Total Station

User Manual-AXIS1

Contents

1 Precautions

For the safe use of the product and prevention of injury to operators and other persons as well as the prevention of property damage, items that should be observed are indicated by an exclamation point within a triangle used with WARNING and CAUTION statements in this operator's manual.
The definitions of the indications are listed below. Be sure you understand them before reading the manual contents.

1.1 General

Do not use the unit in areas exposed to high dust or ash to avoid explosion.
Do not look at the sun through the telescope to avoid losing eyesight.
Do not stare at the laser beam or point the laser to the other's eye to avoid loss of eyesight.
Do not short circuit. Heat or ignition could result.
Do not use voltage other than the specified power supply voltage. Fire or electrical shock could result.
Do not store the equipment in extremely high or low temperatures.
Do not heat or throw batteries or chargers into the fire.
Do not use the battery or the battery charger if its terminals are wet.
Do not connect or disconnect power supply plugs with wet hands. Electric shock could result.
When the equipment is not in use, store it in the case to avoid dust and humidity.
If the equipment has not been used for a long time, you should remove the battery for separate storage. The battery should be charged once a month.
When shipping the equipment, please place it in the carry case. The cushioned material should be used to cover the support case.
Do not disassemble the total station by yourself. Please contact your authorized agency or SETC Service Team when you find the equipment abnormal.

1.2 Laser Safety Information

The total Station is equipped with an EDM of Laser Class 3A/III and verified by these labels as follows:
There's an indication label "CLASS III LASER PRODUCT" above the vertical clamp screw on Face Left as well as

on the Face Right.

The product is classified as a Class 3A laser product, according to the standards as follows:

IEC60825-1:2001 “SAFETY OF LASER PRODUCTS”

Part	Laser Class
EDM device in objective lens	Class 3R
Laser plummet	Class 2

Warning It is dangerous to continuously look straight at the laser beam.

Prevention Do not stare at the laser beam or point the laser beam at others. Reflecting laser beam is also valid.

Do not stare at the direction in which the laser beam might reflect. When the laser is opened, do not look at it near to the optical path or the prism. It is only allowed to observe the prism through the telescope of the total station.

To avoid injury, all the users should take safety precautions and must make sure that everything is under control within the distance that might bring dangers (according to IEC60825-1:2001).

Warning When the laser beam emits on a prism, mirror, metal surface, or window, it might be dangerous to look directly at the reflecting light. It is dangerous to make improper use of Class 3R laser equipment.

There are explanations of some principal points of related standards as follows:

Class 3R laser product is used outdoors and on construction sites (measuring, defining alignment, leveling, etc.). The laser equipment can only be installed, adjusted, and operated by those persons who have taken related training courses and got the authentication.

A. Set related laser warning marks on site.

B. Prevent anyone from looking straight at the laser beam directly or through an optic instrument.

C. To avoid the harm brought by the laser, users should block the laser beam at the end of the working route. When the laser beam passes through a restricted area (harmful distance*), and there are persons taking activities, users must stop the laser beam in time.

D. The optical path of the laser beam should be set higher or lower than the line of sight.

E. When the laser instrument is not in use, users should keep it well. It is not allowed for operation

unless the user is authenticated.

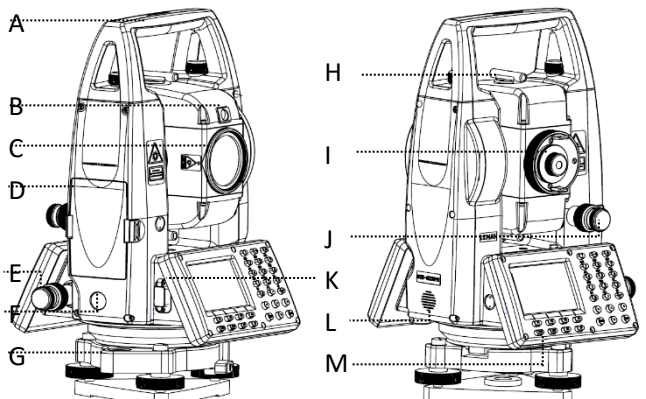
F. Prevent the laser beam from accidentally emitting at a mirror, mental surface, window, etc. Especially pay attention to the surface of a plane mirror or concave mirror.

* Harmful distance suggests the maximum distance from the start point of the laser beam to the point at which the laser beam is weakened to a certain degree that doesn't harm people.

The internal distance measure product which is equipped with a Class3R/III Laser Product has a harmful distance of 1000m (3300ft). Beyond this distance, the laser strength is weakened to Class I (It is not harmful to look straight at the laser beam.

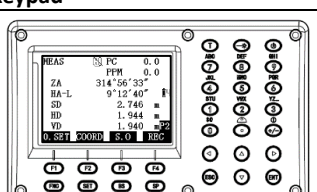
2 Introduction

2.1 Parts of Instrument.



A - Handle
B - Guide light
C - Objective lens
D - Battery
E - Horizontal tangent screw
F - EDM trigger key
G - Tribrach
H - Collimator
I - Eyepiece
J - Vertical tangent screw
K - USB
L - Buzzer
M - Display unit with keypad

2.2 Keypad

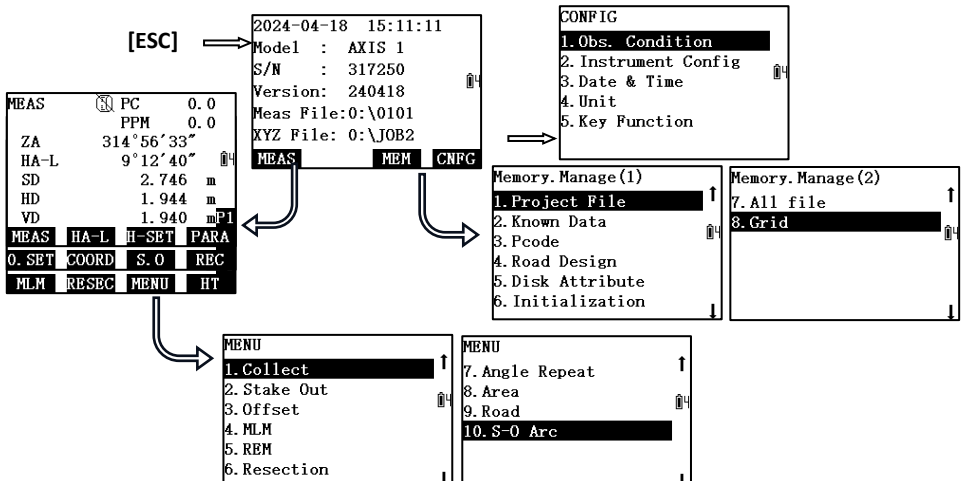


Keys	Description
T	Switch the target (Prism/Non-Prism/Sheet)
☀	Turns on/off the backlight
⏻	Power key (On/Off).
FNC	Function key. Turn the pages. Input target height in Stakeout, MLM, REM, etc.
SET	Shift key. Switch input mode between alphabets and numbers
BS	Backspace.
SP	Space; Modify EDM parameters in the non-input status.
F1	Function keys (F1, F2, F3, F4). Responds to display messages
△ ▽ ◁ ▷	Navigation keys. Controls the cursor in 4 directions.
1 STU	Alphanumeric keys, 0-9
. ZEN	Input dot. Enter the tilt compensator and turn on the laser plummet.
+/-	Input */+/-; Turn on or off the laser pointer in measure mode.

2.3 Icons

Items	Description
	Battery icon. Level from 1 to 4.
	Target status. Click to switch between non-prism, prism, or sheet.
	Tilt status
	Input status, numbers or alphabets

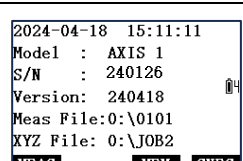
2.4 Menu Tree



2.5 Information

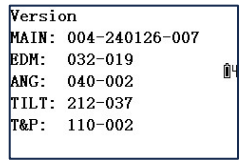
Access

Press **[ESC]** key in OBS page to enter the information page. Including the model, SN number, firmware version, current measured file and coordinate file.



Keys	Descriptions
[F1] MEAS	Back to OBS (Observation) page.
[F3] MEM	Memory management, refers to Chapter 17.

[F4] CNFG	Config. Refers to Chapter 4.
[FNC]	Check the other version. Including the version of mainboard, EDM board, angle board, tilt sensor and T-P sensor.
[SP]	Check the illumination settings. Refers to Chapter 4.3.



3 Measuring Preparation

3.1 Unpacking & Packing

Unpacking

Lay down the case lightly with the cover upward. Unlock the case, and take out the instrument.

