

1. Applications

The NETH503 series Electronic Theodolite has an optical incremental grading system which features digital angle measurements. It can achieve measurement, calculating, display and memory etc. It can display measuring results of horizontal and vertical angle at the same time. Furthermore, vertical angle can refer to zenith angle or grade and so on.

The NETH503 series Electronic Theodolite can be used in third and fourth-order triangulation control surveying of railway, highway, bridge, water conservancy, mine and engineering surveying as well as building and installing of large equipment. It is also applied to cadastral surveying, topographic surveying and other engineering surveying.

The NETH503 series Electronic Theodolite features wide LCD display and power saving design. The NETH503 can continuously work for 80 hours using 4 AA alkaline batteries. When the unit is in absolute horizontal angle encoder measurement mode, it can project data when the power is off.

2. Introduction



Fig. 1

2.1 Instrument encasement

Please refer to the following figure to encase. See also packing list.

1. Instrument
2. Instruction manual
3. Alkaline Battery pack
4. Adjusting tools
5. Rain cover
6. Silica gel

Warning! Please loosen the clamp system when the instrument is in the case

2.2 Nomenclature

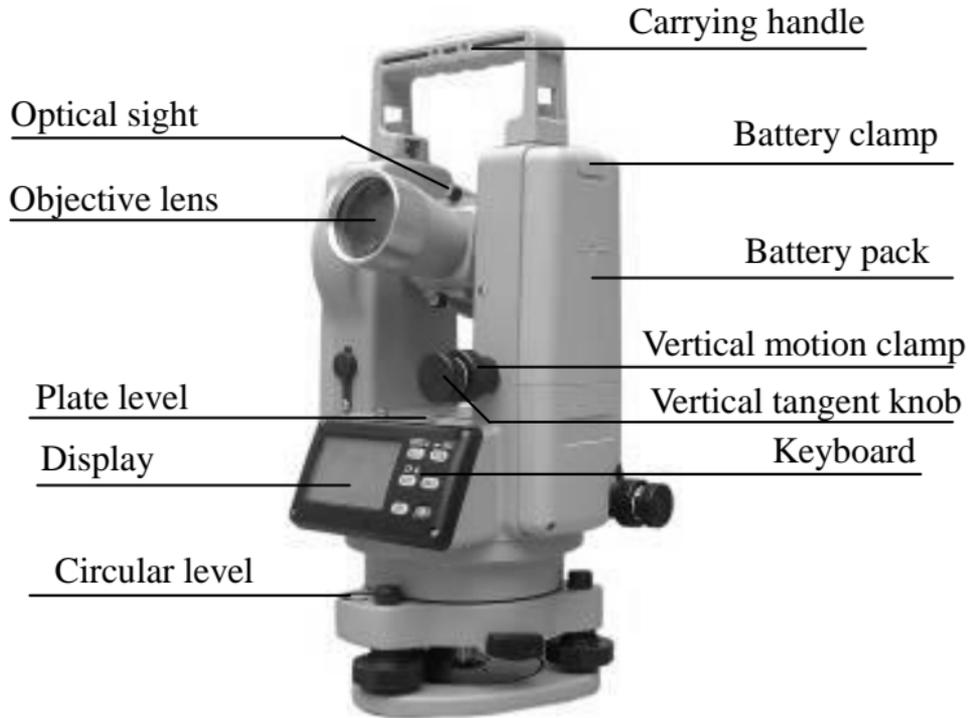


Fig. 2

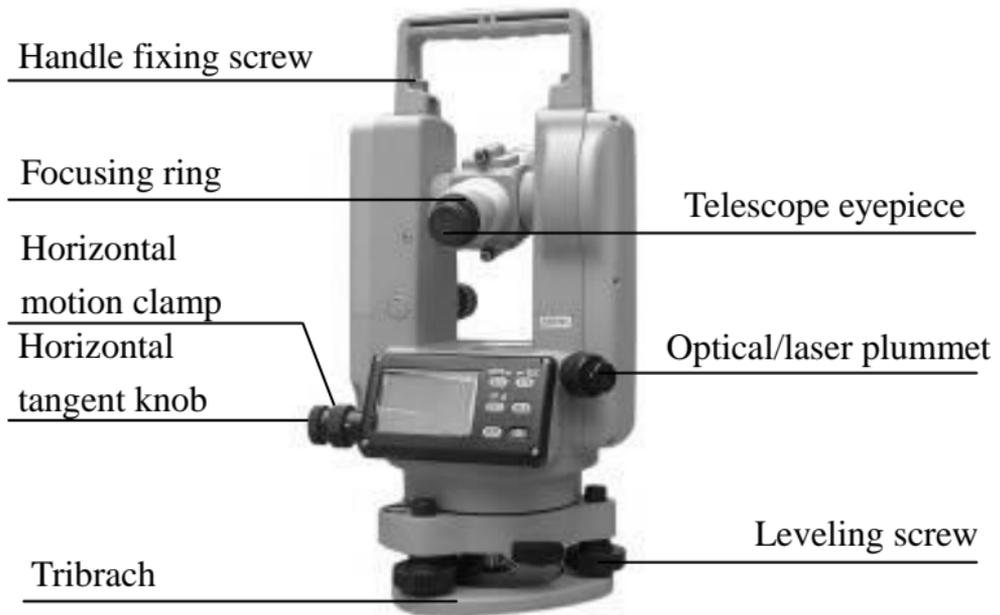


Fig. 3

2.3 Display

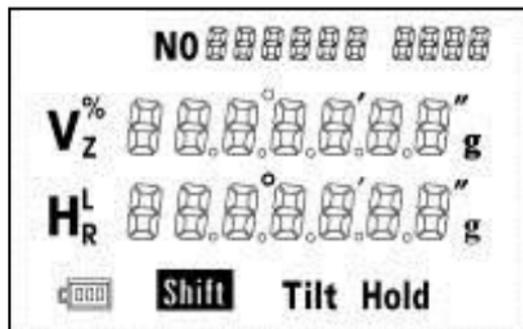


Fig.4

Display	Description	Display	Description
	Battery indicator	Shift	The second function key mode
No 888888	Series number	Tilt	Tilt sensor work mode
8888	Produce date	Hold	Horizontal angle is holding
V%	Percent grade	H ^L	Horizontal angle left
V _Z	Zenith angle	H _R	Horizontal angle right
g	Unit display GON	° ' "	Unit display DEG

2.4 Operation keys



Key	Function
	Power on or off
SHIFT	Select the second function of keys
HOLD	Holding measured horizontal angle
0SET	Set horizontal angle to 0° 00' 00" (The first function)
	LCD and reticle lamp on or off (The second function)
