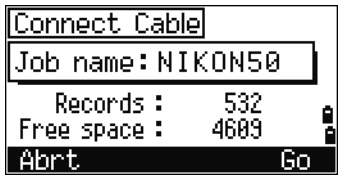


Press the Job softkey to go to the Job Manager screen. For more information, see Job Manager, page 92.

To change the communication settings, press the Comm softkey. The serial port settings must match the settings used by the terminal software on the computer.

Port selection field appears in the Communication menu only when the optional Bluetooth is on-board.



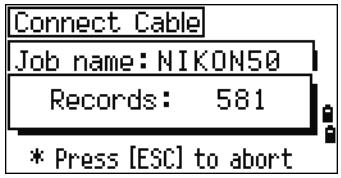


Use an RS-232C cable to connect the instrument to the computer.

The Free space field shows the number of points that can be stored.

Press ENT to put the instrument in receive mode. Then use the Send Text File command in the terminal program on the computer to start sending data.

In the terminal program, set flow control to Xon/Xoff.



As each point is received by the instrument, the value in the Records field is incremented.

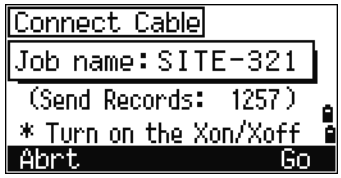
If you press ESC during data upload, the upload is canceled and the display returns to the Communication menu. Records that were received before you pressed ESC are stored in the job.

The system truncates any code that is longer than 16 characters.

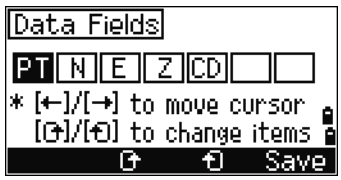
Duplicate points

If the existing point is a UP, CC, or MP record, and it is not referred to by any ST or BS, it is automatically overwritten by the uploaded point. No error message appears.

Advanced feature: Editing the data order for upload



1. To open the Data Fields screen, press the Edit softkey.



2. To move between the fields, press < or >.
3. To change the selected item in a field, use the ↑ and ↓ softkeys. The options are PT, N, E, Z, CD, or blank.
4. To save your changes and return to the previous screen, press the Save softkey.

For example, if your original data is as follows:

1, UB, 30.000, 20.000, L1

and you set the data fields to PT N E CD, then the uploaded data is:

PT=1, N=30.000, E=20.000, CD=L1

Uploading coordinates without points

You can upload data without points. If you do not include a point in the format definition, each line of data is automatically assigned the next available point number. To help you to select points in the field, make sure that you store an identifier in the CD field.

The data format cannot include duplicate items. Use PT, N, E, Z and CD once each in the data format.
To skip some items in your original file, set the corresponding field to blank.

Uploading a point name list or code list

When you upload a code list, it always replaces the existing code list on the instrument.

To upload a point name list via cable, press [3] or select `PT List` in the Communication menu.

To upload a code list, press [4] or select `Code List`.

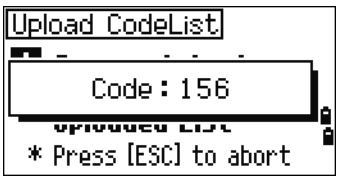
Connect the RS-232C cable.

Start a terminal program on the computer.

To put the instrument into receive mode, press [ENT] or the `OK` softkey.

The counter is updated as each line in the list is stored.

You can store up to 254 codes or point names.



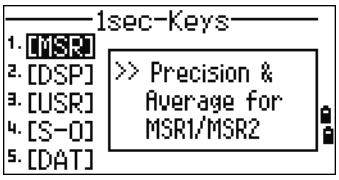
If a code or point name is longer than 16 characters, it is truncated.

1sec-Keys

Use the 1sec-Keys menu to configure the settings for the one-second keys, [MSR], [DSP], [USR], [S-O], and [DAT]. To access this menu, press [6] or select `1sec-Keys` in the MENU screen.

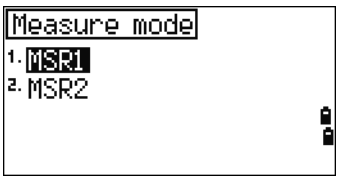
[MSR] key settings

To change settings for the [MSR1] and [MSR2] keys, press [1] or select [MSR] in the 1sec-Keys menu.



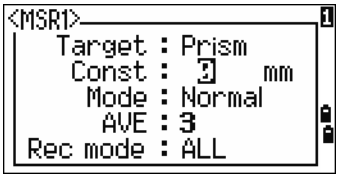
There are two [MSR] keys:

- To change the settings for the [MSR1] key, press [1] or select MSR1.
- To change the settings for the [MSR2] key, press [2] or select MSR2.



Each [MSR] key has five settings.

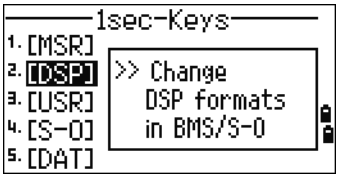
In the Const and AVE fields, use the numeric keys to enter values. In the other fields, use [<] or [>] to change the settings.



Tip – You can also access the settings screen by holding down [MSR1] or [MSR2] for one second.

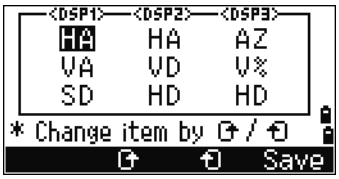
[DSP] key settings

To change the display items in the BMS and in Stakeout observation screens, press [2] or select [DSP] in the 1sec-Keys menu.



To move the cursor, use [<], [>], [^], or [v]. To change the display item, press either the ▶ softkey or the ◀ softkey.

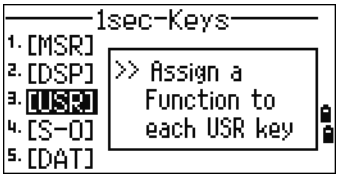
To save the changes, press [ENT] at the last line of <DSP3> or press the Save softkey.



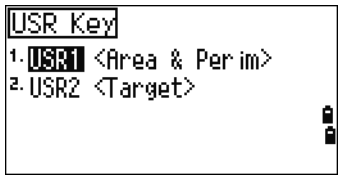
Tip – You can also access the DSP settings screen by holding down [DSP] for one second.

[USR] key settings

To change the functions that are assigned to the [USR1] and [USR2] keys, press [3] or select [USR] in the 1sec-Keys menu.

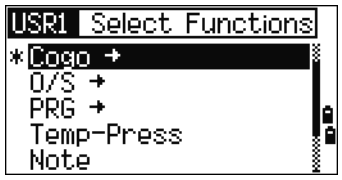


There are two [USR] keys. The function that is assigned to each key appears beside the key name.



- To change the settings for the [USR1] key, press [1] or select USR1.
- To change the settings for the [USR2] key, press [2] or select USR2.

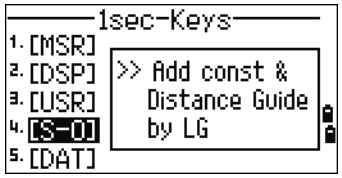
In the Select Functions screen, the asterisk (*) indicates the function that is currently assigned to the key.



To highlight a function, use [^] or [v]. To assign that function to the selected [USR] key, press [ENT].