Packing

Cover the cap, put the instrument into the case with the vertical clamp screw tightened and circular vial upwards (lens towards tribrach).

3.2 Instrument Setup

1) Setting up the tripod

A. Loosen the screws on the tripod legs, pull out to the required length and tighten the screws.

B. Make the center of tripod and the occupied point approximately on the same plumb line.

C. Step on the tripod to make sure if it is well stationed on the ground.

2) Instrument setup (Laser plummet)

Place and fix the instrument carefully on the tripod. Press [ ] to turn on the laser plummet. Hold the two legs which are not fixed on the ground and decide the position to fix according to the laser dot. When the laser dot is roughly on the station point, fix those 2 legs.

3) Roughly leveling by the circular vial

A. Rotate the foot-screw A and B to move the bubble in the circular vial, in which case the bubble is located on a line perpendicular to a line running through the centers of the two leveling screws being adjusted.

B. Rotate the foot-screw C to move the bubble to the center of the circular vial.

4) Leveling by the plate vial

A. Rotate the instrument horizontally by loosening the horizontal clamp unit and place the plate vial parallel to the line connecting rotating the foot-screw A and B, and then bring the bubble to the center of the plate vial by rotating the foot-screw A and B.

B. Rotate the instrument in 90º (100gon) around its vertical axis and turn the remaining leveling screw or leveling C to center the bubble once more.

C. Repeat the steps and check whether the bubble is correctly centered in all directions.

Note: If the laser or optical plummet doesn't stay at the center position after leveling, please slightly loosen the screw under the tripod head and move the instrument (don't rotate the instrument) until the equipment is on the station point. Tighten the screw and level the instrument again. Repeat these steps until the instrument is precisely centered and leveled.

3.3 Battery

Inserting

Put the battery into the instrument, push it. Check and insert it correctly to side into the housing.

Replacing

Press the battery lock on both sides, remove the battery. When the remaining voltage is less than one grid, please stop your operation and charge it as soon as possible.

Before remove the battery from the instrument, make sure that the power is turned off. Otherwise, the instrument may be damaged.

Charging

The battery must be charged prior to using before the first-time operation.

The battery LI-30(C) should be charged by official charger, which packed together with the instrument. Please connect the power supply in 220V, among 0°~±45°C.

When the indicator on the charger is red, the charging process has begun. When indicator turns green, the charging has finished. For safety, please pull out the battery and charger in time.

In order to get the maximum service life, please charge the battery at least once in a month.

Note:

a) The operating time depends on the outside conditions, such as ambient temperature, charging time, the cycles of charging, etc. It is recommended for safety to charge the battery beforehand or to prepare spare full-charged batteries.

b) *The remaining voltage of battery shows the power regarding to the current measure mode. The consumption of distance measurement is higher than angle measurement in normal. When switching the measurement mode from angle to distance in a low battery voltage, the equipment might be interrupted.*

3.4 Tribrach

Dismounting

If necessary, the instrument can be dismounted from tribrach. Turn the locking knob in 180° counter-clockwise to disengage anchor jaws, and take off the instrument.

Mounting

Insert three anchor jaws into holes of tribrach and line up the directing stub. Turn the locking knob about 180° clockwise to mounting the instrument.

3.5 Eyepiece Focusing

Sight the Telescope to bright place and rotate the eyepiece tube to make the reticle clear. Roughly collimate the target by the top of the triangle mark on EDM cover.

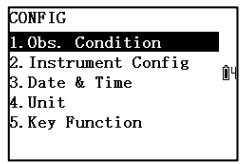
Rotate the focusing screw on eyepiece to make the image clear

4	Settings
4.1	General Config

Access

Press **[Esc]\[F4] CNFG** to configure the basic setting as the figure shows.

1. Observation condition
2. Instrument config
3. Date & time
4. Unit
5. Key function



Description

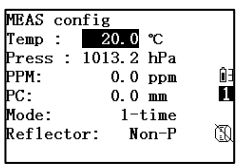
Item	Sub Items	Descriptions
Observation Condition	C&R Crn:(Coefficient k)	None / k = 0.2 / k = 0.14
	VA mode	Zenith / H0 / H90°
	Tilt	Off / X / XY
	Auto-off	Never / 60min off
	NEZ order	ENZ / NEZ
	Min angle reading	0.1”/ 1”
	Min distance reading	0.1mm / 1mm
	Key buzzer	On / Off
	Angle buzzer	On / Off
	F1/F2 coordinate	Same / Different
Instrument Config	Error display	Index, collimation, and tilt error value.
	Index Angle	Calibrate I Angle
	Collimation	Calibrate the 2C collimation
	Contrast	Adjust screen contrast (1-13)
	Tilt adjustment	Calibrate tilt sensor.
Date & Time		Set the date and time (in 24 hours).

Unit	Temperature	C° / F°
	Pressure	hPa / mmHg / inHg
	Angle	Degree / Gon / Mil
	Distance	Meter / US feet
Key function	Define	Define F1-F4 functions (Refers to Chapter 4.4)
	Key allocation	User 1 / User 2
	Recall	User 1 / User 2 / Default

4.2 Measurement Parameter

Access

Press **[F4] PARA** to set the parameter, including temperature, pressure, PPM, prism constant, measure mode and reflector.



Press **[ENT]** to confirm settings.

Description

Item	Descriptions
Temperature	Enter the temperature by manual. Range: -30℃ to +60 ℃, -22℉ to +140℉, interval: 0.1
Pressure	Enter the pressure by manual. Range: 560 to 1066hPa, 420 to 800mmHg or 16.5 to 31.5inHg. Interval: 0.1.
PPM	Atmospheric parameters. It can be calculated by entered temperature and pressure automatically. Or inputted by manual, from -99.9PPM to +99.9PPM.
PC	Enter the prism constant by manual. Default: -30mm.
Mode	Use [◄][►] to select 1-time/ 3-times/ Track/ Repeat mode.
Reflector	Use [◄][►] to select Prism/ Sheet/ Non-prism mode.

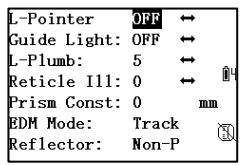
4.3 Illumination Config

Access

Press **[SP]** in OBS (observation) page to enter the configuration of laser pointer, guide light, laser plumb, reticle illumination, prism constant, EDM mode, and reflector type. Press **[ENT]** to confirm settings.

Description

Item	Descriptions
L-Pointer	Use [◄][►] to turn on or off the laser pointer.
Guide Light	Use [◄][►] to turn on or off the guide light.
L-Plumb	Use [◄][►] to set the brightness from level 1 to 5.
Reticle Light	Use [◄][►] to set reticle light from level 0 to 10.
Prism constant	Manually input the prism constant
EDM Mode	Use [◄][►] to select 1-time/ 3-times/ Track/ Repeat.
Reflector	Use [◄][►] to select Prism/ Sheet/ Non-prism mode.



4.4 Allocating Key Functions

Axis 1 allows allocating the definition of softkeys **[F1], [F2], [F3], [F4]** in OBS mode.
The current softkey allocations are retained until they are revised again.

- It is possible to register two sets of key function allocations under user setting 1 and user setting 2.
- It is possible to recall the softkey arrays registered for User 1 and User 2 as necessary.

4.4.1 Define Soft Keys

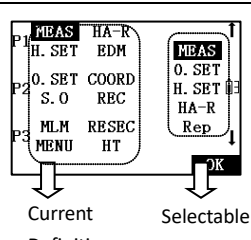
Access

1) Press **[ESC]\[F4] CNFG\[5]** Key Function**[1]** Define.

Default soft-key definition:

P1 [MEAS] [HA-R] [H-SET] [PARA]
P2 [0.SET] [COORD] [S.O] [REC]
P3 [MLM] [RESEC] [MENU] [HT]

2) Use **[◄][►]** to move the cursor and select the function key, which you want to change on P1, P2, P3.



3) Use **[▲][▼]** to move the cursor on the selectable list, press **[ENT]** to confirm.
4) After revise, press **[F4] OK** to record.
5) In OBS page, press **[FNC]** to switch the page (P1, P2, P3) of soft-keys.

