

INSTRUCTION MANUAL LASER SCANNER

GLS-1500 SERIES

FOREWORD

Thank you for purchasing the TOPCON Laser Scanner, GLS-1500 series. For the best performance of the instruments, please carefully read these instructions and keep them in a convenient location for future reference.

General Handling Precautions

Before starting work or operation, be sure to check that the instrument is functioning correctly with normal performance.

Using the instrument on rainy days

It may not be possible to use the instrument if there are water drops on the glass of the windows.

It is also not possible to scan wet objects.

Horizontally rotating part (head)

Do not turn the head with your hands while the power is ON. If it has been turned by force, turn the power ON again.

Waterproof property

The instrument is designed based on the International Standard IPX2, therefore it can withstand light rain. However, in case of heavy rain, there is no guarantee that the instrument will be protected from waterdrops.

Setting the instrument on a tripod

When mounting the instrument on a tripod, use a wooden tripod.

Do not use a metallic tripod.

Installing the tribrach

If the tribrach is installed incorrectly, the measuring precision could be effected. Occasionally check the adjusting screws on the tribrach. Make sure the base fixing lever is locked and the base fixing screws are tightened.

Guarding the instrument against shocks

When transporting the instrument, provide some protection to minimize risk of shocks. Heavy shocks may cause the measurement to be faulty.

Exposing the instrument to extreme heat.

Do not leave the instrument in extreme heat for longer than necessary. It could adversely affect its performance.

Sudden changes of temperature

Any sudden change of temperature to the instrument may result in a reduction of measuring distance range, i.e when taking the instrument out from a heated vehicle. Let instrument acclimate itself to ambient temperature.

Direct sunlight

Do not expose the instrument to direct sunlight for extended periods of time. When left in the sun for long periods, performance may be adversely affected, or if the inner temperature of the instrument may rise to an abnormally high level, the instrument may fail to operate. When measurements must be made in locations exposed to the sun and require high precision, protect from direct sunlight by using a sunshade for the instrument and tripod.

Battery level check

Confirm battery level remaining before operating.

Battery use

Always use four batteries as one set, and operate the instrument with batteries that have been charged and discharged the same number of times. Do not mix old and new batteries, or batteries that have been charged and discharged a different number of times.

Taking the battery out

It is recommended not to take the battery out during the power is on. Please do your assembling or taking the battery out after the power is off.Refer to Chapter 4.5 "Replacing the Battery" if you need to replace the batteries during scanning.

External power source

Use only recommended batteries or external power source. Use of batteries or an external power source not recommended by us may result in equipment failure.

Wireless LAN card

Do not touch the connector area for the wireless LAN card. Static electricity may damage the instrument.

When a wireless LAN card is used near instruments that emit radio waves such as cordless phones or wireless transmitters, the radio waves may interfere with each other.

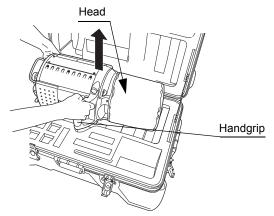
Target sheet

Be sure to use target sheets for GLS-1500.

(Do not use target sheets for GLS-1000 because the high precision can not be obtained with them.)

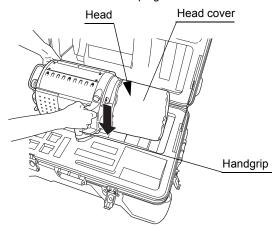
Removing the instrument

When removing the instrument from the case, hold by the handle and handgrip and pick it up while keeping it level.



Storing the instrument

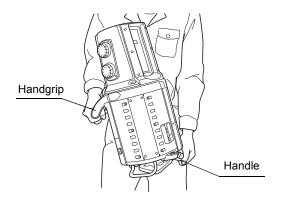
When storing the instrument in the case, first install the head cover, hold by the handle and handgrip, and lower into the case while keeping it level.



Carrying the instrument

Because this instrument is heavy, make sure to carry it carefully using both the handle and the handgrip.

There is a possibility that the instrument may topple and fall resulting in possible injury. Incorrect lifting posture may also result in hurting your back.



Display for Safe Use

In order to encourage the safe use of products and prevent any danger to the operator and others or damage to properties, important warnings are put on the products and inserted in the instruction manuals.

We suggest that everyone understand the meaning of the following displays and icons before reading the "Safety Cautions" and text.

Display	Meaning
<u></u> WARNING	Ignoring or disregard of this display may lead to the danger of death or serious injury.
<u></u> CAUTION	Ignoring or disregard of this display may lead to personal injury or physical damage.

- Injury refers to hurt, burn, electric shock, etc.
- Physical damage refers to extensive damage to buildings or equipment and furniture.

Safety Cautions

↑ **WARNING**

• There is a risk of fire, electric shock or physical harm if you attempt to disassemble or repair the instrument yourself.

This is only to be carried out by TOPCON or an authorized dealer, only!

· High temperature may cause fire.

Do not cover the charger while it is charging.

· Risk of fire or electric shock.

Do not use damaged power cable, plug and socket.

· Risk of fire or electric shock.

Do not use a wet battery or charger.

• May ignite explosively.

Never use an instrument near flammable gas, liquid matter, and do not use in a coal mine.

· Battery can cause explosion or injury.

Do not dispose in fire or heat.

· Risk of fire or electric shock.

Do not use any power voltage except the one given on manufacturers instructions.

· Battery can cause outbreak of fire.

Do not use any other type of charger other than the one specified.

· Risk of fire or electric shock.

Do not use an AC cable incompatible with the power supply voltage in use.

• Because this instrument is heavy, make sure to carry it carefully using both the handle and the handgrip.

There is a possibility that the instrument may topple and fall resulting in possible injury, and incorrect lifting posture may also result in hurting your back.

 Risk of implantable cardiac pacemaker and implantable cardioverter defibrillator malfunction affected by radio wave.

Use the instrument away from your body if you have an implantable cardiac pacemaker or implantable cardioverter defibrillator in your body.

 Risk of accidents resulting from the malfunction of electronic and medical equipment affected by radio wave.

In the area where the use of wireless equipment is prohibited or restricted, such as on an airplane or in a hospital, comply with the instructions of the person in charge and the regulations of the respective area.

· The short circuit of a battery can cause a fire.

Do not short circuit battery when storing it.

CAUTION

- Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Risk of injury by overturn the carrying case.
 Do not stand or sit on the carrying cases.
- · Please note that the tips of tripod can be hazardous, be aware of this when setting up or carrying the tripod.
- Risk of injury by falling down the instrument or case.
 Do not use a carrying case with a damaged which grips or casters.
- Risk of injury by protrusion.
 Do not touch the connector area of the wireless LAN card.
- Do not allow skin or clothing to come into contact with acid from the batteries, if this does occur then wash off with copious amounts of water and seek medical advice.
- · Ensure that you mount the Tribrach correctly, failing to do so may result in injury if the tribrach were to fall over.
- · It could be dangerous if the instrument falls over, please check that you fix the instrument to the tripod correctly.
- Risk of injury by falling down a tripod and an instrument.
 Always check that the screws of tripod are tightened.
- The appliance is not intended for use by young children or infirm persons without supervision. Young children should be supervised to ensure that they do not play with the appliance.

User

- 1)This product is for professional use only!
 - The user is required to be a qualified surveyor or have a good knowledge of surveying, in order to understand the user and safety instructions, before operating, inspecting or adjusting.
- 2) Wear the required protectors (safety shoes, helmet, etc.) when operating.

Exceptions from Responsibility

- 1)The user of this product is expected to follow all operating instructions and make periodic checks of the product's performance.
- 2)The manufacturer, or its representatives, assumes no responsibility for results of a faulty or intentional usage or misuse including any direct, indirect, consequential damage, and loss of profits.
- 3)The manufacturer, or its representatives, assumes no responsibility for consequential damage, and loss of profits by any disaster, (an earthquake, storms, floods etc.).
 - A fire, accident, or an act of a third party and/or a usage any other usual conditions.
- 4) The manufacturer, or its representatives, assumes no responsibility for any damage, and loss of profits due to a change of data, loss of data, an interruption of business etc., caused by using the product or an unusable product.
- 5)The manufacturer, or its representatives, assumes no responsibility for any damage, and loss of profits caused by usage except for explained in the user manual.
- 6)The manufacturer, or its representatives, assumes no responsibility for damage caused by wrong movement, or action due to connecting with other products.

Laser Safety

The GLS-1500 series emits an invisible laser beam when the power is turned ON.

The GLS-1500 series are manufactured and sold in accordance with "Performance Standards for Light-Emitting Products" (FDA/BRH 21 CFR 1040) or "Radiation Safety of Laser Products, Equipment Classification, Requirements and User's Guide" (IEC Publication 60825-1) provided on the safety standard for laser beam.

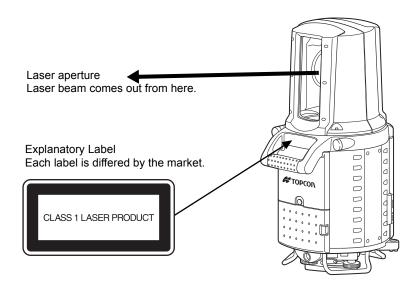
"Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 50, dated (July 26, 2001)"

As per the said standard, the GLS-1500 series is classified as "Class 1 Laser Products". In case of any failure, do not disassemble the instrument. Contact TOPCON or your TOPCON dealer.

