SinoGNSS®
By ComNav Technology Ltd.

C100 Total Station User Guide

2022

Foreword

Thank for very much for purching C100 series total station!

Scope of use of this manual: applicable to C100 series total station.

Note: the manufacturer reserves the right to change the technical parameters without prior notice!

Features: rich functions

The southern total station C100 has rich measurement programs, as well as data storage and parameter setting functions,Powerful, applicable to various professional and engineering surveys.

Corporate office

ComNav Technology Ltd.

Building 2, No.618 Chengliu

Middle Road, 201801

Shanghai, China Tel: +86 21

64056796

Fax: +86 21 54309582

Website: *http://www.comnavtech.com*

E-mail: *support@comnavtech.com*

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- Absolute digital dial

The absolute digital dial is pre-installed, and the instrument can be directly measured when it is turned on. Even if the power is reset midway, the azimuth information will not be lost.

- SD card function

With functions such as high memory capacity, fast data transfer, great mobility flexibility, and good security , various data can be easily saved to SD during operations The SD card can be easily read on the

computer through the laptop slot or card reader data on the card. The SD card cannot be pulled out during the file operation in the SD card, otherwise it will lead to result in loss or corruption of data.

1 megabyte (MB) of memory on the SD card can store 8500 sets of measurement data and the number of coordinates (converted from the measurement data) data, or 22000 coordinate data.

- Powerful memory management

Large-capacity memory, and can easily manage the file system to achieve data addition, deletion, modification, transmission , etc.

- Prism-free ranging

C100 series total station with laser ranging can directly measure objects of various materials and colors (such as walls of buildings, telephone poles, wires, cliff walls, mountains, soil, wood, etc.) Pile, etc.) for long-distance, high-precision measurement. For those targets that are difficult to reach or cannot be reached at all, the application of the prism-free ranging function can complete the measurement task very well.

- Special measurement procedures

In addition to the common basic measurement functions, this series of total stations also have special measurement procedures, which can perform suspension height measurement, eccentric measurement, side-to-side measurement, stakeout, resection, area calculation, road design and stakeout, etc. It can meet the needs of professional surveying and engineering surveying.

Precautions:

1. Avoid directing the objective lens to the sun when measuring in sunlight. A sun filter is recommended to reduce this effect.
2. Avoid storing the instrument at high and low temperatures, and avoid sudden temperature changes (except for temperature changes during use) .
3. When the instrument is not in use, it should be put into a box, placed in a dry place, and should be protected from shock, dust and moisture.
4. If the temperature difference between the working place of the instrument and the temperature of the storage place is too large, the instrument should be left in the box and used until it adapts to the ambient temperature.

5. If the instrument is not used for a long time, the battery should be removed and stored separately. And the battery should be charged once a month.
6. When transporting the instrument, it should be packed in a box. Be careful during transportation to avoid extrusion, collision and violent vibration. It is best to use upholstery around the box for long-distance transport.
7. When erecting the instrument, use a wooden stand as much as possible. Because the use of metal tripods may cause vibration and affect the measurement accuracy.
8. When the exposed optical device needs to be cleaned, it should be gently wiped with absorbent cotton or lens paper, and must not be wiped with other items.
9. After the instrument is used, use a flannel or a brush to remove the dust on the surface of the instrument. After the instrument is wet by rain, do not turn it on, dry it with a clean soft cloth and store it in a ventilated place for a period of time.
10. Before the operation, the instrument should be carefully and comprehensively inspected, and the operation should be carried out only when all the indicators, functions, power supply, initial settings and correction parameters of the instrument meet the requirements.
11.If the instrument is found to function abnormally, non-professional maintenance personnel should not disassemble the instrument without authorization to avoid unnecessary damage .
12 .The prism-free C100 series total station emits laser light, which should not be aimed at the eyes.

Safety Guidelines

Warn:
Total stations equipped with laser class 3R/ IIIa rangefinders are identified by the following designations :

A warning label is attached above the vertical micro-movement of the front mirror of the instrument: "Class 3A Laser Product " , and there is a similar label on the opposite side.This product is a Class 3R laser product according to the following standards.
IEC 60825-1 : 2001 " Radiation Safety of Laser Products " .

Class 3R / Ⅲ a laser product: continuous observation of the laser beam is harmful, avoid direct laser eyes. in wavelength
400nm-700nm can reach the emission limit within five times of Class 2/ Ⅱ.
warn:
Continuously looking directly into the laser beam is harmful. prevention: Do not stare into the laser beam with your eyes, and do not point the laser beam at others. The reflected beam is valid for the instrument Measurement.

warn:

When the laser beam strikes eg prisms, flat mirrors, metal surfaces, windows, direct viewing of the reflected light with the eye can be dangerous.
prevention:
Do not stare at where the laser is reflected. When the laser switch is on (ranging mode), do not look next to the laser beam path or prism. The collimating prism can only be viewed through the telescope of the total station.

warn:

Incorrect use of Class 3R laser equipment is dangerous. prevention:
In order to avoid injury and make every user take effective safety precautions, it is necessary to
Control it from the inside (according to the standard IEC60825-1:2001).
Below is an explanation of the main parts of the standard:
Class 3R laser products for outdoor and construction site use (measurement, alignment, leveling).
a. Only persons with relevant training and certification can install, commission and operate such laser equipment.
b. Set up corresponding laser warning signs within the area of use.
c. To prevent anyone from looking directly at the laser beam or using optical instruments to view the laser beam.
d. In order to prevent the damage of the laser to people, the laser beam should be blocked at the end of the working route, and the

laser beam must be terminated when the laser beam passes through the restricted area (harmful distance *) and there are people moving.
e. The passing route of the laser beam must be set above or below the line of sight of the person.
f. When the laser products are not in use, they should be properly kept and stored, and uncertified persons should not use them.
g. To prevent the laser beam from inadvertently irradiating such as flat mirrors, metal surfaces, windows, etc., pay special attention to surfaces such as flat mirrors and concave mirrors .
* Harmful distance refers to the maximum distance from the starting point of the laser beam to the point where the laser beam is weakened so that it will not cause harm to people.

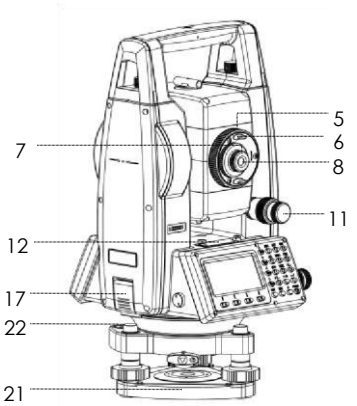
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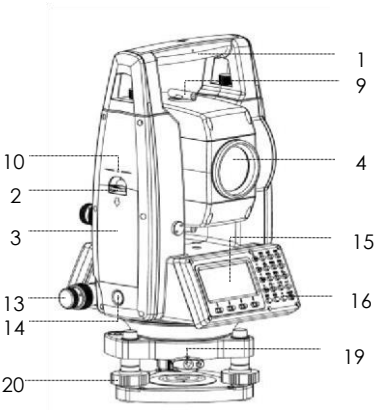
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1 BRIEF INTRODUCTION

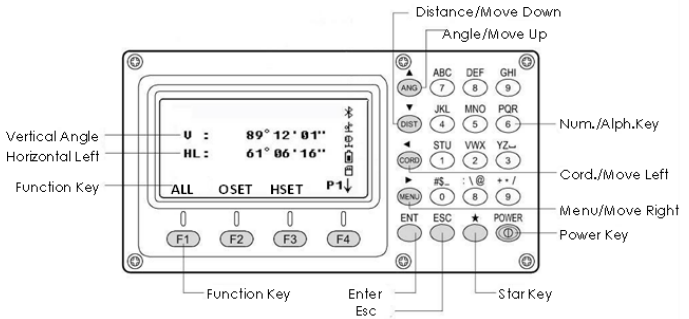
1.1Appearance





1	Handle	12	Vial bubble
2	Battery lock	13	Horizontal clamp and Tangent unit
3	Battery		
4	Optical Unit	14	Trigger Key
5	Optical Focusing Ring	15	Display Unit
6	Eyepiece Handle	16	Power Key
7	Eyepiece Focusing Ring	17	USB Comm Port
8	Eyepiece	18	Circle Bubble
9	Collimator	19	Tribrach Lock
10	Central Mark	20	Leveling Screw
11	Vertical clamp and Tangent unit	21	Base
		22	horizontal bubble

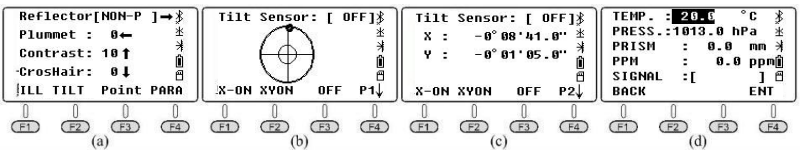
1.2 Keyboard



Key	Name	Function
★	Star key	Enter the star mode
ANG	Angle	Enter the angle measurement mode
DIST	Distance	Enter the distance measurement mode
CORD	Coordinate	Enter coordinate measurement mode
MENU	Menu	Enter menu
ESC	Esc	Cancel operation, or return to the last page
⏻	Power key	Power ON/OFF
[F1]~[F4]	Function key	Functions correspond to information displayed
0 ~ 9	Number keys	numbers/characters, or select items/hot keys
◄►▲▼	Move keys	Move the cursor to the left, right, up and down
ENT	Enter	Confirm the data, or go down to next item

2 Star Key

Press **[★]** to activate the Star Key menu, press direction key **[▲] [▼] [▶] [◀]** to move the cursor, press function keys to operate. Press **[ESC]** to exit the menu.