V/%	Select the zenith angle or grade angle (The first function)
REC	Send data to other equipment through RS-232C (The second function)
R/L	Select the right or left horizontal angle (The first function)
UNIT	Select angle unit DEG or GON (The second function)



Fig. 5



Fig. 6

3. Battery 3.1 Mounting the battery

Insert the battery by aligning the battery guide with the guide hole on the instrument. Press the top of the battery until you hear a click.

3.2 Removing the battery

Push the lock lever downward and pull out the battery.

3.3 Battery indicator display

A battery figure is displayed at bottom right corner of the LCD panel. All black indicates that the battery is full. If the black shows little or approaches the bottom, it means the batteries needs to be replaced.

Please find the operating time on Specifications (p46-49). Please use a reputable alkaline battery brand or it could do harm to the battery pack.

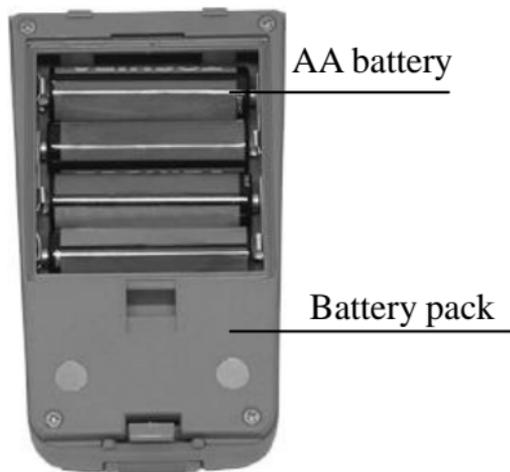


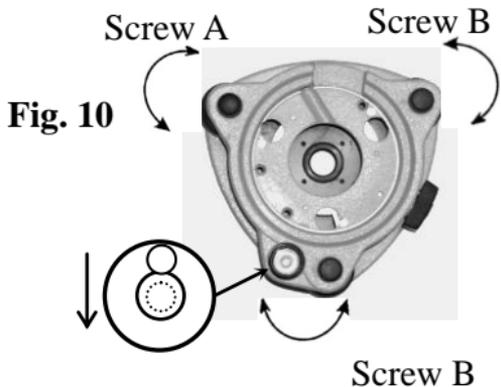
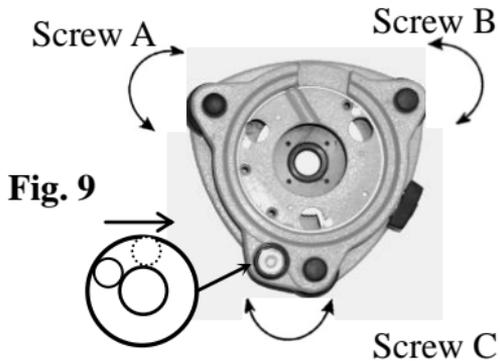
Fig. 8

3.4 Replace the AA alkaline batteries

Open the cover of the AA battery pack, take out the old batteries and put 4 new AA alkaline batteries as illustration shows in the direction of + and -, and then close the cover.

Note:

- 1.** Replace all 4 batteries with new ones at the same time. Don't mix the old batteries with new ones.
- 2.** If the instrument is not used for a long period of time, please remove the batteries.



4. Surveying preparation

4.1 Setting up the instrument

(1) Setting up the tripod

Adjust the tripod legs so that a height suitable for surveying is gained. Tighten the lock screws.

(2) Setting up instrument on the tripod

Put the instrument on the head and attach it to the base plate by the center screw.

4.2 Leveling the instrument

(1) Leveling with the bubble

By adjusting leveling screws A and B, position the bubble in the center of vial (Fig.9).

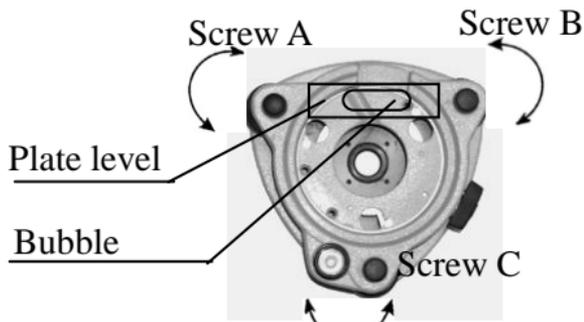


Fig. 11

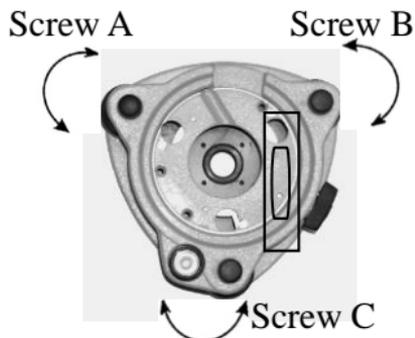


Fig. 12

Adjust the leveling screw C, position the bubble in the center of circle.