Labels

Find the labels which describes the caution and safety about the laser beam as follows in GLS-1500 series.

We request you to replace it one anytime the caution labels are damaged or lost and paste a new one at the same place. You can get the labels from Topcon or your dealer.



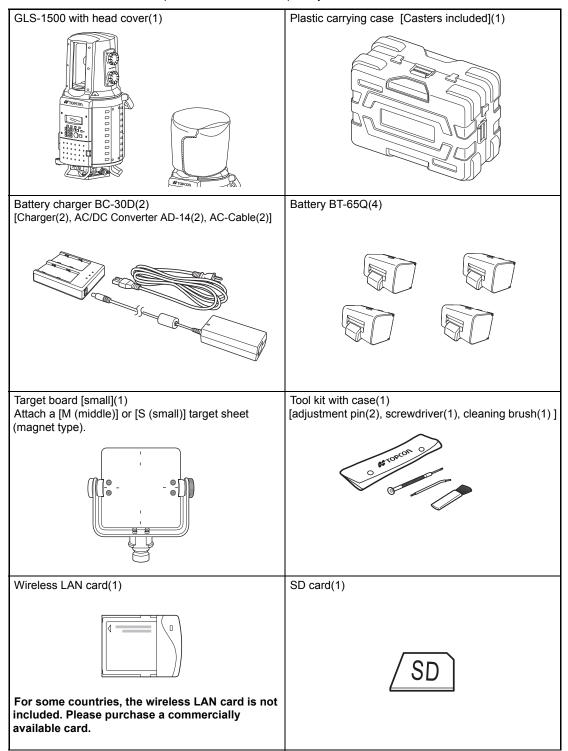
Contents

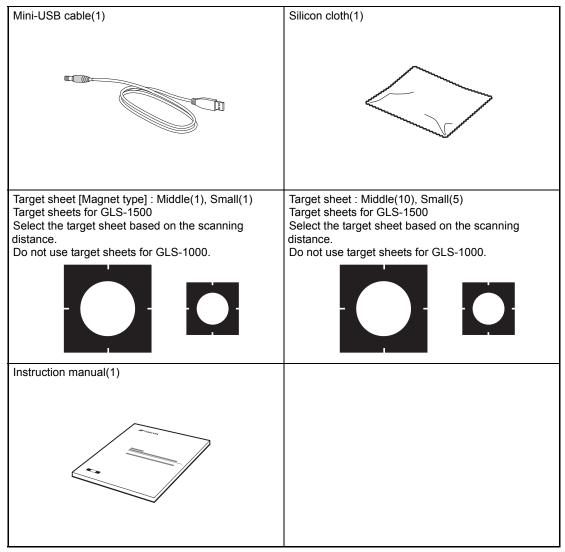
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Standard Components

The numerical value in parentheses shows the quantity.



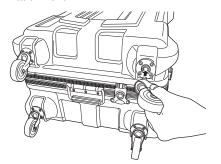


Make sure that all of the above items are with the instrument when purchased.

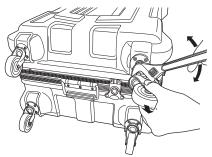
Attaching/removing casters on the carrying case

At the time of purchase, casters are stored inside the case. Remove them from the case and attach as necessary.

Attachment



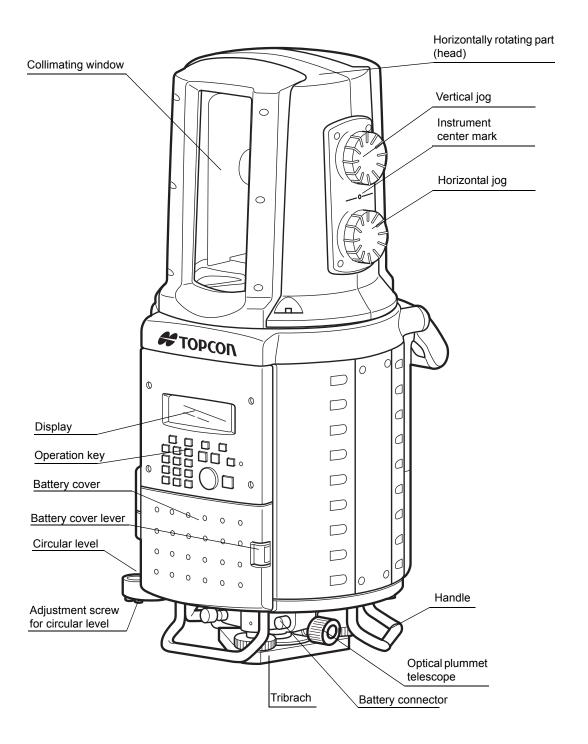
Removal

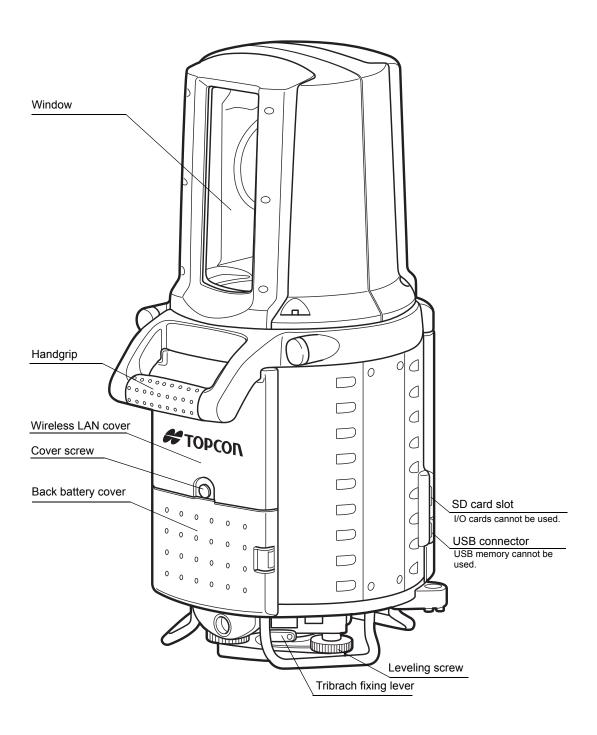


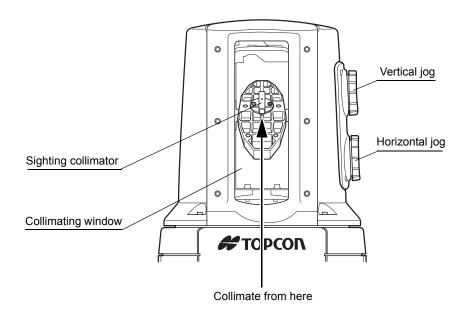
If you cannot remove casters by pulling them with your hand, use commercially available tools sold in stores.

1 NOMENCLATURE AND FUNCTIONS

1.1 Nomenclature







1.2 Display

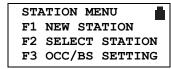
Display

The display uses a character-type LCD which has 4 lines and 20 characters per line.

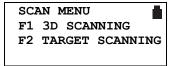
• Contrast and Illumination

The contrast and illumination of display window are adjusted. See 5.1 "Settings by the Star Key".

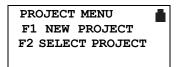
Example



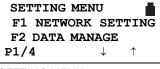
STATION MENU



SCAN MENU



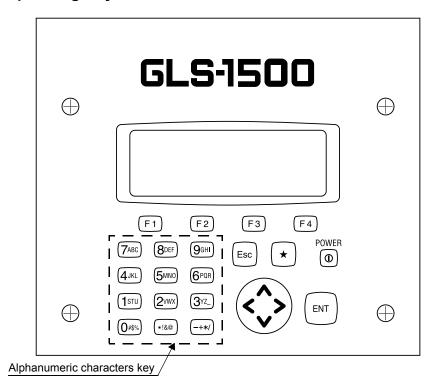
PROJECT MENU



SETTING MENU

:Battery power remaining mark Refer to Chapter 4.4 "Battery Power Remaining Display".

1.3 Operating Key



Keys	Name of Key	Function
POWER	Power source key	ON/OFF of power source
*	Star key	Star key mode is used for each presetting or displaying. To select function of Star key, see Chapter 5.1 "Settings by the Star Key".
ESC	Escape key	Returning to the previous display.
F1–F4	Soft key (Function key)	Responds to the message displayed.
ENT	Enter key	Press at the end of inputting values.
(\(\) \(\) \(\)	Cursor key	Moves the selected item or the cursor laterally and vertically.

2 PREPARATIONS BEFORE USE

For inspection procedure before use, refer to the "PREOPERATIONAL EASY INSPECTION (GLS-1500)" section of the SCAN MASTER Instruction Manual.

2.1 LAN card, SD card, Power source and Network

The following are the preparation procedures before use.

For some countries, the wireless LAN card is not included.

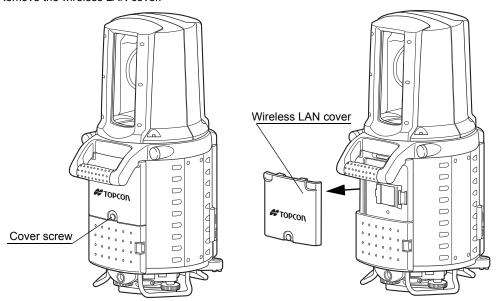
Please purchase a commercially available card.

