

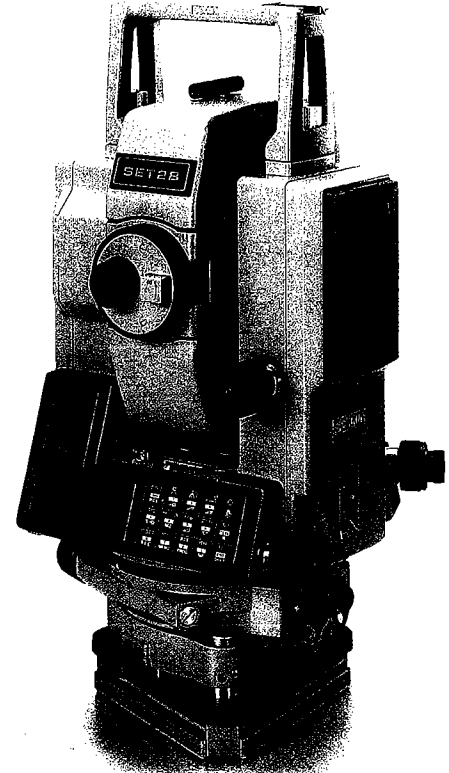
SOKKIA

SET2B II

SET3B II

SET4B II

Electronic Total Station



OPERATOR'S MANUAL



Ni-Cd

- **[English]** CONTAINS NICKEL-CADMIUM BATTERY. MUST BE RECYCLED OR DISPOSED OF PROPERLY.
- **[Deutsch]** MIT NiCd AKKU. E Fordert 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 SÅTT.
- **[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 its 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 usate al negozio.

SET2B II
SET3B II
SET4B II

Electronic Total Station

OPERATOR'S MANUAL

Congratulations on your purchase of the SET BII Series!
Before using the instrument, please read this operator's manual
and verify that all equipment is included, refer to P. 196
"STANDARD EQUIPMENT".

A version

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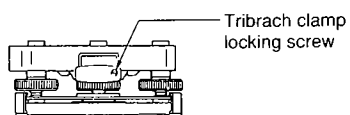
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<Important>

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

<Important>



When the new SET B is shipped, the tribrach clamp is fixed with a screw.
Loosen it and leave it loose.
And if the SET B is again shipped, fix the tribrach clamp with the screw to stop the tribrach becoming detached from the instrument.

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.

QUICK GUIDE TO THIS MANUAL

- Ensure that the battery is charged before measurement.

Preparation for measurement

- Battery mounting 17
- Setting up Instrument <Centring 18/Levelling 19> ● Power on 21
- Indexing V & H circles 23 ● Focussing & target sighting 25
- Display & Reticle illumination 28 ● Setting instrument options 29

Angle & Distance measurement

- Angle <Set H angle to 0 33/Set H circle to a required value 35/
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- Coordinate data reviewing 125

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- Error messages 149

1

2

3

4

5

6

1

FEATURES

< SET B II ADVANCED MEASUREMENT FUNCTIONS >

- Resection measurement
- Traverse-style coordinate measurement
- Offset measurement
- REM measurement
- Missing line measurement
- Setting-out measurement

< COORDINATE DATA CAN BE STORED IN AN INTERNAL MEMORY >

- 100 coordinate data can be stored in an internal memory for about a week.
- These coordinate data can be used as instrument station coordinates, backsight station coordinates, known station coordinates (for the resection measurement), and setting-out coordinates.
- These coordinate data can be displayed.

< TILT ANGLE COMPENSATION >

- Dual axis tilt sensor
- The index error of the tilt angle can be eliminated

< COLLIMATION PROGRAM >

- The collimation error between the centre of the telescope reticle and the sighting line can be calculated, and the correction value specified is set. (for angle measurement of high accuracy.)

< DATA OUTPUT >

- The SET B RS232C-compatible data output connector allows 2-way communication with an external device.

