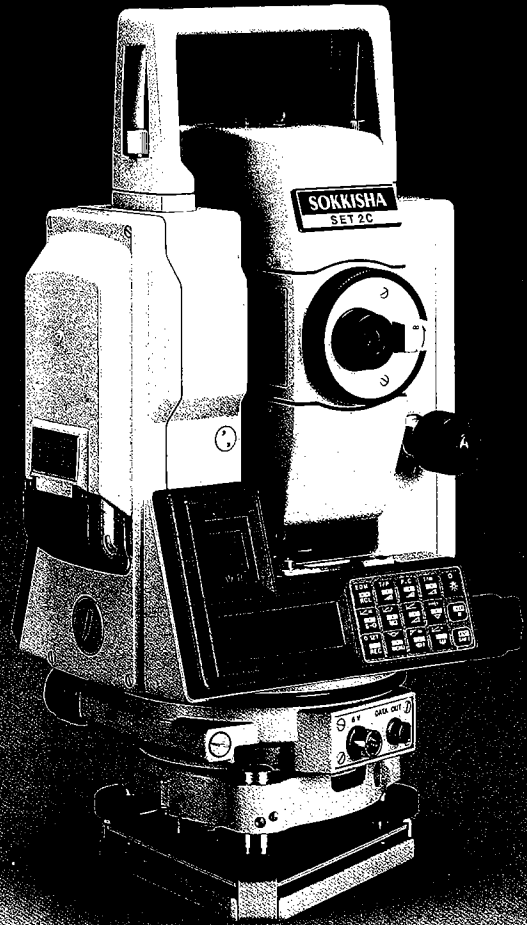


INTELLIGENT TOTAL STATION  
**SET2C**  
OPERATOR'S MANUAL



**SOKKISHA**

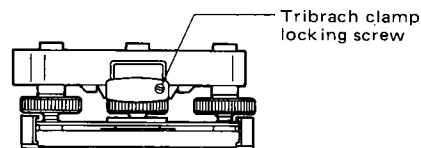
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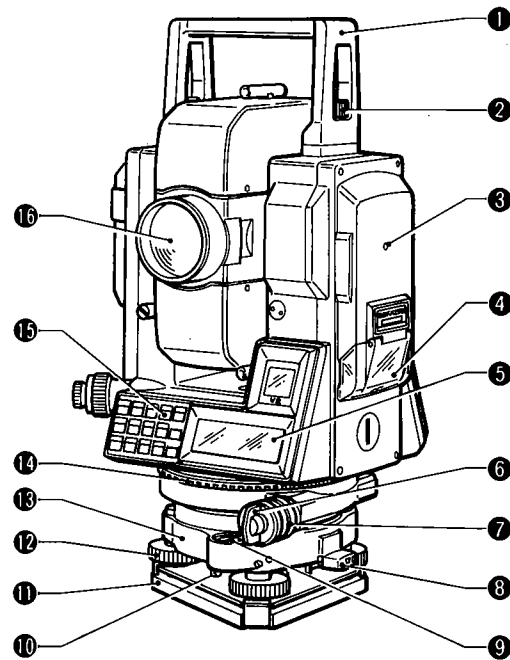
**IMPORTANT**

When the new SET2C is shipped, the tribrach clamp is fixed with a screw. Loosen it and leave it loose.