Functions

Selectable List	Descriptions	Refers to
[MEAS]	Measure, without record.	
[0.SET]	Set the horizontal angle to 0.	Chapter 5.1
[H SET]	Set the horizontal angle.	Chapter 5.2
[HA-R]/[HA-L]	Set horizontal right or horizontal left.	Chapter 5.3
[REP]	Angle repetition measurement.	Chapter 5.5
[HOLD]	Hold or release horizontal angle.	Chapter 5.4
[ZA/%]	Switch zenith angle between angle and percents.	Chapter 5.6
[HT]	Set the instrument height and target height.	
[REC]	To check job data records.	Chapter 16
[REM]	Remote height program.	Chapter 12
[MLM]	MLM (Tie distance) program.	Chapter 11
[LAST]	Check the last data in the job.	
[VIEW]	Check the data list.	Chapter 16.7
[PARA]	Set EDM config.	Chapter 4.2
[COORD]	Coordinate measurement.	Chapter 7
[S.O]	Stake out program.	Chapter 9.1
[OFSET]	Offset program.	Chapter 10
[MENU]	Menu.	
[RESEC]	Resection	Chapter 8.3
[OUPUT]	Output data.	
[F/M]	Switch distance unit between feet or meter.	

[AREA]	Area program.	Chapter 13
[ROAD]	Road surveying.	Chapter 15
[PT PRO]	Point projection program.	Chapter 14
[S-O L]	Stake out line.	Chapter 9.2
[NULL]	No definition.	

Note *It is possible to allocate the same key on every page:*
e.g. P1 [MEAS] [HA-L] [H-SET] [EDM];
P2 [MEAS] [HA-L] [H-SET] [EDM];
The same definition can be allocated to more than one key on the same page:
e.g. P1 [MEAS] [MEAS] [HA-L] [HA-L];
It is also possible to allocate only one key: e.g. P1 [MEAS] [---] [---] [---].

4.4.2 Save as User 1 & User 2

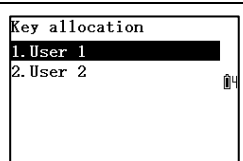
Description In Axis 1, you can save the definition of soft keys based on your own operating habits.

Access

1) Press **[5]** Key Function**[2]** Key allocation.

2) Use **[▲][▼]** to select **[1]** User1 or **[2]** User 2.

3) Press **[ENT]** to save the current definition under User 1 or User 2.



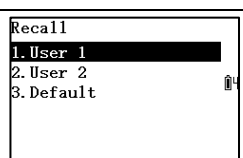
4.4.3 Recall Settings

Access

1) Press **[5]** Key Function**[3]** Recall.

2) Select **[1]** or **[2]** to recall soft-key settings under user 1 or user 2. Select **[3]** Default to recall the default settings.

3) Press **[ENT]** to confirm the select.



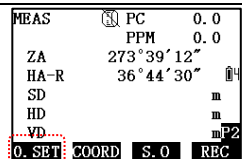
5 Angle Measurement

5.1 Measure the Horizontal Angle between Two Points

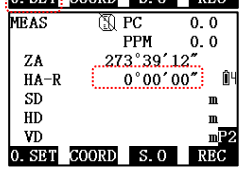
Description Use the **[0 SET]** function to measure the angle between two points.

Access

1) Aim on the first point. Press **[F1] 0.SET** in P2, the horizontal angle will be 0.



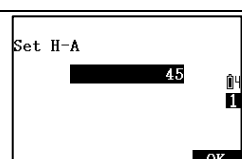
2) Rotate the telescope to aim at the second point. The displayed horizontal angle is the included angle between two points.



5.2 Setting the Horizontal Angle as Required

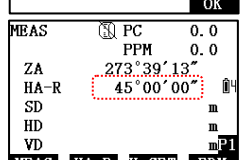
Access

1) Aim on the first point. Press **[F3] H-SET** in P1.



2) Enter angle value (e.g. 45°00’00”) as you need.

3) Press **[F4] OK** to set the current direction as 45°00’00”.



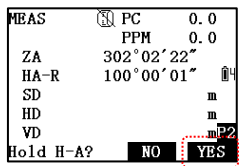
5.3 Switch between Horizontal Left and Horziontal Right.

Press **[F2] HA-L or HA-R** in P1 to switch the current horizontal angle between left (Face1) and right (Face2).

HA L = 360°- HA R

5.4 Hold the Horizontal Angle

1) Rotate the equipment and make the horizontal angle near to 100°00'00", then adjust the tangent screw until it's fully reached the value.
2) Press **[HOLD]**, enter the H-A Holding page.
3) Then loosen the horizontal tangent screw, and aim at the target. In this moment, the horizontal angle will not change.
4) Press **[F4] YES** to confirm and release the horizontal angle.



Note: [HOLD] is not displayed in the default functions, please define it to a softkey when necessary.

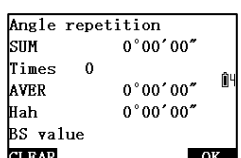
5.5 Horizontal Angle Repetition

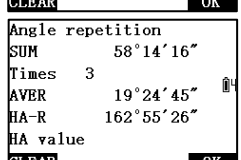
Description

To increase angle measurement precision, press **[REP]** to repeat measurement in maximum 10 times.

Steps

1) Sight the first target. Press **[F4] OK**.
2) Sight the second target. Press **[F4] OK.**
3) Sight the first and second target again press **[F4] OK.**
   The sum value, measure times, and average value of the horizontal angle are displayed.
4) Repeat the steps 3 to 4. Press **[ESC]** to exit.
5) Press **[F1] CLEAR** to return previous measurements.

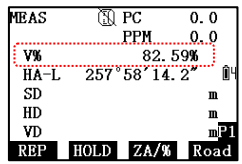




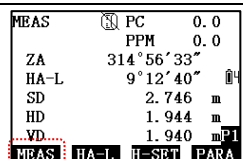
Item	Descriptions
Sum	Summarized angle
Reps	Measure times/repeats
Aver	Average horizontal angle
HA	Current horziontal angle

Note: [REP] is not displayed in the default functions, please define it to a softkey when necessary.

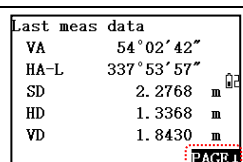
5.6	**Slope Display**
Description	To check the vertical angle in percentage.
Steps	Press **[ZA/%]** to switch the display of vertical angle between value and percentages. Range: within 100% *Note: [ZA/%] is not displayed in the default functions, please define it to a softkey when necessary.*



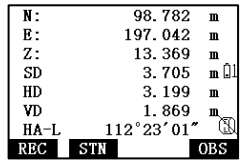
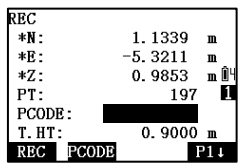
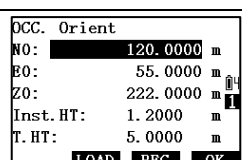
6	**Distance Measurement**
6.1	**Measure**
	Press **[F1] MEAS** in P1 to measure the distance. The result of ZA(VA), HA, SD, HD, and VD will show on screen. Press **[SP]** or **[T]** to change the target. The icon will be changed based on the current mode.



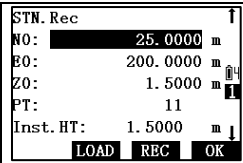
6.2	**Recalling the Measured Data**
	Press **[LAST]**, the last measurement data was displayed. Press **[F4] PAGE** to view second page of N, E, Z. *Note: [LAST] is not displayed in the default functions, please define it to a softkey when necessary.*

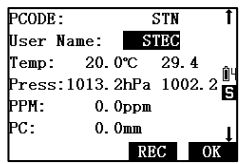


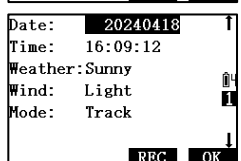
7	**Coordinate Measurement**
Description	Coordinate measurements are a way of determining the location of a point in a three-dimensional space using a reference system of axes and planes.

Access	1) Press the soft-key **[F3] MENU** in P3**\ [1] Collect \ [1] MEAS.** Or press **[F2] COORD** in P2 directly in functional keys. 2) Aim the target point. Press **[F4] OBS** and result shows. 3) Press **[F1] REC** to record it with point ID, code, target height, N, E, Z, SD, ZA, HA. 4) Aim to next point and press **[F4] OBS** to continue until all the points have been measured. Note: Please set the station and orientation before coordinate measurement.	 
8	**Station**	
8.1	**Station Setup**	
Description	Set up a coordinate system before going for coordinate measurement.	
Access	Method 1: **[F2] COORD** in P2\ **[2] STN;** Method 2: **[F3] MENU** in P3\ **[1] Collect, [F2] Stake Out, [F3] Offset ** Select **STN;**	
Steps	1) Enter the station coordinates, instrument height and target height. Or press **[F2] LOAD** to read a coordinate from internal memory. 2) Press **[F3] REC** to record the station. 3) Or you can press **[F4] OK** to save the station directly.	
Note	If you press **[F3] REC,** the information of this station will be recorded. Including the station coordinates, point name, instrument height, code, user name, temperature, pressure, PPM, prism constant (PC), date, time, weather, wind and measure mode.	