INTRODUCTION

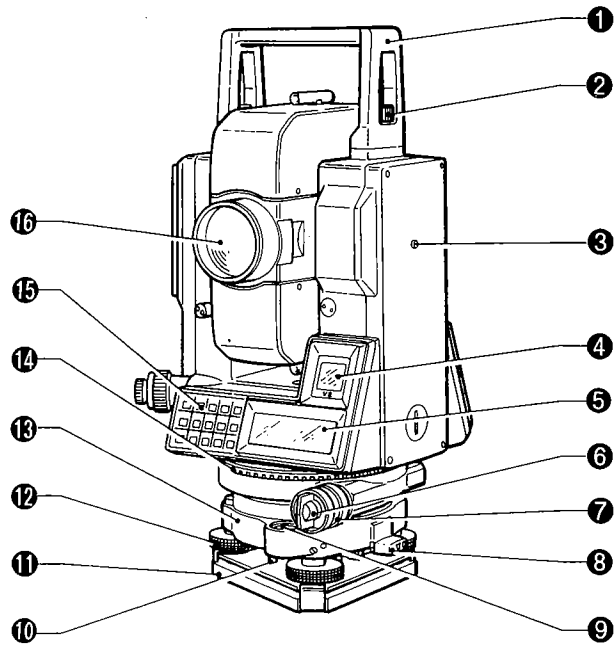
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2. PARTS OF THE INSTRUMENT ➔ P.6
3. KEY FUNCTIONS ➔ P.8
4. MODE DIAGRAM ➔ P.12
5. DISPLAY SYMBOLS ➔ P.13



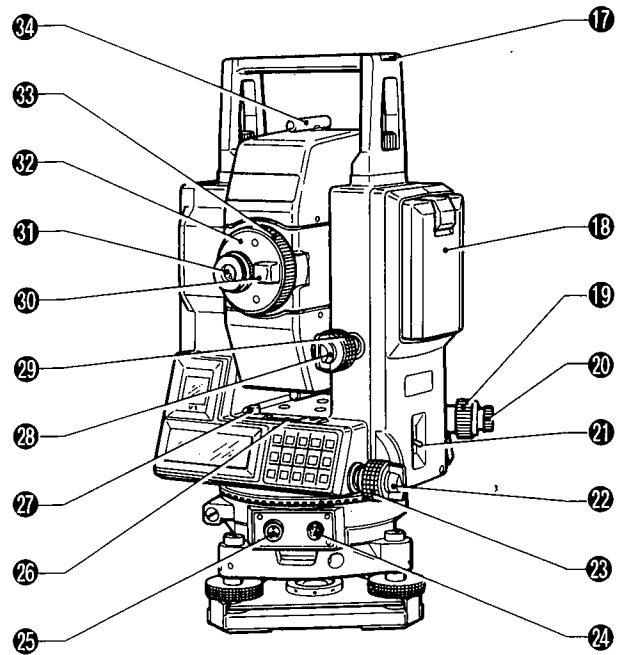
1. PRECAUTIONS

- **Never place the SET B directly on the ground.**
Avoid damaging the tripod head and centring screw with sand or dust.
- **Do not aim the telescope at the sun.**
Avoid damaging the LED of the EDM.
- **Protect the SET B with an umbrella.**
against direct sunlight, rain and humidity.
- **Never carry the SET B on the tripod to another site.**
- Handle the SET B with care. Avoid heavy shocks or vibration.
- When the operator leaves the SET B, the vinyl cover should be placed on the instrument.
- Always switch the power off before removing the standard battery.
- Remove the standard battery from the SET B before putting it in the case.
- When the SET B is placed in the carrying case, follow the layout plan.
- Make sure that the SET B and the protective lining of the carrying case are dry before closing the case. The case is hermetically sealed and if moisture is trapped inside, damage to the instrument could occur.

2. PARTS OF THE INSTRUMENT



- | | |
|--------------------------|--------------------------------------|
| ① Handle | ⑩ Circular level adjusting screws |
| ② Handle securing screw | ⑪ Base plate |
| ③ Instrument height mark | ⑫ Levelling foot screw |
| ④ Sub display | ⑬ Tribrach |
| ⑤ Main display | ⑭ Horizontal circle positioning ring |
| ⑥ Lower clamp | ⑮ Keyboard |
| ⑦ Lower clamp cover | ⑯ Objective lens |
| ⑧ Tribrach clamp | |
| ⑨ Circular level | |