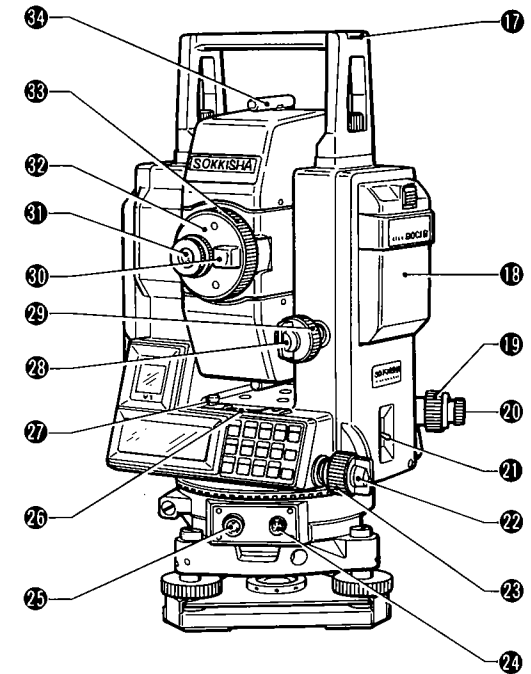
**1. PRECAUTIONS**

- 1) When the SET2C is not used for a long time, check it at least once every three months.
- 2) Handle the SET2C with care. Avoid heavy shocks or vibration.
- 3) If any trouble is found on the rotatable portion, screws or optical parts (e.g. lens), contact our agent.
- 4) When removing the SET2C from the carrying case, never pull it out by force. The empty carrying case should then be closed to exclude dust.
- 5) Never place the SET2C directly on the ground.
- 6) Never carry the SET2C on the tripod to another site.
- 7) Protect the SET2C with an umbrella against direct sunlight, rain and humidity.
- 8) When the operator leaves the SET2C, the vinyl cover should be placed on the instrument.
- 9) Do not aim the telescope at the sun.
- 10) Always switch the power off before removing the internal battery.
- 11) Always remove the battery from the SET2C when returning it to the case.
- 12) Do not wipe the display ⑤, keyboard ⑬ or the carrying case with an organic solvent.
- 13) When the SET2C is placed in the carrying case, follow the layout plan.
- 14) Make sure that the SET2C 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 Memory card cover      | ⑬ Tribrach                           |
| ⑤ 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            | ⑳ Plate level                        |
| ⑱ Battery BDC18                   | ㉑ Plate level adjusting screw        |
| ㉒ Optical plummet focussing ring  | ㉓ Vertical clamp                     |
| ㉔ Optical plummet eyepiece        | ㉕ Vertical fine motion screw         |
| ㉖ Power switch                    | ㉗ Telescope transitting knob         |
| ㉘ Horizontal clamp                | ㉙ Telescope eyepiece                 |
| ㉚ Horizontal fine motion screw    | ㉛ Telescope reticle adjustment cover |
| ㉜ Data output connector           | ㉝ Telescope focussing ring           |
| ㉞ External power source connector | ㉟ Peep sight                         |

Note: Fine motion screws.

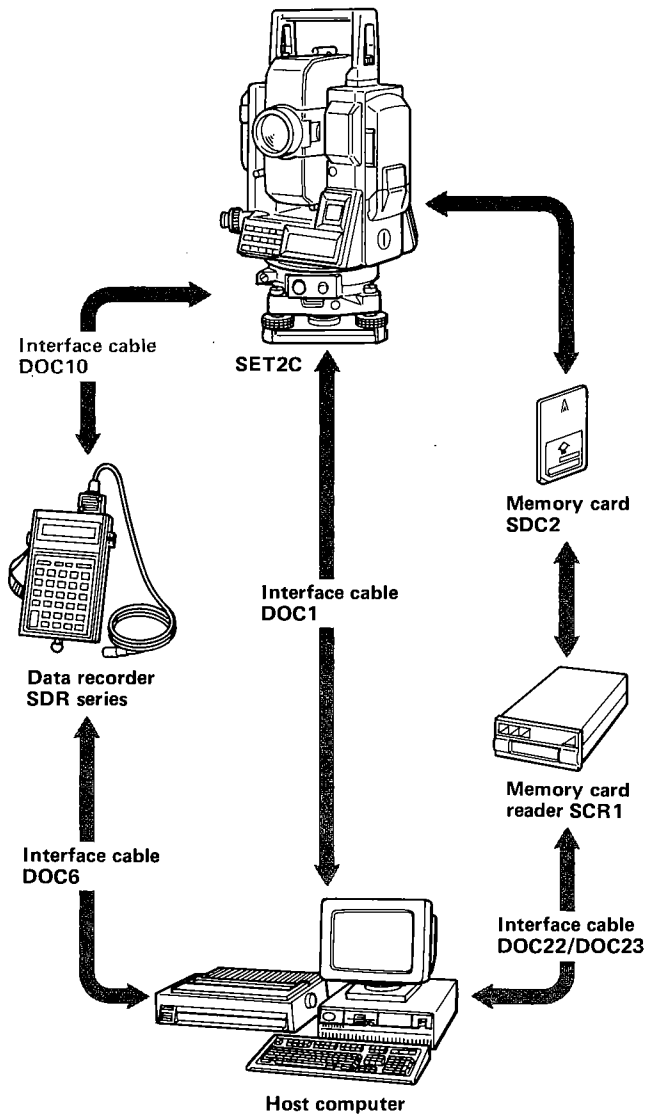
The horizontal and vertical fine motion screws have 2-speed (coarse and fine) motions. The motion is coarse when the screws feel heavy to rotate. The opposite turning direction gives a moveable fine motion "window".