(2) Leveling precisely by the Plate level.

Loosen horizontal clamp screw, Place the plate level in parallel with a line joining leveling screws A and B. Adjust the leveling screws A and B, position the bubble in the center of the plate level.

(Fig11) Loosen horizontal clamp screw, rotate the Plate level through 90° around the vertical axis. Adjust leveling screw C, position the bubble in the center of plate level. (Fig. 12)

Repeat above steps until the bubble remains in the center of plate level to any position.

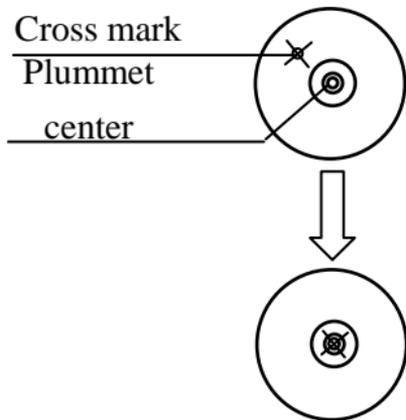


Fig. 13

4.3 Centering

4.3.1 Centering with the optical plummet

4.3.1.1 Three-jaw tribrach

Rotate the focusing knob of the optical plummet and adjust the focus to the ground mark point. Then loosen the center screw of the tripod. Look through the optical plummet, and move the base plate on the tripod head until the center mark coincides with the ground mark point. Tighten the center screw. Ensuring that the bubble stays positioned in the center when rotating the Plate level in steps of 90° (100g). If the bubble is not positioned in the center, adjust the level screws. Repeat above steps. Ensure that the center of reticle plate coincides with the mark point when rotating alidade of instrument.

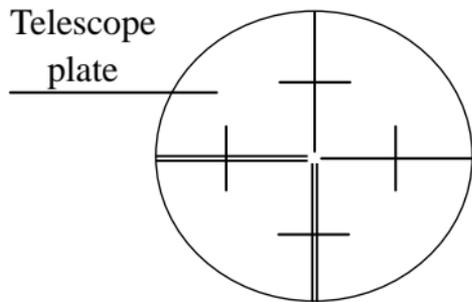


Fig. 16

4.4 Focusing and Sighting

(1) Reticle Cross Hairs

Point telescope to sky or a uniformly light surface, turn eyepiece until cross hairs are sharp and black. The dioptic scale now indicates the correct setting for the observer's eye.

(2) Target Image Focusing

Loosen horizontal and vertical clamps. Point telescope to target by means of optical sight. Tighten clamps. Look through telescope eyepiece and turn focusing ring until target is seen. Set

cross hairs close to target by turning horizontal and vertical tangent screw. Complete focusing by turning ring until target image is sharp and free from parallax, i.e. there should be no apparent movement between cross hairs and target as observer moves his eye slightly. If there is parallax, remove by adjusting the focusing ring slightly. Arrows on the ring indicate the direction to infinity.

5. Setting mode

Before beginning any work with this instrument, you must set the parameters, but in the future, if your demand doesn't change, it will not be necessary to set again.

5.1 Enter into the setting mode

Press the  key and  key to turn on the power. The current data will be shown, and the first digit will be blinking.

5.2 Items of the selecting mode

Turn on and press
 key



1100000

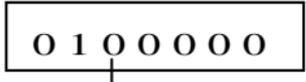
0 1 0 0 0 0 0
① ② ③ ④ ⑤ ⑥ ⑦

Digit No.	Description	Setting value			
		0	1		
1	On/off of horizontal angle absolute encoder mode	Off	On		
2	On/off of vertical compensator	Off	On		
3	Set power auto-off when it is without any operation for 10 minutes	Off	On		
Digit No.	Description	Setting value			
		00	01	10	11
4-5	Choose minimum reading	1" 0.5mgon	5" 1mgon	10" 2mgon	20"
6-7	Choose baud rate	1200	2400	4800	9600

5.3 How to set the selecting mode

The all parameters could be set in the same interface due to the setting mode is used code.

[Example] Power auto-off; minimum reading: 5" .

Operating procedure	Operation	Display
1. Turn the power ON and pressing [R/L] key. The current data is shown with the first digit is blinking.	Power on + [R/L]	 Digit No.1 Digit No.7
2. Press [▲] key and make the digit No. 3 blinking	[▲]	 Blinking
3. Press [◀] key to select "1"	[◀]	

Operating procedure	Operation	Display
4. Press [▲] key and make the digit No. 5 blinking	[▲]	<div style="border: 1px solid black; padding: 5px; text-align: center;"> 0 1 1 0 0 0 </div> <p style="text-align: center;"> Blinking</p>
5. Press [◀] key to set “1”	[◀]	<div style="border: 1px solid black; padding: 5px; text-align: center;"> 0 1 1 0 1 0 0 </div>
6. Press [ⓘ], the instrument enter into angle measurement mode	[ⓘ]	<div style="border: 1px solid black; padding: 5px;"> V_Z SET 0 H_R 000° 00' 00" </div>
<p>NOTE:</p> <ol style="list-style-type: none"> 1. Pressing [▲] key, blinking digit moves towards the right direction 2. Pressing [◀] key, the blinking digit shows “0” or “1” 		

After these operations, the minimum reading of current setting is 5" , and power auto-off setting is on.