1. Inserting a wireless LAN card (when the instrument is used connected to a PC)

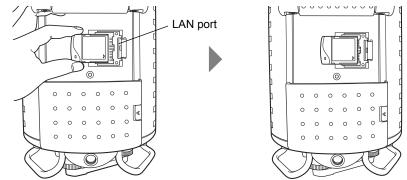
It is necessary to insert a wireless LAN card for wireless communication between the instrument and the PC.

Insert a wireless LAN card after purchasing the instrument.

- 1 Use a coin to remove the cover screw.
- 2 Remove the wireless LAN cover.



3 Insert a wireless LAN card.



- 4 Replace the wireless LAN cover.
- **5** Replace the cover screw.

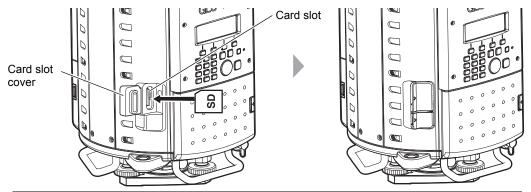
2. Inserting an SD card (when the instrument is used alone (stand alone))

All of the data including project, station information, and scanning data will be recorded on the SD card. Make sure to insert an SD card before scanning.

- 1 Open the card slot cover.
- 2 Insert a SD card to the card slot...

Please make sure you have the front and back of the SD card facing correctly when inserting into the card slot.

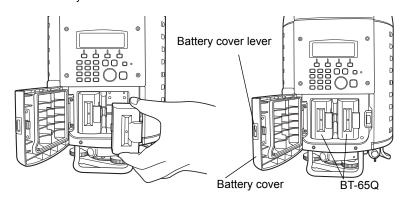
3 Close the card slot cover.



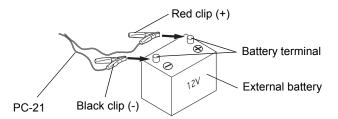
When [SCANNING IN PROGRESS] and [PAUSING] is being displayed, do not remove the SD card. Otherwise, the data may be destroyed.

3. Connecting to a power source

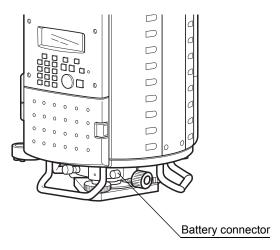
- When using the internal BT-65Q power source
- 1 Open the battery cover, and place four batteries in the instrument.
- **2** Shut the battery cover until click sound can be heard.



- When using an external power source
- 1 Connect the clips of the external power source cable (PC-21) to the terminals of the external power source (12V, commercially available).



2 Connect the external power source cable (PC-21) to the battery connector.



4. Network Settings (when the instrument is used connected to a PC)

Use one of the following methods to connect the instrument to the PC.

Connection via Wireless LAN cards

The network setting is required to connect this instrument to a PC or an access point using a wireless LAN card.

There are two methods for connection with wireless LAN.

AdHoc mode : Mode for direct transmission between the instrument and a PC

Infrastructure mode: Mode for connection to network via an access point

Connecting with AdHoc mode

Move to the network setting screen. Refer to Chapter 5.2.2 "Network Settings (To connect to PC or access point)" 2 Match the PC setting to the instrument setting. *1) Or

Match the instrument setting to the PC setting. *2)

- *1) Refer to "PC settings (OS: For Windows XP)"(P5-8) for PC settings.
- *2) To change the mode, authorization, SSID, WEP, IP address, and subnet mask of the instrument, refer to "5.2.2 Network setting (To connect to PC or access point)."

[Reference: factory settings of the instrument]

MODE : AD-HOC AUTH : OPEN SSID : gls1500

WEP

IP address : 192.168.0.1 subnet mask : 255.255.255.0

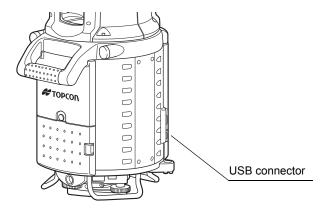
Connecting with Infrastructure mode

Move to the network setting screen.
Refer to Chapter 5.2.2 "Network Settings (To connect to PC or access point)"

2 Match the instrument setting to the access point setting. *3) Or Using a PC, match the access point setting to the instrument setting. *4)

- *3) To change the mode, authorization, SSID, WEP, IP address, and subnet mask of the instrument, Refer to Chapter 5.2.2 "Network Settings (To connect to PC or access point)".
- *4) Refer to the wireless LAN access point instruction manual for setting on the access point side.
- Connection via USB cable
- 1 Connect a Mini-USB cable to the USB connector.

The USB connection is automatically recognized and [PC CONTROL MODE] is displayed.



USB connector is for connection to PC, and USB memory cannot be connected.

3 OVERVIEW OF SCANNING

3.1 Procedure for Scanning

The following are the procedures for scanning.

When the instrument is used alone

Scanning Preparation

1. Mount and level the instrument.

Refer to Chapter 4.2 "Mount the Instrument to the Tripod".

2. Turn the power ON.

Refer to Chapter 4.3 "Power Switch Key ON".



Setting the project

Refer to Chapter 6 "PROJECT SETTINGS".



Setting the stations

Refer to Chapter 7 "STATION SETTING".

1. Set the backsight point name and the occupied point name.

Refer to Chapter 7.3 "Setting the Occupied Point Name and the Backsight Point Name".

2. Scan the backsight point.



Scanning

Refer to Chapter 8 "SCANNING".

1. Scan the target.

Refer to Chapter 8.1 "Target Scanning".

2. Perform the 3D scanning.

Refer to Chapter 8.2 "3D Scanning".



Turning the power OFF



When scanning another target within the same project, move the instrument to the next station and repeat the procedures above.

• When the instrument is used connected to a PC

Scanning Preparation

1. Mount and level the instrument.

Refer to Chapter 4.2 "Mount the Instrument to the Tripod".

2. Turn the power ON.

Refer to Chapter 4.3 "Power Switch Key ON".



Using the PC, enter settings and perform the scanning

Refer to the Instruction Manual for Scan Master.



Turning the power OFF

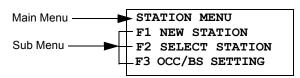


When scanning another target within the same project, move the instrument to the next station and repeat the procedures above.

3.2 Display and Functions

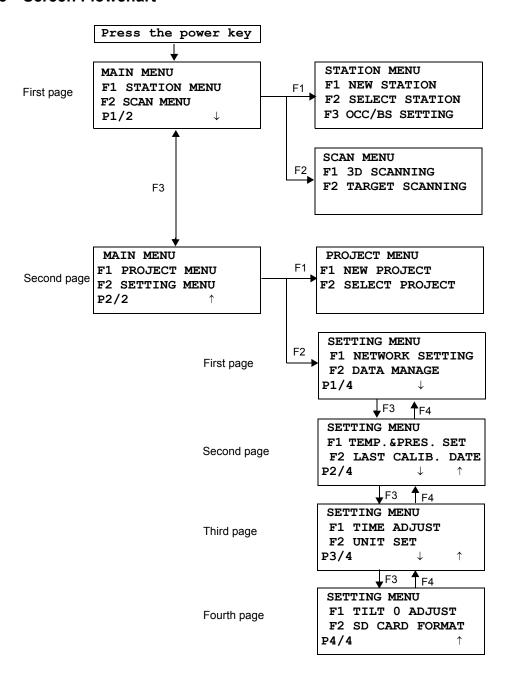
The following are examples of the displays and its functions.

Display



Display Main Sub Menu Menu		Function		
STATION MENU	SELECT STATION	Select an existing station. Refer to Chapter 7.2 "Selecting from Existing Stations".		
	OCC/BS SETTING	Set the backsight point name and the occupied point name. Refer to Chapter 7.3 "Setting the Occupied Point Name and the Backsight Point Name".		
SCAN	3D SCANNING	Perform a 3D scanning of the designated area. Refer to Chapter 8.2 "3D Scanning".		
MENU	TARGET SCANNING	Scan the target. Refer to Chapter 8.1 "Target Scanning".		
PROJECT	NEW PROJECT	Set a new project. Refer to Chapter 6.1 "Creating a New Project".		
MENU	SELECT PROJECT	Select an existing project. Refer to Chapter 6.2 "Selecting from Existing Projects".		
	NETWORK SETTING	Set the network. Refer to Chapter 5.2.2 "Network Settings (To connect to PC or access point)".		
	DATA MANAGE	Edit the data. Refer to Chapter 5.2.3 "Editing the SD Card Data (data management)".		
SETTING MENU	TEMP.&PRES. SET	Set the temperature and atmospheric pressure. Refer to Chapter 5.2.4 "Setting the Temperature and Atmospheric Pressure".		
	LAST CALIB. DATE	Display the last calibration date. Refer to Chapter 5.2.5 "Displaying the Last Calibration Date and Time".		
	TIME ADJUST	Set the time. Refer to Chapter 5.2.6 "Setting the Date and Time".		
	UNIT SET	Set the units. Refer to Chapter 5.2.7 "Changing the Units".		
	TILT 0 ADJUST	Adjust the tilt sensor installation error. Refer to Chapter 5.2.8 "Adjusting the Tilt Sensor Installation Error".		
	SD CARD FORMAT	Format the SD card. Refer to Chapter 5.2.9 "Formatting the SD card".		

3.3 Screen Flowchart



ESC key: Returning to the previous display.