(1) Direction keys

Reflector: the default setting is NON-P. Press **[▶]** to switch among Prism, Sheet and Non-prism mode.

Plummet: the intensity for laser plummet. Press **[◀]** to switch the value among 2→1→0→4→3→2, 0 means off.

Contrast: the default value is 10. Press **[▲]** to switch the contrast for LCD screen among 10→11→·····→16→00→01→02·····→09→10.

CrosHair: Illumination for crosshair (reticle unit). The default value is 0. Press **[▼]** to switch the value among 0→1→2→3→4→0, 0 means off.

(2) Function keys

F1 **ILL:** Illumination for LCD screen and keyboard. The default setting is on. Press **[F1]** to open or close the illumination.

F2 **TILT:** On/Off the tilt sensor. The default setting is dual-axis sensor. Press **[F2]** to enter 1/2 page. Then press **[F1]** X-ON for single X-axis compensation, press **[F2]** XYON for dual-axis compensation. Press **[F3]** OFF to close the compensator. Press **[F4]** to enter 2/2 page. It will display the compensate value on current position.

F3 **Point:** On/off laser pointer. The default setting is off. Press **[F3]** to switch the laser pointer between on and off.

F4 **PARA:** Parameter setting menu.

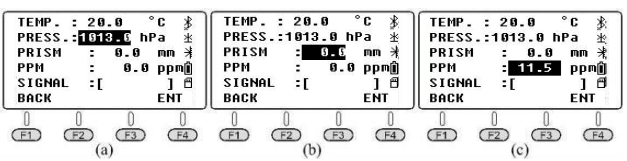
Input the value of temperature and atmosphere pressure. It will calculate the PPM automatically based on the atmosphere correction.

Reference value: Temperature 20℃, pressure P=1013hPa

Calculation formula: $$PPM = 278.44 - \frac{0.294922P}{1+0.003661t}$$

Users can also calculate the PPM value based on the formula by themselves and input the value by manual.

Note: a) Input range for temperature :-30℃~+60℃, increased by 0.1 ℃ ; Input range for atmosphere pressure560~1066hPa, min.0.1hPa increase. B) Input range for PPM is -999.9~999.9ppm.



2.1Hot Keys

When the total station is under the basic measurement surface, click the numeric keyboard to quickly access to the other pages.

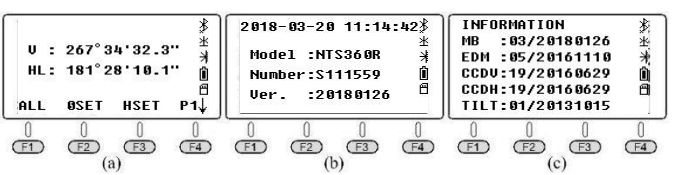
Key	Quick Access To
0	Stake Out

.	Tilt Sensor
-	Data Confirm
1	Memory MGR.
2	View Meas File
3	View Coord File
4	Resection
5	Created Meas & Coord File
6	Read Coordinate File
7	STN Setup
8	BS setup by coordinate
9	BS setup by angle

2.2System Information

Hold the power key in 1s to power on. The initial page is the angle measurement mode (pic a), press **[ESC]** to enter the system information page (pic b).

Press **[Menu]** - **[F4]** P2 - **[3]** Information to check the hardware information (pic b).



3. PREPARATION

3.1 Preparation

Unpacking

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

Storage of Instrument

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)

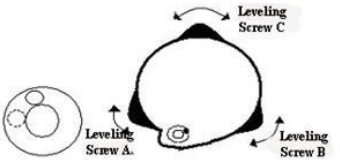
A. Place and fix the instrument carefully on the tripod

B. Press **[★]** and 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.

Instrument setup (Optical plummet)

Adjust the eyepiece of the optical plummet telescope to your eyesight. Slide the instrument by loosening the tripod screw; place the point on the center mark of the optical plummet. Sliding the instrument carefully as to not rotate the axis will allow you to get the least dislocation of the bubble.

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 screw being adjusted.

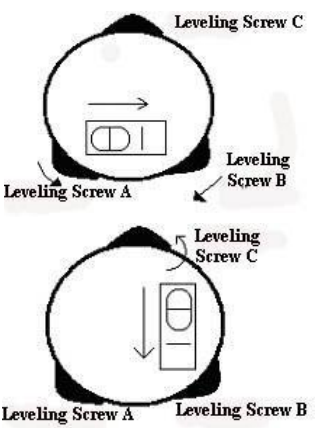


B. Rotate the foot-screw C to move the bubble to the center of the circular vial.

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 90° (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.

If the laser or optical plummet doesn't stay at the center position after levelling, 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.

Note: You can also level the instrument precisely by the E-bubble. When the tilt is over ±4', the system will enter the adjusting page of tilt sensor automatically.

3.3 Battery

Inserting

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

Replacing

Press the battery lock on the top of batter case, then 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 LB-01 should be charged only by the official charger NC10, which packed together with the instrument. Please connect the power supply in 110V - 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:

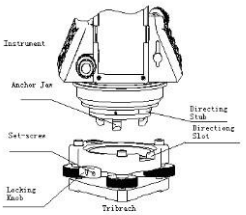
a) *The operating time depends on the outside conditions, such as ambient temperature, charging time, the cycles of charging, etc. It is recommended for safety to charge the battery beforehand or to prepare spare full-charged batteries.*

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.

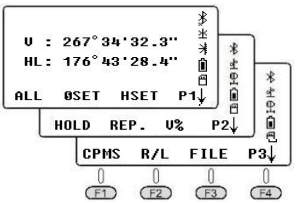
3.5 Eyepiece Focusing

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. ANGLE MEASUREMENT

When power on the equipment, C100 will enter the angle measurement mode automatically.



Press **[ANG]** to enter the angle measurement mode.

4.1 [F1] ALL

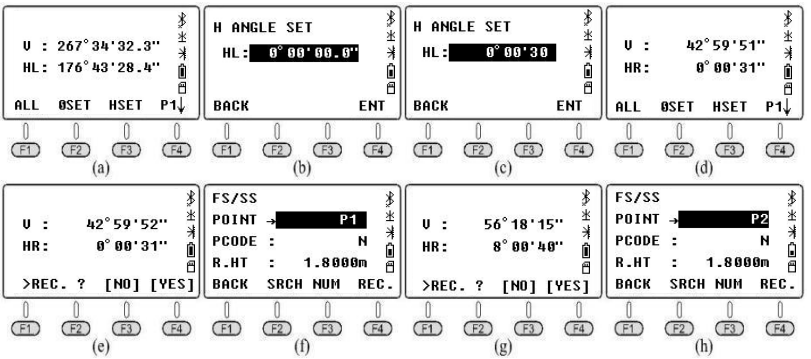
Measuring and saving the data of angle.

Q.: Setup a station at Point A, how to measure the horizontal angle for Target B/C by multiple round observation?

a) Aim at target B in Horizontal Left (HL), press **[F3] HSET** , input value as 0°00' 30".

Press **[F1] ALL**, and **[F4] YES** to record the result of HL. Input point name for target B. Press **[F4] REC** to save the data under the current file.

b) Rotate the equipment in clockwise direction to aim at target C. Press **[F1] ALL**, and **[F4] YES** to record the result and name the point. Press **[F4] REC** to save the data.



c) Rotate the EDM in vertical direction in Horizontal Right. Aim at target C. Press **[F1] ALL**, and **[F4] YES** to record the result of HR and name the point. Press **[F4] REC** to save the data.

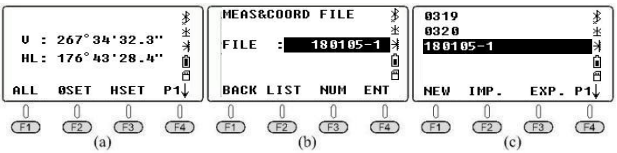
d) Rotate the equipment in anti-clockwise direction to aim at target B. Press **[F1] ALL**, and **[F4] YES** to record the result and name the point. Press **[F4] REC** to save the data.

In the second round, input HSET value as 90°00' 30". Measure and record the data as the above steps. ∠BAC can be calculated as below:

Station	Target	HA	Reading	Half-round	Whole-round	Average
1st Round	B	HL	0° 00' 28"	138° 14' 22"	138° 14' 19"	138° 14' 19.5"
	C		138°14' 50"			
	B	HR	180° 00' 31"	138° 14' 16"		
	C		318° 14' 47"			
2nd Round	B	HL	90° 00' 26"	138° 14' 25"	138° 14' 20"	
	C		228° 14' 50"			
	B	HR	270° 00' 31"	138° 14' 15"		
	C		48° 14' 46"			

e) Export the file by USB stick:

Press **[F4] P1/P2** turn to page 3, then click **[F4] FILE** - **[F2] LIST** – **[F3] EXP** to export the data of the current file "180105_1" :



180105_1_600.txt Format 600 file
180105_1_300.txt Format 300 file
180105_1.dat Coordinate file for SOUTH CASS
180105_1.csv Coordinate file for SOUTH CASS

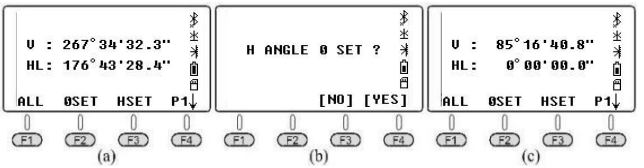
There are some differences between format 600 and format 300.