[S-O] key settings

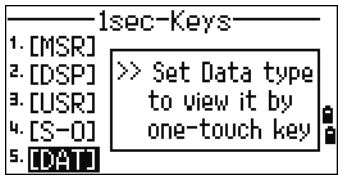
To enter the Stakeout settings screen, press [4] or select [S-O] in the 1sec-Keys menu.



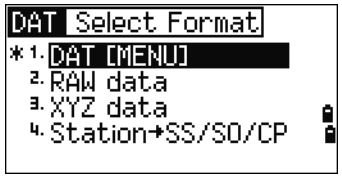
There are two Stakeout settings. For more information, see Stakeout, page 111.

[DAT] key settings

1. To change the settings for the [DAT] key, press [5] or select [DAT] in the 1sec-Keys menu.



   The asterisk (*) indicates the currently selected view format.



2. To move the cursor, use [^] or [v].
3. To change the format displayed by [DAT], press [ENT].

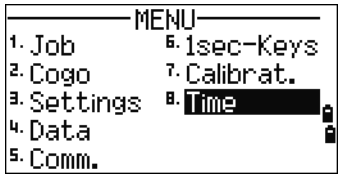
Calibration

Use the Calibration screen to calibrate the instrument. To open the Calibration screen, press 7 or select `Calibrat.` on the MENU screen.

For more information, see Adjusting, page 138.

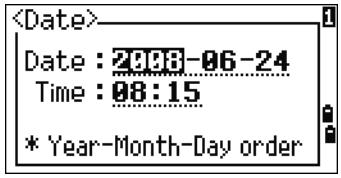
Time

Use the Date & Time screen to set the current date and time.



1. To open the Date & Time screen, press 8 or select `Time` on the MENU screen.

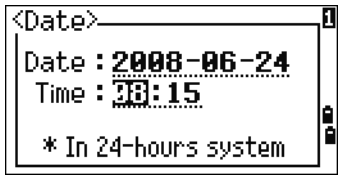
   The current date and time settings are displayed.



2. Enter the date in Year-Month-Day format. For example, to change the date to June 18, 2008, press 2 0 0 8 ENT 6 ENT 1 8 ENT.

   If the highlighted part of the field (for example, the year) is already correct, you can just press ENT to use the current value. For example, if the date is already set to June 24, 2008, and you want to change the date to June 18, 2008, press ENT ENT 1 8 ENT.

3. To move to the Time field, press ENT in the Date field.



4. Enter the time in 24-hour format. For example, to set the time to 4:35 PM, press 1 6 ENT 3 5 ENT.

5. Do one of the following:

   - To finish setting the date and time, press ENT in the Minutes field.
   - To cancel the input, press ESC.

CHAPTER

6

Checking and Adjustment

In this chapter:

Adjusting the Electronic Level

Adjustment of the electronic level is done by Zero point errors of vertical scale and horizontal angle corrections. For detailed instruction, please see page 137.

Checking and Adjusting the Circular Level

Once you have checked and adjusted the electronic level, check the circular level.

If the bubble is not in the center of the level, use the adjusting pin to rotate the three adjustment screws of either circular level on the instrument main body or tribrach until the bubble is centered.

Checking and Adjusting the Optical/Laser Plummet

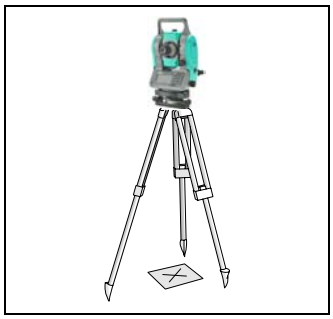
The optical axis of the plummet must be aligned with the vertical axis of the instrument.

To check and adjust the optical/laser plummet:

1. Place the instrument on the tripod. You do not have to level the instrument.
2. Place a thick sheet of paper marked with an X on the ground below the instrument.

   While you are looking through the optical plummet, adjust the leveling screws until the image of the X is in the center of the reticle mark ⊙.

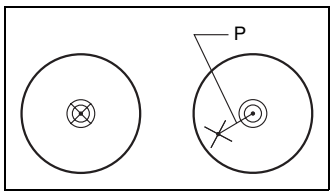
   For laser plummet, adjust the laser pointer to the X.



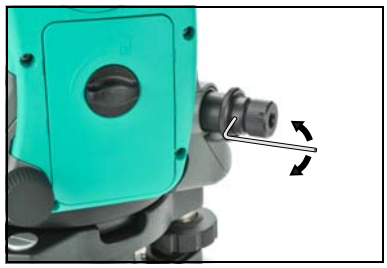
3. Rotate the alidade 180°.

   If the marked image is in the same position in the center of the reticle mark, no adjustment is required

   For laser plummet, if the laser pointer is on the X, no adjustment is required.



4. If the image or laser pointer is not in the same position, adjust the optical or laser plummet:



   a. Use the supplied hexagonal wrench to turn the adjustment screws until the image of the X is in Position P. Position P is the center point of the line connecting the X and the center of the reticle mark ⊙.

   b. Repeat from Step 2.
   For laser plummet adjustment, a cap needs to be removed.

Zero Point Errors of Vertical Scale and Horizontal Angle Corrections

Checking

1. Set up the instrument on the tripod.
2. Follow the leveling procedures described in Leveling, page 15.
3. Flip the telescope to the Face-1 position.
4. Sight a target that is within 45° of the horizontal plane.
5. Read the vertical angle from the VA1 field in the Basic Measurement Screen (BMS).
6. Rotate the instrument 180° and flip the telescope to the Face-2 position.
7. Read the vertical angle from the VA2 field.
8. Add the two vertical angles together, VA1 + VA2.
   - No adjustment is required if the zero reference for vertical angles (VA zero setting) is set to Zenith, and VA1 + VA2 equals 360°.
   - No adjustment is required if the zero reference for vertical angles (VA zero setting) is set to Horizon, and VA1 + VA2 is either 180° or 540°.
   - An adjustment is required if VA1 + VA2 is not one of the values listed above.

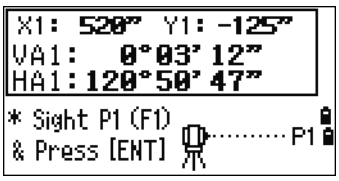
***Note** – The difference between the vertical angle reading the relevant angle (either 360° for Zenith, or 180° or 540° for Horizon) is called the **altitude constant**.*

Adjusting

To enter the calibration screen, press MENU and 7.

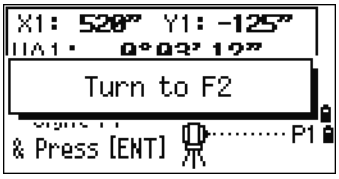
1. The Nivo series has two-axis level compensation.Take an F1 measurement to a target on the horizon. Press ENT.

   The vertical angle is shown in the V0 dir= Horiz setting.

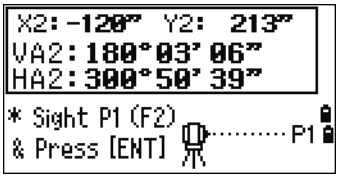


VA1	Face-1 vertical angle (tilt-off value)
HA1	Face-1 horizontal angle (tilt-off value)
X1	Face-1 X axis tilt value
Y1	Face-1 Y axis tilt value

When you have taken the measurement, the message on the bottom line changes from `DO NOT TOUCH!` to `Turn to F2`.