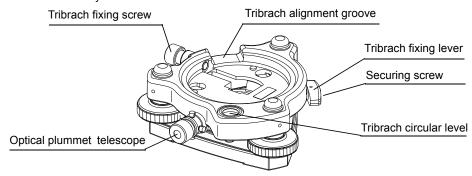
: Battery marks omitted

4 PREPARATION FOR MEASUREMENT

When attaching the instrument on a tripod, first attach only the tribrach on the tripod, then attach the instrument after leveling and centering.

4.1 Detach/Attach of Tribrach

The instrument is easily detached or attached to the tribrach.

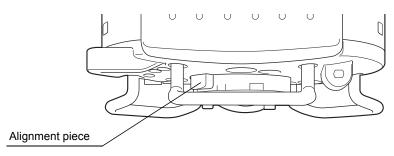


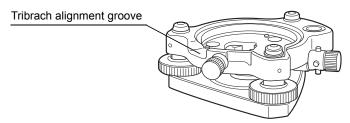
Detachment

- 1 Loosen the tribrach fixing screw.
- 2 Loosen the tribrach fixing lever by turning counterclockwise. (When the tribrach fixing lever securing screws are screwed in, use the driver provided in the package to loosen.)
- 3 Lift the instrument straight upwards and off.

Attachment

- 1 Coincide the white alignment piece on the lower part of the instrument with the tribrach alignment groove.
- 2 Tighten the tribrach fixing lever firmly by turning clockwise.
- 3 Tighten the tribrach fixing screw.





Locking the tribrach fixing lever

The tribrach fixing lever can be locked from being moved accidentally. This is useful if the upper instrument section is not being detached very often. Simply tighten the securing screw on the fixing lever with the accessory screw driver.

4.2 Mount the Instrument to the Tripod

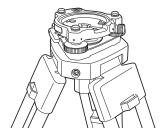
First, mount the tribrach to the tripod. Roughly level and center the tribrach. Next, mount the instrument to the tribrach. Level and center the instrument precisely. Level and center the instrument precisely to insure the best performance.

Use tripods with a tripod screw of 5/8 in. diameter and 11 threads per inch, such as the Type E TOPCON wide-frame wooden tripod. Do not use a metallic tripod.

4.2.1 Leveling and Centering the Instrument

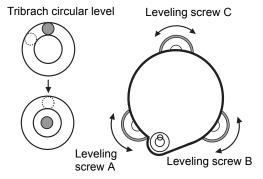
1 Setting up the Tripod

- 1) First, extend the extension legs to suitable lengths and tighten the screws on their midsections.
- 2) Remove the tribrach from the instrument, and place the tribrach carefully on the tripod head.
- 3) Loosen the tripod screw and slide the tribrach. When the tribrach is directly above the point, lightly tighten the tripod screw.



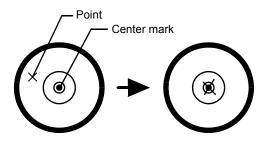
2 Roughly Leveling the Tribrach by Using the Tribrach circular level

- Turn the leveling screws A and B and adjust the bubble to stay at the top or bottom of the circular level.
- 2) Turn the leveling screw C to bring the bubble to the center of the tribrach circular level.



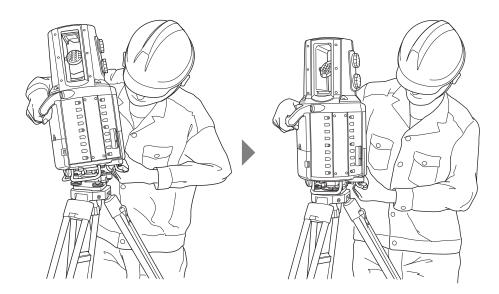
3 Centering by Using the Optical Plummet Telescope

- 1) Adjust the eyepiece of the optical plummet telescope to your eyesight.
- Slide the tribrach by loosening the tripod screw, place the point on the center mark, and then tighten the tripod screw.
 - Try to keep the tribrach from rotating when sliding it so as to minimize the dislocation of the bubble.
- 3) Repeat step 2 and 3 if necessary.

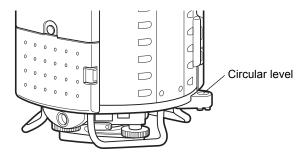


- **4** Mounting the instrument on the tribrach
- Mount the instrument on the tribrach and tighten the tribrach fixing lever and the tribrach fixing screw.

Refer to Chapter 4.1 "Detach/Attach of Tribrach".



- **5** Leveling the instrument using the circular level on the instrument
- 1) Level the instrument as in procedure 2 using the circular level on the instrument.



6 Completely Leveling the Instrument by Using the Tilt Sensor of the Instrument

- 1) Turn the power ON.
- 2) After initialization of the instrument is complete, turn the tilt sensor ON, and wait until inclination of the instrument is shown on the display.

Refer to Chapter 5.1.8 "Setting Example Using the Star Key".

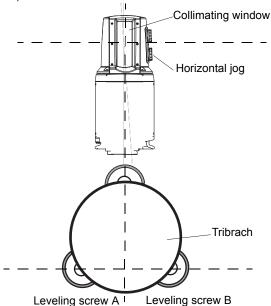
TILT SETTING [ON]

X:+0°01'02"

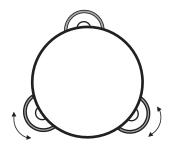
Y:-0°04'05"

ON OFF

3) Use the horizontal jog to turn the instrument as shown in the figure. Make the collimating window parallel to the line connecting the leveling screws A and B of the tribrach (or make a random choice of any two).



4) Turn the leveling screws A and B, and adjust the Y-inclination on the display to ±6' or less.



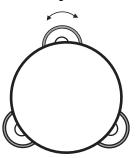
TILT SETTING [ON]

X :+0°03'45"

Y : 0°00'00"

ON OFF

5) Turn the leveling screw C, and adjust the X-inclination on the display to $\pm 6'$ or less. Leveling screw C



TILT SETTING [ON]
X: 0°00'00"
Y:+0°00'06"
ON OFF

6) Use the horizontal jog to make sure the X and Y inclinations are ±6' or less (within the calibration range of the tilt sensor), regardless of the direction the collimating window faces.

TILT SETTING [ON]

X :+0°00'08"

Y :+0°00'06"

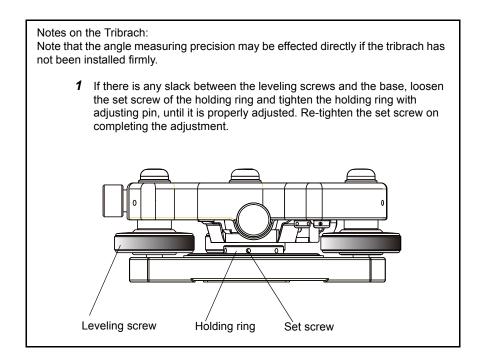
ON OFF

NOTE:

Since the level may change slightly while scanning, we recommend leveling the instrument as precisely as possible.

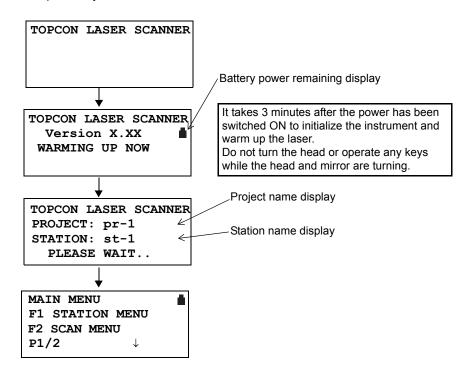
Leveling of the instrument is complete.

- 7 Checking centering
- 1) Re-check the centering with an optical plummet telescope. If there is misalignment, adjust the instrument to align.
- 2) Repeat the above described steps **6-7** until both leveling and centering are matched.



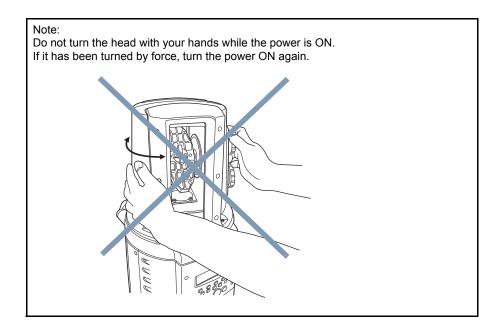
4.3 Power Switch Key ON

1 Press the power key.



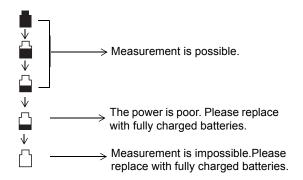
[CALIBRATING] display

[CALIBRATING] will be displayed on the screen once every 20 minutes or when ambient temperature fluctuates during operation. When displayed, distance measurement is being adjusted internally. Please wait for the display to disappear.



4.4 Battery Power Remaining Display

Battery power remaining display indicates the power condition.



- Note: 1 The battery operating time will vary depending on the environmental conditions such as ambient temperature, charging time, the number of times of charging and discharging etc. It is recommended for safety to charge the battery beforehand or to prepare spare full charged batteries.
 - 2 For general usage of the battery, Refer to Chapter 10 "CHARGING THE INTERNAL POWER SOURCE (BT-65Q)".

4.5 Replacing the Battery

Replace all (4) batteries with fully charged batteries when replacing the internal batteries.