- | | |
|------------------------------------|---------------------------------------|
| 17 Tubular compass slot | 26 Plate level |
| 18 Battery BDC25 | 27 Plate level adjusting screw |
| 19 Optical plummet focussing ring | 28 Vertical clamp |
| 20 Optical plummet eyepiece | 29 Vertical fine motion screw |
| 21 Power switch | 30 Telescope transitting knob |
| 22 Horizontal clamp | 31 Telescope eyepiece |
| 23 Horizontal fine motion screw | 32 Telescope reticle adjustment cover |
| 24 Data output connector | 33 Telescope focussing ring |
| 25 External power source connector | 34 Peep sight |

3. KEY FUNCTIONS

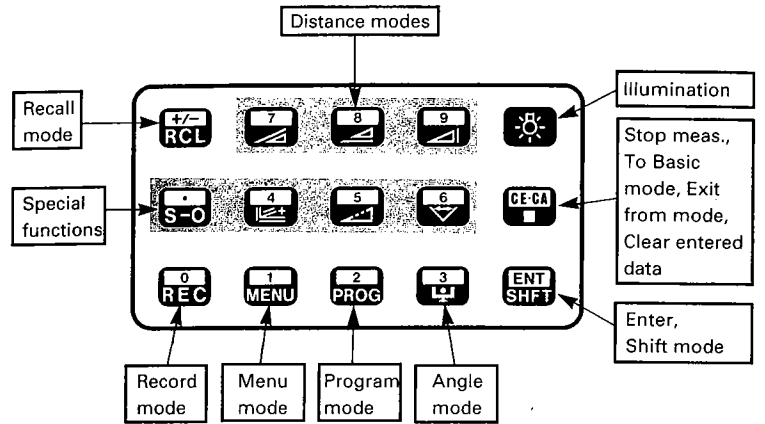
Shift functions ←
 Numeric input ←
 Main functions ←

EDM +/- RCL	7 [Icon: 7]	8 [Icon: 8]	9 [Icon: 9]	0 [Icon: 0]
[Icon: Left Arrow]	[Icon: 4]	f / m [Icon: f/m]	BS [Icon: BS]	No [Icon: No]
0 SET 0 REC	1 MENU	2 PROG	3 [Icon: 3]	Yes ENT SHFT

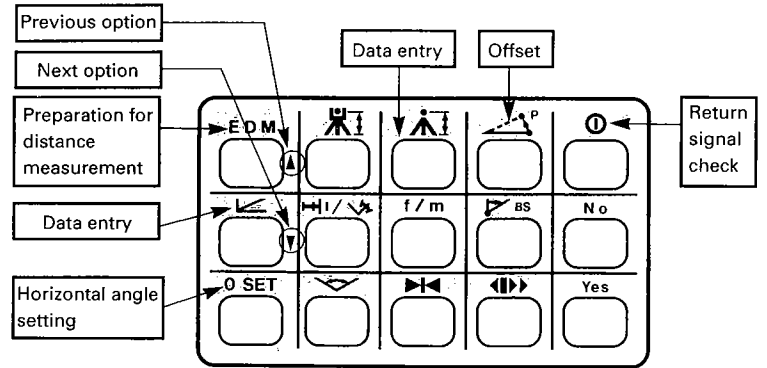
Shift functions ←
 Numeric input ←
 Main functions ←

Shift functions ←
 Numeric input ←
 Main functions ←

<Main functions>



<Shift functions>



EDM



- < **ENT** **SHIFT** + > : Distance mode/Prism constant/ppm
- (Data input mode): Change the sign of the data input value
(Parameter/Input mode): Move to previous option

● Recall data from the memory



- < **ENT** **SHIFT** + > : Input Instrument station coordinates/
Input Backsight station coordinates/
Input coordinates of point to be set out

- (Data input mode): Input "." (Decimal point)
(Parameter/Input mode): Move to next option

● Setting out measurement (+ mode key)

0 SET



- < **ENT** **SHIFT** + > : Set Horizontal angle to 0/
In Missing line measurement, change the starting point

- (Data input mode): Input "0"

● Output data to an External device



- < **ENT** **SHIFT** + > : Input Instrument height
- (Data input mode): Input "7"

● Measure Slope distance



- < **ENT** **SHIFT** + > : Input distance & horizontal angle
Setting-out data

- (Data input mode): Input "4"

● Measure 3-Dimensional coordinates



- < **ENT** **SHIFT** + > : Set horizontal angle to the required value
- (Data input mode): Input "1"

● Menu mode: Configuration/Coordinate data settings



- < **ENT** **SHIFT** + > : Input target height
- (Data input mode): Input "8"