Check the picture shown as below. 600.txt included the data in two lines for each measured point. SS line is Point Name, Target Height, Code; while HV line is Horizontal Reading and Vertical Reading.



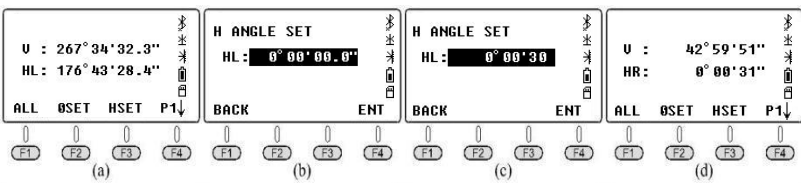
4.2 [F2] 0 Set

Set the horizontal angle of the first target as 0°00'00".



4.3 [F3] H Set

Input the horizontal angle by manual. The value will apply to the target. The input format is 123.4567. 123 means degree. Range is from 0-359. 45 is minute from 0-59. 67 means second from 0-59.



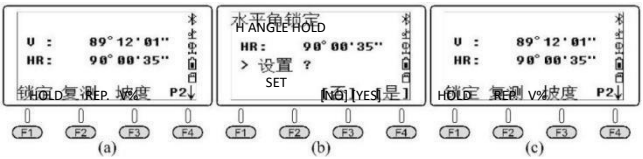
4.4 [F1] HOLD

Define and hold the horizontal angle of target as previous value.

Q.: How to "hold" the angle reading in 90°00'00"?

a) Rotate the equipment and make the horizontal angle near to 90° 00'00" , then adjust the tangent screw until it's fully reached the value.

b) Press **[F1] HOLD**, enter the Horizontal Angle setting page. Then loosen the horizontal tangent screw to aim at the target. In this moment, the horizontal angle will not change. c) Press **[F4] YES** to confirm the setting.



4.5 [F2] REP.

[REP.] is the abbreviation of repeat measurement. It requests the measurement under horizontal right, under the clockwise direction.

Suppose that the total station has been setup at point A, the guidance of repeat measurement as below:

a) Aim at target B (pic a), press **[F2] REP.** The HR is 0°00' 00" (pic b).

b) Rotate the equipment in clockwise direction, aim at target C (pic

c) and press **[F4] HOLD** (pic d).

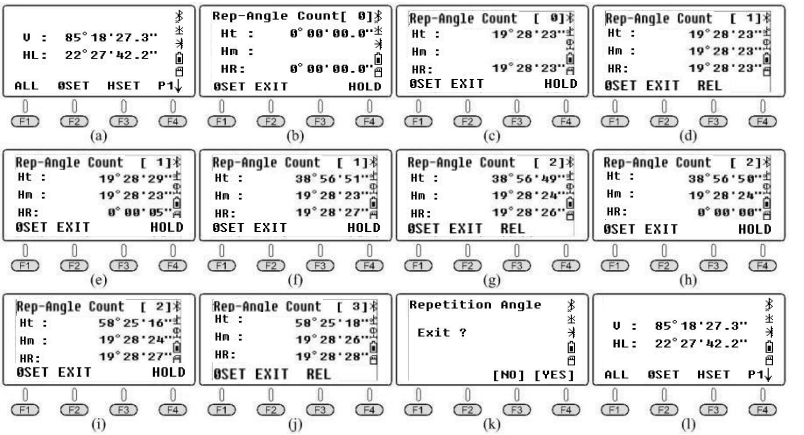
c) Rotate the equipment in clockwise direction, aim at target B in the second time, press **[F3] REL.** to release (pic e).

d) Rotate the equipment in clockwise direction, aim at target C in the second time (pic f), press **[F4] HOLD**, it will show us the horizontal value of ∠BAC during this two times, the average value is 19°28' 24"(pic g).

e) Rotate the equipment in clockwise direction, aim at target B in the third time, press **[F3] REL.** (pic i)

f) Rotate the equipment in clockwise direction, aim at target C in the third time, press **[F4] HOLD**. It will show the horizontal value of ∠ BAC during this three times, the average value is 19°28' 26" (pic j)

g) Press **[F2] EXIT** and **[F4] YES** to exit the menu.

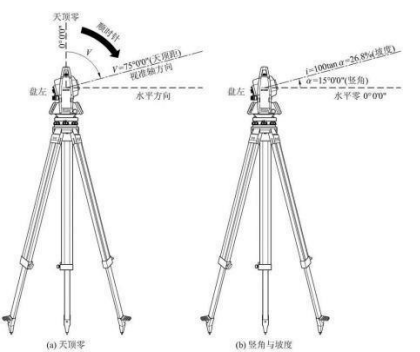


4.6 [F3] V%

Switch the reading of vertical angle from vertical degree to percent.

As picture shown, if the vertical reading has been set as Zenith 0, HL= 75°00' 00".

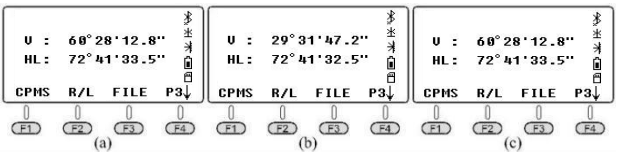
aL=90°−L=90°−75°00'00"=15°00' 00"



The slope angle i=100×tan 15°00'00"=26.7949 %≈26.79%.

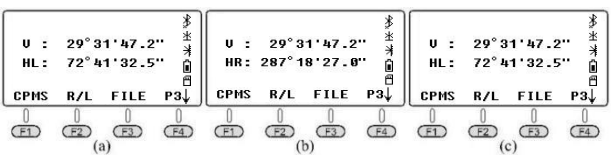
4.7 [F1] CPMS

Switch the display format of vertical angle. The angle of depression is negative number while the elevation angle is positive number.



4.8 [F2] R/L

Switch the horizontal angle between Horizontal Right and Left. In same direction, HR + HL = 360°



4.9 [F3] FILE

In this page, we can change the current job, create a new job, rename or delete the existed job, export or import data.

Press **[F3] FILE** , **[F2] LIST** to enter the profile list, or press **[F3] NUM/ALPH** to create a new job.

[F1] NEW: Create a new job.

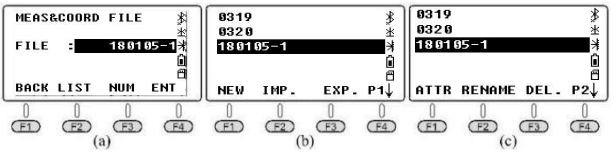
[F2] IMP.: Import the data from USB flash disk to total station.

[F3] EXP.: Export the data from total station to USB flash disk.

[F1] ATTR: Check the file name, create time and date.

[F2] RENAME: Rename the selected file.

[F3] DEL.: Delete the selected file.



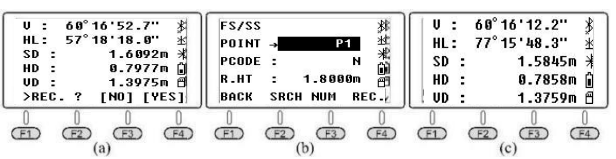
5. DISTANCE MEASUREMENT

Press [DIST] to enter the distance measurement mode.

5.1 [F1] ALL

Measure and record the distance.

C100 calculate the coordinate of target based on the current station, instrument height and target height, then it will be recorded in coordinate file and measurement file.

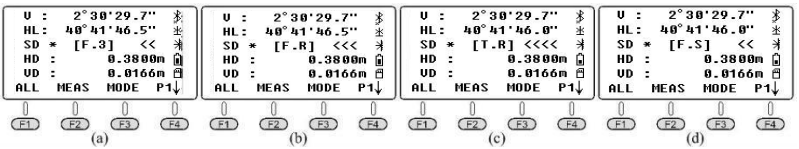


5.2 [F2] MEAS

Measure the current target without recording.

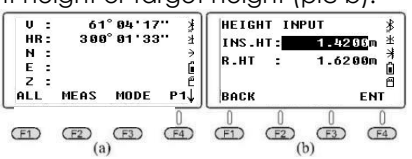
5.3 [F3] MODE

The default measure mode is single. Press [F3] MODE to switch the measure mode among [F.S], [F.3], [F.R], [T.R].



5.4 [F1] HT

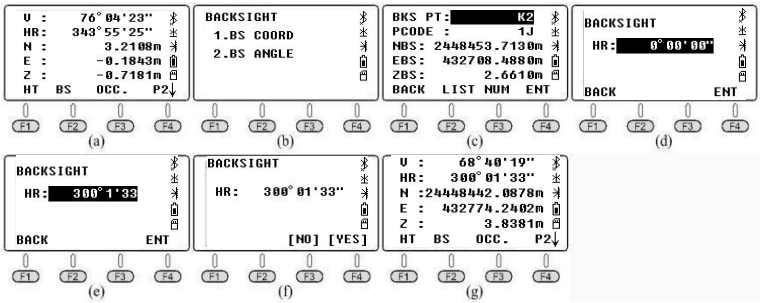
Set the instrument height or target height (pic b).



5.5 [F2] BS

Orient the backsight by point or angle. Select the existed point or enter the angle 300.1.33 to define the backsight.

Rotate the equipment to aim at the target K2. Press **[F4] YES** to set the orientation of backsight.

