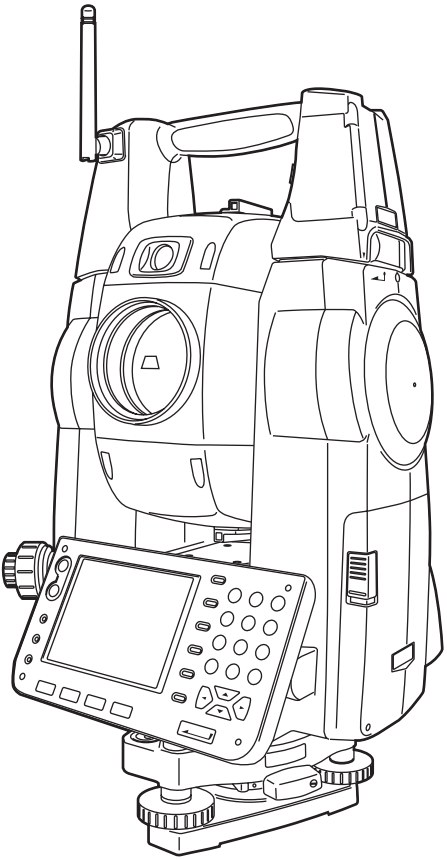
SOKKIA

Series SRX

SRX1X
SRX2X
SRX3X
SRX5X

Total Station



Class 3R Laser Product

OPERATOR'S MANUAL

Li-ion CONTAINS Li-ion BATTERY.
MUST BE RECYCLED OR DISPOSED OF PROPERLY.

JSIMA

This is the mark of the Japan Surveying Instruments Manufacturers Association.

SOKKIA

Series SRX

SRX1X
SRX2X
SRX3X
SRX5X

Total Station

Class 3R Laser Product

OPERATOR'S MANUAL

- Thank you for selecting the SRX1X/SRX2X/SRX3X/SRX5X.
- Please read this operator's manual carefully before using this product.
- Verify that all equipment is included.
  ☞"35. STANDARD EQUIPMENT"
- SRX has a function to output data to a connected host computer. Command operations from a host computer can also be performed. For details, refer to "Interfacing with the SOKKIA SDR Electronic Field Book" and Command Explanations manuals and ask your local dealer.
- The specifications and general appearance of the instrument are subject to change without prior notice and without obligation by Sokkia Topcon Co., Ltd. and may differ from those appearing in this manual.
- The content of this manual is subject to change without notice.
- Some of the diagrams shown in this manual may be simplified for easier understanding.

Regarding other manuals

- Manuals 2, 3, and 4 below are electronic manuals provided on a CD-ROM in PDF format ().

  Adobe Reader is necessary in order to view these documents. The latest version of Acrobat Reader can be downloaded from the Adobe homepage.
- The SRX comes equipped with 5 manuals for operation information:
  1. Series SRX Operator's Manual (this manual):

     Explains basic operation and functions of the SRX.

  2. Spectrum Survey Field Program Explanations  :

     Explains advanced measurement operations using the Spectrum Survey Field.

  3. SFX Dial-Up Program Explanations  :

     Explains how to send and receive data using the SFX function

  4. Mesh-Scan Survey Program Explanations  :

     Explains how to measure using the Mesh-Scan Survey function

  5. Quick Start Guide:

     Simplified explanations of operations such as Auto Tracking to allow users to get started straight away.

  For Auto Tracking measurement, read this manual in conjunction with the On-demand Remote Control System Manual.

Symbols

The following conventions are used in this manual.

 : Indicates precautions and important items which should be read before operations.

 : Indicates the chapter title to refer to for additional information.

: Indicates supplementary explanation.

 : Indicates an explanation for a particular term or operation.

[Softkey] etc. : Indicates softkeys on the display and window dialog buttons.

{Key} etc. : Indicates keys on the operation panel.

<Screen title> etc.: Indicates screen titles.

Notes regarding manual style

- Except where stated, “SRX” means SRX1X/SRX2X/SRX3X/SRX5X in this manual.
- Except where stated, “SSF” means Spectrum Survey Field in this manual.
- The SRX is available in both "Auto Tracking" and "Auto Pointing" models. Users with an "Auto Tracking" instrument should read the instructions regarding the Auto Tracking function. The "Auto Pointing" model does not support Auto Tracking.
- Screens and illustrations appearing in this manual are of SRX3X (Auto Tracking model with RC-TS3 handle).
- Location of softkeys in screens used in procedures is based on the factory setting. It is possible to change the allocation of softkeys.

☞ Softkey allocation: "30.6 Allocating Key Functions"

- Learn basic operations in "4. PRODUCT OUTLINE" and "5. BASIC OPERATION" before you read each measurement procedure. An overview of the available SRX functions is given in "4.1 Functions". For selecting options and inputting figures, see "5.1 Basic Key Operation".
- Measurement procedures are based on continuous measurement. Some information about procedures when other measurement options are selected can be found in “Note” (Note).

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1. PRECAUTIONS FOR SAFE OPERATION

For the safe use of the product and prevention of injury to operators and other persons as well as prevention of property damage, items which should be observed are indicated by an exclamation point within a triangle used with WARNING and CAUTION statements in this operator's manual.
The definitions of the indications are listed below. Be sure you understand them before reading the manual's main text.

Definition of Indication

⚠ WARNING	Ignoring this indication and making an operation error could possibly result in death or serious injury to the operator.
⚠ CAUTION	Ignoring this indication and making an operation error could possibly result in minor injury or property damage.

△ This symbol indicates items for which caution (hazard warnings inclusive) is urged. Specific details are printed in or near the symbol.

⃠ This symbol indicates items which are prohibited. Specific details are printed in or near the symbol.

● This symbol indicates items which must always be performed. Specific details are printed in or near the symbol.

General

⚠ Warning

⃠ Do not use the unit in areas exposed to high amounts of dust or ash, in areas where there is inadequate ventilation, or near combustible materials. An explosion could occur.

⃠ Do not perform disassembly or rebuilding. Fire, electric shock, burns, or hazardous radiation exposure could result.

⃠ Never look at the sun through the telescope. Loss of eyesight could result.

⃠ Do not look at reflected sunlight from a prism or other reflecting object through the telescope. Loss of eyesight could result.

⃠ Direct viewing of the sun using the telescope during sun observation will cause loss of eyesight. Use a solar filter (option), such as that in "36. OPTIONAL ACCESSORIES", for sun observation.

● When securing the instrument in the carrying case make sure that all catches, including the side catches, are closed. Failure to do so could result in the instrument falling out while being carried, causing injury.

⚠ Caution

⃠ Do not use the carrying case as a footstool. The case is slippery and unstable so a person could slip and fall off it.

Do not place the instrument in a case with a damaged catch, belt or handle. The case or instrument could be dropped and cause injury.

Do not wield or throw the plumb bob. A person could be injured if struck.

Keep hands and clothing away from rotating parts. Injury could result from being dragged into the part.

Do not touch the instrument or look through the telescope eyepiece while the motor drive is in operation. Hands could be caught in moving parts or an eye could be struck by the telescope and cause injury.

Secure handle to main unit with handle locks. Failure to properly secure the handle could result in the unit falling off while being carried, causing injury.

Tighten the adjustment tribrach clamp securely. Failure to properly secure the clamp could result in the tribrach falling off while being carried, causing injury.

Power Supply

Warning

Do not short circuit. Heat or ignition could result.

Do not disassemble, rebuild, mutilate, incinerate, heat or short circuit the battery and charger. Fire, electric shock, burns or an explosion could result.

Do not use voltage other than the specified power supply voltage. Fire or electrical shock could result.

Do not use batteries other than those designated. An explosion could occur, or abnormal heat generated, leading to fire.

Do not use damaged power cords, plugs or loose outlets. Fire or electric shock could result.

Do not use power cords other than those designated. Fire could result.

Do not place articles such as clothing on the battery charger while charging batteries. Sparks could be induced, leading to fire.

Use only the specified battery charger to recharge batteries. Other chargers may be of different voltage rating or polarity, causing sparking which could lead to fire or burns.

Do not heat or throw batteries into fire. An explosion could occur, resulting in injury.

Do not use the battery, charger or AC (power) cable for any other equipment or purpose. Fire or burns caused by ignition could result.

To prevent shorting of the battery in storage, apply insulating tape or equivalent to the terminals. Otherwise shorting could occur resulting in fire or burns.

Do not use batteries or the battery charger if wet. Resultant shorting could lead to fire or burns.

Do not connect or disconnect power supply plugs with wet hands. Electric shock could result.

Caution

Do not touch liquid leaking from batteries. Harmful chemicals could cause burns or blisters.

Tripod

Caution

When mounting the instrument to the tripod, tighten the centering screw securely. Failure to tighten the screw properly could result in the instrument falling off the tripod, causing injury.

Tighten securely the leg fixing screws of the tripod on which the instrument is mounted. Failure to tighten the screws could result in the tripod collapsing, causing injury.

Do not carry the tripod with the tripod shoes pointed at other persons. A person could be injured if struck by the tripod shoes.

Keep hands and feet away from the tripod shoes when fixing the tripod in the ground. A hand or foot stab wound could result.

Tighten the leg fixing screws securely before carrying the tripod. Failure to tighten the screws could lead to the tripod legs extending, causing injury.

***Bluetooth* wireless technology**

Warning

Do not use within the vicinity of hospitals. Malfunction of medical equipment could result.

Use the instrument at a distance of at least 22 cm from anyone with a cardiac pacemaker. Otherwise, the pacemaker may be adversely affected by the electromagnetic waves produced and cease to operate as normal.

Do not use onboard aircraft. The aircraft instrumentation may malfunction as a result.

Do not use within the vicinity of automatic doors, fire alarms and other devices with automatic controls as the electromagnetic waves produced may adversely affect operation resulting in an accident.

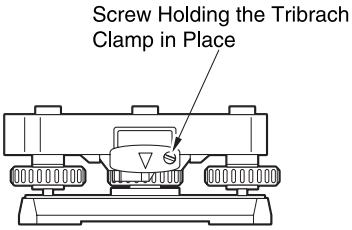
2. PRECAUTIONS

Telescope

- Aiming the telescope at the sun will cause internal damage to the instrument. Use the solar filter when observing the sun.
  ☞"36. OPTIONAL ACCESSORIES"

Tribrach Clamp and Handle

- When the instrument is shipped, the tribrach clamp is held firmly in place with a locking screw to prevent the instrument from shifting on the levelling base. Before using the instrument the first time, loosen this screw with a screwdriver. And before transporting it, tighten the locking screw to fasten the tribrach clamp in place so that it will not shift on the levelling base.
- The SRX handle can be removed. When operating the SRX with the handle attached, always make sure that the handle is securely fixed to the SRX body with the handle lock levers.



Precautions concerning water and dust resistance

SRX conforms to IP64 specifications for waterproofing and dust resistance when the CF card cover and battery cover are closed.

- Make sure that moisture or dust particles do not come in contact with the terminal or connectors. Operating the instrument with moisture or dust on the terminal or connectors may cause damage to the instrument.
- Be sure to correctly attach the connector caps to protect the SRX from moisture and dust particles when the connector is not in use.
- Make sure that the inside of the carrying case and the instrument are dry before closing the case. If moisture is trapped inside the case, it may cause the instrument to rust.

Charging the battery

- The battery (BDC58) was not charged at the factory. Charge the battery fully before using the SRX.

The Lithium Battery

- The lithium battery is used to maintain the SRX Calendar & Clock function. It can back up data for approximately 5 years of normal use, but its lifetime may be shorter depending on circumstances.

The Levelling Base

- Always use the levelling base provided.

Backing up data

- Data should be backed up (transferred to an external device etc.) on a regular basis to prevent data loss.

Other precautions

- Never place the instrument directly on the ground. Sand or dust may cause damage to the screw holes or the centering screw on the base plate.
- Do not perform automatic vertical rotation of the telescope when using the lens hood, diagonal eyepiece, or solar filter. Such accessories may strike the SRX causing damage.
- Protect the instrument from heavy shocks or vibration.

- Protect the instrument from rain or drizzle with an umbrella or waterproof cover.
- When the operator leaves the instrument attached to the tripod, the vinyl cover should be placed on the instrument.
- Never carry the instrument on the tripod to another site.
- Turn the power off before removing the battery.
- Remove the battery before placing the SRX in its case.
- Make sure that the instrument 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, the instrument could rust.
- Consult your local dealer before using the instrument under special conditions such as long periods of continuous use or high levels of humidity. In general, special conditions are treated as being outside the scope of the product warranty.

Maintenance

- Wipe off moisture completely if the instrument gets wet during survey work.
- Always clean the instrument before returning it to the case. The lens requires special care. First, dust it off with the lens brush to remove tiny particles. Then, after providing a little condensation by breathing on the lens, wipe it with the wiping cloth.
- If the display is dirty, carefully wipe it with a soft, dry cloth. To clean other parts of the instrument or the carrying case, lightly moisten a soft cloth in a mild detergent solution. Wring out excess water until the cloth is slightly damp, then carefully wipe the surface of the unit. Do not use any alkaline cleaning solutions, alcohol, or any other organic solvents, on the instrument or display.
  ☞ For de-activating the touch panel, see "5.2 Display Functions", "30. CHANGING THE SETTINGS"
- Store the instrument in a dry room where the temperature remains fairly constant.
- Check the tripod for loose fit and loose screws.
- If any trouble is found on the rotatable portion, screws or optical parts (e.g. lens), contact your local dealer.
- When the instrument is not used for a long time, check it at least once every 3 months.
  ☞ "32. CHECKS AND ADJUSTMENTS"
- Periodically wipe the contacts on the SRX and handle clean with the cleaning cloth provided. Airborne moisture and dust particles can cause corrosion when the handle is left attached to the main unit for long periods.
  ☞ "4. PRODUCT OUTLINE Removing the handle / Attaching the handle"
- When removing the instrument from the carrying case, never pull it out by force. The empty carrying case should be closed to protect it from moisture.
- Check the instrument for proper adjustment periodically to maintain the instrument accuracy.

Exceptions for responsibility

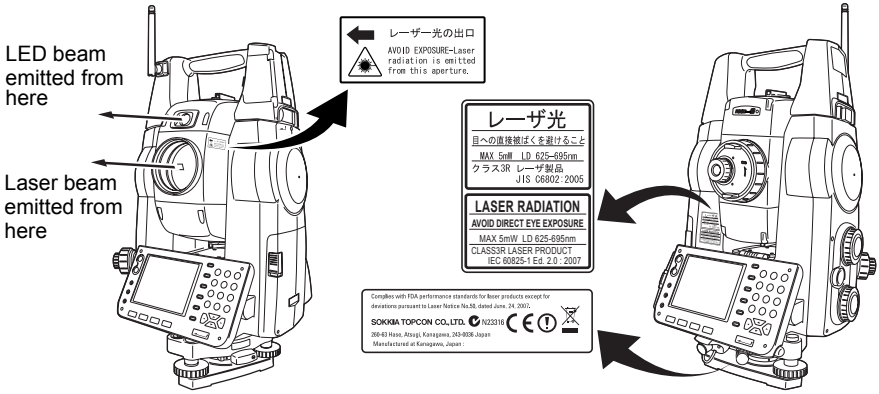
- The user of this product is expected to follow all operating instructions and make periodic checks (hardware only) of the product's performance.
- The manufacturer, or its representatives, assumes no responsibility for results of faulty or intentional usage or misuse including any direct, indirect, consequential damage, or loss of profits.
- The manufacturer, or its representatives, assumes no responsibility for consequential damage, or loss of profits due to any natural disaster, (earthquake, storms, floods etc.), fire, accident, or an act of a third party and/or usage under unusual conditions.
- The manufacturer, or its representatives, assumes no responsibility for any damage (change of data, loss of data, loss of profits, an interruption of business etc.) caused by use of the product or an unusable product.

- The manufacturer, or its representatives, assumes no responsibility for any damage, and loss of profits caused by usage different to that explained in the operator's manual.
- The manufacturer, or its representatives, assumes no responsibility for damage caused by incorrect operation, or action resulting from connecting to other products.

3. LASER SAFETY INFORMATION

SRX is classified as a Class 3R Laser Product according to IEC Standard Publication 60825-1 Ed. 2.0: 2007 and United States Government Code of Federal Regulation FDA CDRH 21CFR Part 1040.10 and 1040.11 (Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No.50, dated June 24, 2007.)

- EDM device in objective lens: Class 3R Laser Product
  (When using prism or reflective sheet as target or when in Auto Tracking mode) Class 1 Laser Product
- Auto pointing device in objective lens: Class 1 Laser Product



- EDM device is classified as Class 3R Laser Product when reflectorless measurement is selected. When the prism or reflective sheet is selected as target, the output is equivalent to the safer class 1.
- The cumulative output during distance measurement and tracking in Auto Tracking mode is equivalent to class 1.

⚠Warning

- Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Follow the safety instructions on the labels attached to the instrument as well as in this manual to ensure safe use of this laser product.
- Never point the laser beam at another person. If the laser beam strikes skin or an eye, it could cause serious injury.
- Do not look directly into the laser beam source. Doing so could cause permanent eye damage.
- Do not stare at the laser beam. Doing so could cause permanent eye damage.
- If an eye injury is caused by exposure to the laser beam, seek immediate medical attention from a licensed ophthalmologist.
- Never look at the laser beam through a telescope, binoculars or other optical instruments. Doing so could cause permanent eye damage.
- Sight the target so that the laser beam does not stray from them.

⚠Caution

- Perform checks at start of work and periodic checks and adjustments with the laser beam emitted under normal conditions.
- When the instrument is not being used, turn off the power and replace the lens cap.
- When disposing of the instrument, destroy the battery connector so that the laser beam cannot be emitted.
- Operate the instrument with due caution to avoid injuries that may be caused by the laser beam unintentionally striking a person in the eye. Avoid setting the instrument at heights at which the path of the laser beam may strike pedestrians or drivers at head height.
- Never point the laser beam at mirrors, windows or surfaces that are highly reflective. The reflected laser beam could cause serious injury.
- When using the laser-pointer function, be sure to turn OFF the output laser after distance measurement is completed. Even if distance measurement is canceled, the laser-pointer function is still operating and the laser beam continues to be emitted.
- Only those who have been received training as per the following items shall use this product.
  - Read the Operator's manual for usage procedures for this product.
  - Hazardous protection procedures (read this chapter).
  - Requisite protective gear (read this chapter).
  - Accident reporting procedures (stipulate procedures beforehand for transporting the injured and contacting physicians in case there are laser induced injuries).
- Persons working within the range of the laser beam are advised to wear eye protection which corresponds to the laser wavelength of the instrument being used.
- Areas in which the lasers are used should be posted with laser warning notices.
- If Search or Track is selected in "A.T. Setting" in the "Configuration" tab of <Motor configuration>, the laser beam will be emitted from the objective lens when tracking a moving prism or searching for the center of the prism.

  ☞ Tracking settings: "12.1 Auto Tracking Settings"

4. PRODUCT OUTLINE

4.1 Functions

SRX has the following features to make operation more efficient.

1. Auto Tracking (Auto Tracking model only)

   The SRX will automatically follow a moving prism when the target is being moved to the next measurement point, making surveying operations such as setting out faster and smoother. Even when an obstacle causes the SRX to momentarily lose the target, the On-demand Remote Control System allows the operator at the target to move the SRX via remote control and re-acquire the target position.

   ☞ "12. MEASUREMENT WITH AUTO TRACKING"

2. *Bluetooth* wireless technology (Models with handle RC-TS3 or H-BT1 only)

   Bluetooth technology removes the need for cumbersome cables and provides wireless communication functionality between the SRX and the On-demand Remote Control System, and data collectors for even greater efficiency gains in the field.

   ☞ "8. CONNECTING TO EXTERNAL DEVICES"

   Bluetooth®

   Use of this technology must be authorized according to telecommunications regulations of the country where the instrument is being used.

   ☞ "39. REGULATIONS"

3. High accuracy with reflectorless measurement

   SOKKIA optics, electrical circuits, and processing algorithms combine to provide superior reflectorless accuracy at distances as short as 30cm.

   RED-tech 800 Revolutionary Digital Processing EDM Technology

4. Various interface options

   Data link options for the SRX include both a CF card slot and USB ports.

5. Full color touch panel display

   Not only does the color screen improve usability, but the Graphic option allows the user to visualise setting out operations. In addition to the operation keys, the touch panel with stylus pen offers another user-friendly method for selecting screens and inputting characters.

   ☞ "5.2 Display Functions"

6. Guide light

Setting-out measurement etc. can be carried out effectively using the guide light. The guide light is composed of a light that is divided into green and red sections. A poleman can ascertain whether to move to the right or left by checking the guide light color.

☞"14.2 Using the Guide Light"

7. Sighting the target using Auto Pointing

Once the instrument is pointed in the general direction of the target, simply pressing **[SRCH]** will automatically sight the center of the prism. When used in collaboration with the On-demand Remote Control System, the SRX will locate the RC-Controller and automatically sight the target allowing all measurement to be performed from target side.

☞"11.2 Auto-Pointing Function for Target Sighting" and "30.3 EDM Settings"

8. Trigger Key for Easier Operation

Each screen contains a number of softkeys. Softkeys displayed in bold type control the flow of measurement operation. Pressing the trigger key located on the side of the SRX will perform exactly the same operation as the bolded softkey in the current screen. This allows the user to continue operation without having to return to the display to press softkeys.

☞"4.2 Parts of the Instrument Trigger key"

9. Wide range of advanced programs

One touch of the **{PROGRAM}** key allows the user to switch from Basic mode to the program selection screen in order to use advanced measurement programs.

☞Switching modes: "4.3 Mode Structure"

10. SETTINGS Mode

One-touch of the **{SETTINGS}** key allows the user to jump to and from the SETTINGS mode during operation without exiting measurement.

☞"4.3 Mode Structure", "5.4 SETTINGS Mode"

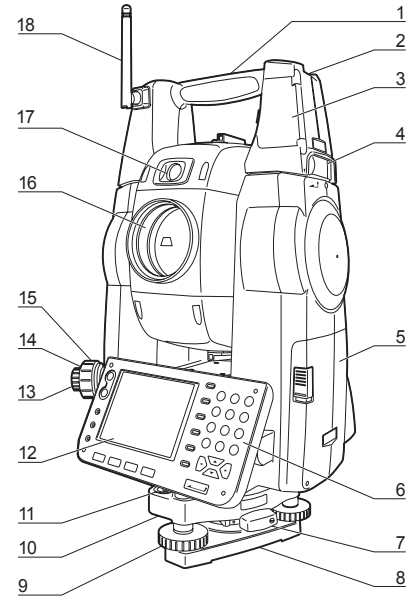
11.SOKKIA original Independent Angle Calibration System (IACS) technology

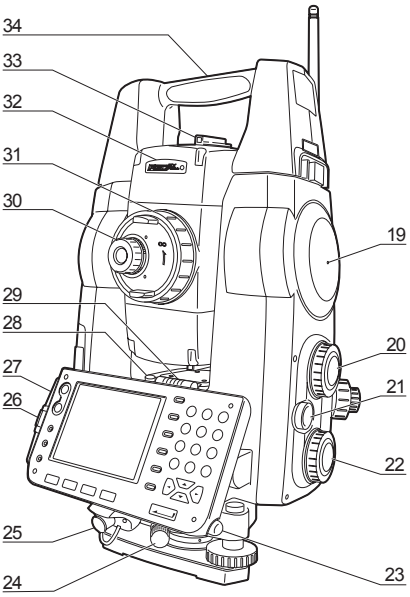
This revolutionary technology provides an even higher level of stability and reliability for angle measurement. With IACS technology, the SRX independently calibrates angle to a high degree of accuracy, and eliminates the need for a reference standard instrument when performing calibration.

☞Independent angle calibration cannot be performed by the user. Consult your local dealer.

4.2 Parts of the Instrument

Parts and functions of the instrument





1 Handle
☞"36. OPTIONAL ACCESSORIES"
2 Tubular compass slot
3 Beam detector (for On-demand Remote Control System operation)
4 Handle lock
5 Battery cover
6 Keyboard ☞ "5.1 Basic Key Operation"
7 Tribrach clamp
8 Base plate
9 Levelling foot screw
10 Circular level adjusting screws
11 Circular level
12 Display
13 Optical plummet eyepiece
14 Optical plummet reticle cover
15 Optical plummet focussing ring
16 Objective lens
(Includes "Laser-pointer function")
17 Guide light
18 *Bluetooth* antenna

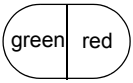
19 Instrument height mark
20 Vertical Jog dial
21 Trigger key
22 Horizontal Jog dial
23 Stylus pen holder
24 Tribrach fixing screw
25 Combined communications and power supply connector
26 CF card slot
☞"6. USING THE CF CARD SLOT"
27 USB ports
☞"8. CONNECTING TO EXTERNAL DEVICES"
28 Plate level adjusting screw
29 Plate level
30 Telescope eyepiece screw
31 Telescope focussing ring
32 Laser radiation warning indicator
33 Peep sight
34 Instrument center mark

Vertical and Horizontal Jog dials

The instrument and telescope can be rotated manually by hand or, for more precise adjustments, by turning the vertical and horizontal Jog dials.
The faster the Jog dials are turned, the faster the instrument and telescope rotate.
☞"11.1 Auto Pointing Settings" step 3

Guide light

Setting-out measurement etc. can be carried out effectively using the guide light. The guide light is composed of a light that is divided into green and red sections. A poleman can ascertain the present position by checking the guide light color.



●Guide light status

Light status	Meaning
Slow flashing (Red and green simultaneously)	Waiting
	Search error (error screen only)
Fast flashing (Red and green simultaneously)	Searching in progress
	Measuring (continuous measurement)
	Returned signal checking in progress
	Auto Tracking in progress (Auto Tracking model only)
	Auto Tracking in predicted direction (Auto Tracking model only)
Green and red alternate flashing	Distance measurement error (no signal, sighting error)
	"Prism wait"

The guide light indicator is lit or flashes depending on the status of the guide light.

Laser radiation warning indicator

Laser radiation warning indicator is red when laser beam is emitted or laser-pointer is used, allowing the status of the laser beam to be ascertained from the telescope eyepiece side.

Peep sight

Use peep sight to aim the SRX in the direction of the measurement point.
Turn the instrument until the triangle in the peep sight is aligned with the target.

Instrument height mark

The height of the SRX is as follows:
- 192.5mm (from tribrach mounting surface to this mark)
- 236mm (from tribrach dish to this mark)

"Instrument height" is input when setting instrument station data and is the height from the surveying point (where SRX is mounted) to this mark.

Trigger key

When the Trigger key is pressed SRX carries out the operation indicated by the softkey in bold type on the screen. This allows the user to continue operation without having to return to the display to press softkeys.

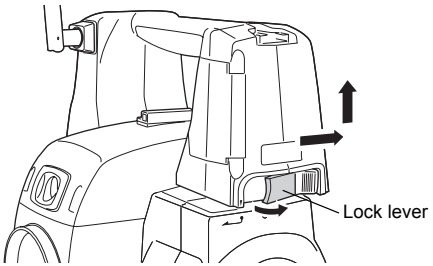
Laser-pointer function

A target can be sighted with a red laser beam in dark locations without the use of the telescope.

Removing the handle

1. Slide the handle locks in the direction as shown at right until a click is heard. The handle is now unlocked.

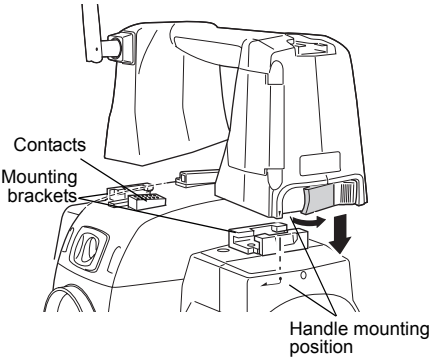
2. Pull the lock levers towards you and slide the handle back and up to remove.
   The handle lock levers, once released, will return to the original position.



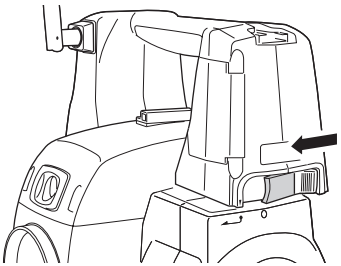
- Make sure that the handle does not fall while being removed. Removing the handle requires a certain amount of force. As a result, always hold firmly when removing.

Attaching the handle

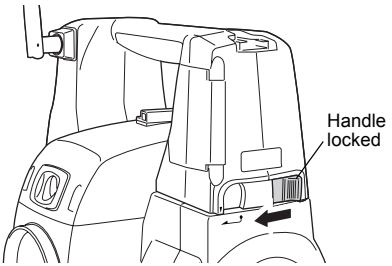
1. Align the handle with the mounting brackets.



2. Slide the handle onto the mounting position until a click is heard. Check that the handle lock levers, once released, return to the closed position.



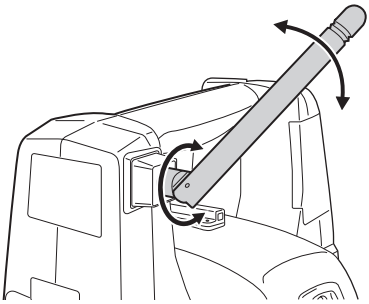
3. Slide the handle locks away from you to lock the handle. Check that the green sections of the handle locks are showing.



- Securely lock the handle in place before starting measurement.

Bluetooth antenna (RC-TS3/H-BT1 handles only)

When performing communication using *Bluetooth* wireless technology, the antenna must be directed towards the zenith.

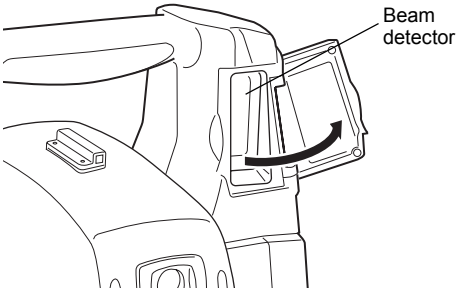


Handle the antenna with care and be aware of the following points when operating.

- An extended antenna may be damaged if struck during operation.
- The antenna may be damaged if forcibly bent in an incorrect direction. The antenna cannot be bent to angles exceeding 90°.
- Always stow the antenna in a downward direction when the instrument is not in use.

Beam detector for On-demand Remote Control System (RC-TS3/RC-TS3A handles only)

Always open the beam detector cover when using the On-demand Remote Control System.



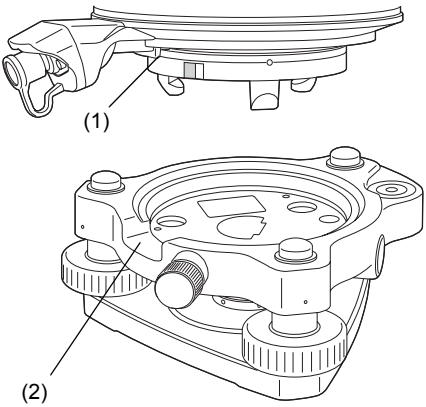
- The beam detector cover can be damaged if forced open beyond a certain angle. Always close the beam detector cover before moving the instrument or placing it in its case.
- Never touch the beam detector. The ability of the system to perform Turning may be adversely affected.

Detaching the instrument from the levelling base

1. Loosen the locking screw by turning 2 or 3 rotations in the counterclockwise direction.
2. Turn the tribrach clamp counterclockwise to loosen.
3. Lift the instrument to detach.

Attaching the instrument to the levelling base

1. Check that the tribrach fixing screw has been loosened.
2. Align (1) and (2) and lower the instrument onto the tribrach.
3. Turn the tribrach clamp clockwise to tighten.
4. Turn the tribrach fixing screw clockwise to tighten.

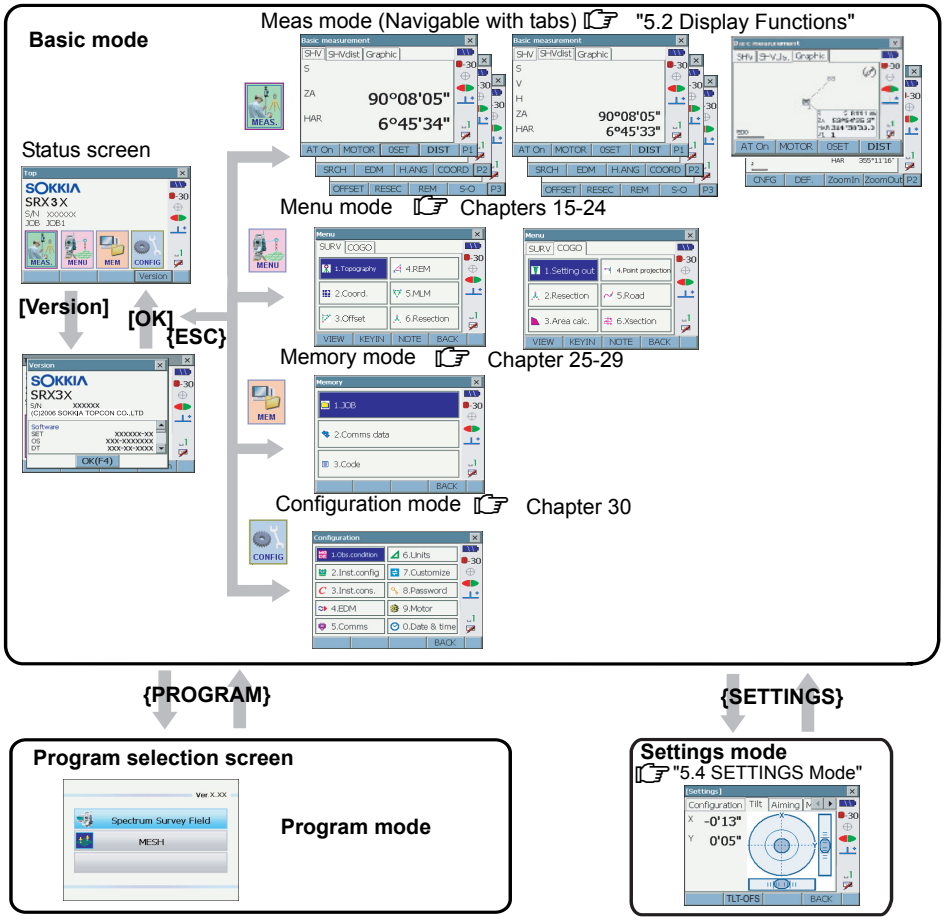


Note

•Always fully tighten the tribrach fixing screw to reduce adverse effects of motor operation on accuracy and ensure optimal results.

4.3 Mode Structure

The diagram below describes the different modes of the SRX and key operations for navigating between them. Managing data functions are contained in Memory mode.



- Programs accessed from the Program selection screen cannot be active simultaneously.
- Switching between modes is not possible during distance measurement or while the motor is in operation.

4.4 *Bluetooth* Wireless Technology

- *Bluetooth* communication is only possible with instruments incorporating either the RC-TS3 or H-BT1 handle.
- Use of this technology must be authorized according to telecommunications regulations of the country where the instrument is being used. Contact your local dealer in advance.
  ☞"39. REGULATIONS"
- Sokkia Topcon Co., Ltd. is not liable for the content of any transmission nor any content related thereto. When communicating important data, run tests beforehand to ascertain that communication is operating normally.
- Do not divulge the content of any transmission to any third party.

Radio interference when using *Bluetooth* technology

Bluetooth communication with the SRX uses the 2.4 GHz frequency band. This is the same band used by the devices described below.

- •Industrial, scientific, and medical (ISM) equipment such as microwaves and pacemakers.
- • portable premises radio equipment (license required) used in factory production lines etc.
- • portable specified low-power radio equipment (license-exempt)
- •IEEE802.11b/IEEE802.11g standard wireless LAN devices

The above devices use the same frequency band as *Bluetooth* communications. As a result, using the SRX within proximity to the above devices may result in interference causing communication failure or reduction of transmission speed.

Although a radio station license is not required for this instrument, bear in mind the following points when using *Bluetooth* technology for communication.

● Regarding portable premises radio equipment and portable specified low-power radio equipment:

- Before starting transmission, check that operation will not take place within the vicinity of portable premises radio equipment or specified low-power radio equipment.
- In the case that the instrument causes radio interference with portable premises radio equipment, terminate the connection immediately and take measures to prevent further interference (e.g. connect using an interface cable).
- In the case that the instrument causes radio interference with portable specified low-power radio equipment, contact your local dealer.

● When using the SRX in proximity to IEEE802.11b or IEEE802.11g standard wireless LAN devices, turn off all devices not being used.

- Interference may result, causing transmission speed to slow or even disrupting the connection completely. Turn off all devices not being used.

● Do not use the SRX in proximity to microwaves.

- Microwave ovens can cause significant interference resulting in communication failure. Perform communication at a distance of 3m or more from microwave ovens.

● Refrain from using the SRX in proximity to televisions and radios.

- Televisions and radios use a different frequency band to *Bluetooth* communications.

However, even if the SRX is used within proximity to the above equipment with no adverse effects with regard to *Bluetooth* communication, moving a *Bluetooth* compatible device (including the SRX) closer to said equipment may result in electronic noise in sound or images, adversely affecting the performance of televisions and radios.

Precautions regarding transmission

● For best results

- When using the On-demand Remote Control System, perform communication within a line-of-sight distance of approximately 300m. The usable range becomes shorter when obstacles block the line of sight, or devices other than the On-demand Remote Control System, such as PDAs or computers, are used. Wood, glass and plastic will not impede communication but the usable range becomes shorter. Moreover, wood, glass and plastic containing metal frames, plates, foil and other heat shielding elements as well as coatings containing metallic powders may adversely affect *Bluetooth* communication and concrete, reinforced concrete, and metal will render it impossible.
- Use a vinyl or plastic cover to protect the instrument from rain and moisture. Metallic materials should not be used.
- The direction of the *Bluetooth* antenna can have adverse effects upon usable range. For best results make sure that the antennas of both the SRX and the paired device are pointing towards one another.

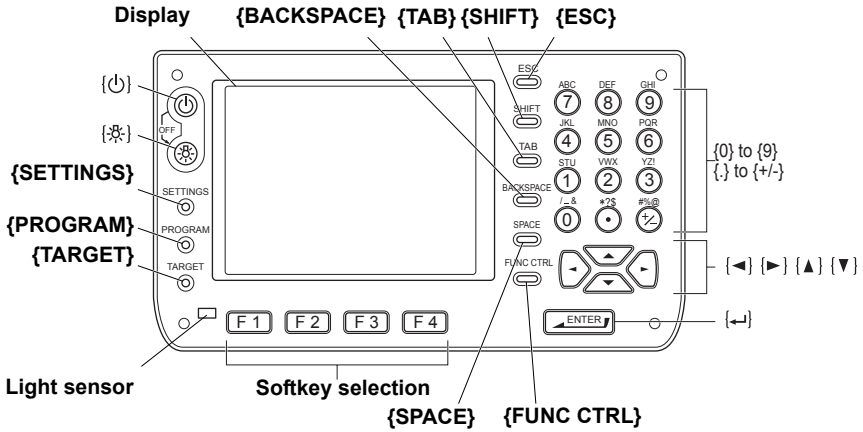
● Reduced range due to atmospheric conditions

The radio waves used by the SRX may be absorbed or scattered by rain, fog, and moisture from the human body with the limit of usable range becoming lower as a result. Similarly, usable range may also shorten when performing communication in wooded areas. Moreover, as wireless devices lose signal strength when close to the ground, perform communication at as high a position as possible.

5. BASIC OPERATION

Learn basic key operations here before you read each measurement procedure.

5.1 Basic Key Operation



● **Power ON/OFF**

{⏻}	Power ON
{⏻} (while pressing) + **{☼}**	Power OFF

● **Lighting up the reticle/keys and selecting screen backlight brightness**

{☼}	Switches the reticle illumination/key backlight ON/OFF
	Switches the screen backlight brightness setting

☞ "30.2 Instrument Configuration", Light sensor: "30.2 Instrument Configuration Color setting"

● **Switching to SETTINGS mode**

{SETTINGS}	Switches to screens for tilt correction, returned signal checking, motor operation, fixed velocity rotation, and general configuration
{SETTINGS}/{ESC}	Returns to the previous screen (mode)

☞ "5.4 SETTINGS Mode"

● **Switching to Program selection screen**

{PROGRAM}	Switches between Basic mode and program selection screen

☞ "5.5 Using the Program Selection Screen"

● **Switching target type**

{TARGET}	Switches between target types

☞ "30.3 EDM Settings"

Note

• Changes can also be made by tapping the status bar icon with the stylus pen.
☞ "5.2 Display Functions"

● **Switching the laser-pointer/guide light ON/OFF**

{☼} (Press and hold until a beep sounds)	Turns the laser-pointer/guide light ON/OFF

☞ Selecting laser-pointer/guide light after pressing **{☼}:** "30.3 EDM Settings"
• Changes can also be made by tapping the status bar icon with the stylus pen.
☞ "5.2 Display Functions"

● **Softkey operation**

Softkeys are displayed on the bottom line of the screen.

{F1} to **{F4}**	Select the function matching the softkeys
{FUNC CTRL}	Toggle between softkey pages

● **Inputting letters/figures**

Character input method can be selected from upper case alphabetic, lower case alphabetic and numeric characters.

Note

•A selection can also be made by tapping the status bar icon with the stylus pen.

{0} to {9}	Input numeral or symbol printed above the key (during numeric input mode)
	Input alphabetic character in the order they are listed (in alphabetic input mode)
{.}	Input a decimal point (during numeric input mode)
{+/-}	Input a plus or minus sign (during numeric input mode)
{ESC}	Cancel the input data
{TAB}	Shift to the next item
{BACKSPACE}	Delete the character to the left
{SPACE}	Input a blank space (increments by 1 when setting the date and time)
{◀}/{▶}	Move the cursor left/right during character input
{ ▲ }/{ ▼ }	Move the cursor up/down during character input
{↵}	Select/accept input word/value

● **Selecting options**

{ ▲ }/{ ▼ }	Move the cursor/selection item up/down
{◀}/{▶}	Move the cursor/selection item left/right or select other option
{TAB}	Shift to the next item
{SPACE}	Display other options
{↵}	Select/accept the option

● **Selecting tabs**

{ ▲ }/{ ▼ }	Move tab/cursor in tab up/down
{◀}/{▶}	Display next tab at left/right

● **Other operation**

{ESC}	Return to previous screen

☞ Tabs: "5.2 Display Functions"

Example: Entering "computer" (lower case) as the name of a new device

1. Tap the input mode icon in the status bar (second from bottom) until "_a" is displayed.

2. Press **{7}** three times.
"c" is displayed.

3. Press **{5}** three times.
"o" is displayed.

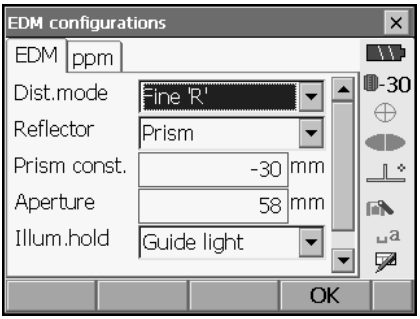
4. Press **{▶}**.
Press **{5}**. "m" is displayed.

5. Continue to input letters. Press **{⏎}** to complete inputting.

Example: selecting a reflector type

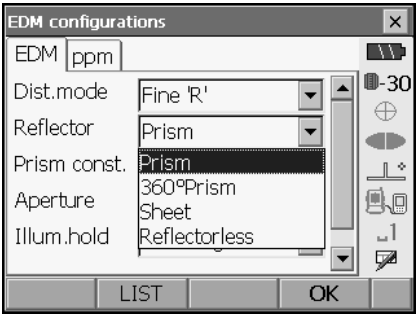
(Method 1)

1. Select **[EDM]** in the second page of Meas mode or "EDM" in SETTINGS mode/Configuration mode.



2. Move to "Reflector" using **{▲}**/**{▼}**/**{TAB}**.

3. Press **{SPACE}** to display a list of all options.



4. Select an option using **{▲}/{▼}.**

5. Press **{↵}** to confirm selection.

(Method 2)

1. Select **[EDM]** in the second page of Measure mode or "EDM" in SETTINGS mode/ Configuration mode.

2. Move to "Reflector" using **{▲}/{▼}/{TAB}**.

3. Switch between Prism, 360° Prism, Sheet, and Reflectorless using **{◀}/{▶}**.

4. Press **{↵}** to confirm selection.

5.2 Display Functions

Screens can be selected/operated using the keys on the keyboard or the touch panel. The touch panel can be operated using either the stylus pen provided or your fingers.
It is also possible to de-activate the touch panel.
☞"30. CHANGING THE SETTINGS"

- Do not scratch the display or use any sharp implement other than the stylus pen to operate the touch panel.

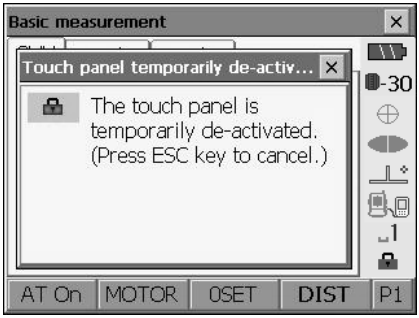
Using the stylus

The stylus pen can be used to select menus and buttons on the screen and operate the scroll bar. The touch panel supports "tap", "double tap", and "drag" operations.

Operation	Method
Tap	Lightly tap the display once. This operation is equivalent to the clicking of a mouse button when using a computer.
Double tap	Lightly tap the display twice on the same point.This operation is equivalent to the "double-click" for a computer mouse.
Drag	Lightly apply the point of the stylus pen to the display and move in the desired direction, maintaining contact between the stylus and display all the time.

Temporarily de-activating the touch panel

The touch panel can be temporarily de-activated. This is especially useful when cleaning the display. To de-activate, tap on the status bar. <Touch panel temporarily de-activated> is displayed.



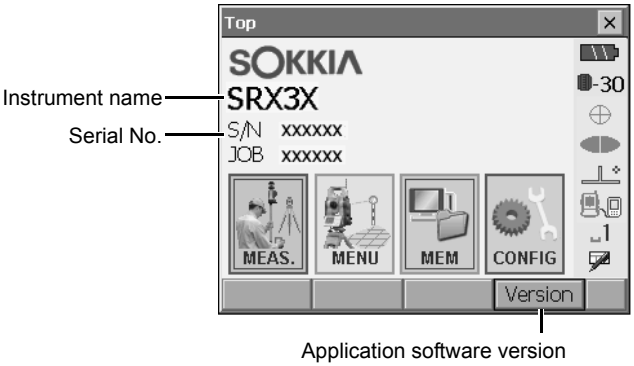
The touch panel cannot be operated while the above message is displayed. Press **{ESC}** to cancel the message and re-activate the touch panel.

Displaying and operating screens

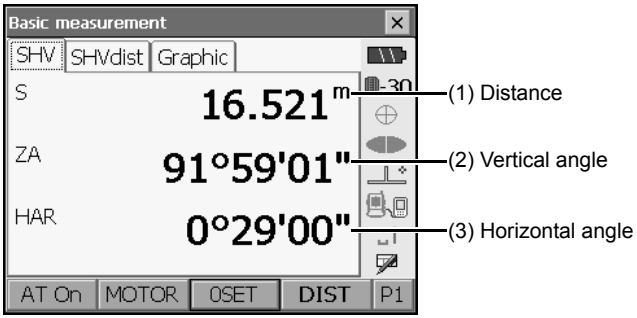
- To close a screen, tap the cross in the top right corner, or press **{ESC}**.
- Tabs, softkey allocations, displayed tab items, and character sizes can all be changed in accordance with user preferences.

☞"30. CHANGING THE SETTINGS"

● **Status screen**



● **Basic measurement screen**



(1) Distance

Press **[/SHV]** to switch between the SHV and SHVdist tabs. An SHVdist tab will be created when one does not exist.

☞"30.1 Observation Conditions"
☞"30.6 Allocating Key Functions"

(2) Vertical angle

The Vertical angle display can be switched between Zenith (Z=0°)/Horiz (H=0°)/Horiz (H=±90°) To switch vertical angle/slope in %, press **[ZA/%]** when allocated to the Meas mode screen. The capitalized letter in the softkey indicates the currently selected mode.

☞"30.1 Observation Conditions"

(3) Horizontal angle

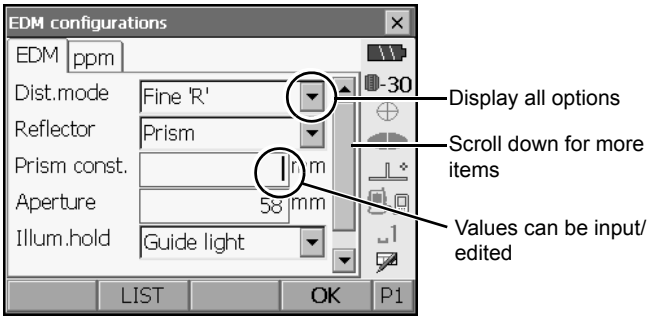
Press **[R/l]** when allocated to the Meas mode screen to switch the display status. The capitalized letter in the softkey indicates the currently selected mode.

HAR : Horizontal angle right

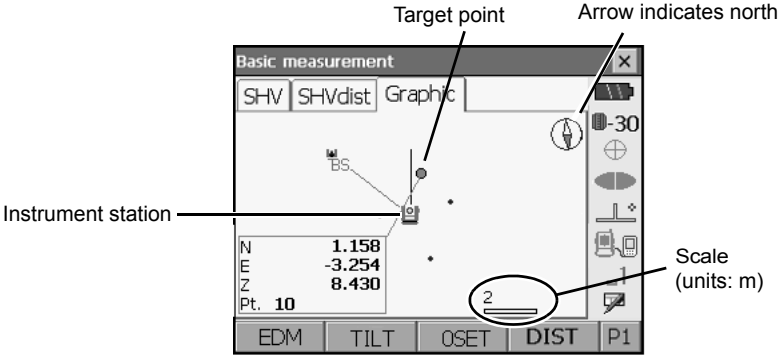
HAL : Horizontal angle left

☞ "30.6 Allocating Key Functions"

● **Input screen/configuration screen**



● **Graphic tab**



The Graphic tab display can be modified using the softkeys in the second page.

[CNFG]: In <Config.> the user can specify the orientation of the graphic tab display and whether or not to display JOB data/Coord data saved in the JOB.

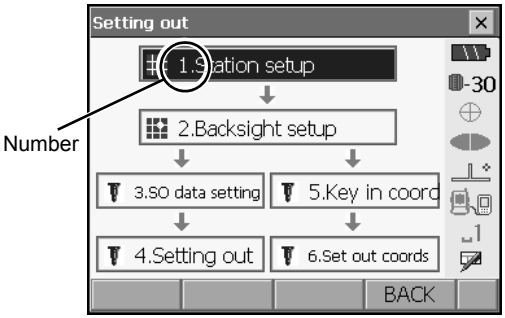
[DEF.]: Returns to the original orientation display.

[ZoomIn]: Zooms in.

[ZoomOut]:Zooms out.

● **Selecting menus**

To select a menu, tap the touch panel or press the relevant number key.



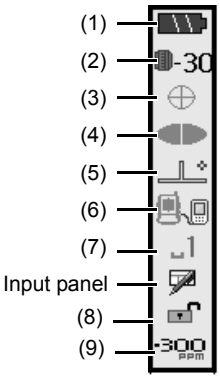
● **Status bar**

Indicates the current status of the instrument. Tapping icons (1) to (9) will switch between the relevant options for that item. Tapping and holding will display a list of all available options for that item and, in certain cases, a link to the configuration screen for that item.

☞ Settings: "30. CHANGING THE SETTINGS"

It is possible to re-arrange status bar icons.

☞ "30.7 Changing Status Bar Icons"



(1)Remaining battery power

Remaining battery power indicator and configuration of auto-power function (BDC58/external battery BDC61, Temperature = 20°, EDM on).

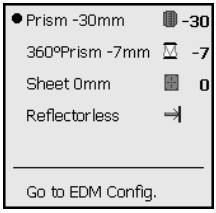
The remaining battery power displayed when distance measurement or motor operation is in progress may differ to that displayed at other times.

: Level 3	Full power
: Level 2	Plenty of power remains
: Level 1	Half or less power remains
Level 0	Little power remains. Prepare a replacement battery where available (Flashes red and black)
: No power	(Red display in the center of the screen) Stop measurement and charge the battery

☞ "7. USING THE BATTERY"

(2) Target display

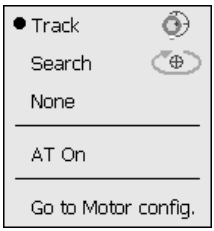
Selection of target type and configuration of prism constant.



: Prism (-30mm)
: 360° Prism (-7mm)
: Sheet (0mm)
: Reflectorless

Target information can be edited/recorded in <Reflector setting>.
☞"30.3 EDM Settings"

(3) Motor configuration
Configuration of Auto Pointing/Auto Tracking status. The display may change slightly depending on the target type selected. Auto Tracking items are only relevant to Auto Tracking models and are not available for Auto Pointing models.



: Auto Tracking ON
: Auto Pointing ON
: Both Auto Tracking and Auto Pointing OFF

: Start Auto Tracking."AT Off" is displayed when performing Auto Tracking or when in "Prism wait" status. Tap to quit Auto Tracking.

One of the following icons will be displayed while the motor is in operation to indicate the current status of the SRX.

