

SOKKIA

SET6E SET6ES

Electronic Total Station



OPERATOR'S MANUAL



Ni-Cd

- **[English]** CONTAINS NICKEL-CADMIUM BATTERY. MUST BE RECYCLED OR DISPOSED OF PROPERLY.
- **[Deutsch]** MIT NiCd AKKU. EFORBERT RECYCLING ODER FACHGERECHTE ENTSORGUNG.
- **[Français]** CONTIENT UNE BATTERIE AU CADMIUM NICKEL. DOIT ÊTRE RECYCLÉE OU DONNÉE A UN ORGANISME DE RETRAITEMENT.
- **[Italiano]** CONTIENE NiCd BATTERIA. DEVE QUINDI ESSERE RICICLATA O ELIMINATA IN MODO APPROPRIATO.
- **[Nederlands]** BEVAT EEN NiCd BATTERIJ. DIENT GERECYCLEERD TE WORDEN OF OP EEN CORRECTE MANIER VERNIETIGD TE WORDEN.
- **[Español]** CONTIENE UNA NiCd BATERÍA. DEBE RECICLARSE O ELIMINARSE ADECUADAMENTE.
- **[Português]** CONTEM BATERIA DE NÍQUEL CÁDMIO. DEVERÁ SER RECICLADA OU DE CARTADA CONVENIENTEMENTE.
- **[Svensk]** INNEHÅLLER NiCd BATTERI. BÖR ÅTERVINNAS ELLER FÖRSTÖRAS PÅ ETT SÅKERT SÄTT.
- **[Suomi]** SISÄLTÄÄ NIKKELI-KADMIUM AKUN. HÄVITETTÄESSÄ KÄSITELTÄVÄ ONGELMAJÄTTEENÄ.
- **[Norsk]** NiCd BATTERIER MÅ RESIRKULERES ELLER KASTES PÅ EN FORSVARLIG MÅTE.
- **[Dansk]** INDEHOLDER NiCd BATTERI. SKAL GENVINDES ELLER KASSERES PÅ FORSVARLIG MÅDE.
- **[Ελληνικά]** ΠΕΡΙΕΧΕΙ ΜΠΑΤΑΡΙΑ ΝΙΚΕΛΙΟΥ-ΚΑΔΜΙΟΥ. ΠΡΕΠΕΙ ΝΑ ΑΝΑΚΥΚΛΩΝΕΤΑΙ Η ΝΑ ΚΑΤΑΣΤΡΕΦΕΤΑΙ ΜΕ ΤΟΝ ΚΑΤΑΛΛΗΛΟ ΤΡΟΠΟ.

For U.S.A. ATTENTION:

The product that you have purchased contains a rechargeable battery. The battery is recyclable. At the end of it's useful life, under various state and local laws, it may be illegal to dispose of this battery into the municipal waste stream. Check with your local solid waste officials for details in your area for recycling options or proper disposal. Use the standard battery charger.

Die Schweiz: Nach Gebrauch der Verkaufsstelle zurückgeben.

La Suisse: Après usage à rapporter au point de vente.

Swizzera: Ritornare la pila usata al negozio.

Congratulations on your purchase of the SET6E!
Before using the instrument, please read this operator's
manual.

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- The specifications and general appearance of the instrument may be altered at any time and may differ from those appearing in catalogues and this operator's manual.

- Ensure that the battery is charged before measurement.




1 Setting up the instrument

- Battery mounting  P. 7
- Centring/Levelling/Focussing  P. 8



2 Preparation for power on  P. 12

- Prism constant correction/Distance mode/Distance units/Earth curvature and refraction/Vertical angle display/ Angle units




3 Power on/V circle indexing

- Power on/Instrument self-check  P. 13
- Vertical circle indexing  P. 15
- Target sighting  P. 17

4 Angle measurement

- Measure the angle between two points  P. 19
- Set the horizontal circle to a required value  P. 20

5 Distance measurement

- Atmospheric correction  P. 23
- Return signal check  P. 25
- Distance and angle measurement  P. 27

Note: The instrument parameters are set to default settings at the factory. Before use, ensure that the parameters are set to your required options. See Section 2.

FEATURES

〈Light in weight, highly accurate total station〉

- The total weight of the instrument is 4.8 kg including the handle and battery. For total station operations, all keys on the keyboard can be used for two or more functions.

〈Automatic tilt compensation of vertical angles〉

- The tilt angle of the vertical axis is measured by an internal sensor. The vertical angle value can be automatically compensated for this tilt angle and the compensated value displayed.

〈Instrument parameter settings stored in memory〉

- The SET6E has an internal memory which stores the instrument parameter settings. The parameter settings can be changed by key operation and the new settings are memorized even after power off.