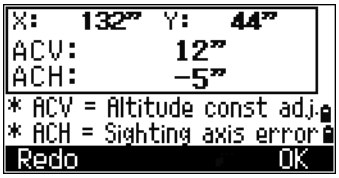


2. Take an F2 measurement to the same target. Press ENT.



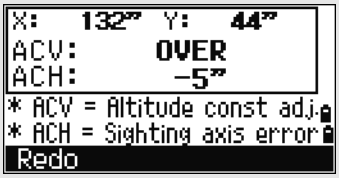
VA2	Face-2 vertical angle (tilt-off value)
HA2	Face-2 horizontal angle (tilt-off value)
X2	Face-2 X axis tilt value
Y2	Face-2 Y axis tilt value

When the observation on F2 is completed, four parameters are displayed.



3. Do one of the following:
   - To return to the first observation screen, press ESC or the `Redo` softkey.
   - To set parameters on the instrument, press ENT or the `OK` softkey.

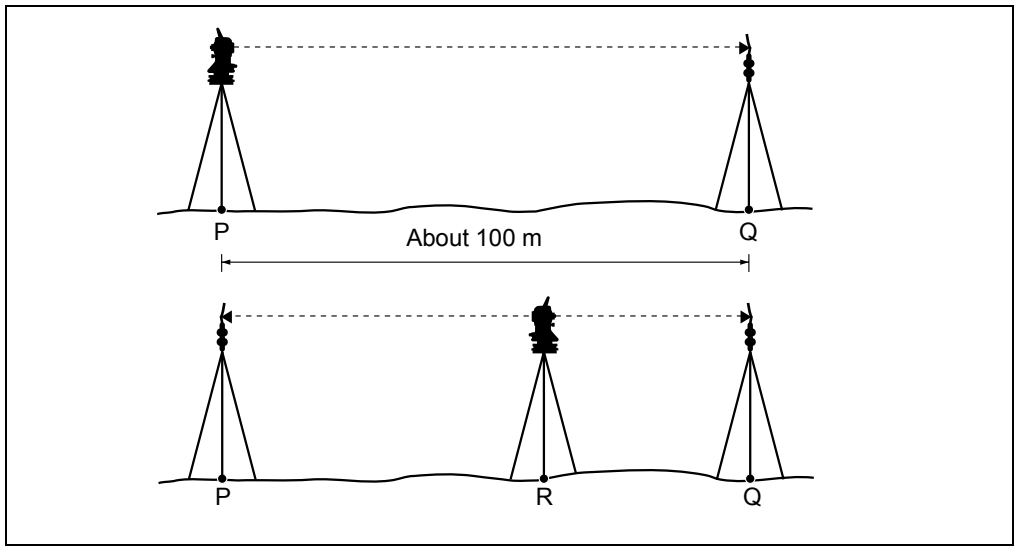
If ACV, ACH, X, or Y is out of range, OVER appears. Press any key to return to the first observation screen.



Checking the Instrument Constant

The instrument constant is a numerical value used to automatically correct for the displacement between the mechanical and electrical centers when measuring distances. The instrument constant is set by the manufacturer before the instrument is shipped. However, to ensure the highest operational accuracy, we recommend that you check the instrument constant several times a year.

To check the instrument constant, you can either compare a correctly measured base line with the distance measured by the EDM, or follow the procedure below.



To check the instrument constant:

1. Set up the instrument at Point P, in as flat an area as possible.
2. Set up a reflector prism at Point Q, 100 m away from Point P. Make sure that you take the prism constant into account.
3. Measure the distance between Point P and Point Q (PQ).
4. Install a reflector prism on the tripod at Point P.
5. Set up another tripod at Point R, on the line between Point P and Point Q.
6. Transfer the Nivo series instrument to the tripod at Point R.
7. Measure the distance from Point R to Point P (RP), and from Point R to Point Q (RQ).
8. Calculate the difference between the value of PQ and the value of RP + RQ.
9. Move the Nivo series instrument to other points on the line between Point P and Point Q.
10. Repeat Step 5 through Step 9 ten times or so.
11. Calculate the average of all the differences.

    The error range is within 3 mm. If the error is out of range, contact your dealer.

Checking the Laser Pointer

The Nivo series total station uses a red laser beam to a laser pointer. The laser pointer is coaxial with the line of sight of the telescope. If the instrument is well adjusted, the red laser pointer coincides with the line of sight. External influences such as shock or large temperature fluctuations can displace the red laser pointer relative to the line of sight.

CHAPTER

7

Specifications

In this chapter:

Main Body

Telescope

Tube length	125 mm (4.91 in.)
Magnification	30 X
Effective diameter of objective	45 mm (1.77 in.) EDM 50 mm (1.97 in.)
Image	Erect
Field of view	1°20' 2.3 m at 100 m (2.3 ft at 100 ft)
Resolving power	3.0"
Focusing distance	1.5 m to infinity (4.92 ft to infinity)

Measurement range

Distances shorter than 1.5 m (4.92 ft) cannot be measured with this EDM.

Measurement range with no haze, visibility over 40 km (25 miles))	
Prism mode	
Reflector sheet (5 cm x 5 cm)	300 m (984 ft)
Standard prism (1P)	5,000 m (16,400 ft)
Reflectorless mode	
Reference target	300 m (984 ft)

- The target should not receive direct sunlight.
- “Reference target” refers to a white, highly reflective material. (KGC90%)
- The maximum measurement range is 500 m in the reflectorless mode.

Distance precision

Precise mode	
Prism	± (3 + 2 ppm × D) mm (–10 °C to +40 °C) ± (3 + 3 ppm × D) mm (–20 °C to –10 °C, +40 °C to +50 °C)
Reflectorless	± (3 + 2 ppm × D) mm (–10 °C to +40 °C) ± (3 + 3 ppm × D) mm (–20 °C to –10 °C, +40 °C to +50 °C)
Normal mode	
Prism	± (10 + 5 ppm × D) mm
Reflectorless	± (10 + 5 ppm × D) mm

Measurement intervals

Measurement intervals may vary with the measuring distance or weather conditions. For the initial measurement, it may take few more seconds.

Precise mode	
Prism	1.5 sec.
Reflectorless	1.8 sec.
Normal mode	
Prism	0.8 sec.
Reflectorless	1.0 sec.
Prism offset correction	–999 mm to +999 mm (1 mm step)

Angle measurement

Reading system	Absolute encoder
Nivo$^{3.M}$	Diametrical reading on HA Single reading on VA
Nivo$^{5.M}$	Single reading on HA/VA
Minimum display increment	
360°	1"/5"/10"
400G	0.2 mgon/1 mgon/2 mgon
MIL6400	0.005 MIL/0.02 MIL/0.05 MIL
DIN18723 accuracy	Nivo$^{3.M}$: 3" / 1.0 mgon Nvo$^{5.M}$: 5"/1.5 mgon

Tilt sensor

Method	Liquid-electric detection (Dual axis)
Compensation range	±3'

Tangent screw

Type	Friction clutch endless fine motion

Tribrach

Type	Detachable

Level

Electronic level	Displayed on the LCD
Circular level vial	Sensitivity 10'/2 mm

Optical plummet

Image	Erect
Magnification	3×
Field of view	5°
Focusing range	0.5 m (1.6 ft) to infinity

Optional laser plummet

Wave length	635 nm
Laser class	Class 2
Focusing range	∞
Laser diameter	Approx. 2 mm

Display and keypad

Display type	Graphical LCD
Resolution	128 × 64
Display illumination	Backlight
Keys	25

Connections in the base of instrument

Communications	
Type	RS-232C
Maximum baud rate	38400 bps asynchronous
External power supply input voltage	4.5 V to 5.2 V DC

Battery pack

Output voltage	3.8 V DC rechargeable
Continuous operation time	
Continuous distance/angle measurement	10 hours
Distance/angle measurement every 30 seconds	16 hours
Continuous angle measurement	30 hours

Tested at 25 °C (nominal temperature). Operation times may vary depending on the condition and deterioration of the battery.