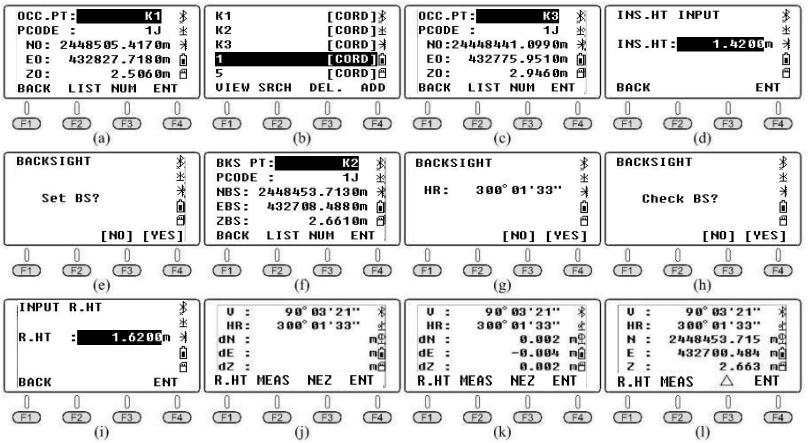


5.6 [F3] OCC.

Press **[F3] OCC** to enter the setting page for occupied point (pic a), it will show the coordinates of the last occupied point. Press **[F2] LIST** to enter the list of points. (pic b)

Move the cursor to K3 and press **[ENT]** to select it. it will show the details of this point, including the code and coordinate. Press **[ENT]** and input the instrument height and the backsight. (pic e).

The horizontal angle - HR should be the angle from K3 to K2 (pic g). Rotate the equipment, aim at the target of backsight K2, press **[F4] YES** to set the orientation.



Check BS

After the orientation of backsight, press **[F1]R.HT** to input the prism height. Press **[F2]MEAS** to measure the backsight again. The equipment will check and calculate the difference between the known point K3 and the measured point.

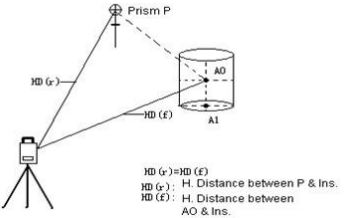
[F3]NEZ.: Check the coordinate of measured point.

[F3]Δ: Check the difference.

5.7 [F1] OFSET

5.7.1 Angle Offset

If the target is invisible, it is difficult to set up a prism on the target directly, for example the center of a tree. Angle offset helps you calculate the coordinate of invisible target by an offset point.

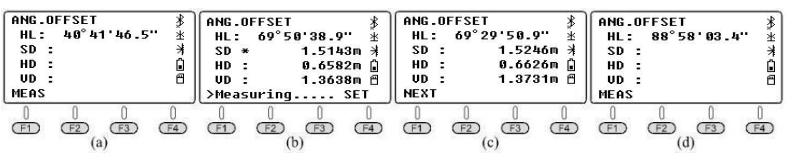


Steps:

A) When target A0 is invisible and difficult to set the target, please set an offset point at Point P which is near to A0.

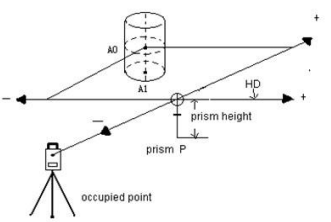
B) Aim at prism P(pic c), press **[F1] MEAS**, rotate the equipment, then aim at the invisible target A0. (pic d)

C) Press **[CORD]** to check the coordinate of Point A0. Press **[DIST]** to check the distance.



5.7.2 Distance Offset

This function calculates the coordinate of point based on lateral and longitudinal offset or height difference of the target.

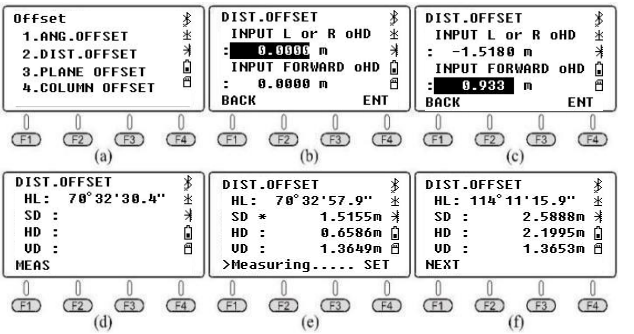


Steps:

A) Input the offset value, press **[F4]ENT** to confirm (Pic d)

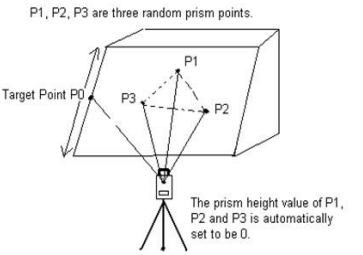
B) Aim at the offset point P, press **[F1]MEAS** (pic e)

C) Press **[CORD]** to check the coordinate of Point A0. Press **[DIST]** to check the distance.



5.7.3 Plane Offset

This function calculates the point cannot be measured directly from the other three points which in same plane.



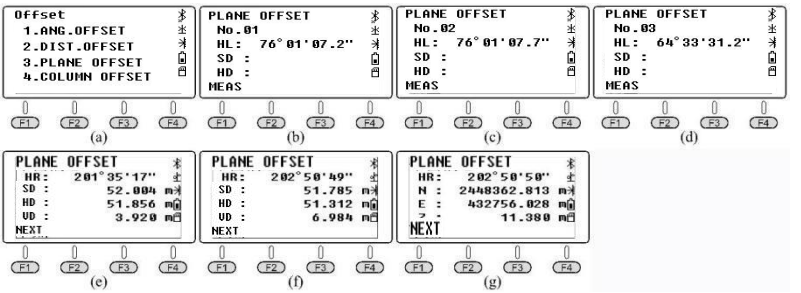
Those three points (P1/P2/P3) can be measured, inputted or selected from the data list to define a plane.
Then aim at the target (P0) to calculate the coordinate and SD/HD/VD from station.

Steps:

A) Press **[F1]MEAS** to aim at P1/P2/P3 to define a plane(pic e)

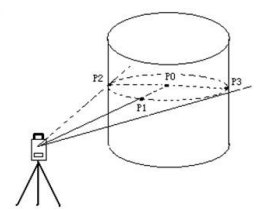
B) Rotate the equipment, aim at point P. It will show the distance between station to Point P(pic f)

C) Press **[CORD]** to check the coordinate of Point A0. Press **[DIST]** to check the distance.



**Note: in this case, the equipment should switch into "non-prism mode" in advance. Set the equipment height as 0.*

5.7.4 Column Offset

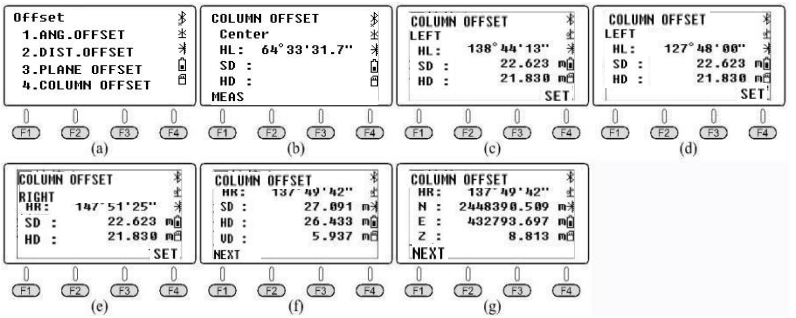


It calculates the coordinate of a hidden point (P0) that is not directly visible inside from the center (P1) and edge (P2/P3) of column.

Steps:

A) Press **[F1] MEAS** to measure P1 at first. Then aim at the edge of column P2 and P3, press **[F4]SET** (pic f)

B) Press **[CORD]** to check the coordinate of Point A0. Press **[DIST]** to check the distance.



5.8 [F2] S.O

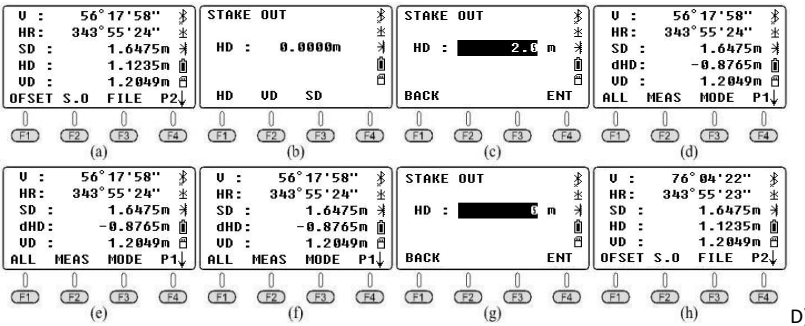
This function calculates the distance elements (SD/HD/VD) to stakeout points

Steps: Use **[F1]HD** as an example.

A) Input the horizontal distance: 2.0m, press **[F4]ENT** to confirm.

B) Rotate the equipment and then ask the prism move to the correct sight of view. Press **[F2]MEAS** in the first page, the difference will show as pic e.

C) dHD= actual HD - stake out HD = -6.8265m. It means that the prism should move away from the equipment in 6.8265m. Press **[F2]MEAS** again to confirm.



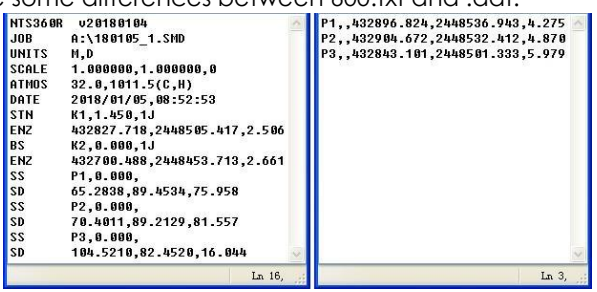
D)

If you need switch dHD back to HD, please set the distance as 0 in S.O menu .