● Measure Horizontal distance



- < **ENT** **SHIFT** + > : Change metres ↔ feet for 5 seconds
- (Data input mode): Input "5"

● Measure remote elevation



- < ENT SHFT + > : Hold/Release Horizontal angle
- (Data input mode): Input "2"
- **Program mode: Resection/Correction/
Set Instrument station coordinates and azimuth angle**



- < ENT SHFT + > : Offset measurement
- (Data input mode): Input "9"
- **Measure Height difference**



- < ENT SHFT + > : Set Azimuth angle from Instrument station and Backsight station coordinates
- (Data input mode): Input "6"
- **Missing line measurement**



- < ENT SHFT + > : Select horizontal angle right/left/repetition
- (Data input mode): Input "3"
- **Transfer to Theodolite mode /
Display tilt angle (when instrument is in Theodolite mode
and: "Tilt correction" parameter is on)**



- < ENT SHFT + > : Return signal check(stop: DE-CA)
- **Display and Reticle illumination ON/OFF**



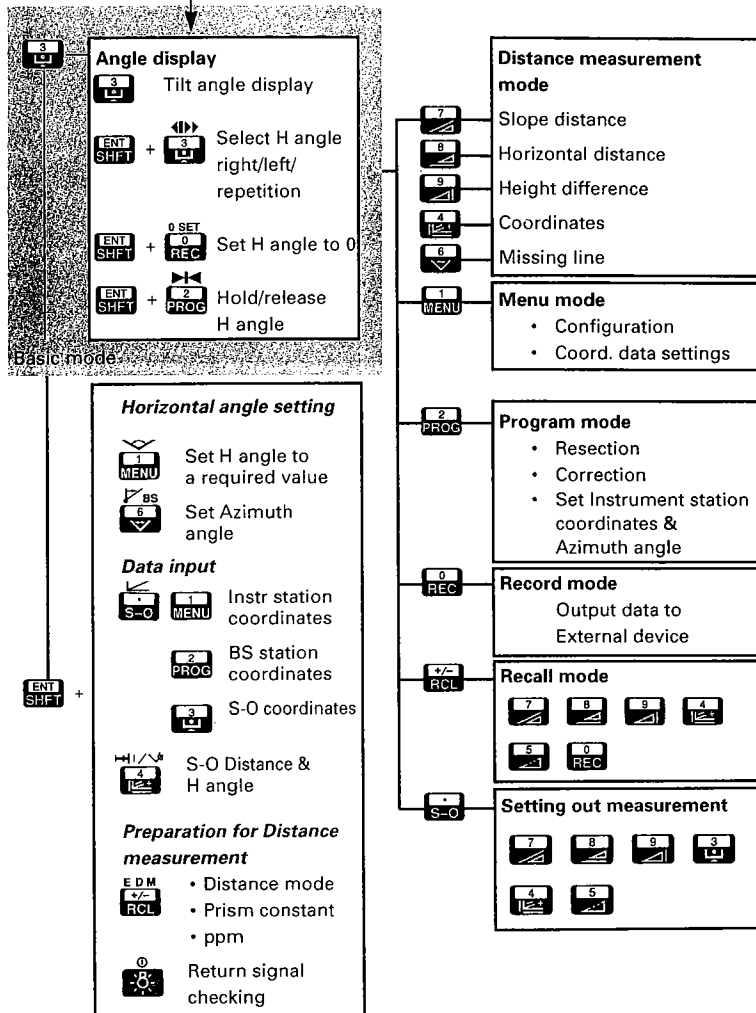
- Input "No"
- (Data Input mode): Clear input data
- **Stop measurement and transfer to Basic mode/
Exit from mode**



- Input "Yes"
- (Data input mode): Input data into memory
- **Select/Release Shift mode**

4 MODE DIAGRAM

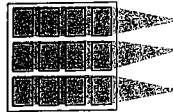
Switch on → H & V circle indexing



5 DISPLAY SYMBOLS

<Sub display>

ppm/P.C./MODE

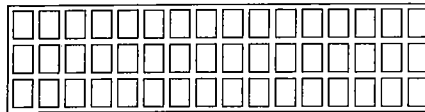


V1

ppm(Atmospheric correction value)
P.C.(Prism constant correction value)