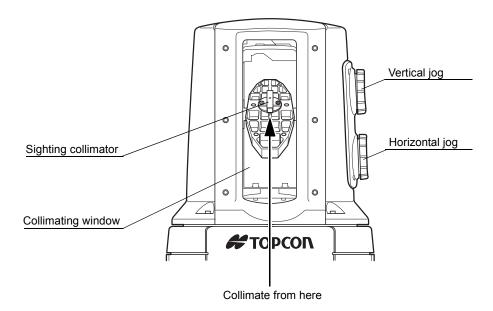
How to replace the batteries without turning the instrument's power switch OFF

If the battery power becomes low while scanning, replace the batteries by following the below steps. The scanning can be continued.

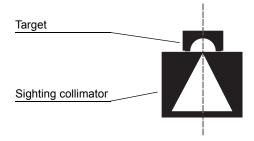
- 1 Press the F2 key (stop) while scanning. The scanning will pause.
- 2 Open the front battery cover, and replace 2 batteries.
- **3** Close the front battery cover.
- **4** Open the back battery cover, and replace 2 batteries.
- **5** Close the back battery cover.
- 6 Press the F1 key (start) to resume scanning.

4.6 How to Collimate to a Target.

- 1 From the collimating window, use the vertical and horizontal jogs to set the sighting collimator approximately on the target.
- 2 Look into the sighting collimator.

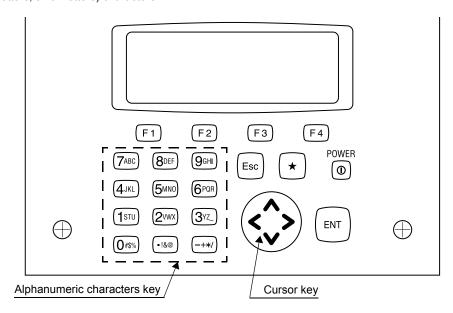


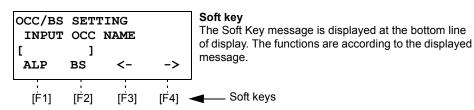
3 Use the vertical and horizontal jogs to adjust the peak of the triangle inside the sighting collimator to the target.



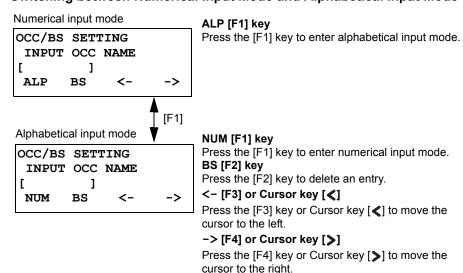
4.7 How to Enter Alphanumeric Characters

When entering the station, instrument height, backpoint, etc., you can enter alphanumeric (capital letters, small letters) characters.





4.7.1 Switching between Numerical Input Mode and Alphabetical Input Mode



Characters that can be entered

Items	Characters that can be entered	Number of characters
Scan name Target name Project name Station name Occupied point name Backsight point name SSID	All alphabets: a to z, A to Z Numeric: 0 to 9 Symbols '_', '!', '@', '&', '-', '#', '\$', '%', can be entered. '+' cannot be entered.	Within 8 characters Within 31 characters (For SSID only)
WEP	Refer to "Characters that can be entered"(P4-10).	

[Example setting] Occupied point name : [a-1]

Operating procedure Operation			Display
1	Press the [F1](STATION MENU) key.	[F1]	MAIN MENU F1 STATION MENU F2 SCAN MENU P1/2 STATION MENU F1 NEW STATION F2 SELECT STATION
2	Press the [F3](OCC/BS SETTING) key.	[F3]	F3 OCC/BS SETTING OCC/BS SETTING INPUT OCC NAME [] NUM BS <>
3	Press the [7] key to select "a".	[7]	OCC/BS SETTING INPUT OCC NAME [a] NUM BS <>
4	Press the [F1](NUM) key. The instrument switches to numerical input mode.	[F1]	OCC/BS SETTING INPUT OCC NAME [a] ALP BS <>
5	Press the [-+*/] key to select "-".	[-+*/]	OCC/BS SETTING INPUT OCC NAME [a-] ALP BS <>
6	Press the [1] key to select "1".	[1]	OCC/BS SETTING INPUT OCC NAME [a-1] ALP BS <>
7	Press the [ENT] key. Occupied point name is set.	[ENT]	OCC/BS SETTING INPUT HEIGHT []m <-

4.8 File Name Input Assistant Function

When a new file name is input under the conditions below, the last digit of the file name will be counted up when entered next (EX: PRJ0001, PRJ0002, PRJ0003...). (The initial entry of the file name for each entry item will be as shown below.)

Entry item	File name	Entry example (initial entry)
INPUT PROJECT NAME	PRJ + 4 digit number	PRJ0001
INPUT STATION NAME	STA + 4 digit number	STA0001
INPUT SCAN NAME	SCN + 4 digit number	SCN0001
INPUT TARGET NAME	TAR + 4 digit number	TAR0001
INPUT BS NAME	BS + 4 digit number	BS0001
INPUT OCC NAME	OCC + 4 digit number	OCC0001

When the file name other than specified above is entered, the last digit of the file name will not be counted up. The file name entered previously will be displayed.

4.9 Target

Be sure to use target sheets for GLS-1500.

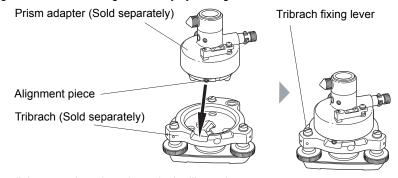
4.9.1 Selecting the Target Sheet

Select the target sheet (large, medium, small) based on the distance to the object being scanned. (Target sheet (large) is sold separately)

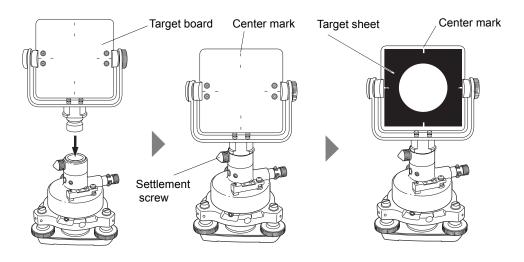
Target sheet	Distance to the object being scanned (m)	
Large	50-200	
Middle	10-100	
Small	2-50	

4.9.2 Assembling the Target

- 1 Coincide the alignment piece on the lower part of the prism-adapter with the tribrach alignment groove.
- 2 Tighten the tribrach fixing lever firmly by turning clockwise.



- **3** Install the target board as shown in the illustration.
- **4** Tighten the settlement screw surely.
- 5 Put the magnetic target sheet on the target board. At this point, adjust the center marks (4) of the target sheet and the target board exactly.



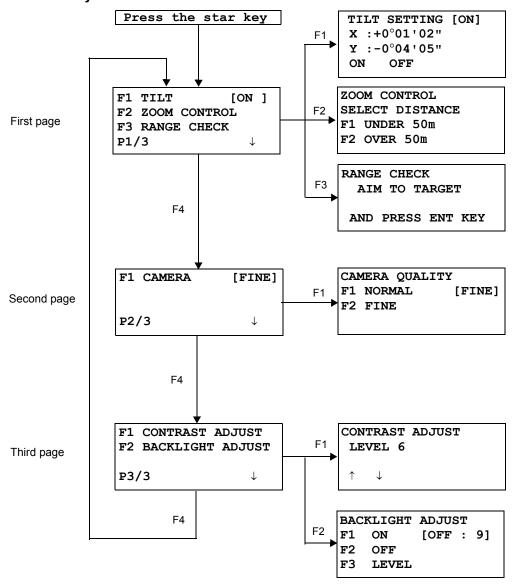
5 INSTRUMENT SETTINGS

5.1 Settings by the Star Key

• Items to be set by the star key

Display Function	
TILT SETTING	Set the tilt sensor ON/OFF.
ZOOM CONTROL	Choose the best optical zoom system setting for the scanning.
RANGE CHECK	Measure the distance to the scanning object.
CAMERA QUALITY	Set the image quality mode of the camera.
CONTRAST ADJUST	Adjust the contrast of the display.
BACKLIGHT ADJUST	Adjust the backlight of the display.

5.1.1 Star Key Screen Flowchart

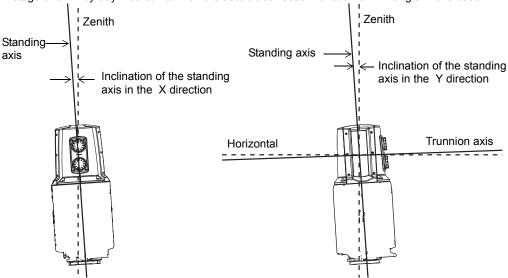


5.1.2 Tilt Setting

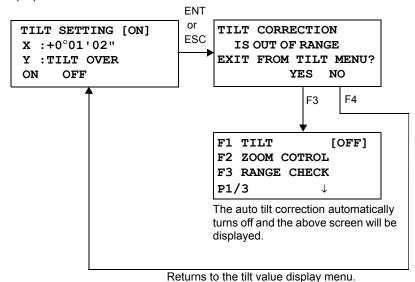
When the auto tilt correction function of the vertical and horizontal angles is turned ON, the 2-axis tilt sensor is activated, and tilts in vertical and horizontal angles due to inclination of the standing axis will be corrected automatically.