### 3. FEATURES

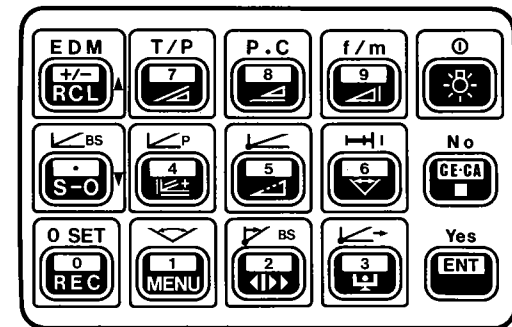
The Intelligent Total Station SET2C is an advanced Electronic Total Station.







- Distance and angle measurements are electronically measured and displayed on a main display located on both faces of the instrument. These 3-line, 48-character alphanumeric dot-matrix displays can simultaneously show measured or stored angle and distance data or N- and E-coordinates and height, or display prompts and messages. The 3-line, 12-character sub-display on each face of the instrument shows the atmospheric correction, prism constant value and instrument mode.
  - Advanced software functions include the calculation of 3-dimensional coordinates, automatic calculation and setting of the azimuth angle from input coordinates, traverse-style measurement, and setting out from input coordinates, in addition to the standard functions of remote elevation measurement, missing line measurement and setting out by distance and angle. The distance measurement can be set to single or repeat readings with a choice of fine, coarse or tracking-type measurement modes. The Instrument parameter settings are stored in an internal memory which can be changed by key operation, and remain stored in the memory even after power off. The atmospheric correction ppm values are calculated by the instrument after input of the temperature and pressure values. A micro-computer constantly checks the instrument operation; if an error is detected, an error message or code is displayed.
  - Both the horizontal and vertical circles are provided with 0 index points. The horizontal index can be set to any direction and the value is stored in the short-term memory so that even after power is switched off (i.e. battery change), the previous index position can be recovered when the instrument is switched on and the circle is indexed again (in auto indexing mode).
  - The tilt angles of the vertical axis are measured by an internal 2-axis tilt sensor. These tilt angles can be displayed for use in accurately levelling the instrument, and can also be used to automatically compensate the vertical and horizontal angles.
- The SET2C instruments have 2-speed horizontal and vertical fine motion screws for fast and precise target sighting.
  - Measured and input data can be recorded by the SET2C on Sokkisha SDC2 memory cards. One 32Kb card can store approximately 500 measured target points in angle and distance (S, V, H) format. The data stored on the memory card can be reviewed on the SET2C or read and output to a host computer using the optional Sokkisha SCR1 memory card reader, or by direct communication through the data output connector.
  - The SET2C RS232C-compatible data output connector allows 2-way communication with an external device.
