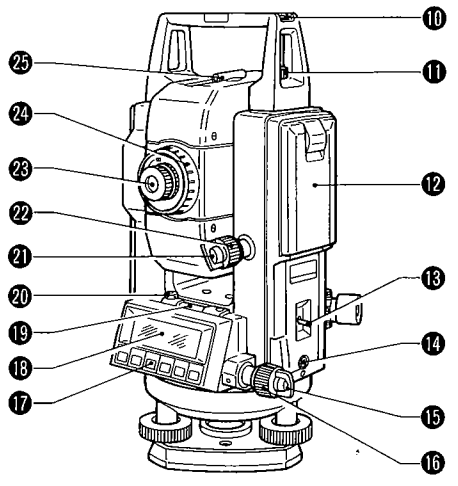
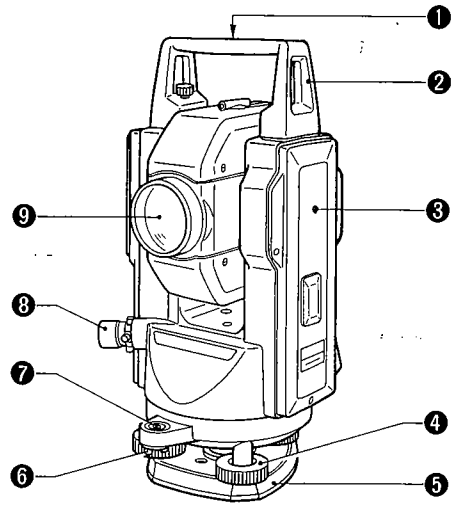
〈Rechargeable battery〉

- The SET6E is powered by a rechargeable battery. For continuous angle measurement, a fully-charged battery supplies power for about 21 hours, and for angle and distance measurement, the battery will allow operation for about 10 hours (at an ambient temperature of 25°C).

〈Data output function〉

- An RS-232C data output connector is provided for use with a data collector or external computer. The SET6E can transmit slope distance and horizontal and vertical angle data to an external device.

1. NAMES OF PARTS



Above figures are SET6E.

1

- ① Instrument centre mark
- ② Handle
- ③ Instrument height mark
- ④ Levelling foot screw
- ⑤ Base plate
- ⑥ Circular level adjusting screw
- ⑦ Circular level
- ⑧ Optical plummet eyepiece
- ⑨ Objective lens
- ⑩ Tubular compass slot
- ⑪ Handle securing screw
- ⑫ Battery BDC25
- ⑬ Power switch
- ⑭ Data output connector
- ⑮ Horizontal clamp
- ⑯ Horizontal fine motion screw
- ⑰ Keyboard
- ⑱ Display
- ⑲ Plate level
- ⑳ Plate level adjusting screw
- ㉑ Vertical clamp
- ㉒ Vertical fine motion screw
- ㉓ Telescope eyepiece
- ㉔ Telescope focussing ring
- ㉕ Peep sight

IMPORTANT:

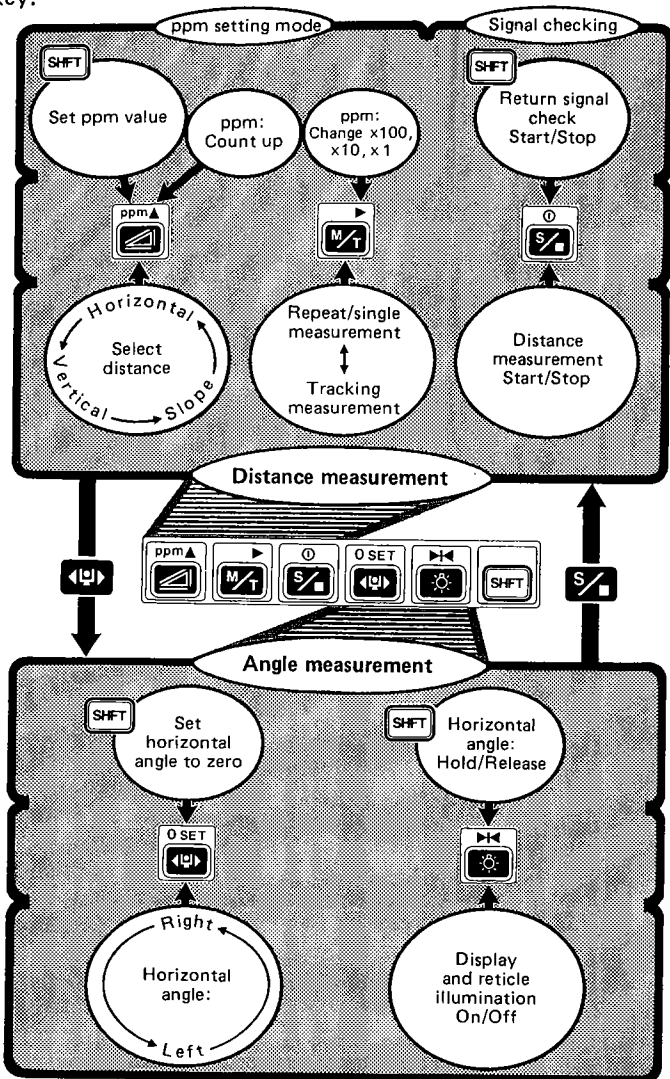
The battery has not been charged at the factory. Please charge the battery fully before using.