6. Instrument operation

6.1 Switch on ()

Press the  key. All the segments on LCD will display. Release the  key, and the instrument will enter into initialization mode. Rotate the telescope up and down to initialize the vertical angle. If the horizontal angle is in absolute encoder mode, then turn the instrument one circle on horizontal direction to initialize it, and enter into angle measurement mode. It will display horizontal angle, vertical angle, battery indicator, series number and so on.

NOTE: If the horizontal angle measurement is not absolute encoder mode, the initialization to turn instrument is not necessary.

6.2 Switch off ()

Hold to press the  key until the instrument display “OFF”, release the key the instrument will turn off.

Vz: 075° 52' 37"
H_R: 175° 12' 03"

Press **R/L** key

Vz: 075° 52' 37"
H^L: 184° 47' 57"

Flow chart for horizontal R/L
angle shift

Vz: 075° 52' 37"
H_R: 175° 12' 03"

Vz: 075° 52' 37"
H_R: 000° 00' 00"

Flow chart for horizontal
angle 0 set

6.3 Switching horizontal angle right/left (**R/L**)

After instrument is switched on and initialized, the horizontal angle display is "H_R xxx° xx' xx" ", it shows horizontal angle and will increase by turning the instrument clockwise. ("H_R" mode)

Press the R/L key and release it. The horizontal angle display will change to "H^L xxx° xx' xx" ", it shows horizontal angle and will increase by turning the instrument counterclockwise. ("H^L" mode)

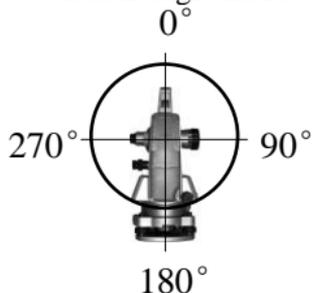
6.4 Set the horizontal angle to 0 (**0SET**)

Press the **0SET** key, then release it. The horizontal angle value is change to "000° 00' 00" "

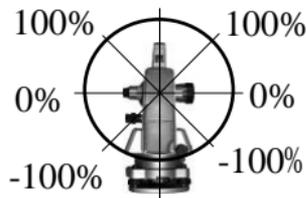
V _Z :	058° 52' 20"
H _R :	175° 12' 00"

V [%] :	0.6039
H _R :	175° 12' 00"

Flow chart for
Vertical angle mode



Zenith mode



Grade mode

6.5 Switching vertical angle zenith/grade ($\boxed{V/\%}$)

(1) Zenith mode (V_Z)

After the instrument is switched on and initialized, vertical angle measurement mode enters the Zenith mode automatically. The angle value range is 0° / 360° .

(2) Grade mode (V[%])

Press the $\boxed{V/\%}$ key and release it under the Zenith mode (V_Z), vertical angle measurement becomes grade mode (V[%]). The range of grade is -100% ~ +100% , corresponding angle range is -45° ~ +45° , horizontal direction is 0.0000. If it is over the range, LCD displays “V[%] --.-----”.

V_Z: 075° 52' 37"
H_R: 175° 12' 03"
[Battery icon]

Press R/L key

V_Z: 075° 52' 37"
H_R: 175° 12' 03"
[Battery icon] Hold

Press R/L key

V_Z: 075° 52' 37"
H_R: 175° 12' 03"
[Battery icon]

Flow chart for hold angle

6.6 Holding the horizontal angle value and set to arbitrary value (HOLD)

(1) Holding the horizontal angle value

Press the **HOLD** key and release it, the buzzer will ring, the LCD displays "Hold" at the last line. At this status the horizontal angle reading remains unchanged when you rotate the alidade. Press **HOLD** key again, and the instrument returns to original status. The horizontal angle will change when instrument is turned.

(2) Set horizontal angle to arbitrary value

Turning the horizontal tangent screw until the value that you need is displayed, press the **HOLD** key and release it. The angle value is held and hold message is displayed. Turning the instrument and sighting the target, press the **HOLD** key and release it again, the hold function will release and you can go on the next measurement.

V_Z: 075° 52' 37"
H_R: 175° 12' 03"


Press **Shift** key

V_Z: 075° 52' 37"
H_R: 175° 12' 03"
 **Shift**

Flow chart for shift
key function mode

6.7 Enter into the second function key mode

Some keys on the board have two functions. The first function is marked on the key, and the second function is marked above the key. At normal mode, the first function is active, and at shift mode, the second function is active.

Press the **SHIFT** key and release it. The buzzer will ring, and the LCD display “Shift” on the last line. The instrument enters into second function key mode. Press the **SHIFT** key again, and the instrument enters into the normal mode (first function key mode).

6.8 Illumination on/off

Enter the second function key mode, and the LCD display “Shift”. Press **0SET** key, the buzzer will ring and the illumination of LCD display and telescope’s reticle will be on. Press **SHIFT** key,

Vz: 075° 52' 37"
H_R: 175° 12' 03"
[Battery icon]

Press **Shift** key

Vz: 075° 52' 37"
H_R: 175° 12' 03"
[Battery icon] **Shift**

Press **R/L** key

Vz: 083.9152 g
H_R: 194.5781 g
[Battery icon] **Shift**

Flow chart for
selecting angle unit

the instrument come into normal mode, and the illumination will still be on.