## The SET2C Communication System



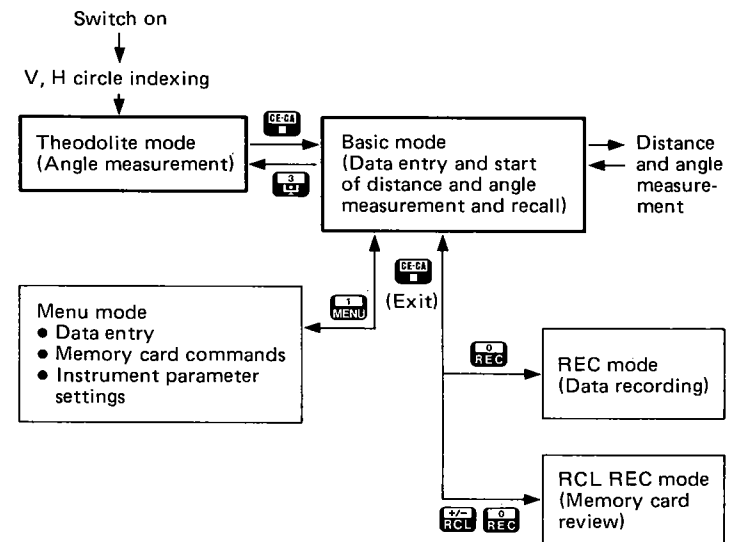
## 4. KEY FUNCTIONS



- 
  - Select the distance measuring mode ( $\text{ENT SHFT} + \text{EDM +/- RCL}$ )
  - Change the sign of the data input value
  - Recall data from the memory
  - Move to previous option ( $\blacktriangle$ )
- 
  - Enter the Atmospheric correction (Temperature/Pressure values ( $\text{ENT SHFT} + \text{T/P 7}$ ))
  - Enter "7"
  - Measure slope distance
- 
  - Enter the prism constant value ( $\text{ENT SHFT} + \text{P.C 8}$ )
  - Enter "8"
  - Measure horizontal distance
- 
  - Change meters  $\leftrightarrow$  feet for 5 seconds ( $\text{ENT SHFT} + \text{f/m 9}$ )
  - Enter "9"
  - Measure height difference
- 
  - EDM power ON/OFF for locating prism ( $\text{ENT SHFT} + \text{0 Sun icon}$ )
  - Display and reticle illumination ON
- 
  - Enter Backsight station coordinates ( $\text{ENT SHFT} + \text{BS S-O}$ )
  - Enter "." (Decimal point)
  - Setting out measurement (+ mode key)
  - Move to next option ( $\blacktriangledown$ )

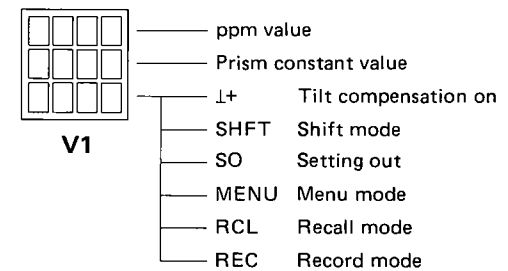
- 
  - Enter coordinates of point to be set out (  +  )
  - Enter "4"
  - Measure 3-dimensional coordinates
- 
  - Enter Instrument station coordinates (  +  )
  - Enter "5"
  - Measure remote elevation
- 
  - Enter distance setting out data (  +  )
  - Enter "6"
  - Missing line measurement
- 
  - Clear entered data
  - Stop measurement and transfer to basic mode
  - Exit from mode
  - Enter "No"
- 
  - Set the horizontal angle to zero/In Missing line measurement, change the starting (  +  ) point
  - Enter "0"
  - Output data to the memory card
- 
  - Set horizontal circle to a required value (  +  )
  - Enter "1"
  - Transfer to menu mode
- 
  - Set azimuth angle from Instrument and Backsight station coordinates (  +  )
  - Enter "2"
  - Select horizontal angle right, left or repetition
- 
  - Set Instrument station coordinates and azimuth angle using data from previous station (  +  )
  - Enter "3"
  - Transfer to theodolite mode
  - Display tilt angle (When instrument is in Theodolite mode and the "Tilt correction" parameter is ON)
- 
  - Enter data into memory
  - Select/release SHIFT mode (Upper key functions)
  - Enter "Yes"

## MODE DIAGRAM



## DISPLAY SYMBOLS

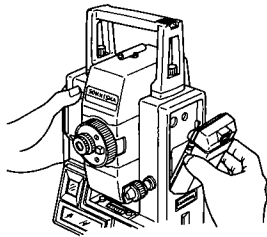
Upper Display:



The main lower display shows program prompts, stored, entered and measured data, and error messages.