Item	*Entry Limits*
N0	*4 digits after decimal point (e.g. 1234567890.1234)*
E0	*4 digits after decimal point (e.g. 1234567890.1234)*
Z0	*4 digits after decimal point (e.g. 1234567890.1234)*
Point ID	*10 characters in maximum*
Code	*10 characters in maximum*
User Name	*6 characters in maximum*
Temperature	*Range: -30 to 60(C°); -22 to 140(F°)*
Pressure	*560-1066 hPa; 420 to 800mmHg; 16.5 to 31.5 inHg;*
PPM	*-99.9 to +99.9PPM;*
Date	*e.g. Enter 20240418 for April.18th, 2024*
Time	*e.g. Enter 173000 for 17:30:00.*
Weather	*Sunny, Cloudy, Light Rain, Rain, Snow*
Wind	*Calm, Gentle, Light, Strong, Storm*







8.2 Orient the Backsight by Angle or by Coordinate

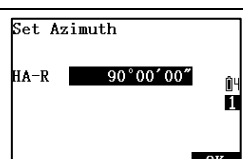
Access

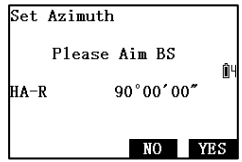
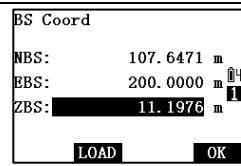
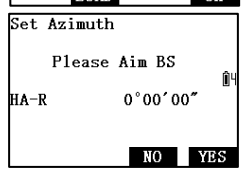
Method 1: **[F2] COORD** in P2\ **[3] BS;**
Method 2: **[F1] MENU** in P3\ **[1] Collect \ [3] BS;**
Method 3: **[F1] MENU** in P3\ **[2] Stake Out\ [1] STN \[F3] BS**

By Angle

1) Select **[1] Angle.**

2) Input azimuth angle, press **[F4] OK.**



	3) Aim the back sight point and press **[F4] YES.** Backsight data is recorded. 4) Press **[ESC]** to return to the previous menu.	
By Coordinate	1) Select **[2] COORD** to input backsight coordinates N, E, Z. or load backsight point from data list. 2) Press **[F4] OK**, the azimuth angle will be displayed. 3) Aim the backsight point and press **[F4] YES**. Backsight data is recorded. 4) Press **[ESC]** to return to the previous menu.	 

8.3	**Resection**
Description	Resection is used by measuring multiple known points to calculate the station which is set up in an unknown position. The multiple known points can be called from the library or inputted by manual.
Access	Method 1: Press **[F2] RESEC** on P3; Method 2: Press **[F3] MENU** on P3\ **[6]** Resection;
	1) Press **[F1] LOAD** to select the 1st known point from data list, or enter the coordinates by manual. Press **[F4] OK**.

2) Repeat to load other known points. When all the points are entered, press **[F1] MEAS**.

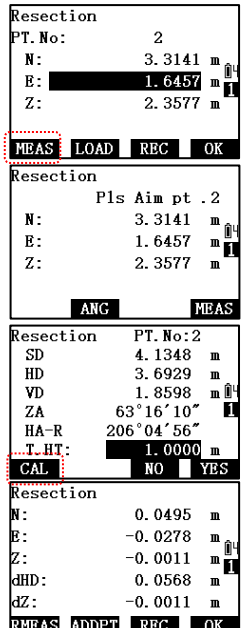
3) Press **[F2] ANG** to measure angle or **[F4] MEAS** to measure distance of the first known point.

4) Press **[F4] YES** to confirm result. Or press **[F3] NO** to remeasure this point.

5) Repeat the steps to measure the other points. At least two points with coordinate measurement or three points with angle measurement is necessary for resection.

6) Press **[F1] CAL** to calculate the coordinate of station and residual error.

7) Check the result of station, press **[F3] REC\[F1] REC** to save it.



Note: If not satisfied with the accuracy, press **[F2] ADD PT** to add more points to measure and improve the accuracy. You can press **[F1] REMAS**, and select remeasure from 1st point or only remeasure the last one.

9	Stake Out
9.1	**Coordinates Stakeout**
Description	Stake out a point by coordinates.

Access

1) Press **[F3] S.O** on page 2;
or Press **[F3] MENU** in page 3**\[2] Stake Out** to enter the stake out page.

2) After setting up the station. Press **[2] Stake Out.**

3) Enter the coordinates by manual or press **[F2] LOAD** to loading points from the data list.

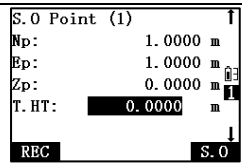
4) Use **[▲][▼]** to check the horizontal distance and angle of stake out point.

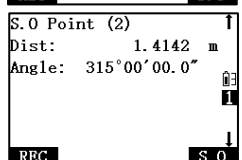
5) Aim at the prism, press **[F4] S.O** to check the result.

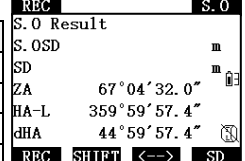
Display	Entry Limits
S.O SD	Slope distance from current point to stake out point.
SD	Slope distance from current point to station.
ZA	Move to the right (from station side).
HA-L	Vertical angle for current point.
d HA	Horizontal angle for current point.

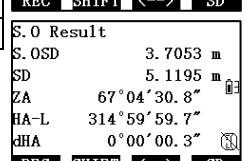
6) Rotate the telescope until d HA = 00°00’00”, which means the stake out point is located on this direction.

7) Press [F3] < -- > to check the guidance of stake out. Press **[F2] SHIFT** to switch the result among HD, SD, VD, REM and Coordinate.

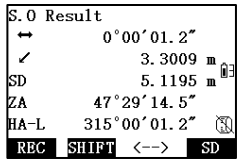


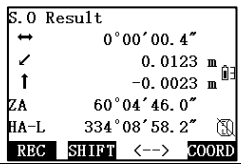






Display		Description
d HA	←	Move the prism to the left (from station side).
	→	Move the prism to the right (from station side).
	↔	The difference of horizontal angle is less than 1".
SD	↙	Move the prism to a further position.
	↗	Move the prism to a closer position.
VD	↑	Move the prism to an upper position.
	↓	Move the prism to a lower position.





8) When SD/VD/HD is close to 0.000m, the stake out point is founded on site.
9) Press **[F1] REC** to record it.

9.2 Line Stake Out

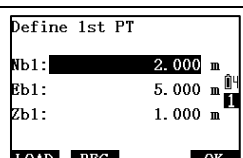
Line stakeout is used to stake out points, which related to the baseline and a preset distance. It also used to find the distance from a baseline to a measured point.

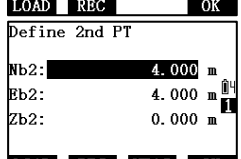
9.2.1 Define Baseline

1) Press **[S-O L] \[3] Define Baseline.**

2) Enter, select (Press **[F1] LOAD**) the first point, press **[F4] OK**.
3) Repeat the step to add the second point, press **[F4] OK**.

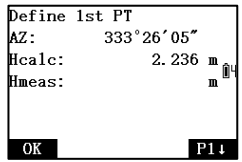
4) Press **[F3] MEAS\[F1] OBS\[F4] YES** to measure the first and second point.
5) Check the result between P1 and P2. Press **[F4] P1↓** to check the 2nd page.

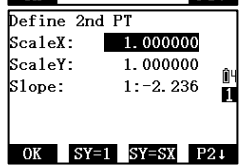




Display		Descriptions
Page 1	**AZ**	Azimuth between P1 and P2.
	H Calc	Horizontal distance calculated from inputted

		coordinates P1 & P2.
	H Meas	Horizontal distance measured from P1 & P2.
Page 2	**Scale X**	When P1&P2 are measured: Scale=H Meas /H Calc
	Scale Y	When P1&P2 are not measured: Scale = 1
	Slope	Slope = Elevation : Horizontal Distance





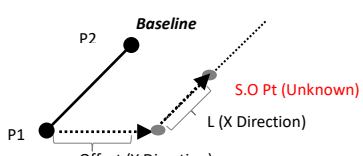
Keys	Descriptions
[F2] SY=1	Set Scale Y = 1
[F3] SY=SX	Set Scale Y = Scale X
[F2] 1: **	The slope is displayed by elevation: HD.
[F3] %	The slope is displayed by percents.

6) Press **[F1] OK** to confirm the setting of baseline by P1 and P2.

Note: [S.O L] is not displayed in the default functions, please define it to a softkey when necessary.