: Rotating
: Rotating at fixed velocity
: Searching/Searching after target lost
: Auto Tracking in progress (when Auto Tracking set)
: Auto Tracking idle (when Auto Tracking set)
: Auto Tracking in predicted direction (when Auto Tracking set)
: (Flashes red) Waiting for prism (when Auto Tracking set)

☞"12.2 Measurement with Auto Tracking Lost Prism"

Note

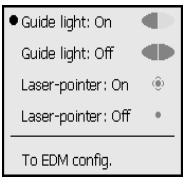
- Auto Tracking and Auto Pointing cannot be performed when "Reflectorless" has been selected as the target type. will be displayed. Auto Tracking cannot be performed when "Sheet" has been selected as the target type. will be displayed
- An arrow indicating turn direction will be displayed when the SRX is rotating at a fixed velocity.

☞ Fixed velocity rotation: "5.4 SETTINGS Mode ● Fixed velocity rotation"

(4) Laser-pointer/guide light

Configuration of laser-pointer/guide light status.

☞ Switching the laser-pointer/guide light ON/OFF: "5.1 Basic Key Operation"



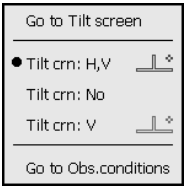
: Guide light ON
: Guide light OFF
: Laser-pointer ON
: Laser-pointer OFF

Note

- The laser-pointer will be automatically switched OFF during distance measurement.

(5) Tilt angle compensation

The vertical and horizontal angles are automatically compensated for small tilt errors usng the SRX's dual-axis tilt sensor. This icon displays the status of this function.



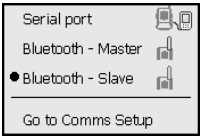
: Horizontal and vertical tilt angles compensated (blue)
: No compensation
: Only horizontal tilt angle compensated (green)

Note

-  is displayed when the instrument is out of level.

(6) Communication status

Selection and configuration of communication status with external devices. This icon is not displayed in Program mode. *Bluetooth* settings can only be selected when using instruments incorporating either the RC-TS3 or H-BT1 handle.



: Connection via RS232C cable
: Connection via *Bluetooth* (SRX set as "Master" device) (blue antenna)
: Connection via *Bluetooth* (SRX set as "Slave" device) (green antenna)

Note

- When *Bluetooth* communication is selected (SRX set as "Master" device) a connection can be initiated/canceled

  by tapping  /  .
- This icon is not displayed in Program mode.

Connection status to external devices is displayed as follows.

i) Connection via *Bluetooth* wireless technology

When SRX is set as the "Master" device the antenna mark is blue. When the SRX is set as the "Slave" device the antenna mark is green.

: Connecting

: Canceling connection

: (Antenna is purple - moving)

SRX set to "Master": Inquiring about other *Bluetooth* devices

: (Antenna is purple - stationary)

Communication settings in progress/Preparing for communication (Instrument just powered ON or just switched to "Slave")

: Connection error (icon flashes green and red)

ii) : Connection via RS232C cable

Note

- An arrow (e.g. /) is displayed to indicate that data transmission is in progress. A red arrow indicates that data transmission has failed and data needs to be sent again.
- If a connection cannot be established or a connection error occurs, there may be dust particles on the contacts between the SRX and handle. Wrap a dry cloth around your fingertip and wipe the contacts clean.

  ☞ Contacts: " 4.2 Parts of the Instrument Removing the handle/Attaching the handle"

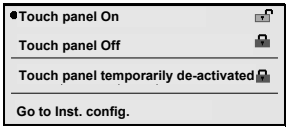
(7) Input mode

Selection of input mode

_1	Inputting numbers and symbols
_A	Inputting upper case alphabetic characters
_a	Inputting lower case alphabetic characters

(8) Touch panel

De-activates/re-activates the touch panel.



: Touch panel ON
: Touch panel OFF
: Touch panel temporarily de-activated

Note

•This icon cannot be operated during distance measurement, or during data transmission.

(9) Atmospheric correction factor (ppm)
Configuration of atmospheric correction factor status

-300 ppm / - 3 ppm : Current atmospheric correction factor setting

Go to EDM config.

Note

•This icon cannot be operated during distance measurement, or during data transmission.

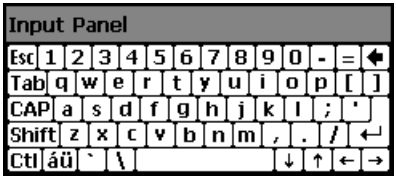
5.3 Inputting Characters using the Input Panel

Tap to display <Input Panel>. This keyboard can be used to input numeric and alphabetic characters as well as symbols. Tap the icon again to close.

Note

- When <Input Panel> is covering the icon of the status bar, use the stylus pen to drag the input panel to another part of the screen so that you can access the icon.

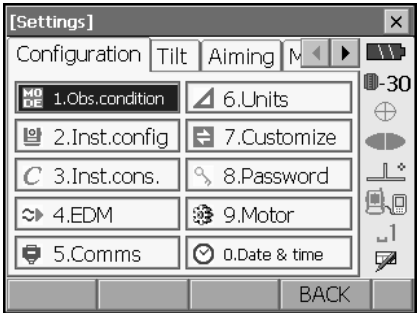
Input panel



Esc	: Deletes all input characters
Tab	: Moves the cursor to the next text box
CAP	: Alternates between upper and lower case alphabetic characters and numbers/ symbols
Shift	: Alternates between upper and lower case alphabetic characters and numbers/ symbols. Is canceled after inputting a single character.
Ctl	: No function
Del/⇦	: Delete the character to the left/right or deletes the entire text in the active section
← →	: Move the cursor left/right
↵	: Accept input characters
Space	: Input a blank space
áü	: Accesses further Latin/Germanic characters/symbols

5.4 SETTINGS Mode

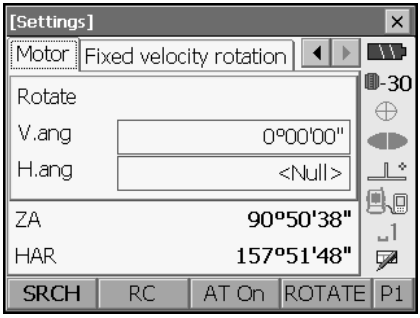
Press **{SETTINGS}** to switch to screens for tilt correction, returned signal checking, motor operation, fixed velocity rotation, and general configuration



☞ Performing settings: "30. CHANGING THE SETTINGS", Tilt settings: "9.2 Levelling", Returned signal checking: "14.1 Returned Signal Checking"

● Motor settings

The instrument can be automatically rotated to a desired vertical and/or horizontal angle by specifying the angle in the "Motor" tab and selecting **[ROTATE]**.

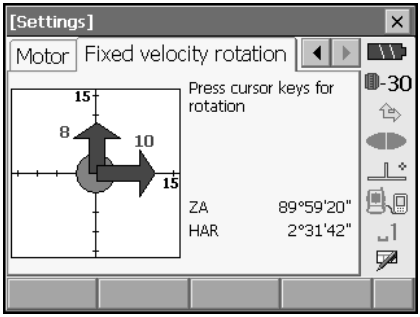


Note

- The following operations can be performed using the softkeys in the second page.
  [READ] : Read in coordinates from Memory mode and set as the desired angle.
  [COORD] : Specify rotation angle by inputting coordinates in <Key in coord>.
  [TURN] : Rotate the SRX 180°.
  [CNFG] : Perform Motor configuration settings. ☞ "12.1 Auto Tracking Settings"

● Fixed velocity rotation

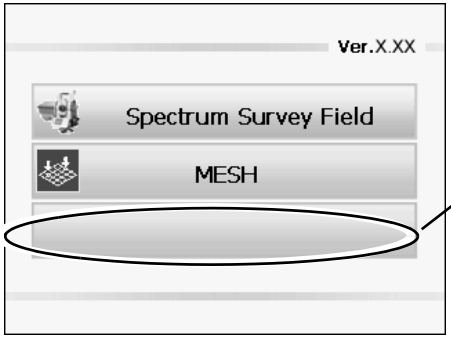
The SRX horizontal angle and telescope can be rotated using the controls in the Fixed velocity rotation tab. Speed settings are from 1 to 16.



Tap the touch panel in the desired rotation direction.
Press **{ESC}** or tap the red center circle/ (arrow mark) in the status bar to stop rotation.

5.5 Using the Program Selection Screen

The program selection screen displays a list of all programs installed on the SRX. Each screen page contains a maximum of 5 program icons. When mutliple screen pages exist, navigating between pages is possible using the arrows that appear at the left/right of the screen.



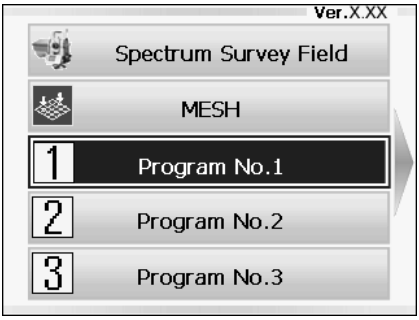
Navigating between pages

The previous/next screen page can be displayed by pressing **{▲}/{▼}/{▶}/{◀}**, or that appear at the left/right of the screen.

Rearranging the icon list

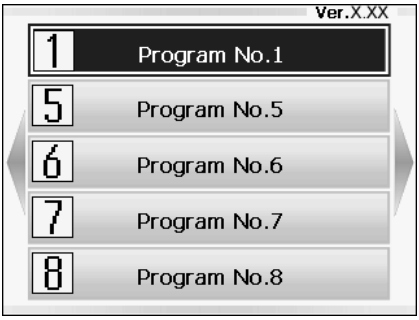
The order in which program icons are displayed in this list can be rearranged in accordance with user preferences.

1. Select the icon you wish to move, then press **{FUNC}**.



2. Use **{▲}**/**{▼}**/**{▶}**/**{◀}** to select the new position for the selected icon.

3. Press **{⏎}** to confirm settings. Press **{ESC}**/**{FUNC}** to discard settings.



6. USING THE CF CARD SLOT

CF (Compact Flash) cards, for saving surveying and other data, are supported by the SRX. Management of JOB and survey data is done in Memory mode.

Note

- Contact your local dealer for details regarding communication formats for CF card input/output.
- Data can also be transferred to an external device with memory capabilities for storage and/or editing using the SRX's USB ports.

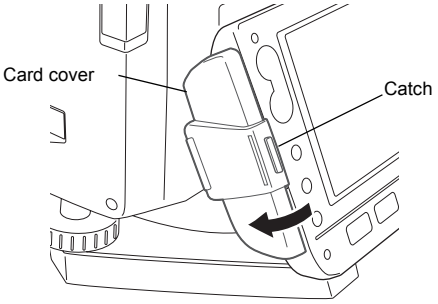
☞"8. CONNECTING TO EXTERNAL DEVICES"

6.1 Inserting/Removing the CF Card

- Do not remove the CF card during data read/write.
- Make sure the eject button is fully depressed when a CF card is inserted. A protruding eject button will be depressed when the card cover is closed causing the card to be ejected.
- Always close the card cover before moving the instrument. The card cover can be damaged if forced open beyond a certain angle.

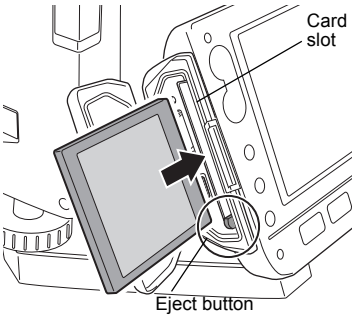
PROCEDURE Inserting the CF card

1. Push the catch on the card cover away from the display to open.



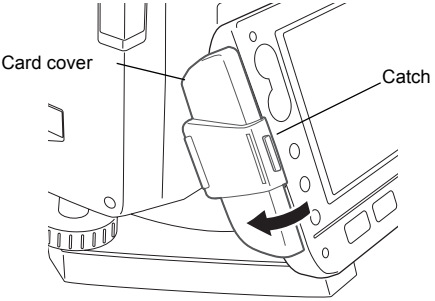
2. Insert the CF card.

3. Close the card cover.

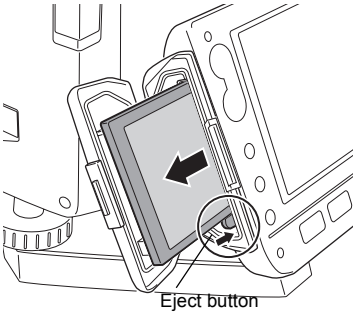


PROCEDURE Removing the CF card

1. Push the catch on the card cover away from the display to open.



2. Press the eject button once to release. Once the eject button is fully protruded, press once more to remove the card from the card slot.



3. Check that the eject button is not protruding, then close the card cover. Make sure the cover is properly closed.

7. USING THE BATTERY

☞ Types of power source: "33. POWER SUPPLY SYSTEM"

7.1 Battery Charging

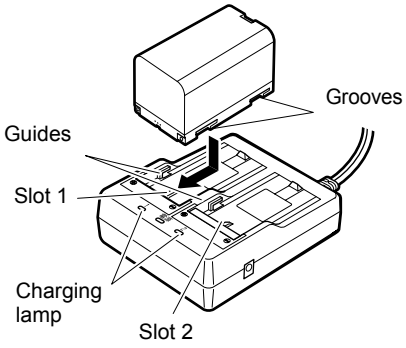
The battery was not charged at the factory. Charge the battery fully before using the SRX.

- The charger will become rather hot during use. This is normal.
- Do not use to charge batteries other than those specified.
- The charger is for indoor use only. Do not use outdoors.
- Batteries cannot be charged, even when the charging lamp is flashing, when the temperature is outside the charging temperature range.
- Remove batteries from the charger before putting into storage.
- When not in use, disconnect the power cable plug from the wall outlet.

PROCEDURE

1. Connect the power cable to the charger and plug the charger into the wall outlet.

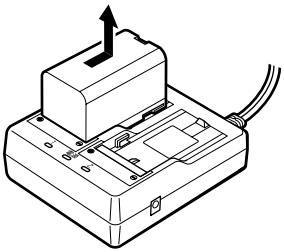
2. Mount the battery in the charger by matching the grooves on the battery with the guides on the charger.



3. When charging starts, the lamp starts blinking.

4. The lamp lights when charging is finished.

5. Remove the battery and unplug the charger.



Note

- Slots 1 and 2:
  The charger starts charging the battery mounted first. If you place two batteries in the charger, the battery in slot 1 is charged first, and then the battery in slot 2. (☞ step 2)
- Charging lamp:
  The charging lamp is off when the charger is outside the charging temperature range or when the battery is mounted incorrectly. If the lamp is still off after the charger falls within its charging temperature range and the battery is mounted again, contact your local dealer. (☞steps 2 and 3)
- Charging time per battery (at 25°C):
  BDC58: about 4 hours
  (Charging can take longer than the times stated above when temperatures are either especially high or low.)

7.2 Installing/Removing the Battery

Mount the charged battery.

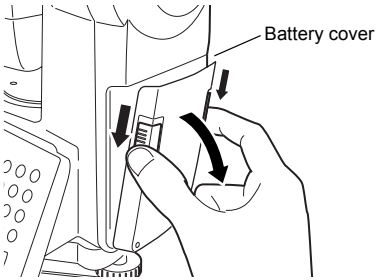
- Before removing the battery, turn off the power to the instrument. If the battery is removed while the power is switched on, a warm boot occurs. File and folder data may be lost as a result.
- When installing/removing the battery, make sure that moisture or dust particles do not come in contact with the inside of the instrument.
- Remove batteries from the surveying instrument or charger before putting into storage.
- Store the battery in a dry room where the temperature is within the following ranges

Storage period	Temperature range
1 week or less	-20 to 50°C
1 week to 1 month	-20 to 45°C
1 month to 6 months	-20 to 40°C
6 months to 1 year	-20 to 35°C

  For long-term storage, the battery should be charged at least once every six months.
- The BDC58 generates power using a chemical reaction and as a result have a limited lifetime. Even when in storage and not used for long periods, battery capacity deteriorates with the passage of time. This may result in the operating time of the battery shortening despite having been charged correctly. In this event, a new battery is required.

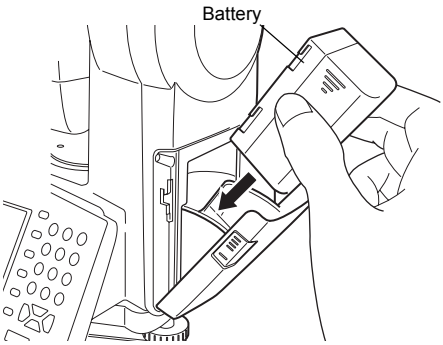
PROCEDURE Mounting the battery

1. Slide down the catches on the battery cover to open.



2. Insert the battery in the direction of the arrow on the side of the battery.

3. Close the battery cover. A click is heard when the cover is secure.



PROCEDURE Removing the battery

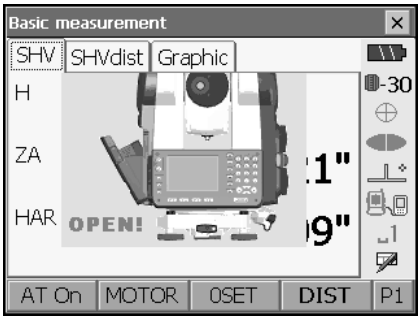
1. Slide down the catches on the battery cover to open.

2. Grip the battery by the arrow symbols printed on the side and slide out.

3. Close the battery cover. A click is heard when the cover is secure.

Note

- Battery cover
  If the battery cover is open during power ON, SRX notifies you by displaying the screen below and beeping.
- When the battery cover is closed, the previous screen is restored.



8. CONNECTING TO EXTERNAL DEVICES

The SRX supports both USB and *Bluetooth* wireless technology for communication with data collectors, the On-demand Remote Control System etc.
Read this manual in conjunction with the operator's manual for the relevant external device.

☞ *Bluetooth* communication: "4.4 Bluetooth Wireless Technology"
Transferring data using the SFX function: SFX Dial-Up Program Explanations (Series SRX and SETX), Output format and command operations: "Interfacing with the SOKKIA SDR Electronic Field Book" and Command Explanations manuals

•*Bluetooth* communication is only possible with instruments incorporating either the RC-TS3 or H-BT1 handle.

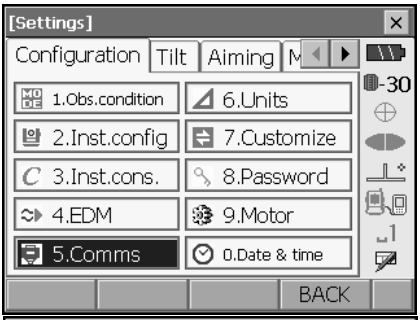
8.1 Wireless Communication using *Bluetooth* Technology

The *Bluetooth* module incorporated in the SRX can be used for communication with Bluetooth devices such as the On-demand Remote Control System RC-Controller and data collectors.

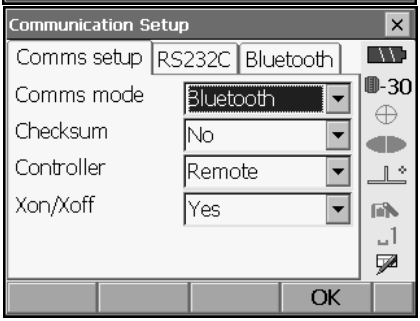
***Bluetooth* connections**
Communication between a pair of *Bluetooth* devices requires one device to be set as the "Master" and the other as the "Slave". To initiate connections from the SRX side, set the SRX as the "Master" device. To initiate connections from the paired device side, set the SRX as the "Slave" device. The factory setting is "Slave".

PROCEDURE Necessary settings for *Bluetooth* communication

1. Select "Comms" in SETTINGS mode. Set Comms mode in the Comms setup tab to "*Bluetooth*".

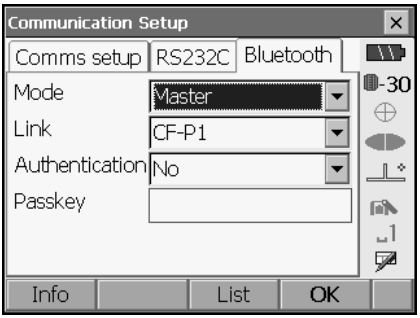


- Changing communication settings during *Bluetooth* communication will cancel the connection.
- The status bar icon cannot be tapped in <Communication Setup>.



2. Select a mode for the SRX in the *Bluetooth* tab. The factory setting is "Slave".
   Register companion devices.
   - "Master" cannot be selected when no companion devices have been registered.

   ☞ "Master"/"Slave": "*Bluetooth* connections"



3. Select, in "Link", a companion device from among the *Bluetooth* devices already registered in the SRX.

   ☞ Registering devices: "PROCEDURE Registering *Bluetooth* companion devices"

   - Companion devices cannot be selected when the SRX is set as "Slave".

4. Set "Authentication" to "Yes" or "No".
   If "Authentication" is set to "Yes" for the SRX the passkey will also need to be input on the companion device.

5. When "Authentication" is set to "Yes", input the same passkey as that for the intended companion device. Even if "Authentication" is set to "No", a passkey is requested when authentication is set on the companion device being used.
   - Up to 16 numeral characters can be input. Input characters will be displayed as asterisks (e.g. "*****"). The passkey was set to "0123" at the factory.

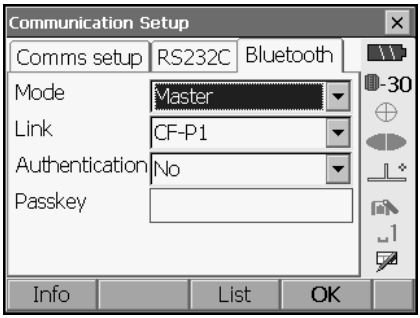
6. Press **[OK]** to finish settings.

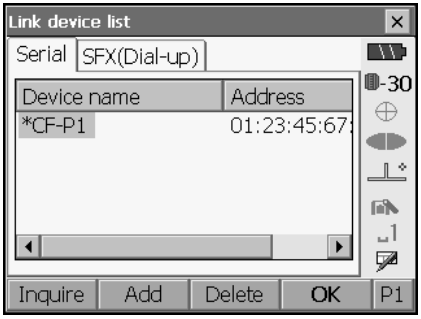
PROCEDURE Registering *Bluetooth* companion devices

1. Power on the companion device.

2. Select "*Bluetooth*" in "Comms mode" in the Comms setup tab.

3. Press **[LIST]** in the *Bluetooth* tab to display a list of all registered devices.
   Data collector devices can be set in the Serial tab and devices for use with the SFX Dial-Up Program in the SFX (Dial-Up) tab.





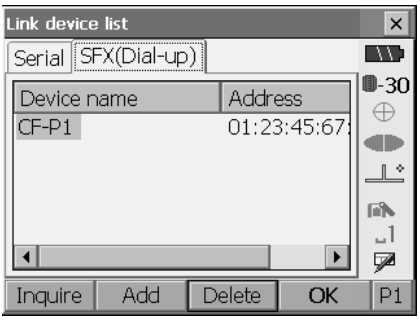
4. Register your *Bluetooth* device(s).

   Press **[Add]** to display <Add device>. Input the device name and *Bluetooth* address and press **[OK]**. *Bluetooth* address should be 12 characters (numbers 0 to 9 and letters from A to F) in length.

Press **[Inquire]** to inquire about *Bluetooth* devices in the immediate vicinity of the SRX and display their device name and address in a list. Select a device from this list and press **[OK]** to add to the Link device list in step 3.

Press **[Delete]** to delete the selected device name. Deleted device names cannot be retrieved.

- Select a device and press **[Edit]** in the second page to update the device name and/or device address.

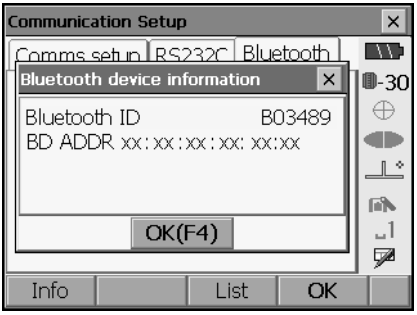


5. Press **[OK]** to complete registration and return to the screen in step 2.

PROCEDURE Displaying *Bluetooth* information for the SRX

1. Select "Comms" in SETTINGS mode.

2. Press **[Info]** in the *Bluetooth* tab to display information for the SRX. Register the *Bluetooth* address (BD ADDR) displayed here in the paired device set as "Master".



***Bluetooth* device address**

This is a number unique to one particular *Bluetooth* device used to identify devices during communication. This number consists of 12 characters (numbers 0 to 9 and letters from A to F). Some devices may be referred to by their *Bluetooth* device address.

8.2 Communication between the SRX and Companion Device

- *Bluetooth* communication causes SRX battery power to be depleted at a rate higher than that for normal operation.
- Check that the companion device (data collector, computer, cellular phone, or On-demand Remote Control System etc.) is turned on and the relevant *Bluetooth* settings are complete.
- All communication settings will be changed to factory settings when a cold boot is performed. Comms setup will need to be performed again.

☞"8.1 Wireless Communication using Bluetooth Technology"

1. Complete the necessary SRX settings for *Bluetooth* communication.
   ☞ "8.1 Wireless Communication using Bluetooth Technology"

2. Start communication
   When SRX is set as the "Master" device, the **[Connect]** softkey is allocated to the fourth page of Meas mode. When **[Connect]** is pressed the SRX searches for the device selected in "Link" and a connection starts. When a connection has been successfully established  is displayed in the status bar.
   The establishing of a connection can also be initiated by tapping  in the status bar.
   ☞Status bar, communication status: "5.2 Display Functions"

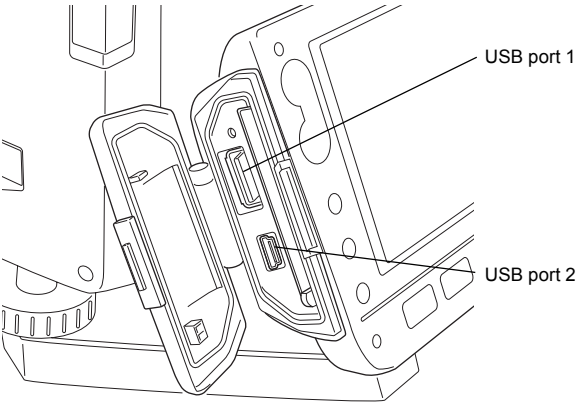
Note

•When SRX is set as the "Slave" device, the establishing of a connection can only be initiated/ canceled by the companion device set as "Master".

3. Press **[Cancel]** in the fourth page of Meas mode to terminate the connection.
   A connection can also be terminated by tapping  in the status bar.

8.3 Connecting to USB devices

SRX has two different USB ports. Sokkia Topcon Co., Ltd. cannot guarantee that all USB devices are compatible with the SRX USB ports.



Each port is used for connection to different types of devices.

Port name	Device type
USB port 1	USB memory devices etc.
USB port 2	computers etc.

Connecting the SRX to a computer to transfer data from Memory mode

1. Power OFF the SRX. Connect the SRX and computer using the USB cable.
   ☞ "10. POWER ON/OFF"

Note

•The computer does not need to be turned off before connection.

2. Press **{ ⏻ }** while pressing **{⏎}**. "USB Mode" will be displayed on the screen of the SRX. After a short period (approx. 1 minute) <Removable disk> will be displayed on the computer screen.

3. The JOB data and observation data displayed in <Removable disk> can be copied and/or transferred to the computer.

Note

•The computer display may vary depending on Windows settings.

Follow the instructions below to ensure that the SRX continues to operate normally during USB transfer.

- Do not change the folder hierarchy or folder names in <Removable Disk>.
- Do not format the removable disk.

4. Double-click  in the computer task bar.
"Safely Remove Hardware" is displayed. Select "USB Mass Storage Device" and press "Stop". After confirming the subsequent prompt, disconnect the USB cable from the computer and SRX.

5. Press **{** ⏻ **}** while pressing **{☼}**. The next time the SRX is powered ON, the Meas mode screen will be displayed.

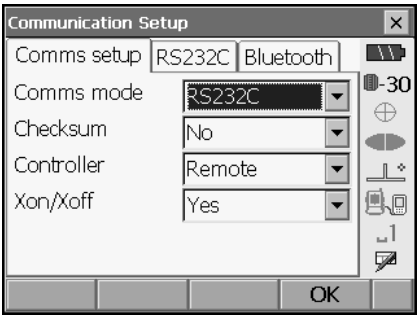
•Do not disconnect the USB cable or turn off the SRX or computer while files are being copied/ transferred.

8.4 Connection via RS232C cable

PROCEDURE Basic cable settings

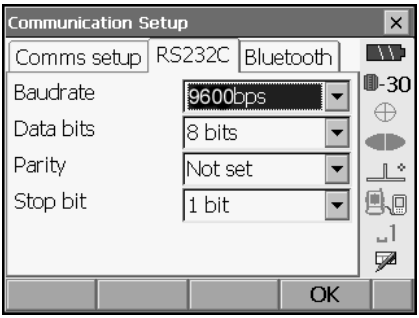
1. Connect the cable.
   ☞ Cables: "36. OPTIONAL ACCESSORIES"

2. Select "Comms" in SETTINGS mode.
   Set communication conditions in the Comms setup tab. Set "Comms mode" to "RS232C".



3. Set options in the RS232C tab according to the selection made in the Comms setup tab.
   *: factory settings

   Baud rate:
   1200/2400/4800/9600*/19200/38400bps
   Data bits: 7/8* bits
   Parity: Not set*/Odd/Even
   Stop bit: 1*/ 2

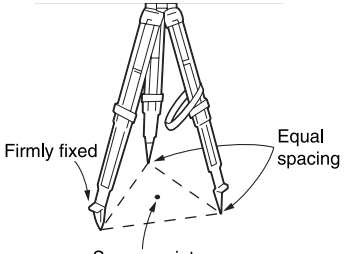


- Mount the battery in the instrument before performing this operation because the instrument will tilt slightly if the battery is mounted after levelling.

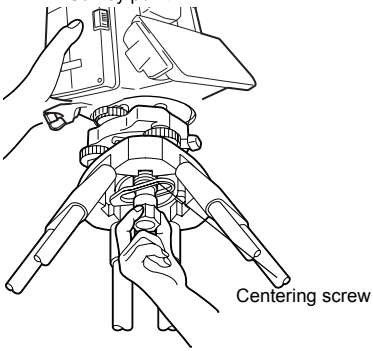
9.1 Centering

PROCEDURE

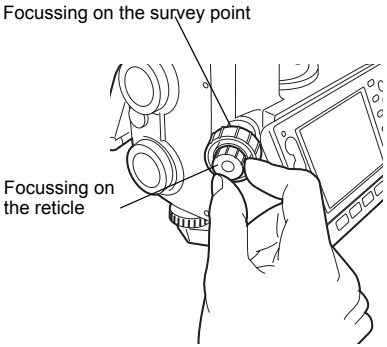
1. Make sure the legs are spaced at equal intervals and the head is approximately level.
   Set the tripod so that the head is positioned over the survey point.
   Make sure the tripod shoes are firmly fixed in the ground.



2. Place the instrument on the tripod head.
   Supporting it with one hand, tighten the centering screw on the bottom of the unit to make sure it is secured to the tripod.



3. Looking through the optical plummet eyepiece, turn the optical plummet eyepiece to focus on the reticle.
   Turn the optical plummet focusing ring to focus on the survey point.

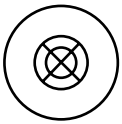


9.2 Levelling

Instrument can be levelled using the screen.
☞ “Levelling on the screen”

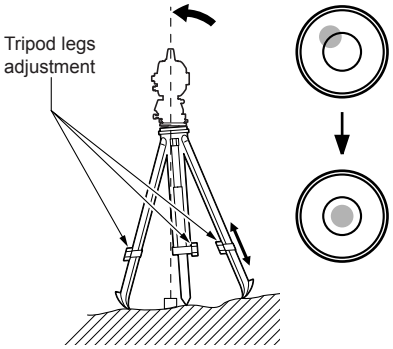
PROCEDURE

1. Adjust the levelling foot screws to center the survey point in the optical plummet reticle.

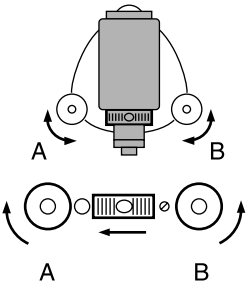


2. Center the bubble in the circular level by either shortening the tripod leg closest to the offcenter direction of the bubble or by lengthening the tripod leg farthest from the offcenter direction of the bubble. Adjust one more tripod leg to center the bubble.

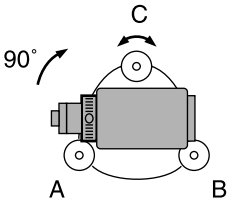
   Turn the levelling foot screws while checking the circular level until the bubble is centered in the center circle.



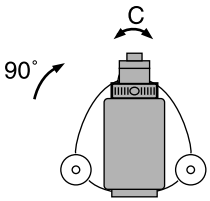
3. Turn the upper part of the instrument until the plate level is parallel to a line between levelling foot screws A and B.
   Center the air bubble using levelling foot screws A and B simultaneously.
   The bubble moves towards a clockwise rotated levelling foot screw.



4. Turn the upper part of the instrument though 90°.
   The plate level is now perpendicular to a line between levelling foot screws A and B.
   Center the air bubble using levelling foot screw C.



5. Turn another 90° and check bubble position
   Turn the upper part of the instrument a further 90° and check to see if the bubble is still in the center of the plate level. If the bubble is off-center, perform the following:
   a. Turn levelling foot screws A and B equally in opposite directions to remove half of the bubble displacement.
   b. Turn the upper part a further 90°, and use levelling foot screw C to remove half of the displacement in this direction.
   Or adjust the plate level.
   . ☞"32.1 Plate Level"



6. Turn the instrument and check to see if the air bubble is in the center position in all directions. If it is not, repeat the levelling procedure.

7. Loosen the centering screw slightly.
   Looking through the optical plummet eyepiece, slide the instrument over the tripod head until the survey point is exactly centered in the reticle. Retighten the centering screw securely.

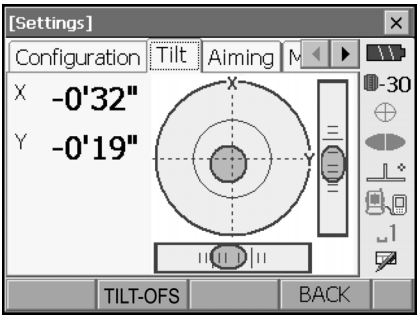
8. Check again to make sure the bubble in the plate level is centered.
   If not, repeat the procedure starting from step 3.

PROCEDURE Levelling on the screen

1. Press **{ ⏻ }** to power on.
   ☞"10. POWER ON/OFF"

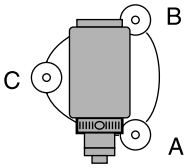
2. Press **{SETTINGS}** to enter SETTINGS mode.

3. Select the Tilt tab to display the circular level on the screen.
"●" indicates the bubble in circular level. The range of the inside circle is ±2.5' and the range of the outside circle is ±4.5'.



4. Center "●" in the circular level.
☞"9.2 Levelling" steps 1 to 2

5. Turn the instrument until the telescope is parallel to a line between levelling foot screws A and B.



6. Set the tilt angle to 0° using foot screws A and B for the X direction and levelling screw C for the Y direction.

7. Press **{ESC}** to return to Meas mode.

Note

•Press **[TLT-OFS]** to enter <Tilt offset/Meas.>.
☞"32.3 Tilt Sensor"

10.POWER ON/OFF

PROCEDURE Power ON

1. Press **{** ⏻ **}**.
   When the power is switched on, a self-check is run.
   The Meas mode screen is displayed.

   If "Out of range" is displayed, the instrument tilt sensor is indicating that the instrument is out of level. Level the instrument once again and the horizontal and vertical angles will be displayed.

Note

- "Tilt crn." in "Obs. condition" should be set to "No" if the display is unsteady due to vibration or strong wind.

☞ "30.1 Observation Conditions"

Resume function
The Resume function redisplays the screen appearing before the instrument was powered OFF when the instrument is powered back ON. All parameter settings are also saved. Even if remaining battery power is completely depleted, this function will remain active for 1 minute, after which it is canceled. Replace a depleted battery as soon as possible.

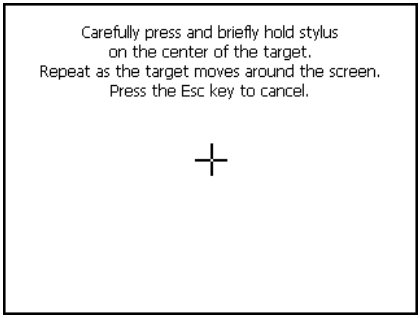
PROCEDURE Power OFF

Press **{** ⏻ **}** while pressing **{**☼**}**.

- When there is almost no battery power remaining, the battery mark in the status bar will start to blink. In this event, stop measurement, switch off the power and charge the battery or replace with a fully charged battery.
- To save power, power to the SRX is automatically cut off if it is not operated for a fixed period of time. This time period can be set in "Power off" in <Inst.config.>.
  ☞ "30.2 Instrument Configuration"

10.1 Configuring the Touch Panel

When using for the first time, or after performing a cold boot, the screen for configuring the touch panel will be displayed.



Follow the instructions on the screen. Tap the cross-hairs at the center of the display with the stylus pen. Tap 5 times. Press **{↵}** to complete touch panel configuration. Press **{ESC}** to retain previous settings. For units with a display on both the F1 and F2 faces: After tapping 5 times the display backlight will dim and the display on the reverse face will illuminate. Tap the cross-hairs on the reverse face display a further 5 times.

Note

- Touch panel configuration can be performed at any time during normal operation by pressing **[PNL CAL]** in <Inst.config.>.

☞"30.2 Instrument Configuration"

10.2 Resolving Software Issues

If you are experiencing problems with the SRX and suspect a fault in the program, you should try a warm boot. If the problem is not resolved with a warm boot the next step is to perform a cold boot. A warm boot will not erase surveying data in Memory mode and Program mode but will cancel the resume function. Whenever possible transmit the data to a personal computer before rebooting.

PROCEDURE

1. Power OFF the instrument.

2. Press **{ ⏻ }** while pressing **{↵}**.
   The instrument is reset and powers ON as normal.

Note

•Pressing **{PROGRAM}** after performing a warm boot will automatically restore the program active before the warm boot was performed.

Cold boot

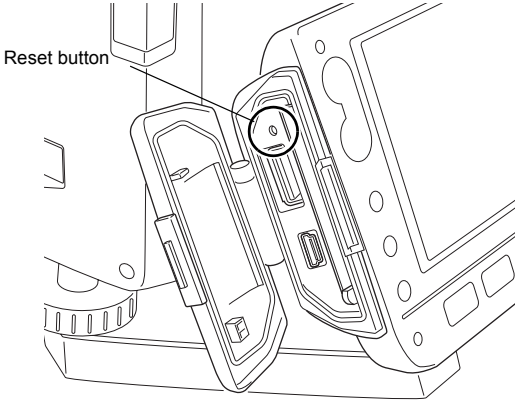
If the problem is not resolved with a warm boot the next step is to perform a cold boot. A cold boot will not erase surveying data in Memory mode and Program mode but all the parameters will be changed to the factory settings. If the data in the memory is necessary, **BE SURE TO TRANSFER IT TO A PERSONAL COMPUTER BEFORE PERFORMING A COLD BOOT.**
To perform a cold boot, while holding **{F3}, {F1},** and **{BACKSPACE}**, press **{ ⏻ }** .
The instrument is reset and powers ON as normal.

☞ "30.11 Restoring Default Settings"

Problems Powering OFF

When the instrument cannot be powered OFF as normal, depress the reset button with the tip of the stylus pen. Then, power ON as normal.

•Pressing the Reset button may result in file and folder data being lost.



10.3 Powering the SRX ON/OFF from an External Instrument

The SRX can be powered ON/OFF from an external device such as a computer or data collector. Powering OFF from the paired *Bluetooth* device during *Bluetooth* communication is only possible when the SRX is set as the "Slave" device.

When the SRX is powered OFF from a paired *Bluetooth* device during *Bluetooth* communication, the screen shown at right will be displayed.

Powering ON the SRX from the paired *Bluetooth* device or by pressing **{** ⏻ **}** on the SRX itself redisplays the screen appearing before the instrument was powered OFF.

Powering OFF the SRX during *Bluetooth* communication will cancel the *Bluetooth* connection. If this screen is displayed continuously for 30 minutes, power to the SRX is automatically cut off.

•The password must be input after powering ON the SRX from an external device when a password has been set.

☞ Remote PWR-On function: "30.2 Instrument Configuration"
Setting a password: "30.9 Changing Password"

11.TARGET SIGHTING

A target can be automatically sighted using the Auto Pointing function or manually sighted by the operator using the peep sight and telescope. When Auto Pointing is performed, the SRX determines the direction in which the light beam reflected from the target (prism or reflective sheet target) has returned and automatically rotates the telescope to align the collimation axis of the total station with the center of this target.

⚠ Caution

- The instrument emits a laser beam until the center of the prism is sighted.

- Auto Pointing can only be performed when a prism or sheet is used as the target. For reflectorless measurement, the target must be sighted manually.
- Use SOKKIA reflective prisms/reflective sheets for higher precision measurement. Make sure reflector type and aperture/sheet size are set correctly in <EDM configurations>.
- Auto Pointing cannot be performed if the prism is located at the zenith. In this case, manually sight the target.

☞"11.3 Manually Sighting the Target"

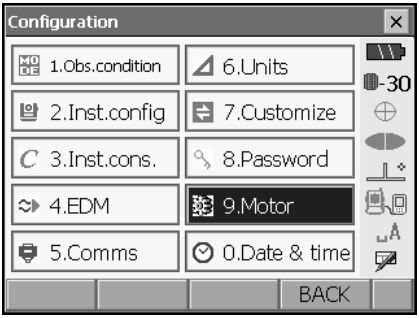
- If more than one prism is located in the field of sight during Auto Pointing, an operation error will occur and the SRX will not be able to find the target.
- A prism beyond glass cannot be searched because a measurement error occurs.
- If an obstacle blocks the laser beam path between the SRX and the prism, SRX cannot find the target correctly.
- If strong light shines directly into the objective lens, measurement cannot be performed correctly.
- Position the prism in alignment with the objective lens. A prism with a prism constant of -40mm can eliminate the error caused by tilted prism.

  ☞"38.1 High Accuracy with the 360° Prism"
- The following table suggests what size target to use for different distances when performing Auto Pointing with a reflective sheet target.

Distance	Target size
5 to 15m	RS10 (10mm)
5 to 30m	RS30 (30mm)
5 to 40m	RS50 (50mm)
10 to 50m	RS90 (90mm)

11.1 Auto Pointing Settings

1. Select "Motor" in <Configuration>.
   Set Auto Pointing functions in the Configuration tab.
   Set "A.T. Setting" to "Search".



Settings and Options

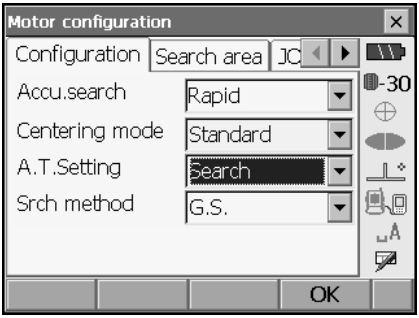
(*: factory settings)

(1) Accu. search
Fine/Rapid*

(2) Centering mode
Advanced/Standard*

(3) A.T. Setting
Auto Pointing model: None/Search*
Auto Tracking model: None/Search/Track*

(4) Srch method
G.S.*/R.C.



Accu. search

Set to "Fine" for greater accuracy during Auto Pointing. Make sure that the prism is securely mounted on a tripod etc.
Set to "Rapid" when supporting the pole by hand.
When "Fine" is set the SRX checks that the prism position is stable, then searches for the prism direction. Once the SRX confirms that the prism is sighted at the approximate center of the field-of-view, Auto Pointing is complete. Although this setting provides greater accuracy, when supporting the pole by hand, hand movements will result in Auto Pointing taking too long to complete and a "Time out" error will occur.
When "Rapid" is set however, Auto Pointing can be performed even with slight instability of prism position or minor shifts of target position in the field-of-view. The SRX will use the data obtained to determine the direction of the target.
Auto Pointing performed using the "Rapid" setting can be completed in a much quicker time than the "Fine" setting.
"Fine" is recommended when a high level of measurement accuracy is needed. The range for the offset between the target and reticle after Auto Pointing completed changes as shown below depending on the Srch. accuracy setting.

"Fine": ± 5" (approx.)
"Rapid": ± 30" to ± 10' (depending on distance)

Centering mode

This setting refers to internal operation of the Auto Pointing function.
The "Advanced" setting executes Auto Pointing with an emphasis on stability in the movement of the telescope. As a result, Auto Pointing takes longer to complete but sighting accuracy is improved. The "Standard" setting enables Auto Pointing at a comparatively faster speed than "Advanced".

Srch method

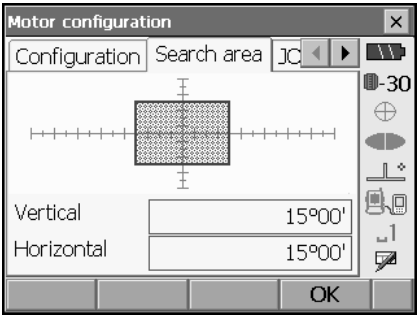
Selects search before distance measurement option.
When set to "G.S." the SRX will search for the target in the area specified in the Search area tab. When set to "R.C.", the SRX will wait for a Turning command to be issued from the RC-Controller before starting Auto Pointing. Such commands can only be received when using instruments incorporating either the RC-TS3 or RC-TS3A handle.

Search operation during Auto Pointing

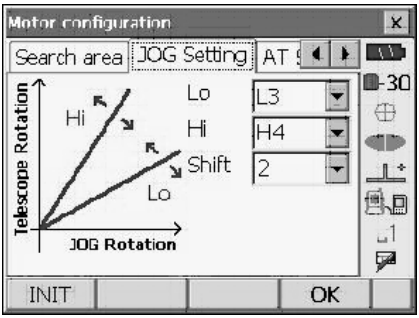
When the target enters the field-of-view within the set time limit for Auto Pointing completion, the SRX stops moving and the offset between the target and telescope reticle is added to the angle measurement value obtained from the encoder and compensated using image processing calculation. Although this compensation reduces measurement time and increases search accuracy, there is a possibility that the target and telescope reticle appear to be misaligned. Compensated values are displayed in blue.
If the SRX is rotated (manually or using the jog dials) more than 10", compensation will be canceled, the angle reverts to that obtained from the encoder, and the angle values are once again displayed in black. Compensation is automatically performed when performing Auto Tracking. Terminating Auto Tracking or powering OFF the SRX will cancel the compensation function.

2. Set the area in which to perform target sighting in the Search area tab. Drag the box to specify the desired area or input vertical and horizontal angle values.
   Angle values can only be specified in 1°30’ steps (e.g. 15°00’, 16°30’, 18°00’ etc.). Input values not conforming to this format will be automatically rounded up.

3. Press **[OK]**.



4. Set the Jog dial turning speed for vertical and horizontal rotation of the telescope. The "Shift" point signifies the dial turning speed at which telescope rotation switches from the Lo speed setting to the Hi speed setting.The higher the "Shift" point setting, the faster the jog dial turning speed needed to activate the Hi speed setting.



Settings and Options

(*: factory settings)

(1) Lo
1 to 4 (3*) (steps. 4 is fastest)

(2) Hi
1 to 7 (4*) (steps. 7 is fastest)

(3) Shift point
1 to 6 (2*) (steps)

Press **[INIT]** to return JOG Setting tab settings only to their factory settings.

11.2 Auto-Pointing Function for Target Sighting

PROCEDURE

1. Use the peep sight to aim the objective lens in the general direction of the target. The vertical and horizontal Jog dials can be used for precise adjustments of the instrument and telescope
   ☞ JOG Setting tab: "11.1 Auto Pointing Settings" step 4.

2. Press **[SRCH]** in any Meas mode screen. The telescope and top half of the instrument rotate and target auto-search begins. When the target is found, the instrument sights the center of the prism and stops.
   ☞ Allocating the **[SRCH]** softkey: "30.6 Allocating Key Functions"

Note

• When "Search" is selected in "A.T. Setting" in the "Configuration" tab of <Motor configuration>, the function of the following softkeys will change depending on the option selected in "Srch. method".
☞ Motor settings: "11.1 Auto Pointing Settings"
•"Turning" operation: The SRX locates the On-demand Remote Control System RC-Controller by detecting the laser beam output by the RC-Controller, then starts Auto Pointing.

"Motor" setting / Softkey	When "Search" set in "A.T. Setting"		When "None" set in "A.T. Setting"
	"Srch method" is R.C.	"Srch method" is G.S. (Global Search)	
[SRCH]	Performs Auto Pointing		
[DIST]	Performs Turning operation then angle/ distance measurement	Performs Auto Pointing then angle/distance measurement	Performs angle and distance measurement
[RC]	Rotates directly in the direction of the RC-Controller then performs Auto Pointing		
[<-RC]	Rotates in a counterclockwise direction (from the point of view of the RC-Controller) then performs Auto Pointing		
[RC->]	Rotates in a clockwise direction (from the point of view of the RC-Controller) then performs Auto Pointing		
[RC Cont]	Nullifies the current measurement position then continues Turning operation		
[AT On] (Auto Tracking model only)	Performs Turning operation then Auto Tracking	Performs Auto Pointing then Auto Tracking	Performs Auto Tracking *1

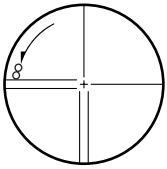
*1: Pressing **[AT On]** when A.T. Setting is set to "None" will result in one of the following operations being performed.
When "R.C." selected: Performs Turning operation then Auto Tracking
When G.S." selected: Performs Auto Pointing then Auto Tracking

11.3 Manually Sighting the Target

- When sighting the target, strong light shining directly into the objective lens may cause the instrument to malfunction. Protect the objective lens from direct light by attaching the lens hood.

▶PROCEDURE

1. Look through the telescope eyepiece at a bright and featureless background.
   Turn the eyepiece clockwise, then counterclockwise little by little until just before the reticle image becomes focussed.
   Using these procedures, frequent reticle refocussing is not necessary, since your eye is focussed at infinity.



2. Use the peep sight to bring the target into the field of view. Turn the vertical and horizontal Jog dials for fine sighting adjustments.

3. Turn the telescope focussing ring to focus on the target.
   Turn the vertical and horizontal fine motion screws to align the target with the reticle.
   The last adjustment of each fine motion screw should be in the clockwise direction.

4. Readjust the focus until there is no parallax
   Readjust the focus with the focussing ring until there is no parallax between the target image and the reticle.

Eliminating 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 refocussing the reticle.

Greater accuracy when sighting manually

For greater accuracy when sighting manually, set A.T. Setting to "None" then automatically rotate the telescope to a specified angle. When the target is in the field-of-view, use the Jog dials to make fine adjustments and accurately sight the center of the prism.
☞ "11.3 Manually Sighting the Target"

It is recommended that a slow Jog dial turning speed is used for greater stability when performing fine adjustments.

With the Auto Tracking function, the SRX searches for and sights the target. The SRX will then following that target as it is moved from measurement point to measurement point. The On-demand Remote Control System is recommended for high performance Auto Tracking measurement.

⚠ Caution

- The instrument emits a laser beam during Auto Pointing and Auto Tracking operation.

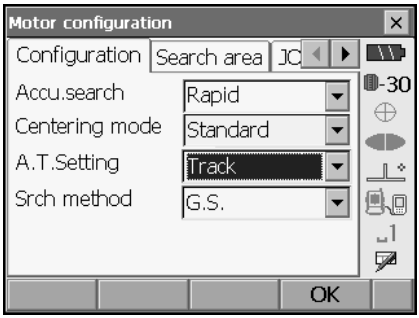
- Auto Pointing model does not support Auto Tracking.
- Auto Tracking can only be performed when a prism is used as the target. Auto Tracking is not possible with reflective sheet and reflectorless measurement.
- Use SOKKIA reflective prisms for higher precision measurement.
- If more than one prism is located in the field of sight during Auto Tracking, an operation error will occur and the SRX will not be able to find the target.
- The SRX cannot perform Auto Pointing/Auto Tracking when there is glass between the SRX and the prism. A measurement error will occur.
- If an obstacle blocks the laser beam path between the SRX and the prism, SRX cannot find the target correctly.

12.1 Auto Tracking Settings

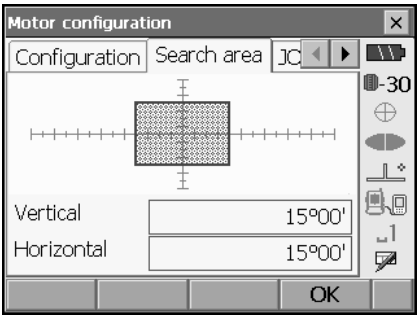
PROCEDURE

1. Select "Motor" in <Configuration>.
   Select the Configuration tab.
   Set "A.T. Setting" to "Track".

   ☞ Configuration tab: "11.1 Auto Pointing Settings"



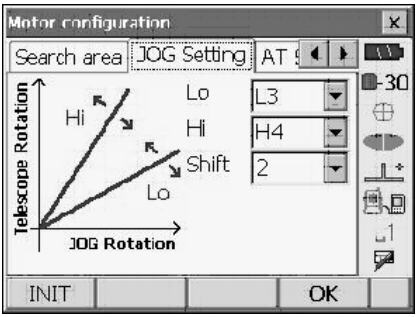
2. Set the area in which to perform target sighting in the Search area tab. Drag the box to specify the desired area or input vertical and horizontal angle values.
   Angle values can only be specified in 1°30' steps (e.g. 15°00', 16°30', 18°00' etc.). Input values not conforming to this format will be automatically rounded up.