L+ : Tilt angle compensation on
 SHFT : Shift
 SO : Setting-out measurement mode
 MENU : Menu mode
 PROG : Program mode
 REC : Record mode
 RCL : Recall mode
 Stn : Instrument station coordinates
 BS : Backsight station coordinates
 Pt : Coordinate setting-out data




<Main display>









▲	: Select options	S	: Slope distance
ZA	: Zenith angle (Z 0°)	H	: Horizontal distance
VA	: Vertical angle (H 0°)	V	: Height difference
	Vertical angle	Ht	: REM value/Instrument
	(H 0°±90°)	D	: Distance setting-out data/
HAR	: Horizontal angle right		Offset distance
HAL	: Horizontal angle left		
HARp	: Horizontal angle		
	repetition		
HAh	: Horizontal angle hold		
dHA	: Horizontal angle from		
	setting-out data		
X	: Tilt angle in sighting		
	direction		
Y	: Tilt angle in horizontal		
	axis direction		

PREPARATION FOR MEASUREMENT

- 6. MOUNTING THE BATTERY  P.17


- 7. SETTING UP THE INSTRUMENT  P.18
 - 7.1 Centring 
 - 7.2 Levelling 


- 8. POWER ON  P.21

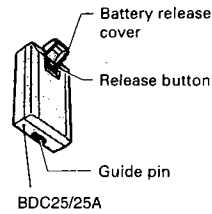
- 9. PREPARATION FOR MEASUREMENT  P.23
 - 9.1 Indexing the vertical and horizontal circles 
 - 9.2 Focussing and target sighting 
 - 9.3 Display and reticle illumination 
 - 9.4 Setting the instrument options 



6. MOUNTING THE BATTERY

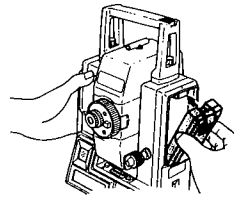
- Charge the battery fully before measurement.  P.177

Note: Turn off the power supply switch  before replacing the battery.



< 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.

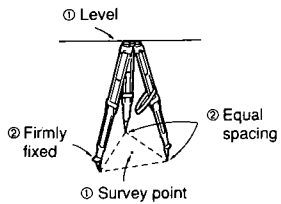
- If the power is to be turned on immediately after replacing the battery, please refer to P. 21.

7. SETTING UP THE INSTRUMENT

- Mount the battery in the instrument before performing this operation, because the instrument will tilt slightly if the battery is mounted after levelling.

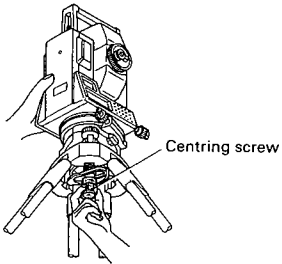
7.1 Centring

Set up the tripod



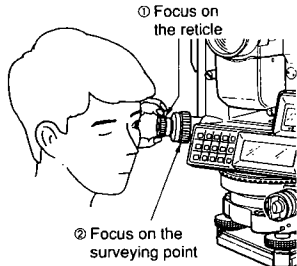
- 1) Make sure the legs are spaced at equal intervals and the head is approximately level.
- 2) Set the tripod so that the head is positioned over the surveying point.
- 3) Make sure the tripod shoes are firmly fixed in the ground.

Install the instrument



- 4) Place the instrument on the tripod head.
- 5) Supporting it with one hand, tighten the centring screw on the bottom of the unit to make sure it is secured to the tripod.

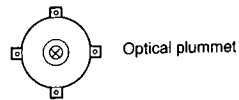
Focus on the surveying point



- 6) Looking through the optical plummet eyepiece, turn the optical plummet eyepiece 20 to focus on the reticle.
- 7) Turn the optical plummet focusing ring 19 to focus on the surveying point.

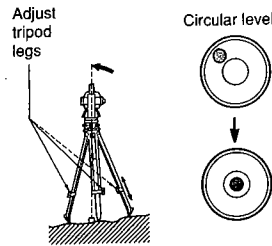
7.2 Levelling

Centre the surveying point in the reticle



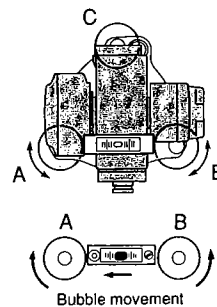
- 1) Adjust the levelling foot screws ⑫ to centre the surveying point in the optical plummet reticle.