9.2.2 "Point Stake Out" Sub-application

Description



It calculates from the longitudinal (X Direction) and parallel (Y Direction) offsets of the target point relative to the base line.

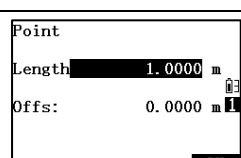
Known: P1, P2, Offs, L.

Unknown: Stake out point.

Access

1) Press **[S-O L] \ [4] S-O Pt**.

2) Enter longitudinal (Length) and parallel (Offs) offsets from the first point. Input a positive value for right side or a negative value for left side.



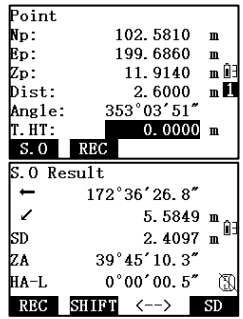
3) Press **[F4] OK** to check the stake out coordinate.

4) Enter the target height, press **[F1] S.O** to start stake out.

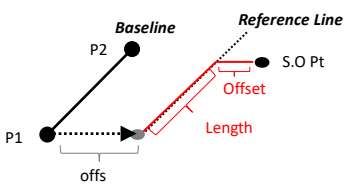
5) Rotate the EDM till d HA = 0, set and move the prism based on the guidance.

6) Press **[F4] SD** to measure and move the prism till the SO distance = 0m.

7) Press **[F1] REC** to record.



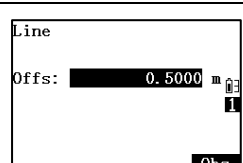
9.2.3 "Line Stake Out" Sub-application



It calculates how far horizontally and vertically the measured point is from the baseline. The baseline can be offset in a horizontal direction, if necessary.
Known: P1, P2, offset, measured target.
Unknown: longitudinal (Length), parallel (Offset) and vertical (d VD) offset.

1) Press **[S-O L] \ [5] S-O LINE**.
2) Enter parallel offset from the baseline (P1). The positive value is for right side and the negative value is for left side. Or leave it as 0.

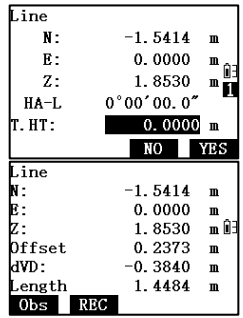
3) Aim at the target, press **[F4] OBS.** It will measure and show the coordinates, horizontal angle and target height.



4) Press **[F4] YES**. The difference between measured point and the base line will display on the screen.

Item	Descriptions
Offset	Parallel offset between the measured point and the line.
d VD	Vertical difference between the measured point and line.
Length	Distance along the line from the first point to the measured point.

5) Press **[F1] OBS** to measure it again, or press **[F2] REC** to record it.



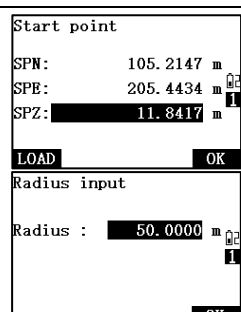
9.3 Arc Stake Out

9.3.1 Define an Arc

1) Select **[10] S.O Arc** in [MENU] program. Press **[4] Define Arc.**

2) Enter the coordinate of a start point, an end point and radius to define the arc.

3) Press **[F4] OK.** Then back to the previous page.



9.3.2 Stake Out an Arc

Determine the coordinates of points along an arc by the arc length and an offset value.

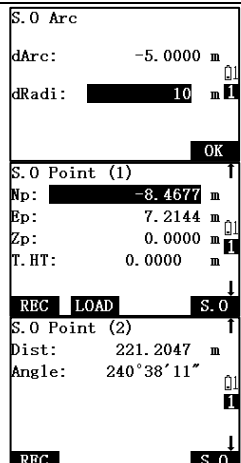
1) Press **[3] S.O Arc** in **[MENU]** program.

2) Enter **d Arc** (Arc distance. A positive value indicates the distance along the defined arc from the start point. A negative value indicates the distance extended from the opposite direction from the start point) and **d Radi** (Radius offset. Distance from the stake out point to the position on a curve parallel to the original defined arc.)

3) Press **[F4] OK** to check the coordinate, target height, distance and angle of the stake out point.

4) Press **[F4] S.O** to stake out. Stake out the point based on the guidance (refers to chapter 9.1).

5) Then press **[F1] REC** to record it.



10 Offset

Offset measurement is used to measure the distance and angle from the survey station to a point with clear sight but where a prism cannot be set up, or from the survey station to a point with no clear sight.

Note: [OFSET] is not displayed in the default functions, please define it to a softkey when necessary.

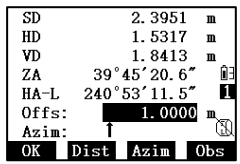
10.1 Distance Offset

When the offset point is on the left or right of the target point, please ensure that the angle formed by the lines connecting the offset point to both the target point and the instrument station is approximately 90 degrees.

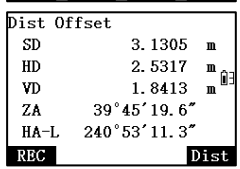
When the offset point is in front of or behind the target point, the offset point should along the line that links

the instrument station with the target point.

1) Press **[3] Offset** in **[MENU]** page. Press **[1] Distance Offset**.



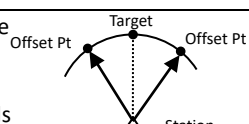
2) Press **[F3] AZMTH** to select the offset direction.
3) Input offset value between offset point and the prism.
4) Press **[F4] OBS** to measure the prism.
5) Press **[F2] DIST** to switch view the distance data or coordinate data.
6) Press **[F1] OK** to check the coordinate or distance data for offset point.
7) Press **[F1] REC** to record it.



10.2 Angle Offset

Description

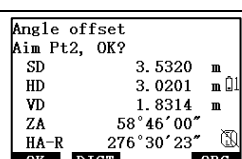
For angle offset, the offset point (prism) should be set as close as possible to the left or right side of the target point, and the target height should be the same.



The distance from the offset point to the station should be approximately equals to the distance from the target point to station.

Access

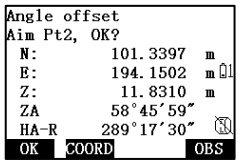
1) Press **[3] Offset** in [MENU] page. Press **[2] Angle Offset**.



2) Aim at offset point and press **[F4] OBS**.
3) The SD, HD, VD of the offset point distance will be shown, press **[F2] DIST** to switch coordinate display (N, E, Z).

4) Rotate the EDM to aim at the target. The coordinate will be updated immediately.

5) Press **[F1] OK\[F1] REC** to record the target.



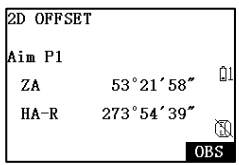
10.3 2D Offset

Set the offset points P1 and P2 on the straight line passing from the target point. Determine the target by measuring the offset points P1 and P2 and inputting the distance between point P2 and the target.

Access

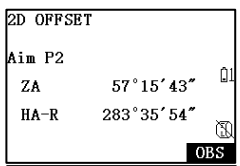
1) Press **[3] Offset** in [MENU] page. Press **[3] 2D OFFSET**.

2) Aim at offset point P1 and press **[F4] OBS.**

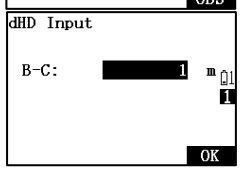


3) The coordinate will be shown. Press **[F4] YES** to the next step and press **[F3] NO** for remeasurement.

4) Aim at offset point P2 and press **[F4] OBS**.

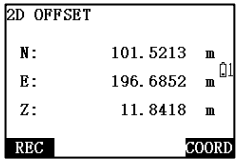


5) The coordinate will be shown. Press **[F4] YES** to the next step and press **[F3] NO** for remeasurement.



6) Input offset distance from point 2 to the target.

7) Press **[F4] COORD/DIST**, the coordinate and distance of target will be shown.



11 MLM

MLM is used to directly measure the slope distance, horizontal distance, and height difference between a certain starting point (P1) and any other point without moving the instrument. When measuring the height difference between two points, place make the target height at all points the same.

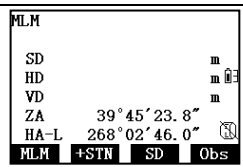
1) Press **[F1] MLM** in P3, or select **[4] MLM** in [MENU] program.

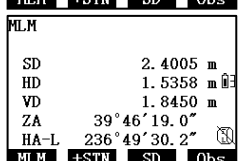
2) Aim at point A then press **[F4] OBS**.