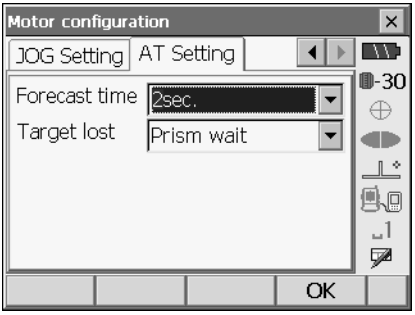
3. When neccessary, set the Jog dial turning speed for vertical and horizontal rotation of the telescope.

   ☞ JOG Setting tab: "11.1 Auto Pointing Settings" step 4

   Press **[INIT]** to return JOG Setting tab settings only to their factory settings.



4. Set "Forecast time" and "Target lost".
   ☞ "Forecast time", "Target lost": Lost Prism



Settings and Options

(*: factory settings)

(1) Forecast time
1 sec./2 sec.*/3 sec./4 sec./5 sec.

(2) Target lost
Prism wait*/Search

5. Press **[OK]**.

12.2 Measurement with Auto Tracking

PROCEDURE

1. Use the peep sight to aim the objective lens in the general direction of the target. (The vertical and horizontal Jog dials can be used for precise adjustments of the instrument and telescope.)
   ☞ JOG Setting tab: "11.1 Auto Pointing Settings" step 4

2. Select **[DIST]**, **[RC Cont]**, or **[SRCH]** in any Meas mode screen. The telescope and top half of the instrument rotate and target auto-search begins. When the target is found, the target is aligned in the field-of-view and Auto Tracking starts.
   ☞ Allocating softkeys: "30.6 Allocating Key Functions"

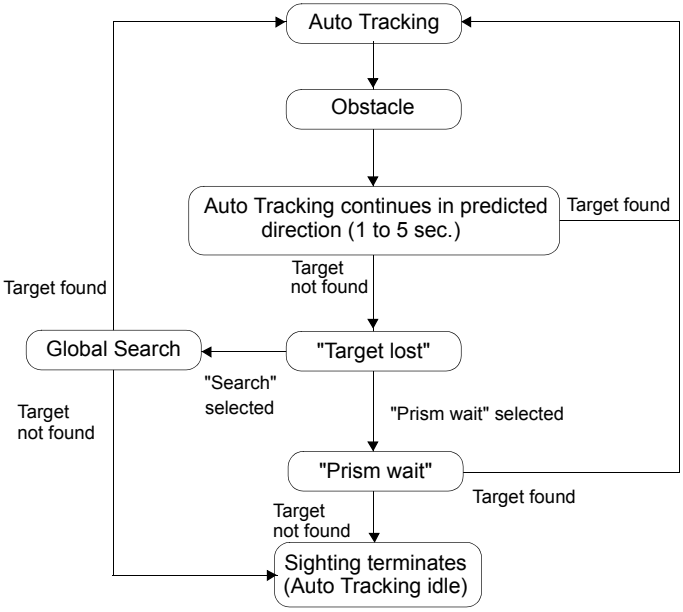
3. Press **[AT Off]** in a Meas mode screen to stop Auto Tracking.

Note

- When **[STOP]** is pressed, distance measurement will stop but Auto Tracking will remain active.

Lost Prism

In the event that an obstacle prevents the SRX sighting the target during Auto Tracking, the instrument will predict the direction in which the target will travel and continue Auto Tracking based on this prediction for the time period set in "Forecast time". If the SRX re-acquires the target in this predicted direction, Auto Tracking continues without change. If the target is not re-acquired however, the target is considered "lost" ("Target lost" status) and the SRX enters either "Prism wait" or "Search" mode. When "Prism wait" has been selected in "Target lost" and the target enters the field of view or a Turning command is received from the RC-Controller within 60 seconds, the SRX will search for the target, then resume Auto Tracking. If the target is not re-acquired within 60 seconds, sighting terminates.
Start Auto Tracking procedure again from step 1.
☞ "Forecast time" (duration of search in predicted direction) and "Target lost" operation: "12.1 Auto Tracking Settings" step 4



Note

• When "Tracking" is selected in "A.T. Setting" in the "Configuration" tab of <Motor configuration>, the function of the following softkeys will change depending on the option selected in "Srch. method" and Auto Tracking will be added.

☞ Motor settings, "Forecast time" and "Target lost" operation: "12.1 Auto Tracking Settings"

Turning operation

The SRX locates the On-demand Remote Control System RC-Controller by detecting the laser beam output by the RC-Controller, then starts Auto Pointing.

"Motor" setting / Softkey	When "Track" set in "A.T. Setting"		When "None" set in "A.T. Setting"
	"Srch method" is R.C.	"Srch method" is G.S. (Global Search)	
[SRCH]	Performs Auto Pointing then Auto Tracking		Performs Auto Pointing
[DIST]	Performs Turning operation then distance measurement/Auto Tracking	Performs Auto Pointing then distance measurement/Auto Tracking	Performs angle and distance measurement
[RC]	Rotates directly in the direction of the RC-Controller then performs Auto Pointing		Rotates in the direction specified by the RC-Controller then performs Auto Pointing
[<-RC]	Rotates in a counterclockwise direction (from the point of view of the RC-Controller) then performs Auto Pointing/Auto Tracking		Rotates in a counterclockwise direction (from the point of view of the RC-Controller) then performs Auto Pointing
[RC->]	Rotates in a clockwise direction (from the point of view of the RC-Controller) then performs Auto Pointing/Auto Tracking		Rotates in a clockwise direction (from the point of view of the RC-Controller) then performs Auto Pointing
[RC Cont]	Nullifies the current measurement position then continues Turning operation/Auto Tracking		Nullifies the current measurement position then continues Turning operation
[AT On]	Performs Turning operation then Auto Tracking	Performs Auto Pointing then Auto Tracking	Performs Auto Tracking *1

*1: Pressing **[AT On]** when A.T. Setting is set to "None" will result in one of the following operations being performed.
When "R.C." selected: Performs Turning operation then Auto Tracking
When "G.S." selected: Performs Auto Pointing then Auto Tracking

13.ANGLE MEASUREMENT

This section explains the procedures for basic angle measurement in Basic mode.

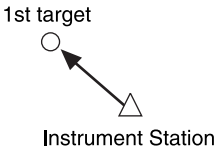
- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.
  ☞"30.6 Allocating Key Functions"

13.1 Measuring the Horizontal Angle between Two Points (Horizontal Angle 0°)

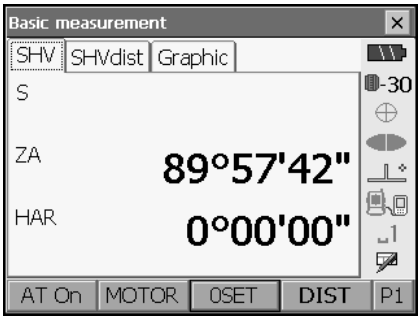
Use the “0SET” function to measure the included angle between two points. The horizontal angle can be set to 0 at any direction.

PROCEDURE

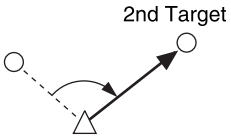
1. Sight the first target as at right.
   ☞"11. TARGET SIGHTING"



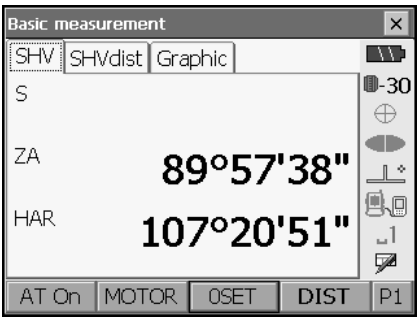
2. In the first page of Meas mode, press **[0SET]**.
   [0SET] will flash, so press **[0SET]** again.
   The horizontal angle at the first target becomes 0°.



3. Sight the second target.



The displayed horizontal angle (HAR) is the included angle between two points.



13.2 Setting the Horizontal Angle to a Required Value (Horizontal Angle Hold)

You can reset the horizontal angle to a required value and use this value to find the horizontal angle of a new target.

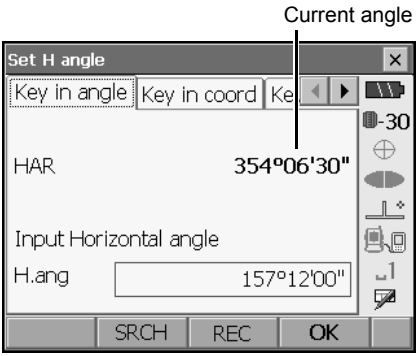
PROCEDURE

1. Sight the first target.

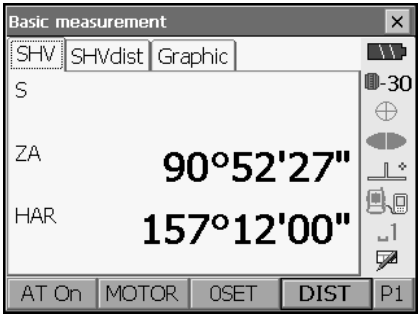
2. In the second page of Meas mode, press **[H.ANG]**. <Set H angle> is displayed.

3. Enter the angle you wish to set, then press **[OK]**. The value that is input as the horizontal angle is displayed.

   - The same setting can also be performed with coordinate and azimuth input.
   - Press **[REC]** to store the backsight station data in the current JOB. Input point number, target height and code, then press **[OK]**.



4. Press **[OK]** to confirm the input value and display the new horizontal angle.



5. Sight the second target.
   The horizontal angle from the second target to the value set as the horizontal angle is displayed.

Note

- Pressing **[HOLD]** performs the same function as above.
- Press **[HOLD]** to set the displayed horizontal angle. Then, set the angle that is in hold status to the direction you require.

☞ Allocating **[HOLD]**: "30.6 Allocating Key Functions"

13.3 Turning the Instrument from the Reference Angle to a Specified Angle

The SRX automatically turns from the reference direction to the specified angle (target).

- SRX also turns to the target coordinates when reference angle is omitted.

- Rotation may not be completed correctly when specifiying an angle near the zenith or nadir if "Tilt crn." or "Coll. crn" is set to "Yes" in "Obs.condition".

PROCEDURE

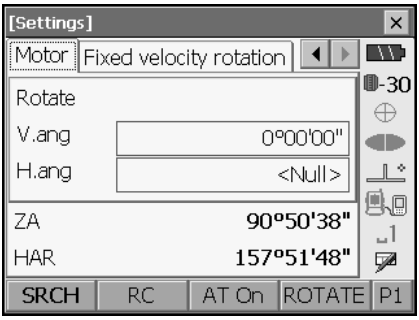
1. Sight the point you will use as the reference angle and set it as the reference angle.
   Sight the reference point and press **[0SET]**, or input the reference point angle.
   ☞"13.1 Measuring the Horizontal Angle between Two Points (Horizontal Angle 0°)"/ "13.2 Setting the Horizontal Angle to a Required Value (Horizontal Angle Hold)"

2. Press **{SETTINGS}** to switch to SETTINGS mode.
   Select "Motor" tab.

3. Enter the vertical and horizontal angles in the Motor tab.

   - Pressing **[READ]** in the second page displays the coordinates data recorded in Memory mode. This data can be recalled and used for settings.

   ☞"16.4 Reading in registered coordinate data from Memory mode"



4. After confirming the angle, press **[ROTATE]**. The SRX moves to the point (target) entered in step 3.

13.4 Angle measurement and Outputting the Data

The following explains angle measurement and the features used to output measurement results to a computer or other external devices.

☞"8. CONNECTING TO EXTERNAL DEVICES", Cables: "36. OPTIONAL ACCESSORIES", Output format and command operations: "Interfacing with the SOKKIA SDR Electronic Field Book" and Command Explanations manuals

PROCEDURE

1. Connect SRX and external device.

2. Sight the target point.

3. Press **[HV out]** in Meas mode to output target measurement results to the external device.

14.DISTANCE MEASUREMENT

Perform the following settings as preparation for distance measurement in Basic mode.
- Distance measurement mode
- Target type
- Prism constant correction value
- Search area
- Auto Pointing/Auto Tracking
  ☞"11.1 Auto Pointing Settings", "12.1 Auto Tracking Settings", "30.3 EDM Settings"
- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.
  ☞"30.6 Allocating Key Functions"

⚠ Caution

- When using the laser-pointer function, be sure to turn OFF the output laser after distance measurement is completed. Even if distance measurement is canceled, the laser-pointer function is still operating and the laser beam continues to be emitted.

- Make sure that the target setting on the instrument matches the type of target used. SRX automatically adjusts the intensity of the laser beam and switches the distance measurement display range to match the type of target used. If the target does not correspond to the target settings, accurate measurement results cannot be obtained.
- Accurate measurement results cannot be obtained if the objective lens is dirty. Dust it off with the lens brush first, to remove minute particles. Then, after providing a little condensation by breathing on the lens, wipe it off with the wiping cloth.
- During reflectorless measurement, if an object with a high reflective factor (metal or white surface) is positioned between the SRX and the target, accurate measurement results may not be received.
- Scintillation may affect the accuracy of distance measurement results. Should this occur, repeat measurement several times and use the averaged value of the obtained results.

14.1 Returned Signal Checking

Check to make sure that sufficient reflected light is returned by the target sighted by the telescope. Checking the returned signal is particularly useful when performing long distance measurements.

⚠ Caution

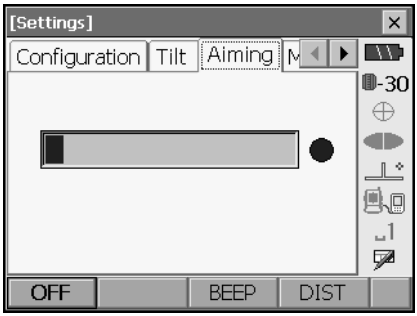
- The laser beam is emitted during returned signal checking.

- Manually sight the target when checking the returned signal.
- When the light intensity is sufficient even though the center of the reflective prism and the reticle are slightly misaligned (short distance etc.), "●" will be displayed in some cases, but in fact, accurate measurement is impossible. Therefore make sure that the target center is sighted correctly.

PROCEDURE

1. Accurately sight the target manually.
   ☞"11.3 Manually Sighting the Target"

2. Press **{SETTINGS}** to switch to SETTINGS mode and select the Aiming tab or press **[AIM]** in Meas mode.
   ☞Allocating **[AIM]**: "30.6 Allocating Key Functions"



   When **[AIM]** is pressed, a gauge indicating light intensity is displayed.

   - The more ■■■■■■■■ displayed, the greater the quantity of reflected light.
   - If "●" is displayed, only enough light for the measurement is returned.
   - When "●" is not displayed, accurately resight the target.

   [BEEP]/[OFF]: Sets a buzzer sound when measurement is possible. Press to switch on and off.
   [DIST]: Returns to Meas mode and starts angle and distance measurement regardless of "A.T. Setting" setting. This softkey is not displayed when the returned signal checking function is accessed from Program mode.

3. Press **[OFF]** to finish signal checking.
   Press **{ESC}** or tap the cross in the top-right corner to return to the previous screen.

Note

- When ■■■■■■■■ is displayed persistently, but "●" is not, contact your local dealer.
- If no key operations are performed for two minutes, the display automatically returns to the previous screen.

14.2 Using the Guide Light

The color and flashing speed of the guide light indicates the status of the SRX and can be known when the user is located at a distance from the instrument.
☞ Switching the guide light ON/OFF "5.1 Basic Key Operation"

• The pattern of the guide light can be changed.
☞ "30.2 Instrument Configuration"

Light status	Meaning
Slow flashing (Red and green simultaneously)	Waiting
	Search error (error screen only)
Fast flashing (Red and green simultaneously)	Searching in progress
	Measuring (continuous measurement)
	Returned signal checking in progress
	Auto Tracking in progress (Auto Tracking model only)
	Auto Tracking in predicted direction (Auto Tracking model only)
Green and red alternate flashing	Distance measurement error (no signal, sighting error)
	"Prism wait"

14.3 Distance and Angle Measurement

An angle can be measured at the same time as distance.

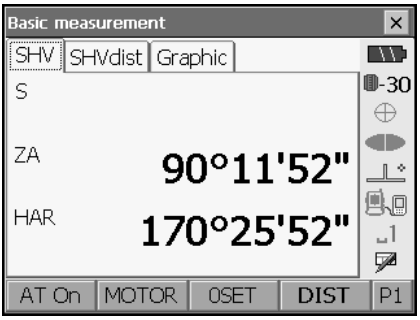
• The search range can be set.
☞ "11.1 Auto Pointing Settings"

⚠Caution
• The laser beam is emitted during Auto Pointing and Auto Tracking.

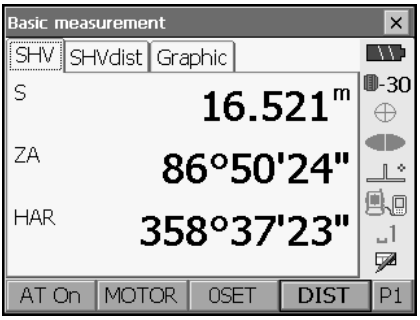
PROCEDURE

1. Face the SRX in the direction of the target
   Use the peep sight to aim the SRX and telescope toward the target.
   ☞ "11. TARGET SIGHTING"

2. Start measurement.
   Press **[DIST]** in the first page of Meas mode to start measurement.



   The measured distance data (S), vertical angle (ZA), and horizontal angle (HAR) are displayed.



3. Press **[STOP]** to quit distance measurement.

Note

- If the single measurement mode is selected, measurement automatically stops after a single measurement.
- During fine average measurement, the distance data is displayed as S1, S2,... to S9. When the designated number of measurements has been completed, the average value of the distance is displayed in the "SA" line.
- The distance and angle that are most recently measured remain stored in the memory until the power is off and can be displayed at any time by pressing **[RCL]**.

☞ Allocating **[RCL]**: "30.6 Allocating Key Functions"

14.4 Distance Measurement and Outputting the Data

The following explains distance measurement and the features used to output measurement data to a computer or external devices.

☞"8. CONNECTING TO EXTERNAL DEVICES", Communication cables: "36. OPTIONAL ACCESSORIES". Output format and command operations: "Interfacing with the SOKKIA SDR Electronic Field Book" and Command Explanations manuals

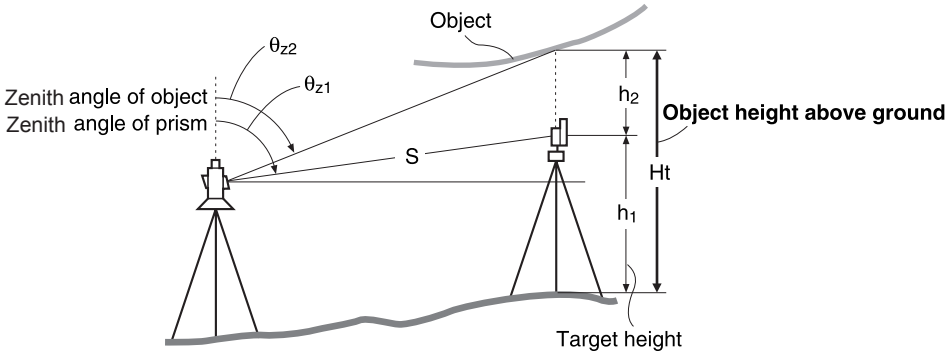
PROCEDURE

1. Connect SRX and external device.
2. Sight the target point.
3. Press **[HVD out]** in Meas mode to start distance measurement. Target measurement results are output to the external device.
   ☞ Allocating **[HVD out]**: "30.6 Allocating Key Functions"
4. Press **[STOP]** to finish data output and return to the Meas mode.

14.5 REM Measurement

An REM measurement is a function used to measure the height to a point where a target cannot be directly installed such as power lines, overhead cables and bridges, etc.
The height of the target is calculated using the following formula.

$Ht = h_1 + h_2$
$h2 = S \sin\theta_{z1} \times \cot\theta_{z2} - S \cos\theta_{z1}$



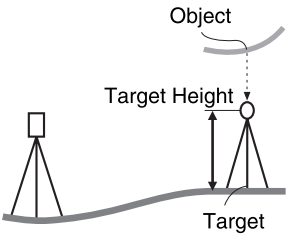
- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.

☞"30.6 Allocating Key Functions"

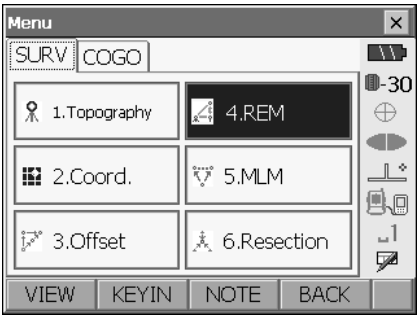
PROCEDURE

1. Set the target directly under or directly over the object and measure the target height with a tape measure etc.

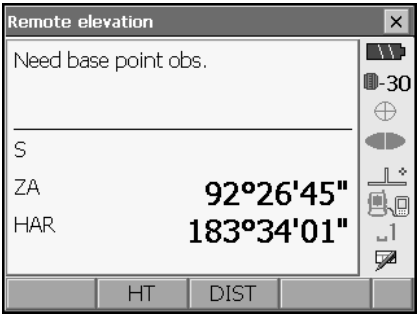
   Press **[HT]** and enter the target height.



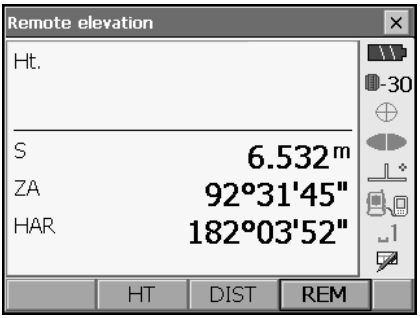
2. Select "REM" in the "SURV" tab of <Menu>.



3. Sight the target and press **[DIST]** to start measurement. Press **[STOP]** to stop the measurement.

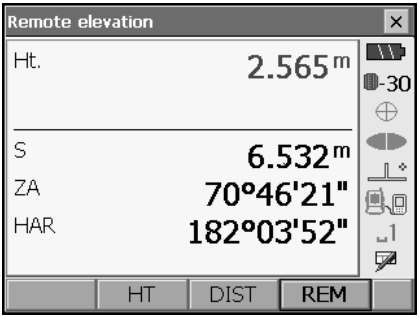


   The measured distance data, vertical angle and horizontal angle are displayed.



4. Sight the object, then press **[REM]** to start REM measurement. The height from the ground to the object is displayed in "Ht.". Press **[STOP]** to stop the measurement.

   - To re-observe the target, sight the target then press **[DIST]**.
   - To continue REM measurement, press **[REM]**.

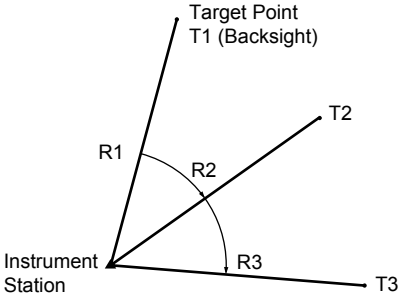


Note

- When measurement data already exists, select **[REM]** in <Menu> as in step 2 to proceed to step 4 and start REM measurement. Press **[STOP]** to stop the measurement.

15.TOPOGRAPHY MEASUREMENT

It is possible to find angle and distance to the target based on station point coordinates, instrument height, target height, and azimuth angles of the backsight station which are entered in advance. Measurement can be continuously performed and recorded.



- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.
  ☞"30.6 Allocating Key Functions"

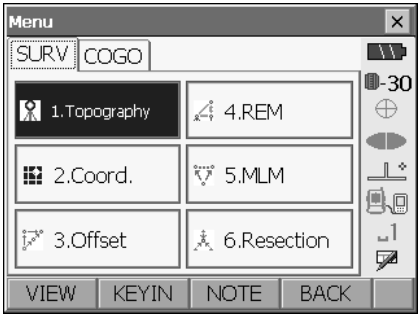
15.1 Entering Instrument Station Data

Before performing topography measurement, enter instrument station coordinates and instrument height.

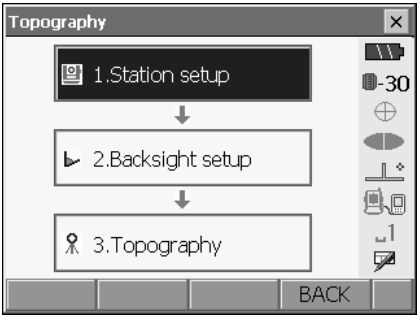
PROCEDURE

1. First measure instrument height with a tape measure, etc.

2. Select "Topography" in the "SURV" tab of <Menu>.

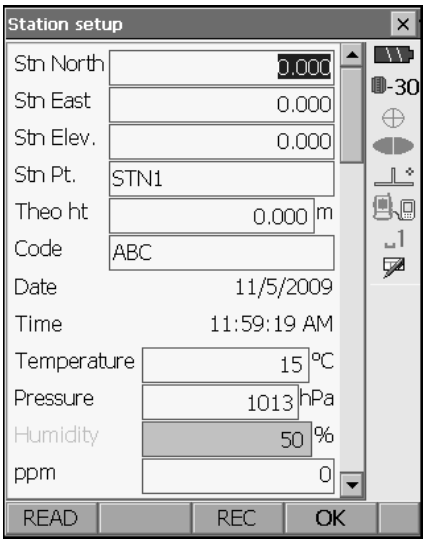


3. Select "Station setup" in <Topography> and enter instrument station coordinates, point number, instrument height and code.



- Press **[READ]** to read in coordinate data registered in Memory mode.

☞ "16.4 Reading in registered coordinate data from Memory mode"

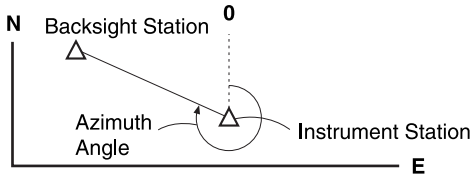


4. Press **[OK]** to set the input values. <Set H angle> is displayed.

- When **[REC]** is pressed, instrument station data is stored in the current JOB and the input values are set.

15.2 Azimuth Angle Setting

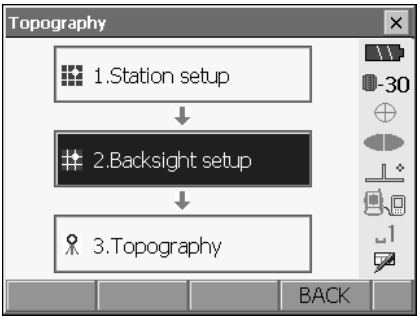
Based on the instrument station coordinates and backsight station coordinates already been set, the azimuth angle of the backsight station is calculated.



PROCEDURE Entering coordinates

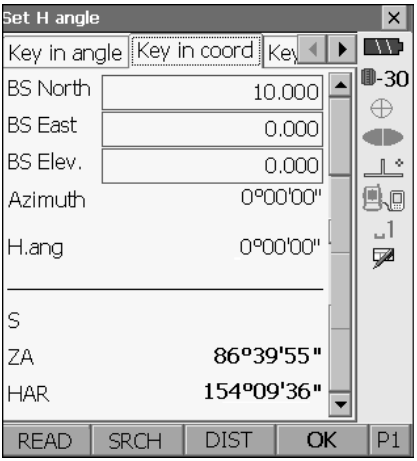
1. Select "Backsight setup" in <Topography>. <Set H angle> is displayed.

   • <Set H angle> can also be displayed from the screen in step 4 of "15.1 Entering Instrument Station Data".

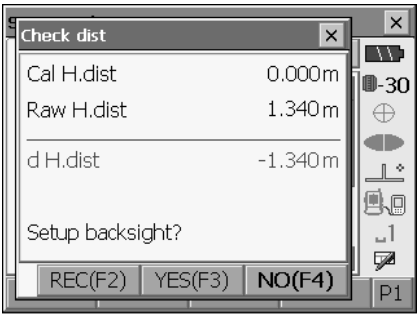


2. Select the Key in coord tab and enter the backsight station coordinates.

   • **[READ]**: Reads in coordinate data registered in Memory mode.
   • **[Azimuth]**: Switches horizontal angle setting method.
   ☞ Horizontal angle settings



- Sight the backsight station and press **[DIST]**. Press **[STOP]** to display the distance calculated from coordinates, the measured distance, and the difference between the two. Press **[YES]** to set the azimuth angle and return to <Topography>. Press **[REC]** to store the backsight station data in the current JOB. Input point number, target height and code, then press **[OK]**.



3. Press **[OK]** to set the azimuth angle. <Topography> is displayed.

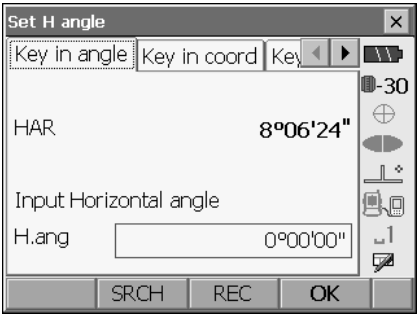
PROCEDURE Entering angle

1. Select "Backsight setup" in <Topography>. <Set H angle> is displayed.

. <Set H angle> can also be displayed from the screen in step 4 of "15.1 Entering Instrument Station Data".

2. Select the Key in angle tab and enter the desired angle in "H.ang".

   - Press **[REC]** to store the backsight station data in the current JOB. Input point number, target height and code, then press **[OK]**.



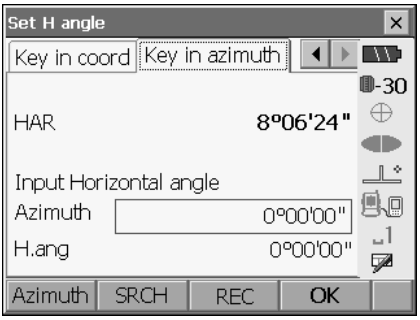
3. Press **[OK]** to set the input values. <Topography> is displayed.

PROCEDURE Entering azimuth

1. Select "Backsight setup" in <Topography>. <Set H angle> is displayed.

   - <Set H angle> can also be displayed from the screen in step 4 of "15.1 Entering Instrument Station Data".

2. Select the Key in azimuth tab and enter the desired angle in "Azimuth".



   - **[Azimuth]**: Switches horizontal angle setting method.
     ☞ "Horizontal angle settings"
   - Press **[REC]** to store the backsight station data in the current JOB. Input point number, target height and code, then press **[OK]**.

3. Press **[OK]** to set the input values. <Topography> is displayed.

Horizontal angle settings
Azimuth (set both horizontal and azimuth angles to the same value)/H.ANG (input both horizontal and azimuth angles)/None (input azimuth angle only)/0 SET (horizontal angle set to 0°)

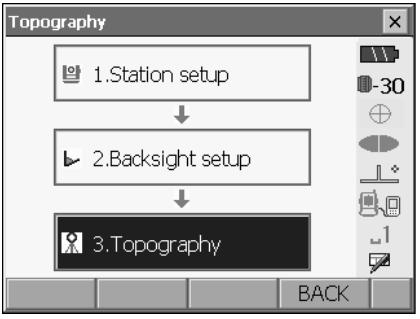
15.3 Topography Measurement

The angle and distance to a target can be found by measuring the target based on the settings of the instrument station and backsight station.

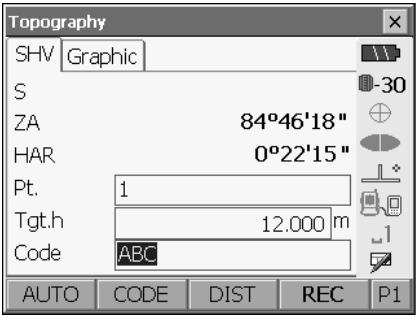
PROCEDURE

1. Sight the target at the target point.

2. Select "Topography" in <Topography>.



Press **[DIST]** to start measurement. Press **[STOP]** to stop the measurement. The measurement results are displayed. Select the Graphic tab to display measurement results on a graph.



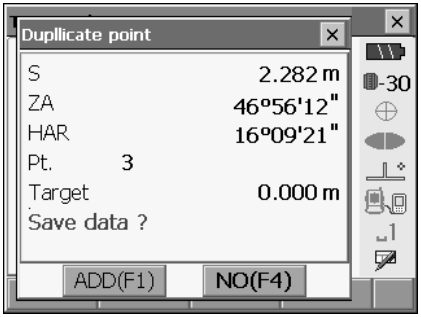
- When recording data in the current JOB, input point number, target height, and code, then press **[REC]**.
- Press **[AUTO]** to perform coordinate measurement and automatically record the results. **[AUTO]** is convenient for recording measurement data when point number, code, and target height are not set.
- Press **[A-OFS]/[D-OFS]** on the second page to perform angle/distance offset measurement. ☞ "20. OFFSET MEASUREMENT"

3. Sight the next target and press **[DIST]** to begin measurement. Continue until all targets have been measured.

4. When topography measurement is completed, press **{ESC}** or tap the cross in the top-right corner to return to <Topography>.

Note

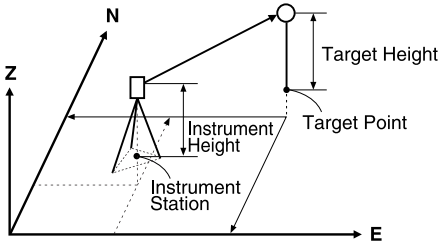
- If the same point number is input, the following screen is displayed. Recording instrument station data and backsight station data is an exception.



Press **[ADD]** to record the point as another record with the same name.
Press **[NO]** to input a new name.

16.COORDINATE MEASUREMENT

By performing coordinate measurements it is possible to find the 3-dimensional coordinates of the target based on station point coordinates, instrument height, target height, and azimuth angles of the backsight station which are entered in advance.



- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.
  ☞"30.6 Allocating Key Functions"

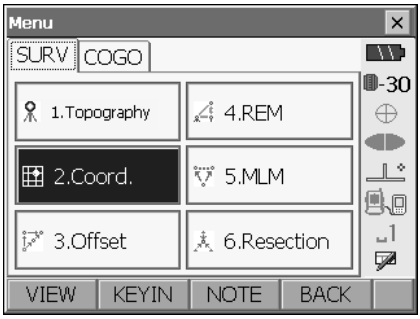
16.1 Entering Instrument Station Data

Before performing coordinate measurement, enter instrument station coordinates and instrument height.

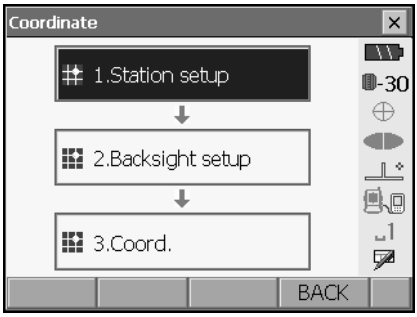
PROCEDURE

1. First measure the instrument height with a tape measure, etc.

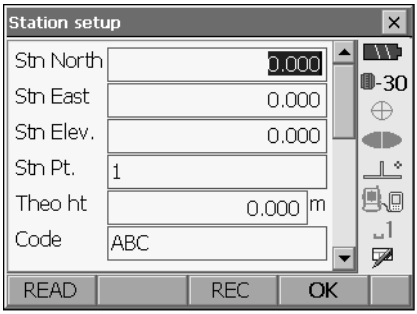
2. Select "Coord." in the "SURV" tab of <Menu>.



3. Select "Station setup" and enter instrument station coordinates, point number, instrument height and code.



- Press **[READ]** to read in coordinate data registered in Memory mode.
  ☞ "16.4 Reading in registered coordinate data from Memory mode"

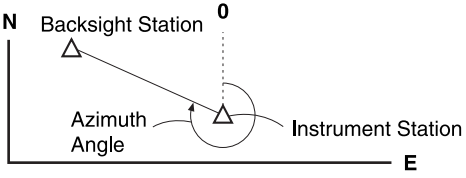


4. Press **[OK]** to set the input values. <Set H angle> is displayed again.

- When **[REC]** is pressed, instrument station data is stored in the current JOB and the input values are set.

16.2 Azimuth Angle Setting

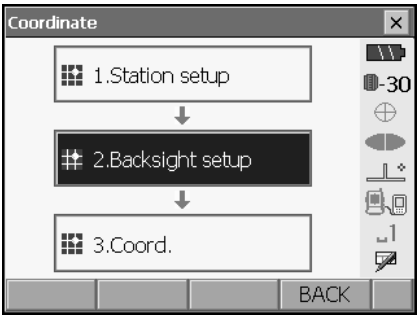
Based on the instrument station coordinates and backsight station coordinates which have already been set, the azimuth angle of the backsight station is calculated.



PROCEDURE Entering coordinates

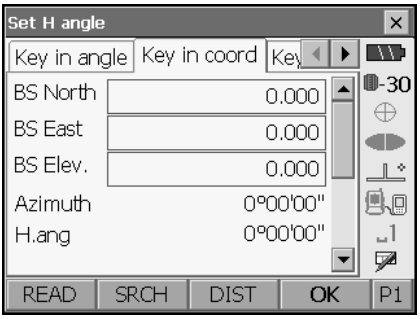
1. Select "Backsight setup" in <Coordinate>. <Set H angle> is displayed.

   • <Set H angle> can also be displayed from the screen in step 4 of "16.1 Entering Instrument Station Data".

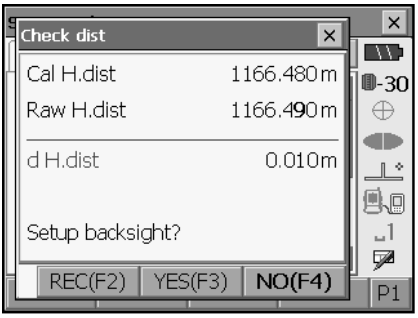


2. Select the Key in coord tab and enter the backsight station coordinates.

   • **[READ]**: Reads in coordinate data registered in Memory mode.
   ☞"16.4 Reading in registered coordinate data from Memory mode"
   • **[SRCH]**: Performs Auto Pointing. Rotates the SRX in the direction of the backsight.
   • **[Azimuth]**: Switches horizontal angle setting method.
   ☞ "Horizontal angle settings"



   • Sight the backsight station and press **[DIST]**. Press **[STOP]** to display the distance calculated from coordinates, the measured distance, and the difference between the two. Press **[YES]** to set the azimuth angle and display <Coord. measurement>. Press **[REC]** to store the backsight station data in the current JOB. Input point number, target height and code, then press **[OK]**.



3. Press **[OK]** to set the azimuth angle. <Coord. measurement> is displayed.

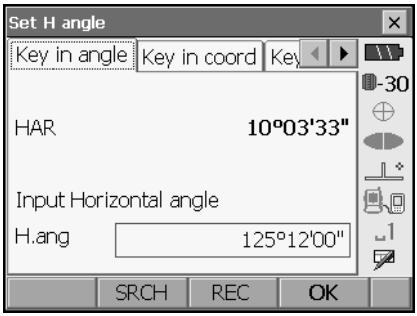
PROCEDURE Entering angle

1. Select "Backsight setup" in <Coordinate>. <Set H angle> is displayed.

. <Set H angle> can also be displayed from the screen in step 4 of "16.1 Entering Instrument Station Data".

2. Select the Key in angle tab and enter the desired angle in "H.ang".

   • **[SRCH]**: Performs Auto Pointing. Rotates the SRX in the direction of the backsight.



3. Press **[OK]** to set the input values. <Coord. measurement> is displayed.

   • Press **[REC]** to store the backsight station data in the current JOB. Input point number, target height and code, then press **[OK]**. <Coord. measurement> is displayed.

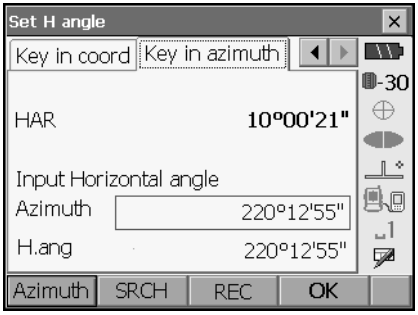
PROCEDURE Entering azimuth

1. Select "Backsight setup" in <Coordinate>. <Set H angle> is displayed.

. <Set H angle> can also be displayed from the screen in step 4 of "16.1 Entering Instrument Station Data".

2. Select the Key in azimuth tab and enter the desired angle in "Azimuth".

   • **[SRCH]**: Performs Auto Pointing. Rotates the SRX in the direction of the backsight.
   • **[Azimuth]**: Switches horizontal angle setting method.
   ☞ "[] Horizontal angle settings"



3. Press **[OK]** to set the input values.<Coord. measurement> is displayed.

   • Press **[REC]** to store the backsight station data in the current JOB. Input point number, target height and code, then press **[OK]**. <Coord. measurement> is displayed.

Horizontal angle settings
Azimuth (set both horizontal and azimuth angles to the same value)/H.ANG (input both horizontal and azimuth angles)/None (input azimuth angle only)/0 SET (horizontal angle set to 0°)

16.3 3-D Coordinate Measurement

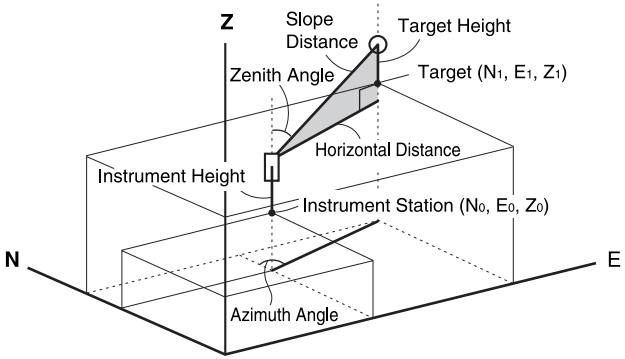
The coordinate values of the target can be found by measuring the target based on the settings of the instrument station and backsight station.

The coordinate values of the target are calculated using the following formulae.

N1 Coordinate = N0 + S x sinZ x cosAz
E1 Coordinate = E0 + S x sinZ x sinAz
Z1 Coordinate = Z0 + S x cosZ + ih - fh

N0: Station point N coordinateS: Slope distance ih: Instrument height
E0: Station point E coordinateZ: Zenith angle fh: Target height
Z0: Station point Z coordinateAz: Direction angle

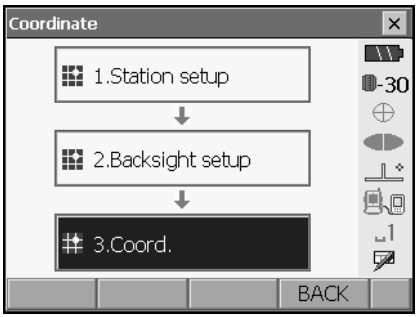
"Null" coordinates will not be included in calculations. "Null" is not the same as zero.



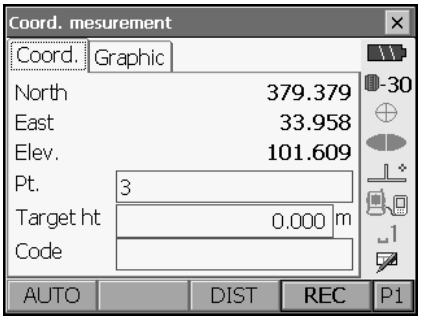
PROCEDURE

1. Sight the target at the target point.
   ☞ "11. TARGET SIGHTING"

2. Select "Coord." in <Coordinate>.



   Press **[DIST]** to start measurement. Press **[STOP]** to stop the measurement. The coordinates of the target point are displayed. Select the Graphic tab to display coordinates on a graph.



   - When recording data in the current JOB, input point number, target height, and code, then press **[REC]**.
   - Press **[AUTO]** to perform coordinate measurement and automatically record the results. **[AUTO]** is convenient for recording measurement data when not setting point number, code, and target height.
   - Press **[A-OFS]**/**[D-OFS]** on the second page to perform angle/distance offset measurement.
     ☞ "20. OFFSET MEASUREMENT"

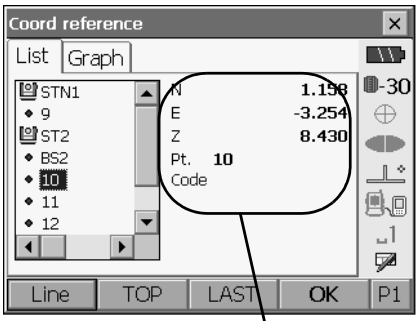
3. Sight the next target and press **[DIST]** to begin measurement. Continue until all targets have been measured.

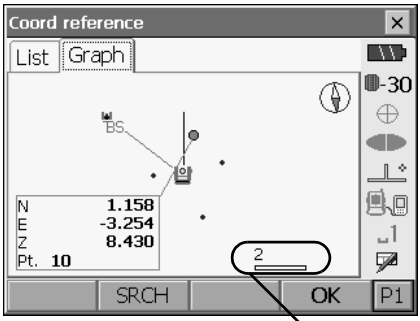
4. When coordinate measurement is completed, press **{ESC}** or tap the cross in the top-right corner to return to <Coordinate>.

16.4 Reading in registered coordinate data from Memory mode

16.4.1 Selecting points from registered coordinates

When **[READ]** is pressed, coordinate data stored in the current JOB and the coordinate search JOB is recalled and displayed in <Coord reference>. The points thus displayed can then be selected as points for the current operation. The List and Graphic tabs are linked so that when a particular point is selected in one tab, the same point is automatically selected in the other tab.





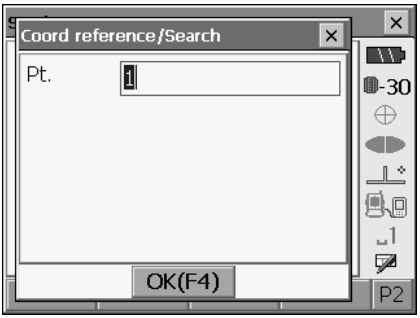
The screen contains the following softkeys:

[Line]/[Page]: Switch the operation of **{▲}/{▼}** from page scroll to point scroll.
[TOP]: Select the first point in the list.
[LAST]: Select the last point in the list.
[SRCH]: Search for point number.
[CNFG] (on the second page):
Change the display setting.
[DEF.] (on the second page):
Return to the default display format.

16.4.2 Searching for a point

1. Press **[SRCH]** in <Coord reference>.

2. Enter a point number and press **[OK]** or **{↵}** to start the search. Up to 14 characters can be input. Any existing point with a matching number will be displayed at the bottom of the list.

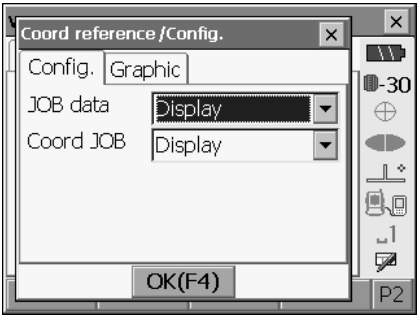


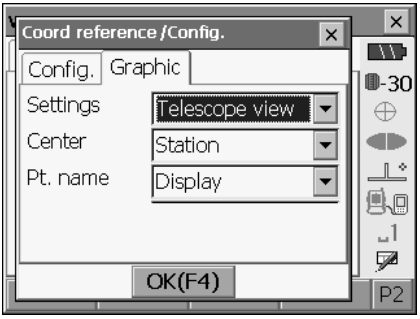
16.4.3 Configuration

1. Press **[CNFG]** on the second page of <Coord reference> to change the display setting.

2. Change the settings.

   JOB data and Coord JOB:
   Displayed JOB can be selected.
   Settings:
   Orientation of the display can be selected from telescope direction, north or south.
   Center:
   Center point for the display can be selected from instrument station or target point.
   Pt.name:
   Switch point name display on/off.



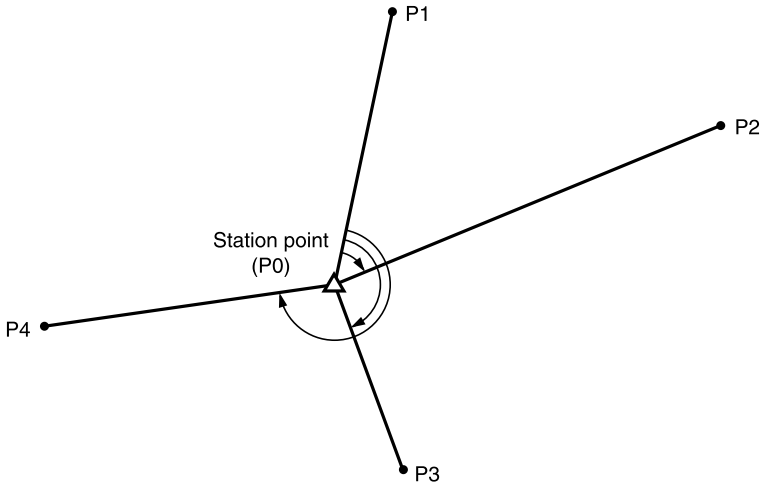


3. Press **[OK]** to confirm the settings.

17.RESECTION MEASUREMENT

Resection is used to determine the coordinates of an instrument station by performing multiple measurements of points whose coordinate values are known. Registered coordinate data can be recalled and set as known point data. Residual of each point can be checked, if necessary

Entry			Output		
Coordinates of known point	:	(Ni, Ei, Zi)	Station point coordinates	:	(N0,E0, Z0)
Observed horizontal angle	:	Hi			
Observed vertical angle	:	Vi			
Observed distance	:	Di			



- Between 2 and 10 known points can be measured by distance measurement, and between 3 and 10 known points by angle measurement.
- The more known points there are and the more points there are whose distance can be measured, the higher the precision of the coordinate value calculation.
- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.

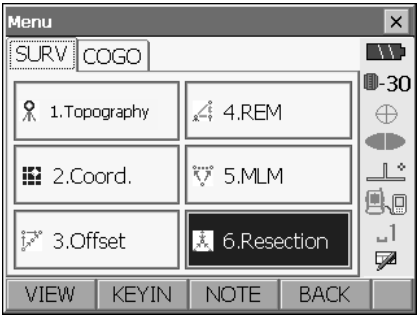
☞ "30.6 Allocating Key Functions"

17.1 Coordinate Resection Measurement

N, E, Z of an instrument station is determined by the measurement.

PROCEDURE

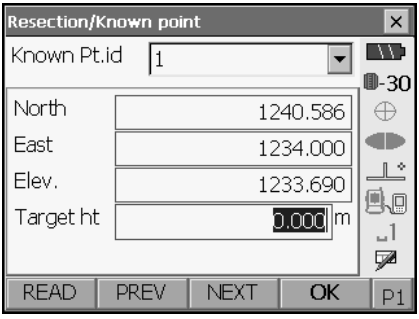
1. Select "Resection" in the "SURV" tab of<Menu>.



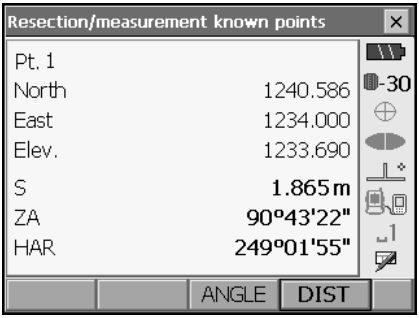
2. Select "NEZ" to display <Resection/Known point>.

3. Input the known point.
   After setting the coordinates and target height for the first known point press **[NEXT]** to move to the second point.
   - Press **[READ]** to read in coordinate data registered in Memory mode.
     ☞"16.4 Reading in registered coordinate data from Memory mode"
   - Press **[PREV]** to return to settings for the previous point.
   - When recording known point data in the current JOB, press **[REC]** on the second page.

   When all required known points have been set, press **[OK]**.

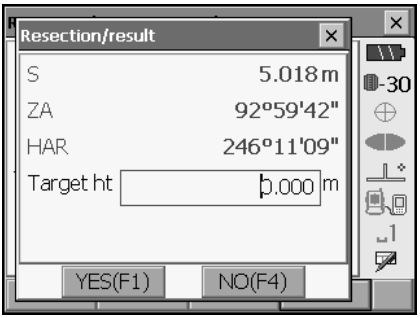


4. Sight the first known point and press **[DIST]** to begin measurement.
   The measurement results are displayed on the screen.
   • When **[ANGLE]** has been selected, the distance cannot be displayed.

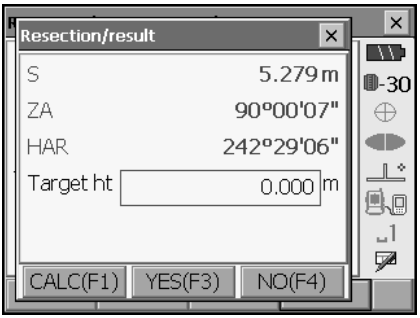


5. Press **[YES]** to use the measurement results of the first known point.

   • You can also input target height here.
   • Press **[NO]** to return to the screen in step 4 and perform measurement again.

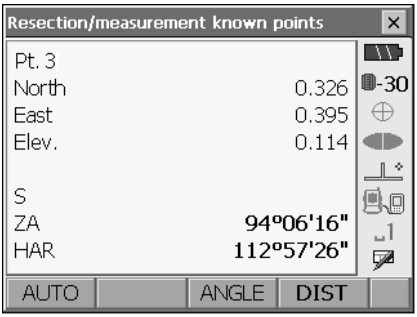


6. Repeat procedures 4 to 5 in the same way from subsequent points.
   When the minimum quantity of observation data required for the calculation is present, **[CALC]** is displayed.

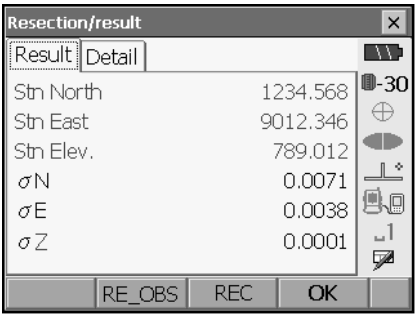


   [AUTO] will be displayed for the 3rd point onwards for Auto Tracking models. Pressing **[AUTO]** will rotate the instrument to the next point and start auto measurement.