5.9 [F3] FILE

The users can change the current file, create a new file, rename, delete, import or export freely by Bluetooth or USB flash disk.

There are some differences between 600.txt and .dat.



```
NTS360R  v20180104
JOB      A:\180105_1.SMD
UNITS    M,D
SCALE    1.000000,1.000000,0
ATMOS    32.0,1011.5(C,H)
DATE     2018/01/05,08:52:53
STN      K1,1.450,1J
ENZ      432827.718,2448505.417,2.506
BS       K2,0.000,1J
ENZ      432700.488,2448453.713,2.661
SS       P1,0.000,
SD       65.2838,89.4534,75.958
SS       P2,0.000,
SD       70.4011,89.2129,81.557
SS       P3,0.000,
SD       104.5210,82.4520,16.044
```

Ln 16,

```
P1,,432896.824,2448536.943,4.275
P2,,432904.672,2448532.412,4.870
P3,,432843.101,2448501.333,5.979
```

Ln 3,

STN K1,1.450,1J — Station Point K1, Station Height 1.45m, Code: 1J

ENZ 32827.718,2448505.417,2.506 —Coordinate of station

BS K2,0.000,1J —Backsight point K2, Target Height: 0, Code: 1J

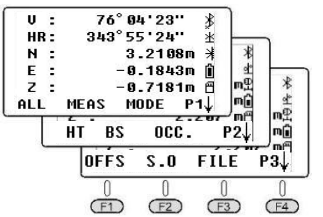
ENZ 432700.488,2448453.713,2.661 —Coordinate of backsight point

SS P1,000 — Measured point P1, Target Height 0

SD 65.2838,89.4534,75.958 —Horizontal / Vertical value, HD In .dat profile, which is widely used in South CASS software, the format is "Point Name; Code; E,N,Z".

6. COORDINATE MEASUREMENT

Press **[CORD]** to enter the coordinate measurement mode.

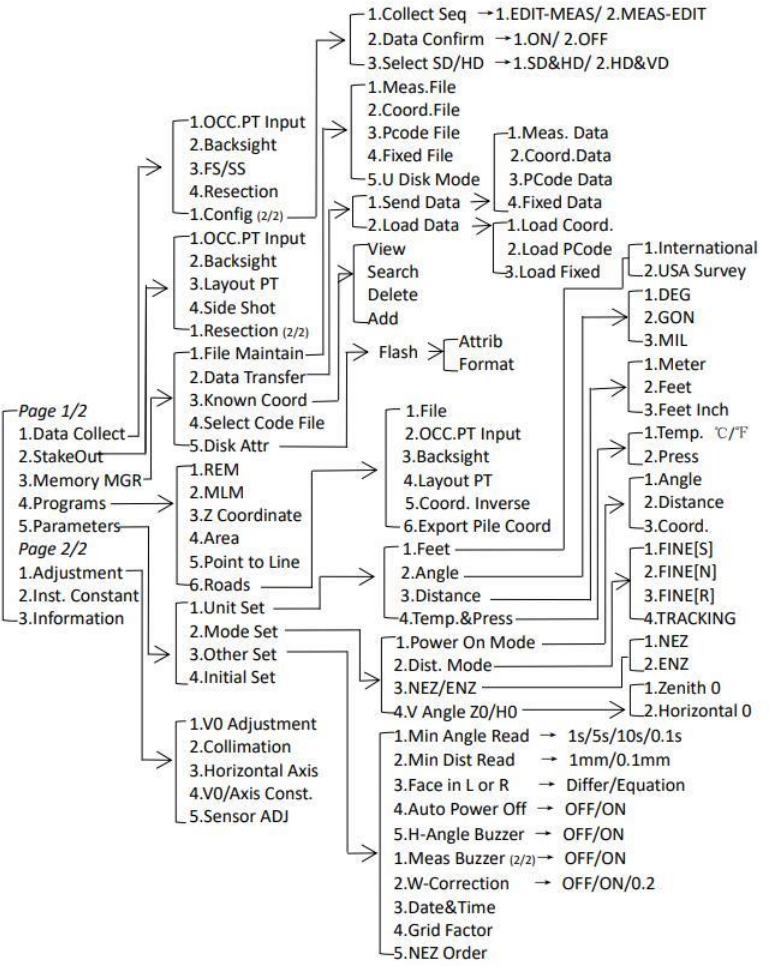


Users can input the coordinates of occupied point by a standard CASS format "Point Name; Code; E, N, Z", maximum 200 points and save as ".csv" format by Bluetooth or USB Flash Disk.

Insert USB flash disk into total station, import the .csv profile into the existed FIX.LIB menu. It can be listed when the user need to settle the occupied point and backsight point in coordinate mode, data collection and stakeout program.

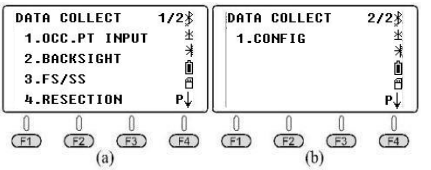
7. MENU

The structure underlying the Menu system as below:


Page 1/2
1.Data Collect
2.StakeOut
3.Memory MGR
4.Programs
5.Parameters
Page 2/2
1.Adjustment
2.Inst. Constant
3.Information
1.OCC.PT Input
2.Backsight
3.FS/SS
4.Resection
1.Config (2/2)
1.OCC.PT Input
2.Backsight
3.Layout PT
4.Side Shot
1.Resection (2/2)
1.File Maintain
2.Data Transfer
3.Known Coord
4.Select Code File
5.Disk Attr
1.REM
2.MLM
3.Z Coordinate
4.Area
5.Point to Line
6.Roads
1.Unit Set
2.Mode Set
3.Other Set
4.Initial Set
1.V0 Adjustment
2.Collimation
3.Horizontal Axis
4.V0/Axis Const.
5.Sensor ADJ
1.Collect Seq →1.EDIT-MEAS/ 2.MEAS-EDIT
2.Data Confirm →1.ON/ 2.OFF
3.Select SD/HD →1.SD&HD/ 2.HD&VD
1.Meas.File
2.Coord.File
3.Pcode File
4.Fixed File
5.U Disk Mode
1.Send Data
2.Load Data
1.Meas. Data
2.Coord.Data
3.PCode Data
4.Fixed Data
1.Load Coord.
2.Load PCode
3.Load Fixed
View
Search
Delete
Add
Flash
Attrib
Format
1.File
2.OCC.PT Input
3.Backsight
4.Layout PT
5.Coord. Inverse
6.Export Pile Coord
1.Feet
2.Angle
3.Distance
4.Temp.&Press
1.Power On Mode
2.Dist. Mode
3.NEZ/ENZ
4.V Angle Z0/H0
1.Min Angle Read → 1s/5s/10s/0.1s
2.Min Dist Read → 1mm/0.1mm
3.Face in L or R → Differ/Equation
4.Auto Power Off → OFF/ON
5.H-Angle Buzzer → OFF/ON
1.Meas Buzzer (2/2)→ OFF/ON
2.W-Correction → OFF/ON/0.2
3.Date&Time
4.Grid Factor
5.NEZ Order
1.International
2.USA Survey
1.DEG
2.GON
3.MIL
1.Meter
2.Feet
3.Feet Inch
1.Temp. ℃/℉
2.Press
1.Angle
2.Distance
3.Coord.
1.FINE[S]
2.FINE[N]
3.FINE[R]
4.TRACKING
1.NEZ
2.ENZ
1.Zenith 0
2.Horizontal 0

7.1 Data Collect

Data Collect, is used for measure and save the coordinates under the current coordinate file, and it will also save the measured data under the current measure file.

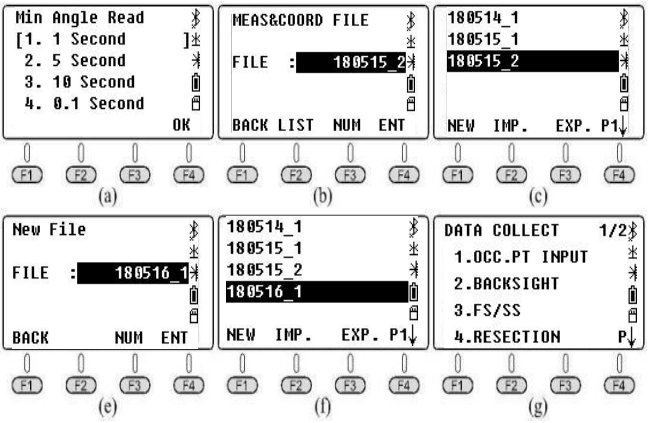


7.1.1 New Job

Press **1.Data Collect** in the first page of menu, enter the file selecting page, the equipment will show the latest file on the screen. Press **[F4] ENT** to confirm, or press **[F2] LIST** to select the other job.

[F1] NEW: Start to create a new job. The system will name the new job as "Date_Num". Press **[F3] NUM/ALPH** to switch the characters between number and alphabet.

The equipment will create a *.SMD and a *.SCD file automatically. SMD records the data of horizontal disk, vertical disk and slope distance. SCD records the coordinate of measured points. **[F2] IMP.:** Import the job from USB flash disk to your total station **[F3] EXP.:** Export the job from total station to USB flash disk.