Follow the same way to turn off illumination.

6.9 Select angle unit 360° / 400gon (**UNIT**)

The default setting of angle measurement is in 360° system. The procedure of changing it to 400gon system is as follows:

Press **SHIFT** key to enter the second function key mode, and the LCD will display “Shift”. Press **R/L** key. The buzzer will ring and angle unit change to 400gon system. Press **SHIFT** key, the instrument come back normal mode, and the angle measurement is still in 400gon system.

In the same way, enter the second function key mode press **R/L** key to enter 360° angle measurement system.

7. Angle measurement

7.1 Horizontal angle measurement

- (1) Switch on, rotating the telescope and alidade to initialize the instrument. (**ON**)
- (2) Check battery indicator.
- (3) Check LCD illumination is ON or OFF.
- (4) Select direction of angle measurement (H_R or H^L).
- (5) Select unit of angle (360° or 400gon).
- (6) Set horizontal angle to 0° or set to arbitrary value. (**0SET** or **HOLD**)
- (7) Aim target.
- (8) Read the displayed value.
- (9) Go on next measurement item.
- (10) Complete measurement and turn off. (**OFF**)

7.2 Vertical angle measurement

- (1) Switch on, rotating the telescope in order to initialization. ()
- (2) Check battery indicator.
- (3) Check LCD illumination is ON or OFF.
- (4) Select unit of angle (360° or 400gon).
- (5) Select vertical angle measurement mode (zenith Vz, grade V%).
- (6) Aim target.
- (7) Read the displayed value.
- (8) Go on next measurement item.
- (9) Complete measurement and turn off. ()

Note: Both of horizontal and vertical angle can be measurement at the same time.

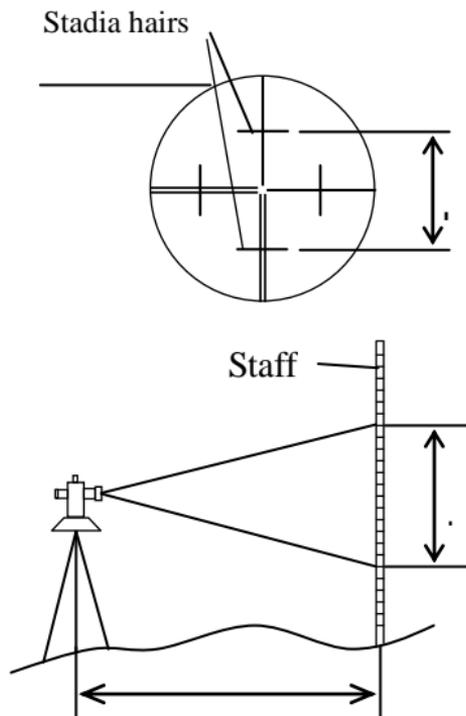


Fig. 17

8.Distance measurement with the stadia hairs

Distance measurement could be done as follow:

- (1)Set the instrument and level it at the measurement station.
- (2)Set the staff in the Station point.
- (3)Readout the distance (l).
- (4)Calculation the distance from target to instrument $L=100 \times l$.

Note:

l: Distance between top line and bottom line in the cross hairs.

L: The distance from target to instrument.

100: Multiplication factor of telescope.

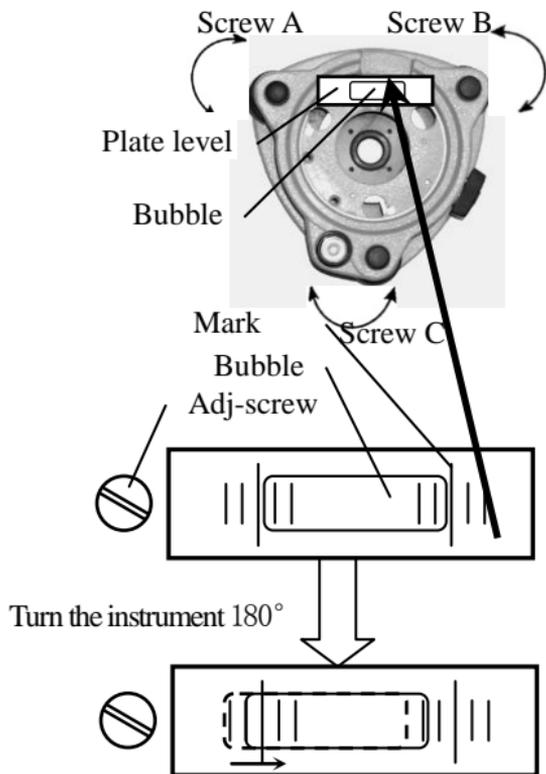


Fig. 18

9. Check and adjustment

9.1 Check/adjustment the plate level

Check

- (1) Set-up the instrument on stable equipment such as a tripod or adjustment platform.
- (2) Leveling the instrument, place the plate level parallel to a line of two leveling screws. Adjust the leveling screws and position the bubble in the center of the plate level.
- (3) Rotate the instrument through 180° (200g), confirm if the bubble is in the center. No adjustment is necessary if the bubble of the plate level is in the center. If the bubble moves, then proceed with the following adjustment.

Adjustment

(1) Set-up the instrument on stable equipment.

(2) Level the instrument.

(3) Rotate instrument, place the plate level parallel to a line of two leveling screws. Adjust the leveling screws, position the bubble in the center of the plate level.

(4) Rotate the instrument 180° (200g), bring the bubble half way back to the center by adjusting the bubble adjustment screw with the adjusting pin.