To ensure precise scanning, use the instrument with the auto tilt correction ON. If the tilt is out of automatic compensation range, [TILT OVER] display will appear on the screen. In such case, level the instrument. When the tilt comes into the automatic compensation range after the leveling, the screen will automatically return to the display before the [TILT OVER] display.

- GLS-1500 compensates both the vertical angle and the horizontal angle readings due to inclination
 of the standing axis in the X and Y directions.
- The display of inclination of the X and Y directions is unstable when instrument is on an unstable stage or a windy day. You can turn off the auto tilt correction function of V/H angle in this case.



 If the instrument is tilted 6 degrees or more, the screen below will be displayed for confirmation purposes.



5.1.3 Zoom Control (Zoom setting)

The zoom control function is used to select the best optical zoom system based on the scanning distance, scanning precision, and scanning time. The GLS-1500 is equipped with three types of optical zoom systems and the ability to change the size of the beam spot according to the scanning object, which allows you the choice of obtaining a highly precise three-dimensional data or a quick scan. Select the following two items below according to the scanning conditions.

Selection item (1)

UNDER 50m	Select when the distance between the instrument and the scanning object is 50 m or less.
OVER 50m	Select when the distance between the instrument and the scanning object is over 50 m.

Selection item (2)

NORMAL	Use one optical zoom system. Scanning time is quickest.
FINE	Use two optical zoom systems which measure with high precision. Scanning time is about twice that of NORMAL mode.
SFINE	Select the optimum use of three optical zoom systems which measure with the highest accuracy. Scanning time is three times that of NORMAL mode.

The setting will become invalid when the power is turned off. Please set the scanning mode each time the instrument is used for measurement.

5.1.4 Measuring Distance to the Scanning Object

Rough distance to the scanning object, which is required to set scanning density, is measured as shown below.

- 1 Press the [★] (star) key.
- 2 Press the [F3] (range check) key.
- **3** Collimate the scanning object using the sighting collimator.
- **4** Press the [ENT] key to display the measured distance.

This function confirms rough distance and is not for measuring accurate distance to the target.

5.1.5 Camera Setting

When scanning, the internal camera automatically takes pictures of the entire scanning area, and keeps the data in the image file (if [SCAN+IMAGE] or [IMAGE] has been selected. Refer to Chapter 8.2.2 "Setting the Scanning Density".)

Several photographs are taken in order to cover the entire scanning area. As the scanning area becomes larger, number of photographs taken will increase.

Also, as the quality of the image becomes higher, the file size will increase. Select the image quality based on your needs.

Selection item

NORMAL	Standard image(800x600 pixels) quality mode, small file size
FINE	High image(1600x1200 pixels) quality mode, large file size

5.1.6 Contrast Adjust

Adjust the contrast of the display according to the surrounding conditions. The contrast range is from 1 [light] to 10 [dark].

5.1.7 Backlight Adjust

Use the backlight when the display is difficult to read; for example at dusk or when you are inside a tunnel. There is a switch to keep the backlight always ON or always OFF. When selecting the backlight is always ON, the brightness can be adjusted. The range is from 1 [dark] to 10 [light].

5.1.8 Setting Example Using the Star Key Example: set the tilt sensor OFF

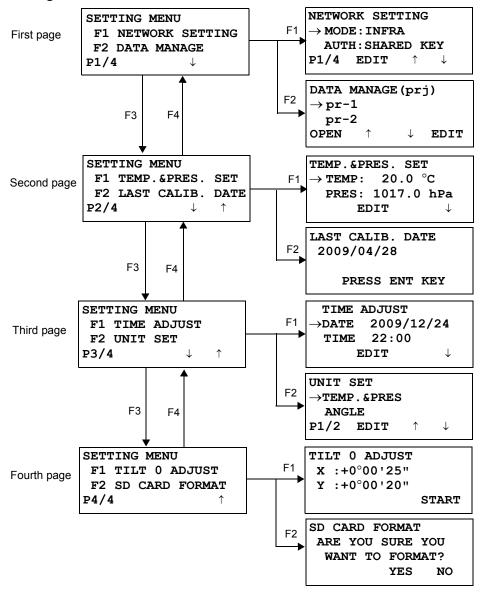
	Operating procedure	Operation	Display
1	Press the [★] key.	[★]	F1 TILT [ON] F2 ZOOM CONTROL
		[F1]	P1/3 ↓
2	Press [F1] key.	ני ין	TILT SETTING [ON] X :+0°01'02" Y :-0°04'05" ON OFF
3	Press the [F2] key.	[F2]	TILT SETTING [OFF]
			ON OFF

5.2 Using the Setting Menu

Selection items in the setting menu

Display	Function
NETWORK SETTING	Set the network.
DATA MANAGE	Edit the data on the SD card.
TEMP.&PRES. SET	Set the temperature and atmospheric pressure.
LAST CALIB. DATE	Display the date of the last calibration.
TIME ADJUST	Set the date and time.
UNIT SET	Set the scanning units.
TILT 0 ADJUST	Adjust the tilt sensor installation error.
SD CARD FORMAT	Format the SD card.

5.2.1 Setting Menu Screen Flowchart



5.2.2 Network Settings (To connect to PC or access point)

Connection to a PC can be accomplished either via wireless LAN with a wireless LAN card, or USB connection using a USB cable. Wireless LAN connection has two modes: the AdHoc mode and the Infrastructure mode.

Here we describe how to select one of the connections, and connect via wireless LAN.

Selectable networks and selection items

Wireless LAN

For some countries, the wireless LAN card is not included.

Please purchase a commercially available card.

: AdHoc mode

Mode for direct transmission between the instrument and a PC

: Infrastructure mode

Mode for connection to network via an access point

: OFF mode

The wireless LAN mode will be OFF

: AUTH

There are two authorization methods. Please match the authorization method for the instrument and the PC/access point.

· OPFN

Select when authorization is not required. (always be authorized)

: SHARED KEY

Connection of the instrument to a PC will require the same WEP key setting. When selecting the SHARED KEY, WEP key entry will be required.

: WEP

Connection of the instrument to a PC will require the same WEP key setting. WEP key can be entered by the four methods listed below.

Characters that can be entered for WEP key

Type of characters	Characters that can be entered	Number of characters	Entry example
	All alphabets:	5	GLS15
Character entry	a to z, A to Z Numeric: 0 to 9 Symbols '_', '!', '@', '&', '-', '#', '\$', '%', '+'	13	TOPCONGLS1500
	All alphabets: a to z, A to Z Numeric: 0 to 9	10	474C533135(Hexadecimal)
Binary entry		26	544f50434f4E474C5331353030 (Hexadecimal)

: IP address

(ID numbers assigned to the individual PC and the GLS-1500)

: subnet mask

(Numbers identifying the network that connects the PC and the GLS-1500)

: SSID

(Identifier assigned to the PC and the GLS-1500 in order to prevent crossed signals. Up to 15 characters can be used.)

: GW

This is the identification number that identifies the gateway when connecting different networks. This needs to be set up when using the Infrastructure mode. (This will not be displayed in the AdHoc mode)

Selection items for wireless LAN

Setting Items	Selection Items
MODE	AD-HOC/INFRA/OFF
AUTH	OPEN/SHARED KEY
SSID, WEP, IP, SUB, GW	Enter character strings for each setting item. Refer to "Characters that can be entered for WEP key" (P5-6) for characters for WEP key. The GW setting is required for the infrastructure mode only.

The IP address, subnet mask, SSID, and GW can be entered from the instrument or the PC/ access point side.

In order to perform wireless transmission between a PC and the instrument, match these addresses.

• How to set up wireless LAN

[Setting example]

[Setting before c	hange]	[Setting after ch	ange]	
IP address	: 192.168.0.1	IP address	:	10.1.1.240
SSID	: gls1500	SSID	:	topcon

(Any number can be used for "IP address" and "SSID".)

How to set up the instrument

	Operating procedure	Operation	Display
			SELECT MENU F1 STATION MENU F2 SCAN MENU P1/2
1	Press F3 (\downarrow) key to display the second page of the main menu.	[F3]	SELECT MENU F1 PROJECT MENU F2 SETTING MENU P2/2
2	Press the [F2](SETTING MENU) key to select SETTING MENU.	[F2]	SETTING MENU F1 NETWORK SETTING F2 DATA MANAGE P1/4
3	Press the [F1](NETWORK SETTING) key.	[F1]	NETWORK SETTING
4	Press [F4]((↓) key four times.	[F4] [F4] [F4]	→IP:192.168.0.1 SUB:255.255.255.0 P3/3 EDIT ↑ ↓
5	Press the [F2](EDIT) key to edit IP address.	[F2]	NETWORK SETTING INPUT IP ADDRESS [192.168.0.1] <-

6 Input IP address [10.1.1.240].	Input IP address	NETWORK SETTING INPUT IP ADDRESS [10.1.1.240] <-
7 Press the [ENT] key.	[ENT]	NETWORK SETTING IP:10.1.1.240 →SUB:255.255.255.0 P3/3 EDIT ↑ ↓
8 Press [F4]((↓) key four times.	[F4] [F4] [F4] [F4]	NETWORK SETTING SSID: gls1500 WEP: P2/3 EDIT ↑ ↓
9 Press the [F2](EDIT) key to edit SSID.	[F2]	NETWORK SETTING INPUT SSID [gls1500] NUME DEL <>
10 Input SSID [topcon].	Input SSID	NETWORK SETTING INPUT SSID [topcon] NUME DEL <>
11 Press the [ENT] key.	[ENT]	NETWORK SETTING SSID: topcon WEP: P2/3 EDIT ↑ ↓
12 Press the [ENT] key. WLAN AdHoc is set.	[ENT]	NETWORK SETTING WLAN AdHoc SET! PLEASE WAIT

PC settings (OS: For Windows XP)

Following are the procedures to set the IP address, subnet mask, and SSID on the PC.