Min Angle Read
[1. 1 Second]
2. 5 Second
3. 10 Second
4. 0.1 Second
OK
F1 F2 F3 F4
(a)
MEAS&COORD FILE
FILE : 180515_2
BACK LIST NUM ENT
F1 F2 F3 F4
(b)
180514_1
180515_1
180515_2
NEW IMP. EXP. P1
F1 F2 F3 F4
(c)
New File
FILE : 180516_1
BACK NUM ENT
F1 F2 F3 F4
(e)
180514_1
180515_1
180515_2
180516_1
NEW IMP. EXP. P1
F1 F2 F3 F4
(f)
DATA COLLECT 1/2
1.OCC.PT INPUT
2.BACKSIGHT
3.FS/SS
4.RESECTION P
F1 F2 F3 F4
(g)

7.1.2 OCC Point Input

A. Press **[F2] LIST** to enter the point list, move the cursor to the known point K3, press **[ENT]** to view the coordinate of K3(pic d).

B. Input the instrument height (pic e) and press **[ENT]** to confirm.

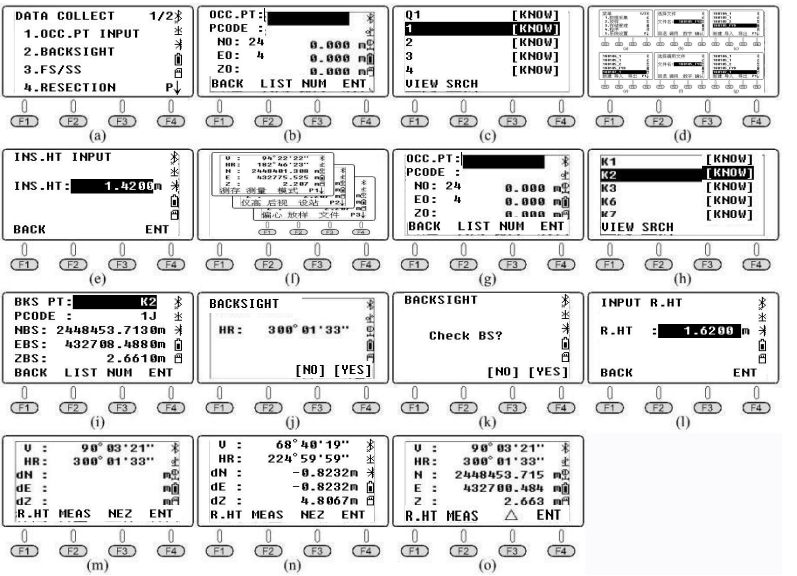
C. The equipment will enter the backsight setting page (pic f). Press **[F2]LIST** to select the backsight point from memory (pic h), or input the coordinate directly. The equipment will calculate the backsight angle(pic i).

D. Aim the backsight, press **[F4]YES** for orientation(pic j).

Check BS

a. Press the EDM trigger key or **[F2]MEAS** to measure the backsight (pic m), the equipment will show the difference(pic n).

b. Press **[F3]NEZ/△** to check the coordinate of backsight.



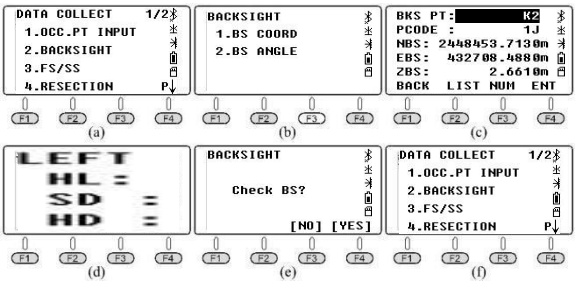
7.1.3 Backsight

The backsight is able to be oriented by coordinate or by angle.

BS COORD

[F2] LIST: Select the coordinate from the list.

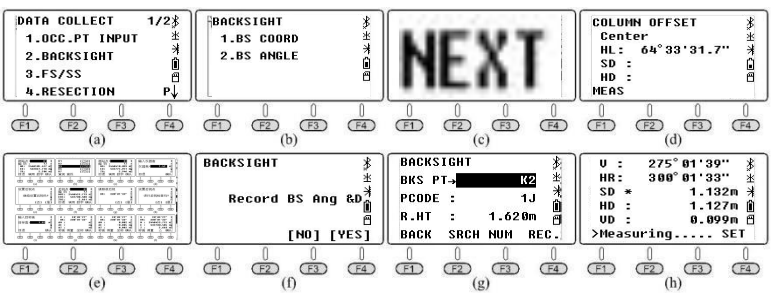
[F3] NUM/ALPH: Enter the coordinate directly as the backsight.



BS ANGLE

Input the angle as backsight: 300°01'33"(pic c).

Aim at the target center of backsight, press **[F4]YES** to set the horizontal angle as the backsight(pic e). Press **[F4]YES** to confirm the angle(pic f) and then press **[F4]REC** to measure the distance (pic g).



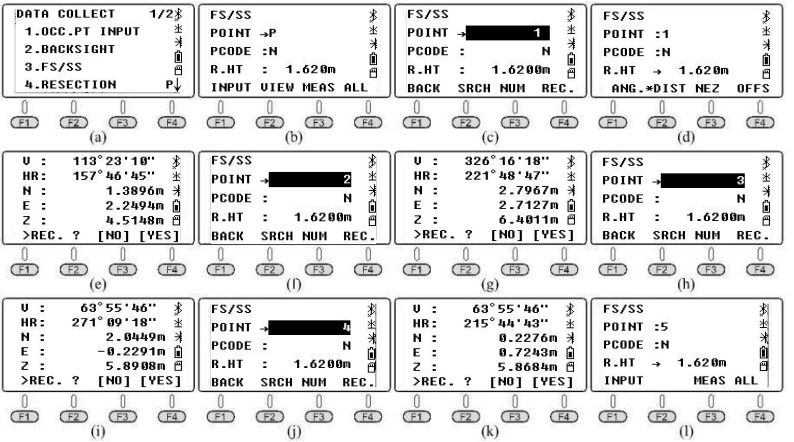
7.1.4 FS/SS

Measure and save the coordinate of points.

[F1] INPUT: Input the point name, code and target height (R.HT) **[F2] VIEW:** Enter the point list.

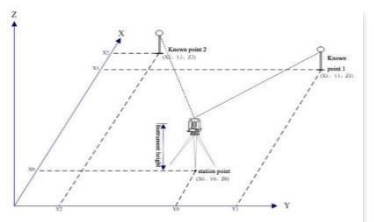
[F3] MEAS: Measure angle, distance, or coordinate

[F4] ALL: Measure and save



7.1.5 Resection

A resection sets up the station by using the angle and distance measurements in maximum 5 points.



1) Resection by Angle

The station can be calculated after the measurement of at least 3 points.

Steps:

1) Input P1 as the unknown station, and the equipment height (pic b). Press **[F4]ENT** to the measure page.

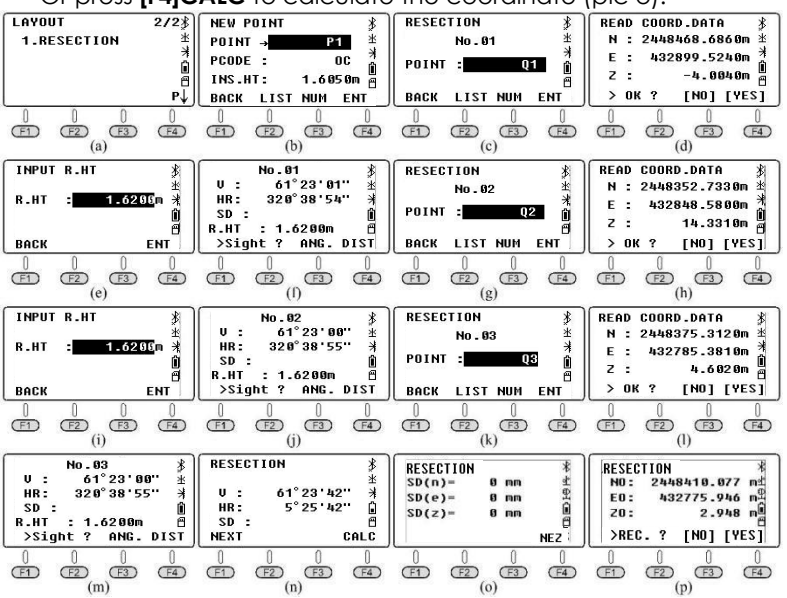
2) Input the known point Q1. The system will select Q1's coordinate from list. Aim at the prism center of Point Q1 (pic f). Press **[F3]ANG** to measure the angle. Then it will continue the measurement for the 2nd point.

3) Repeat the steps to select and measure the 2nd known point: as picture g-j shown.

4) Repeat the steps to select and measure the 3rd known point, as picture k-m shown.

5) After the measurement for point Q1/Q2/Q3, press **[F1]NEXT** to the 4th point.

Or press **[F4]CALC** to calculate the coordinate (pic o).



2) Resection by Distance

The distance resection method should include at least 2 known points to calculate the coordinate. The steps are similar to angle resection methods. The only thing you should notice is press **[F4] DIST** after aiming at the target.

7.1.6 Config

7.1.6.1 Collect Sequence

Set the sequence. The default setting is "EDIT→MEAS"

① EDIT→MEAS: Set the point name, code and target height before measure the points.

② MEAS→EDIT: Measure the points before edit the point name, code and target height.

7.1.6.2 Data Confirm

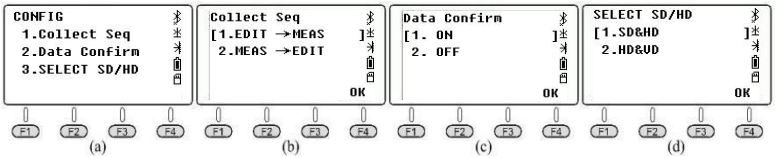
Turn on or off the function of data confirm. The default set is ON. ① ON: After measure the points, it will reminder the user to confirm the data storage.