(5) Repeat the procedures of (3) and (4) until the bubble always in the center by rotating the instrument.

9.2 Check/adjustment the circular level

(1) Set-up the instrument on stable equipment and fix it.

(2) Leveling the instrument accurately by plate level; Confirm if the bubble of circular level is in the center. No adjustment is necessary if the bubble of the plate level is in the center. If the bubble moves, proceed with the following adjustment.

Adjustment

(1) Set-up the instrument on stable equipment and fix it.

(2) Leveling the instrument accurately by the plate level.

(3) Shift the bubble to the center by adjusting the bubble adjusting 2 screws with the adjusting pin.

NOTE: When adjusting two adjustment screws with the adjusting pin, don't press too strong.

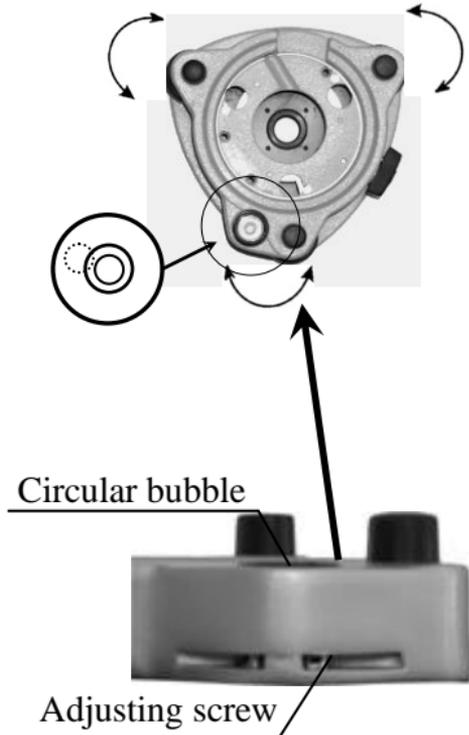
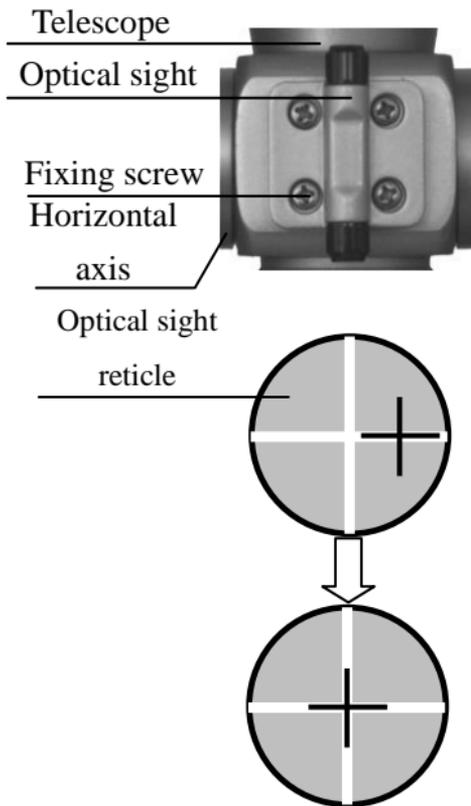


Fig. 19



9.3 Optical sight Check

- (1) Set-up the instrument on tripod and fix it.
- (2) Place a cross-hairs target from instrument 50m.
- (3) Aim at the cross hair on the target through telescope.
- (4) Confirm if optical sight aim at the cross hair. No adjustment is necessary if the optical sight aim at the cross hair. If the cross hair moves, proceed with the following adjustment.

Adjustment

- (1) Set-up the instrument on tripod and fix it.
- (2) Place a cross-hairs target from instrument 50m.
- (3) Aim at the cross hair on the target through telescope.
- (4) Loosen four fixing screws of the optical sight, adjusting the optical sight to correct position, then tighten these four fixing screws.

Fig. 20

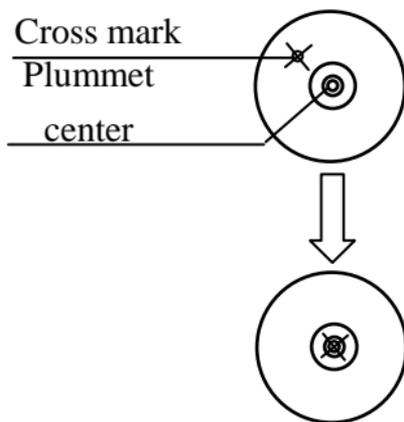


Fig. 21

9.4 Optical Plummet

Check

- (1) Set-up the instrument on tripod and fix it.
- (2) Place a cross-mark under the instrument directly.
- (3) Rotate the leveling screws, make the intersection of cross hair superpose to the Point.
- (4) Rotate the instrument 180° (200g), Confirm if intersection of cross hair superpose to the Point. No adjustment is necessary if the intersection of cross hair superpose to the Point. If not, proceed with the following adjustment.