- 1 Click in the order of [start] → [Control Panel] → [Network and Internet Connections] → [Network Connections].
- **2** Right click [Wireless Network Connection] and select [Properties]. [Wireless Network Connection Properties] will be displayed.
- **3** Select [General] tab on the [Wireless Network Connection Properties].
- 4 Select Internet Protocol (TCP/IP) and click [Properties]. [Internet Protocol (TCP/IP) Properties] will be displayed.
- **5** Enter IP address and Subnet mask on the [Internet Protocol (TCP/IP) Properties].
- **6** Select [Wireless Networks tab] on the [Wireless Network Connection Properties].
- 7 Click [Add...] displayed on the [Preferred networks]. [Wireless network properties] will be displayed.
- 8 Select [Association tab] displayed on the [Wireless network properties].

9 Set the following

```
Network name(SSID) → gls1500

Network Authentication → Open system

Data encryption → Disabled
```

- **10** Click [Advanced] displayed on the [Preferred networks].
- 11 Select [Computer-to-computer(ad hoc) networks only] displayed on the [Networks to access]. Settings are complete.

PC settings (OS: For Windows Vista)

Following are the procedures to set the IP address, subnet mask, and SSID on the PC.

- **1** Click in the order of [start] → [Control Panel] → [Network and Sharing Center].
- 2 Click [Manage network connections] item in the Tasks.
- 3 Right click [Wireless Network Connection] and select [Properties]. [Wireless Network Connection Properties] will be displayed.
- 4 Select Internet Protocol (TCP/IP) and click [Properties]. [Internet Protocol (TCP/IP) Properties] will be displayed.
- **5** Enter IP address and Subnet mask on the [Internet Protocol (TCP/IP) Properties].
- **6** Click in the order of [start] → [Control Panel] → [Network and internet] → [Network and Sharing Center].
- 7 Click [Manage network connections] item in the Tasks.
- **8** Click in the order of [Add] \rightarrow [Create an ad hoc network] \rightarrow [Next]
- 9 Set the following

```
Network name(SSID) → gls1500
Security type → Without authentication (Open system)
```

10 Tick [Save this network]. Settings are complete.

When connecting to an access point in the infrastructure mode

Refer to the wireless LAN access point instruction manual for setting when connecting via an access point.

USB

: No setting is necessary to connect the USB cable and PC. (It is automatically recognized.)

5.2.3 Editing the SD Card Data (data management)

You can delete or rename the folders on the SD card.

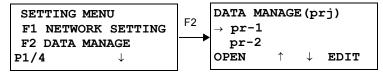
Data that can be renamed or deleted: Project data

Station data3D scan dataTarget data

Make sure to check before deleting folders.

Once a folder is deleted, all the data under the directory will be deleted.

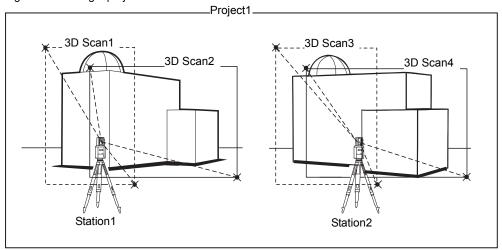
• Data management operation



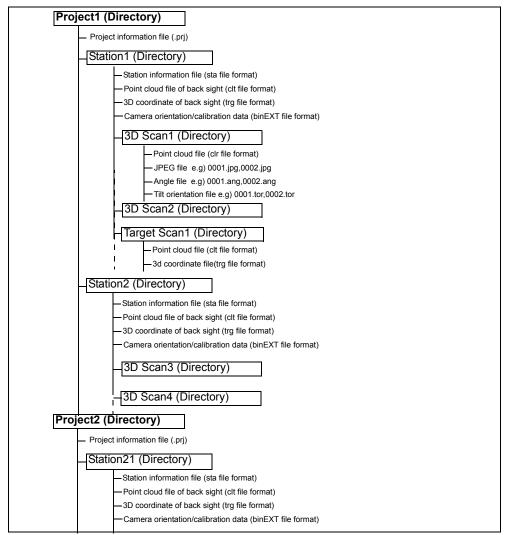
Data structure in an SD card

SD card data is saved under the following directory structure.

An object should be 3D scanned several times from multiple positions, and the results should be kept together as a single project.



Example of data structure



• Renaming folders
Refer to the below when deleting or renaming folders
[Example] Rename station [st-1] --> [st-9]

	Operating procedure	Operation	Display
1	Press the [F3](↓)key to display the second page of the main menu.	[F3]	MAIN MENU F1 STATION MENU F2 SCAN MENU P1/2 MAIN MENU F1 PROJECT MENU F2 SETTING MENU
2	Press the [F2](SETTING MENU) key to select the menu.	[F2]	F2 SETTING MENU P2/2 SETTING MENU F1 NETWORK SETTING F2 DATA MANAGE P1/4 ↓
3	Press the [F2](DATA MANAGE) key to select the DATA MANAGE. The projects list will be shown.	[F2]	DATA MANAGE (prj) → pr-1 pr-2 OPEN ↑ ↓ EDIT
	Choose the project file (Project containing the station you want to rename) by pressing the [F2] (\uparrow) or [F3] (\downarrow) key Press the [F1](OPEN) key to open the project file. The stations list will be showen.	[F2]or[F3] [F1]	DATA MANAGE(sta) → st-1 st-2 OPEN ↑ ↓ EDIT
	Choose the station file (you want to rename) by pressing the [F2] (\uparrow) key or the [F3] (\downarrow) key. Press the [F4](EDIT) key.	[F2]or[F3] [F4]	DATA MANAGE(sta) st-1 F1 RENAME F2 DELETE
8	Press the [F1](RENAME) key.	[F1]	DATA MANAGE(sta) INPUT STATION NAME [st-1]
9	Press the [F3] (<-) key to move the curser.	[F3]	NUM BS <>
	Rename the station name. [ST-1]> [ST-9]	Rename	DATA MANAGE(sta) INPUT STATION NAME [st-9] ALP BS <>
11	Press the [ENT] key. The station name has been changed.	[ENT]	DATA MANAGE(prj) → pr-1 pr-2 OPEN ↑ ↓ EDIT

5.2.4 Setting the Temperature and Atmospheric Pressure

In order to calibrate the scanning data, enter the temperature and atmospheric pressure at the time of scanning.

Setting range

Temperature : -10°C to +50°C (0.1°C step) (Factory preset: +20°C) : -14°F to +122°F (0.1°F step) (Factory preset: 1013.3hPa)

Pressure : 560hPa to 1066.0hPa (0.1hPa step)

: 420mmHg to 800mmHg (0.1mmHg step) : 16.5inHg to 31.5inHg (0.01inHg step)

Example: Entering a temperature of 22.5°C.

	Operating procedure	Operation	Display
			MAIN MENU F1 STATION MENU F2 SCAN MENU P1/2
1	Press the [F3] (\downarrow) key to display the second page of the main menu.	[F3]	MAIN MENU F1 PROJECT MENU F2 SETTING MENU P2/2
2	Press the [F2](SETTING MENU) key.	[F2]	SETTING MENU F1 NETWORK SETTING F2 DATA MANAGE P1/4
3	Press the [F3] (\downarrow) key to display the second page.	[F3]	SETTING MENU F1 TEMP.&PRES. SET F2 LAST CALIB. DATE P2/4
4	Press the [F1](TEMP.&PRES. SET) key.	[F1]	TEMP.&PRES. SET → TEMP: 20.0 °C PRES: 1017.0 hPa EDIT ↓
5	Press the [F2](EDIT) key.	[F2]	TEMP.&PRES. SET INPUT TEMP.
6	Press the [F3] (<-) key to move the curser.	[F3]	[20.0]
7	Input a temperature. [22.5°C]	Input a tempera- ture.	TEMP.&PRES. SET INPUT TEMP. [22.5] <-
8	Press the [ENT] key.	[ENT]	TEMP.&PRES. SET → TEMP: 22.5 °C PRES: 1017.0 hPa EDIT ↓

5.2.5 Displaying the Last Calibration Date and Time

The GLS-1500 can display the date and time of the last calibration (precision calibration of scanning distance and scanning angle).

It is recommended that precision calibration be performed within one year after the last calibration.