Environmental performance

Operating temperature range	–20 °C through +50 °C (–4 °F through +122 °F)
Storage temperature range	–25 °C through +60 °C (–13 °F through +140 °F)

Dimensions

Main unit	149 mm W x 145 mm D x 306 mm H
Carrying case	435 mm W x 206 mm D x 297 mm H

Weight

Main unit w/o battery	3.5 kg (7.95 lbs), approx.
Battery	0.1 kg (0.22 lbs), approx.
Carrying case	2.4 kg (5.28 lbs), approx.
Charger and AC adapter	0.4 kg (0.99 lbs), approx.

Environmental protection

Watertight/dust-proof protection	IP66

Standard Components

- Instrument main body
- Battery pack (X 2)
- Universal charger, power cord, and adapters
- Adjustment pin, Allen wrench
- Objective lens cap
- Vinyl cover
- *Total Station Nivo Series Instruction Manual* (this document)
- Carrying case
- Shoulder strap (X 2)

External Device Connector

This connector can be used to connect to an external power source or to communicate with an external device.

Before using the external device connector, make sure that the external device meets the specifications below.

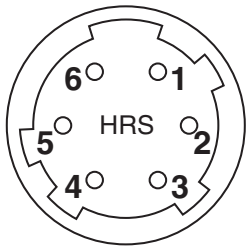
Input voltage	4.5 V to 5.2 V DC
System	RS-232C
Signal level	±9 V standard
Maximum baud rate	38400 bps asynchronous
Compatible male connector	Hirose HR10A-7P-6P or HR10-7P-6P

CAUTION – Except for the connection shown in Figure 8.1on page 150, use of this connector is at your own risk.

CAUTION – Use only the male connectors specified above. Using other connectors will damage the instrument.

The external device connector is a Hirose HR 10A-7R-6S female connector. The pinouts for connecting it to an external device connector are shown below:

Pin	Signal	Description
1	RXD	Receive data (Input)
2	TXD	Send data (Output)
3	NC	No connection
4	V	Power
5	GND	Ground
6	NC	No connection



CAUTION – Use only the pin connections shown above. Using other connections will damage the instrument.

CAUTION – The Nivo series total station has different pin assignment from other models of Nikon total station.

To connect to an external power source, supply power to Pin 4 (power terminal) and Pin 5 (ground terminal) on the instrument. The instrument will use the external power source even if the internal battery packs are attached.

CAUTION – Make sure that the power supplied is within the rated input range (4.5 V to 5.2 V DC, 1 A maximum). Power supplied outside this range will damage the instrument.

To communicate with an external device, connect the RS-232C signal from the external device to Pin 1 (input terminal) and to Pin 2 (output terminal) on the instrument.

Cap the data output/external power input connector securely while not in use. The instrument is not watertight if the cap is not attached or not attached securely, and when the data output/external power input connector is in use.

The instrument can be damaged by static electricity from the human body discharged through the data output/external power input connector. Before handling the instrument, touch any other conductive material once to remove static electricity.

CHAPTER

8

System Diagrams

In this chapter:

System Components

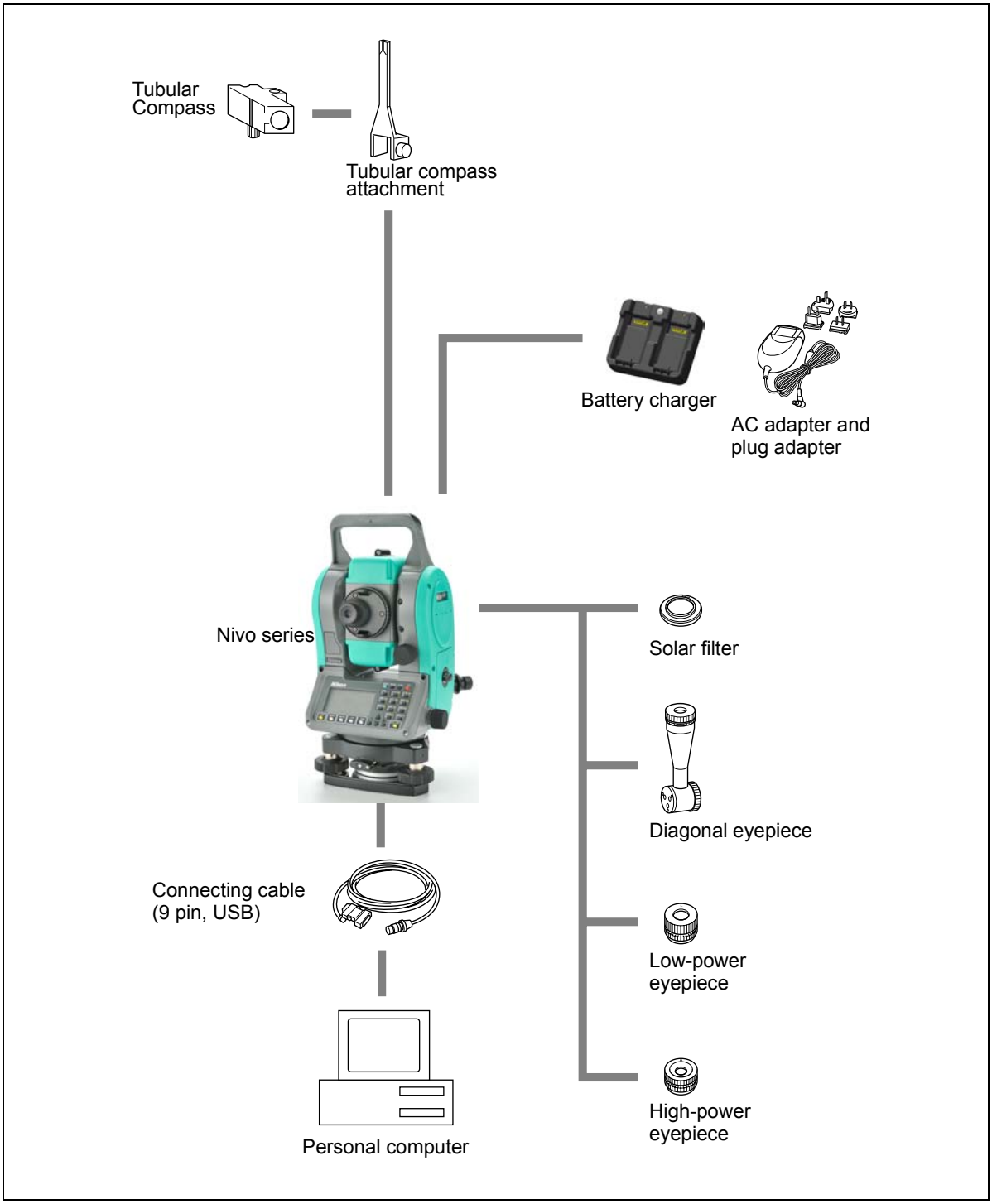


Figure 8.1 Measurement side

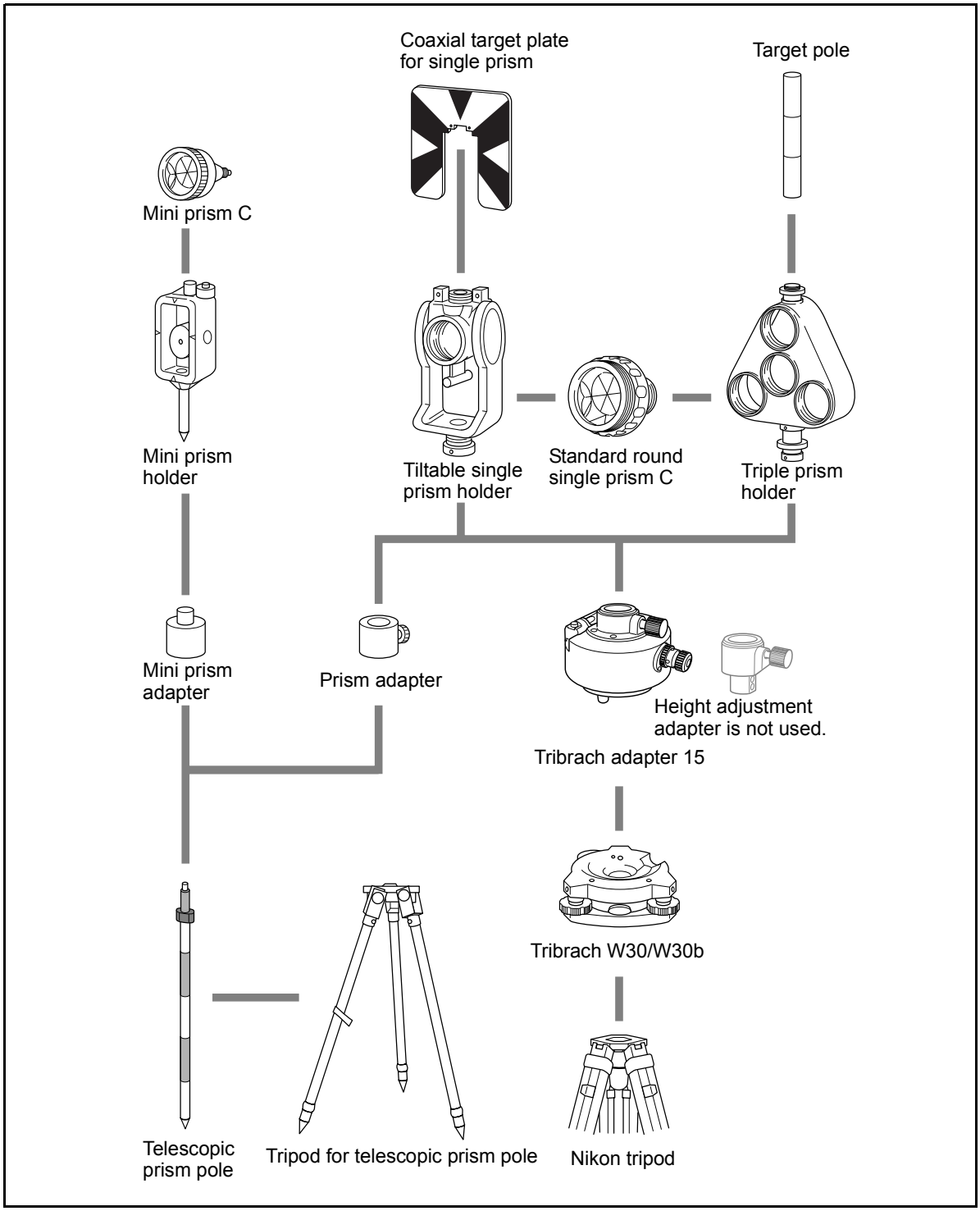


Figure 8.2 Prism reflector side

Note *– Nivo series must be used with the Tribrach W30 or W30b.*

CHAPTER

9

Communications

In this chapter:

Uploading Coordinate Data

Settings

To configure the transmission speed and other settings, go to MENU > Settings > Comm. For more information, see Communications, page 111.

Record format

You can upload coordinate records in the following formats:

PT	,	X	,	Y	,	Z	,	CD

PT		X		Y		Z		CD

PT	,	X	,	Y	,	Z

PT		X		Y		Z

PT	,	X	,	Y	,	,	CD

PT		X		Y		CD

PT	,	X	,	Y	,	,

PT	,	X	,	Y	,

PT	,	,	,	Z	,	CD

PT	,	,	,	Z

The record formats shown above use the following codes:

Code	Description	Length
PT	Point number	Up to 20 digits
X	Actual X coordinate	Variable length
Y	Actual Y coordinate	Variable length
Z	Actual Z coordinate	Variable length
CD	Feature code	Up to 16 characters

Data example

20100,6606.165,1639.383,30.762,RKBSS
20104,1165611.6800,116401.4200,00032.8080
20105 5967.677 1102.343 34.353 MANHOLE
20106 4567.889 2340.665 33.444 PT1
20107 5967.677 1102.343 34.353
20109,4657.778,2335.667,,PT2
20111,4657.778,2335.667
20113 4657.778 2335.667
20115,,,34.353,MANHOLE
20117,,,33.444

Uploading Point Lists and Code Lists

Settings

To configure the transmission speed and other settings, go to MENU > Settings > Comm. For more information, see Communications, page 111.

File format

PT lists and code lists use the same record format. Use the filenames POINT.LST for a PT list, and CODE.LST for a code list.