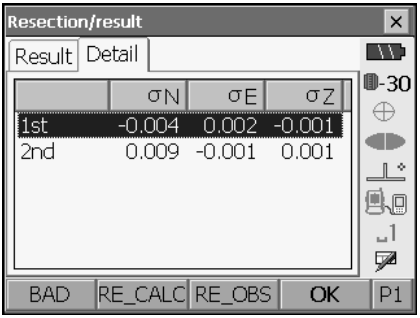
   • Press **[STOP]** during auto measurement to display a confirmation message. Press **[YES]** in this message to return to the first point measured using auto measurement. Measurement can now be continued manually. Press **[NO]** to continue measurement manually from the current position.



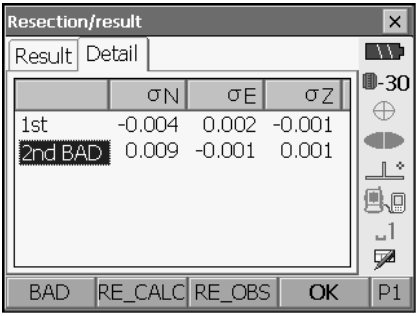
7. Press **[CALC]** or **[YES]** to automatically start calculations after observations of all known points are completed.
   - Instrument station coordinates, station elevation, and standard deviation, which describes the measurement accuracy, are displayed.
   - These values are displayed automatically after observation is complete when performing auto measurement.
   - When recording instrument station data in the current JOB, press **[REC]**.



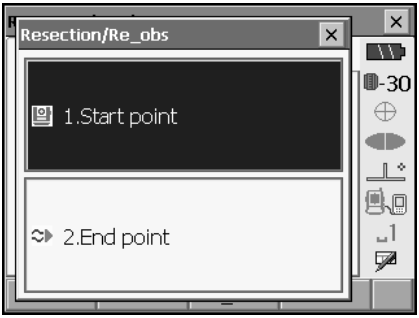
Standard deviation for the northing, easting and elevation coordinates of each point are displayed in the Detail tab.



8. If there are problems with the results of a point, align the cursor with that point and press **[BAD]**. “BAD” is displayed to the right of the point. Repeat for all results that include problems.



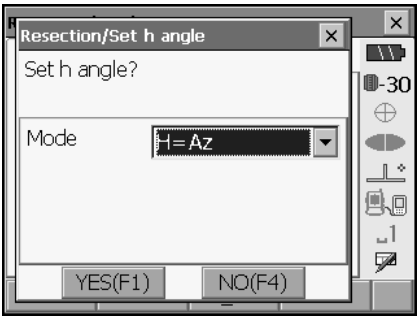
9. Press **[RE CALC]** to perform calculation again without the point designated in step 8. The result is displayed.
   If there are no problems with the result, go to step 10.
   If problems with the result occur again, perform the resection measurement from step 4.
   - Press **[RE OBS]** to measure the point designated in step 8.
     If no points are designated in step 8, all the points or only the final point can be observed again.
   - Auto measurement is possible from the 1st point when performing re-observation.
   - Press **[ADD]** when there is a known point that has not been measured or when a new known point is added.



10. Press **[OK]** in <Resection/result> to display <Resection/Set h angle>.

11. Select an angle mode and press **[YES]** to set the azimuth angle of the first known point as the backsight point and return to <Resection/Menu>.

12. Press **[NO]** to return to <Resection/Menu> without setting the azimuth angle.



Horizontal angle settings
H=Az (set horizontal angle to the same value as azimuth angle)/Az (set azimuth angle only)/H (set horizontal angle to measured value)

Note

- It is also possible to perform resection measurement by pressing **[RESEC]** when allocated to the Meas mode screen.
  ☞ Allocating **[RESEC]**: "30.6 Allocating Key Functions"

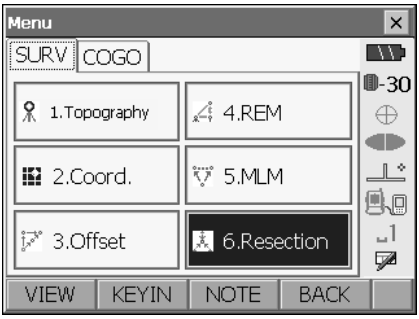
17.2 Height Resection Measurement

Only Z (height) of an instrument station is determined by the measurement.

- Known points must be measured by distance measurement only.
- Between 1 and 10 known points can be measured.

PROCEDURE

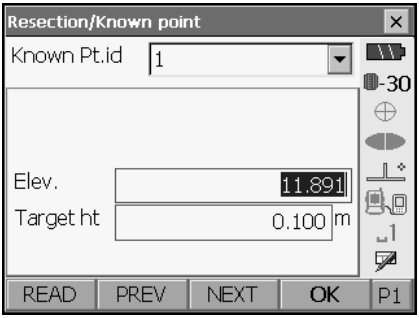
1. Select "Resection" in the "SURV" tab of <Menu>.



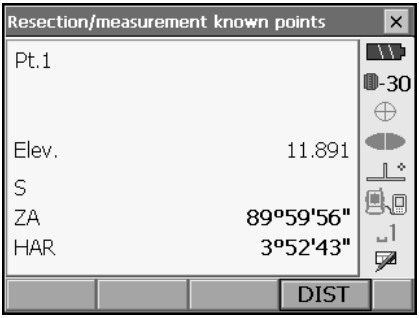
2. Select "Elevation" to display <Resection/Known point>.

3. Input the known point.
   After setting the elevation and target height for the first known point press **[NEXT]** to move to the second point.
   - Press **[READ]** to read in data registered in Memory mode.
     ☞"16.4 Reading in registered coordinate data from Memory mode"
   - Press **[PREV]** to return to settings for the previous point.
   - When recording known point data in the current JOB, press **[REC]** on the second page.

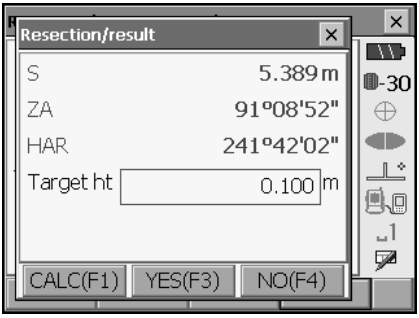
   When all required known points have been set, press **[OK]**.



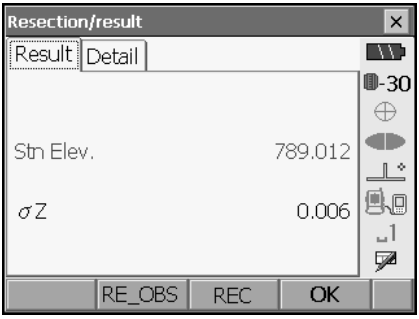
4. Sight the first known point and press **[DIST]** to begin measurement.
   The measurement results are displayed on the screen.



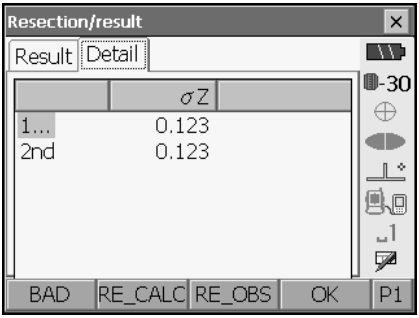
5. If measuring two or more known points, repeat procedures 4 in the same way from the second point.



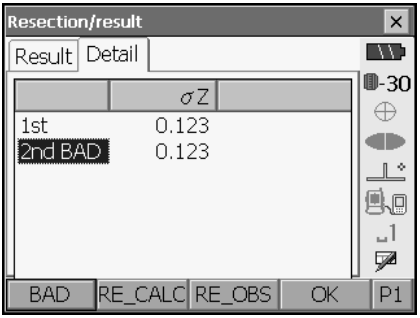
6. Press **[CALC]** or **[YES]** to automatically start calculations after observations of all known points are completed.
   - Instrument station elevation and standard deviation, which describes the measurement accuracy, are displayed in the Result tab.
   - When recording instrument station data in the current JOB, press **[REC]**.



   Standard deviation values for each point are displayed in the Detail tab.

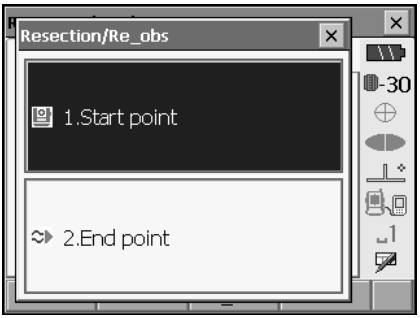


7. If there are problems with the results of a point, align the cursor with that point and press **[BAD]**. “BAD” is displayed to the right of the point. Repeat for all results that include problems.



8. Press **[RE CALC]** to perform calculation again without the point designated in step 8. The result is displayed.
   If there are no problems with the result, go to step 9.
   If problems with the result occur again, perform the resection measurement from step 4.
   • Press **[RE OBS]** to measure the point designated in step 4.

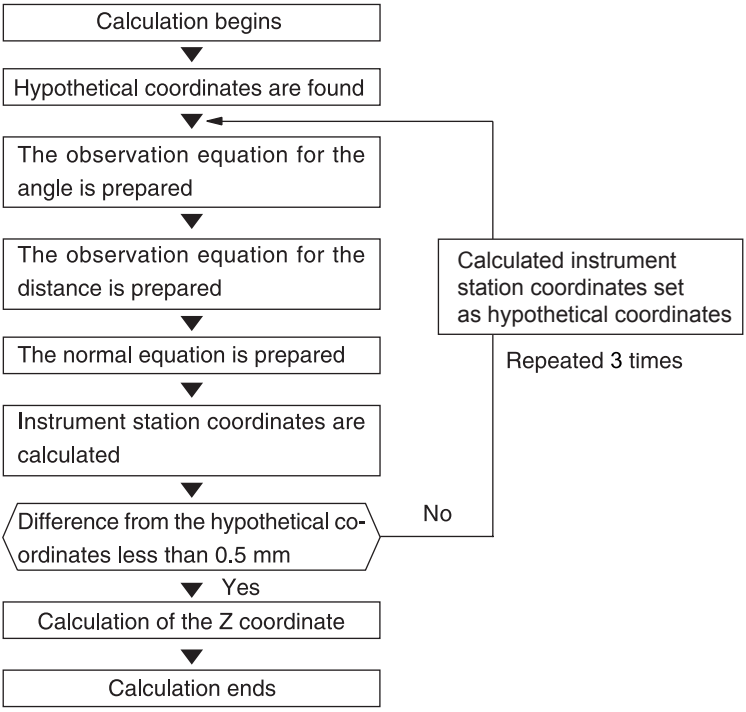
   If no points are designated in step 8, all the points or only the final point can be observed again.
   • Press **[ADD]** when there is a known point that has not been measured or when a new known point is added.



9. Press **[OK]** to finish resection measurement and return to <Resection/Menu>. Only Z (elevation) of the instrument station coordinate is set. N and E values are not overwritten.

Resection calculation process

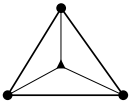
The NE coordinates are found using angle and distance observation equations, and the instrument station coordinates are found using the method of least squares. The Z coordinate is found by treating the average value as the instrument station coordinates.



Precaution when performing resection

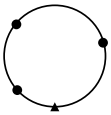
In some cases it is impossible to calculate the coordinates of an unknown point (instrument station) if the unknown point and three or more known points are arranged on the edge of a single circle.

An arrangement such as that shown below is desirable.



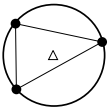
△▲ : Unknown point
○● : Known point

It is sometimes impossible to perform a correct calculation in a case such as the one below.

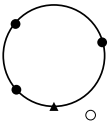


When they are on the edge of a single circle, take one of the following measures.

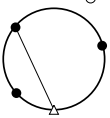
(1) Move the instrument station as close as possible to the center of the triangle.



(2) Observe one more known point which is not on the circle.



(3) Perform a distance measurement on at least one of the three points.



- In some cases it is impossible to calculate the coordinates of the instrument station if the included angle between the known points is too small. It is difficult to imagine that the longer the distance between the instrument station and the known points, the narrower the included angle between the known points. Be careful because the points can easily be aligned on the edge of a single circle.

18.SETTING-OUT MEASUREMENT

Setting-out measurement is used to set out the required point.
The difference between the previously input data to the instrument (the setting-out data) and the measured value can be displayed by measuring the horizontal angle, distance or coordinates of the sighted point.

The horizontal angle difference distance difference, and coordinate difference are calculated and displayed using the following formulae.
Horizontal difference
Displayed value (angle) = Horizontal angle of setting-out data - measured horizontal angle
Displayed value (distance) = measured horizontal distance x tan (horizontal angle of setting out data - measured horizontal angle)

Slope distance difference
Displayed value (slope distance)* = measured slope distance - slope distance setting-out data
*Horizontal distance or height difference can be input in the above formula.

Coordinate difference
Displayed value (coordinates)* = measured N setting-out coordinates - N coordinates of setting-out data
*E or Z coordinates can be input in the above formula

Height difference (REM setting out measurement)
Displayed value (height) = measured REM data - REM data of setting out data

- Setting out data can be input in various modes: slope distance, horizontal distance, height difference, coordinates and REM measurement.
- It is possible to allocate softkeys in the Setting-out measurement menu to suit various applications and the ways that different operators handle the instrument.

☞ "30.6 Allocating Key Functions"

- **[AT On]** can only be selected on the Auto Tracking model.

18.1 Using the Guide Light

When the guide light is set to ON, the flashing speed of the light indicates the status of the SRX and can be known when the user is located at a distance from the instrument. Also, the flashing colors relative to the target indicate the direction of the instrument and allow the user to reposition the target.
☞ Turning the Guide light ON/OFF: "5.1 Basic Key Operation"

- The pattern of the guide light can be changed.

☞ "30.2 Instrument Configuration"

● Guide light status and meaning

Status of SRX

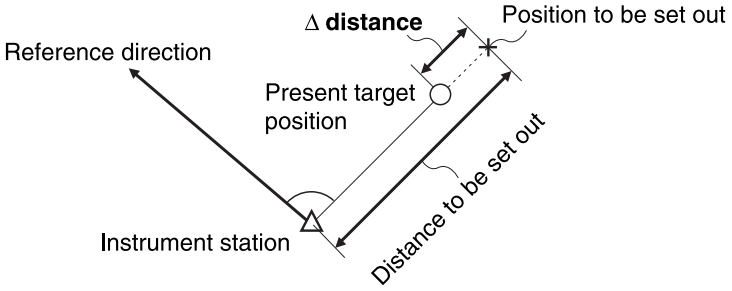
Light status	Meaning
Slow flashing (Red and green simultaneously)	Waiting
	Search error (error screen only)
Fast flashing (Red and green simultaneously)	Searching in progress
	Measuring (continuous measurement)
	Returned signal checking in progress
	Auto Tracking in progress (Auto Tracking model only)
	Auto Tracking in predicted direction (Auto Tracking model only)
Green and red alternate flashing	Distance measurement error (no signal, sighting error)
	"Prism wait"

Indication for positioning target during setting-out measurement

Light status	Meaning
Increased flashing speed	(From position of poleman) Move target toward SRX
Decreased flashing speed	(From position of poleman) Move target away from SRX
Fast flashing	Target is at correct distance
Red	(From position of poleman) Move target left
Green	(From position of poleman) Move target right
Red and Green	Target is at correct horizontal position

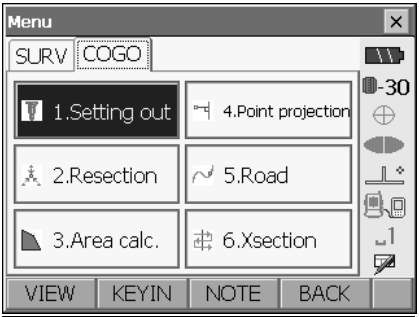
18.2 Distance Setting-out Measurement

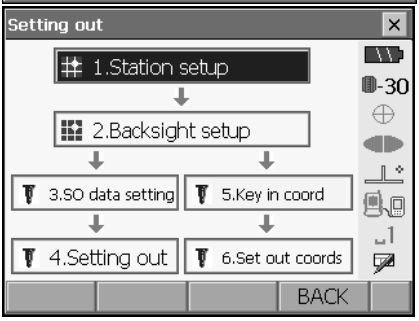
The point is to be found based on the horizontal angle from the reference direction and the distance from the instrument station.



PROCEDURE

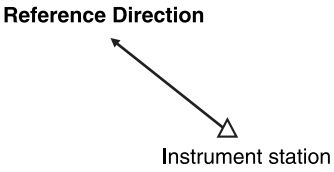
1. Select "Setting out" in the "COGO" tab of <Menu> to display <Setting out>.





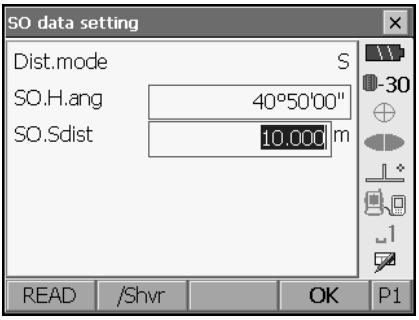
2. Select "Station setup" to display <Station setup>. Enter data for the instrument station and press **[OK]** to move to Backsight setup.
   ☞"16.1 Entering Instrument Station Data"

   • Press **[READ]** to read in coordinate data registered in Memory mode.
   ☞ "16.4 Reading in registered coordinate data from Memory mode"

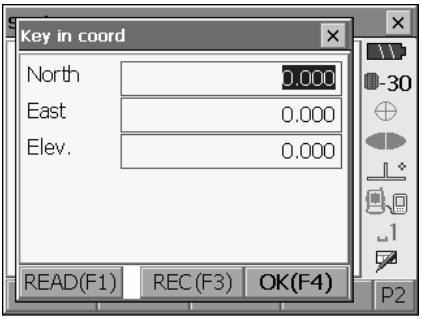


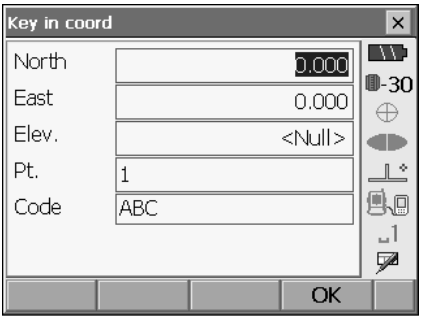
3. Set the azimuth angle for the backsight station. Press **[OK]** to return to <Setting out>.
   ☞"16.2 Azimuth Angle Setting"

4. Select "SO data setting" In <Setting out> to display <SO data setting>. In the distance mode that conforms to your measurement requirements, enter the included angle between the reference point and the setting-out point in "SO.H.ang", and the distance (slope distance, horizontal distance or height difference) from the instrument station to the position to be set out in "SO.Sdist".

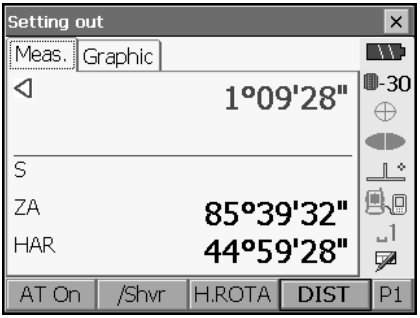


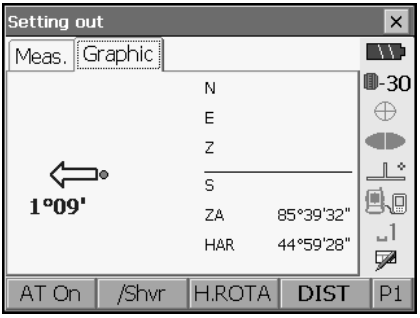
   - Each time **[/Shvr]** is pressed, the distance mode changes from "S" (slope distance), "H" (horizontal distance), "V" (height difference), and "Ht." (REM).
   - When **[READ]** is pressed, coordinates registered in Memory mode can be recalled and used. The distance selected according to the selected distance input mode is calculated using these coordinate values.
     ☞ "16.4 Reading in registered coordinate data from Memory mode"
   - Press **[COORD]** in the second page and input coordinates in <Key in coord>. The angle and distance from these coordinates to the position to be set out will be calculated.
   - When recording known point data in the current JOB, press **[REC]** in <Key in coord>. Enter known point coordinates, point number, and code, then press **[OK]**.





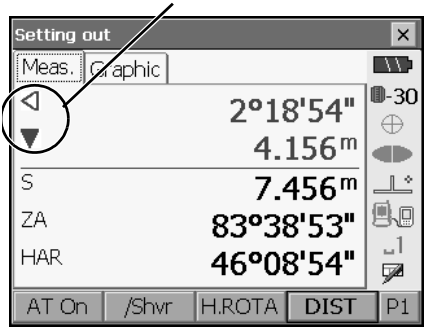
5. Enter values and press **[OK]** to display the screen at right.
   Press **[H.ROTA]** to automatically rotate the SRX until the difference in horizontal angle to the setting out point reads 0°.

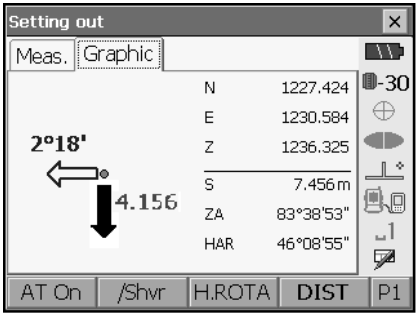




6. Position the target on the line of sight and press **[DIST]** to begin distance measurement.
   The distance and direction to move the target until the setting out point is located is displayed on the SRX. The sighting point measurement results (currently installed position of the target) are displayed.

Arrows indicate direction to move



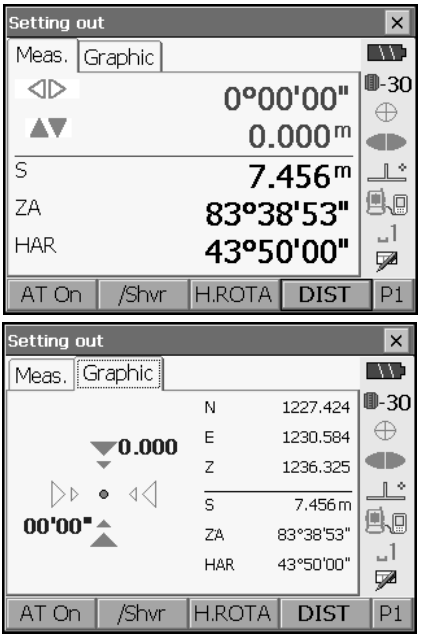


- Movement indicator (Red indicates that target position is correct)
  Arrows indicating horizontal direction will point in the opposite direction when viewing the display in Face 2.

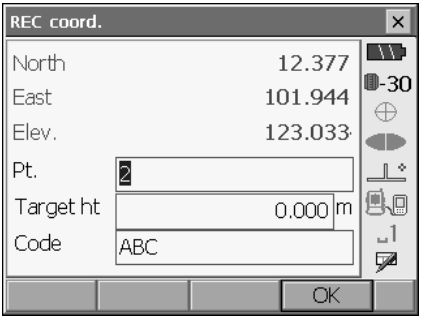
◁ : (Viewed from SRX) Move target to the left
▷ : (Viewed from SRX) Move target to the right
◁▷: Target position is correct
▼ : (Viewed from SRX) Move target closer
▲ : (Viewed from SRX) Move target away
▲▼: (Viewed from SRX) Target position is correct
⏫ : Move target upward
⏬ : Move target downward
⏫⏬: Target position is correct

- Each time **[/Shvr]** is pressed, the distance input mode changes from "H" (horizontal distance), "V" (height difference), "R" (slope distance), and "S" (slope distance).
- Press **[CNFG]** to set setting out accuracy. When the position of the target is within this range both arrows will be displayed to indicate that the target position is correct.

7. Move the target until the distance to the setting-out point reads 0m. When the target is moved within the allowed range, all distance and position arrows are displayed.



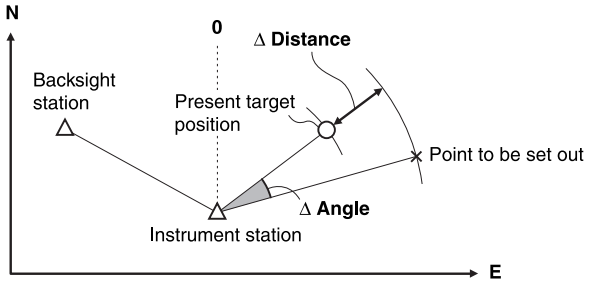
- When recording data in the current JOB, press **[REC]** in page 2. Enter point number, target height and code, then press **[OK]**.



8. Press **{ESC}** to return to <Setting out>. Set the next setting out point to continue setting out measurement.

18.3 Coordinates Setting-out Measurement

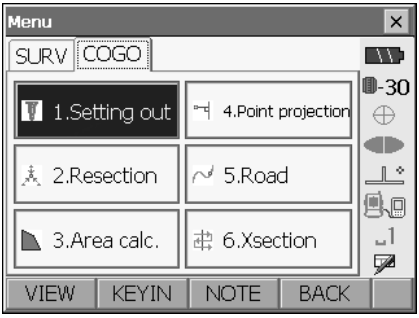
After setting the coordinates for the point to be set out, the SRX calculates the setting-out horizontal angle and horizontal distance. By selecting the horizontal angle and then the horizontal distance setting-out functions, the required coordinate location can be set out.



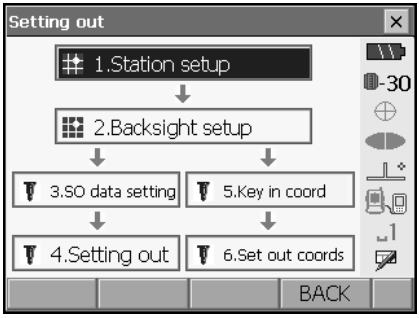
- Previously recorded setting-out points can be placed in order. Up to 50 points can be recorded.
- To find the Z coordinate, attach the target to a pole etc. with the same target height.

PROCEDURE

1. Select "Setting out" in the "COGO" tab of <Menu> to display <Setting out>.

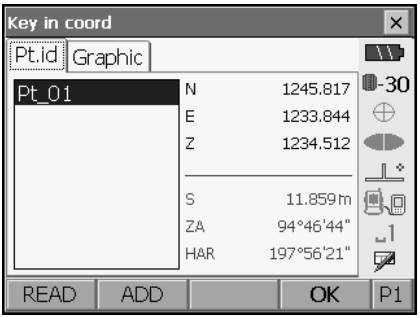


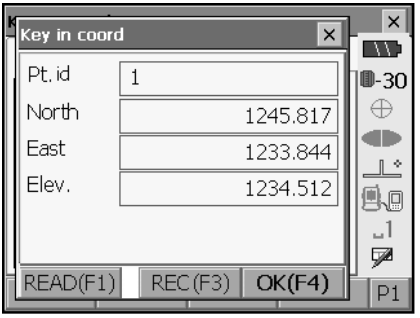
2. Select "Station setup" to display <Station setup>. If necessary, enter data for Backsight setup.
   ☞"18.2 Distance Setting-out Measurement" steps 2 to 3

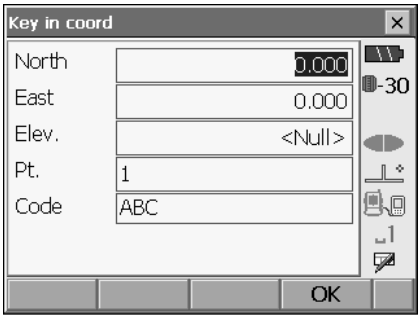


3. Select "Key in coord" in <Setting out>. Record all the setting-out points (includes setting-out points you will measure from now).
   Press **[READ]** to display recorded angle data or press **[ADD]** to record new data.
   ☞ "16.4 Reading in registered coordinate data from Memory mode"

   - Press **[DEL]** in the second page to delete the selected setting out point.
   - Press **[DELALL]** in the second page to delete all setting out points.
   - When recording known point data in the current JOB, press **[REC]** in <Key in coord>. Enter known point coordinates, point number, and code, then press **[OK]**.

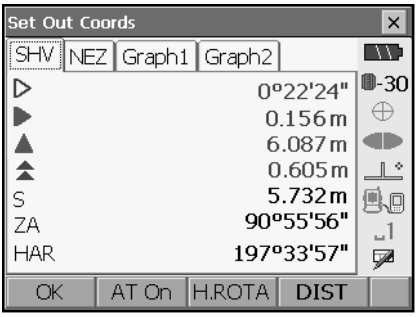






4. Select a setting-out point in the first screen of step 3 and press **[OK]** to display <Set out Coords>**.**
   Press **[H.ROTA]** to automatically rotate the SRX until the angle of the setting out point reads 0°.

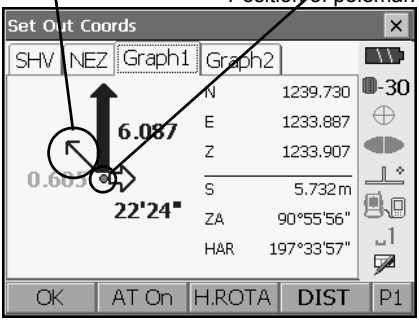
5. Position the target on the line of sight and press **[DIST]** to begin distance measurement.
   The distance and direction from the target to the setting out point is displayed on the SRX. The sighting point measurement results (currently installed position of the target) are displayed.



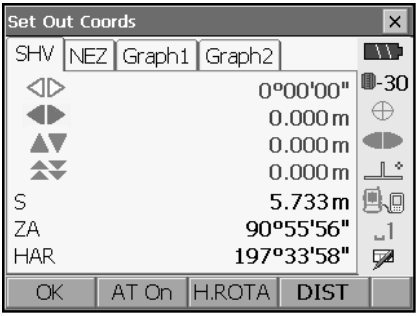
   - Switch between the tabs to display different sets of information.
     The Graph 1 tab shows the current position of the mirror and the direction to the setting out point from this position.
     The Graph 2 tab shows the position of the setting out point (square) and the current location of the mirror (circle).

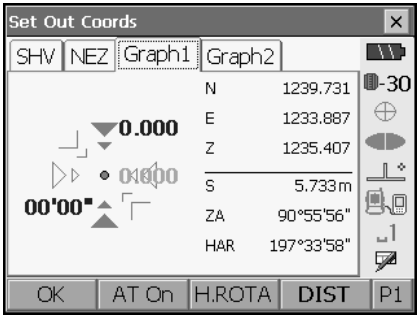
Height difference direction

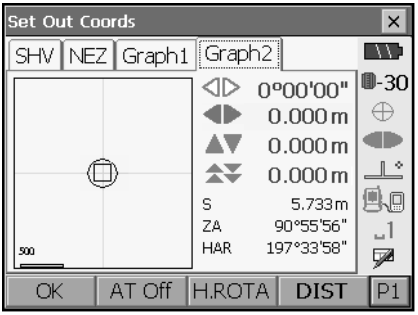
Position of poleman



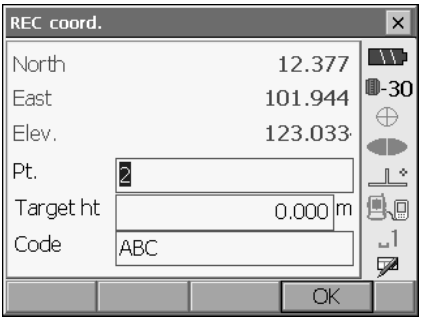
   Move the target to find the correct distance (0 is displayed) to the setting out point.
   ☞ Movement indicators: "18.2 Distance Setting-out Measurement" step 6







•When recording data in the current JOB, press **[REC]**. Enter point number, target height and code, then press **[OK]**.



6. Press **{ESC}** to return to <Key in coord>. Set the next setting out point to continue setting out measurement.

18.4 REM Setting-out Measurement

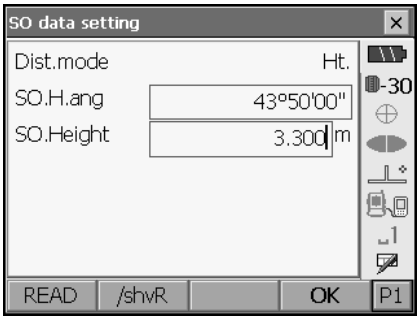
To find a point where a target cannot be directly installed, perform REM setting-out measurement.
☞"14.5 REM Measurement"

PROCEDURE

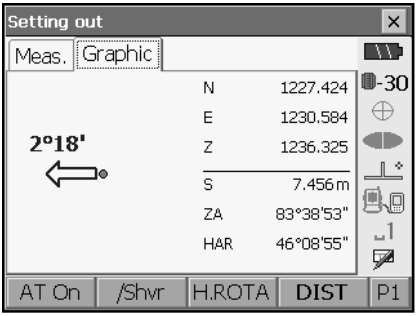
1. Install a target directly below or directly above the point to be found. Then use a measuring tape etc. to measure the target height (height from the survey point to the target).

2. Select "Station setup" in <Setting out> to display <Station setup>. If necessary, enter data for Backsight setup.
☞"18.2 Distance Setting-out Measurement" steps 2 to 3

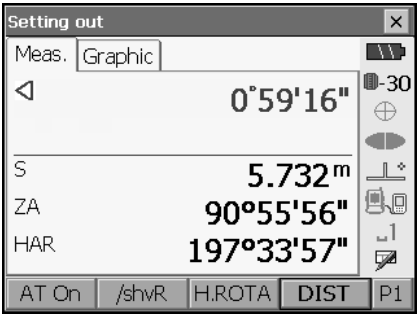
3. Select "SO data setting" In <Setting out> to display <SO data setting>. Press **[/Shvr]** until the distance input mode is "Ht.". Input height from the survey point to the position to be set out in "SO.Height". If necessary, input the angle to the point to be set out.



4. Enter values and press **[OK]** in step 3 to display the screen at right.
   Press **[H.ROTA]** to automatically rotate the SRX toward the horizontal angle set in step 3 and set the angle to the setting out point to 0°.



5. Sight the target and press **[DIST]**. Measurement begins and the measurement results are displayed.

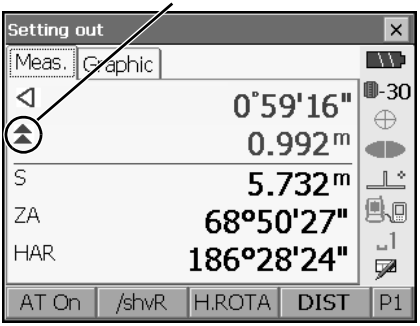


6. Press **[REM]** in the second page to start REM measurement.
The distance (height difference) and direction to the sighting point and setting out point is displayed on the SRX.

Press **[STOP]** to stop measuring.

Find the setting-out point by moving the telescope until the distance to the setting-out point reads 0m.

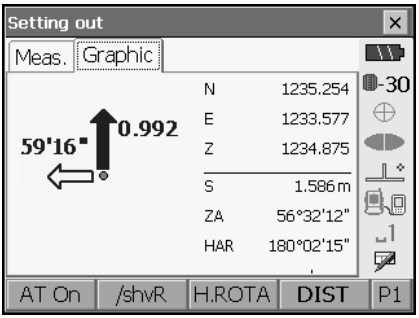
Arrows indicate direction to move



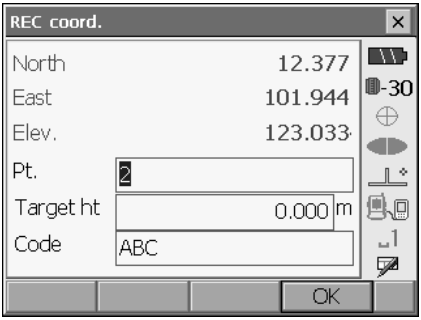
- Movement indicator (Red indicates that target position is correct)

  : Move the telescope near the zenith
  : Move the telescope near the nadir
  : Telescope direction is correct

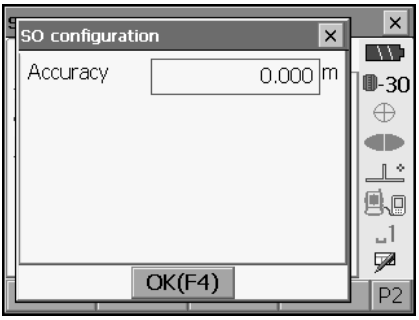
  ☞For details of other movement indicators: "18.2 Distance Setting-out Measurement" step 6



- When recording data in the current JOB, press **[REC]**. Enter point number, target height and code, then press **[OK]**.



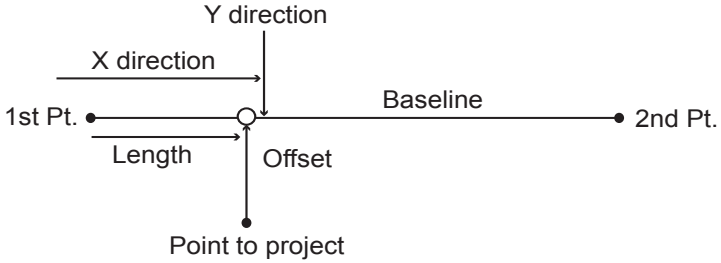
- Press **[CNFG]** to set setting out accuracy. When the position of the target is within this range both arrows will be displayed to indicate that the target position is correct.



7. Press **{ESC}** to return to <SO data setting>.

19.POINT PROJECTION

Point projection is used for projecting a point onto the baseline. The point to project can be either measured or input. Displays the distances from the first point and point to project to the position at which a line extending from point to project intersects the baseline at right angles.



19.1 Defining Baseline

To perform point projection, first, define the baseline. The baseline can be defined by inputting the coordinates of the two points. The scale factor value is the difference between the input coordinates and the observed coordinates.

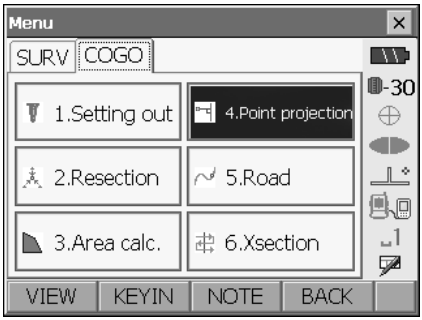
$$\text{Scale (X, Y)} = \frac{\text{Hdist' (horizontal distance calculated from the measured value)}}{\text{Hdist (horizontal distance calculated from the input coordinates)}}$$

- When not observing first or second points, scale factor is set to “1”.

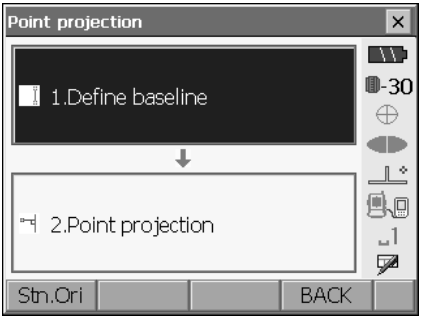
▶PROCEDURE

1. Select COGO tab.

2. Select "Point Projection" in the "COGO" tab of <Menu>.



3. Select "Define baseline" in <Point projection>.

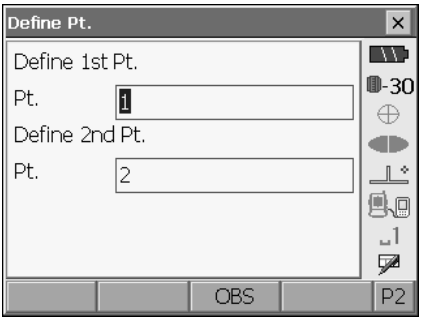


4. Press **[Stn.Ori]** and enter the instrument station data.
   ☞"16.1 Entering Instrument Station Data"

5. Select “Define baseline” in <Point projection>.

6. Enter the first point data and the second point data.

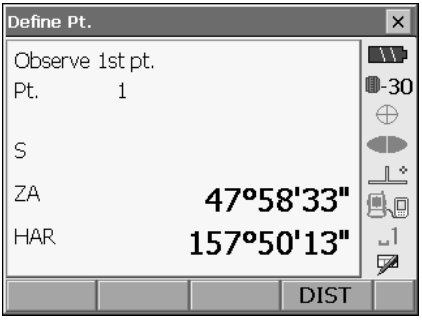
   - When **[READ]** on the first page is pressed, registered coordinates can be recalled and used.



7. Sight the first point and press **[OBS]** on the second softkey page of the screen.

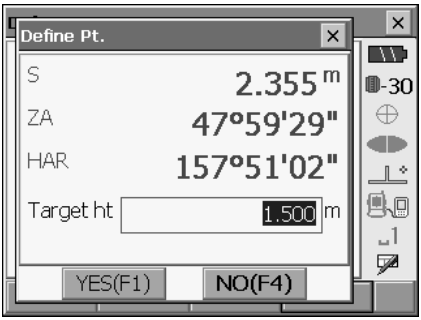
   - When not observing the first point and the second point, press **[OK]** and go to step 12.

8. Press **[DIST]** to start measurement.



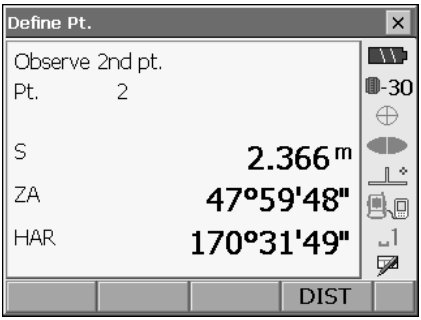
9. Press **[YES]** to use the measurement results of the first point.

   • Press **[NO]** to observe the first point again.

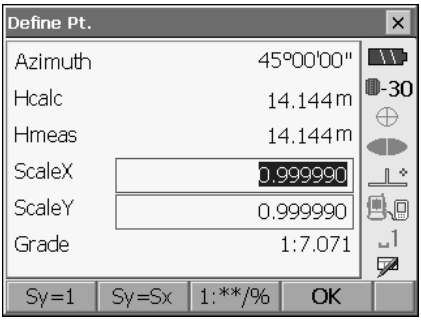


10. Sight the second point and press **[DIST]**.

11. Press **[YES]** to use the measurement results of the second point.



The distance between the two measured points, the distance calculated from inputting the coordinates of two points and the scale factors are displayed.



12. Press **[OK]** on the second screen of step 11 to define the baseline. Move to reference point setting.
    ☞"19.2 Point Projection"

    • Press **[Sy=1]** to set scale factor y to “1”.
    • Press **[1 : **/%]** to switch the grade display mode between “1 : * * = elevation :horizontal distance” and %.

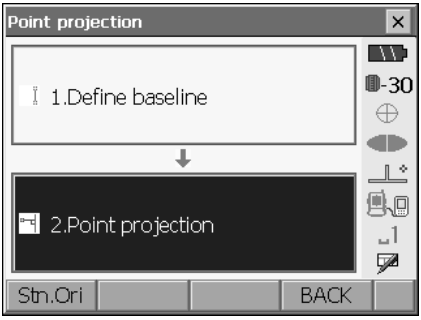
19.2 Point Projection

Before performing point projection, the baseline must be defined.

▶PROCEDURE

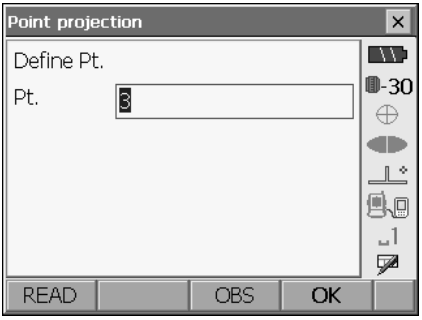
1. Define the baseline.
   ☞"19.1 Defining Baseline"

2. Select "Point projection" in <Point projection>.



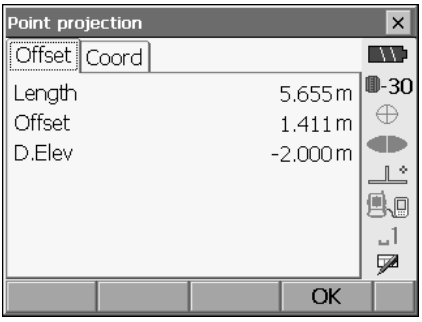
3. Input the point number of reference point.

   • Press **[OBS]** to observe the point to project.



4. Press **[OK]** on the screen of step 3.
   The following items are calculated and displayed.

   • Length: Distance along the baseline from the first point to the projected point (X direction).
   • Offset: Distance from point to project to the position at which a line extending from point of project intersects the baseline at right angles. (Y direction).
   • D.Elev: Elevation between the baseline and the projected point.



On the Coord tab, the coordinate values are displayed.

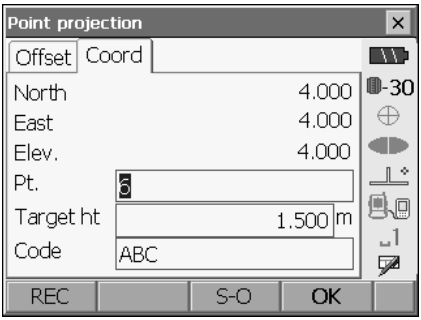
- **[REC]**: records the coordinate values as known point data.

☞ Recording method: "25.1 Registering Known Point Data"

- Press **[S-O]** to move to setting-out measurement of the projected point.

☞ "18. SETTING-OUT MEASUREMENT"

5. Press **[OK]**.



20.OFFSET MEASUREMENT

Offset measurements are performed in order to find a point where a target cannot be installed directly or to find the distance and angle to a point which cannot be sighted.

- It is possible to find the distance and angle to a point you wish to measure (target point) by installing the target at a location (offset point) a little distance from the target point and measuring the distance and angle from the survey point to the offset point.
- The target point can be found in the three ways explained in this chapter.
- The instrument station and backsight must be set before the coordinates of an offset point can be found. Station and backsight setup can be performed in the Offset menu.

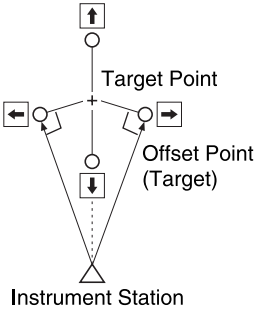
☞ Station setup: "16.1 Entering Instrument Station Data", Backsight setup: "16.2 Azimuth Angle Setting" .

- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.

☞ "30.6 Allocating Key Functions"

20.1 Single-distance Offset Measurement

Finding it by entering the horizontal distance from the target point to the offset point.

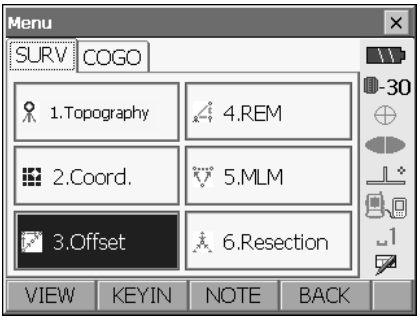


- When the offset point is positioned to the left or right of the target point, make sure the angle formed by lines connecting the offset point to the target point and to the instrument station is almost 90°.
- When the offset point is positioned in front of or behind the target point, install the offset point on a line linking the instrument station with the target point.

PROCEDURE

1. Set the offset point close to the target point and measure the distance between them, then set up a prism on the offset point.

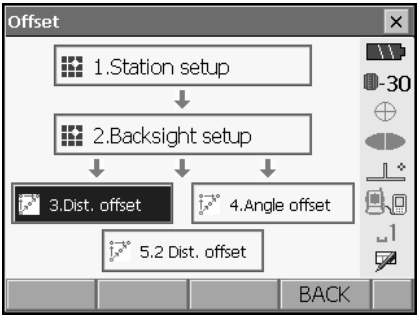
2. Select "Offset" in the "SURV" tab of <Menu> to display <Offset>.

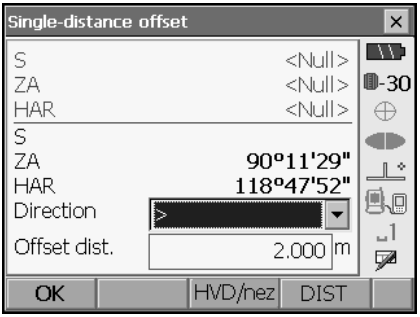


3. Select “Dist. offset”.
   Input the following items.
   (1) Direction of the offset point.
   (2) Horizontal distance from the target point to the offset point.

   • Direction of offset point

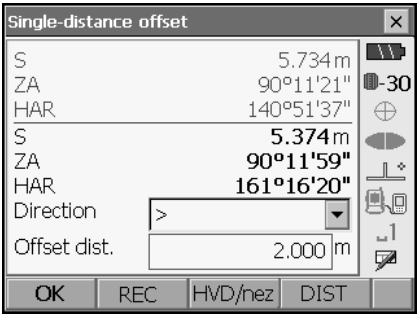
   ← : On the left of the target point.
   → : On the right of the target point.
   ↓ : Closer than the target point.
   ↑ : Beyond the target point.



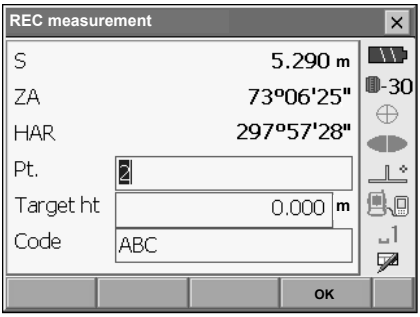


4. Sight the offset point and press **[DIST]** in the screen of step 3 to start measurement.
   Press **[STOP]** to stop the measurement.
   The measurement results are displayed.

   • Press **[HVD/nez]** to switch results for the target point between distance/angle values and coordinate/elevation values.



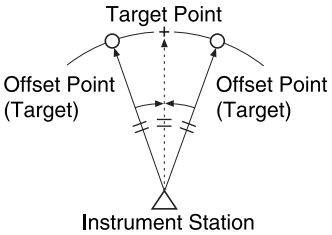
- When recording data in the current JOB, press **[REC]**. Enter point number, target height and code, then press **[OK]**.



5. Press **[OK]** in the screen in step 4 to return to <Offset>.

20.2 Angle Offset Measurement

Sighting the direction of the target point to find it from the included angle.
Install offset points for the target point on the right and left sides of and as close as possible to the target point and measure the distance to the offset points and the horizontal angle of the target point.

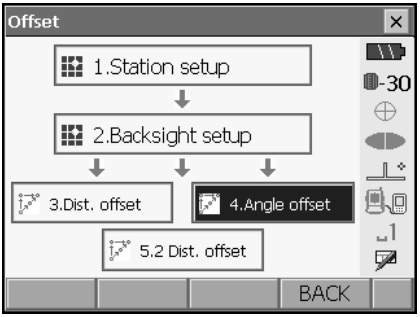


PROCEDURE

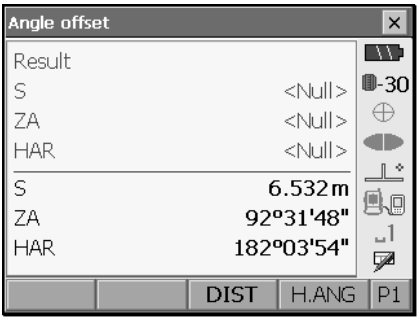
1. Set the offset points close to the target point (making sure the distance from the instrument station to the target point and the height of the offset points and the target point are the same), then use the offset points as the target.

2. Select "Offset" in the "SURV" tab of <Menu> to display <Offset>.

   Select "Angle offset".



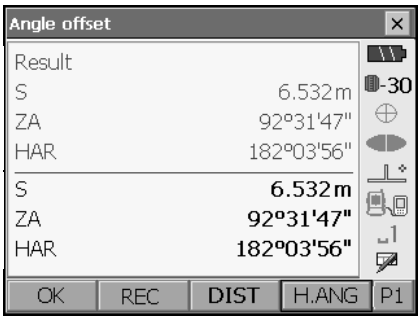
3. Sight the offset point and press **[DIST]** to start measurement.
   Press **[STOP]** to stop the measurement.



4. Sight the target point and press **[H.ANG]**.

   - Press **[HVD/nez]** on the second page to switch results for the target point between distance/angle values and coordinate/ elevation values.
   - When recording data in the current JOB, press **[REC]**. Enter point number, target height and code, then press **[OK]**.

Results for offset point



Results for target point

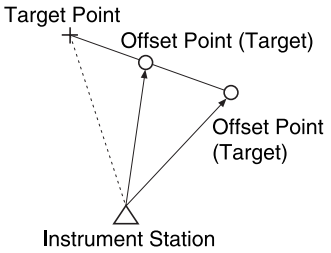
5. Press **[OK]** in the screen in step 4 to return to <Offset>.

20.3 Two-distance Offset Measurement

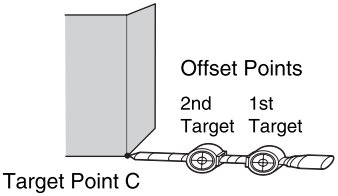
By measuring the distances between the target point and the two offset points.
Install two offset points (1st target and 2nd target) on a straight line from the target point, observe the 1st target and 2nd target, then enter the distance between the 2nd target and the target point to find the target point.

- It is possible to make this measurement easily using the optional equipment: the 2-point target (2RT500-K). When using this 2-point target, be sure to set prism constant to 0.

☞"34. TARGET SYSTEM"



How to use 2-point target (2RT500-K)



- Install the 2-point target with its tip at the target point.
- Face the targets toward the instrument.
- Measure the distance from the target point to the 2nd target.
- Set the prism constant to 0mm.

Note

- The target should be sighted manually when performing two-distance offset measurement. Multiple prisms in the field will mean that Auto Pointing may not operate correctly, or the SRX may not be able to judge which is the desired target.