## 5. BATTERY BDC18: MOUNTING AND CHECK



Self check ok

Battery level 3

ppm  
p.c  
↓+

V1

ZA 0 SET  
HAR 0 SET

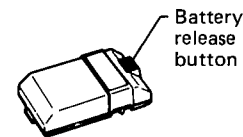
- 1) Ensure that the SET2C power switch ① is off.
- 2) Mount the BDC18 battery in the SET2C. Hold the left standard and push the battery until a click is heard. Confirm that the battery is securely mounted.
- 3) Level the SET2C instrument.
- 4) Instrument and battery check: Switch the SET2C power switch ① on.
  - ▷ The audio tone sounds and the instrument performs self-diagnostic checks. "Self check ok" is displayed for two seconds when the instrument has successfully completed the checks.

The remaining battery power is then displayed for three seconds in the format "Battery level X" where X represents the battery level as follows:

Code	0 .....	less than 1 hr	[Angle-only measurement at 25°C]
	1 .....	3 hrs	
	2 .....	6 hrs	
	3 .....	9 hrs	

- ▷ The display of "ZA/HAR 0 SET" indicates that the instrument is ready for vertical and horizontal circle indexing. If "HAR 0°00'00" or "ZA Face 1" is displayed, the Horizontal/Vertical indexing is set to "Manual". See "Instrument parameter settings" on page 44—.

Battery is low



Memory error

ppm  
P.C  
↓+

V1

Out of range

If "Battery is low" is displayed, the BDC18 battery should be recharged or replaced by a charged battery. To remove the battery, ensure that the SET2C power switch is off, then push down the battery release button.

A display of "Memory error" after more than 1 week of power off means that previously-entered data such as station and backsight coordinates, instrument and target heights and setting out information has been cleared from the short term memory.

- When the ↓+ symbol is shown on the small display, the vertical and horizontal angles are automatically compensated for small tilt errors using the 2-axis tilt sensor. The tilt sensor has a range of ±3'.

If "Out of range" is displayed, the SET2C tilt sensor is indicating that the instrument is off-level. The instrument should be re-levelled using the plate level bubble.

Instrument parameters: See page 44—.

The "Tilt correction (Dual axis)" parameter can be used to switch on (Yes) and off (No) the automatic angle compensation. For example, the compensation should be switched off if the displayed values are unsteady due to vibration or strong wind.

## 6. SETTING UP THE INSTRUMENT

### 6.1 CENTRING THE SET2C BY ADJUSTING TRIPOD LEG LENGTH

- 1) Make sure that:
  - a. The tripod head is approximately level.
  - b. The tripod shoes are firmly fixed in the ground.
- 2) Set the SET2C on the tripod head. Tighten the centring screw.
- 3) Focus on the surveying point:
  - a. Turn the optical plummet eyepiece ⑩ to focus on the reticle.
  - b. Turn the optical plummet focussing ring ⑪ to focus on the surveying point.
- 4) Turn the levelling foot screws ⑫ to centre the surveying point in the reticle.
- 5) Observe the off-centre direction of the bubble in the circular level ⑨. Shorten the leg nearest that direction, or extend the leg farthest from that direction.  
Generally, two legs must be adjusted to centre the bubble.
- 6) When centring of the circular level is completed, turn the levelling screws to centre the plate level ⑮ bubble.
- 7) Look through the optical plummet again. If the surveying point is off-centre, loosen the centring screw to centre the surveying point on the reticle. Tighten the centring screw.
- 8) Repeat 6), 7) if the plate level bubble is off-centre.

### 6.2 FOCUSING

- 1) Looking through the telescope, turn the eyepiece fully clockwise, then anticlockwise until just before the reticle image becomes blurred. In this way, frequent refocussing can be dispensed with, since your eye is focussed at infinity.
- 2) Loosen the vertical ⑳ and horizontal clamp ㉑.  
Bring the target into the field of view with the peep sight ㉒. Tighten both clamps.
- 3) Turn the focussing ring ㉓ and focus on the target.  
Sight the target centre using the vertical ㉔ and horizontal fine motion screws ㉕. Focus on the target until there is no parallax between the target and the reticle.

#### Parallax:

Relative displacement of target image in respect to the reticle when observer's head is moved slightly before the eyepiece.

If sighting is carried out before parallax is eliminated, this will introduce errors in reading and will impair your observations.