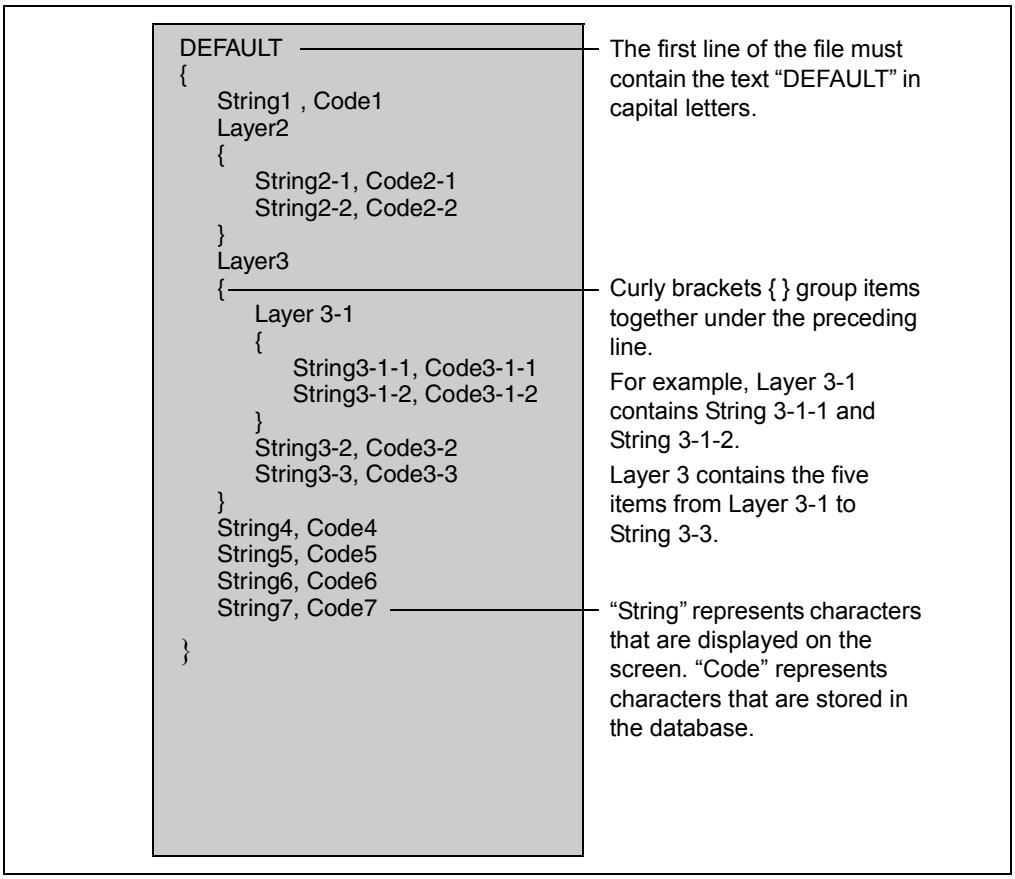


Figure 9.1 Record format for PT lists and code lists

Data example

```
DEFAULT
{
        “STRUCTURES”
        {
            “TREE”, “S0001”
            “FENCE”, “S0002”
            “MAIL BOX”, “S0003”
            “FLOWER BED”, “S0004”
        }
        “ROADS”
        {
            “MANHOLE”, “R0001”
            “CENTER LINE”
            {
                “WHITE”, “R002-W”
                “YELLOW”, “R002-Y”
            }
            “SIDEWALK”, “R0003”
            “CROSSING”, “R0004”
            “BRIDGE”, “R0005”
            “SIGNAL”, “R0006”
            “HIGHWAY STAR”, “R0007”
        }
        “RAILWAY”
        {
            “CROSSING”, “RW001”
            “STATION”, “RW002”
            “SIGNAL”, “RW003”
            “BRIDGE”, “RW004”
            “TUNNEL”, “RW005”
        }
}
```

Downloading Data

Settings

To configure the transmission speed and other settings, go to `MENU > Settings > Comm`. For more information, see Communications, page 111.

Nikon raw record formats

Coordinate records

type	,	pt	,	(pt id)	,	northing	,	easting	,	elevation	,	code

type	One of the following codes: **UP** Uploaded point **MP** Manually input point **CC** Calculated coordinate RE Resection point
pt	Point number
(pt id)	(Point ID)
northing	Northing of the coordinate
easting	Easting of the coordinate
elevation	Elevation of the coordinate
code	Feature code

Station records

ST	,	stnpt	,	(stnid)	,	bspt	,	(bs id)	,	hi	,	bsazim	,	bsha

ST	Station record identifier (fixed text)
stnpt	Station point number
(stn id)	(Station ID)
bspt	Backsight point number
(bs id)	(Backsight ID)
hi	Height of instrument
bsazim	Backsight azimuth
bsha	Backsight horizontal angle

Control point records

CP	,	pt	,	(pt id)	,	ht	,	sd	,	ha	,	va	,	time	,	code

CP	Control point record identifier (fixed text)
pt	Point number
(pt id)	(Point ID)
ht	Height of target
sd	Slope distance
ha	Horizontal angle
va	Vertical angle
time	24-hour time stamp
code	Feature code

Sideshot records

SS	,	pt	,	ht	,	sd	,	ha	,	va	,	time	,	code

SS	Sideshot record identifier (fixed text)
pt	Point number
ht	Height of target
sd	Slope distance
ha	Horizontal angle
va	Vertical angle
time	24-hour time stamp
code	Feature code

Stakeout records

SO	,	pt	,	(sopt)	,	ht	,	sd	,	ha	,	va	,	time	,

SO	Stakeout record identifier (fixed text)
pt	Recorded point number
(sopt)	(Original number of point staked)
ht	Height of target
sd	Slope distance
ha	Horizontal angle
va	Vertical angle
time	24-hour time stamp

F1 records

face	,	pt	,	ht	,	sd	,	ha	,	va	,	time

face	One of the following: **F1** Shot taken using Face-1 (fixed text) Shot taken using Face-1 for Station setup (fixed text)
pt	Point number
ht	Height of target
sd	Slope distance
ha	Horizontal angle
va	Vertical angle
time	24-hour time stamp

Comment/note records

CO	,	text

CO	Comment record identifier (fixed text)
text	Comment text

SDR2x and SDR33 record formats

Header record

00NM	ver	**0000**	datetime	ang	dist	press	temp	coor	**1**

1–4	**00NM**	Header record identifier (fixed text)
5–20	ver	SDR download version. One of the following: **SDR20V03-05** SDR2x **SDR33V04-01** SDR33
21–24	**0000**	Not used
25–40	datetime	Download date and time (in hours and minutes)
41	ang	Angle units. One of the following: **1** Degrees **2** Gons **4** Mils
42	dist	Distance units. One of the following: **1** Meters **2** Feet
43	press	Pressure units. One of the following: **1** mm Hg **2** In. Hg **3** hPa
44	temp	Temperature units. One of the following: **1** Celsius **2** Fahrenheit
45	coor	Coordinate order. One of the following: **1** NEZ **2** ENZ
46	**1**	Not used

Instrument record

01KI1	instr	serNo	Instr	serNo	**1**	zero VA	**0.000**	**0.000**	**0.000**

1–5	**01KI1**	Instrument record identifier (fixed text)
6–21, 28–43	instr	Instrument make and model
22–27, 44–49	serNo	Instrument serial number
50	**1**	Not used
51	zero VA	The reference point for vertical angles. One of the following: **1** Zenith **2** Horizon
52–61,	**0.000**	Not used
62–71,	**0.000**	Not used
72–81,	**0.000**	Not used

Station details record

02KI	stnpt	northing	easting	elevation	hi	desc

1–4	**02KI**	Station details record identifier (fixed text)
5–8 (2x), 5–20 (33)	stnpt	Station point number
9–18 (2x), 21–36 (33)	northing	Northing of station
19–28 (2x), 37–52 (33)	easting	Easting of station
29–38 (2x), 53–68 (33)	elevation	Elevation of station
39–48 (2x), 69–84 (33)	hi	Height of instrument
49–64 (2x), 85–100 (33)	desc	Station description

Target details record

03NM	ht

1–4	**03NM**	Target details record identifier (fixed text)
5–14 (2x), 5–20 (33)	ht	Height of target

Backsight bearing details record

07K**I**	stnpt	bspt	bsazim	ha

1–4	**07KI**	Backsight bearing details record identifier (fixed text)
5–8 (2x), 5–20 (33)	stnpt	Station point number
9–12 (2x), 21–36 (33)	bspt	Backsight point number
13–22 (2x), 37–52 (33)	bsazim	Backsight azimuth
23–32 (2x), 53–68 (33)	ha	Horizontal angle

