

# **Training Manual for Total Station Setting-out Competition**

## **一、 Training Plan**

### **1、 Basic Operation of Total Station Setting-out (14:00-17:00 on November 16, 2018)**

① Centring and Leveling of Total Station (90 min)

② Station Set of Total Station (90 min)

### **2、 Total station setting-out (14:00-17:00 on November 18, 2018)**

① Station Set of Total Station (60 min)

② Total Station Setting-out (120 min)

### **3 、 Rules Interpretation and Simulated Training (9:00-12:00 am on November 19, 2018)**

① Rules interpretation for Competition (30 min)

② Simulated Training (60 min)

## **二、 Training Content**

### **① Tripod Mount**

- High, level, central and stable
- Tripod shall stand at eye level before it is separated. After separated, the top surface of tripod shall stand at chest level.
- Lock, insert the underground. Make tripod stable and reliable.



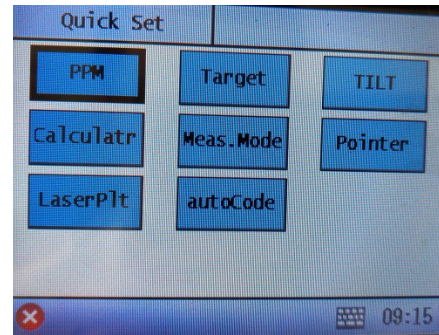
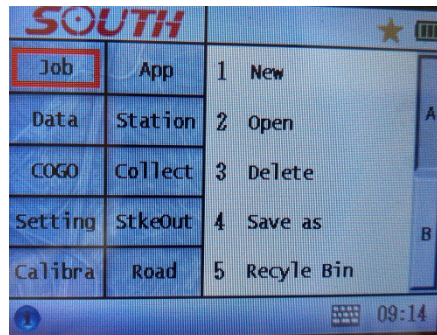
### **② Stabilize the instrument**

- Hold the hand shank of the instrument with your left hand. Support the base

with your right hand. Don't loosen your left hand until you tighten up the central screw with your right hand immediately. Turn back and close the instrument box.

### ③ Instrument centering

- Turn on the laser centering device and then red marks will appear on the ground immediately.



- Lift two feet of the tripod slightly with both your hands and move them to make the centering device center.
- The centering status shall be checked after the instrument is leveled. If there is deviation, loosen the center screw slightly and lightly move instrument base to accurate centring.



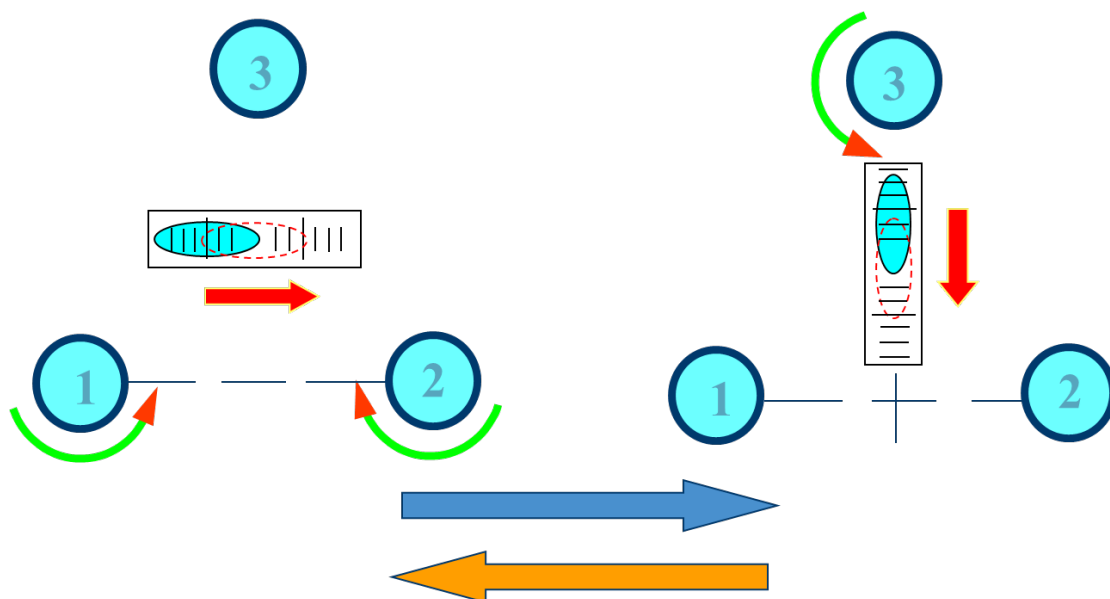
### ④ Level the tripod

- Make the circular vial center by heightening and lowering the tripod.