2. PRECAUTIONS

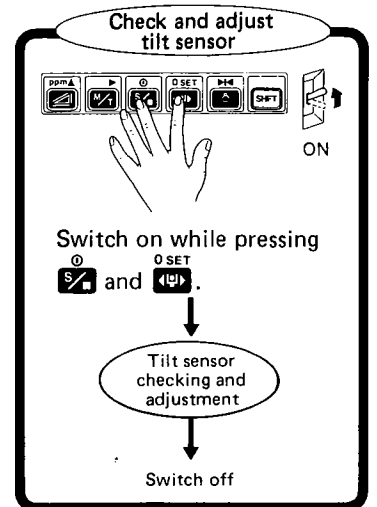
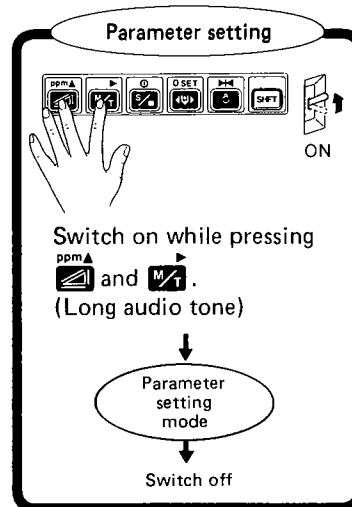
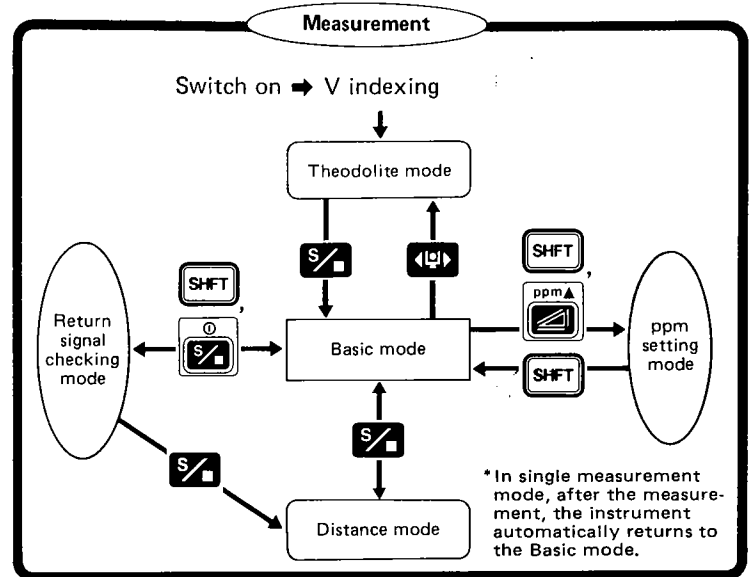
- 1) When the SET6E is not used for a long time, check it at least once every three months.
- 2) Handle the SET6E with care. Avoid heavy shocks or vibration.
- 3) When removing the SET6E from the carrying case, never pull it out by force. The empty carrying case should then be closed to exclude dust.
- 4) If any problems are found with the rotatable portion, screws or optical parts (e.g. lens), contact our agent.
- 5) Never place the SET6E directly on the ground.
- 6) Never carry SET6E on the tripod to another site.
- 7) Protect the SET6E with an umbrella against strong sunlight and rain.
- 8) When the operator leaves the SET6E, the vinyl cover should be placed over the instrument.
- 9) Do not aim the telescope at the sun.
- 10) Always remove the battery from the SET6E before returning it to the case.
- 11) Always switch the power off before removing the internal battery.
- 12) Do not wipe the display **10**, keyboard **17** or the carrying case with any organic solvent.
- 13) When the SET6E is placed in the case, follow the layout plan.
- 14) Make sure that the SET6E and the protective lining of the carrying case are dry before closing the case. (The case is hermetically sealed; if moisture is trapped inside, damage to the instrument could occur.)

3. KEY FUNCTIONS

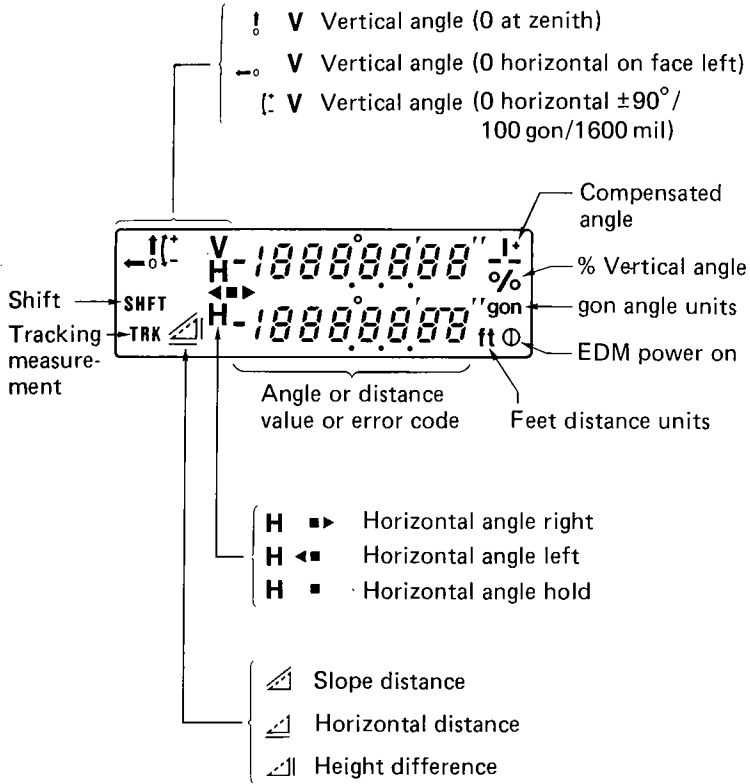
- The upper functions are accessed by pressing **SHIFT** and the required key.