Coordinates record

08KI	pt	northing	easting	elevation	desc

1–4	**08KI**	Coordinates record identifier (fixed text)
5–8 (2x), 5–20 (33)	pt	Point number
9–18 (2x), 21–36 (33)	northing	Northing of the coordinate
19–28 (2x), 37–52 (33)	easting	Easting of the coordinate
29–38 (2x), 53–68 (33)	elevation	Elevation of the coordinate
39–54 (2x), 69–84 (33)	desc	Feature code

Observation record

09MC	stnpt	pt	sd	va	ha	desc

1–4	**09MC**	Observation record identifier (fixed text)
5–8 (2x), 5–20 (33)	stnpt	Station point number
9–12 (2x), 21–36 (33)	pt	Observed point number
13–22 (2x), 37–52 (33)	sd	Slope distance
23–32 (2x), 53–68 (33)	va	Vertical angle
33–42 (2x), 69–84 (33)	ha	Horizontal angle
43–58 (2x), 85–100 (33)	desc	Feature code

Job identifier record

10NM	jobid	1	incZ	T&Pcorr	C&Rcorr	refcon	sealev

1–4	**10NM**	Job identifier record ID (fixed text)
5–8 (2x), 5–20 (33)	jobid	Job name/title

Note *– The following fields occur only in SDR33 format.*

21	**1**	Point ID length option
22	incZ	2D or 3D coordinates. One of the following: **1** 2D **2** 3D
23	T&Pcorr	Atmospheric correction. One of the following: **1** Off **2** On
24	C&Rcorr	Curvature and refraction correction. One of the following: **1** Off **2** On
25	refcon	Refraction constant. One of the following: **1** 0.132 **2** 0.200
26	sealev	Sea level correction. One of the following: **1** Off **2** On

Note record

13NM	note

1–4	**13NM**	Note record ID (fixed text)
5–64	note	Note text

Data examples

Nikon raw data format

CO,Nikon RAW data format V2.00
CO,EXAMPLE5
CO,Description: SAMPLE DATA OF DOWNLOAD
CO,Client:
CO,Comments:
CO,Downloaded 22-JUL-2008 18:56:10
CO,Software: Pre-installed version: 1.0.0.1
CO,Instrument: Nivo 5.M
CO,Dist Units: Metres
CO,Angle Units: DDDMMSS
CO,Zero azimuth: North
CO,Zero VA: Zenith
CO,Coord Order: NEZ
CO,HA Raw data: Azimuth
CO,Tilt Correction: VA:ON HA:ON
CO, EXAMPLE5 <JOB> Created 22-JUL-2008 07:09:21
CO,S/N:213705
MP,1,,100.000,200.000,10.000,
CO,Temp:20C Press:760mmHg Prism:0 22-JUL-2008 07:11:34
ST,1,,,,1.400,55.4500,55.4500
F1,,,,0.0000,90.0000,8:27:58
SS,3,1.200,330.706,326.027,20.320,07:13:46,SIGN
SS,4,1.250,379.193,300.847,29.084,07:14:24,TREE
SS,5,1.218,363.344,328.032,30.105,07:14:57,TREE R
SO,1003,,1.240,331.220,326.783,19.998,07:18:17,

Nikon coordinate data format

1,100.0000,200.0000,10.0000,
2,200.0000,300.0000,20.0000,
3,116.9239,216.9140,11.8425,TRAIN PLATFORM
4,126.6967,206.2596,11.2539,RAMP
11,100.0045,199.9958,10,0000,
13,116.9203,216.9113,11.7157,
14,126.6955,206.2579,10.9908,
21,100.0103,199.9958,10.0000,
31,100.0013,200.0005,10.0000,
41,100.0224,200.0331,9.9000,
43,116.9263,216,9165,11.8016,CURB
44,126.7042,206.2871,10.8193,DITCH
45,116.9266,216.9160,11.8028,
46,126.7046,206.2845,10.8213,CP POINT

SDR2x raw data format

```
00NMSDR20V03-05     000023-Jul-2008 18:39:111211
10NMEXAMPLE6
01KI1  Nikon Nivo 5.M 000000  Nikon Nivo 5.M 00000012     0.000     0.000     0.000
13NMDownloaded 23-Jul-2008 18:39:22
13NMSftware: Pre-install version: 1.0.0.1
13NMInstrument: Nikon Nivo 5.M
13NMDist Units: Metres
13NMAngle Units: Degrees
13NMZero azimuth: North
13NMZero VA: Horizon
13NMCoord Order: NEZ
13NMClient:
13NMDescription:
13NMTilt Correction:  VA:ON HA:ON
13NM EXAMPLE6 <JOB> Created 23-Jul-2008 07:09:21
08KI0001100.000   200.000   10.000
08KI0002200.000   300.000   20.000
02KI0001100.000   200.000   10.000   0.100
07KI0001000245.0000   0.0000
13F100000002<null>   <null>   0.0000
13F200000002<null>   <null>   179.9639
13NMBS Check HA:359.3525  Reset to HA:  0.0000     07:21:41
13F10000000323.990    4.1694   0.0000
13F20000000323.990    175.8403  180.0028
03NM0.000
13F10001000323.990    4.1653    359.9833  MAIN PLATFORM
13F10001000427.445    2.4097    328.1958  RAMP
13NMStart of 2-Pt Resection
13F10000000427.445    2.4097    0.0000
13F10000000323.991    4.1542    31.8042
13F10000000427.430    1.8583    121.4306
13F10000000323.976    3.8625    153.2306
08KI0011100.005   199.996   10.000
02KI0011100.005   199.996   10.000   0.100
07KI0011000344.9980   0.0000
```

SDR2x coordinate data format

00NMSDR20V03-05 000023-Jul-2008 18:40:111211
10NMEXAMPLE6
01KI1 Nikon Nivo 5.M 000000 Nikon Nivo 5.M 00000012 0.000 0.000 0.000
13NM 080926-2 <JOB> Downloaded 08-Oct-2008 18:40:06
13NMSftware: Pre-install version: 1.0.0.1
13NMInstrument: Nikon Nivo 5.M
13NMDist Units: Metres
13NMAngle Units: Deqrees
13NMZero azimuth: North
13NMZero VA: Horizon
13NMProjection correction: OFF
13NMC&R correction: OFF
13NMSea level correction: OFF
13NMCoord Order: NEZ
13NMClient:
13NMDescription:
13NMTilt Correction: VA:OFF HA:OFF
13NM EXAMPLE6 <JOB> Created 23-Jul-2008 07:09:21
13NMPrism constant: 0
08KI0001100.000 200.000 10.000
08KI0002200.000 300.000 20.000
13NMBacksight Check to Pt:2 HA:359.3525 07:21:39
13NMBacksight Pt:2 Reset to HA: 0.0000 07:21:41
08KI0003116.924 216.914 11.843 MAIN PLTFORM
08KI0004126.697 206.260 11.254 RAMP
13NMStart of 2-Pt Resection
08KI0011100.005 199.996 10.000

CHAPTER

10

Error Messages

In this chapter:

Cogo

NO Result

The system was unable to calculate an area because points were not entered in the correct order.

Press any key to return to the Cogo menu. Then enter the points in the correct order.

Same Coordinate

The point or coordinate that you entered is identical to the previous input point.

Press any key to return to the point input screen. Then use a different point.