- (1) Set-up the instrument on tripod and fix it.
- (2) Place a cross-mark under the instrument directly.
- (3) Rotate leveling screws, make the intersection of cross hair superpose to the Point.
- (4) Rotate the instrument 180° (200g), remove the eyepiece shield, bring the Point half way back to the intersection of cross hair by adjusting the adjusting pin.
- (5) Repeat procedure (3) (4) until the intersection of cross hair superpose to the Point by rotating the instrument

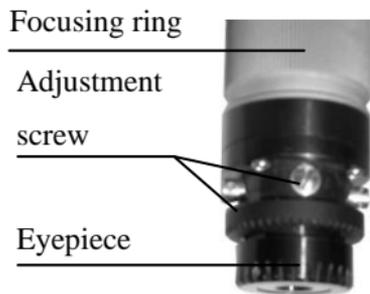
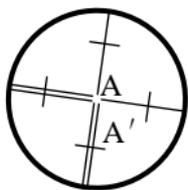
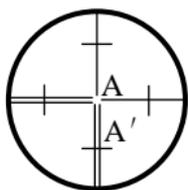


Fig. 23

9.5 Vertical Hairs of telescope's reticle

Check

- (1) Set-up the instrument on tripod and level it accurately.
- (2) Place a point mark A from instrument 50m.
- (3) Aim at the point mark A, turn the vertical tangent screw. If point A moves along the vertical hairs, no adjustment will be necessary. If point A moves deviation from the vertical hairs, proceed with the following adjustment.

Adjustment

- (1) Set-up the instrument and place a point mark A from instrument 50m.
- (2) Remove the eyepiece shield of telescope, turn the vertical tangent screw, loosen four adjusting screws slightly. Then turn the eyepiece assembly until the point A coincides with the vertical hairs. Tighten the four adjusting screws.
- (3) Repeat check procedure (3), adjustment procedure (2) until the deviation is not existence.

For example:

Face left angle

$$H(l)=000^{\circ} 00' 00''$$

Face right angle

$$H(r)=180^{\circ} 00' 30''$$

Horizontal collimation error C is:

$$C=(H(l) - H(r) \pm 180^{\circ}) / 2 = -15''$$

If C is out of tolerance, need to adjust

Focusing ring

Adjustment

screw

Eyepiece



Fig. 24

9.6 Horizontal collimation error C

Check

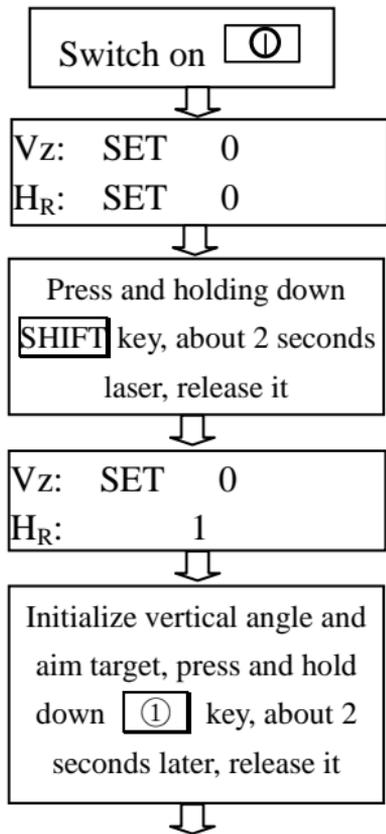
- (1) Set-up the instrument and level it accurately.
- (2) Aim at the cross-hairs of collimator or the obvious target at a distance. Get the face left angle reading $H(l)$ and the face right angle reading $H(r)$.
- (3) Calculating the horizontal collimation error C according to $C = (H(l) - H(r) \pm 180^{\circ}) / 2$

If $C < 10''$, no adjustment will be necessary.

If $C > 10''$, proceed with the following adjustment.

Adjustment

- (1) Rotate the instrument in face right position, turning horizontal tangent screw until $H(r') = H(r) + C$.
- (2) Loosen the shield of telescope's reticle, adjusting two screws at left and at right until the vertical hairs of telescope's reticle coincides with the cross-hairs of collimate or target.
- (3) Repeat the check and adjustment procedure until it is up to standard value.



9.7 Check and adjustment of the vertical index error i

Check

(1) Set-up the instrument on tripod or platform and level it accurately.

(2) Aim at the cross-hairs of collimator or the target which is not apart away from horizontal line $\pm 10^\circ$. Then read the face left angle reading V_l and the face right angle reading V_r .

(3) Calculating the vertical index error i according to $i = (V_l + V_r - 360^\circ) / 2$

(4) If $i < 15''$, no adjustment will be necessary.

If $i > 15''$, proceed with the following adjustment.

Adjustment

(1) Set-up the instrument on tripod or adjustment platform and level it accurately.

(2) Press the  key and release, the instrument enter into initialization mode, and then press and holding down  key, the buzzer sound once, about 2 seconds later, release the key, it will enter into

Vz: 091° 51' 37"
H_R: 2



Turn 180° and aim the same target. press and hold down  key, about 2 seconds laser, release it, the instrument come into angle measurement mode

Vertical index I adjustment

vertical index error adjustment mode. The instrument displays vertical angle on the second line and “1” on the third line.

(3) Rotate the telescope up and down to initialize the vertical angle, aim the cross-hairs of collimator or the target which is not apart away from horizontal line $\pm 10^\circ$, then press and holding down  key, the buzzer sound once, and about 2 seconds later, release the key, the LCD will display “2” on the third line.

(4) Turn the instrument around 180°, and aim the same target, press and holding down  the

key, the buzzer sound once, and about 2 seconds later, release the key, the adjustment finish and enter into measurement mode automatically.

NOTE:

1. After the adjustment of vertical index I, please check it again.
2. If the horizontal angle in absolute encoder mode, then it needs initialization to enter measurement mode.