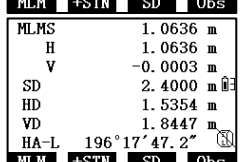
3) Aim at point B then press **[F1] MLM** to check the SD, HD and VD between A and B.

Item	Descriptions
MLM - S	Slope distance between A and B.
H	Horizontal distance between A and B.
V	Vertical difference between A and B.
SD	Slope distance of current point B.
HD	Horizontal distance of current point B.
VD	Vertical distance of current point B.
HA	Horizontal angle of current point B.

4) Aim at point C then press **[F1] MLM** to check the SD, HD and VD between A and C.







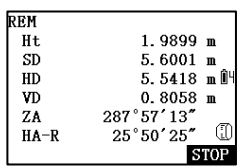
Keys	Descriptions
[F2] +STN	To set the last point as a new start station, which calculates by A-B, B-C, C-D,etc.
[F3] SD	To switch the slope distance by meter or by percents

12 REM

When the target is difficult to reach in the air, such as power lines, cables, bridges, roofs, REM (Remote Height) is a function to help you measure an object that cannot put a target directly on it.

Access

1) Press **[FNC]** twice to P3\ **[F3] MENU\ [5] REM** to enter REM program.
2) Set a prism vertically below the target. Press **[FNC]** to enter prism height.
3) Aim on a prism and press **[F4] OBS** to take measurements.
4) Rotate the EDM to aim the target which vertically hanging in the air.
5) Press **[F1] REM**, the height of target (Ht) is displayed. It will change in real-time when the EDM is rotated.



13 Area

Calculate the area from 3 to 30 points. The points can be loaded, manual inputted or measurement.

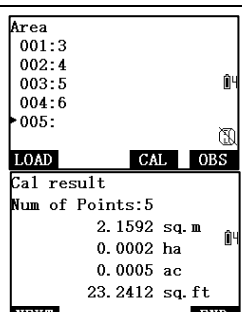
1) Select **[8] Area** in [MENU] program.

2) Press **[F4] OBS** for measure 1st point.

Keys	Descriptions
[F1] LOAD	Load the points from data list.
[F3] CALC	Calculate
[F4] OBS	Observe/ Measure the target.

3) Press **[F3] CAL** to calculate the area.

Note: [AREA] is not displayed in the default functions, please define it to a softkey when necessary.



14 Point Projection

It calculates a projected point onto the baseline.

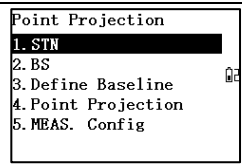
1) Select **[PtPRO]** for point projection.

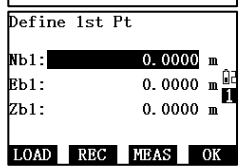
2) Press **[3]** Define a base line. Enter, measure or load two points as start point and end point.

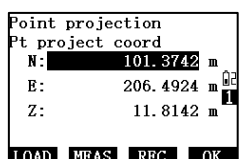
3) Then press **[4] Point Projection**.

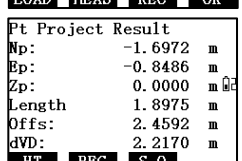
4) Select (press **[F1] LOAD**), measure (press **[F2] MEAS**) or enter the coordinate of the point to be projected.

5) Press **[F4] OK** To check the projected coordinates on the base line.







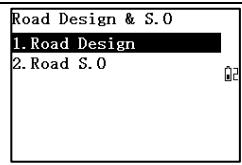


Item	Descriptions
Length	The length from start point to the projected point.
Offs	The horizontal offset from start point to projected point.
d VD	The vertical offset from start point to projected point.
Keys	**Descriptions**
[F1] HT	Enter the target height and instrument height.
[F2] REC	Record the projected point.
[F3] S.O	Stake out the projected point.

Note: [PtPRO] is not displayed in the default functions, please define it to a softkey when necessary.

15 Road

The road function including road design and stake out.



15.1 Road Design

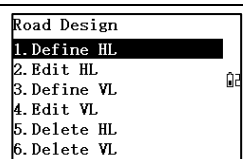
15.1.1 Define HL (Horizontal Alignment)

Horizontal alignment can be loaded from library or inputted by manual.
Including start point, straight line, curve and trans curve. HL file is created with job file together.
Maximum 20 data for HL file.

Methods

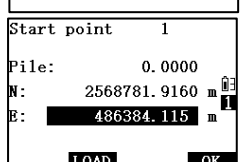
A) By Elements

1) Select **[9] Road\[1] Road Design** in **[MENU]** program.



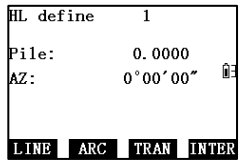
2) Press **[1] Define HL** the horizontal alignment.

3) Input the mileage/pILE and coordinates to start the road.



4) Choose and enter the elements.

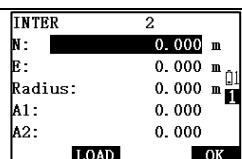
Item	Descriptions
[F1] Line	Enter the length and azimuth.
[F2] Arc	Enter the arc radius (+R: turn right, -L: turn left) and arc length.
[F3] Tran	Enter the radius (+R: turn right, -L: turn left) and curve length.



B) By Intersection Points

The data entered by intersection method cannot be mixed with data entered by elements., otherwise the calculation results will be incorrect.

Press **[F4] INTER** to define the intersection points. Including coordinate, radius and parameter A1 and A2.

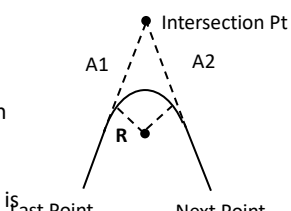


Parameter A1/A2 can be calculated by the length of transition curve L1/L2:

$$A_1 = \sqrt{L_1 \times Radius}$$

$$A_2 = \sqrt{L_2 \times Radius}$$

The radius, A1 and A2 can't be negative.



If a radius is entered, the arc with the specified radius will be inserted between the current point and the next point.

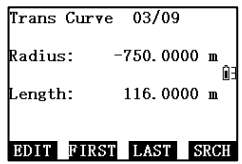
If the parameters A1 and A2 are entered, a specified length of transition curve is inserted between the line and the arc.

15.1.2 Edit HL (Horizontal Alignment)

Edit the elements in current horizontal alignment.

Select **[9] Road\[1] Road Design\[2] Edit HL**. It shows the last elements. Press arrow key [▲] or [▼] to select which element need to be edited.

Item	Descriptions
[F1] EDIT	To modify the data.
[F2] FIRST	To the first element.
[F3] LAST	To the last element.
[F4] SRCH	Input mileage to search elements.

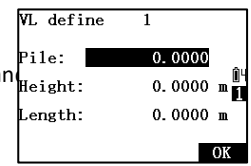


15.1.3 Define VL (Vertical Alignment)

1) Select **[9] Road\[1] Road Design\[3] Define VL**.

2) Enter the pile number (chainage), height and curve length. The start point and end point height must be 0.

3) Press **[F4] OK** to repeat the steps. Press **[ESC]** to escape.

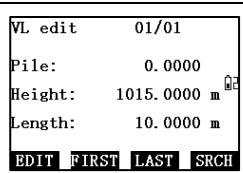


15.1.4 Edit VL (Vertical Alignment)

Edit the elements in current vertical alignment.

Select **[9] Road\[1] Road Design\[4] Edit VL**. It shows the last elements.

Press arrow key [▲] or [▼] to select which element need to be edited.



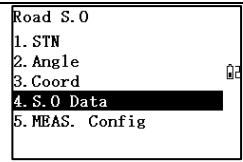
15.1.5 Delete Horizontal or Vertical Alignment

Select **[9] Road\[1] Road Design\[5] Delete HL or [6] Delete VL** to delete the alignment.

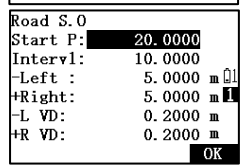
15.2 Road Stake Out

Stake out the points based on the mileage numbers and deviations determined by the road design.

1) Select **[9] Road\[2] Road S.O** to enter the road stake out program.
2) Press **[1] Station** to set up the station.
3) Press **[3] Coord** to input the mileage/pile you want to set as backsight.

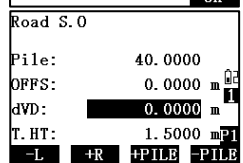


4) Press **[4] S.O Data** to set the stake out point.



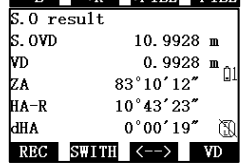
Item	Descriptions
Start P	Start pile (mileage).
Interval	Intervals of stake out points.
-Left	Horizontal offset, left.
+Right	Horizontal offset, right.
-L VD	Vertical offset, left.
+R VD	Vertical offset, right.