### ⑤ Precise leveling

- Use foot screw for precise leveling. Rotate instrument alidade to make the long horizontal pipe run parallel to a pair of screw wires. Rotate the two screws inward or outward at the same time to center the pipe circular level vial.
- Rotate alidade 90 degrees. Rotate the third screw to center the pipe circular level vial. Repeat Step 2 and Step 3 to center the circular level vial.

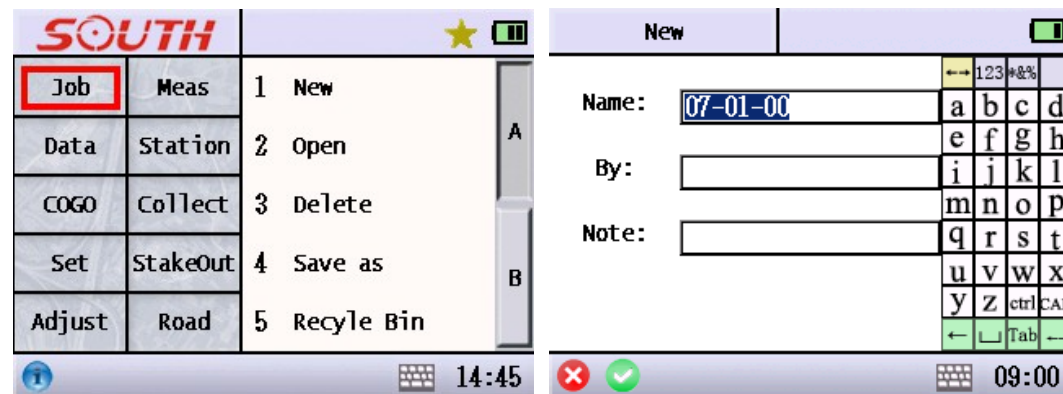


### ⑥ Accurate Centring

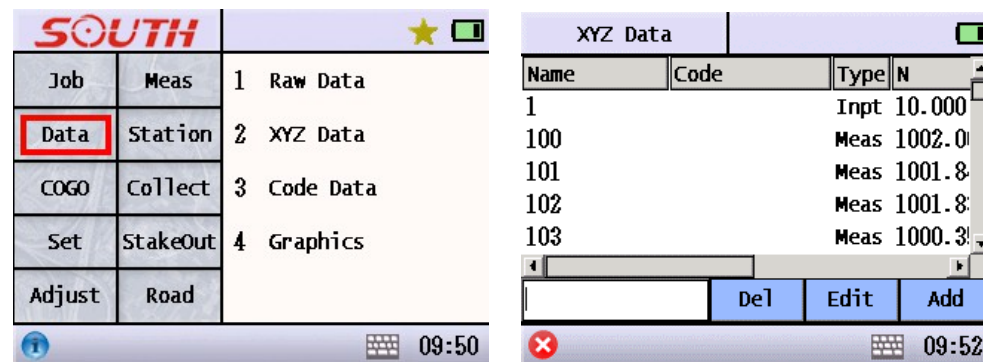
- Check optical centring. If there is a little deviation, the connection screw pan base can be opened to make it center precisely. Rotate the connection screw and check whether the leveling circular vial is centered or not. If not, repeat Step 5.

## 2、Steps to operate surveying station of total station

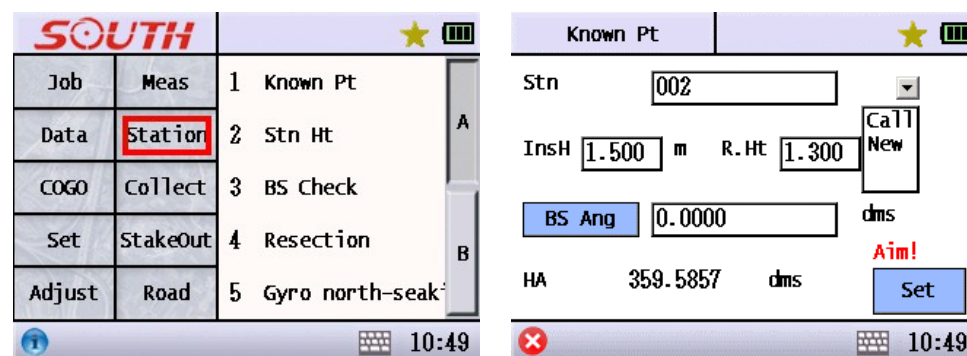
① Click on JOB, then select 1 new. Create a new project, and input its name.



② Click on Data, then input coordinate data on surveying station point, backsight point, check point and setting-out point (XYZ DATA).



③ Click on Station, then set up the surveying station.



Click on call and then call the input known point coordinates to set the surveying station point and the backsight point (use BS PT for backsight point). After collimating backsight prism, click on SET to complete the surveying station setting.