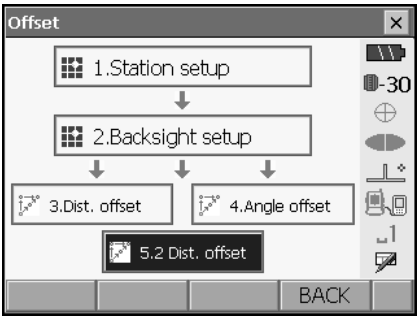
☞"11.1 Auto Pointing Settings"

PROCEDURE

1. Install two offset points (1st target, 2nd target) on a straight line from the target point and use the offset points as the target.

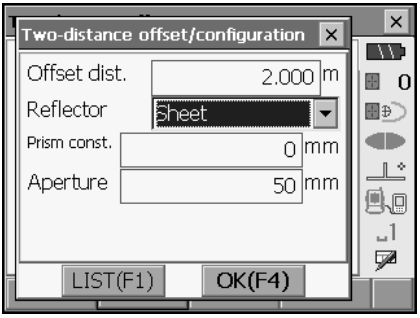
2. Select "Offset" in the "SURV" tab of <Menu> to display <Offset>.

   Select "2 Dist. offset".

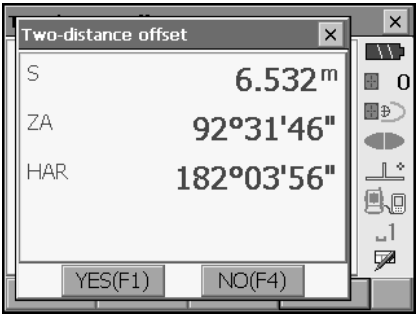


3. Press **[CNFG]** and input the distance from the 2nd target to the target point in "Offset dist.". Set reflector settings and press **[OK]** to confirm.

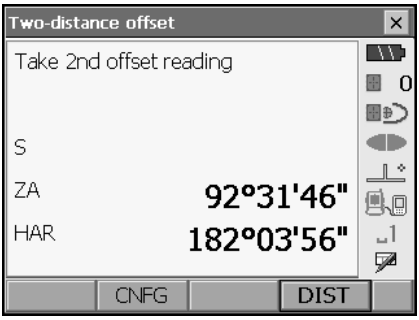
   • Press **[LIST]** to edit the prism constant and aperture in <Reflector setting>.



4. Sight the 1st target and press **[DIST]** to start measurement.
   Press **[STOP]** to stop the measurement. The measurement results are displayed. Press **[YES]** to confirm.



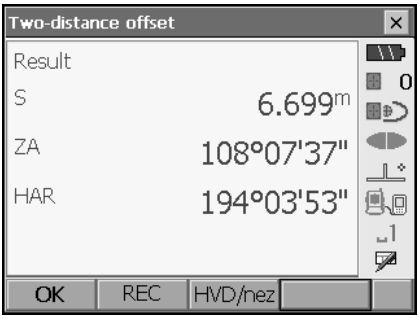
5. Sight the 2nd target and press **[DIST]** to start measurement.
   Press **[STOP]** to stop the measurement. The measurement results are displayed.



6. Press **[YES]** to display results for the target point.

   Press **[HVD/nez]** to switch results for the target point between distance/angle values and coordinate/elevation values.

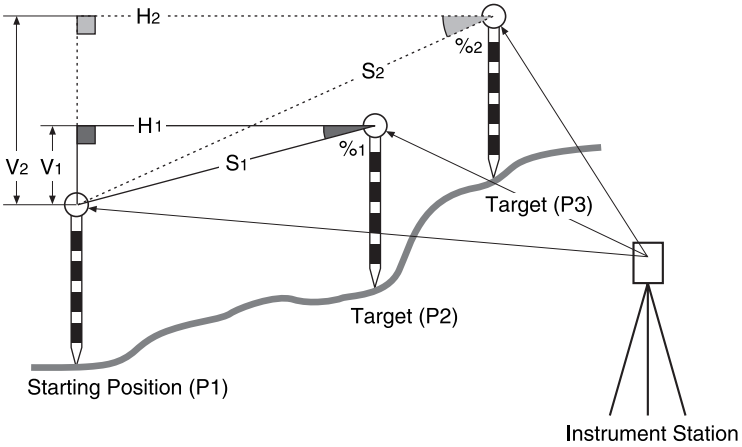
   •When recording data in the current JOB, press **[REC]**. Enter point number, target height and code, then press **[OK]**.



21.MISSING LINE MEASUREMENT

Missing line measurement is used to measure the slope distance, horizontal distance, and horizontal angle to a target from the target which is the reference (starting point) without moving the instrument.

- It is possible to change the last measured point to the next starting position.
- Measurement results can be displayed as the gradient between two points.



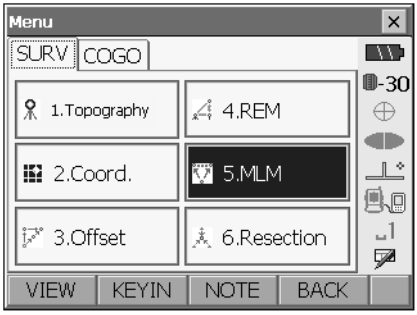
- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.

☞"30.6 Allocating Key Functions"

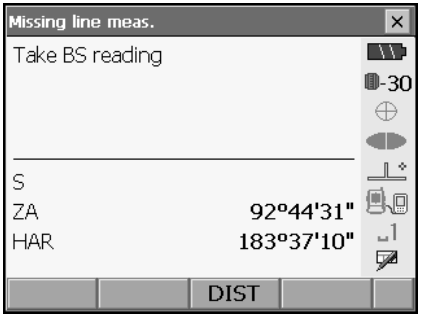
21.1 Measuring the Distance between 2 or more Points

PROCEDURE

1. Select "MLM" in the "SURV" tab of <Menu>.

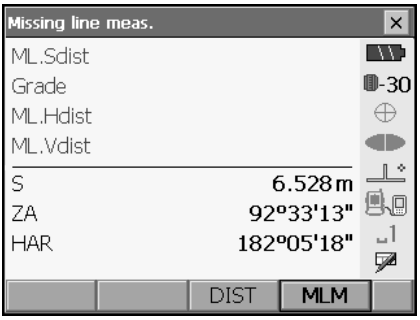


2. Sight the starting position, and press **[DIST]** to start measurement.
   Press **[STOP]** to stop measurement.



Note

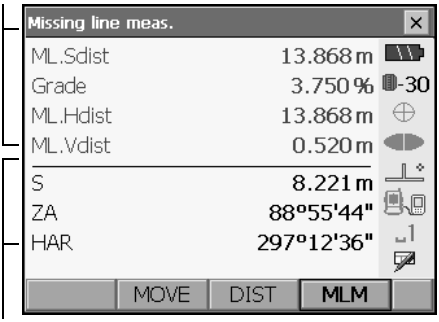
- When measurement data already exists the screen of step 3 is displayed and measurement starts.



3. Sight the next target and press **[MLM]** to begin observation. Slope distance, grade, horizontal distance and height difference between multiple points and the starting position can be measured this way.

   - Press **[DIST]** to re-observe the starting position. Sight the starting position and press **[DIST]**.
   - When **[MOVE]** is pressed, the last target measured becomes the new starting position to perform missing line measurement of the next target.
     ☞ "21.2 Changing the Starting Point"

Results for measurement between starting position and second target

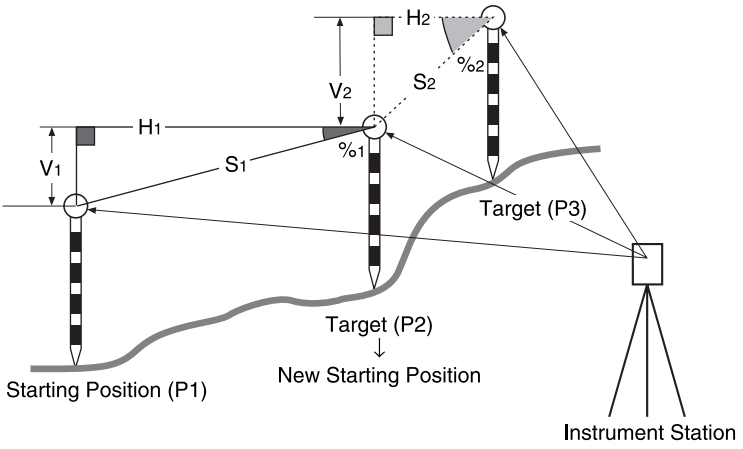


Results for current point

4. Press **{ESC}** or tap the cross in the top-right corner to end missing line measurement.

21.2 Changing the Starting Point

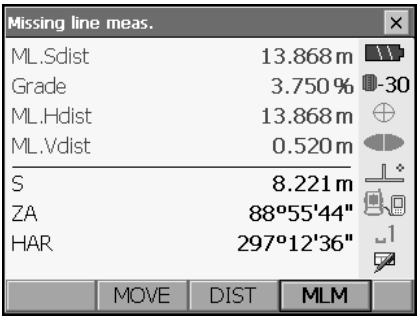
It is possible to change the last measured point to the next starting position.



PROCEDURE

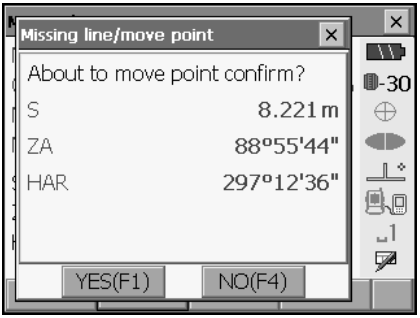
1. Observe the starting position and target following steps 1 to 3 in "21.1 Measuring the Distance between 2 or more Points".

2. After measuring the targets, press **[MOVE]**.



Press **[YES]** in the confirmation message window.

- Press **[NO]** to cancel measurement.



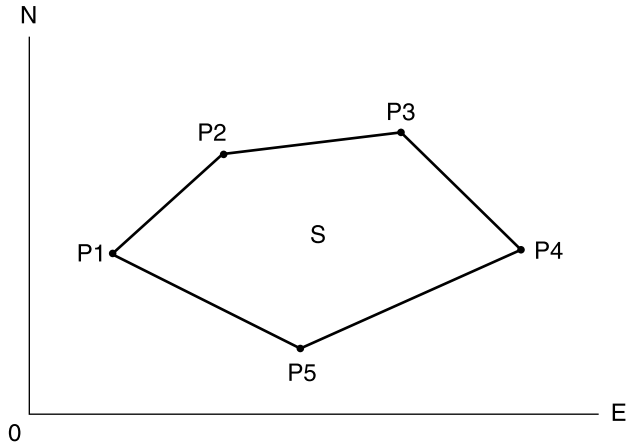
3. The last target measured is changed to the new starting position.

4. Perform missing line measurement following steps 3 to 4 in "21.1 Measuring the Distance between 2 or more Points".

22.SURFACE AREA CALCULATION

You can calculate the area of land (slope area and horizontal area) enclosed by three or more known points on a line by inputting the coordinates of the points

Input		Output	
Coordinates:	P1 (N1, E1, Z1) P2 (N2, E2, Z2) P3 (N3, E3, Z3)	Surface area:	S (horizontal area and slope area)



- Number of specified coordinate points: 3 or more, 30 or less
- Surface area is calculated by observing in order the points on a line enclosing an area or by reading in the previously registered coordinates and using it as known point data.
- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.

☞ "30.6 Allocating Key Functions"

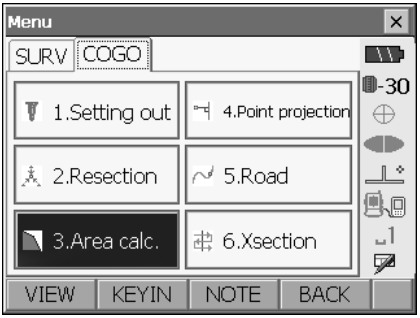
- An error will occur if only two points (or less) are entered (or recalled) when specifying an enclosed area.
- Be sure to observe (or recall) points on an enclosed area in a clockwise or counterclockwise direction. For example, the area specified by entering (or recalling) point numbers 1, 2, 3, 4, 5 or 5, 4, 3, 2, 1 implies the same shape. However, if points are not entered in numerical order, the surface area will not be calculated correctly.

Slope area

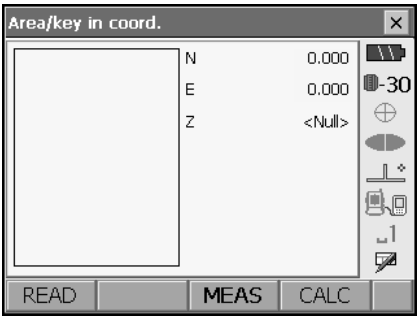
The first three points specified (measured/read-in) are used to create the surface of the slope area. Subsequent points are projected vertically onto this surface and the slope area calculated.

PROCEDURE Surface area calculation by measuring points

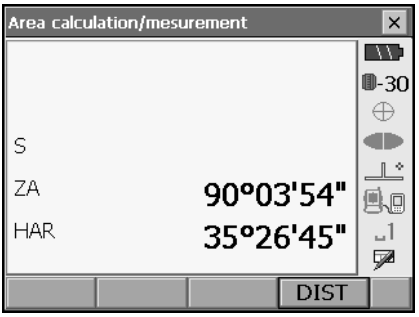
1. Select "Area calc." in the "COGO" tab of <Menu>.



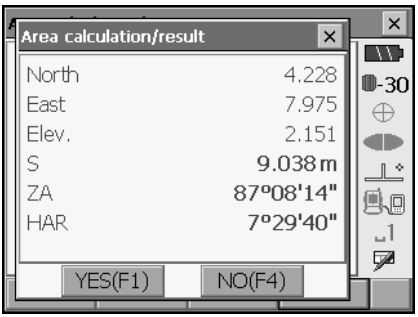
- When **[READ]** is pressed, registered coordinates can be recalled and used in subsequent measurements.
  ☞ "PROCEDURE Surface area calculation using registered coordinate data"

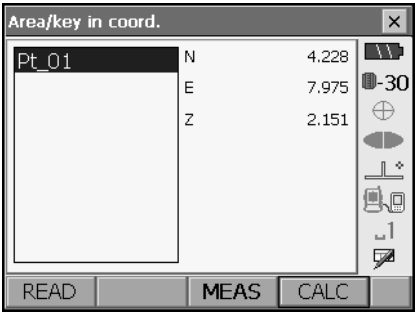


2. Press **[MEAS]** to display <Area calculation/ measurement>. Sight the first point on the line enclosing the area, and press **[DIST]**. Measurement begins and the measured values are displayed. Press **[STOP]** to stop measuring.

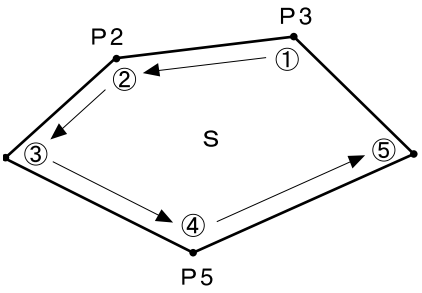


3. The measurement results are displayed. Press **[YES]** to confirm.The value of point 1 is set in "Pt_01".

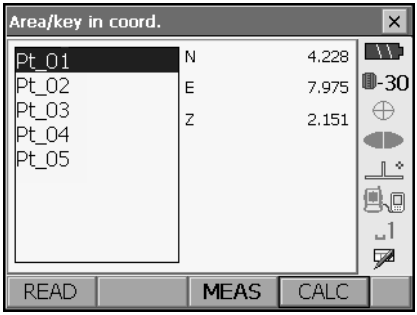


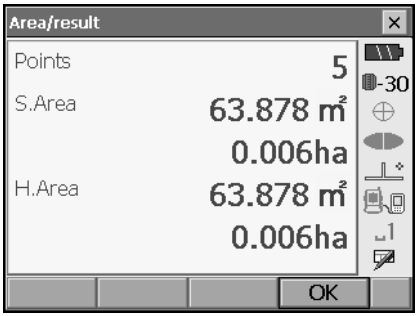


4. Repeat steps 2 to 3 until all points have been measured. Points on an enclosed area are observed in a clockwise or counterclockwise direction.
   For example, the area specified by entering point numbers 1, 2, 3, 4, 5 or 5, 4, 3, 2, 1 implies the same shape.



5. Press **[CALC]** to display the calculated area.





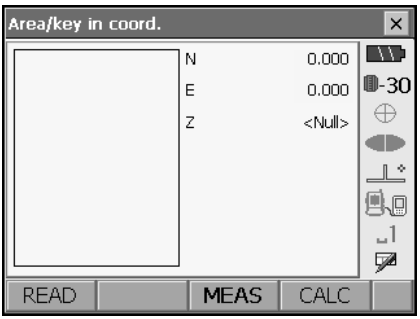
6. Press **[OK]** to return to <Area/key in coord.>. Press **{ESC}** or tap the cross in the top-right corner.

PROCEDURE Surface area calculation using registered coordinate data

Coordinate data registered in Memory mode can be recalled and used for area calculations.
☞ "16.4 Reading in registered coordinate data from Memory mode"

1. Select "Area calc." in the "COGO" tab of <Menu>.

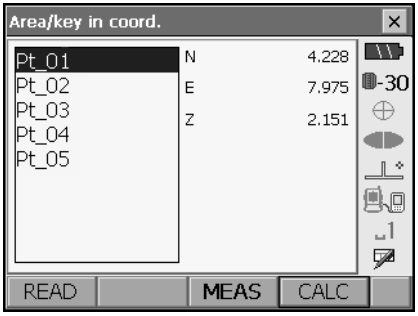
2. Press **[READ]** to read in coordinate data registered in Memory mode.



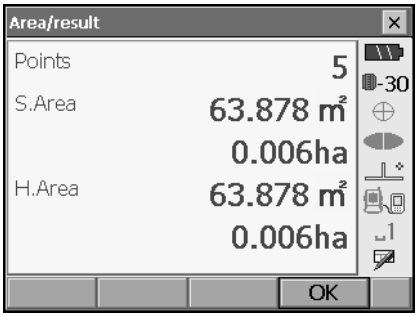
3. Register the first point in the list and press **[OK]**.
   ☞ Reading in coordinate data from Program mode: "16.4 Reading in registered coordinate data from Memory mode"

4. Read in coordinates of point 2 and onward
   Repeat steps 2 to 3 until all points have been read in.
   Points on an enclosed area are read in a clockwise or counterclockwise direction.

   After all known points necessary to calculate the surface area have been observed, **[CALC]** is displayed.



5. Press **[CALC]** to display the calculated area.



6. Press **[OK]** to return to <Area/key in coord.>.
   Press **{ESC}** or tap the cross in the top-right corner to quit area calculation.

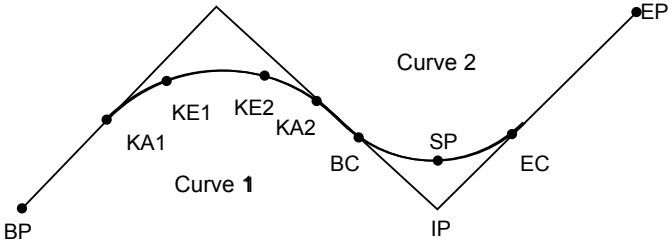
23.ROUTE SURVEYING

This mode allows a variety of route surveying options widely used in civil engineering measurement. Each menu allows the operator to initiate a string of successive configuration/calculation/record/ setting-out operations.

- The orientation of the instrument station and backsight station can be set as necessary.

- The Z-axis coordinate value in all route surveying work is always "Null" ("Null" is not the same as "0").

Symbols and terms used in Route Surveying



BP Point: route origin
KA Point: clothoid curve origin
BC Point: circular curve origin
IP Point: point of intersection
Offset: reference point stationing chainage

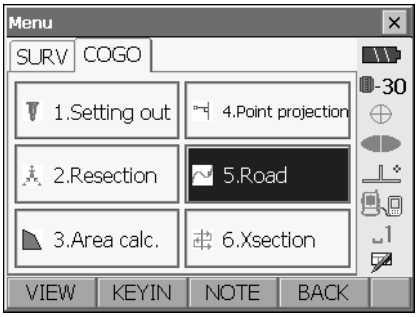
EP Point: route end-point
KE Point: clothoid end-point
EC Point: circular curve end-point
SP Point: circular curve midpoint
Stationing chainage: target point stationing chainage

23.1 Instrument Station Settings

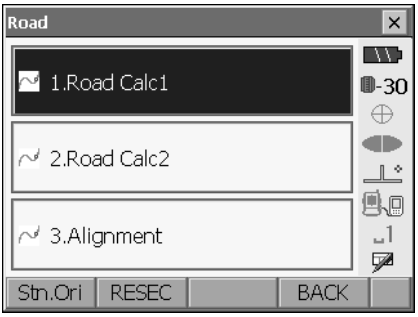
The instrument station to be used as the reference point is recorded, as necessary, prior to starting surveying.

PROCEDURE

1. Select "Road" in the "COGO" tab of <Menu>.



2. Press **[Stn.Ori]**.



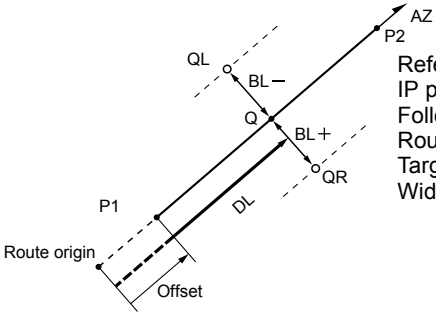
- Press **[RESEC]** to perform resection measurement. It is possible to set a point found by specifying 2 known points as the instrument station.
  ☞"17. RESECTION MEASUREMENT"

3. Select "Station setup" in <Stn. Orientation> and enter instrument station data.
   ☞ "15.1 Entering Instrument Station Data"

4. Select "Backsight setup" in <Stn. Orientation> and enter backsight station data.
   ☞ "15.2 Azimuth Angle Setting"

23.2 Straight Line Calculation

The coordinates of the center peg and width pegs for a straight line can be found from the coordinates of the reference point and IP point.
It is then possible to proceed with the setting-out of the center peg and width pegs.



Reference point (P1)
IP point (P2)
Follow-up distance (DL)
Route width (BL)
Target point (Q)
Width peg (QR, QL)

PROCEDURE

1. Select "Road" in the "COGO" tab of <Menu>.

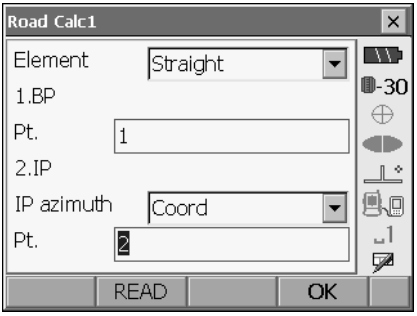
2. Select "Road Calc1" in <Road>.

3. Select "Straight" in "Element".

4. Input the point number of reference point.

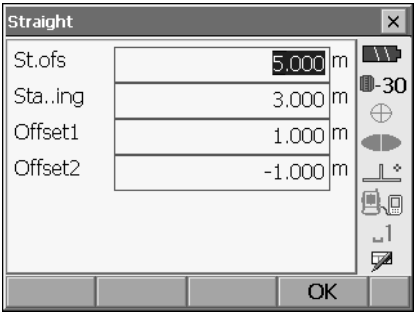
   - Press **[READ]** to read in the already registered coordinate data and set as the coordinates of the reference point.
   - If the coordinate of the input point number is not registered, record screen is displayed.

   ☞"16.4 Reading in registered coordinate data from Memory mode"

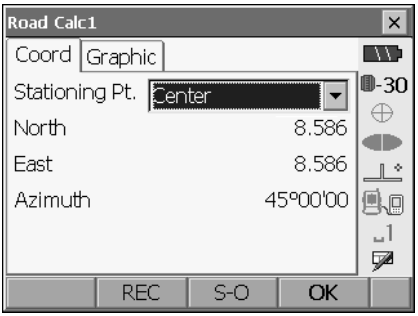


5. Input IP point number or azimuth angle. When inputting point number, select "Coord" in "IP azimuth". When inputting azimuth angle, select "Azimuth" in "IP azimuth". Press **[OK]**.

6. Input the reference point station offset, stationing chainage and offset for width peg.

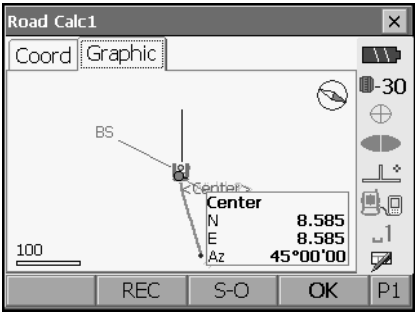


7. Press **[OK]** in the screen shown in step 6 to calculate the center peg and width peg coordinates and azimuth angle. The coordinates and azimuth angle are then displayed on the screen.



- Select the Graphic tab to display calculation results on a graph.

☞ "25.3 Reviewing Data"



8. Press **{ESC}** twice to finish Straight Line calculation and return to <Road>.

- The center peg or width pegs can be stored as a known point in the current job by pressing **[REC]**.

☞ "25.1 Registering Known Point Data"

- The center peg or width pegs can be set-out by pressing **[S-O]**.

☞ "18. SETTING-OUT MEASUREMENT"

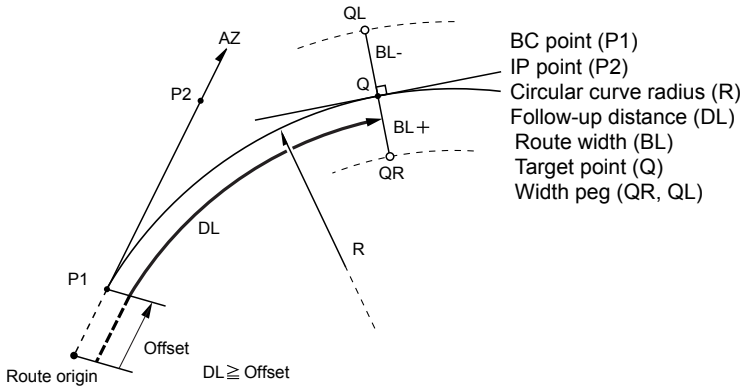
- Press **{ESC}** to return to the center peg setting screen.

Note

- When the azimuth angle is set after the point numbers have been input in step 4, if the coordinates are deleted the azimuth angle is given priority.
- Offset/Stationing chainage input range: 0.000 to 99999.999 (m)
- Route width input range: -999.999 to 999.999 (m)

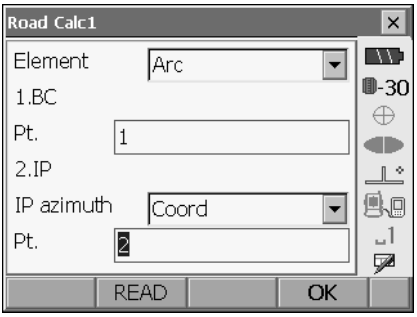
23.3 Circular Curve Calculation

The coordinates of the center peg and width pegs on a circular curve can be found from the coordinates of the BC point and IP point.
It is then possible to proceed with the setting-out of the center peg and width pegs.



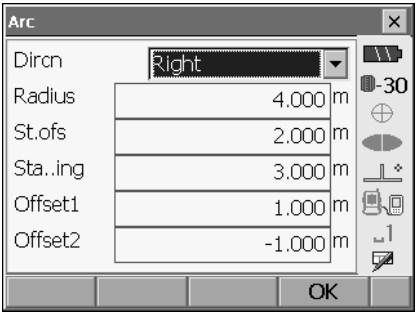
PROCEDURE

1. Select "Road" in the "COGO" tab of <Menu>.
2. Select "Road Calc1" in <Road>.
3. Select "Arc" in "Element".

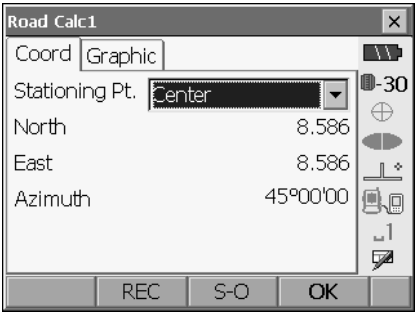


4. Input the point number of BC point.
5. Input IP point number or azimuth angle. When inputting point number, select "Coord" in "IP azimuth". When inputting azimuth angle, select "Azimuth" in "IP azimuth". Press **[OK]**.

6. Select the curve direction, enter curve radius, station offset, and stationing chainage and offset for width peg.



7. Press **[OK]** in the screen shown in step 6 to calculate the center peg and width peg coordinates and azimuth angle. The coordinates and azimuth angle are then displayed on the screen.



8. Press **{ESC}** twice to finish Circular Curve calculation and return to <Road>.

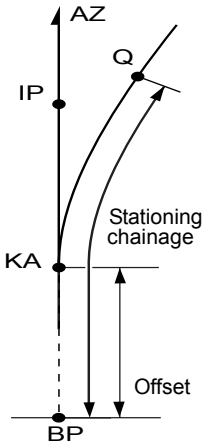
Note

- Curve direction: right/left
- Radius input range: 0.000 to 9999.999 (m)

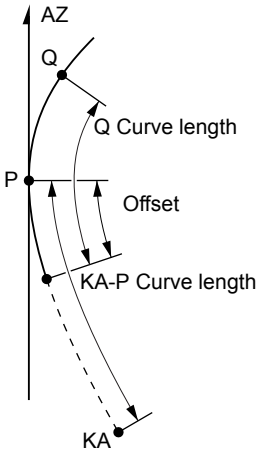
23.4 Clothoid Curve

The coordinates of the center peg and width pegs on a clothoid curve can be found from the coordinates of the reference point and curve properties.
It is then possible to proceed with the setting-out of the center peg and width pegs.

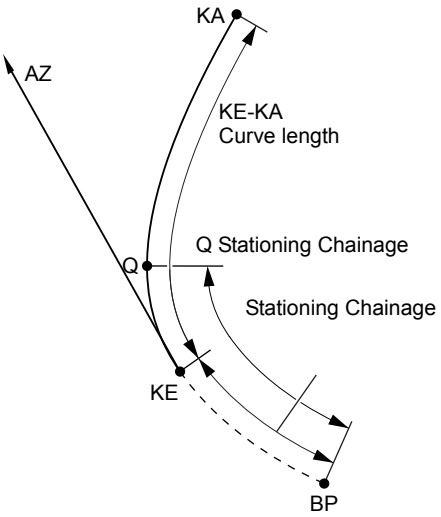
- Select a calculation menu depending on the section of the clothoid curve to be calculated.
  Clothoid curve is calculated by the following formula.
  $A^2=RL$
  Calculation using KA Point as reference: "KA-KE Calculation 1"



  Calculation using arbitrary point between KA1 and KE1 as reference:
  "KA-KE Calculation 2"



Calculation using KE2 as reference: "KE-KA Calculation"



- If the following conditions are not met, coordinate calculation cannot be performed.

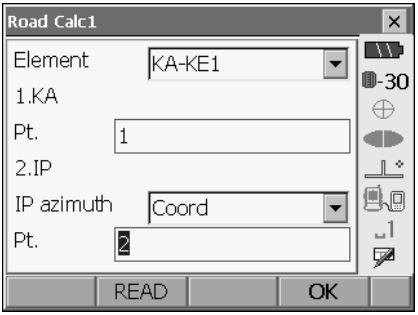
"KA-KE Calculation 1":	0 ≦ curve length ≦ 2A
"KA-KE Calculation 2":	0 ≦ KA - reference point curve length ≦ 3A
	0 ≦ KA - target point curve length ≦ 2A
"KE-KA Calculation":	0 ≦ KA - KE curve length ≦ 3A
	0 ≦ KA - target point curve length ≦ 2A

PROCEDURE Calculation using KA Point as reference

1. Select "Road" in the "COGO" tab of <Menu>.

2. Select "Road Calc1" in <Road>.

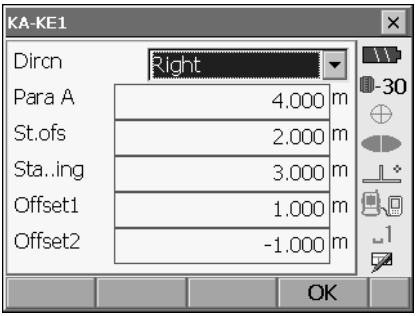
3. Select "KA-KE1" in "Element".



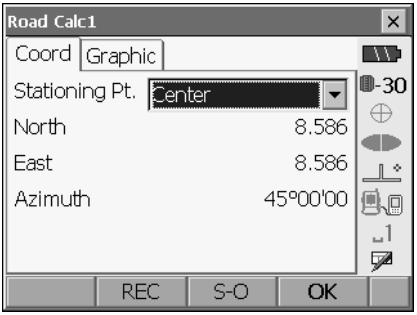
4. Input the point number of KA point.

5. Input IP point number or azimuth angle. When inputting point number, select "Coord" in "IP azimuth". When inputting azimuth angle, select "IP azimuth" in "IP azimuth". Press **[OK]**.

6. Select the curve direction, enter parameter A, station offset, and stationing chainage and offset for width peg.



7. Press **[OK]** in the screen shown in step 6 to calculate the center peg and width peg coordinates and azimuth angle. The coordinates and azimuth angle are then displayed on the screen.



8. Press **{ESC}** repeatedly to finish Clothoid Curve calculation and return to <Road>.

Note

- Curve direction: right/left
- Parameter A input range: 0.000 to 9999.999 (m)
- Station offset /Stationing chainage input range:0.000 to 99999.999 (m)

PROCEDURE Calculation using arbitrary point between KA1 and KE1 as reference

1. Select "Road" in the "COGO" tab of <Menu>.

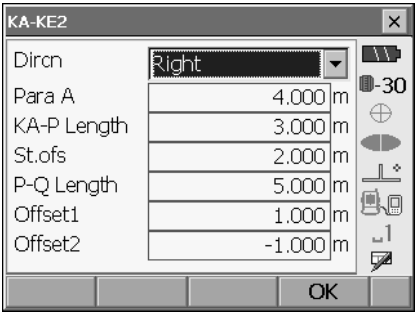
2. Select "Road Calc1" in <Road>.

3. Select "KA-KE2" in "Element".

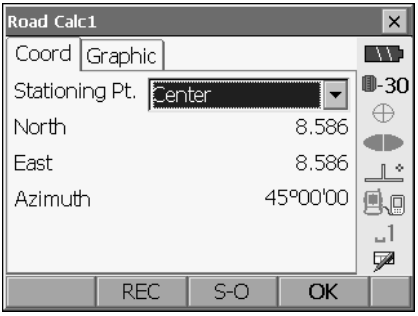
4. Input the point number of P point (reference point).

5. Input the point number of the arbitrary point on the line tangential to the P point or azimuth angle. When inputting point number, select "Coord" in "Direction". When inputting azimuth angle, select "Azimuth" in "Direction". Press **[OK]**.

6. Select the curve direction, enter parameter A, KA-P length (length of curve from KA to P point), station offset, P-Q length (length of curve from P point to target point) and offset for width peg.



7. Press **[OK]** in the screen shown in step 6 to calculate the center peg and width peg coordinates and azimuth angle. The coordinates and azimuth angle are then displayed on the screen.



8. Press **{ESC}** repeatedly to finish Clothoid Curve calculation and return to <Road>.

Note

- KA-P length range: 0.000 to 99999.999 (m)
- P-Q length input range: -999.999 to 999.9999 (m)

PROCEDURE Calculation using KE2 Point as reference

1. Select "Road" in the "COGO" tab of <Menu>.

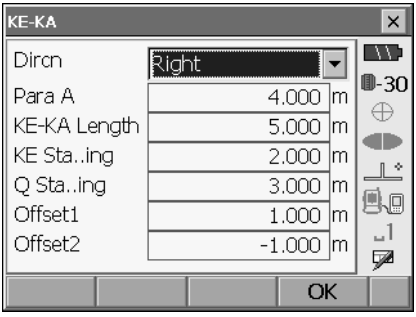
2. Select "Road Calc1" in <Road>.

3. Select "KE-KA" in "Element".

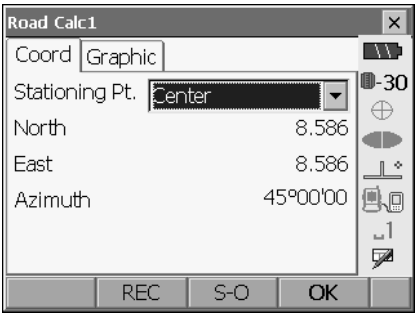
4. Input the point number of KE point (reference point).

5. Input the point number of the arbitrary point on the line tangential to the KE point or azimuth angle. When inputting point number, select "Coord" in "Direction". When inputting azimuth angle, select "Azimuth" in "Direction". Press **[OK]**.

6. Select the curve direction, enter parameter A, KE-KA curve length (length of curve from KE to KA), KE stationing chainage, target point stationing chainage and offset for width peg.



7. Press **[OK]** in the screen shown in step 6 to calculate the center peg and width peg coordinates and azimuth angle. The coordinates and azimuth angle are then displayed on the screen.



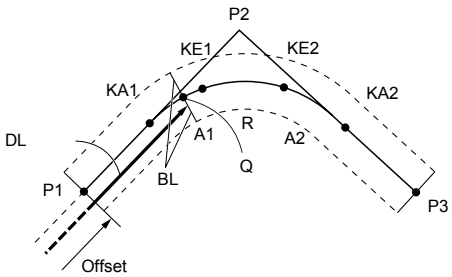
8. Press **{ESC}** repeatedly to finish Clothoid Curve calculation and return to <Road>.

Note

- KE-KA length (length of curve from KE to KA)/KE stationing chainage/Q stationing chainage (Set out pt sta) input range: 0.0000 to 99999.9999 (m)

23.5 3 Point Calculation

The coordinates of a cardinal point, an arbitrary center peg, and width pegs can be found from the coordinates of 3 IP points and curve properties.
It is then possible to proceed with the setting-out of the cardinal point, arbitrary center peg, and width pegs



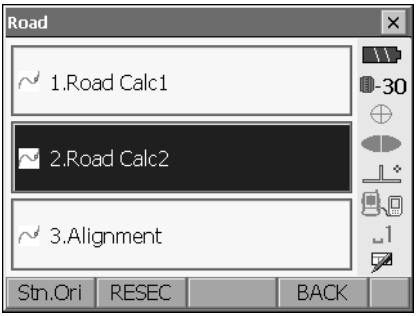
BP point (P1)
IP point (P2)
EP Point (P3)
Clothoid parameter (A1)
Clothoid parameter (A2)
Curve radius (R)
Route width (BL)
Arbitrary point follow-up distance (DL)

- When parameter A1, parameter A2 and radius R have all been input a clothoid is created and the KA1, KE1, KE2 and KA2 points can be found.
- When parameter A1 and parameter A2 have been input and radius R is "Null", a clothoid without a transition curve is created and the KA1, KE1, and KA2 points can be found.
- When parameter A1 and parameter A2 are both "Null" and only radius R has been input, a circular curve is created and the BC point and EC point can be found.

PROCEDURE

1. Select "Road" in the "COGO" tab of <Menu>.

2. Select "Road Calc2" in <Road>.



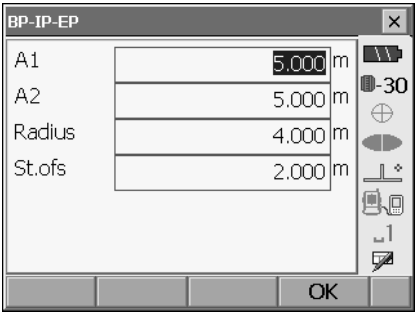
3. Select "BP-IP-EP" in "Element".

4. Input the point number of BP point (reference point), IP point and EP point then press **[OK]**

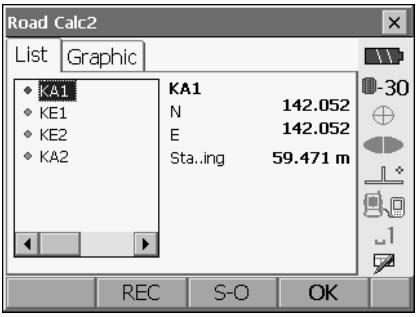
5. The IA angle (intersection angle), curve direction, BP-IP length, and IP-EP length are calculated from the coordinates of the three input points. The results are then displayed on the screen. Check the data, then press **[OK]**.

   - Press **{ESC}** to return to the previous screen to make alterations to this data.

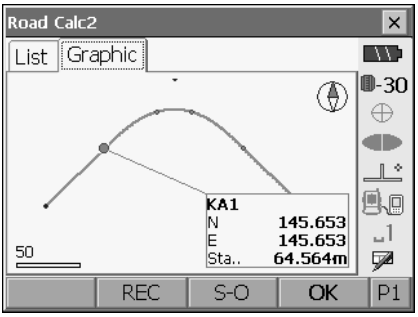
6. Input curve properties: parameter A1, parameter A2, curve radius R, and Station offset (offset from stationing chainage).



7. Press **[OK]** in the screen shown in step 6 to calculate the the coordinates and stationing chainage of the KA1 point, KE1 point, KE2 point and KA2 point. The results are then displayed on the screens

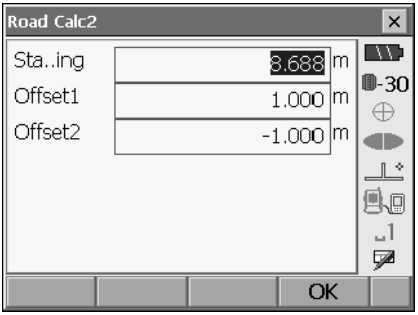


- Select the Graphic tab to display calculation results on a graph.
  ☞"25.3 Reviewing Data"

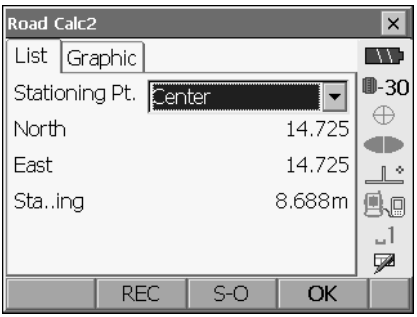


8. Press **[OK]** in the screen shown in step 7 to move to center peg settings.

9. Input stationing chainage and offset for width peg.



10. Press **[OK]** in the screen shown in step 9 to calculate the coordinates and stationing chainage of the center peg and width peg. The results are then displayed on the screen



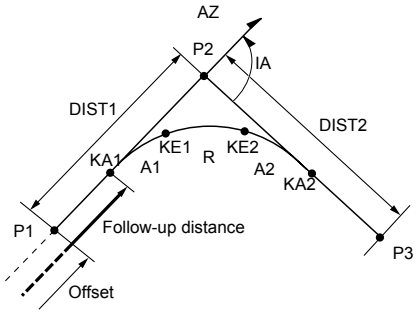
11. Press **{ESC}** repeatedly to finish 3 point calculation and return to <Road>.

Note

- In the case of a clothoid with no transition curve, the KA1 Point, KE Point, and KA2 Point can be found in step 7.
- In the case of a circular curve, the BC Point and EC Point can be found in step 7.

23.6 Intersection Angle/Azimuth Angle Calculation

The coordinates of a cardinal point, an arbitrary center peg, and width pegs can be found from an intersection angle, curve properties, and either the coordinates of BP point and 1 IP point of intersection or the azimuth angle from the BP Point to the IP point.
It is then possible to proceed with the setting-out of the cardinal point, arbitrary center peg, and width pegs



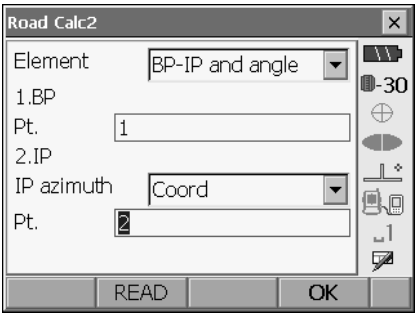
BP point (P1)
IP intersection point (P2)
EP point (P3)
BP to IP distance (DIST1)
IP to EP distance (DIST2)
Clothoid parameter (A1)
Clothoid parameter (A2)
Curve radius (R)

PROCEDURE

1. Select "Road" in the "COGO" tab of <Menu>.

2. Select "Road Calc2" in <Road>.

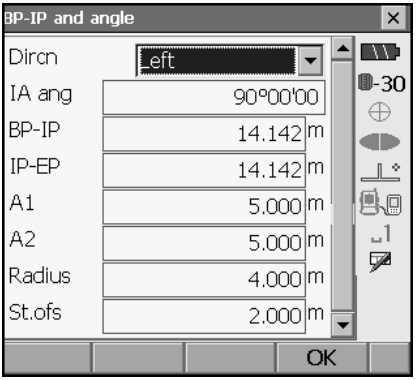
3. Select "BP-IP and angle" in "Element".



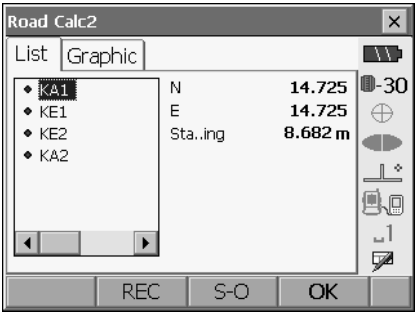
4. Input the point number of BP point (reference point).

5. Input the point number of the IP point or azimuth angle. When inputting point number, select "Coord" in "IP azimuth". When inputting azimuth angle, select "Azimuth" in "IP azimuth". Press **[OK]**

6. Input curve properties: curve direction, IA angle (intersection angle), BP-IP (distance between BP Point and IP Point), IP-EP (distance between IP Point and EP Point), parameter A1, parameter A2, curve radius, and station offset (BP Point stationing chainage).

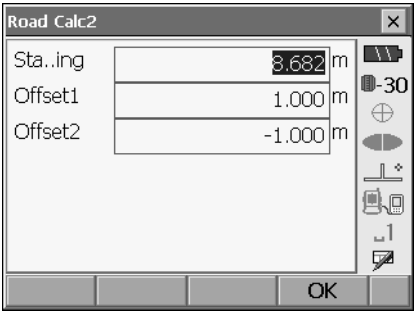


7. Press **[OK]** in the screen shown in step 6 to calculate the coordinates and stationing chainage of the KA1 point, KE1 point, KE2 point, KA2 point. The results are then displayed on the screens

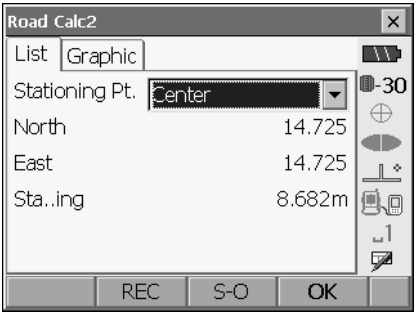


8. Press **[OK]** in the screen shown in step 7 to move to center peg settings.

9. Input stationing chainage and offset for width peg.



10. Press **[OK]** in the screen shown in step 9 to calculate the coordinates and stationing chainage of the center peg and width peg. The results are then displayed on the screen.



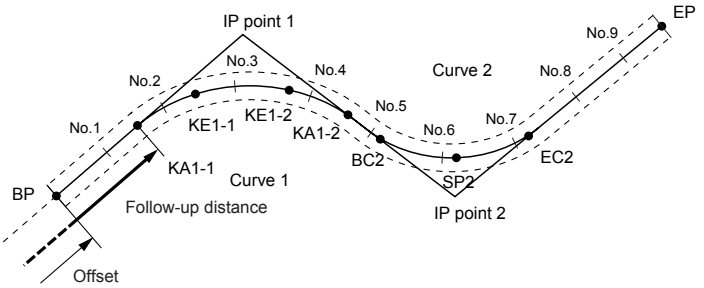
11. Press **{ESC}** repeatedly to finish intersection angle/azimuth angle calculation and return to <Road>.

Note

- In the case of a clothoid with no transition curve, the KA1 Point, KE Point, and KA2 Point can be found in step 7.
- In the case of a circular curve, the BC Point and EC Point can be found in step 7.
- Intersection angle IA input range: 0° < IA < 180°

23.7 Route Calculation

Route Calculation is used to find the center pegs and width pegs of a route which contains a series of curves. It is then possible to proceed with setting-out.



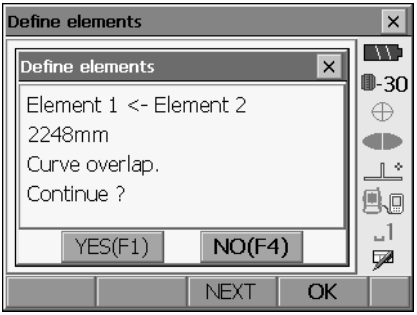
- Route Calculation includes the following:
  Curve properties input, curve properties display, automatic calculation of cardinal points, arbitrary point calculation, and inverse width peg calculation.
- In the Route Calculation menu it is possible to set one route per JOB, each route containing a maximum of 16 curves.
- Up to 600 points, including all center pegs and width pegs, can be calculated using automatic calculation of cardinal points.
- Route data is retained even when the power has been cut off. However, the route data will be cleared if the JOB is deleted.
  ☞ Deleting a JOB: "26.2 Deleting a JOB"

- Curve data is not set when curve properties (parameter A1, parameter A2, radius R) are all set to "Null".
- Route Calculation is used to measure a series of successive curves. If a curve is not connected to the main series of curves, all data from the end of the last connected curve is void. Route surveying is not performed for this section.
- The rounding up of error values in curve calculation may create discrepancies (mm) in coordinates of peg No.

23.7.1 Inputting curve properties

- BP Point auto setting (step 10)
  It is possible to preset which point to use as the BP Point of the next curve: the IP Point of the previous curve or the end-point (KA-2 or EC Point) of the previous curve.
  ☞ "23.7.6 Setting parameters"

・ If curves overlap when the next curve has been calculated based on input curve properties (by pressing either **[NEXT]** or **[OK]**), the following screen is displayed.



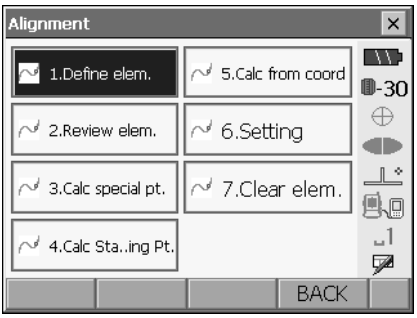
Press **[YES]** to ignore the overlapping and continue calculation.
Press **[NO]** to stop calculation and return to the curve properties input screen.

PROCEDURE

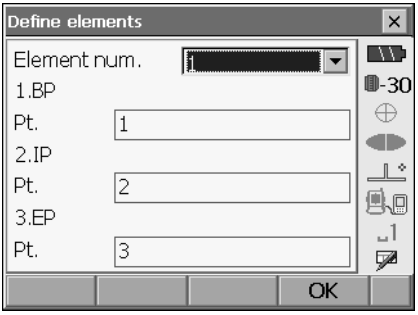
1. Select "Road" in the "COGO" tab of <Menu>.

2. Select "Alignment" in <Road>.

3. Select "Define elem." in <Alignment>.

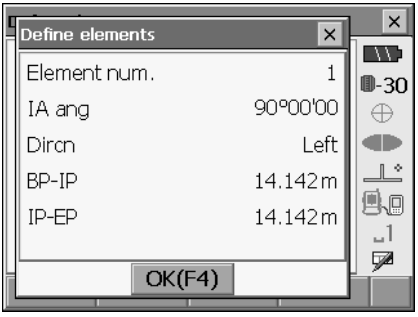


4. Input the desired curve number.
   Input the point number of BP point, IP point and EP point then press **[OK]**.

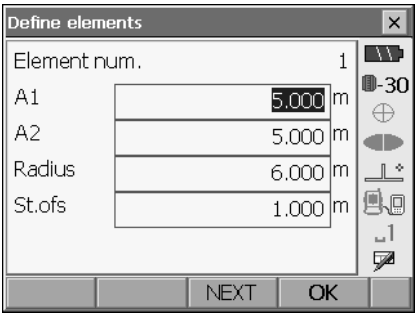


5. The intersection angle, curve direction, BP-IP length, and IP-EP length are calculated from the coordinates of the three selected points. The results are then displayed in this screen.
   Check the data, then press **[OK]**.

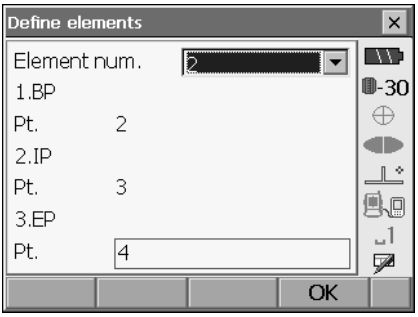
   • Press **{ESC}** to return to the previous screen to make alterations to this data.



6. Input curve properties: parameter A1, parameter A2, radius R, and Station offset (offset from stationing chainage).



7. Pressing **[NEXT]** in the screen shown in step 7 moves to the next curve number.
   When "EC/KA2" is set in "23.7.6 Setting parameters", the end-point of the previous curve is displayed as the BP point of the next curve.
   The EP Point of the previous curve is displayed as the IP Point coordinates of the next curve.



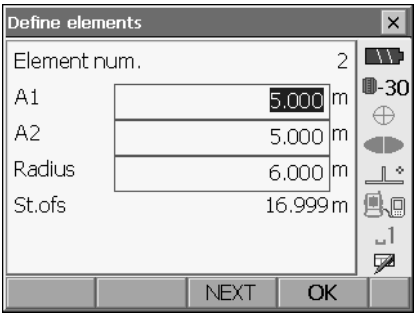
8. The EP Point of the previous curve is displayed as the IP Point coordinates of the next curve.

9. Input the point number of the EP point of the next curve, then press **[OK]**.

10. The intersection angle, curve direction, BP-IP length, and IP-EP length are calculated from the coordinates of the BP Point, IP Point and EP Point. The results are then displayed in this screen.
    Check the data, then press **[OK]**.