5) Press **[F4] OK** to check the pile (mileage) and offsets.



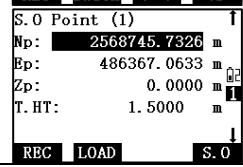
Key	Descriptions
[F1] -L	To enter the left offset.
[F2] +R	To enter the right offset.
[F3] +Pile	To the next pile (mileage) with pre-set intervals.
[F4] –Pile	To the last pile (mileage) with pre-set intervals.

6) Press **[ENT]** to check the coordinate to stake out.



Key	Descriptions
[F1] REC	Record the coordinate.
[F2] LOAD	Load the coordinate from internal memory.
[F4] S.O	Stake out this point.

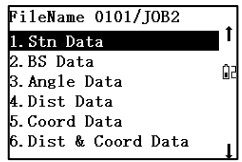
7) Stake out the point based on the guidance (refers to chapter 9.1). Then press **[F1] REC** to record it.



16 Record

Press **[F4] REC** in P2 to record data under the currect file.

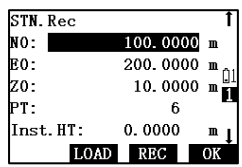
On the top of screen, it shows the current file for raw data (e.g. 0101) and coordinate data (e.g. JOB2).



16.1 Station Data

Select **[1] Stn data**. Including station coordinates, point ID, code, instrument height, user name, temperature, pressure, PPM, prism constant, observation date and time (entered by 24 hours), weather conditions, wind, and measure mode.

Use [▲]/[▼] to the previous or last item. Use [◄][►] to switch the settings.



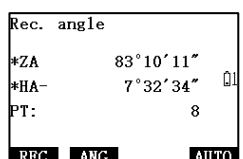
16.2 Backsight Data

Press **[2] BS data** to setup backsight point by angle or coordinate. Refers to chapter 8.2 Backsight.

16.3 Angle Data

Press **[3] Angle Data** to record the observed angle data.

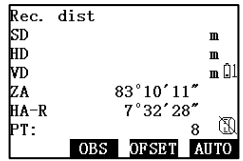
Key	Descriptions
[F1] REC	Recording the data, including vertical angle (ZA), horizontal angle, point ID, pcode and target height.
[F2] ANG	Angle measure only.
[F4] AUTO	Angle measure and record automatically.



16.4 Distance Data

Press **[4] Dist Data** to record the observed distance data.

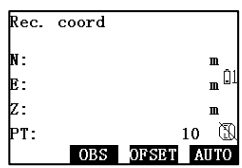
Key	Descriptions
[F1] REC	Recording the data, including SD, HD, VD, ZA, HA, point ID, code.
[F2] OBS	Distance measure only.
[F3] OFSET	Offset measurement. Refers to chapter 10.
[F4] AUTO	Angle measure and record automatically.



16.5 Coordinate Data

Press **[5] Coord Data** to record the observed coordinate data.

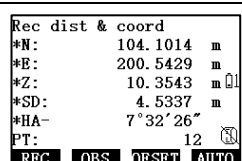
Key	Descriptions
[F1] REC	Recording the data, including N, E, Z, point ID, code and target height.
[F2] OBS	Coordinate measure only.
[F3] OFSET	Offset measurement. Refers to chapter 10.
[F4] AUTO	Coordinate measure and record automatically.



16.6 Distance & Coordinate Data

Press **[6] Dist & Coord Data** to record the observed distance and coordinates in once.

The recorded data includes N, E, Z, SD, ZA, HA, point ID, code and target height.

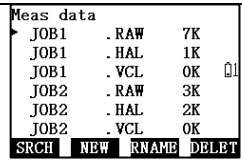


16.7 View Data

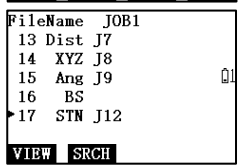
16.7.1 Measured Data

1) Press **[F1] REC\ [7] View Data\[1] Meas Data**.

2) Use **[◄]/[►]** to turn the pages. Use **[▲]/[▼]** to select the job, which ended by RAW (Raw data), HAL (Horizontal alignment) or VCL (Vertical alignment).
3) Press **[ENT]** to check the measured data in the selected job.
4) Press **[F1] View** or **[ENT]** to check the details.



Key	Descriptions
[F1] VIEW	Check the information of selected point. **[F1] First:** First point in data list. **[F2] Last:** Last point in data list.
[F2] SRCH	Search the point by point ID.

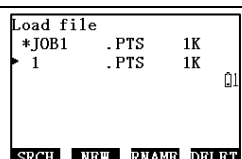


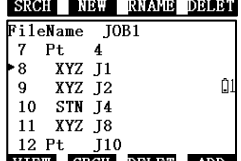
Data Type

13 DIST J7: Point ID, Distance Only, Point ID
14 XYZ J8: Point ID, Coordinate, Point ID
15 ANG J9: Point ID, Angle Only, Point ID
16 BS: Point ID, Backsight
17 STN J12: Point ID, Station Point, Point ID

16.7.2 Coordinate Data

1) Press **[F1] REC\ [7] View Data\[1] Coord Data**.
2) Use **[◄]/[►]** to turn the pages.
3) Use **[▲]/[▼]** to select the job, which ended by PTS.
4) Press **[ENT]** to confirm.
5) Check the coordinate data which saved in the selected job.
6) Press **[F1] View** or **[ENT]** to check the details.



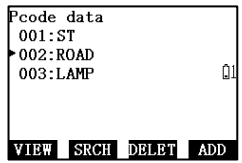


Data Type

7 Pt 4 Point ID, Imported or calculated coordinate, Point ID
8 XYZ J1 Point ID, Measured coordinate, Point ID
10 STN J4 Point ID, Station with coordinate, Point ID

16.7.3 Pcode Data

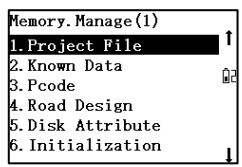
1) Press **[F1] REC\ [7] View Data\[3] Pcode Data**.
2) Use **[◄]/[►]** to turn the pages. Use **[▲]/[▼]** to move the cursor up or down.



17 Memory Management

Press **[ESC]** in OBS page\ **[F3] MEM** to enter the memory management.

In this function, you can select the job, manage the data of known points, codes and roads, check the disk attribution, initialize the settings of Axis1, check the data and grids.



17.1 Project File

Press **[1] Project File** to enter the file management.

Item	Descriptions
1. Select Meas File	Select the measure file.
2. Select Coord File	Select the coordinate file. The current file will be marked with an asterisk.
3. Export Meas Data	Export the raw data (***.csv, *.txt, *.sdr)** by USB.
4. Import Coord Data	Import the coordinates (***.csv, *.txt, *.sdr)** by USB.
5. Send Meas Data	Send the measure data by Bluetooth and data transfer software.
6. Receive Coord Data	Receive the coordinate data by Bluetooth and data transfer software.

17.1.1 Export Measure Data by USB Flash Disk

1) Press **[3] Export Meas File \[F2] Load** to select a measure file, e.g. JOB1.

2) Press **[ENT]**. Put the USB flash disk on TS.
Please note the USB file format should be FAT32.
3) Press **[F4] OK or [ENT]** to export the data by USB flash disk.
4) The raw data **(*.csv, *.txt, *.sdr)** will be saved in your USB flash disk.

Data Sample

```
00NMSDR33 V240220 14:57 2024-03-04 000000
10NM0:JOB1.PTS
06NM1.00000000
01NM:AXIS 1 240220 317250
08TP  14          99.400       197.749       12.282
09F1              14          2.933        37.2522       255.0430
08TP  15          99.400       197.749       12.282
09F1              15          2.933        37.2522       255.0429
08TP  16          100.485      201.847       12.386
09F1              16          2.684        44.3827       255.1700
08TP  D1          100.485      201.847       12.386
```

17.1.2 Import Coordinate Data by USB Flash Disk

1) Press **[4] Import Coord File \[F2] Load \[ENT]** to select the file. The data will be imported into this job.
2) Put the USB flash disk on TS.
Please note the USB file format should be FAT32.
3) Select the file (***txt, *csv, *.sdr**) in the USB flash disk.
4) Press **[ENT]** to import data.

Data Format

*txt:

```
08KI  Point ID  N  E  Z  Code
08KI 1 1.123 2.234 1.333 STN
08KI 2 2.234 3.456 1.444 BS
```

*csv:

Point ID	Code	N	E	Z

INP1	River	103.471	2564746	17.742
INP2	Building	99.687	204.363	11.783
INP3	House	95.712	198.012	12.297

17.2 **Known Data**

Press **[2] Known Data** under **[MEM]** page to manage the coordinates.