②OFF: After measure the points, the equipment will save the data automatically without user's confirm.

7.1.6.3 Select SD/HD

① SD&HD: The data will be shown in the order of SD&HD

② HD&VD: The data will be shown in the order of HD&VD



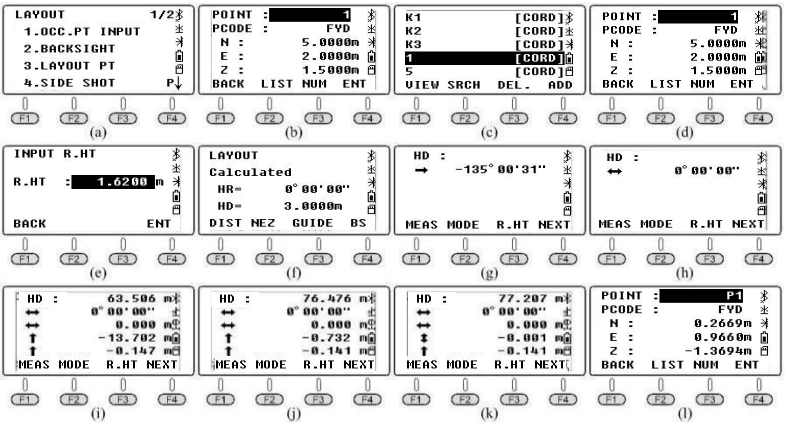
7.2 Stake Out

Press **[F2]LIST** to view the file list (pic), move the cursor to select the file where you saved the data.

7.2.1 Layout Pt

Press **[F2]LIST** to select a point from the list (pic d), Press **[F1]VIEW** to check the detail information for the selected point.

1) **[F3] GUIDE:** Check the guidance of direction. ➡ -53°50'36" means the prism should turn right in 53°50'36" to find the stakeout point (pic h). Guide and set the prism on the azimuth of EDM until the value of HD become 0°00'00".
2) Rotate the equipment vertically to aim at the target center (please notice that the horizontal angle should not be moved), press **[F1]MEAS** to measure the distance (pic i);
3) Guide the prism and move -13.702m, the minus distance means the prism should move backward. Aim at the target center and press **[F1]MEAS** again after the movement (pic j)



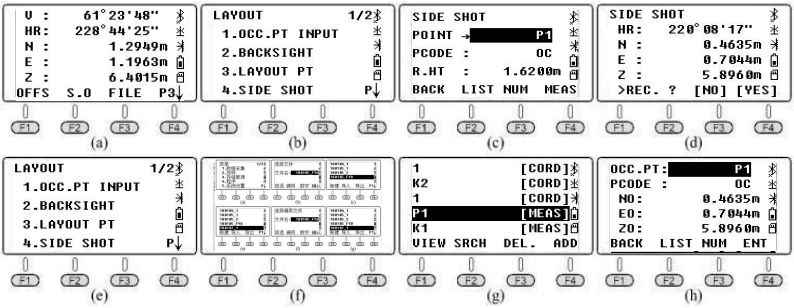
7.2.2 Side Shot

If the stake out point is invisible, we can use Side Shot to add another point as station to find the target.

Input P1 as the point name, aim at the target center.

Press **[F4] MEAS** to measure the coordinate of point P1. Then press **[F4] YES** to record it.

Move the total station to P1 and well-settled the position. Press 1.OCC. PT INPUT under stake-out menu. Select Point P1 from data list and set the backsight and station on this point.

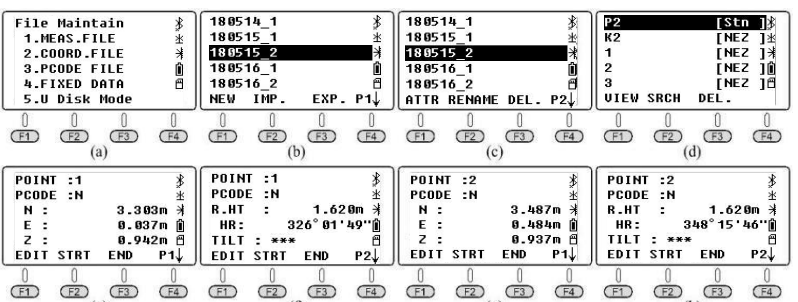


8 Memory MGR

8.1File Maintain

Create, import, export, check, rename or delete the files.

8.1.1Meas File



[F1]NEW: Add a new file, the system will create two files, "SMD" and "SCD". "SMD" for measurement data, while "SCD" for coordinate data.

[F2]IMP: Import the coordinate file "SCD" from USB flash disk to equipment.

[F3]EXP: Export the "TXT", "DAT", "CSV" and "DXF" to USB flash disk.

[F1]ATTR: Check the attribute for the current file. Including the name, size, quantity of data, create time and date.

[F2]RENAME: Rename the file which has been selected.

[F3]DEL: Delete the file which has been selected. Please notice that "SMD" and "SCD" file will be deleted in the same time.

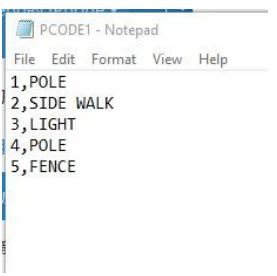
8.1.2 Coord. File

Press 2.COORD.FILE to enter the file list of coordinate.

8.1.3 Pcode File

Before the measurement, you can create a TXT file on PC to edit codes, each code appears on its own line within 10 characters.

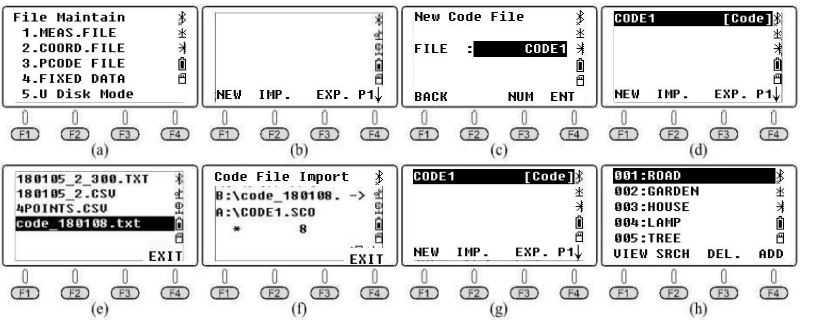
Copy the TXT file from, as below picture shown:



[F1]NEW: Input the code name "CODE1" (pic c)

[F2]IMP: View the file list under the root directory of USB stick, move the cursor to the file you need (pic e) and press **[ENT]** to import the code file to CODE1, the equipment will back to the file list automatically (pic g);

In the code list, press **[F1]VIEW** and **[F1]EDIT** to edit the selected code; Press **[F3]DEL** and **[F4]OK** to delete the selected code; Press **[F4]ADD** to add the new created code at the end of file list.

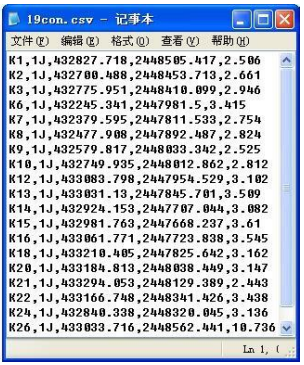


8.1.4 Known Coord.

Press 4.Known Coord. under the "File Maintain" menu (pic b) to enter the list of coordinate files. The file name is FIX.LIB which is not able to edit; the number refers the quantity of coordinates.

Import the Coordinates of Occupied Point into Total Station: As picture shown, input those coordinates by "Point Name; Code; E, N, Z". The maximum number of characters for code is 10.

	A	B	C	D	E
1	K1	1J	432827.718	2448505.417	2.506
2	K2	1J	432700.488	2448453.713	2.661
3	K3	1J	432775.951	2448410.099	2.946
4	K6	1J	432245.341	2447981.5	3.415
5	K7	1J	432379.595	2447811.533	2.754
6	K8	1J	432477.908	2447892.487	2.824
7	K9	1J	432579.817	2448033.342	2.525
8	K10	1J	432749.935	2448012.862	2.812
9	K12	1J	433083.798	2447954.529	3.102
10	K13	1J	433031.13	2447845.701	3.509
11	K14	1J	432924.153	2447707.044	3.082
12	K15	1J	432981.763	2447668.237	3.61
13	K16	1J	433061.771	2447723.838	3.545
14	K18	1J	433210.405	2447825.642	3.162
15	K20	1J	433184.813	2448038.449	3.147
16	K21	1J	433294.053	2448129.389	2.443
17	K22	1J	433166.748	2448341.426	3.438
18	K24	1J	432840.338	2448320.045	3.136
19	K26	1J	433033.716	2448562.441	10.736



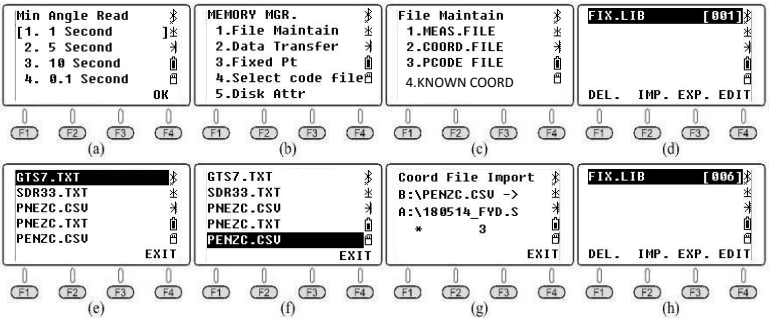
Steps:

A) Save the file as *.csv, it can be opened by excel.