4. MODE DIAGRAM



5. DISPLAY SYMBOLS



6 BATTERY BDC25: MOUNTING

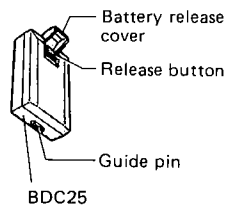
- Charge the battery before measurement.

P. 48

* Ensure that the power switch **18** is OFF.

〈Mounting the battery〉

- 1) Close the battery release button cover. ↑



- 2) Match the battery guide with the hole in the instrument battery recess.

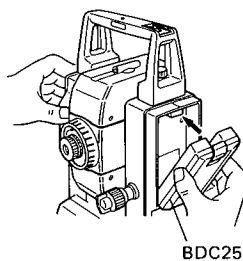
- 3) Press the top of the battery until a click is heard.

〈Removing the battery〉

- 1) Open the battery release cover.

- 2) Press the release button downward.

- 3) Remove the battery.

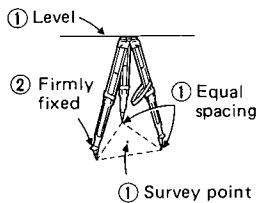


7. SETTING UP THE INSTRUMENT

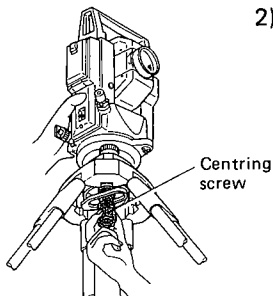
- Mount the battery in the instrument before performing this operation.

7.1 Centring

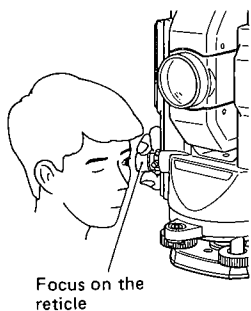
↑



- 1) Ensure that:
 - ① The tripod head is approximately level, and over the surveying point.
 - ② The tripod shoes are firmly fixed in the ground.



- 2) Place the SET6E on the tripod head. Support it with one hand and insert and tighten the centring screw with the other.



- 3) Turn the optical plummet eyepiece ⑧ to focus on the reticle circles. Note the position of the surveying point with respect to the reticle centre.

7.2 Levelling

Levelling foot screws



1) Optical plummet



1) Adjust the levelling foot screws ④ to centre the surveying point in the optical plummet reticle.

2) Circular level



2) Observe the off-centre direction of the circular level ⑦ bubble.

Adjust tripod legs



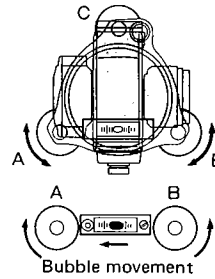
Optical plummet



3) Shorten the tripod leg nearest the bubble direction or extend the leg farthest from this direction.

Generally, two tripod legs must be adjusted to centre the bubble.

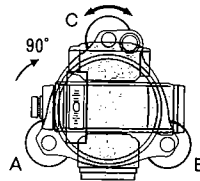
Circular level



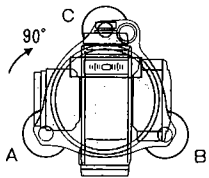
4) Using the horizontal clamp ⑮, turn the upper part of the instrument until the plate level ⑲ is parallel to a line between levelling screws A and B.

5) Centre the plate bubble using levelling screws A and B.

Note: The bubble moves towards a clockwise-rotated foot screw.



6) Turn the upper part through 90°. The plate level is now perpendicular to a line between levelling screws A and B. Centre the plate level bubble using levelling screw C.



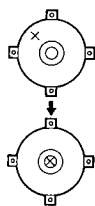
- 7) Turn the upper part a further 90° and check the bubble position.

If the bubble is off-centre, either perform the plate level adjustment described on page 31 or carefully adjust levelling screws A and B in equal and opposite directions to remove half of the bubble displacement. Again turn the upper part a further 90° and use levelling screw C to remove half of the displacement in this direction.

- The bubble should now remain in the same position for any position of the upper part. (If it does not, repeat the levelling procedure.)