Item	Descriptions
1. Input Coord Data	Enter point ID, code, N, E, Z by manual.
2. Import Coord Data	Import the coordinates (***.csv, *.txt, *.sdr)** by USB.
3. Export Coord Data	Export the coordinates (***.csv, *.txt, *.sdr)** by USB.
4. Receive Coord Data	Receive the coordinates by Bluetooth and software.
5. Send Coord Data	Send the coordinates by Bluetooth and software.
6. Delete Coord Data	Delete all the coordinates.

17.3 **PCode**

Press **[3] PCode** under **[MEM]** page to manage the codes.

Item	Descriptions
1. Input Pcode	Enter point ID, code, N, E, Z by manual.
2. Import Pcode	Import the codes (*.txt, *.csv) by USB flash disk.
3. Export Pcode	Export the codes (*.txt)by USB flash disk.
4. Receive Pcode	Receive the codes by Bluetooth and software.
5. Delete All	Delete all the codes

Data Sample

Tunnel
River
Building
House

17.4 Dist Attribute

Press **[5] Disk Attr** to enter the disk attribute mode.

Disk: 0 is internal memory.

Disk: 2 is the external USB memory.

Keys	Descriptions
[F1] ATTR	Check the attribute of disk, including file system, used, free and total capacity.
[F2] FORMAT	Format the memory.
[F4] QUIT	Escape to the last page.

17.5 Initialization

Press **[6] Initialization\[ENT]\[F4]Yes** to reset the parameter to the initial settings.

17.6 All File

Check the measured data, coordinate data and codes. Refers to chapter 16.7 View Data.

17.7 Grid

Press [8] Grid to enter the grid factor. When calculating coordinates, the measured horizontal distance needs to be multiplied by the scale factor. The raw data will not be changed.

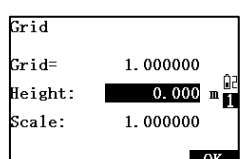
Height factor =R / (R + Elevation)

R: The average radius of the earth.

Elevation: Elevation above average sea level.

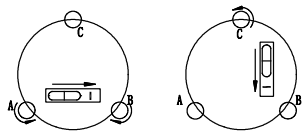
Scale: The scale factor for station point.

Grid= Height * Scale



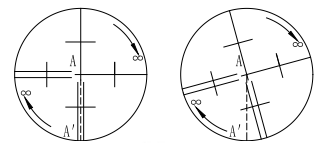
18 Inspection & Adjustment

The instrument has passed the procedure of inspection and adjustment before shipping to your side. However, after long periods of transportation or the changeable environment, some influences may occur to the internal structure. Before the instrument is used for the first time, please check and adjust the functions we introduced in this session to ensure the precision of the job.

18.1	**Plate Vial**
	Inspection Rotate the instrument after set-up to see whether the bubble is in center, if not, please adjust the vial bubble.  **Adjustment** 1. If the bubble of the plate vial moves away from the center, bring it half way back to the center by adjusting the screws, which is parallel to the plate vial. Adjust the remaining half by adjusting pin. 2. Rotate the instrument in 180º to check whether the bubble is in the center. If not, repeat Step 1. 3. Rotate the instrument in 90º, adjust the third screw. Repeat the steps until the bubble remains in the center in any direction.
18.2	**Circular Vial**
	Inspection It is not necessary to adjust the circular vial, except the bubble is not in the center after the adjustment of plate vial. **Adjustment** If the bubble of the circular vial is not in the center, adjust the bubble to the center by using the adjusting pin or hexagon wrench. First, loosen the screw opposite to the offset side, and then tighten the other adjusting screw on the offset side, bringing the bubble to the center. When the bubble stays in the center, keep the tightness of the three screws uniformly.
18.3	**Reticle Unit**
	Inspection 1. After leveling the instrument, select a target point A on the sight line of the telescope, aim at A with the center of the reticle crosshair and tighten the horizontal and vertical tangent screws. 2. Move point A to the edge of the field of view (point A').

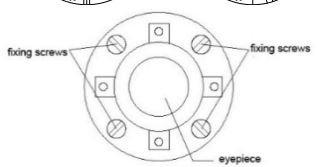
3. If point A moves along the vertical line of the crosshair, that is, point A' is still within the vertical line, then the crosshair is no need adjust.

As shown in the figure, if point A′ deviates from the center of the vertical line, the crosshair will be tilted, and the reticle needs to be adjusted.



Adjustment

1. Remove the eyepiece cover to expose the four reticle adjusting screws, as picture shown.
2. Loosen the four reticle adjusting screws uniformly by the adjusting pin. Rotate the reticle around the sight line and align the vertical line of the reticle with point A′.
3. Tighten the adjusting screws slightly. Repeat the previous steps to see whether the position is correct.
4. Assemble the eyepiece cover back.



18.4 2C Collimation

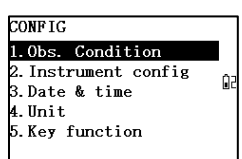
Inspection

1. Set target A at the same height as the instrument, level the instrument accurately and turn on the power.
2. Aim the telescope at target A by face 1 and read the horizontal angle. (e.g.: L=10°13′10″).
3. Turn to face 2. Aim at the same point A to read the horizontal angle. (e.g. R = 190°13′40″).
4. 2C = L − (R±180°) = − 30″≥±20″, which means the 2C should be adjust.

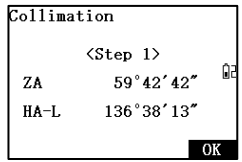
Adjustment

Method 1:

1. Press **[ESC]** in OBS, Press **[F4] CNFG\ [2] Instrument Config\ [3] Collimation.**



2. Leveling up the device on collimator, aim at Point A in face 1. Then press **[F4] OK**.
3. Rotate the device to face 2. Aim at point A again. Then press **[F4] OK.**

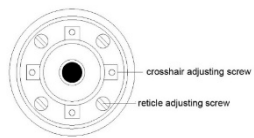


Method 2:

1. Use the tangent screw to adjust the horizontal angle to the right reading, which has been eliminated C:

e.g. R+C=190°13′40″-15″=190°13′25″

2. Take off the cover of the reticle between the eyepiece and focusing screw.
3. Adjust the left and right adjusting screws by loosening one and tightening the other.
4. Move the reticle to sight target A exactly.
4. Repeat inspection and adjustment until | 2C | < 20".



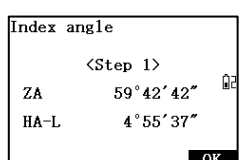
18.5 Index Angle

Inspection

1. After leveling up the instrument, collimate at target A in HL (Face 1). Record the vertical angle as L.
2. Rotate the EDM and aim at the target A in HR (Face 2). Record the vertical angle as R.
3. If the vertical 0 is in zenith, I =(L + R - 360°)/2.
   If the vertical 0 in horizontal, I= (L + R - 180°)/2 or (L + R - 540°)/2.
4. If |i| ≥10", it's necessary to adjust the Vertical 0.

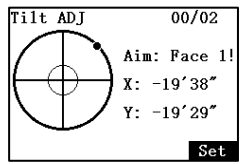
Adjustment

1. Press **[ESC]** in OBS, Press **[F4] CNFG\ [2] Instrument Config\ [2] Index Error.**
2. Leveling unit on collimator and aim at point A in face 1, then press **[F4] OK**.
3. Rotate the device, aim at the same target A in face 2 , press **[F4] OK**.



18.6 Tilt

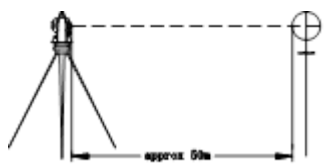
Adjustment



1. Press **[ESC]** in OBS, Press **[F4] CNFG\ [2] Instrument Config\ [5] Tilt ADJ.**
2. Leveling unit on collimator and aim at point A in face 1, then press **[F4] SET**.
3. Rotate the device, aim at the same target A in face 2 , press **[F4] SET**.

18.7 Coincidence between Sight of View & Emitting Axis

Inspection



1. Set a target at 50m away from the instrument.
2. Aim and measure the center of target.
3. Rotate the tangent screw to launch electric collimation and make the light path of EDM unblocked. In the bright zone, find the center of emitting photoelectric axis.
4. Check whether the center of reticle is coincided with the center of emitting photoelectric axis. If yes, the instrument is eligible.

Adjustment

If there is any difference between sight of view and emitting axis, please send the instrument to your local dealer for repair and maintenance.