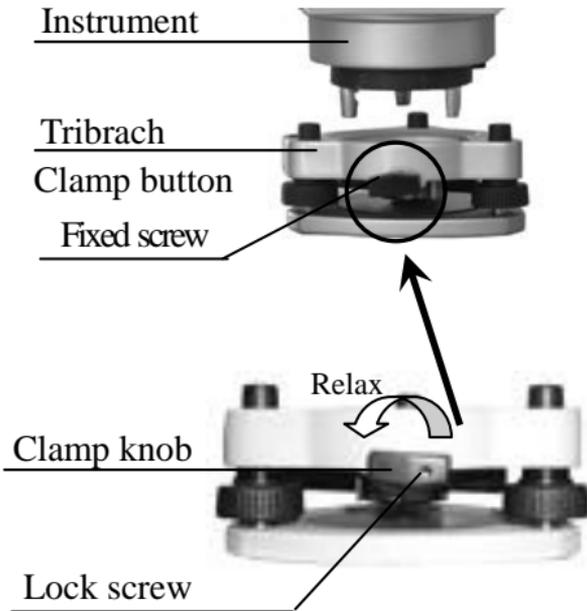


Fig. 25

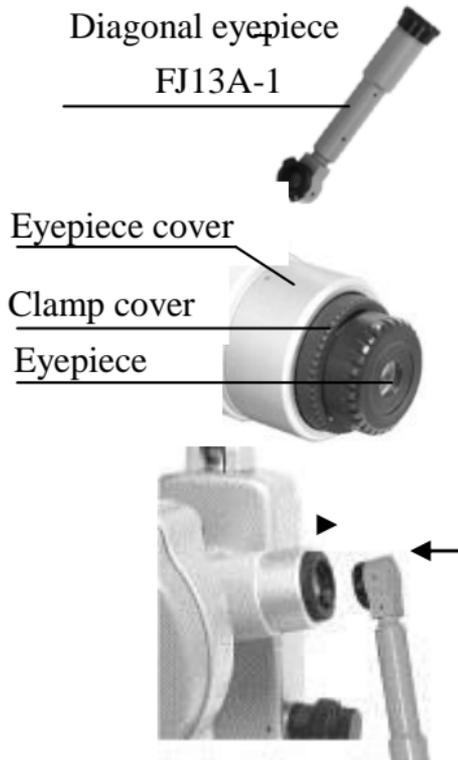
10. Assembling and disassembling for three-jaw tribrach

Disassembling

- (1) Tighten the fixed screw.
- (2) Rotate the clamp knob 180°(200g) anticlockwise.
- (3) One hand hold up the tribrach, another hand hold the carry handle of the instrument and lift out the instrument from the tribrach.

Assembling

- (1) Confirm the tribrach clamp knob is loosened.
- (2) Put the instrument into the tribrach lightly, let the communication port against in the indentation of the tribrach.
- (3) Rotate the clamp knob of tribrach through 180°(200g) clockwise.
- (4) Tighten the fixed screw. (Note: don't remove the fixed screw from the tribrach.)



11. Optional Accessories

The telescope diagonal eyepiece can be applied to the instrument in order to observe the larger elevation and zenith.

Assembling

(1) Loosen the eyepiece clamp cover counter-clockwise, then take out the eyepiece.

(2) Put the diagonal eyepiece into corresponding eyepiece site, tighten the eyepiece clamp cover clockwise.

Fig. 26

12. Specifications

NETH503

Objective lens:	42 mm
Magnification:	30x
Image:	Erect
Field of view:	1°20'
Minimum focus:	2m/1m*(selectable)
Accuracy:	5"
Minimum reading:	1"(0.2mgon)/5"(1mgon)/10"(2mgong)/20"
Power supply:	Ni-MH recharge battery/Alkaline battery
Operation time:	About 40 hours/80 hours
Angle unit:	DEG or GON
Illumination	
Operation temperature:	-20c~+50c
Display panel:	LCD screen - Double sides

Serial interface:

RS232C

Standard Warranty Terms

The warranty period for the NETH503 is 12 months from the date of purchase.

Northwest Instrument, Inc. (Seller) warrants that this instrument made by Northwest Instrument is free from manufacturing defects in materials and workmanship. For claims to be made under this warranty the instrument must be inspected by the seller and the defect must be proven to Seller's satisfaction. At the time that this is proven to the Seller's satisfaction it shall be repaired or replaced, and returned to the original purchaser at no cost to them, including transportation charges. Seller's sole obligation and the Buyer's sole remedy are limited strictly to repair or replacement with these provisions below:

- A. The instrument is returned to Northwest, properly packaged with the transportation charges prepaid the item insured and accompanied by proof of ownership. Receipt and previous registration is required.
- B. Except for ordinary wear and tear resulting from normal usage, the instrument, upon inspection by the Seller is determined to be defective in material and/or workmanship. Under no circumstances shall the Seller be liable for any consequential, incidental or contingent damages whatsoever.

Limitations and Exclusions

- A. This warranty does not apply to instruments subject to negligence, abuse, accident, improper operation, damaged in transit or damaged due to unauthorized service repairs made by someone other than Northwest or any other Northwest authorized service personnel. Circumstances beyond Northwest Instrument's control cannot be warranted.
- B. This warranty does not apply to regular required maintenance such as cleaning, adjusting, lubricating or calibrating unless required as a result of a defect in workmanship or materials. If, upon examination of the instrument, the Seller determines that additional repair services are required and which are not covered under this warranty, the Seller shall notify the Buyer of such repair charges and proceed only after authorization has been received.
- C. This warranty does not apply to instruments damaged in transit to or from Northwest Instrument or any authorized repair center. Other options may or may not be available for transportation damages.

NOTE:

These designs, figures and specifications are subject to change without notice.

We shall not be held liable for damages resulting from errors in this instruction manual.