The following steps are different for the SET6E and SET6ES.

<SET6E>



- 8) Look through the optical plummet eyepiece. Loosen the centring screw slightly, then carefully slide the instrument over the tripod head until the surveying point is exactly centred in the reticle. Re-tighten the centring screw.

- 9) Repeat procedures 4)–8) until the instrument is correctly levelled and centred over the surveying point.

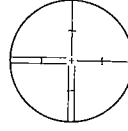
<SET6ES>

- 8) Turn the tribrach shifting clamp anti-clockwise. Adjust the instrument position on the tribrach to centre the surveying point. Tighten the shifting clamp to fix the instrument in the centre position.

Note: The SET6ES shifting tribrach can be adjusted up to ± 8 mm.

7.3 Focussing

1) Look through the telescope at a bright, featureless background.



2) Turn the eyepiece ⌚ clockwise, then anticlockwise until just before the reticle image goes out of focus. Using this procedure, frequent reticle re-focussing is not necessary, since **your** eye is focussed at infinity. ↗

8. PREPARATION FOR POWER ON

The SET6E instrument parameters are set at the factory to the options tabulated below. Before using the instrument for the first time, check that these parameters are set to your required options.

- To change the parameter options, see "INSTRUMENT PARAMETERS" on page 41.

Parameter No.	Function	Options
1	Prism constant correction	<u>-30mm</u> (adjustable from 0 to -90mm in 10mm steps.)
2	Distance mode	<u>Repeat</u> /Single measurements P. 42
3	Distance units	<u>Metres</u> or feet
4	Earth curvature and refraction correction	<u>Not applied</u> or applied P. 56
6	Vertical angle	<u>Zenith 0</u> /Horizontal 0/ Horizontal $0 \pm 90^\circ$ (100 gon/1600 mil)/ % vertical angle
9	Angle resolution	<u>20"</u> (5 mgon/0.1 mil) or 10" (2 mgon/0.05 mil)
10	Angle units	<u>Degrees</u> or gon or mil

(Underlined values are the factory settings.)

- See page 41 for a complete list of the instrument parameters.

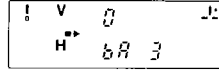
9. POWER ON AND INSTRUMENT CHECKS



1) Turn the SET6E power switch **ON**.
The audio tone sounds and all the display symbols are shown on the display while the instrument performs self-diagnostic checks.



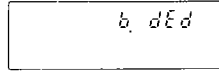
2) On successful completion of the checks, the battery power is displayed as a numeric code for three seconds.



(Temperature = 25°C, every one distance measurement in repeat measurement mode, Measurement interval = every 30 secs)

- 0 ... 10 ~ 0%
- 1 ... 90 ~ 10%
- 2 ... 98 ~ 90%
- 3 ... 100 ~ 98%

or



If *b. dEd* is displayed, the battery voltage is too low for measurement. Turn the power switch off and re-charge the battery. (This display also occurs during measurement when the battery power is low.)



3) The "V 0" display indicates that the instrument is ready for vertical circle indexing.

E 114, *E 115*, *E 116* or *E 117* is displayed when the tilt angle exceeds 10°. Re-level the SET6E using the plate level bubble.

[Note: Power-saving cut-off]

- If the power switch is left on, the SET6E has the option to switch off automatically 30 minutes after the last key operation.

Instrument parameter No. 11 P. 41

- Parameter 11 can be used to switch off and on the 30-minute power cut-off facility.



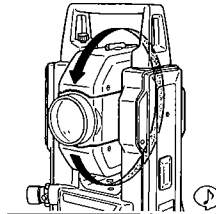
10.1 Indexing the vertical circle

(When V circle indexing parameter is set to "9".)

Turn the SET6E power switch **18** ON.



..... Waiting for vertical circle indexing

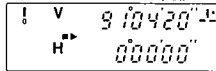


< Vertical circle indexing >

1) Loosen the vertical clamp **21**, and transit the telescope completely.

(Indexing occurs when the objective lens crosses the horizontal plane in face left.)

The audio tone sounds and the vertical angle (V) is displayed.



● Angle measurement can now begin.

(The instrument is now in the theodolite mode.)

Note: Each time the instrument is switched on, the vertical index must be re-determined.

Instrument parameter No. 7 P. 41

- Parameter 7 can be used to change the vertical circle indexing. Options are indexing by transitting the telescope or indexing by face left, face right sightings. P. 54

[Note: Automatic vertical angle compensation]

Automatic vertical angle
compensation mark



- When the compensation mark is shown on the display, the vertical angle is automatically compensated for small tilt errors.
- Read the compensated vertical angle after the displayed angle value becomes steady.

Instrument parameter No. 8 P. 41

- Parameter 8 can be used to switch off and on the automatic vertical angle compensation; for example, the automatic compensation should be switched off if the display is unsteady due to vibration or strong wind.

00

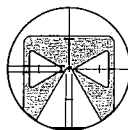
10.2 Target sighting

Line the target with the white arrow in the peep sight.