Centre the bubble in the circular level



- 2) Observe the off-centre direction of the bubble in the circular level ⑨, and shorten the nearest tripod leg, or extend the leg farthest from that direction to centre the bubble.
- 3) One more tripod leg must be adjusted to centre the bubble.

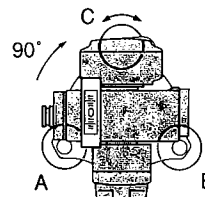
Centre the bubble in the plate level



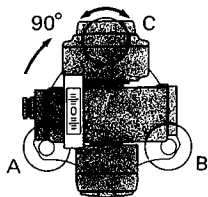
- 4) Loosen the horizontal clamp ⑫ to turn the upper part of the instrument until the plate level ⑬ is parallel to a line between levelling screws A and B.
- 5) Centre the air bubble, using levelling screws A and B.

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

Turn 90° and centre the bubble



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

Turn another 90° and check bubble position

- 8) Turn the upper part of the instrument a further 90° and check to see if the bubble is in the centre of the plate level.

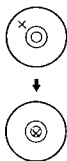
If the bubble is off-centre, perform the following:

- ① Adjust levelling screws A and B in equal and opposite directions, to remove half of the bubble displacement.
- ② Turn the upper part a further 90°, and use levelling screw C to remove half of the displacement in this direction.

Or try the adjustment described on P.149, under "22.1 Plate level".

Check to see if bubble is in same position in any direction

- 9) Turn the instrument and check to see if the air bubble is in the same position for any position of the upper part.
If it is not, repeat the levelling procedure.

Focus on the centre of the reticle again

- 10) Loosen the centring screw slightly.
- 11) Looking through the optical plummet eyepiece, slide the instrument over the tripod head until the surveying point is exactly centred in the reticle.
- 12) Retighten the centring screw securely.

Check plate level bubble again

- 13) Check again to make sure the bubble in the plate level is centred. (If not, repeat the procedures starting from step 4.)

8 POWER ON

- When the power is turned on, a self-check is run to make sure the instrument is operating normally.

Turn on the power



SET B model 2
No. 88132
Ver. 70-xx

Self check ok


or

Memory cleared

Battery level 3

- 0: less than 20%
- 1: less than 50%
- 2: less than 80%
- 3: less than 100%

Battery is low

- 1) Turn on the power switch  after completing sections 6 and 7.

- 2) The instrument name, instrument number, and software version are displayed for several seconds, an audio tone sounds, and the instrument performs self-diagnostic checks.

On successful completion of the checks, "Self check ok" is displayed for 2 secs.

Note: After power-off for more than 1 week, the previously stored data have been cleared from the short-term memory and "Memory cleared" is displayed.

- 3) The remaining battery power is then displayed for 3 seconds as a numeric value. (BDC25, Coarse meas. mode, Single meas., Temperature 25°C.)

If the battery is at the "low" level, the message "Battery is low" will be displayed, and an audio tone sounds. Turn the power off and charge the battery.

If the battery power becomes low during surveying, the same message will be displayed.

ZA	0 SET
HAR	0 SET

Out of range		
X	> ⊥	< Y

- 4) This display indicates that the instrument is ready for vertical and horizontal circle indexing.
- If the parameter horizontal indexing is set to "Manual", a horizontal angle of 0° is displayed, when the power is turned on.

If this error message is displayed, the instrument tilt sensor is indicating that the instrument is off-level. Relevel the instrument once again, using the plate level bubble.

- When "Face 1" is displayed for the vertical angle, please refer to P.183 (Appendix 1: Manually indexing the vertical circle).

Instrument parameter No.8 P.167

Parameter No.8 can change the indexing method. Options are indexing by transitting the telescope or indexing by face left, face right sightings.

[Note: Changing the brightness of the display]

- If the display appears too dim or too bright, the keyboard can be used to adjust the brightness level (6 levels).
For a brighter display → Press **ENT** **SHFT** and **7/** **ROL** at the same time .
For a dimmer display → Press **ENT** **SHFT** and **S-0** at the same time .

[Note: Power-saving cut-off]

- SET B switches off automatically 30 minutes after the last key operation.

Instrument parameter No.12 P.167

- Parameter No. 12 can be changed so that the SET B will not switch off automatically after 30 minutes.