B) Copy the *.csv file under the root menu of USB Flash Disk. Insert it into total station. Press **[MENU]** to enter the menu, press **3. MEMORY MGR.**, **1.File Maintain**, **4.FIXED DATA**. The equipment will record the data under "FIX.LIB" in default, the number [001] refers to the number of known coordinate is 1.

C) Press **[F2]IMP**, there are three kinds of profile, .dat/.txt/.csv. Move the cursor to the *.csv file you need. Press **[ENT]** to confirm. D) the internal memory is called FLASH.

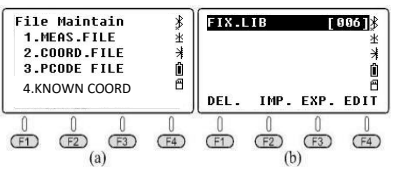
*Note: the files import from USB stick can be duplicated by same name. If there has duplicated point, the system will add a same point name under the same file without any notice.

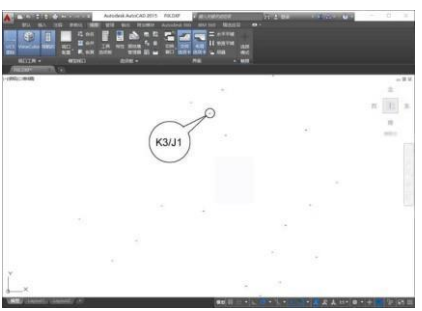


Export the Coordinates of Occupied Point to USB Stick:

Press **[F3]EXP.** To export the file FIX.LIB to USB stick.

FIX.dat is SOUTH CASS format, the data can be recognized as "Point Name; Code; E, N, Z"; the other file FIX.dxf is a graphics interchange format, which can be opened by AutoCAD and save as .dwg file.





The right picture is the interface when open the FIX.dxf file by AutoCAD, the user should execute the "zoom/e" commend to view the whole map.

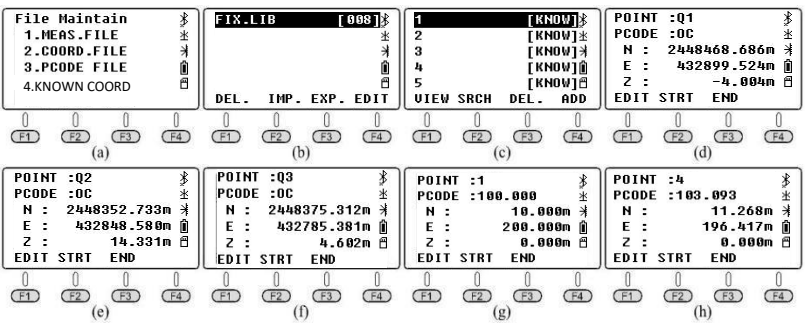
Edit the Coordinates of Occupied Point:

[F1]VIEW: Check the coordinate of the first known point (pic d), press **[△]** or **[F3]END** to check the last point (pic e)

[F2]SRCH: Search known points. (pic h); Press **[F1]EDIT** to edit the selected point.

[F3]DEL: Delete the selected point.

[F4]ADD: Add a new occupied point by manual.

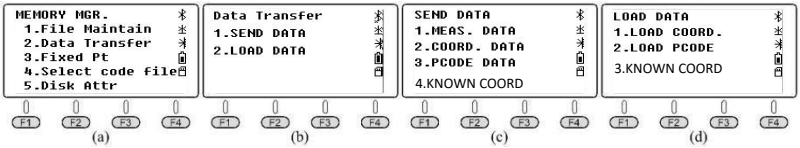


* It is able to save 200 points in maximum.

* the file imported from USB stick to equipment should be under the same format as the equipment setting (CASS or NEZ, check it in Menu - 5.PARAMETERS - 3.OTHER SET - 4.COMM.PARAMETERS in Page 2). The default format is CASS.

8.2 Data Transfer

Press 2.Data Transfer under the "MEMORY MGR" menu (pic b), press 1.SEND DATA or 2.LOAD DATA for data sending (pic c) or loading (pic d).

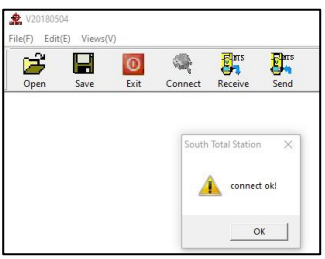


8.2.1 Connection between C100 and PC

C100 only can connect to PC transfer software by Bluetooth.



Click "Start" icon on a laptop which features Windows 10 system and Bluetooth in the same time. Choose "Setting - Device - Bluetooth" to open the Bluetooth connection and search the equipment. Edit the pairing code as "1234".



Open the data transfer software. Click "Connect" button activate the connection, it will show "connect ok" when it successful.

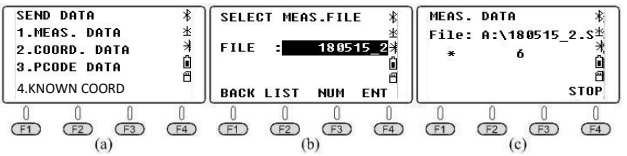
8.2.2 Send Data

There are four kinds of data which can be transferred from C100 to PC: measure data, coordinate data, code data and known coordinate.

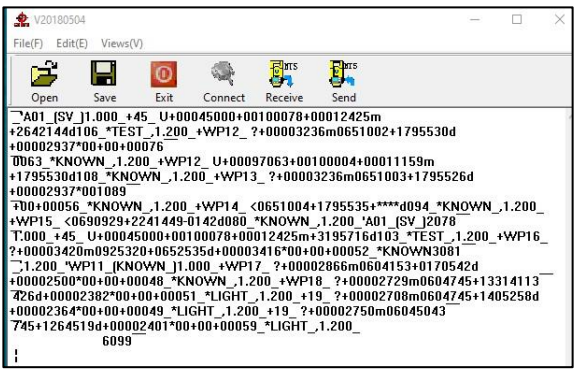
The data is saved in flash memory. Please activate the transfer software before sending data.

Using measure data as an example.

Press 1.MEAS DATA to select the file (pic b), it will show the latest file name on the screen.



Click "Receive" button on PC before press **[ENT]** on C100 to send the selected file. Click "Save" button on PC to save the file after receiving data from total station.



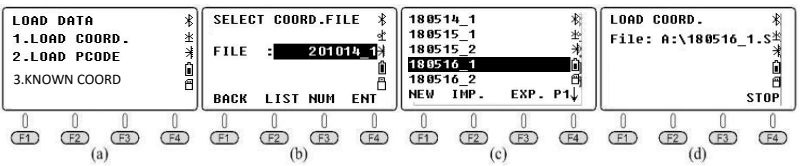
8.2.3 Load Data

C100 can transfer three types of data from PC: coordinate, Code and known point. Please select the file and power on the equipment for data loading before transforming.

Use coordinate data as an example:

① Activate the software, click CONNECT to connect between PC and TS. Then open the coordinate data.

② Press 1.LOAD COORD. Under "LOAD DATA" menu (pic a) and enter the page for file selection (pic b). Press **[F1]LIST**, **[F1]NEW** to create a new file. Move the cursor to the new one (pic e). Press **[ENT]** to confirm the data loading.



③ Click "SEND" button on PC to activate the software, the equipment will show the process for data loading in real-time

8.3 Edit the Known Coordinates

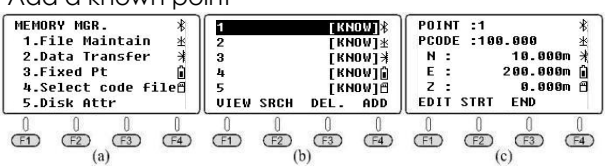
Press 3.EDIT under the "MEMORY MGR" to enter the point list (pic b).

[F1]VIEW: Check the point name, code, N/E/Z

[F2]SRCH: Search the point by point name

[F3]DEL.: Delete the selected point

[F4]ADD: Add a known point



8.4 Select the Code File

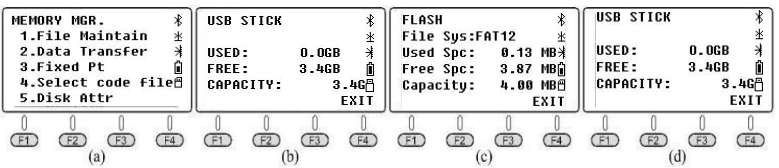
Press 4.Select Code File under the "MEMORY MGR" menu (pic a) to select the code file for current job.

8.5 Disk Attribute

Press 5 DIST ATTR under the "MEMORY MGR" menu (pic a) to check the information of disk.

[F1]ATTRIB: Check the used and free capacity.

[F2] FORMAT: Format the disk



Total Station Packing List

Name	Unit	Quantity	Remarks
Host	Desk	1	
Onboard battery	pack	2	
Charger		1	
Flannel	block	1	
Allen	key	2	
screwdriver	put	1	
Correction needles 2	needles	2	
Desiccant bag 1	bag	1	
Soft brush 1	brush	1	
rain	cover	1	
Warranty	Card	1	
Manual		1	Paper or electronic version
Certificate of Conformity	Sheet	1	Stick it in the battery compartment or place it separately
Reflector	sheet	1	each 20×20, 30×30, 40×40, 60×60