11. Input curve properties for the next curve: parameter A1, parameter A2, and radius R. The offset value is set automatically.

    • When "IP" is set in "23.7.6 Setting parameters", offset is not displayed.



12. Repeat steps 7 to 11 for the next curve until the curve properties have been input.

13. Press **[OK]** when all curve properties have been input.

23.7.2 Displaying curve properties

It is possible to check the curve properties set in "Inputting curve properties". To make alterations, follow the procedure described in "Inputting curve properties".

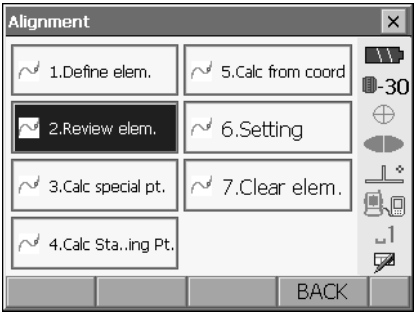
• The curve property data will be displayed in ascending order of curve number.

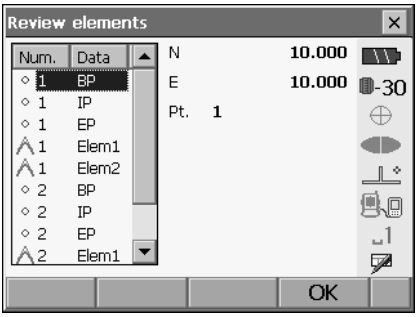
PROCEDURE

1. Select "Road" in the "COGO" tab of <Menu>.

2. Select "Alignment" in <Road>.

3. Select "Review elements" in <Alignment>. Details of the data selected on the left column is displayed on the right.





4. Press **[OK]** to return to <Alignment>.

23.7.3 Automatic calculation of cardinal points

Perform automatic calculation of cardinal points based on the curve properties set in "23.7.1 Inputting curve properties". Center pegs (peg No.) and width pegs set up at intervals can be calculated at once.

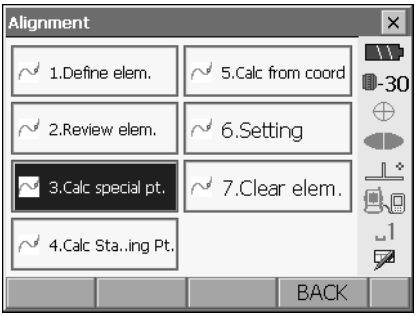
- Up to 600 points, including all center pegs and width pegs, can be calculated using automatic calculation of cardinal points.
- The cardinal point calculated depends on the type of curve involved.
  Clothoid: KA-1 Point, KE-1 Point, KE-2 Point, KA-2 Point
  Clothoid with no transition curve: KA-1 Point, KE Point, KA-2 Point
  Circular curve: BC Point, SP Point, EC Point
- The width pegs can be set up on both sides of the route and the left and right route widths calculated separately.
- A point number is automatically assigned to peg No. that is calculated. The first part of the point number can be preset.
- The coordinates of calculated pegs are automatically stored in the current JOB. When a particular point number already exists in the current job the available options it is possible to select whether or not to overwrite. It is possible to preset which procedure is used in this situation.

PROCEDURE

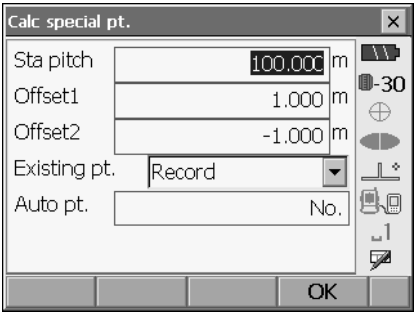
1. Select "Road" in the "COGO" tab of <Menu>.

2. Select "Alignment" in <Road>.

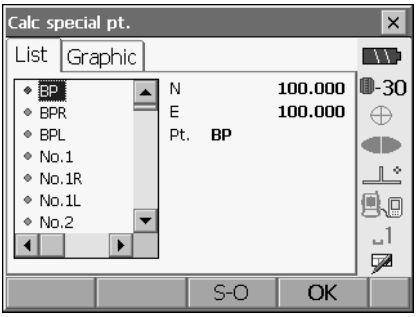
3. Select "Calc special pt." in <Alignment>.



4. Set peg No. pitch (peg interval), Offset 1 (route width), Offset 2, Existing pt. (duplicate point number procedure when point number already exists in current JOB), and Auto pt. (peg No. name).

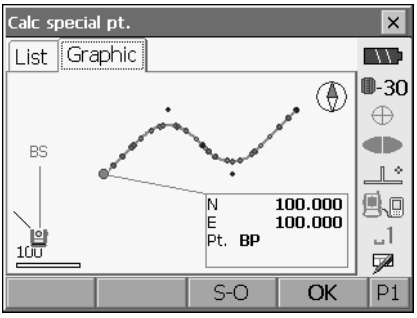


5. Press **[OK]** in the screen shown in step 4 to calculate the coordinates of the cardinal point, width pegs and peg No. Details of the data selected on the left column is displayed on the right.

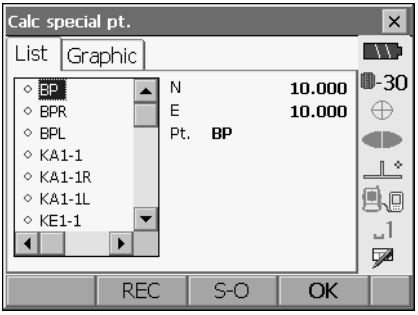


- Select the Graphic tab to display calculation results on a graph.

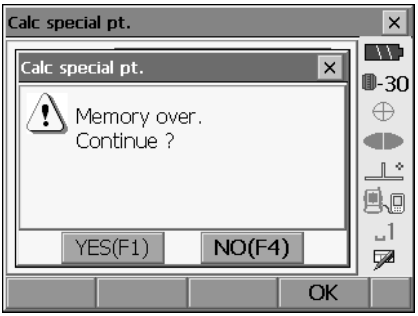
☞"25.3 Reviewing Data"



- When "Existing pt." in step 4 has been set to "Skip" a point with a point number which already exists in the current JOB will not be automatically stored. These points are marked with a blue circle. At this stage of the process it is possible to store such a point under a new point number.



6. The screen at right is displayed, when the amount of set pegs exceeds 600 points. Press **[YES]** to continue using the initial 600 points.
   Press **[NO]** to return to the screen of step 4.



7. Press **[OK]** to return to <Alignment>.

Note

- Sta pitch input range: 0.0000 to 9999.9999 (10.000*) (m)
- Offset input range: -999.9999 to 999.9999 (Null *) (m)
- Exisiting pt. (Duplicate point number procedure): Record (record as separate point with same point number)*/Skip (no overwrite)
- Auto pt. length: 14 characters ("No."*)

Rules regarding the assigning of point numbers to automatically calculated pegs

- Clothoid curve cardinal point: the curve number is added at the end e.g. the KA1 Point of curve number 1 is written "KA1-1", and the KA1 Point of curve number 2 is written "KA2-1".
- Circular curve cardinal point: the curve number is added at the end e.g. the BC Point of curve number 1 is written "BC1", and the BC Point of curve number 2 is written "BC2".
- Width peg: "R" or "L" is added at the end of the center peg point number. "R" is added for positive (+) route widths (the route width from the center peg to the RIGHT width peg) and "L" is added for negative (-) route widths (route width from the center peg to the LEFT width peg). When both route widths are input as positive (+) "R" and "R2" are used. When both route widths are input as negative (-) "L" and "L2" are used.
- A blank space at the beginning and end of a point number will be ignored.

23.7.4 Arbitrary point calculation

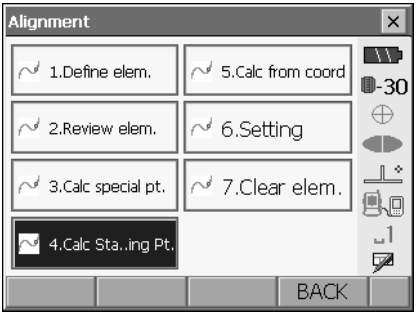
The coordinates of arbitrary points on every calculated curve can be found using arbitrary point calculation.

PROCEDURE

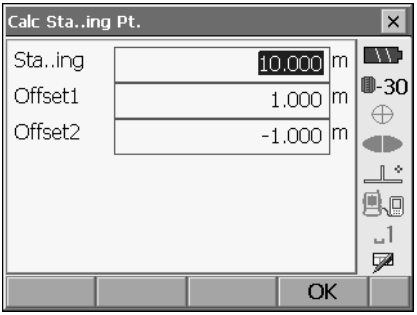
1. Select "Road" in the "COGO" tab of <Menu>.

2. Select "Alignment" in <Road>.

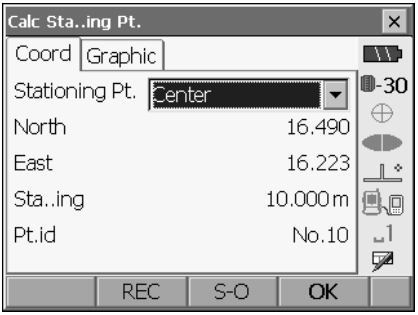
3. Select "Calc Sta...ing Pt." in <Alignment>.



4. Input the arbitrary point stationing chainage and offset for width peg.

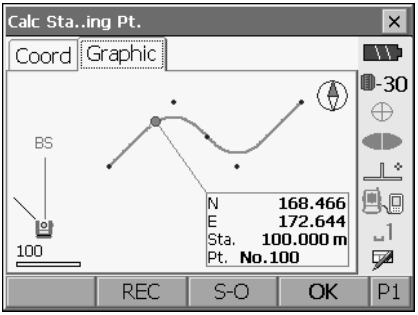


5. Press **[OK]** in the screen shown in step 4 to display the coordinates and point number of the arbitrary point.



   - The center point can be stored as a known point in the current job by pressing **[REC]**.

   - Select the Graphic tab to display calculation results on a graph.
   ☞"25.3 Reviewing Data"



6. Press **{ESC}** to return to <Alignment>.

Rules regarding the automatic assigning of point numbers to arbitrary points

- Arbitrary point: The distance to the arbitrary point is given in terms of the closest peg No. from the front of the curve. The distance from the peg No. is added at the end.

23.7.5 Inverse width peg

The route widths and coordinates for center pegs on every calculated curve can be found by using inverse width peg calculation.

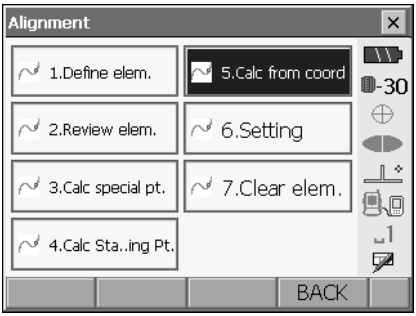
- There are two methods for specifying arbitrary width peg coordinates: key entry and observation.

PROCEDURE Using key entry to specify arbitrary width pegs

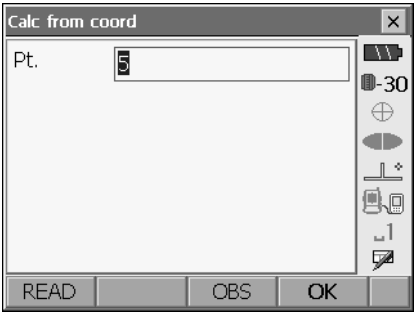
1. Select "Road" in the "COGO" tab of <Menu>.

2. Select "Alignment" in <Road>.

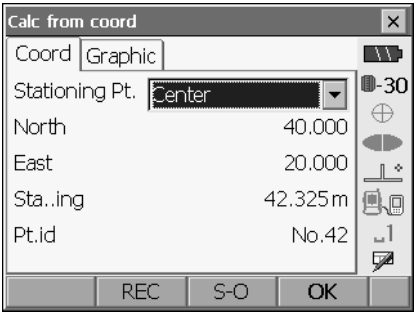
3. Select "Calc from coord" in <Alignment>.



4. Input the point number of the arbitrary width peg.

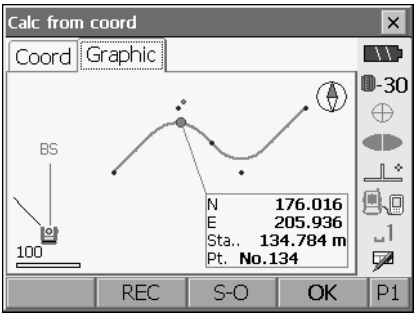


5. Press **[OK]** in the screen shown in step 4 to display the coordinates and point number of the center peg and width peg.



- Select the Graphic tab to display calculation results on a graph.

☞"25.3 Reviewing Data"

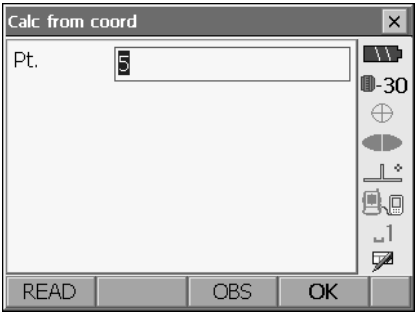


6. The next width peg can then be set by pressing **[OK].**

PROCEDURE Using observation to specify arbitrary width pegs

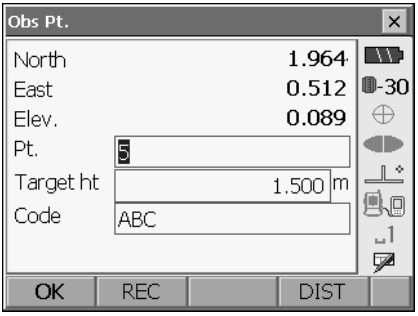
1. Enter the Inverse Width Peg menu in the same manner as shown above.
   ☞ "PROCEDURE Using key entry to specify arbitrary width pegs" steps 1 to 3

2. Sight the width peg and press **[OBS]**.

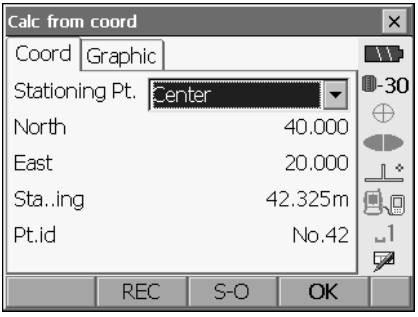


3. Press **[DIST]** to start measurement. The results are displayed.

   •When recording data in the current JOB, press **[REC]**.



4. Press **[OK]** in the screen shown in step 3 to display the coordinates and point number of the center peg and width peg.



5. The next width peg can then be set by pressing **[OK]**.

Note

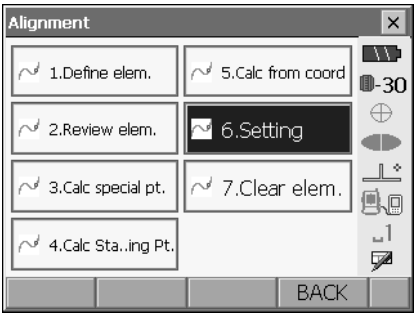
- The rules regarding the assigning of point numbers to center pegs are the same as those for when calculating arbitrary points.
  ☞"23.7.4 Arbitrary point calculation Rules regarding the automatic assigning of point numbers to arbitrary points"

23.7.6 Setting parameters

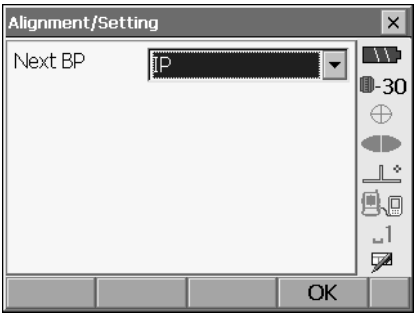
When configuring curve properties in "Inputting curve properties", it is possible to preset which point to set as the BP Point of the next curve: the IP Point of the previous curve or the end-point (KA-2 or EC Point) of the previous curve.

PROCEDURE

1. Select "Road" in the "COGO" tab of <Menu>.
2. Select "Alignment" in <Road>.
3. Select "Setting" in <Alignment>.



4. Select the automatic setting method for the BP Point of the next curve.



Note

The automatic setting method can be selected from the following:
(*: Factory setting)

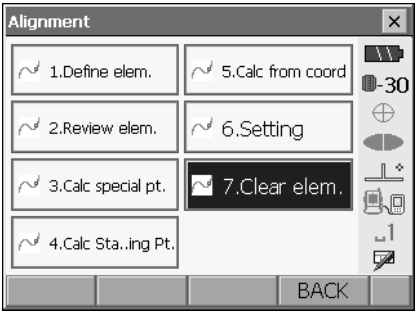
- Next BP: "IP " (IP Point of the previous curve)*/"EC/KA2" (end-point of the previous curve (KA-2 or EC Point)).

23.7.7 Clearing route data

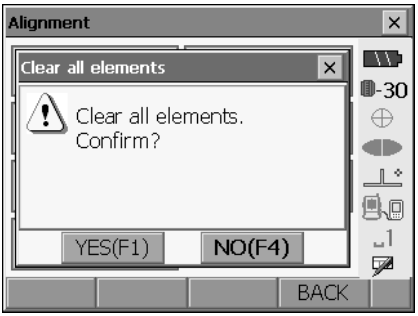
Route data set in "23.7.1 Inputting curve properties" can be cleared.

PROCEDURE

1. Select "Road" in the "COGO" tab of <Menu>.
2. Select "Alignment" in <Road>.
3. Select "Clear elem." in <Alignment>.



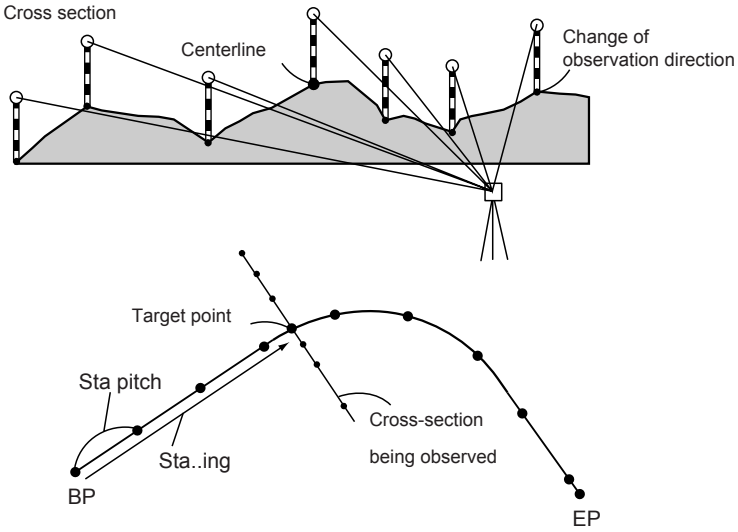
4. Press **[YES]** to clear the route data. <Alignment> is restored.



24. CROSS SECTION SURVEY

The purpose of this function is to measure and set out points along a cross-section of a road or linear feature already surveyed using the Route surveying function. Cross-sections can be surveyed in a variety of directions depending on your requirements.

☞ For terminology: "23. ROUTE SURVEYING"

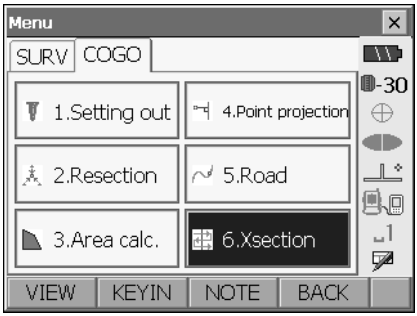


24.1 Instrument Station Settings

The instrument station to be used as the reference point is recorded, as necessary, prior to starting surveying.

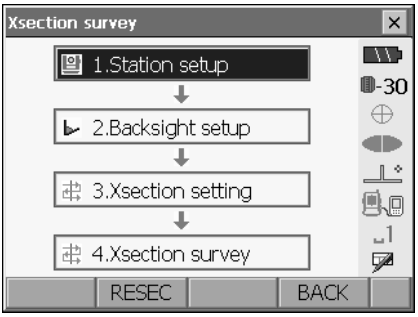
PROCEDURE

1. Select "Xsection" in the "COGO" tab of <Menu>



2. Select "Station setup" in <Xsection survey> and enter instrument station data
   ☞ "15.1 Entering Instrument Station Data"

   • Press **[RESEC]** to perform resection measurement. It is possible to set a point found by specifying 2 known points as the instrument station.
   ☞ "17. RESECTION MEASUREMENT"



3. Select "Backsight setup" in <Xsection survey> and enter backsight station data.
   ☞ "15.2 Azimuth Angle Setting"

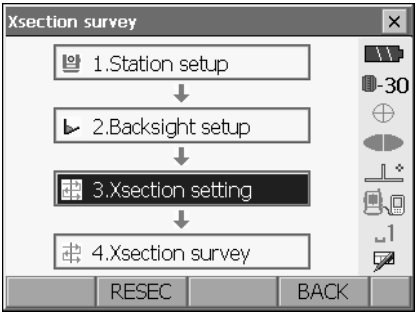
24.2 Cross Section Survey

The instrument station to be used as the reference point is recorded, as necessary, prior to starting surveying.

PROCEDURE

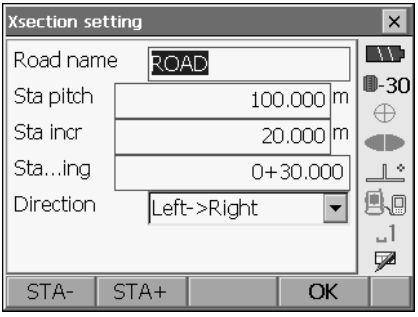
1. Select "Xsection" in the "COGO" tab of <Menu>

2. Select "Xsection setting" in <Xsection survey>

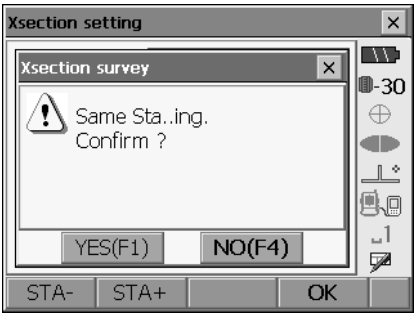


3. Input road name for cross section survey, station pitch, station increment, stationing chainage and select direction. Then press **[OK]**.

   • Press **[STA-]** /**[STA+]** to decrease/increase the pitch set in "Sta incr" from/to "Stationing chain age". Stationing chainage is displayed as "xx+xx.xx".



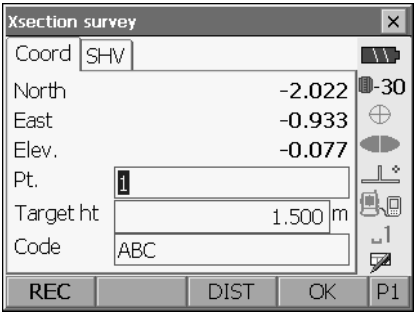
- In the event that stationing chainage was the same as the prior observation, cross-section survey is judged to have finished and a confirmation message window is displayed. Press **[YES]** to proceed to step 4. Press **[NO]** to set station pitch, station increment, and station chainage again.



4. Sight the last point on the cross-section and press **[DIST]**.
   ☞"[] Direction"

   - Press **[OFFSET]** on the second page to perform offset measurement for the last point.
   - When observing the center point first, the center point needs to be set.

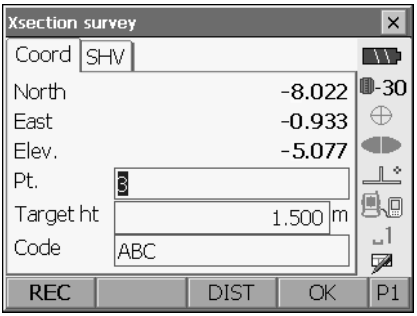
   ☞ Step 7



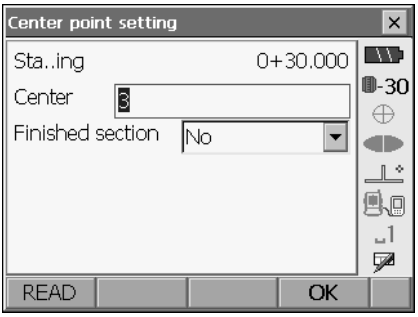
5. Enter point number, target height, and code, then press **[REC]** to record measurement data.

6. Repeat steps 4 to 5 for all points on the cross-section in the set observation direction until the centerline is reached.

7. Observe the center point. Then press **[OK]**.



Enter center point name. Then press **[OK]**.

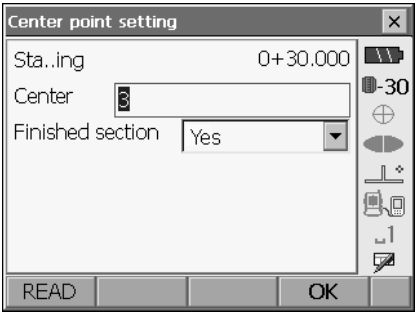


- When the center point is set as the instrument station, press **[READ]** to read in already registered coordinate data and set as the coordinates of the instrument station.

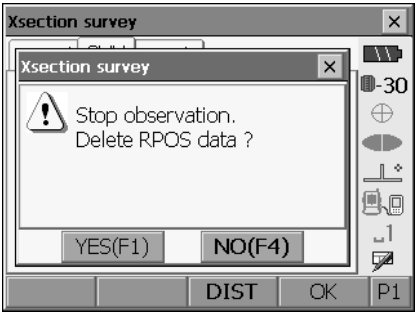
☞ "16.4 Reading in registered coordinate data from Memory mode"

8. Repeat steps 4 to 5 for all points on the cross-section occuring after the centerline.

9. After observing the last changing point, check that "Finished section" is set to "Yes", then press **[OK]**.



- Observation can be cancelled by pressing **{ESC}**. In this event, a confirmation message window is displayed. Press **[YES]** to discard measurement data observed up to that point and exit observation. Press **[NO]** to continue observation.



10. Proceed to observation of the next cross-section.

Note

- Road name: up to 16 characters
- Sta incr: 0.000 to 9999.999 (m)
- Sta..ing: -99999.999 to 99999.999 (m)
- Sta pitch: 0.000 to 9999.999 (m)
- Direction: Left->Right*/Right->Left/Left/Right

Direction

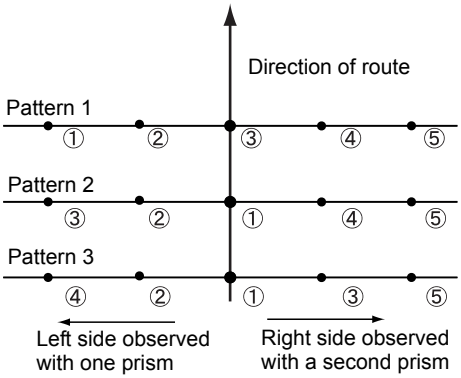
Cross-sections can be measured in the following directions depending on the setting selected in "Direction".

When "Left" or "Left -> Right" selected

Pattern 1: From left-most point to right-most point.

Pattern 2: Center point observed first. Then the point immediately to the left of the center point. Remaining points can then be observed in any order.

Pattern 3: Method using 2 prisms. Center point observed first followed by the point immediately to the left. Subsequent observations can be in whatever order is the most efficient for operation with 2 prisms. In the illustration below the points closest to the center point are observed first, followed by the outermost points (left first, then right).



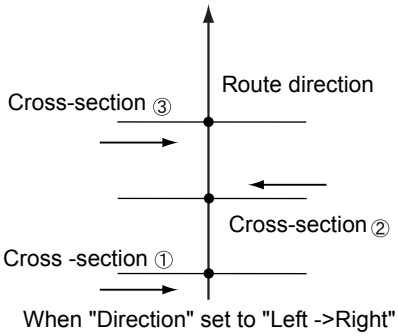
When "Right" or "Right-> Left" selected

Pattern 1: From right-most point to left-most point.

Pattern 2: Center point observed first. Then the point immediately to the right of the center point. Remaining points can then be observed in any order.

Pattern 3: Method using 2 prisms. Center point observed first followed by the point immediately to the right. Subsequent observations can be in whatever order is the most efficient for operation with 2 prisms.

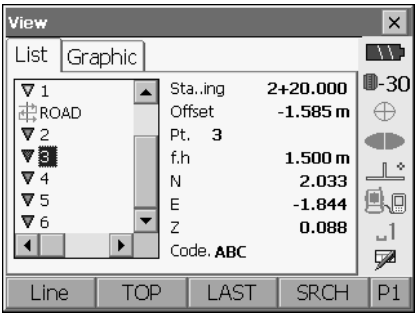
When "Left -> Right" or "Right -> Left" selected, observation of a subsequent cross-section can be switched automatically to the opposite direction upon completion of the previous cross-section observation. This method minimizes the walking distance to the next starting point when measuring multiple cross-sections.



Cross survey data review

Cross-section data recorded in a JOB is displayed as shown at right."Offset" represents the distance calculated from the center point coordinates and measurement point coordinates.

☞Displaying JOB data: "25.3 Reviewing Data"



25.1 Registering Known Point Data

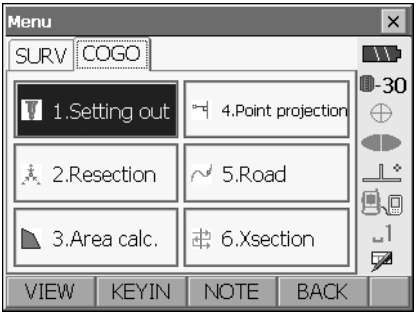
It is possible to register coordinate data of the known points in the current JOB using the key entry method.
Registered coordinate data can be used when setting instrument station, backsight station, known point, and setting-out point coordinate data.

- It is possible to register 2000 items of coordinate data, including the data inside a JOB.

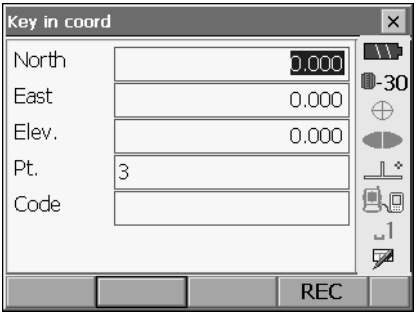
- When “inch” is selected as the distance unit, the value must be input in “feet” or US feet".

PROCEDURE

1. Press **[KEYIN]** in <Menu>.



2. Input known point coordinates, point number and code. Press **[REC]** to record the data in the current JOB



3. Continue to enter other known point coordinate data for other known points.

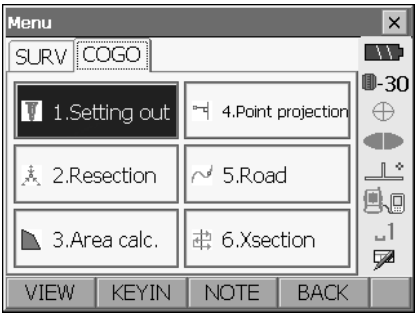
4. After all coordinate data has been registered, press **{ESC}** to restore <Menu>.

25.2 Registering Notes

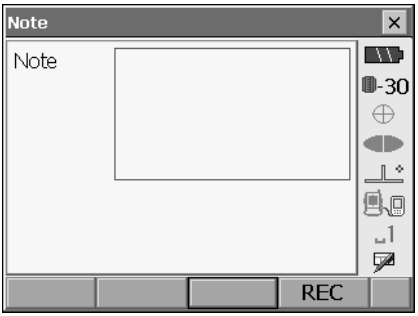
This procedure explains how to register notes in the currently selected JOB.

PROCEDURE

1. Press **[NOTE]** in <Menu>.



2. Input the note data, press **[REC]** to record the note in the current JOB. <Menu> is restored.



Note

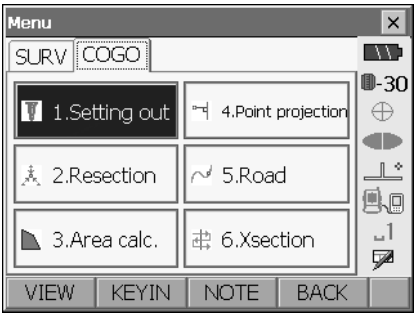
Maximum note length: 60 characters (alphanumeric)

25.3 Reviewing Data

It is possible to display all the data within the current JOB and the coordinate search JOB.

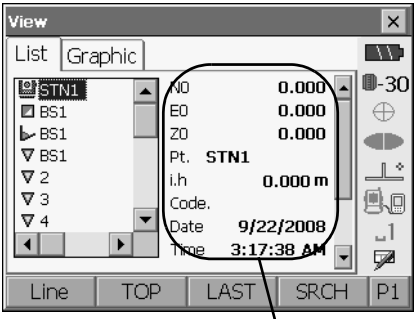
PROCEDURE

1. Press **[VIEW]** in <Menu>.



2. Select a data in the point number list to display details.
   The list is displayed.

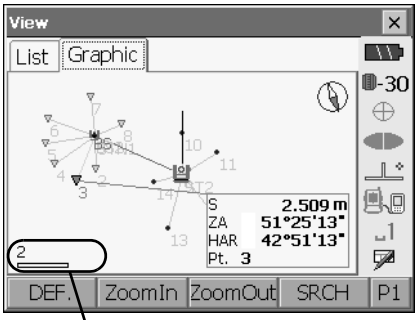
   - Press **[Line]/[Page]** to switch the operation of **{▲}/{▼}** from page scroll to point scroll.
   - Press **[TOP]** to select the first point in the list.
   - Press **[LAST]** to select the last point in the list.
   - Press **[SRCH]** to search for a point number. Up to 14 characters can be input.
   - **[OBS/SAVE]/[RED/SAVE]/[COORD/SAVE]** on the second page are displayed only when observation data is displayed. When the above softkeys are pressed, the observation data is displayed or saved in the converted format.



Details of the selected data

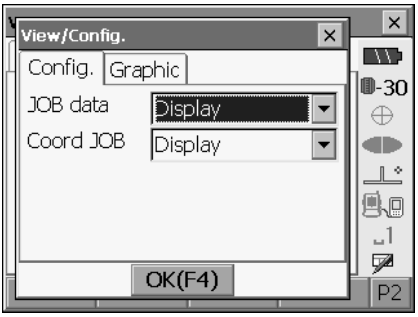
   The List and Graphic tabs are linked so that when a particular point is selected in one tab, the same point is automatically selected in the other tab.

   - Press **[DEF.]** to return to the default display format.

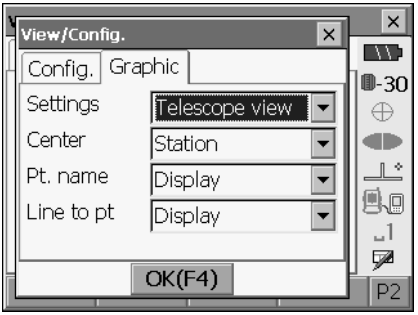


Scale bar

- Press **[CNFG]** on the second page to change the display setting. Press **[OK]** to confirm the settings.
  Displayed JOB can be selected.



Settings:
Orientation of the display can be selected from telescope direction, north or south.
Center:
Center point for the display can be selected from instrument station or target point.
Pt.name:
Switch point name display on/off.
Line to pt:
Switch target line display on/off.



3. Press **{ESC}** to return to <View>.

26.SELECTING / DELETING A JOB

26.1 Selecting a JOB

Select the current JOB and Coordinate Search JOB.

- A total of 10 JOBs have been prepared, and JOB1 was selected when your SRX was shipped from the factory.
- The names of the JOBs has been preset as JOB1 to JOB10; you can change them to any names you wish.
- Scale factor can be set for each JOB.

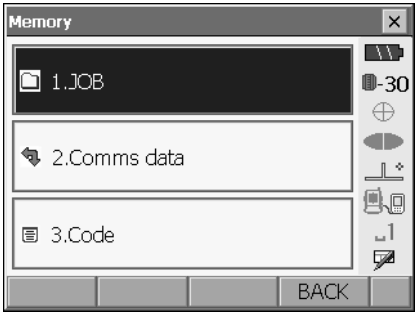
Current JOB
Measurement results, instrument station data, known points data, notes and coordinate data are recorded in the current JOB.
☞ Registering known point data: "25.1 Registering Known Point Data"

Coordinate Search JOB
The registered coordinate data in the selected JOB can be read into coordinate measurement, resection measurement, setting-out measurement, etc.

Scale correction
SET calculates horizontal distance and coordinates of a point using measured slope distance. If scale factor has been set, scale correction is carried out during calculation.
Corrected horizontal distance (s) = Horizontal distance (S) × Scale factor (S.F.)
- When scale factor is set to “1.00000000”, the horizontal distance is not corrected.

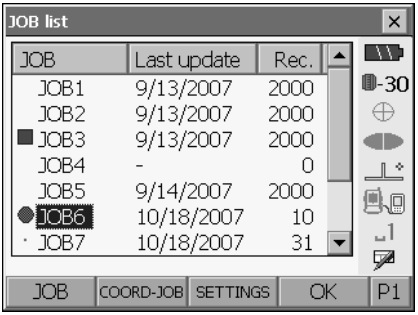
PROCEDURE JOB selection

1. Select “JOB” in <Memory>.
<JOB List> is displayed.



2. Align the cursor with the desired current JOB and press **[JOB]** or **{↵}**.
   Red circle appears to the left of the JOB name.

   - The numbers to the right represent the number of data items in each JOB.
   - "•" means that the JOB has not been output to an external device yet.



3. Align the cursor with the desired coordinate search JOB and press **[COORD-JOB]**.
   Blue square appears to the left of the JOB name.

4. Press **[OK]** to return to <Memory>.

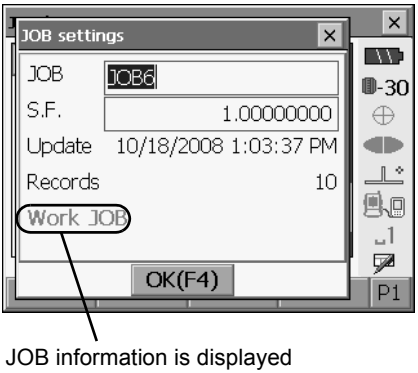
PROCEDURE Inputting a JOB name and scale factor setting

1. Select "JOB" in <Memory>.

2. Select in advance the JOB whose name you wish to change in <JOB List> and press **[SETTINGS]**.
   ☞"PROCEDURE JOB selection"

3. Input the new JOB name and the scale factor for the JOB.
   <JOB list> is restored.

   - Scale factor can be set for each JOB.



JOB information is displayed

4. Press **[OK]** to return to <Memory>.

Note

- Maximum size of JOB name: 12 (alphanumeric)
- Scale factor input range : 0.50000000 to 2.00000000 (*1.00000000)

"*" : Factory setting

26.2 Deleting a JOB

It is possible to clear the data within a designated JOB. After the data has been cleared, the JOB name returns to the name allocated when the SRX was shipped.

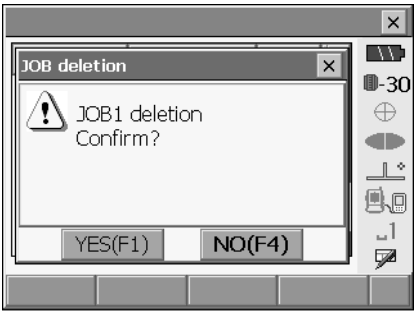
Note

- A JOB that has not been output to an auxiliary device (displayed with *) cannot be deleted.

PROCEDURE

1. Select “JOB” in <Memory>.

2. Select the JOB to delete in <JOB List> and press **[DEL]**.
   <JOB deletion> is displayed.



3. Press **[YES]**. The data within the selected JOB is deleted and <JOB List> is restored.

27.RECEIVING COORDINATE DATA

It is possible to read in coordinate data from a external device, CF card inserted to the SRX, or the internal memory of the SRX to the current JOB. Such coordinate data can be used when setting instrument station, backsight station, known point, and setting-out point coordinate data.

☞ External devices: "6. USING THE CF CARD SLOT" and "8. CONNECTING TO EXTERNAL DEVICES"
Communication cables: "36. OPTIONAL ACCESSORIES"
Output format and command operations: “Interfacing with the SOKKIA SDR Electronic Field Book” and Command Explanations manuals.

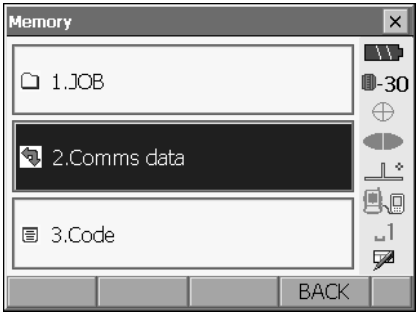
- It is possible to register 2000 items of coordinate data, including the data inside a JOB.
- Coordinate data can be registerd by key entry as well.
  ☞ Key entry: "25. REGISTERING/REVIEWING DATA"
- When entering known point data from an external device, SRX does not check the repeated point number.

- When “inch” is selected as the distance unit, the value must be input in “feet” or US feet".

PROCEDUREReceiving known point coordinate data from an external device via RS232C cable

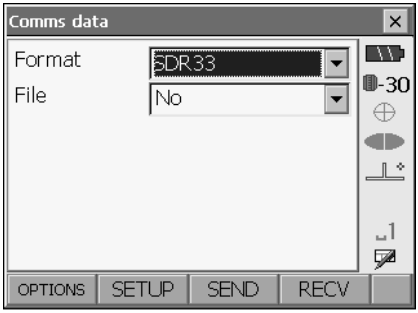
1. Connect SET to the external device.
   ☞"8. CONNECTING TO EXTERNAL DEVICES"

2. Select “Comms data” in <Memory>.



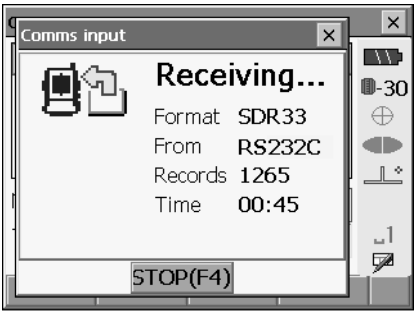
3. Select the input format and select "No" in "File", then press **[RECV]**

   - Press **[SETUP]** to perform communication setup.
     ☞"8. CONNECTING TO EXTERNAL DEVICES"

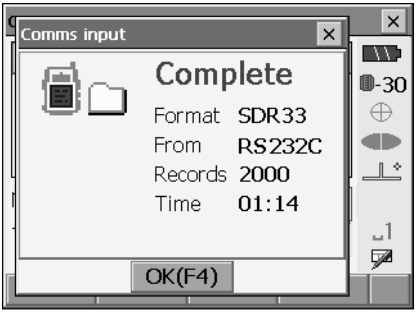


The coordinate data receiving stats.

- To stop data reception, press **[STOP]**.



4. Press **[OK]** to return to <Comms data>.

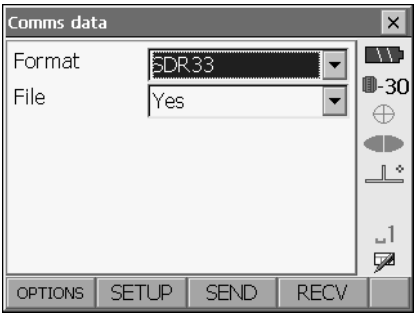


PROCEDUREReceiving known point coordinate data file via USB port/CF card/internal memory of the SET

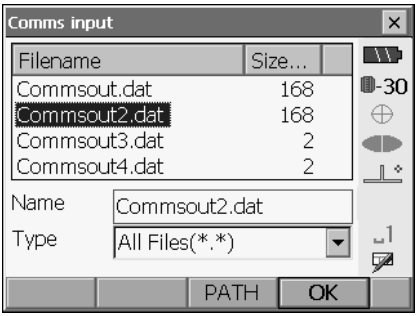
1. Connect SRX to the USB device or insert a CF card to the CF card slot.
   ☞"6. USING THE CF CARD SLOT"/ "8. CONNECTING TO EXTERNAL DEVICES"

2. Select “Comms data” in <Memory>.

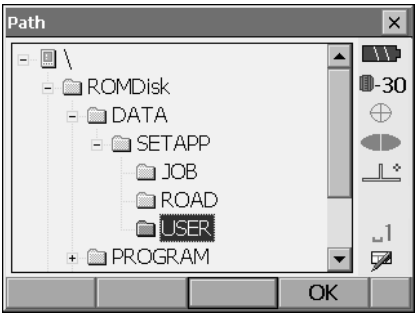
3. Select the input format and select "Yes" in "File", then press **[RECV]**



4. Select the file type to display on the list and select the file to read in.

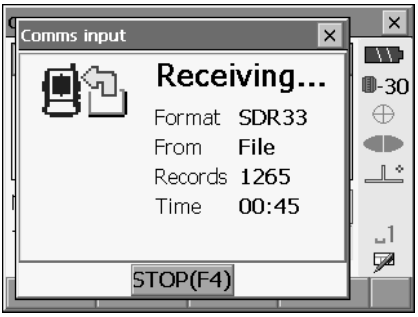


- Press **[PATH]** to specify the filepath.

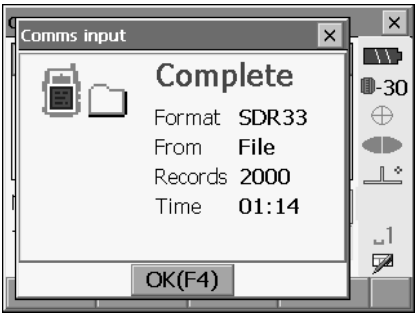


5. Press **[OK]** to start reception.

- To stop reception, press **[STOP]**.



6. Press **[OK]** to return to the screen in step 4.



28.OUTPUTTING JOB DATA

It is possible to output JOB data to a external device, CF card inserted in the SRX, or to save in the internal memory of the SRX.

☞ External devices: "6. USING THE CF CARD SLOT" and "8. CONNECTING TO EXTERNAL DEVICES"
Communication cables: "36. OPTIONAL ACCESSORIES"
Output format and command operations: “Interfacing with the SOKKIA SDR Electronic Field Book” and Command Explanations manuals.

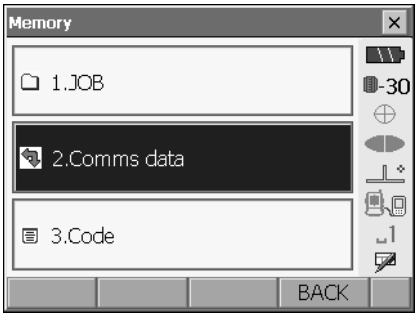
- Measurement results, instrument station data, known point data, notes, and coordinate data in the JOB can be output.

- When “inch” is selected as the distance unit, data is output in “feet” or "US feet" depending on the feet unit selected.

PROCEDUREOutputting JOB data to external device via RS232C cable

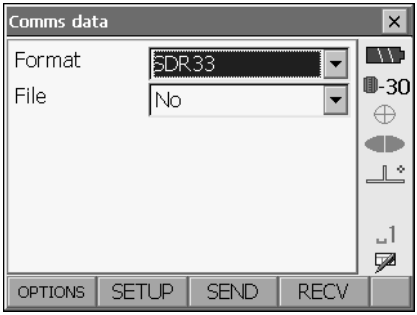
1. Connect SET to the external device.
   ☞"8. CONNECTING TO EXTERNAL DEVICES"

2. Select “Comms data” in <Memory>.



3. Select the output format and select "No" in "File", then press **[SEND]**

   - Press **[SETUP]** to perform communication setup.
     ☞"8. CONNECTING TO EXTERNAL DEVICES"



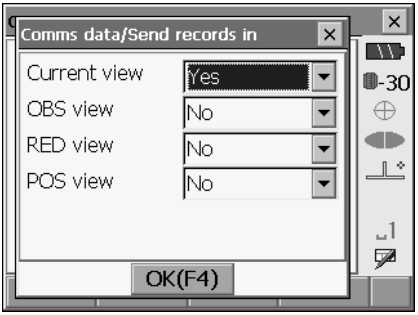
- Press **[OPTIONS]** and set post-conversion format for observation data. Items to be configured are as follows.

Current view:
Select "Yes" when outputting data in original record format.

OBS view:
Select "Yes" when outputting converted data (horizontal angle, vertical angle and slope distance).

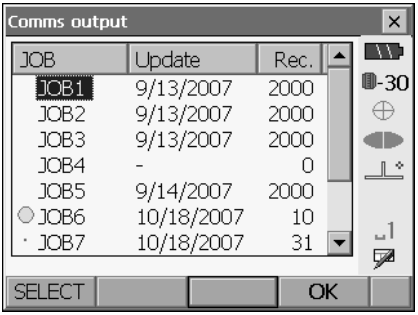
RED view:
Select "Yes" when outputting converted data (azimuth angle, horizontal distance and vertical distance).

POS view:
Select "Yes" when outputting converted data (coordinate).



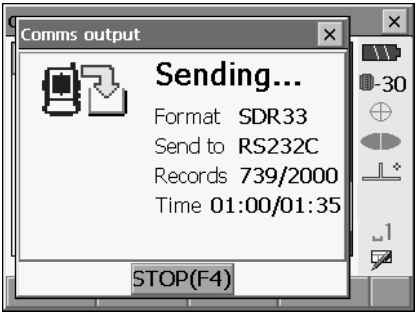
4. Select the JOB to be output by pressing **[SELECT]** or **{↵}**.
Green circle appears to the left of the selected JOB. You can select as many JOBs as you want.

- "●" means the JOB has not been output to an external device yet.

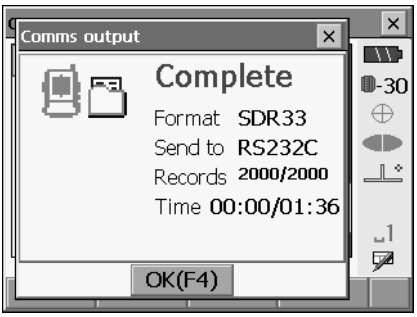


5. Press **[OK]** to start output.

- To stop output, press **[STOP]**.



6. Press **[OK]** to return to the screen in step 4.
   It is possible to proceed to output of the next JOB.

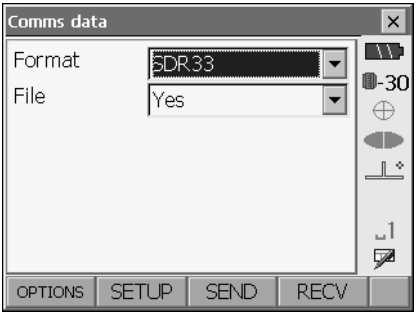


PROCEDUREOutputting JOB data file to external device via USB port/CF card/internal memory of the SET

1. Connect SRX to the USB device or insert a CF card to the CF card slot.
   ☞"6. USING THE CF CARD SLOT"/ "8. CONNECTING TO EXTERNAL DEVICES"

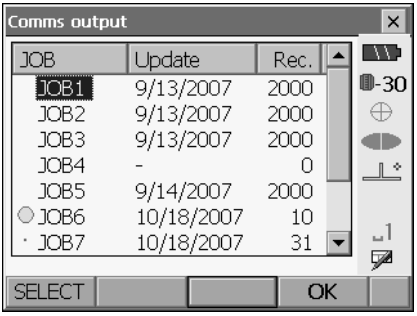
2. Select “Comms data” in <Memory>.

3. Select the output format and select "Yes" in "File", then press **[SEND]**



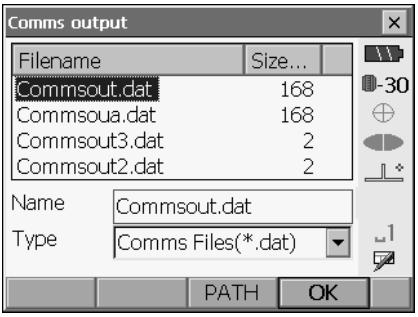
4. Select the JOB to be output by pressing **[SELECT]** or **{↵}**.
   Green circle appears to the left of the JOB selected. You can select as many JOBs as you want.

   • “•” means the JOB has not been output to an external device yet.

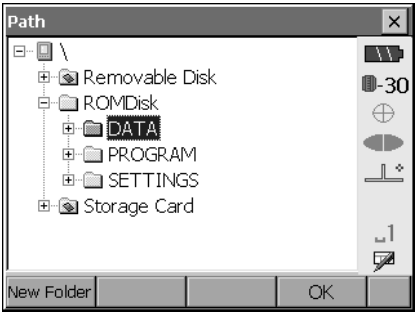


5. Press **[OK]**.

6. Input file name

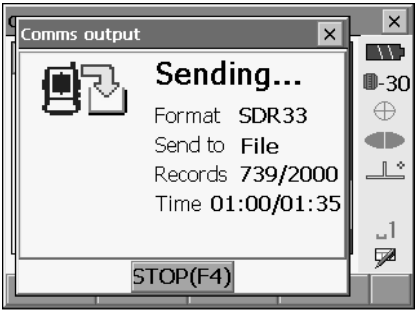


- Press **[PATH]** to specify the filepath. To create a new folder, press **[New Folder]**

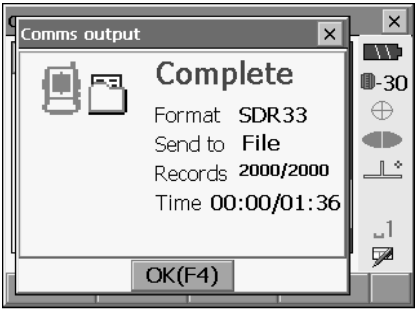


7. Press **[OK]** in the screen of step 6 to start output.

- To stop output, press **[STOP]**.