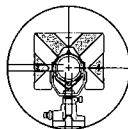


- 1) Loosen the vertical and horizontal clamps ④, ⑤ and use the peep sight ⑥ to bring the target into the field of view.
- 2) Re-tighten both clamps.
- 3) Turn the focussing ring ⑦ to focus on the target.
- 4) Use the vertical and horizontal fine motion screws ⑧, ⑨ to sight the target precisely. The last adjustment of each fine motion screw should be in a clockwise direction.

Position of the target in relation to the reticle:



(Target centre)



(Prism centre)

- Angle only measurement:
Use the reflecting prism or the target.

- Distance and angle measurement:
Use the reflecting prism.

Note: Observe to the same point of the reticle when the telescope face is changed.

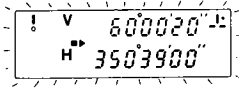
- 5) Check that there is no parallax between the target image and the reticle.

[Note: Parallax]

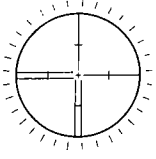
- This is the relative displacement of the target image with respect to the reticle when the observer's head is moved slightly before the eyepiece.

Parallax will introduce reading errors and must be removed before observations are taken. Parallax can be removed by re-focussing.

10.3 Display and reticle illumination



- Press to illuminate the display and reticle of the SET6E.
Press again to switch the illumination off.



Instrument parameter No. 12 P. 41

- Parameter 12 can be used to switch on/off the 30-second illumination automatic cut-off facility.

Instrument parameter No. 13 P. 41

- Parameter 13 can be used to select the illumination brightness (2 steps).

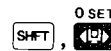
11. ANGLE MEASUREMENT

Check! before angle measurement:

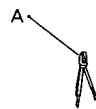
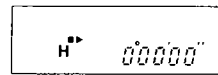
1. The SET6E is set up correctly over the surveying point. P. 8
2. The remaining battery power is adequate. P. 13
3. The vertical angle display mode and angle units are correct. P. 12
4. The vertical circle has been indexed. P. 15

11.1 Measure the horizontal angle between two points — Zero set —

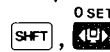
Note: **Horizontal angle 0 set**



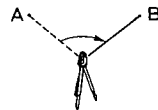
- Press **SHFT**, **O SET** to set the horizontal angle to zero.



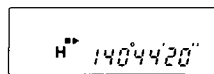
- 1) Sight the first target A.



- 2) Press **SHFT**, **O SET** to set the horizontal angle display to zero.



- 3) Use the horizontal clamp **15** and fine motion screw **16** to sight target B.




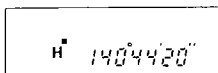
The displayed horizontal angle is the angle between points A and B.


11.2 Set the horizontal circle to a required value – Angle hold –

Note: Horizontal angle hold




- Press **SHIFT**,  to hold the displayed horizontal angle.

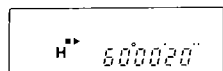




- The hold symbol  is displayed.




- To release the horizontal angle hold, again press **SHIFT**, .

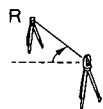
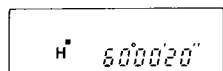
e.g. Set 60°00'20" to reference target R.



- 1) Use the horizontal clamp  and fine motion screw  to turn the theodolite until an angle of 60°00'20" is shown on the display.




- 2) Press **SHIFT**,  to hold the horizontal display, as above.



- 3) Use the horizontal clamp and fine motion screw to turn the theodolite to sight on the reference target R.



- 4) Press **SHIFT**,  to release the display hold.
Reference target R has now been set to 60°00'20".

4

11.3 Select the horizontal display – Angle right/left –

Note: **Horizontal angle right/left**

● Select the required horizontal angle display using the key.

(Display symbol ◻▶ : horizontal angle right)

(Display symbol ◻◀ : horizontal angle left)

- The horizontal left angle display selection is lost after the power is switched off.

12. DISTANCE MEASUREMENT

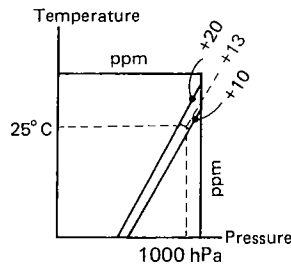
12.1 Atmospheric correction

- The atmospheric correction is necessary for accurate distance measurement, because the velocity of light in air is affected by the temperature and atmospheric pressure.

The SET6E is designed so that the correction factor is 0 for a temperature of +15°C (+59°F) and an atmospheric pressure of 1013hPa (29.9 inchHg).

Note: To obtain the average refractive index of the air throughout the measured light path, you should use the average atmospheric pressure and temperature. Take care when calculating the correction factor in mountainous terrain. P. 55

- Measure the temperature and pressure with a thermometer and a barometer and read the correction factor from the table on page 63.



e.g. Temperature: +25°C
Atmospheric pressure: 1000 hPa
Read correction value from the table.
The correction value is +13 ppm.