XY-coordinate is required

The input point does not have XY (NE) coordinates.

Press any key to return to the point input screen. Then enter a point that has X and Y coordinates.

Communications

If an error is detected during uploading of data, the Nivo instrument aborts the upload process and displays one of the following messages.

Check Data

There are errors in the uploaded data. The uploaded data contains errors, such as an alphabetic character in a coordinate field.

Press any key. Then check the specified line in the data.

DUPLICATE PT

The uploaded data contains a duplicate PT.

Press any key. Then check the specified point in the data.

Tip – If the existing point is a UP, CC, or MP record, and is not referred by ST or BS, then it will be overwritten by the uploaded record. No error message appears.

PT MAX20 chars

The uploaded data contains a PT with a name or number that is longer than 20 digits.

Press any key. Then check the specified line in the data.

XYZ OVERRANGE

The uploaded data contains a coordinate that is longer than 13 digits.

Press any key. Then check the specified line in the data.

Data

Can't Edit Current ST

You have tried to edit the current ST.

***Note** – You cannot edit the current ST. However, old ST records can be edited. No recalculation can be performed on the instrument.*

Press any key to return to the code/layer name input screen.

Can't Edit ST/BS refer to this PT

You have tried to edit a coordinate that the current ST or BS refers to. You cannot change a coordinate if the current ST or BS refers to it.

Press any key to return to the Data view screen.

Can't Edit XYZ from measurement

You have tried to change the coordinates of an SO, SS, or CP record. You cannot change the coordinates of an SO, SS, or CP record.

Press any key to return to the previous screen.

DELETE Stn-XYZ

You have tried to delete a coordinate record that the current ST or BS refers to. You must confirm that you want to delete a coordinate record that the current ST or BS refers to.

To ...	Press ...
delete XYZ	the DEL softkey
return to the previous screen without deleting XYZ	ESC or the Abrt softkey

Job Manager

Cannot Assign

You have tried to set the current job as the control file.

Press any key to return to the previous screen. Then select a different job.

Can't Create

There is no space available to create a job or record a point.

Press any key to return to the Job Manager. Then use the DEL softkey to delete old jobs.

Existing Job

You have entered an existing job name for a new job.

Press any key and then change the name for the new job.

MAX 32Jobs

You are trying to create a new job when the maximum number of jobs (32) is already stored.

Press any key to return to the Job Manager. Then use the DEL softkey to delete old jobs.

Programs

NO Stn Setup

You did not perform a station setup or BS check before entering the Programs function.

To ...	Press ...
go to the Stn Setup menu	2 or select Stn Setup
return to the BMS	ESC
go to the Programs menu	1 or select Continue

Tip – Selecting Continue does ***not*** resume the last ST record. You should only use the Continue option if you are sure that the previous ST coordinates and the current HA orientation are correct. Otherwise, records in the Programs function may not be correct.

XY&Z coordinate are required

Three-dimensional coordinates are required in S-Plane function.

Press any key to return to the point input screen. Then enter a three-dimensional point.

Recording Data

DATA FULL

The data storage is full.

Press any key to return to the Basic Measurement Screen (BMS). Then:

To ...	Go to ...
delete unnecessary data	MENU > Data
delete jobs	MENU > Job

DUPLICATE PT

The input PT you are trying to record already exists in the current job. An existing coordinate record cannot be overwritten by measured data.

Press any key to return to the point input screen. Change PT.

Duplicate PT

The input PT you are trying to record already exists in the current job as an SS, SO, or CP record. An existing SS, SO, or CP record can be overwritten by measured data.

To ...	Press ...
return to the PT input screen	ESC or the Abrt softkey
record RAW data and update XYZ data	the XYZ softkey
record RAW data only	the RAW softkey

No Open Job

No job is open.

To ...	Press ...
open the job list, if there are existing jobs	1 or select Select job
create a new job	2 or select Create job
return to the previous screen	ESC

NO Stn Setup

There is no station record in the current job, or a station setup or BS check has not been done since the program was rebooted.

To ...	Press ...
continue recording	1 or select Continue. If there is already an ST record in the job, the message CO, Use current orientation appears.
go to the Stn Setup menu	2 or select STN Setup
return to the previous screen	ESC

OVER RANGE

You are trying to record a coordinate with more than 13 digits

Press any key to return to the previous screen. Then check the current ST coordinate.

Searching

PT Not Found

There is no point that matches the criteria you entered.

Press any key to return to the point input screen.

This message may appear in any function where the PT/CD is input, such as Station Setup or Stakeout.

Settings

Job Settings will be changed

You have changed one or more of the following job settings:

- VA zero or HA in the Angle screen (see Angle, page 108)
- Scale, T-P, Sea Lvl, or C&R in the Distance screen (see Distance, page 109)
- Coord or Az Zero in the Coordinates screen (see Coordinate, page 110)
- Angle, Dist, Temp, or Press in the Unit screen (see Unit, page 111)

To ...	Press ...
discard the changes to the job settings	ESC or the Abrt softkey. The current job remains open.
close the current job and save the changes to the job settings	ENT or the OK softkey

***Note** – To record a point using the new settings, create a new job using the new settings.*

Stakeout

Input Error

The point name style used in the Fr field is not the same as the style used in the To field. For example, the Fr field style is 1, and the To field style is A200.

Press any key to return to the Fr/To input screen. Then re-enter the point name, using the same naming style in both fields.

`NO Stn Setup`

You did not perform a station setup or BS check before entering the Stakeout function.

To...	Press ...
go to the Stn Setup menu	2 or select `Stn Setup`
return to the Basic Measurement Screen (BMS)	ESC
go to the Stakeout menu	1 or select `Continue`

Tip – Selecting `Continue` does ***not*** resume the last ST record. You should only use the `Continue` option if you are sure that the previous ST coordinates and the current HA orientation are correct. Otherwise, records in the Stakeout function may not be correct.

Station Setup

`Calc ST Failed Need additional PT`

Calculating ST failed in resection. This message may appear after you have deleted a point the View shots screen.

Press any key to return to the PT input screen. Take another shot to calculate the ST coordinate.

`Same Coordinate`

The input PT or coordinate is identical to the current station in STN/1:Known, or the same coordinate or point name/number is found in Resection.

Press any key to return to the PT input screen. Then use a different PT.

`Space LOW`

There is not enough space to record a station when you start any of the Station Setup functions.

To ...	Press ...
return to the BMS	press ESC or the `Abrt` softkey. Use the `DEL` softkey in Job Manager to delete old jobs.
continue	press ENT or the `OK` softkey. You may not be able to record the whole process.

`XY-coordinate is required`

The input point for ST/BS does not have N/E coordinates.

Press any key to return to the PT input screen. Then use a PT that has N/E coordinates.

Z-coordinate is required

The input point for Benchmark does not have a Z coordinate.

Press any key to return to the PT input screen. Then use a PT that has a Z coordinate.

System Error

=SYSTEM ERROR=

The system has detected an internal error that is related to the lower-level system.

Press any key to turn the instrument off. The system will reboot when this error is reported. If you still have more points to shoot in the site, turn the instrument on and repeat the open a job and station setup procedures.

Data stored before this error will be kept safely in the Job file.

If the error appears frequently, please contact your dealer or Trimble Support and report the message that appears below the =SYSTEM ERROR= line.

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