Known Pt		Known Pt	
Stn	002	Stn	002
InsH	1.500 m	InsH	1.500 m
R. Ht	1.300 m	R. Ht	1.300 m
BS Pt		BS Pt	
HA	dms	HA	dms
Call New		Call New	
10:49		10:49	

#### ④ Backsight inspection

Click on Stakeout to enter the lofting process, then select 1 PTSO point for lofting and call the checkpoint coordinates.

SOUTH		Pt SO	
Job	Meas	PtN	015
Data	Station	R. Ht	1.300
COGO	Collect	2.5552 dms HA	.1719 dms
Set	StakeOut	Away	m HD 0.314 m
Adjust	Road	L&R	m Z 0.003 m
13:16		F/D	m Save Meas
		S.O.	Data Grap 13:16

Collimate backsight point and click on Meas for measurement. Check the angle deviation and distance deviation. The smaller, the better.

Pt SO		Pt SO	
PtN	014	PtN	014
R. Ht	1.300 m	R. Ht	1.300 m
10.2603 dms HA	354.4707 dms	10.2603 dms HA	354.4707 dms
Away	m HD 0.478 m	Away	m HD 0.478 m
L&R	m Z 0.000 m	L&R	m Z 0.000 m
F/D	m Save Meas	F/D	m Save Meas
S.O.	Data Grap 13:16	S.O.	Data Grap 13:16

### 3、Steps to operate total station setting-out

Click on Stakeout to enter the setting-out process, then select 1 PTSO point for setting-out and call the setting-out point coordinates.

SOUTH		★	🔋
Job	Meas	1	Pt SO
Data	Station	2	Ang&Dist SO
COGO	Collect	3	Alignment SO
Set	StakeOut	4	Straight RefL SO
Adjust	Road		

13:16

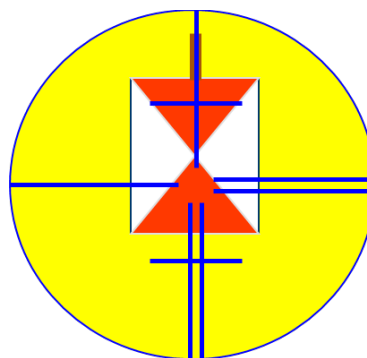
Pt SO		★	🔋
PtN	015	Last	
R.Ht	1.300	Next	
	2.5552 dms HA	2.1719 dms	
Away	m HD	0.314 m	
L&R	m Z	0.003 m	
F/D	m	Save	Meas

S.O. Data Grap 13:16

Turn the horizontal circle of the instrument to set the angle deviation to zero. Then fix the horizontal circle. At the same time, the prism shall be placed in the direction of the telescope's view by the prism conductor.

Pt SO		★	🔋
PtN	015	Last	
R.Ht	1.300 m	Next	
	2.5517 dms HA	2.1719 dms	
Away	m HD	0.314 m	
L&R	m Z	0.003 m	
F/D	m	Save	Meas

S.O. Data Grap 13:16



Click on Meas for measurement. The prism shall be moved forward or backward in the direction of view according to the prompt till Away value is displayed as 0 or close to 0. Fix points on the ground, and setting-out is completed.

Pt SO		→ 1	★	🔋
PtN	015	Last		
R.Ht	1.300 m	Next		
	2.5523 dms HA	2.1719 dms		
Away	m HD	0.314 m		
L&R	m Z	0.003 m		
F/D	m	Save	Meas	

S.O. Data Grap 13:16

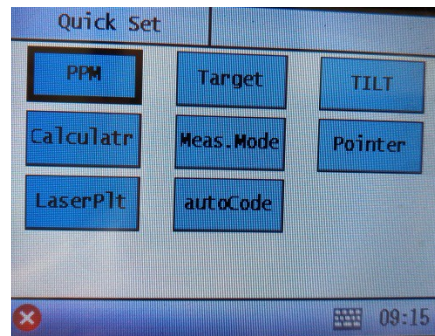
Pt SO		→ 1	★	🔋
PtN	015	Last		
R.Ht	1.300 m	Next		
	2.5523 dms HA	2.1719 dms		
Away	m HD	0.314 m		
L&R	m Z	0.003 m		
F/D	m	Save	Meas	

S.O. Data Grap 13:16

### 三、Analysis on Competition Rules

1. The precision of the setting-out point shall be within 1cm. With a high command of precision, centring and leveling must be accurate without any deviation. Control the error when calibrating the setting-out point on the ground.
2. Time performance accounts for 40% of total score. It is also important to increase speed while ensuring accuracy.
3. Pay attention to adjusting the prism constant set as -30mm.





- ☐ Prism
- ☐ Sheet
- ☒ Non-Prism
- ☐ LongMea