The correction value can be calculated from:

$$X = 278.96 - \frac{0.2904 \times P \text{ (hPa)}}{1 + 0.003661 \times t \text{ (°C)}}$$

where: P = Atmospheric pressure in hPa
t = Temperature in Centigrade

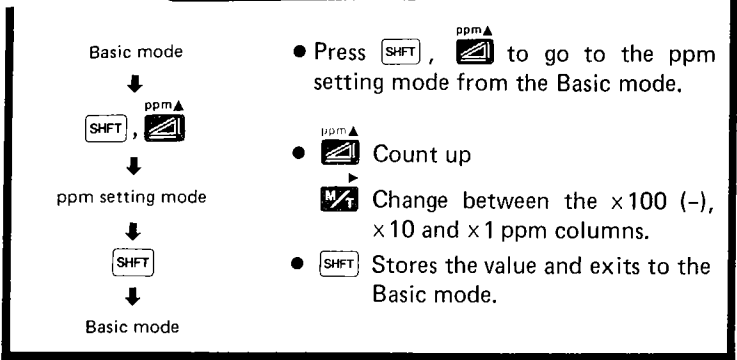
To convert inchHg to hPa, divide by 0.0295.

To convert temperature from Fahrenheit to Centigrade, use the formula:

$$^{\circ}\text{C} = \frac{5 \text{ (}^{\circ}\text{F} - 32)}{9}$$

- The atmospheric correction value can be input to the SET6E as a value between -499 ppm and +499 ppm in 1 ppm steps.
- The input atmospheric correction value is stored in the memory for about 15 hours after the power is switched off.
- If the atmospheric correction is not required, set the ppm value to zero.

Note: ppm setting mode



e.g. Set a ppm value of 13 ppm
From Basic mode:

Press SHFT, ppm▲ to go to the ppm setting mode.

The ×100 (-) ppm column flashes.

Set this column to 0 using ppm▲.
(-0, 0, 1, 2, 3, 4, -4, -3, -2, -1)

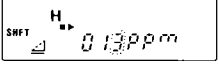
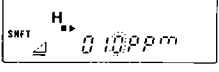
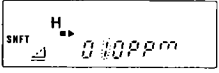
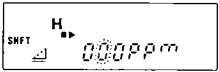
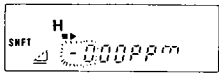
Press M/T to change to the ×10 ppm column. (Value flashes)

Set 1 to this column using ppm▲.

Press M/T to change to the ×1 ppm column. (Value flashes)

Set 3 to this column using ppm▲.

Press SHFT to return to the Basic mode.



- The entered ppm value is stored in the memory for about 15 hours after the power is switched off.

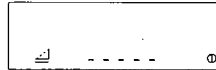
12.2 Prism sighting and return signal check

- Especially for long distances, it is useful to check that the return signal is adequate for measurement.

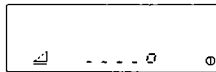
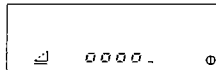
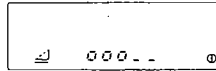
Note: **Return signal checking mode**

- Sight the centre of the reflecting prism with the telescope. [P. 17](#)
- Press **SHFT**, **S** to go to the return signal checking mode. Check the signal strength.
- Press **SHFT**, **S** to return to the Basic mode, or press **S** to start measurement.

- The return signal level is displayed according to its strength. An optional audio tone is output when the signal strength is adequate.



No return signal. Sight the prism centre again. [P. 17](#)



Adequate for measurement.

Note:

Because of a slight mis-sighting, "E 201" or "S ---" is displayed although the return signal level is adequate. Make sure that the prism is sighted correctly.








Return signal is too strong. If this display persists, please contact our agent.

Return signal audio tone on/off P. 41

- Parameter 5 can be used to switch on/off the return signal audio tone.

12.3 Distance and angle measurement

Check! before distance and angle measurement:

1. The SET6E is set up correctly over the surveying point.  P. 8
2. The remaining battery power is adequate.  P. 13
3. The prism constant, the distance mode, the distance units and the curvature and refraction correction have been correctly set.  P. 12
4. The vertical angle format and angle units have been correctly set.  P. 12
5. The vertical circle has been indexed.  P. 15
6. The SET6E is in the Basic mode.
7. The atmospheric correction is correctly set.  P. 23
8. The centre of the reflecting prism is being sighted and the return signal is adequate for measurement.  P. 25


- For simultaneous measurement of distance and horizontal angle, the horizontal angle can be set to zero or a required value. For horizontal angle operations, see page 19—.

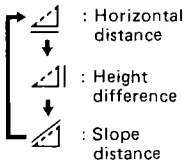


- 1) In Basic mode, select repeat/single* or tracking measurement. (Tracking measurement = Distance value displayed at first after 1.5 sec, then every 0.4 sec in cm units.)



The TRK symbol is shown on the display in tracking mode.

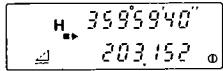
- * Repeat or single measurement can be selected by instrument parameter No. 2.  P. 42



: Measurement start

2) Select the distance measuring mode by pressing .