8. Press **[OK]** to return to the screen in step 4.
It is possible to proceed to output of the next JOB.

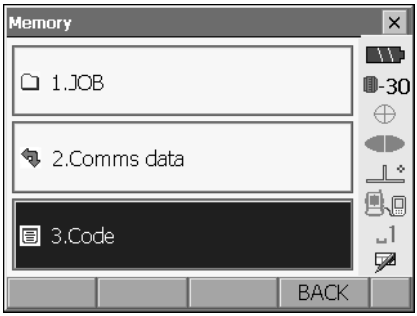


29.REGISTERING/DELETING CODE

It is possible to save codes in memory. You can also read in codes registered in memory when recording instrument station data or observation data.

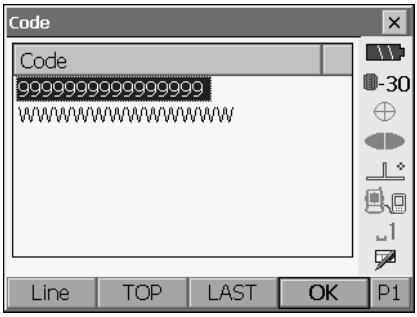
PROCEDURE Inputting Codes

1. Select “Code” in <Memory>.
   Registered codes are displayed.

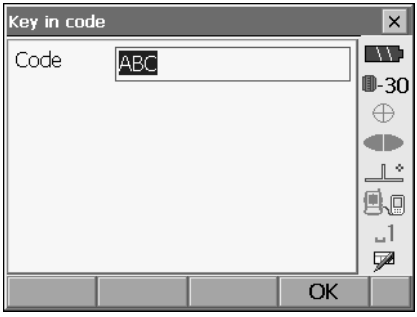


2. Press **[ADD]** on the second page.

   - Press **[Line]/[Page]** to switch the operation of **{▲}/{▼}** from page scroll to point scroll.
   - Press **[TOP]** to select the first point in the list.
   - Press **[LAST]** to select the last point in the list.



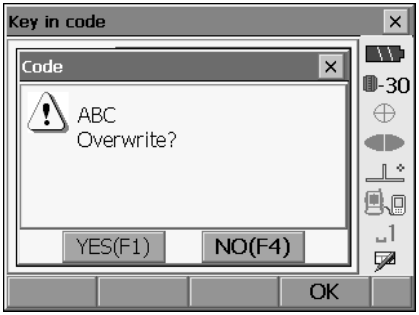
3. Enter the code and press **[OK]**. The code is registered and Code list is restored.



Note

- Maximum code size: 16 (alphanumeric)
- Maximum number of codes registered: 60

• If the same code is input, the following screen is displayed.

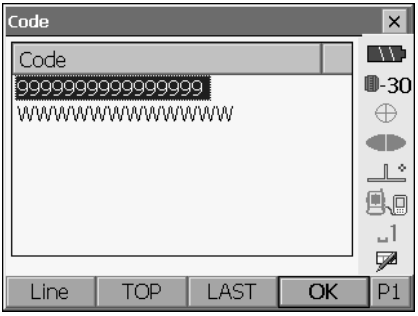


Press **[NO]** to input a new code.
Press **[YES]** to overwrite the present code.

PROCEDURE Deleting codes

1. Select “Comms data” in <Memory>.
   Registed codes are displayed.

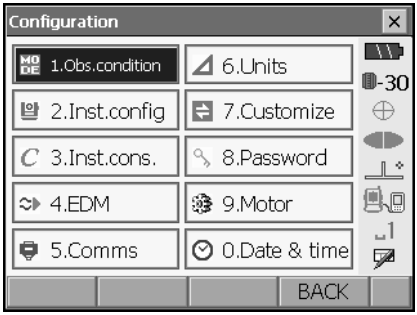
2. Align the cursor with the code to be deleted and press **[DEL]** on the second page.
   The selected code is deleted.



• Press **[DELALL]** on the second page then **[YES]** to delete all codes.

30.CHANGING THE SETTINGS

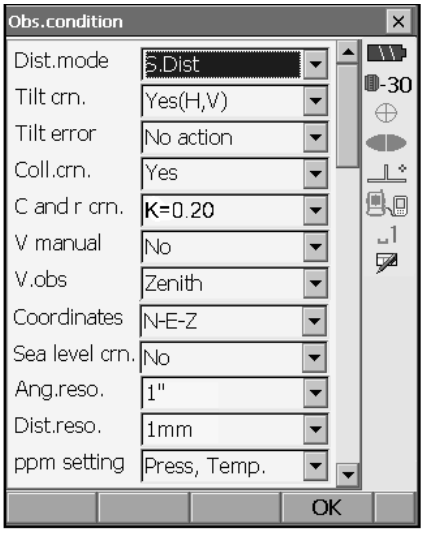
This section explains the contents of parameter settings in Basic mode and how to change these settings. Each item can be changed to meet your measurement requirements.
<Configuration> can be accessed by pressing the "CONFIG" icon in <Top>.



The following chapters provide details of items in Configuration mode.

- Communication settings ☞"8. CONNECTING TO EXTERNAL DEVICES"
- Motor settings ☞"11.1 Auto Pointing Settings", "12.1 Auto Tracking Settings"
- Instrument configurations ☞"32.3 Tilt Sensor", "32.5 Reticle"

30.1 Observation Conditions



Items set and options (*: Factory setting)

Distance mode: S.Dist (slope distance)*, H.dist (horizontal distance), V.dist (height difference)

Tilt crn (tilt correction) : Yes (H,V)*, Yes (V), No

Tilt error:	No action*/Go to Tilt screen
Coll.crn. (collimation correction) :	No, Yes*
C and r crn.:	No, K=0.142, K=0.20*
V manual:	No*, Yes
V.obs (vertical angle display method) :	Zenith*, Horiz., Horiz ±90°
Coordinates:	N-E-Z*, E-N-Z
Sea level crn. (Sea level correction) :	Yes, No*
Ang.reso. (Angle resolution):	SRX1X/SRX2X: 0.5", 1"*
	SRX3X/SRX5X: 1"*, 5"
Dist.reso. (Distance resolution):	SRX1X/SRX2X: 0.1mm, 1mm*
	SRX3X/SRX5X: 1mm*
ppm setting:	Press, Temp.*, +Humidity

Note

- When "V manual" is set to "No" the horizontal angle will be automatically set to 0.

☞ Setting V manual to "Yes": "38.2 Manually Indexing the Vertical Circle by Face Left, Face Right Measurement"

- "Dist.reso." can only be selected for SRX1X/SRX2X. The screen displayed above is that of SRX1X/SRX2X.

Automatic tilt angle compensation mechanism

The vertical and horizontal angles are automatically compensated for small tilt errors using the 2-axis tilt sensor.

- Read the automatically compensated angles when the display has stabilized.
- The horizontal angle error (vertical axis error) fluctuates according to the vertical axis, so when the instrument is not completely leveled, changing the vertical angle by rotating the telescope will cause the displayed horizontal angle value to change.
- Compensated horizontal angle = Measured horizontal angle + Tilt in angle/tan (Vertical angle)
- When the telescope is directed close to the zenith or nadir angle, tilt compensation is not applied to the horizontal angle.

Collimation correction

The SRX has a collimation correction function that automatically corrects horizontal angle errors caused by horizontal axis and leveling axis errors.

Sea level correction

The SRX calculates horizontal distance using slope distance values. As this horizontal distance does not take height above sea level into consideration, performing spherical correction is recommended when measuring at high altitudes. Spherical distance is calculated as follows.

Spherical distance

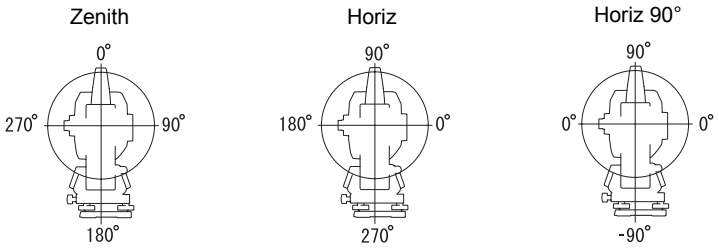
$$= \frac{R - Ha}{R} \times d_1$$

Where: R = radius of the spheroid (6372.000m)

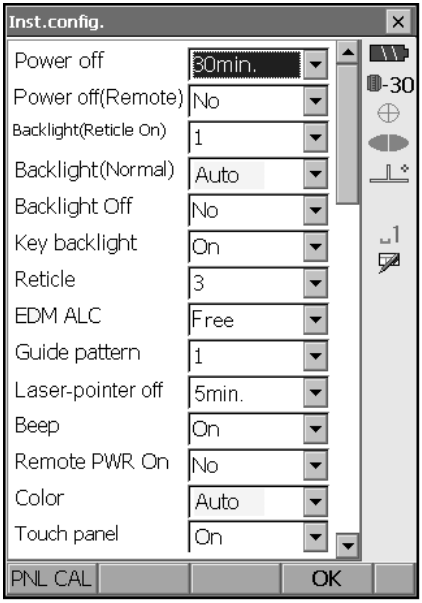
H_a = averaged elevation of the instrument point and target point

d_1 = horizontal distance

V mode (vertical angle display method)



30.2 Instrument Configuration



Items set and options (*: Factory setting)

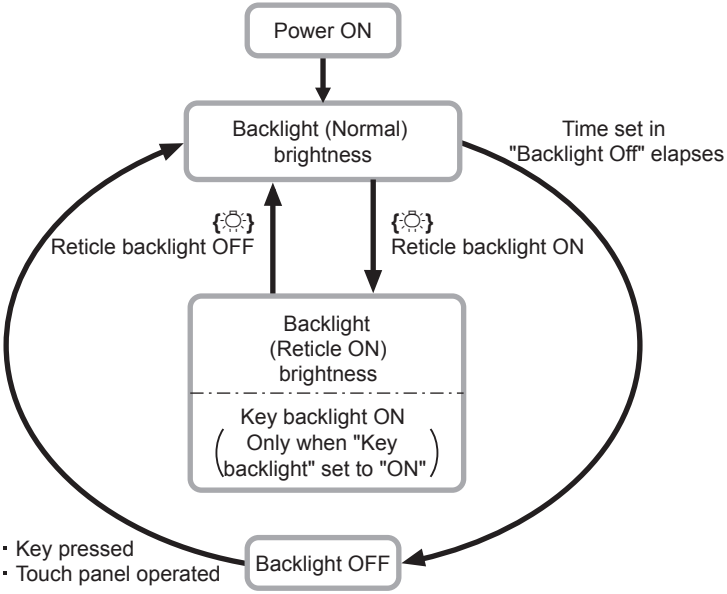
Power off: No/5min./10min./15min./30min.*
Power off (Remote): No*/5min./10min./15min./30min.
Backlight (Reticle On): 0 to 8 (1*) (Brightness level on pressing {☼})
Backlight (Normal): 0 to 8/Auto*
Backlight Off: No*/30sec/1min./5min./10min.
Key backlight: Off/On*
Reticle: 0 to 5 level (3*)
EDM ALC: Free*/Hold
Guide pattern: 1* (simultaneous)/2 (alternating)
Laser-pointer off: No/1min./5min.*/10min./30min.
Beep: On*/Off

Remote PWR-On: Yes/No*
Color : 1 (color)/2 (monochrome)/Auto*
Touch panel: On*/Off

Note

• Press **[PNL CAL]** to display the touch panel calibration screen.
☞"10.1 Configuring the Touch Panel"

Adjusting backlight brightness/turning the reticle illumination and key backlight ON/OFF
Pressing {☼} switches the brightness level of the backlight in conjunction with the ON/OFF status of the reticle illumination/key backlight.
When the SRX is powered ON the brightness level is set to "Backlight (Normal)". "Backlight (Normal)" was set to a higher brightness level than "Backlight (Reticle ON)" when the SRX was shipped but these values can be modified according to user preferences.



Note

•When "Backlight (Normal)" is set to "Auto" the SRX light sensor gauges the level of ambient brightness and automatically sets backlight brightness accordingly. Depending on ambient light conditions, performance of this function may be sub-optimal, or the display may flicker between brightness settings.

Power-saving automatic cut-off
Backlight Off
To save power, power to the SRX is automatically cut off if it is not operated for the set time. The backlight will similarly be turned off if the instrument is not operated for the selected time. However, the backlight will not be turned off when "Backlight" is set to "ON".

Power-saving automatic cut-off (Power on command)
When turned on using a Power on command, power to the SRX is automatically cut off if it is not operated for the set time.

Note

- For details, refer to "Interfacing with the SOKKIA SDR Electronic Field Book" and Command Explanations manuals and ask your local dealer.

EDM ALC
Set the light receiving status of the EDM. While carrying out continuous measurement, set this item according to the measurement conditions.

- When EDM ALC is set to "Free," the instrument's ALC will be automatically adjusted if an error occurs as a result of the amount of light received. Set to "Free" when the target is moved during measurement or different targets are used.
- When "Hold" is set, the amount of light received will not be adjusted until continuous measurement is completed.
- If an obstacle intermittently obstructs the light beam during continuous measurement and the "Signal off" error occurs, each time the obstruction occurs it takes some time for the amount of light received to be adjusted and the measurement value displayed. Set to "Hold" when the light beam used for measurement is stable but is frequently obstructed by obstacles such as people, cars, or tree branches etc. preventing measurement from being performed.

Note

When the distance measurement mode is set to "Tracking" (target is moved during distance measurement) the EDM ALC will be adjusted regardless of the EDM ALC setting.

Laser-pointer off
To save power, the laser-pointer is automatically turned off after the set time has elapsed.

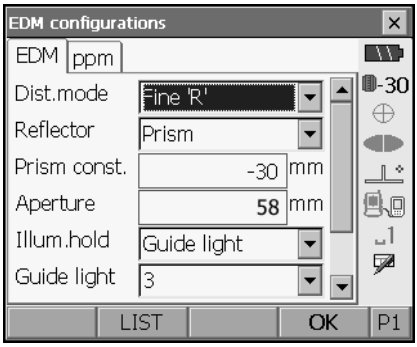
Key backlight
The key backlight can be set to "ON" or "OFF". When "ON" the keys will be illuminated when "Backlight (Bright)" is active.

Color setting
Set "Color" to "2" (monochrome) when strong sunlight reduces visibility of the display. When "Auto" is selected, the SRX detects the ambient brightness level and automatically sets the appropriate color setting accordingly. ☞"5.2 Display Functions"

- Do not block the SRX light sensor when "Color" is set to "Auto". The SRX will be unable to gauge ambient brightness and the display will flicker as a result.

30.3 EDM Settings

• EDM tab



Items set, options, and input range (*: Factory setting)

Dist. mode (Distance measurement mode): Fine “R”*, Fine AVG n= 2 (Setting: 2 to 9 times), Fine “S”, Rapid "R", Rapid “S”, Tracking
Reflector: Prism*/360° Prism/Sheet/Reflectorless
Prism constant: -99 to 99 mm ("Prism" is selected: -30*, "360° Prism" is selected: -7, "Sheet" is selected: 0)
Aperture: 1 to 999mm ("Prism" is selected: 58*, "360° Prism" is selected: 34, "Sheet" is selected: 50)
Illum. hold ({☼} function): Laser-pointer*/Guide light
Guide light (Bright): 1 to 3 (3*)

- The setting for "Fine AVG" distance measurement mode can be increased/decreased using the **[+]**/**[-]** softkeys.
- Target information can be edited and recorded.
  ☞ "PROCEDURE Recording and editing target information"
- "Prism constant" and "Aperture" will not be displayed when Reflectorless" is selected in "Reflector".
- When "prism constant" and/or "Aperture" values are changed and **[OK]** is pressed, these changes are reflected in the status bar target type display. This display will also change to reflect changes in target information settings made using a data collector. In both of the above cases, changes will not be recorded in <Reflector setting>. To remove added target information from the status bar, perform a cold boot.
  ☞ Status bar: "5.2 Display Functions", <Reflector setting>: "PROCEDURE Recording and editing target information", Cold boot: "10.2 Resolving Software Issues 🕮 Cold boot"
- The Guide light brightness item ("Guide light (Bright)") will be displayed only when "Illum. hold" is set to "Guide light".

Prism constant correction

Reflective prisms each have their prism constant.
Set the prism constant correction value of the reflective prism you are using. When selecting "Reflectorless" in "Reflector", prism constant correction value is set to "0" automatically.

•The following are samples of the prism constant correction values of SOKKIA reflective prisms.

AP01S+AP01AR (Constant = 30mm)

Correction Value = –30

AP01AR (Constant = 40mm)

Correction Value = -40

CP01 (Constant = 0mm)

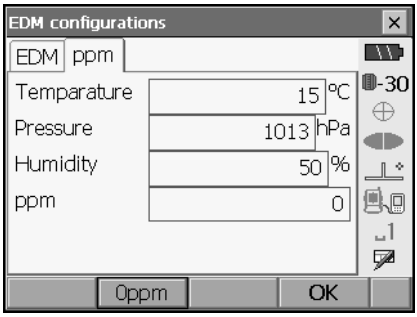
Correction Value = 0

ATP1/ATP1S (Constant = 7mm)

Correction value = -7

Prism constants and aperture settings can be set for each prism. The prism constant and aperture values displayed in the EDM tab will change to reflect the reflector type selected in "Reflector".

● ppm tab



- **[0ppm]**: Atmospheric correction factor returns to 0 and temperature and air pressure are set to the factory settings.
- Atmospheric correction factor is calculated and set using the entered values of the temperature and air pressure. Atmospheric correction factor can also be entered directly.

Items set, options, and input range (*: Factory setting)

Temperature:	-30 to 60°C (15*)
Pressure:	500 to 1400hPa (1013*), 375 to 1050mmHg (760*)
Humidity:	0 to 100% (50*)
ppm (Atmospheric correction factor):	-499 to 499 (0*)

•The "Humidity" item is displayed only when the "ppm setting" in "Obs. condition" is set to "+Humidity".

Atmospheric correction factor

The velocity of the light beam used for measurement varies according to atmospheric conditions such as temperature and air pressure. Set the atmospheric correction factor when you wish to take this influence into account when measuring.

- The SRX is designed so that the correction factor is 0 ppm at an air pressure of 1013 hPa, a temperature of 15°C, and a humidity of 50%.
- By inputting the temperature, air pressure values, and humidity the atmospheric correction value is calculated using the following formula and set into the memory.

t : Air temperature (°C)
p : Pressure (hPa)
e : Water vapor pressure (hPa)

Atmospheric Correction Factor (ppm) =

$$282.324 - \frac{0.294362 \times p}{1 + 0.003661 \times t} + \frac{0.04127 \times e}{1 + 0.003661 \times t}$$

h : Relative humidity (%)
E: Saturated water vapor pressure

- e (water vapor pressure) can be calculated using the following formula.

$$e = h \times \frac{E}{100}$$

$$E = 6.11 \times 10^{\frac{(7.5 \times t)}{(t + 237.3)}}$$

The SRX measures the distance with a beam of light, but the velocity of this light varies according to the index of refraction of light in the atmosphere. This index of refraction varies according to the temperature and pressure. Near normal temperature and pressure conditions:

With constant pressure, a temperature change of 1°C: an index change of 1 ppm.

With constant temperature, a pressure change of 3.6 hPa: an index change of 1 ppm.

To perform high accuracy measurements, it is necessary to find the atmospheric correction factor from even more accurate temperature and pressure measurements and perform an atmospheric correction.

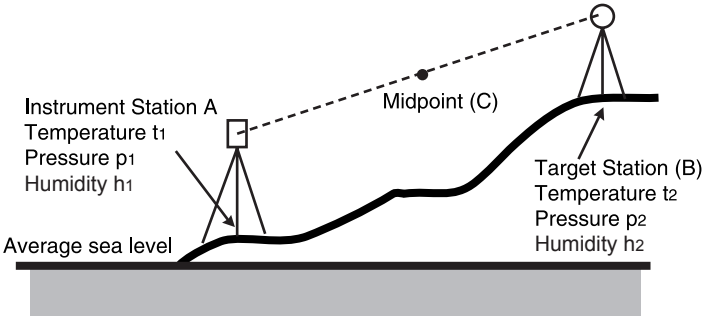
It is recommended that extremely precise instruments be used to monitor the air temperature and pressure.

Enter the average temperature, air pressure, and humidity along the measurement beam route in "Temperature", "Pressure", and "Humidity".

Flat terrain	:Use the temperature, pressure, and humidity at the midpoint of the line.
Mountainous terrain	:Use the temperature, pressure, and humidity at the intermediate point (C).

If it is not possible to measure the temperature, pressure, and humidity at the midpoint, take such measurements at the instrument station (A) and the target station (B), then calculate the average value.

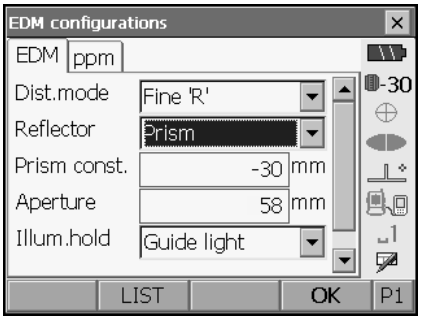
Average air temperature	:(t1 + t2)/2
Average air pressure	:(p1 + p2)/2
Average humidity	:(h1 + h2)/2



•If the weather correction is not required, set the ppm value to 0.

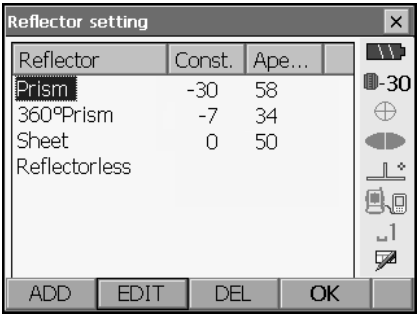
PROCEDURE Recording and editing target information

The **[LIST]** softkey is displayed when either "Reflector" or "Prism const." is selected in the EDM tab of <EDM configurations>.



1. Press **[LIST]** to display a list of all recorded targets.

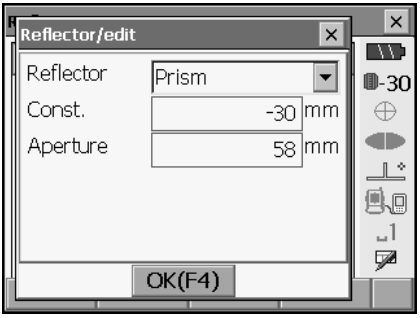
   • **[ADD]**: Displays <Reflector list>. Select the desired target from this list and press **[OK]** to register in the list in <Reflector setting>. Up to a maximum of 6 targets can be recorded.
   • **[DEL]**: Deletes the selected target.



2. To edit a target, select the desired target and press **[EDIT]**. <Reflector/edit> is displayed. Select/input relevant information for the target.

   Reflector: Prism/Sheet/Reflectorless/360° Prism
   Const.: -99 to 99 mm
   Aperture: 1 to 999 mm

   • When selecting "Reflectorless" in "Reflector", prism constant correction and aperture values are set to "0" automatically.



3. Press **[OK]** in the screen of step 2 to save edited information and return to <Reflector setting>. Press **[OK]** to return to <EDM configurations>.

30.4 Allocating User-defined Tabs

It is possible to allocate tabs in Meas mode and Menu mode to suit the measurement conditions. It is possible to operate the SRX efficiently because unique tab allocations can be preset to suit various applications and the ways that different operators handle the instrument.

- The current tab allocations are retained until they are revised again, even when the power is cut off.
- Press **[CLEAR]** in <Customize/Select screen> to return all customized configurations including screen controls, status bar settings, and softkey allocations to their previous settings.
- One screen can contain a maximum of 5 tabs.

- When tab allocations are recorded and registered, the previously recorded tab settings are cleared.

● Tab allocations

The following are tabs allocated when the SRX was shipped and tabs that can be defined by the user.

• Basic measurement

Factory settings	User-definable tabs
SHV	SHV
SHVdist	SHVdist
Graphic	SHV + Coord.

• Setting out

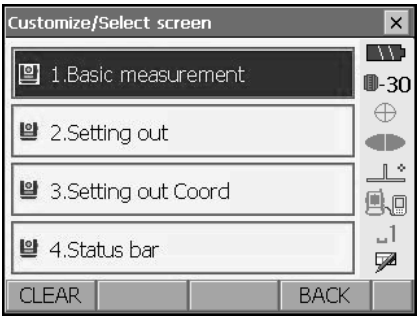
Factory settings	User-definable tabs
Meas.	Meas.
Graphic	

• Setting out Coord.

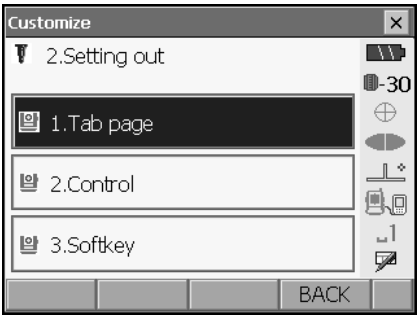
Factory settings	User-definable tabs
SHV	SHV
NEZ	NEZ
Graph1	
Graph2	

PROCEDURE Allocating tabs

1. Select "Customize" to display <Customize/Select screen>.
   Select the measurement mode in which you want to allocate a tab.

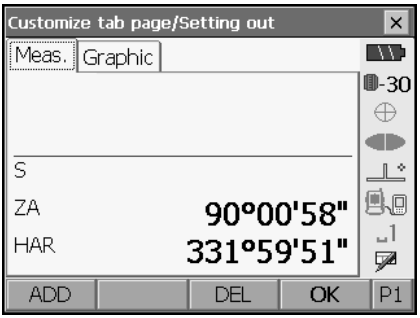


   Select "Tab page".



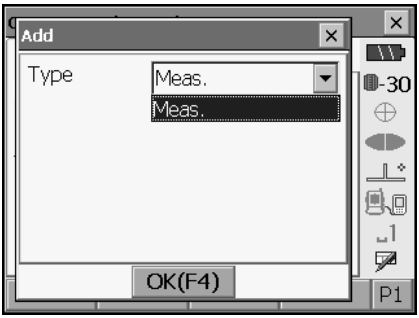
2. Use the softkeys (**[ADD]**, **[DEL]** etc.) in <Customize tab page> to allocate the desired tab page layout.

   - Press **[ADD]** to add the selected tab at the right-hand side of the screen.
   - Press **[INS]** in the second page to insert the selected tab in front of the current tab.
   - Press **[CNFG]** in the second page to replace the current tab with the selected tab.
   - Press **[DEL]** to delete the current tab.



•Tabs, once deleted, cannot be retrieved.

Select a tab type from the "Type" drop-down list.



3. Repeat step 2 to perform further tab allocations.

4. Press **[OK]** to finish allocating tabs. The allocated tabs are stored in memory and <Customize> is displayed. The newly allocated tabs appear in the relevant measurement screen.

30.5 Customizing Screen Controls

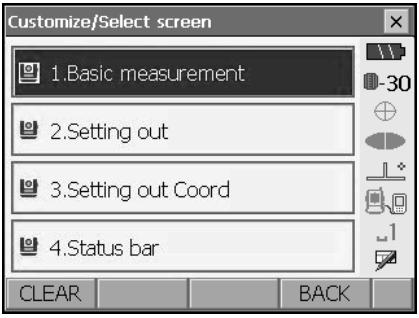
It is possible to customize screen controls in Meas mode to suit the measurement conditions and the different methods employed by different operators.

- The current screen control settings are retained until they are revised again, even when the power is cut off.
- Press **[CLEAR]** in <Customize/Select screen> to return all customized configurations including tab pages, status bar settings, and softkey allocations to their previous settings.
- Screen controls cannot be set for the Graphic tab.

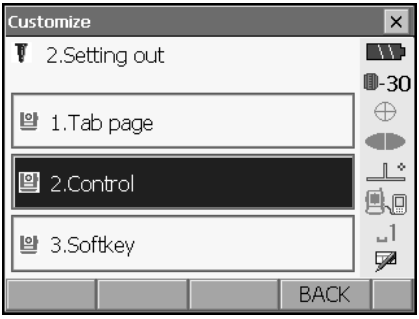
- When screen control settings are recorded and registered, the previously recorded settings are cleared.

PROCEDURE Customizing screen controls

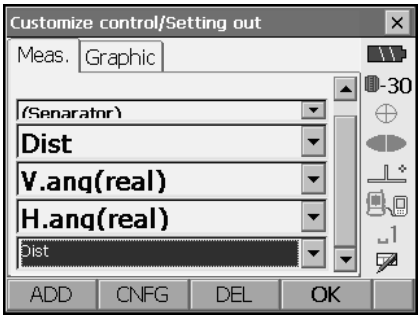
1. Select "Customize" to display <Customize/Select screen>.
   Select the measurement mode in which you want to customize screen controls.



   Select "Control".

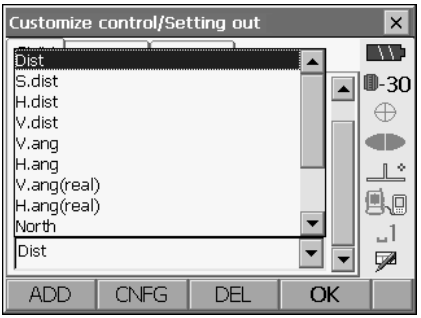


2. Press **[ADD]** to add a control drop-down list.
   • Press **[DEL]** to delete the selected control.

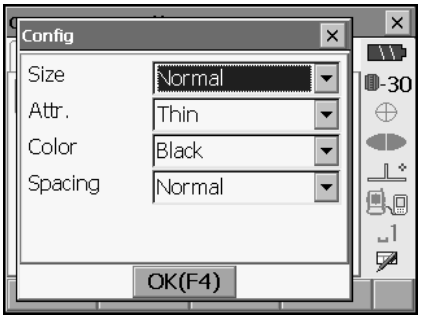


• Controls, once deleted, cannot be retrieved.

3. Select a screen control from the list.



4. Press **[CNFG]** to set the size, thickness, color and spacing of the font.



5. Repeat steps 2 to 4 to customize more screen controls.

6. Press **[OK]** to finish customizing screen controls. The modifications are stored in memory and <Customize> is displayed. The modifications are reflected in the relevant screens.

30.6 Allocating Key Functions

It is possible to allocate the softkeys in Meas mode to suit the measurement conditions. It is possible to operate the SRX efficiently because unique softkey allocations can be preset to suit various applications and the ways that different operators handle the instrument.

- The current softkey allocations are retained until they are revised again, even when the SRX is powered OFF.
- Press **[CLEAR]** in <Customize/Select screen> to return all customized configurations including tab pages, status bar settings, and screen controls to their previous settings.

- When softkey allocations are recorded and registered, the previously recorded key settings are cleared.
- Softkeys cannot be allocated to Graphic tabs.

● **The following are the screens that can be customized and softkey allocations when the SRX was shipped.**

1. SHV and SHVdist tabs of <Basic measurement>
   Page 1 **[AT On] [MOTOR] [0SET] [DIST]**
   Page 2 **[SRCH] [EDM] [H.ANG] [COORD]**
   Page 3 **[OFFSET] [RESEC] [REM] [S-O]**

2. Meas. tab of <Setting out>
   Page 1 **[AT On] [/SHVR] [H.ROTA] [DIST]**
   Page 2 **[CNFG] [---] [REC] [REM]**
   Page 3 **[---] [---] [---] [---]**

3. SHV and NEZ tabs of <Set out Coords>
   Page 1 **[OK] [AT On] [H.ROTA] [DIST]**
   Page 2 **[CNFG] [---] [REC] [---]**
   Page 3 **[---] [---] [---] [---]**

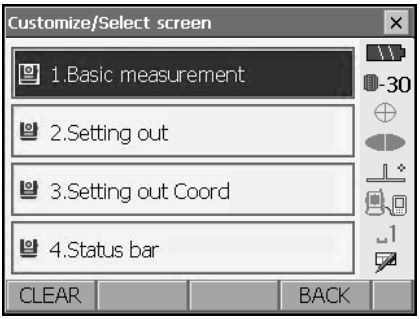
● **The following functions can be allocated to the softkeys.**

[---] : No functions set
[DIST] : Distance and angle measurement
[H.ROTA] : Rotate SRX to the entered horizontal angle. Rotate horizontally to the angle for the setting out point when performing setting out (can only be allocated to 2 and 3 above).
[CNFG] : Set setting out accuracy (can only be allocated to 2 and 3 above)
[/SHV] : Switch the "SHV" tab and the "SHVdist" tab
[/SHVR] : Switch distance mode between slope distance (S)/horizontal distance (H)/height difference (V)/REM (R) in setting out screens. The capitalized letter in the softkey indicates the currently selected mode (can only be allocated to 2 above).
[OK] : Terminate setting out measurement for the selected setting out point and return to <Key in coord>. This setting out point will be removed from the list (can only be allocated to 3 above).
[REC] : Records measurement results as coordinate values (can only be allocated to 2 and 3 above).

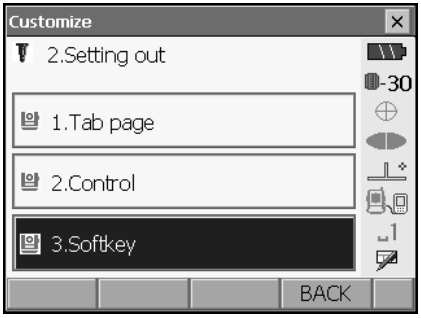
[0SET] : Set horizontal angle to 0°
[H.ANG] : Set required horizontal angle
[R/L] : Select horizontal angle right/left. The capitalized letter in the softkey indicates the currently selected mode.
[ZA / %] : Switch between zenith angle/slope in %. The capitalized letter in the softkey indicates the currently selected mode.
[HOLD] : Hold horizontal angle/release horizontal angle
[RCL] : Display final measurement data
[HV out] : Output angle measurement results to an external device
[HVD out] : Output distance and angle measurement results to an external device
[ft/M] : Switch distance units between meters/feet
[HT] : Set the instrument station, coordinates, and instrument height
[AIM] : Return signal
[TILT] : Display tilt angle
[MOTOR] : SETTINGS mode Motor tab
[TURN] : Rotates SRX 180°
[SRCH] : Automatically sights the center of the target
[RC] : Rotate in the direction specified by the On-demand Remote Control System
[<-RC] : Rotate in a counterclockwise direction (from the point of view of the RC-Controller)
[RC->] : Rotate in a clockwise direction (from the point of view of the RC-Controller)
[RC Cont] : Nullify the current measurement position and continue Turning operation
[Fix Vel] : Fixed velocity rotation around vertical and horizontal axes
[AT On] : Start Auto Tracking (Auto Tracking model only. **[AT Off]** during Auto Tracking)
[EDM] : EDM settings
[MENU] : Display <Menu> (topography measurement, coordinate measurement, setting out measurement, offset measurement, point projection, REM measurement, missing line measurement, resection, area calculation, route surveying, cross section survey)
[TOPO] : Topography measurement
[COORD] : Coordinates measurement
[S-O] : Setting-out measurement
[OFFSET] : Offset measurement
[A-OFS] : Angle offset menu
[D-OFS] : Distance offset menu
[2D-OFS] : Offset/2D menu
[MLM] : Missing line measurement
[REM] : REM measurement
[RESEC] : Resection measurement
[AREA] : Surface area measurement

PROCEDURE Allocating a softkey

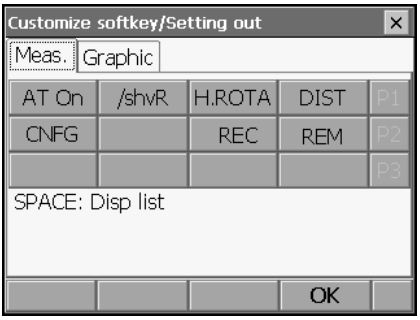
1. Select "Customize" to display <Customize/Select screen>.
   Select the measurement mode in which you want to allocate a softkey.



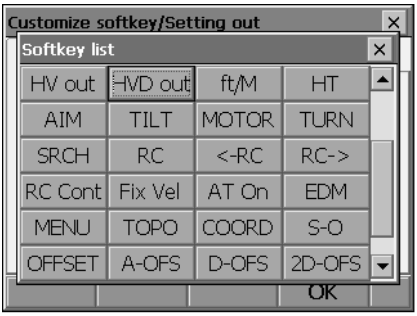
   Select "Softkey".



2. Select the desired tab. All softkeys currently allocated to each page of that tab are displayed.



3. Select the softkey whose allocation you want to change. Tapping a softkey, or pressing **{SPACE}** when the cursor is aligned with a softkey, will display <Softkey list>.



4. Select the desired softkey from <Softkey list> to allocate to the position specified in step 3.

5. Repeat steps 3 to 4 to perform further key allocations.

6. Press **[OK]** to finish allocating keys. The allocated keys are stored in memory and <Customize> is displayed. The newly allocated keys appear in the relevant measurement screen.

30.7 Changing Status Bar Icons

It is possible to preset icon allocations of the status bar to suit various applications and the ways that different operators handle the instrument.

- The current icon allocations are retained until they are revised again, even when the power is turned off.
- Press **[CLEAR]** in <Customize/Select screen> to return all customized configurations including tab pages, screen controls and softkey allocations to their previous settings.

- When icon allocations are recorded and registered, the previously recorded settings are cleared.

● The following icons can be allocated to the status bar:

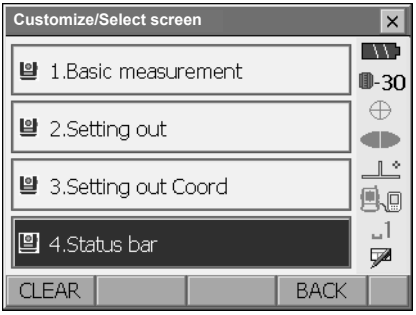
- •Remaining battery power
- •Target display
- •Motor configuration
- •Guide light/Laser-pointer
- •Tilt
- •Communication status
- •Input mode
- •SIP (Input panel)

- •Touch panel
- •ppm (atmospheric correction factor)
- •No icon

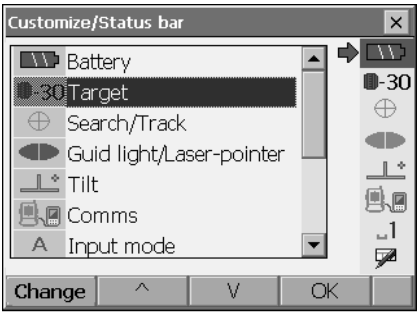
PROCEDURE Changing icon allocations

1. Select "Customize" to display <Customize/Select screen>.

   Select "Status bar".



2. Select the icon position (in the status bar) you wish to re-allocate by tapping or using arrow key. A blue arrow will indicate the selected position.

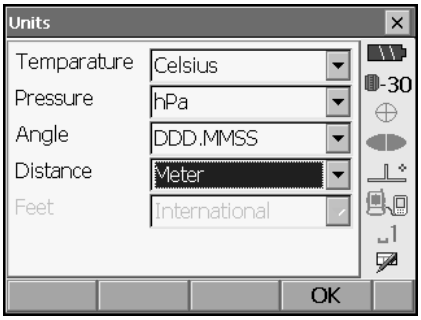


3. Select the new icon for the selected icon position. Select and change by double-tapping. Or Select using **{▲}**/**{▼}** and tap **[Change]**/**{↵}**.

4. Repeat steps 2 to 3 to perform further key allocations.

5. Press **[OK]** to finish allocating icons. The allocated icons are stored in memory and <Customize/Select screen> is displayed. The newly allocated icons appear in the status bar.

30.8 Units

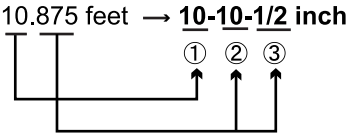


Items set and options (*: Factory setting)

Temperature:	Celsius*/Fahrenheit
Pressure:	hPa*/mmHg/InchHg
Angle:	Degree (DDD.MMSS)*/Gon/Mil
Distance:	Meter*/Feet/Inch
Feet (only displayed when "Feet" or "Inch" selected above):	International*/US

Inch (Fraction of an inch)

"Fraction of an inch" is the unit used in the United States and expressed like the following example.



① **10**.000 feet
② 0.875 feet x 12=**10**.5 inch
③ 0.5 inch=**1/2** inch

- Even if "inch" is selected in this setting, all the data including the result of area calculation are output in "feet" and all the distance values must be input in "feet". In addition, when the "inch" display exceeds the range, it is displayed in "feet".

30.9 Changing Password

Setting a password allows you to protect important information such as measurement data and e-mail addresses.
No password was set when the SRX was shipped. When setting a password for the first time, leave the "Old password" box blank.
When a password has been set, the password screen will appear when the SRX is powered ON. Input the password to continue.

Items set

Old password:	Input current password
New password:	Input the new password
New password again:	Input the new password again

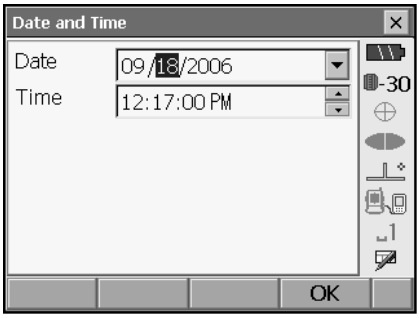
- Password can be up to 16 characters in length. Input characters will be displayed as asterisks.
- To deactivate the password function, perform the new password setting procedure but enter a "space" in the "New password" box.

Note

- An e-mail address is necessary when using the Series SRX SFX Dial-Up Program.
  ☞ SFX Dial-Up Program Explanations (Series SRX and SETX)

- The password function will not be canceled when a cold boot is performed.
- The password must be input after powering ON the SRX from an external device when a password has been set.
  ☞ "10.3 Powering the SRX ON/OFF from an External Instrument"

30.10 Date and Time



Items set

Date:	Manually input date or select from the drop-down calendar by tapping ▼.
Time:	Manually input time or set using **[▲]/[▼]**. Pressing **{SPACE}** will increment the selected section by 1.

Date and Time
The SRX includes a clock/calendar function.

30.11 Restoring Default Settings

Perform a cold boot to return all items to factory settings. A cold boot will not erase surveying data in Memory mode. However, if the data in the memory is important, **BE SURE TO TRANSFER IT TO A PERSONAL COMPUTER BEFORE PERFORMING A COLD BOOT.**

To perform a cold boot, while holding **{F3}, {F1},** and **{BACKSPACE}**, press **{ ⏻ }**. The following message appears.

"All Settings will be cleared. Are you sure?"

Press **[YES]** to continue. Press **{ESC}** to cancel.

After **[YES]** is pressed the instrument powers ON and the screen for configuring the touch panel is displayed. Configure the touch panel to continue.

☞ "10.1 Configuring the Touch Panel"

•The password function will not be canceled.

31.WARNING AND ERROR MESSAGES

The following is a list of the error messages displayed by the SRX and the meaning of each message. If the same error message is repeated or if any message not shown below appears, the instrument has malfunctioned. Contact your local dealer.

A new folder cannot be made in this folder !!

A new folder cannot be created in the selected folder. Select a different location.

Backsight Z coord is Null !!

Cannot compute. Backsight Z coord is set to "Null".
Input the coordinate.

Backup battery dead. Clock display may no longer be correct.

The voltage supplied by the lithium battery either declines or is completely discharged. Ask your local dealer to replace the battery for you.

Bad condition

The air is shimmering a lot, etc., measuring conditions are poor.

The center of the target cannot be sighted.
Resight the target.

Unsuitable distance measurement conditions when reflectorless measurement is set. When reflectorless measurement is set, distance cannot be measured because the laser beam is striking at least two surfaces at the same time.
Choose a single surface target for distance measurement.
☞ Precautions for setting prism: "11. TARGET SIGHTING"

Bad letter !!

A file name containing special characters such as "*" and "?" is invalid.

Calculation error

During resection measurement the same point is registered multiple times. Set another known point so that the known point coordinates do not coincide.

Coordinates identical to the known point coordinates observed during resection exist.

During route surveying, requirements for the calculation are not met.

During surface area calculation, conditions necessary for calculations are not met. Check conditions and try again.

An error occurred during calculation.

Checksum error !!

A sending/repetition error has occurred between the total station and external equipment.
Send/receive the data again.

Code error !!

Cannot read/write code file.

Coord not found
During cross section survey, the dedicated point number cannot be found.

Data not found !!
No data found corresponding to input point number.

Device list is full !!
No more *Bluetooth* devices can currently be registered. Delete unnecessary devices from the list and try again.

Disconnect *Bluetooth*
Wireless connection disconnected. Re-connect and try again.

Error: Read Build Info.
Error: Read sysflg
Error: Self check
Press **[OK]** to cancel the message. If this error message appears frequently, contact your local dealer.

File does not exist !!
No file exists with the input filename.

Folder already exists !!
The folder name input already exists.

Folder creation error !!
Folder creation failed.

Incorrect password.
Input password does not match set password. Input correct password.

Input device name !!
Bluetooth device name not input. Input device name and complete device registration.

Input over 3 letters !
The input password consists of less than 3 characters. Input a password at least 3 characters in length.

Invalid: Same coords !!
During route surveying, coordinates have not been defined correctly.

During point projection measurement, baseline has not been defined correctly.

It is not possible to save in this folder !!
Data cannot be saved in the selected folder. Select a different save location.

JOB data is not developed. Or job may have broken.
Memory mode JOB data lost or cannot be read in. Create JOB data again.

JOB record full !!
No more records can be recorded in the current JOB. Record in a different JOB.

Linear !!
The three input points form a straight line.

Load alignment file error !!
Cannot load route data.

Motor error EXXX
A problem has occurred with the motor drive and operation stops.
Power the SRX OFF then ON to correct the problem.
If this error message appears frequently, contact your local dealer.

Need base pt. obs
During REM measurement, the observation of the target was not completed normally.
Reset and sight the prism and perform measurement again.

Need element !!
During route surveying, parameters are all null, or A1 or A2 is null.

Need 1st obs
During missing line measurement, the observation of the starting position was not completed normally.
Sight the starting position accurately and press **[DIST]** to perform the measurement again.

New password Diff.
During new password setting, the passwords input twice are different. Input new password twice correctly.

No data
When searching for or reading in coordinate data or searching for code data, the search stopped either because the item in question does not exist or the data volume is large.

North/East is null
Coordinates cannot be read in when either the northing or easting value is set to "Null".

No solution
The calculation of the instrument station coordinates during resection does not converge.
Access the results and if necessary, perform the observations again.

Not define baseline !!
Baseline has not been defined in point projection measurement.

Out of range
During gradient % display, the display range (less than ± 1000%) has been exceeded.
During REM measurement, either the vertical angle has exceeded horizontal ±89° or the measured distance is greater than 9999.999m.
Install the instrument station far from the target.

The instrument station coordinates calculated during resection are too high.
Perform the observation again.

During area calculation, results exceeded the display range.

During point projection, scale factor is less than 0.100000 or exceeds 9.999999.

Please define element !!
No route defined when calculating route in route surveying.

Record error !!
Data cannot be recorded to JOB.

Receive error !!
Reception failed.

Receive format error !!
Check the received data.

Reflectorless not supported !!
Auto Tracking cannot be performed in reflectorless mode.
Use the prism to carry out automatic sighting.

Remote Control communication err !!
Communication between the On-demand Remote Control System RC-Controller and the SRX failed. Check the status (communications setup, power supply, cable connections etc.) of the RC-Controller, wireless modem and cables.

Save alignment file error !!
Cannot save route data.

Send error !!
Send failed.

Sheet not supported !!
Auto Tracking cannot be performed with the sheet.
Use the prism to carry out automatic sighting.

Signal off
The reflected light is not observed when distance measurement begins. Or, during measurement, the reflected light has weakened or is blocked.
Either sight the target again or, when using a reflective prism, increase the number of reflective prisms.

Target not found !!
The prism cannot be found within the Search area range.
Reset and sight the prism and perform measurement again.

Temp Rnge OUT
SRX is outside useable temperature range and accurate measurement cannot be performed.
Repeat measurement within the appropriate temperature range.

Tilt over range !!

The tilt angle exceeds the tilt angle compensation range of the sensor.
Level the instrument again.
☞ "9.2 Levelling"

Time out !!

Measurement is not carried out in the allotted time.
Reset and sight the prism and perform measurement again.

When designating the angle of rotation or automatically sighting the prism, there is a problem with the positioning of the prism or the operation of the instrument and measurement is not obtained within the fixed time.
Check the positioning of the instrument and prism and perform measurement again.
If observation is still not possible, sight the target manually.

When the telescope turns to zenith/nadir, it is not possible to search !!

The SRX cannot perform a search during Auto Pointing or Auto Tracking when the telescope is directed to the zenith or nadir angle. Set the telescope position within the range 70° (elevation angle) to 40° (depression angle) and perform the operation again.

32.CHECKS AND ADJUSTMENTS

SRX is a precision instrument that requires fine adjustments. It must be inspected and adjusted before use so that it always performs accurate measurements.

- Always perform checking and adjustment in the proper sequence beginning from "32.1 Plate Level" to "32.8 Additive Distance Constant".
- In addition, the instrument should be inspected with special care after it has been stored a long time, transported, or when it may have been damaged by a strong shock.
- Make sure the instrument is securely set up and stable before performing checks and adjustments.

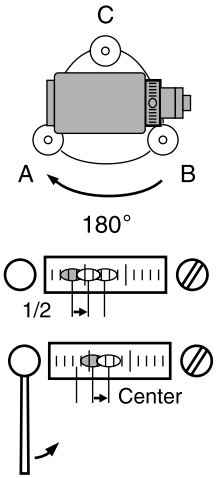
32.1 Plate Level

The bubble tube is made of glass, so it is sensitive to temperature changes or to shock. Check and adjust it as outlined below.

PROCEDURE Checking and adjusting

1. Level the instrument and check the position of the bubble of the plate level.
   ☞"9.2 Levelling", steps 3 to 5

2. Turn the upper part of the SRX through 180° and check the bubble position.
   If the bubble is still centered, no adjustment is necessary.
   If the bubble is off-center, adjust as follows.



3. Correct half of the bubble displacement using levelling foot screw C.

4. Correct the remaining half of the displacement by using the adjustment pin to rotate the plate level adjustment screw.
   When the plate level adjustment screw is turned in the counterclockwise direction, the bubble moves in the same direction.

5. Rotate the top of the instrument and continue adjustments until the bubble remains centered for any position of the upper part.
   If the bubble does not move to the center even when the adjustment has been repeated, ask your local dealer to adjust it.

32.2 Circular Level

Check and adjust it as outlined below.

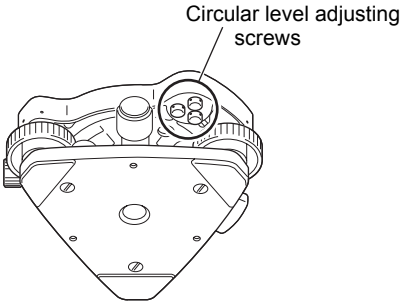
- Be careful that the tightening tension is identical for all the adjusting screws.
- Also, do not over-tighten the adjusting screws as this may damage the circular level.

PROCEDURE Checking and adjusting

1. Perform the plate level inspection and adjustment or carefully use the plate level to level the instrument.
   ☞ "9.2 Levelling", steps 1 to 2

2. Check the position of the bubble of the circular level.
   If the bubble is not off-center, no adjustment is necessary.
   If the bubble is off-center, perform the following adjustment.

3. First confirm the off-center direction.
   Use the adjusting pin to loosen the circular level adjustment screw on the side opposite to the direction the bubble is displaced to move the bubble to the center.



4. Adjust the adjusting screws until the tightening tension of the three screws is the same to align the bubble in the middle of the circle.

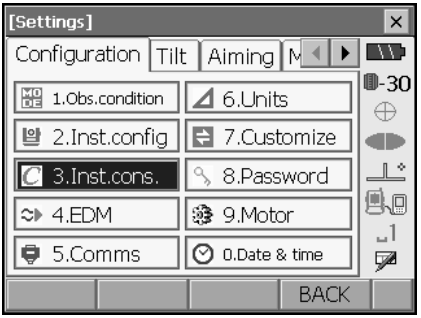
32.3 Tilt Sensor

If the tilt angle shown on the display shifts from tilt angle 0° (zero point), the instrument is not correctly levelled. This will adversely affect angle measurement.
Perform the following procedure to cancel the tilt zero point error.

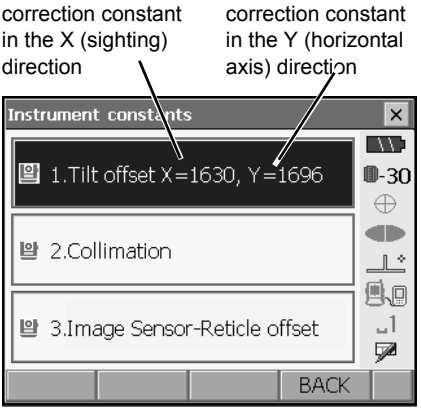
PROCEDURE Checking and adjusting

1. Carefully level the SRX. If necessary, repeat the procedures to check and adjust the bubble levels.

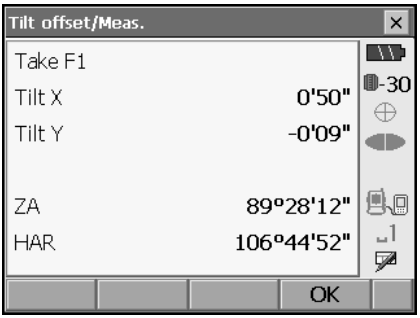
2. Select "Inst. cons." in <Settings>



3. Select "Tilt offset".



4. Level the instrument until the X/Y tilt angles are ±1'. Wait a few seconds for the display to stabilize, then read the current tilt angle in the X (sighting) direction and Y (horizontal axis) direction.

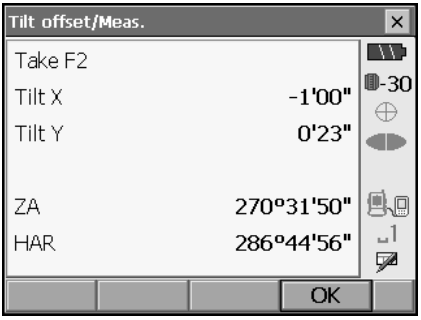


5. Press **[OK]**. The top of the instrument and telescope rotate 180° from the current position.

6. Wait a few seconds for the screen to stabilize, then read the automatically compensated angles X2 and Y2.

7. In this state, calculate the following offset values (tilt zero point error).
   Xoffset = (X1+X2)/2
   Yoffset = (Y1+Y2)/2

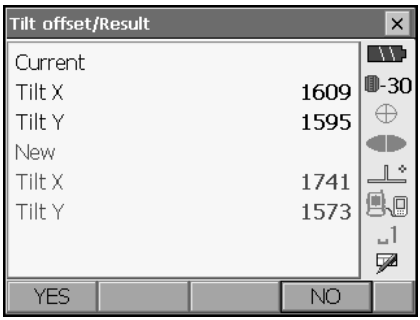
   If one of the offset values (Xoffset, Yoffset) exceeds ±10", adjust the value using the following procedure.
   When the offset value falls within the range ±10", adjustment is not necessary.
   Press **{ESC}** to return to <Instrument constants>.



8. Press **[OK]** to automatically rotate the top of the instrument and telescope through 180°.

9. Confirm that the values are in the adjustment range.
   If both correction constants are within the range 1600 ±360 (SRX1X: 6400 ±1440), select **[YES]** to renew the correction angle. <Instrument constants> is restored. Continue to step 11.
   If the values exceed the adjustment range, select **[NO]** to cancel the adjustment and return to step 4. Contact your local dealer to perform the adjustment.

Results for target point



Results for offset point

PROCEDURE Recheck

10. Select "Tilt offset".

11. Wait a few seconds for the display to stabilize, then read the automatically compensated angles X3 and Y3.

12. Press **[OK]** to automatically rotate the top of the instrument and telescope through 180°.

13. Wait a few seconds for the display to stabilize, then read the automatically compensated angles X4 and Y4.

14. In this state, the following offset values (tilt zero point error) are calculated.
    Xoffset = (X3+X4)/2
    Yoffset = (Y3+Y4)/2
    When both offset values fall within the range ±10", adjustment is completed.
    Press **{ESC}** to return to <Instrument constants>.

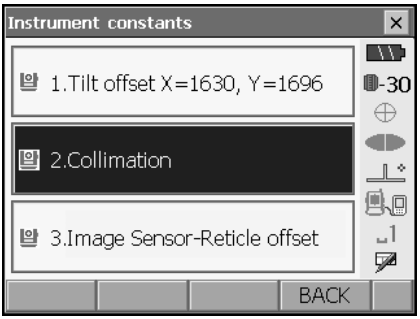
    If one of the offset values (Xoffset, Yoffset) exceeds ±10", repeat the check and adjustment procedures from the beginning. If the difference continues to exceed ±10" after repeating the check 2 or 3 times, have your local dealer perform the adjustment.

32.4 Collimation

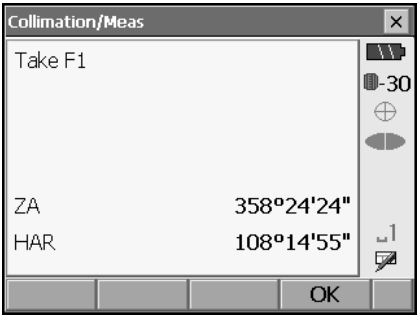
With this option you can measure collimation error in your instrument so that the SRX can correct subsequent single face observations. To measure the error, make angular observations using both faces.

PROCEDURE

1. Select "Inst. cons." in <Configuration>.
2. Select "Collimation".

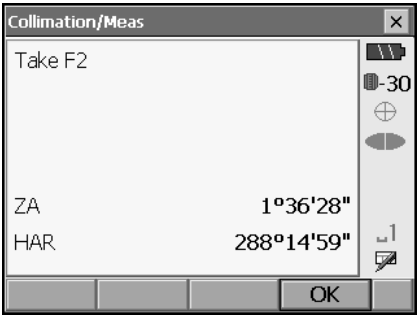


3. Sight the reference point in Face 1 and press **[OK]**. Telescope rotates and vertical circle is indexed.



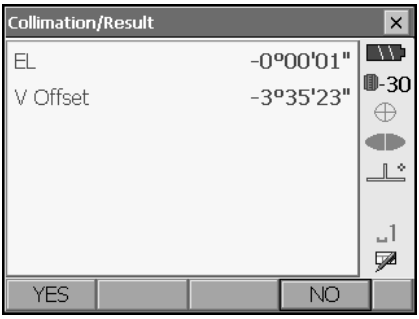
- Do not look through the telescope eyepiece while the motor drive is in operation. An eye could be struck by the telescope and cause injury.

4. Sight the reference point in Face 2 and press **[OK]**.



5. Press **[YES]** to set the constant.

   • Press **[NO]** to discard the data and return to step 3.



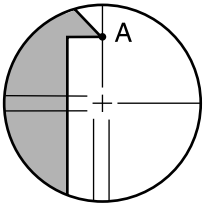
32.5 Reticle

With this option you can check the perpendicularity of the reticle and the horizontal/vertical positions of reticle lines.

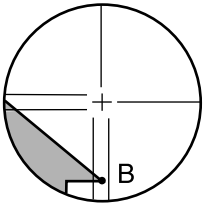
- Check the telescope reticle by manually sighting the target.

PROCEDURE Check 1: Perpendicularity of the reticle to the horizontal axis

1. Carefully level the instrument.
2. Align a clearly visible target (the edge of a roof for example) on point A of the reticle line.



3. Use the Jog dials to align the target to point B on a vertical line.
   If the target moves parallel to the vertical line, adjustment is unnecessary. If its movement deviates from the vertical line, have our service representative adjust it.



PROCEDURE Check 2: Vertical and horizontal reticle line positions

1. Carefully level the instrument.
2. Install a target at a point about 100m in the horizontal direction from the SRX.

3. While the Meas mode screen is displayed and the telescope is in face left, sight the center of the target and read out the horizontal angle A1 and the vertical angle B1.
   Example:
   Horizontal angle A1 = 18° 34' 00"
   Vertical angle B1 = 90° 30' 20"

4. While the telescope is in face right, sight the center of the target and read out the horizontal angle A2 and the vertical angle B2.
   Example:
   Horizontal angle A2 = 198° 34' 20"
   Vertical angle B2 = 269° 30' 00"

5. Do the calculations: A2-A1 and B2+B1
   If A2-A1 is within 180°±20″and B2+B1 is within 360°±20″, adjustment is unnecessary.
   Example:A2-A1 (Horizontal angle)
   =198° 34' 20"- 18° 34' 00"
   =180° 00' 20"
   B2-B1 (Vertical angle)
   =269° 30' 00" + 90° 30' 20"
   =360° 00' 20"
   If the difference is large even after repeating the check 2 or 3 times, have our service representative perform the adjustment.

32.6 Image Sensor Reticle

The internal image sensor is used for automatic sighting. The offset value is set to correct the position of the image sensor in relation to the telescope reticle, but if for whatever reason the telescope reticle and image sensor become misaligned, automatic sighting of the center of the prism cannot be performed correctly. Check and adjust it as outlined below.

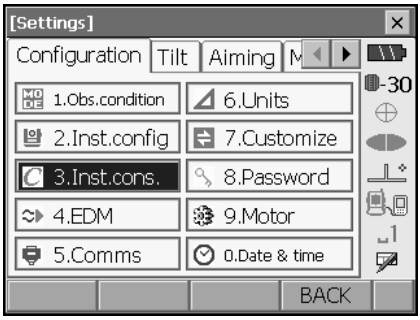
- Perform check and adjustment in weak sunlight and no scintillation.
- It may take up to 20 seconds for an offset value based on the measurement results to appear.
- Use Standard prism AP01AR or Compact prism CP01. Using other prism types may result in adjustment inaccuracies.

PROCEDURE Checks and adjustments

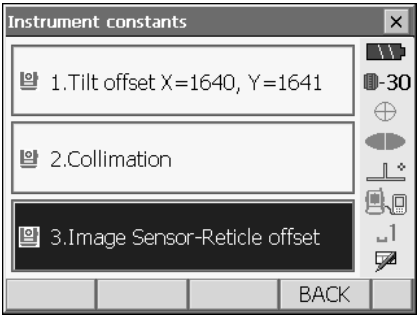
1. Carefully level the instrument.

2. Position the prism in a horizontal direction approximately 50 meters from the SRX.

3. Select "Inst.cons." in <Settings>.



4. Select "Image Sensor-Reticle offset".



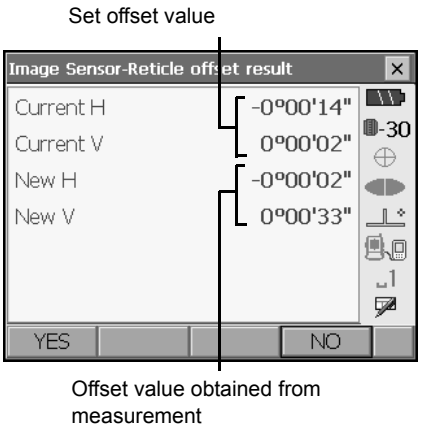
5. Use manual sighting to accurately sight the target.
   ☞"11.3 Manually Sighting the Target"

6. Press **[OK]**.

7. Offset value (H, V) (New) is obtained from the set offset value (H, V) (Current) and the measurement results. The offset value is a constant value that indicates the number of degrees of misalignment between the center of the telescope reticle and the center of the image sensor. If the offset value obtained from the measurement result is significantly larger than the set offset value, press **{ESC}** and resight the target.
   If the offset value (H, V) obtained from the measurement results continues to be significantly large after repeated checks, adjustment is necessary. Go to step 8.

   If one of the offset values exceeds the range, an error message appears on the screen. Contact your local dealer to perform the adjustment.

8. Press **[OK]** to renew the offset value.



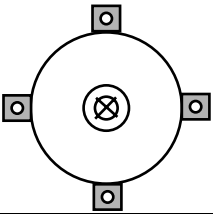
32.7 Optical Plummet

- Be careful that the tightening tension is identical for all the adjusting screws.
- Also, do not over-tighten the adjusting screws as this may damage the optical plummet.

PROCEDURE Checking

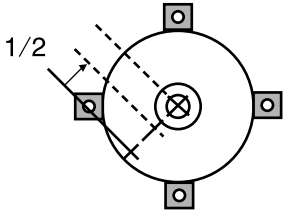
1. Carefully level the SRX and center a survey point precisely in the reticle of the optical plummet.

2. Turn the upper part through 180° and check the position of the survey point in the reticle.
   If the survey point is still centered, no adjustment is necessary.
   If the survey point is no longer centered in the optical plummet, perform the following adjustment.



PROCEDURE Adjustment

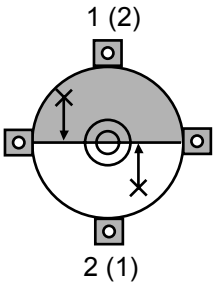
3. Correct half the deviation with the levelling foot screw.

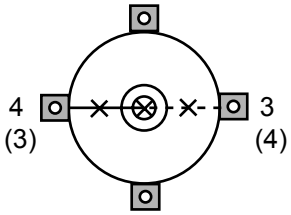


4. Remove the optical plummet reticle cover.

5. Use the 4 adjusting screws of the optical plummet to adjust the remaining half of the deviation as shown below.
   When the survey point is on the lower (upper) part of the illustration:
   Loosen the upper (lower) adjusting screw slightly, and tighten the upper (lower) adjusting screw the same amount to move the survey point to a point directly under the center of the optical plummet. (It will move to the line in the figure on the right.)

   If the survey point is on the solid line (dotted line):
   Loosen the right (left) adjusting screw slightly and, tighten the left (right) adjusting screw by the same amount to move the survey point to a point in the center of the optical plummet.





6. Check to make sure that the survey point remains centered on the reticle even if the upper part of the instrument is rotated.
   If necessary, perform the adjustment again.

7. Replace the optical plummet reticle cover.

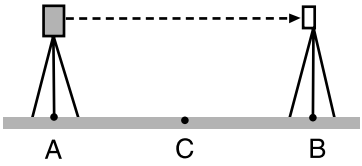
32.8 Additive Distance Constant

The additive distance constant K of the SRX is adjusted to 0 before delivery. Although it almost never deviates, use a baseline with a known distance precision to check that the additive distance constant K is close to 0 several times a year and whenever the values measured by the instrument begin to deviate by a consistent amount. Perform these checks as follows.

- Errors in setting up the instrument and reflective prism or in sighting the target will influence the additive distance constant. Be extremely careful to prevent such errors when performing these procedures.
- Set up so that the instrument height and the target height are identical. If a flat place is not available, use an automatic level to make sure the heights are identical.

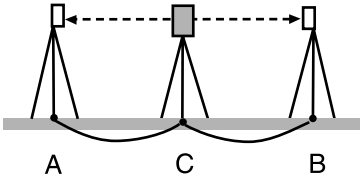
PROCEDURE Check

1. Find an area of flat ground where two points 100m apart can be selected.
   Set up the Instrument at point A and the reflective prism at point B. Establish a point C half way between points A and B.



2. Precisely measure the horizontal distance between point A and point B 10 times and calculate the average value.

3. Place the SRX at point C directly between points A and B and set up the reflective prism at point A.



4. Precisely measure the horizontal distances CA and CB 10 times each and calculate the average value for each distance.

5. Calculate the additive distance constant K as follows.
   K = AB - (CA+CB)

6. Repeat steps 1 to 5 two or three times.
   If the additive distance constant K is within ±3mm even once, adjustment is unnecessary.
   If it always exceeds this range, have our service representative perform an adjustment.

32.9 *Bluetooth* Wireless Communication

Handles RC-TS3 and H-BT1 incorporate a *Bluetooth* wireless communication device.
If more than 1 minute passes without a *Bluetooth* connection being established between the SRX and On-demand Remote Control System, regardless of communication conditions, there may be dust particles on the contacts between the SRX and the handle. Detach the handle and wipe the contacts clean with a dry cloth. Re-attach the handle.
Once cleaning is complete, attempt to establish a connection again. If the problem persists the contacts may be malfunctioning. Contact your local dealer.
☞ "8.2 Communication between the SRX and Companion Device"

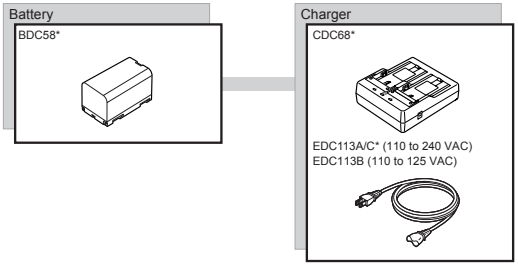
33.POWER SUPPLY SYSTEM

Operate your SRX with the following combinations of power equipment.

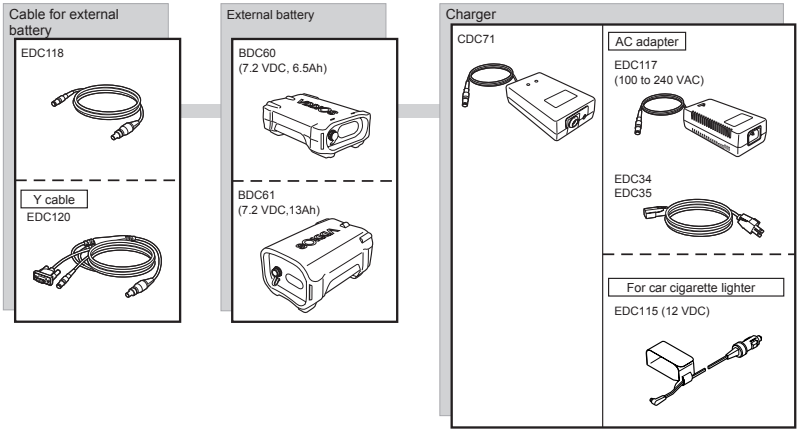
- When using BDC60, BDC61 and EDC117, mount the BDC58 in place to maintain the balance of the instrument.
- Never use any combination other than those indicated below. If you do, the SRX could be damaged.

Those indicated by * are standard accessories. Others are optional accessories (sold separately).

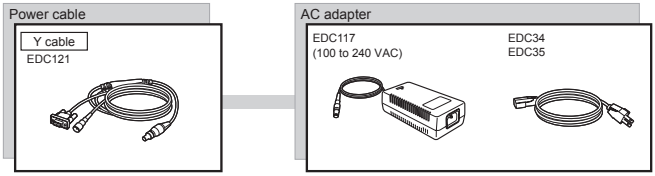
●Battery



●External battery



●AC adapter



Note

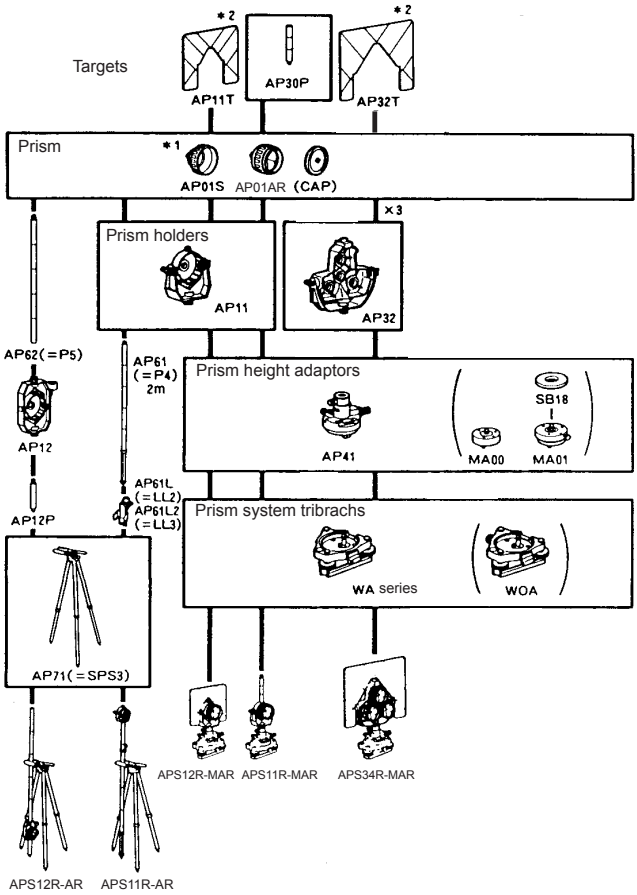
•By using the Y cable the SRX can perform RS232C communication (D-sub 9-pin) at the same time as connecting to an external power source.

34.TARGET SYSTEM

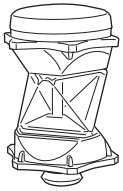
The following are all special accessories (sold separately).

- Because all SOKKIA reflecting prisms and accessories have standardized screws, it is possible to combine these prisms, accessories, etc. according to your objectives.
- Because these targets (*2) are coated with fluorescent paint, they reflect when there is little light.

- When using a reflecting prism equipped with a target for distance and angle measurements, be sure to direct the reflective prism correctly and sight the center of the prism target accurately.
- Each reflective prism (*1) has its own prism constant value. When changing prisms, be sure to change the prism constant correction value.
- To use the triple prism assembly AP32 as a single prism for short distance measurements, mount the single reflective prism AP01AR in the center mounting hole of the prism holder.

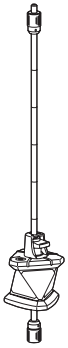


● **360° Prism (ATP1)**
This column-shaped prism reduces the possibility of "losing" the prism during Auto Tracking measurement.
3D positioning accuracy (standard deviation): 3mm (Horizontal acceptance angle: 360° (full transit). Angles of elevation and inclination both less than 20°)



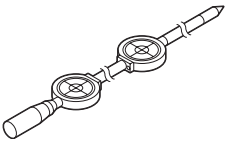
● **360° Sliding Prism (ATP1S)**
This column-shaped prism reduces the possibility of "losing" the prism during Auto Tracking measurement. For use in conjunction with the On-demand Remote Control System.
- The position of the prism on the pin pole can be adjusted by sliding the prism up and down.

3D positioning accuracy (standard deviation): 3mm (Horizontal acceptance angle: 360° (full transit). Angles of elevation and inclination both less than 20°)

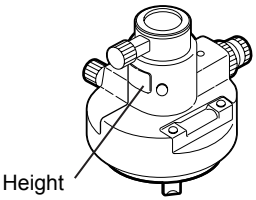


● **High-precision reflecting prism (CPS12)**
Prism constant: -27

● **2-point target (2RT500-K)**
This target is used for two-distance offset measurement.
Prism constant: 0

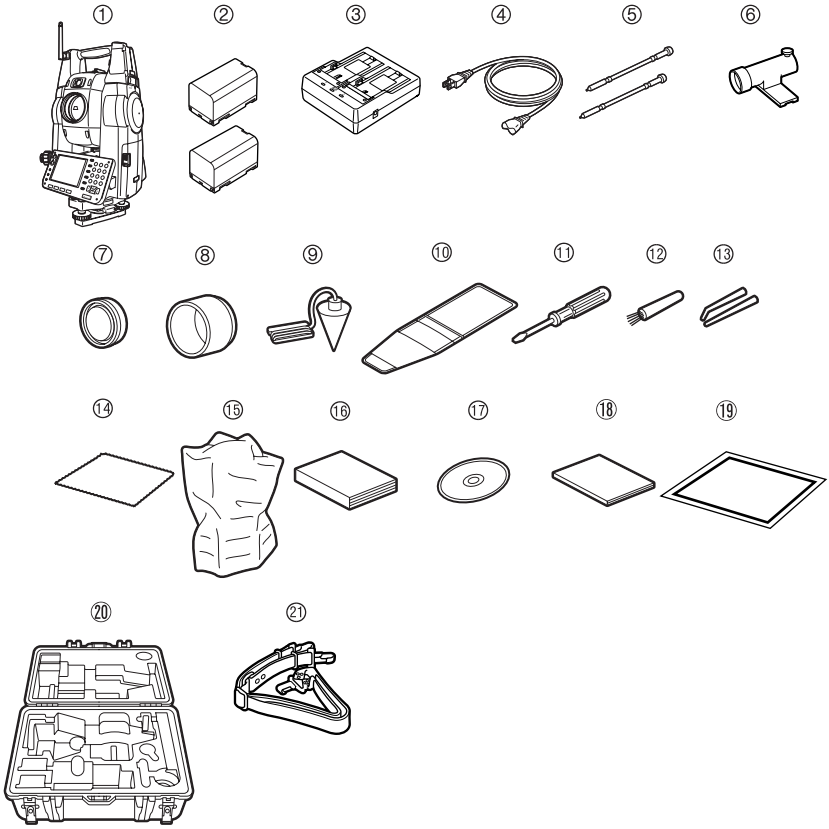


● **Instrument height adaptor (AP41)**
This device is used to adjust the height of the target.
- When used with the SRX, make sure that the instrument height "236" (mm) is displayed in the instrument height adjustment window.
  For details, see the AP Series operator's manual.
- Adjust the level of the AP41 instrument height adaptor following the checking and adjustment methods of plate level.
  ☞ "32.1 Plate Level"
- Adjust the optical plummet of the AP41 instrument height adaptor following the checking and adjustment methods of optical plummet.
  ☞ "32.7 Optical Plummet"



35.STANDARD EQUIPMENT

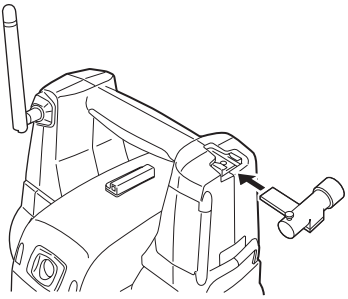
Please verify that all equipment is included.



1 SRX main unit 1
2 Battery (BDC58) 2
3 Battery charger (CDC68) 1
4 Power cable (EDC113A/113B/113C). . 1
5 Stylus pen 2
6 Tubular compass (CP9) 1
7 Lens cap 1
8 Lens hood 1
9 Plumb bob 1
10 Tool pouch 1
11 Screwdriver 1
12 Lens brush 1
13 Adjusting pin 1
14 Cleaning cloth 1
15 Vinyl cover 1
16 Operator's manual 1
17 CD-ROM 1
(operator's manuals). 1
18 Quick Start Guide (Series SRX and NET05/NET1). 1
19 Laser caution sign-board 1
20 Carrying case (SC219) 1
21 Carrying strap 1

● **Tubular compass (CP9)**

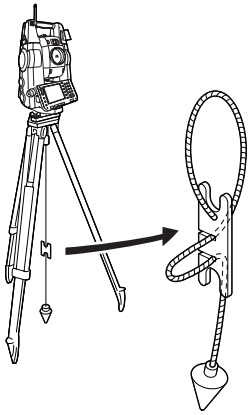
Slide the tubular compass into the tubular compass slot, loosen the clamp screw, then rotate the top part of the instrument until the compass needle bisects the index lines. The telescope's face 1 sighting direction in this position will indicate magnetic north. After use, tighten the clamp and remove the compass from the slot.



- The tubular compass is susceptible to the influence of nearby magnets or metal. Such influence could cause it to fail to accurately indicate magnetic north. Do not use magnetic north as indicated by this compass for base line surveying.

● **Plumb bob**

The plumb bob can be used to set up and center the instrument on days when there is little wind. To use the plumb bob, unwind its cord, pass it through the cord grip piece as shown in the figure to adjust its length, then suspend it from the hook attached to the centering screw.



36.OPTIONAL ACCESSORIES

The following are optional accessories which are sold separately from the SRX.

☞ Power supply and target optional accessories: "33. POWER SUPPLY SYSTEM", "34. TARGET SYSTEM".

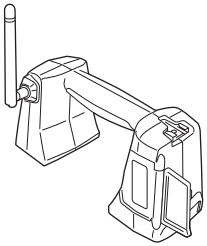
● Handle

Your SRX will come equipped with one of the following handle types upon purchase.

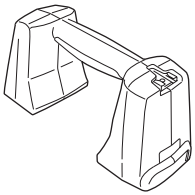
☞ Removing/attaching the handle; *Bluetooth* antenna; Beam detector for On-Demand Remote Control System: "4.2 Parts of the Instrument"

- Software settings may need to be reconfigured when changing from one handle type to another. Consult your local dealer when changing handles.

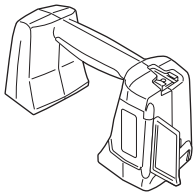
- **RC Handle with *Bluetooth* (RC-TS3)**
  Incorporates both On-demand Remote Control System/*Bluetooth* functionality



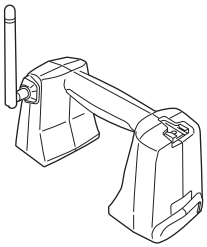
- **Basic Handle (H-BC1)**
  Incorporates neither of the functions mentioned above



- **RC Handle (RC-TS3A)**
  Incorporates On-demand Remote Control System functionality only



- ***Bluetooth* Handle (H-BT1)**
  Incorporates *Bluetooth* functionality only

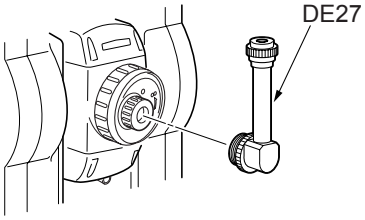


● **Telescope eyepiece lens (EL7)**

Magnification: 40X
Field of view: 1° 20'

● **Diagonal eyepiece (DE27)**

The diagonal eyepiece is convenient for observations near the nadir and in narrow spaces.
Magnification: 30X

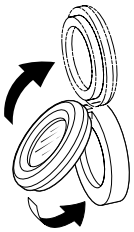


After removing the handle from the SRX loosen the attachment screw to remove the telescope eyepiece. Then screw the diagonal lens into place.
☞ Handle removal method: "4.2 Parts of the Instrument Removing the handle"

- Do not perform automatic vertical rotation of the telescope when using the diagonal eyepiece. The diagonal eyepiece may strike the SRX causing damage.

● **Solar filter (OF3A)**

When sighting targets where glare is present, solar observations for example, attach it to the objective lens of the SRX to protect its interior and the eyes of its operator. The filter part can be flipped up without being removed.



- Do not perform automatic vertical rotation of the telescope when using the solar filter. The solar filter may strike the SRX causing damage.

● **Interface cable**

Connect the SRX to a host computer using the following cables.

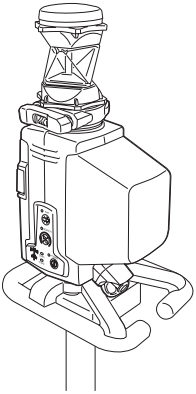
Cable	Notes
EDC120 (Y cable)	Pin number and signal level : RS232C compatible
EDC121 (Y cable) DOC129	D-Sub connector : 9 pins (female)
EDC131 (Y cable)	Length : 5m Pin number and signal level : RS232C compatible No connector for attachment to a computer or AC supply

Note

- By using the Y cable the SRX can perform RS232C communication (D-sub 9-pin) at the same time as connecting to an external power source.
  DOC25/26/27/1 are necessary when connecting EDC120/121 or DOC129 to DOC128.

● **On-demand Remote Control System**

This system points the SRX in the direction of the prism with speed and precision.
☞ On-demand Remote Control System Manual



- This system cannot be used with SRX instruments incorporating either the H-BC1 or H-BT1 handle.

37.SPECIFICATIONS

Except where stated, the following specifications apply to all SRXs.

Telescope

Length	168mm
Aperture	45mm (1.8 inch) (EDM/Auto Tracking:50mm (2.0 inch))
Magnification	30X
Image	Erect
Resolving power	2.5"
Field of view	1°30' (26m/1,000m)
Minimum focus	1.3m (4.3ft)
Focussing ring	1 speed
Reticle illumination	5 brightness levels

Angle measurement

Horizontal and Vertical circles type	
	Rotary absolute encoder scanning
IACS (Independent Angle Calibration System)	
	SRX1X/SRX2X only
Angle units	Degree/Gon/Mil (selectable)
Minimum display	SRX1X/SRX2X: 0.5"(0.0001gon/0.002mil)/1" (0.0002gon/0.005mil) (selectable)
	SRX3X/SRX5X: 1" (0.0002gon/0.005mil)/5" (0.0010gon/0.020mil) (selectable)
Accuracy	
	SRX1X: 1" (0.0003gon/0.005mil)
	SRX2X: 2" (0.0006gon/0.010mil)
	SRX3X: 3" (0.001gon/0.015mil)
	SRX5X: 5" (0.0015gon/0.025mil)
	(ISO 17123-3 : 2001)
Collimation compensation	On/Off (selectable)
Measuring mode	
Horizontal angle	Right/Left (selectable)
Vertical angle	Zenith/Horizontal/Horizontal ±90°/% (selectable)

Tilt angle compensation

Type	Liquid 2-axis tilt sensor
Minimum display	Same as setting for angle measurement
Range of compensation	±4' (±0.0741gon)
Automatic compensator	ON (V & H/V)/OFF (selectable)
Compensation constant	Can be changed

Distance measurement

Measuring method	Coaxial phase-contrast measuring system
Signal source	Red laser diode 690nm Class 3R (IEC60825-1 Ed. 2.0: 2007/FDA CDRH 21CFR Part1040.10 and 1040.11 (Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No.50, dated June 24, 2007.))

(When the prism or reflective sheet is selected in Config mode as target, the output is equivalent to Class 1).

Measuring range (Using SOKKIA reflective prism/reflective sheet target during normal atmospheric conditions ***1**)

360° Prism ATP1/ATP1S[*2]	1.3 to 1,000 m (3,281ft)
Mini pole prism OR1PA	1.3 to 500 m (1,640 ft)
Prism Model 5	1.3 to 2,000 m (6,652 ft)
Compact prism CP01	1.3 to 2,500 m (8,202 ft)
Standard prism AP01AR X 1	1.3 to 5,000 m (16,400 ft) (to 6,000 m[*3]) (19,680 ft)
Standard prism AP01AR X 3	to 8,000 m (26,247 ft) (to 10,000 m[*3]) (32,808 ft)
Reflective sheet RS90N-K[*4]	1.3 to 500 m (1,640 ft)
Reflectorless (White)[*5]	0.3 to 800 m (2,625 ft)
Reflectorless (White)[*6]	0.3 to 1,000 m (3,281 ft)

Minimum display

Fine measurement SRX1X/SRX2X: 0.0001(0.001 ft/ 1/16 inch)/0.001 m (0.01 ft/ 1/8 inch) (selectable)
SRX3X/SRX5X: 0.001 m (0.01 ft/ 1/8 inch)

Rapid measurement 0.001 m (0.01 ft/ 1/8 inch)

Tracking measurement 0.01 m (0.1 ft/ 1/2 inch)

Maximum slope distance display 12,000.0000 m (using prism or reflective sheet target), 1200.0000 m (reflectorless measurement)

Distance unit m/ft/US ft/inch (selectable)

Accuracy (Under normal atmospheric conditions[*1])(ISO 17123-4 : 2001)

(Using prism or using 360° Prism ATP1/ATP1S[*2])

Fine measurement (1.5 + 2 ppm X D) mm

Rapid measurement (5 + 2 ppm X D) mm

(Using reflective sheet target)[*4]

Fine measurement (2 + 2 ppm X D) mm

Rapid measurement: (6 + 2 ppm X D) mm

(Reflectorless (White))[*5]

Fine measurement (2 + 2 ppm X D) mm (0.3 to 200 m)[*7]
(5 + 10 ppm X D) mm (200 to 350 m)
(10 + 10 ppm X D) mm (350 to 1,000 m)

Rapid measurement
(6 + 2 ppm X D) mm (0.3 to 200 m)
(8 + 10 ppm X D) mm (200 to 350 m)
(15 + 10 ppm X D) mm (350 to 1,000 m)

(D: measurement distance; Unit: mm)

Measurement mode Fine measurement (single/repeat/average)/Rapid measurement (single/repeat)/Tracking (selectable)

Measuring time (fastest time under good atmospheric conditions[*3], no compensation, EDM ALC at appropriate setting, slope distance)

Fine measurement less than 1.5 sec + every 0.9 sec or less

Rapid measurement less than 1.3 sec + every 0.6 sec or less

Tracking measurement less than 1.3 sec + every 0.4 sec or less

Atmospheric correction Temperature, pressure, humidity input/ppm input (selectable)

Earth curvature and refraction correction
No/Yes K=0.14/Yes K=0.20 (selectable)

Scale factor setting 0.50000000 to 2.00000000 (in 0.00000001 steps)

Sea level correction No/Yes (selectable)

***1**: Slight haze, visibility about 20 km, sunny periods, weak scintillation.
***2**: Figures when both the elevation and depression angles of the laser beam are within 15° and the SRX is facing the 360° Prism.
***3**: No haze, visibility about 40 km, overcast, no scintillation.
***4**: Figures when the laser beam strikes within 30° of the reflective sheet target.
***5**: Figures when using Kodak Gray Card White side (reflection factor 90%) and brightness level is less than 5,000 lx.
***6**: Figures when using Kodak Gray Card White side (reflection factor 90%) and brightness level is less than 500 lx.
***7**: Accuracy is (5 + 2 ppm X D) mm for distance range 0.3 to 0.66m.

Auto Tracking (Auto Tracking model only)

Measuring method	Pulse laser transmitter and image detector with co-axial optics
Signal source (emittted beam)	infrared laser diode (980nm)
	Class 1 (IEC60825-1 Ed. 2.0: 2007/FDA CDRH 21 CFR Part 1040.10 and 1040.11 (Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No.50, dated June 24, 2007.))
Viewing angle	± 45'
Measuring range	
	H: 360° (full transit)
	V: Elevation angle 70°, Depression angle 38°

Maximum Auto Tracking measurement range***8**

360° Prism ATP1/ATP1S***2**	600 m (1,969 ft)
Mini pole prism OR1PA	400 m (1,312 ft)
Prism Model 5	500 m (1,640 ft)
Compact prism CP01	600 m (1,969 ft)
Standard prism AP01	1,000 m (3,281 ft)

Auto Tracking speed***8** 14°/sec
(Prism moving at 5m/sec. at 20m distance)

Auto Pointing

Measuring method	Pulse laser transmitter and image sensor with co-axial optics
Signal source (emittted beam)	infrared laser diode (980 nm)
	Class 1 (IEC60825-1 Ed. 2.0: 2007/FDA CDRH 21 CFR Part 1040.10 and 1040.11 (Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No.50, dated June 24, 2007.))
Viewing angle	± 45'
Measuring range	
	H: 360° (full transit)
	V: Elevation angle 70°, Depression angle 38°

Auto Pointing measurement range***8**

360° Prism ATP1/ATP1S***2**	2 to 600 m (1,969 ft)
Mini pole prism OR1PA	1.3 to 500 m (1,640 ft)
Prism Model 5	1.3 to 600 m (1,969 ft)
Compact prism CP01	1.3 to 700 m (2,297 ft)
Standard prism AP01	1.3 to 1,000 m (3,281 ft)
Reflective sheet RS10/30/50***9*10**	

		5 to 50 m (164 ft)
	Reflective sheet[*9*10] RS90N-K	
		10 to 50 m (164 ft)

Time to completed Auto Pointing[*8] (When prism in field-of-view, at 100 m distance)/(using RS90N-K, at 50 m distance)
4 to 8 sec.

Sighting accuracy (standard deviation)[*7] (fine measurement)

Prism	1.2 mm or less (equivalent angle) (to 100 m), (0.3 + 9ppm X D) or less (equivalent angle) (100 m and over)
Reflective sheet RS90N-K[*9]	2 mm or less (equivalent angle) (to 50 m)

***8**: No haze, visibility over 20 km, slightly overcast (less than 30000 lx), no scintillation.
***9**: When using a reflective sheet for Auto Pointing, the size of sheet (10 to 90 mm) must be selected to correspond to the distance being measured. Use smaller reflective sheets for shorter distances.
***10**: Figures when the Auto Pointing beam strikes within 15° of the reflective sheet target.

Motor

Type	DC motor drive
Motion range	360°(Vertical and horizontal)
Rotation speed	60°/sec (at 20°C) (Rotating time: about 7 sec. (when rotating 180°, tilt compensation off, at 20°C))
Fine motion	Jog dials

Guide Light

(Slight haze, visibility about 20 km, sunny periods, weak scintillation)

Light source	LED (red 626 nm/green 524 nm)
Distance	1.3 to 150 m[*1]
Visible range	Right and Left/Upward and Downward: ± 4° (7m/100 m)
Resolving power at center area (width)	4' (about 0.12/100 m)
Brightness	3 levels (bright/normal/dim)

Internal memory

Capacity	750 MB (includes memory for program files)

External memory

CF card (up to 4 GB, 3.3V type only)
USB flash memory (up to 4 GB)

Data transfer

USB	USB Ver. 1.1, Host (Type A) and Client (Type miniB)
Card slot	Compact Flash Type II-compatible
SFX Dial-Up function	Yes

Handle

On-demand Remote Control System Beam Detector (RC-TS3/RC-TS3A handles)

Operable range (Slope distance when using RC-PR3/RC-PR4 under normal atmospheric conditions[*1])

Standard mode	2[*11] to 100 m[*12]
Far mode	2[*11] to 250 m[*13]
	2[*11] to 300 m[*12]

Maximum detecting area (vertical angle)

-38° to +30° (on the basis of horizontal direction)

***11**: When there is almost no vertical interval between instrument height and the target height, SRX instrument height is 1.5 m, target height is 0.10 m at a horizontal distance of 1.8 m

***12** When the vertical interval between SRX and the beam emitter of RC-PR3/RC-PR4 is no more than 20 m

***13**: When the vertical interval between SRX and the beam emitter of RC-PR3/RC-PR4 is no more than 40 m

On-demand Remote Control System Turning operation time (RC-TS3/RC-TS3A handles)

About 13 sec (until completion of rapid (single) measurement when "Accu. search" set to "Rapid")

***Bluetooth* wireless communication** (RC-TS3/H-BT1 handles)

Transmission method	FHSS
Modulation	GFSK (Gaussian frequency shift keying)
Frequency band	2.402 to 2.48 GHz
Bluetooth profile	SPP, DUN
Power class	Class 1
Usable range	to 300 m (When using SWT9) (No obstacles, few vehicles or sources of radio emissions/ interference in the near vicinity of the instrument, no rain)
Authentication	Yes/No (selectable)

Power Supply

Power source	Rechargeable Li-ion battery BDC58
Nominal voltage	7.2V
Storage temperature range (long-term)	-20 to 35°C
Working duration at 20 °C	(Fine distance measurement (single) using Auto Pointing, repeated every 30 sec in both Face 1 and Face 2): BDC58: about 4 hours BDC60 (external battery, optional accessory): about 7 hours BDC61 (external battery, optional accessory): about 14.5 hours (after continuous Auto Tracking/tracking distance measurement): BDC58: about 4 hours BDC60 (external battery, optional accessory): about 6 hours BDC61 (external battery, optional accessory): about 12 hours
Battery state indicator	4 levels
Auto power-off	5 levels (5/10/15/30 min/Not set) (selectable)
Remote PWR-On function	Yes (Via serial or *Bluetooth* connection (when RC-TS3/H-BT1 attached). (*Bluetooth* connection: up to 30 min only))
External power source	7.2 to 12V
Required power	36W (power ON)

Battery (BDC58)

Nominal voltage	7.2V
Capacity	4.3Ah
Dimensions	38 (W) x 70 (D) x 40 (H) mm
Weight	about 195g

Charger (CDC68)

Input voltage	AC100 to 240V
Charging time per battery (at 20°C)	about 4 hours (Charging can take longer than the times stated above when temperatures are either especially high or low.)
Charging temperature range	0 to 40°C
Storage temperature range	-20 to 65°C
Size	94 (W) X 102 (D) X 36 (H) mm
Weight	about 170g

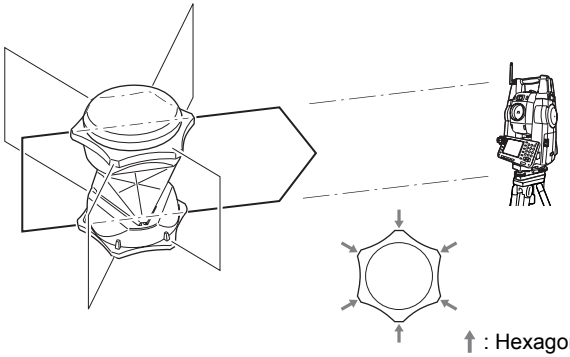
General

Operating system	Windows CE Ver. 5.0
Display	3.7 inch Transmissive TFT QVGA color LCD
Backlight	LED: 0 to 8/Auto (selectable)
Touch panel	Resistance-sensitive analog type
Keyboard	32 keys (power, edit, direct, cursor, numeric, soft function, operations, power on, light)
Key backlight	Yes
Trigger key	Yes (right side)
Sensitivity of levels	
Plate level	SRX1X: 20"/2 mm SRX2X/SRX3X/SRX5X: 30"/2 mm
Electronic level	
Graphic	4’
Circular level	10'/2 mm
Optical plummet	
Image	Erect
Magnification	SRX1X: 5.5X SRX2X/SRX3X/SRX5X: 3X
Minimum focus	0.3 mm
Calendar/clock function	Yes
Laser-pointer function	Yes
Laser radiation warning indicator	Yes (lit continuously while laser emitted)
Operating temperature	-20 to 50°C (no condensation)
Storage temperature range	-30 to 70°C (no condensation)
Dust and water resistance	IP64 (IEC 60529:2001)
Instrument height:	192.5 mm from tribrach mounting surface 236 mm from tribrach bottom
Instrument size (with RC-TS3)	201 (W) X 220 (D) X 375 (H) mm (display on each face, handle attached, excluding protruding sections) 201 (W) X 202 (D) X 375 (H) mm (display on Face 1 only, handle (RC-TS3) attached, excluding protruding sections)

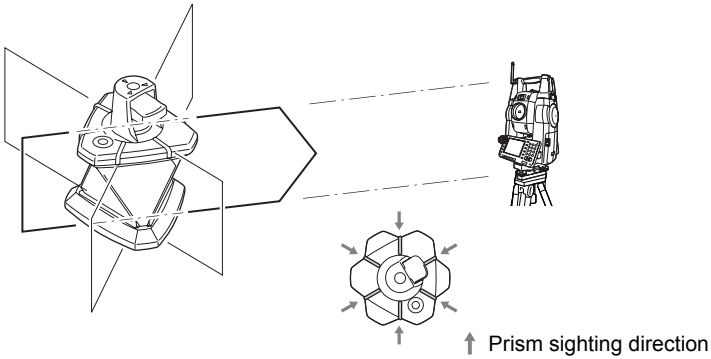
Handle size (RC-TS3/H-BC1/RC-TS3A/H-BT1)
180 (W) X 68 (D) X 86 (H) mm
Instrument weight (with BDC58 and RC-TS3):
Display on both sides 7.8 kg (17.2 lb)
Display on one side 7.6 kg (16.8 lb)
Handle weight
RC-TS3 550g (1.2 lb)
H-BC1 447g (1.0 lb)
RC-TS3A 504g (1.1 lb)
H-BT1 478g (1.1 lb)

38.1 High Accuracy with the 360° Prism

Sighting can be more accurately performed by facing the 360° Prism toward the SRX. The 360° Prism should be set up so that a pair of diametrically-opposed hexagonal points on its rubber flanges are aligned with the sighting direction of the SRX (see the diagram below).



When using the ATP1S, the 360° Prism should be set up so that a pair of diametrically-opposed marks on top of the prism are aligned with the sighting direction of the SRX.



38.2 Manually Indexing the Vertical Circle by Face Left, Face Right Measurement

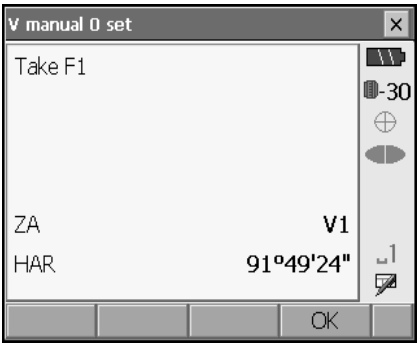
The 0 index of the vertical circle of your SRX is almost 100% accurate, but when it is necessary to perform particularly high precision angle measurements, you can eliminate any inaccuracy of the 0 index as follows.

- If the power is cut off, the vertical circle indexing is ineffective. Do it again every time the power is turned on.
- When indexing the vertical circle, sight the target manually.

PROCEDURE

1. Select “Obs.condition” in <Configuration>. Set “V manual” (vertical circle indexing method) to “Yes”.
   ☞"30.1 Observation Conditions"

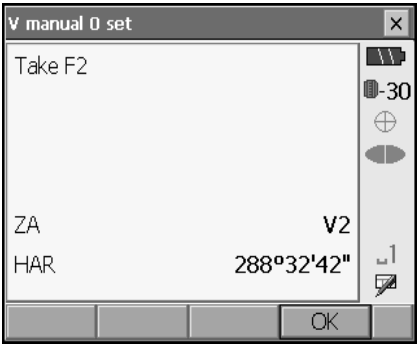
   <V manual 0 set> is displayed.



2. Carefully level the instrument.

3. Accurately sight a clear target with a distance of about 30m in the horizontal direction with the telescope in face left.
   Press **[OK]**. The SRX rotates 180°.

4. Accurately sight the same target and press **[OK]** to rotate the SRX 180°. The vertical angle is displayed.
   This concludes the vertical circle indexing procedure.



39.REGULATIONS

Users must ensure that their instrument is compliant with the relevant regulations and legal restrictions in place in the country of use.

For users in the US

WARNING: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful inter-ference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

This equipment complies with FCC radiation exposure limits set forth for uncontrolled equipment and meets the FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET65. This equipment should be installed and operated with at least 20cm and more between the radiator and person's body (excluding extremeties: hands, wrists, feet and ankles).

For users in California

WARNING: Handling the cord on this product or cords associated with accessories sold with this product will expose you to lead, a chemical known to the State of California to cause birth defects or other reproductive harm. ***Wash hands after handling***.

For users in Canada

This Class A digital apparatus meets all requirements of Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la Class A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

This class A digital apparatus complies with Canadian ICES-003.
Cet appareil numerique de la classe A est conforme a la norme NMB-003 du Canada.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of this device.

This equipment complies with IC radiation exposure limits set forth for uncontrolled equipment and meets RSS-102 of the IC radio frequency (RF) Exposure rules. This equipment should be installed and operated with at least 20cm and more between the radiator and person's body (excluding extremeties: hands, wrists, feet and ankles).

For users in the European Economic Area (EEA)

For a copy of the CE Conformity Declaration for this instrument, contact your local dealer.

Series SRX Total Station with WT11

Česky [Czech]

Sokkia BV potvrzuje, že výše uvedené zařízení je v souladu se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.

Dansk [Danish]

Undertegnede, Sokkia B.V. erklærer herved, at følgende udstyr det ovennaevnte udstyr overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.

Deutsch [German]

Sokkia B.V erklärt., dass die oben genannten Instrumente in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.

Eesti [Estonian]

Käesolevaga kinnitab Sokkia B.V., seadme ülal mainitud varustus direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.

English

Hereby, Sokkia B.V., declares that the above-mentioned equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Español [Spanish]

Por medio de la presente Sokkia B.V., declara que el equipo arriba mencionado cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.

Ελληνική [Greek]

ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ Sokkia B.V., ΔΗΛΩΝΕΙ ΟΤΙ ο προαναφερόμενος εξοπλισμός ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.

Français [French]

Par la présente Sokkia B.V., déclare que l'équipement mentionné ci-dessus est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.

Italiano [Italian]

Con la presente Sokkia B.V., dichiara che questo Il sopra menzionato equipaggiamento è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.

Latviski [Latvian]

Ar šo Sokkia B.V., deklarē, ka augstāk minētā iekārta atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.

Lietuvių [Lithuanian]

Šiuo Sokkia B.V., deklaruoja, kad šis auksciau mineta iranga atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.

Magyar [Hungarian]

Alulírott, Sokkia B.V. nyilatkozom, hogy a a fent említett eszköz megfelel a vonatkozó alapvetõ követelményeknek és az 1999/5/EC irányelv egyéb elõírásainak.

Malti [Maltese]

Hawnhekk, Sokkia B.V., tiddikjara li t-tagħmir imsemmi hawn fuq hu konformi mal-ħtiġijiet essenzjali u provvedimenti rilevanti oħrajn ta' Direttiva 1999/5/KE.

Nederlands [Dutch]

Hierbij verklaart Sokkia B.V., dat bovengenoemd toestel in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.

Polski [Polish]

Niniejszym Sokkia B.V. oświadcza, że sprzet wymieniony powyzej jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.

Português [Portuguese]

Sokkia B.V. declara que este o equipamento acima mencionado está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.

Slovensko [Slovenian]

Sokkia B.V. izjavlja, da je ta zgoraj omenjena oprema v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.

Slovensky [Slovak]

Sokkia BV potvrdzuje, že vyššie uvedené zariadenie je v súlade so základnými požiadavkami a všetky príslušné ustanovenia Smernice 1999/5/ES.

Suomi [Finnish]

Sokkia B.V. vakuuttaa täten että yllåoleva laite tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.

Svenska [Swedish]

Härmed intygar Sokkia B.V. att den ovan nämnda utrustningen står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

Íslenska [Icelandic]

Hér með staðfestir Sokkia B.V. að áðurnefndur búnaður er í samræmi við grundvallarskilyrði og aðrar viðeigandi kröfur í fyrirmæli Evrópusambandsins 1999/5/EC.

Norsk [Norwegian]

Sokkia B.V. erklærer herved at utstyret nevnt ovenfor oppfyller de ubetingede krav og andre relevante bestemmelser i Direktiv 1999/5/EC.

EMC NOTICE

In industrial locations or in proximity to industrial power installations, this instrument might be affected by electromagnetic noise. Under such conditions, please test the instrument performance before use.

For users in Mexico

Este equipo opera a titulo secundario, consecuentemente, debe aceptar interferencias perjudiciales incluyendo equipos de la misma clase y puede no causar interferencias a sistemas operando a titulo primario.

COFETEL + RCPSOWT08-0101

For users in Indonesia

06223/POSTEL/2008
2311

For users in the People's Republic of China

1. 标明附件中所规定的技术指标和使用范围，说明所有控制、调整及开关等使用方法；

■**使用频率**：2.4 - 2.4835 GHz

■**等效全向辐射功率**(EIRP)：

天线增益 < 10dBi **时**：≤100 mW **或**≤20 dBm

■**最大功率谱密度**：

天线增益 < 10dBi **时**：≤20 dBm / MHz(EIRP)

■ **载频容限**：20 ppm

2. 不得擅自更改发射频率、加大发射功率(包括额外加装射频功率放大器)，不得擅自外接天线或改用其它发射天线；

3. 使用时不得对各种合法的无线电通信业务产生有害干扰；一旦发现有干扰现象时，应立即停止使用，并采取措施消除干扰后方可继续使用；

4. 使用微功率无线电设备，必须忍受各种无线电业务的干扰或工业、科学及医疗应用设备的辐射干扰；

5. 不得在飞机和机场附近使用。

CMII ID: 2007DJ1360 (RC-TS3)
2008DJ1282 (H-BT1)

For users in Singapore

Complies with IDA Standards DB101547

For users in Taiwan

低功率電波輻射性電機管理辦法 (930322)

第十二條　經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條　低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前項合法通信，指依電信法規定作業之無線電通信。

低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

For users in the United Arab Emirates

Approved by TRA

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SOKKIA TOPCON CO., LTD.

http://www.sokkia.co.jp/english/

1-5-2, AZUSAWA, ITABASHI-KU, TOKYO, 174-0051 JAPAN

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