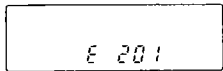
3) Press to start the measurement.
The display flashes to show that the measurement is being performed.



: Measurement stop

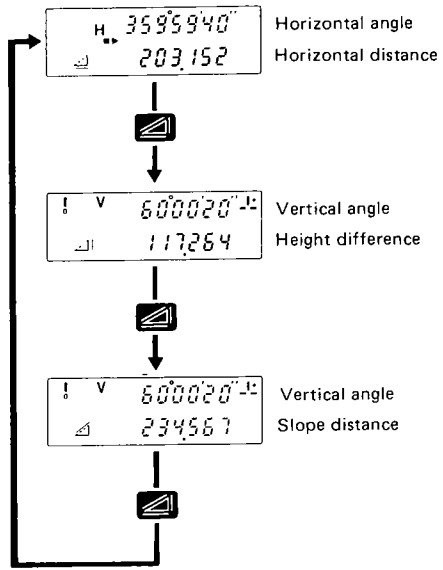
4) The selected distance and angle will be displayed after measurement.
In repeat or tracking measurement mode, press to stop the measurement.


- In single measurement mode, the stop key does not need to be pressed.




Note: If *E 201* is displayed, the return signal is absent or the prism is mis-sighted. In this situation, sight the prism correctly and re-measure. If any other error code is displayed, see page 30.

- After the measurement has been stopped, the horizontal distance, height difference and slope distance, and vertical and horizontal angle data are stored in the memory.



• The horizontal angle and horizontal distance, the vertical angle and height difference or the vertical angle and slope distance can be displayed by pressing .

• Press  to go to the Theodolite mode from the Basic mode.

13. ERROR CODES

- If there is any fault in the SET6E operation, the error codes shown below will be displayed.

Display	Meaning	Action
b. dEd	Battery voltage is too low.	Replace the battery with a charged one, or charge the battery.
E 100*	Error when measuring a horizontal angle.	Press SHIFT , 0SET to set the horizontal angle to zero.
E 101*	Error when measuring a vertical angle.	Index the vertical circle again.
E 114	Tilt angle of trunnion direction exceeds -10'.	Re-level the SET6E.
E 115	Tilt angle of sighting direction exceeds -10'.	
E 116	Tilt angle of trunnion direction exceeds +10'.	
E 117	Tilt angle of sighting direction exceeds +10'.	
S ---**	Incoming reflection was disturbed Or measurement conditions are bad.	Re-sight the prism. Increase the number of prisms for long distances. Remeasure the distance after confirming the return signal.
S. oFF E 201**	Incoming reflection was totally absent at start of measurement. Or measurement condition is bad.	

*If the SET6E telescope or upper part is rotated faster than four revolutions per second, the error indication "E 100" or "E 101" is displayed.

**Because of a slight mis-sighting, "E 201" or "S ---" is displayed although the return signal level is adequate. Make sure that the prism centre is sighted correctly.

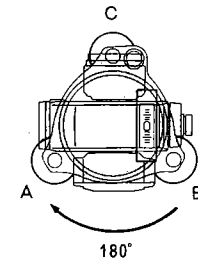
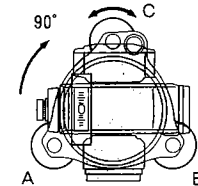
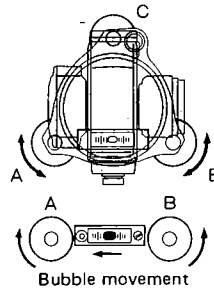
- When an error indication persists, or if an error indication "E xxx" is displayed with any number other than those displayed above, please contact our agent.

14. CHECKS AND ADJUSTMENTS

- It is important that the SET6E is periodically checked and adjusted. In addition, the instrument should be checked after transportation, long storage or when damage to the instrument is suspected to have occurred.

14.1 Plate level

- The glass tube of the plate level is sensitive to temperature change or shock. Check and adjust as follows:



< Check >

- 1) Turn the upper part of the instrument until the plate level is parallel to a line between levelling foot screws A and B. Centre the plate level bubble using levelling screws A and B.

Note: The bubble moves towards a clockwise-rotated footscrew.

- 2) Loosen the horizontal clamp ⑬ and turn the upper part 90°. i.e. The plate level is perpendicular to a line between levelling screws A and B. Centre the plate level bubble using levelling screw C.

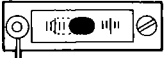
- 3) Turn the upper part through 180° and check the bubble position. If the bubble is still centred, no adjustment is necessary. If the bubble is not centred, adjust as follows:

4) Use levelling screws



→ 1/2

5) Use adjusting pin



→ Centre

<Adjustment>

4) Correct half of the bubble displacement using levelling screw C.

5) Correct the remaining half displacement with the adjusting pin.

Note: The bubble moves away from a clockwise rotation of the adjusting screw.

6) Repeat the procedures from 1) until the bubble remains centred for any position of the upper part.

If the bubble is not still centred in the plate level, please contact your SOKKIA agent.