Operating procedure	Operation	Display
		MAIN MENU F1 STATION MENU F2 SCAN MENU P1/2
Press the [F3] (↓) key to display the second page of the main menu.	[F3]	MAIN MENU F1 PROJECT MENU F2 SETTING MENU P2/2
2 Press the [F2](SETTING MENU) key.	[F2]	SETTING MENU F1 NETWORK SETTING F2 DATA MANAGE P1/4
3 Press the [F3] (↓) key to display the second page.	[F3]	SETTING MENU F1 TEMP.&PRES. SET F2 LAST CALIB. DATE P2/4
4 Press the [F2](LAST CALIB. DATE) key.	[F2]	LAST CALIB. DATE 2009/04/28
		PRESS ENT KEY

5.2.6 Setting the Date and Time

Enter the date and time in order to record the date of the scanning. Example: Date: 2009 01 01 Time 22:30

	Operating procedure	Operation	Display
			MAIN MENU F1 STATION MENU F2 SCAN MENU P1/2
1	Press the [F3] (\downarrow) key to display the second page of the main menu.	[F3]	MAIN MENU F1 PROJECT MENU F2 SETTING MENU P2/2
2	Press the [F2](SETTING MENU) key.	[F2]	SETTING MENU F1 NETWORK SETTING F2 DATA MANAGE P1/4
3	Press the [F3] (\downarrow) key twice to display the third page.	[F3] [F3]	SETTING MENU F1 TIME ADJUST F2 UNIT SET P3/4

4 Press the [F1](TIME ADJUST) key.	[F1]	TIME ADJUST → DATE :2008/12/24 TIME :22:00 EDIT
5 Press the [F2](EDIT) key.6 Press the [F3] (<-) key to move the curser.	[F2] [F3]	TIME ADJUST INPUT DATE
7 Input date.(20090101)	Input date	[20090101]
8 Press the [ENT] key.	[ENT]	TIME ADJUST → DATE 2009/01/01 TIME 22:00 EDIT
9 Press the [F4](↓) key.	[F4]	TIME ADJUST DATE 2009/01/01 → TIME 22:00 EDIT
10 Press the [F2](EDIT) key.11 Press the [F3] (<-) key to move the curser.	[F2] [F3]	TIME ADJUST INPUT TIME
12 Input time.(2230)	Input time	[2230]
13 Press the [ENT] key.	[ENT]	TIME ADJUST DATE 2009/01/01 → TIME 22:30 EDIT

5.2.7 Changing the Units

Select the units for temperature, angle, and distance.

Units that can be selected

Temperature : °C / °F

Angle : DEG / GON / MIL

Distance : METER / FEET / US SURVE / INTERNATIONAL

[Example] Changing the Distance unit to METER

Operating procedure	Operation	Display
		MAIN MENU F1 STATION MENU F2 SCAN MENU P1/2
1 Press the [F3](↓) key.	[F3]	MAIN MENU F1 PROJECT MENU F2 SETTING MENU P2/2
2 Press the [F2](SETTING MENU) key.	[F2]	SETTING MENU F1 NETWORK SETTING F2 DATA MANAGE P1/4

3	Press the [F3](↓) key twice to turn to the menu page P3/3.	[F3] [F3]	SETTING MENU F1 TIME ADJUST F2 UNIT SET P3/4 \ \ \ \ \
4	Press the [F2](UNIT SET) key.	[F2]	UNIT SET →TEMP.&PRES ANGLE P1/2 EDIT ↑ ↓
5	Press the [F4](\downarrow) key twice to display the second page.	[F4] [F4]	UNIT SET →DISTANCE FEET P2/2 EDIT ↑ ↓
6	Press the [F2](EDIT) key.	[F2]	UNIT SET DISTANCE [METER] F1:METER F2:FEET SET
7	Press the [F2](FEET) key to select "FEET".	[F2]	UNIT SET DISTANCE [FEET] F1:METER F2:FEET SET
8	Press the [F4](SET) key.	[F4]	UNIT SET →DISTANCE METER P2/2 EDIT ↑ ↓

5.2.8 Adjusting the Tilt Sensor Installation Error

Calibrate tilt sensor 0 datum.

This adjustment is performed to set the standard position of the tilt sensor. Firmly set the instrument on the stable board before adjusting.

	Operating procedure	Operation	Display
			MAIN MENU F1 STATION MENU F2 SCAN MENU P1/2
1	Press the [F3] (\downarrow) key to display the second page of the main menu.	[F3]	MAIN MENU F1 PROJECT MENU F2 SETTING MENU P2/2
2	Press the [F2](SETTING MENU) key.	[F2]	SETTING MENU F1 NETWORK SETTING F2 DATA MANAGE P1/4
3	Press the [F3] (\downarrow) key 3 times to display the fourth page.	[F3] [F3] [F3]	SETTING MENU F1 TILT 0 ADJUST F2 SD CARD FORMAT P4/4

4	Press the [F1](TILT 0 ADJUST) key.	[F1]	TILT 0 ADJUST
5	Turn the leveling screw to level the unit to within 30".		X :+0°00'25" Y :+0°00'20" START
6	Press the [F4](START) key. Begin the calibration of tilt sensor 0 datum.	[F4]	TILT 0 ADJUST
	When [TILT OVER] is displayed while calibrating, press the [ENT] key and level the unit once again.		PROCESSING PLEASE WAIT
			TILT 0 ADJUST
			SET! PRESS ENT KEY

5.2.9 Formatting the SD card

This is the function to format the SD card.

The time required for formatting will differ depending on the capacity of the SD card.

Rough estimates of the time required for various SD cards are indicated below:

32GB; approximately 2 minutes, 16GB; approximately 1 minute, 1GB; approximately 30 seconds.

Note that formatting will erase all the existing files in the memory and the data cannot be recovered.

	Operating procedure	Operation	Display
			MAIN MENU F1 STATION MENU F2 SCAN MENU P1/2
1	Press the [F3] (\downarrow) key to display the second page of the main menu.	[F3]	MAIN MENU F1 PROJECT MENU F2 SETTING MENU P2/2
2	Press the [F2](SETTING MENU) key.	[F2]	SETTING MENU F1 NETWORK SETTING F2 DATA MANAGE P1/4
3	Press the [F3] (\downarrow) key 3 times to display the fourth page.	[F3] [F3] [F3]	SETTING MENU F1 TILT 0 ADJUST F2 SD CARD FORMAT P4/4
4	Press the [F2](SD CARDFORMAT) key.	[F2]	SD CARD FORMAT ARE YOU SURE YOU WANT TO FORMAT? YES NO

5 Press the [F3](YES) key. Do not remove the SD card while formatting.	[F3]	SD CARD FORMAT FORMATTING NOW DO NOT REMOVE CARD PLEASE WAIT
Formatting is complete.		SD CARD FORMAT FINISHED PRESS ENT KEY

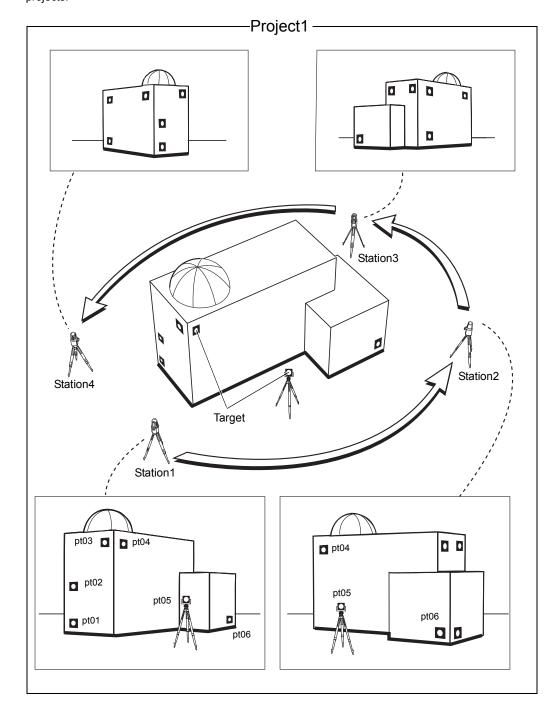
6 PROJECT SETTINGS

The GLS-1500 scans an object from several directions. All the scanned data are managed and stored as one project.

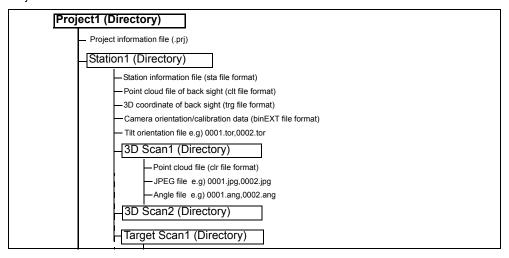
The station information of each scanning is stored inside the same project.

Create a new project when you scan a new object.

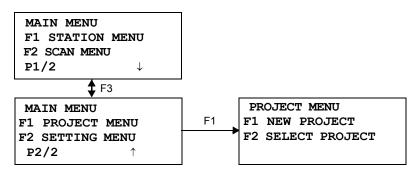
If you continue scanning for the same project or control the existing data, select from the existing projects.



Project data is saved on the SD card.



Project menu operation



6.1 Creating a New Project

[Example] Project name : p03 Occupied point name : a-1

	Operating procedure	Operation	Display
			MAIN MENU F1 STATION MENU F2 SCAN MENU P1/2
1	Press the [F3] (\downarrow) key to display the second page of the main menu.	[F3]	MAIN MENU F1 PROJECT MENU F2 SETTING MENU P2/2
2	Press the [F1](PROJECT MENU) key.	[F1]	PROJECT MENU F1 NEW PROJECT F2 SELECT PROJECT
3	Press the [F1](NEW PROJECT) key to input the project name.	[F1]	NEW PROJECT INPUT PROJECT NAME [] NUM BS <>

4	Input project name [p03]. (Refer to Chapter 4.8 "File Name Input Assistant Function" if you wish to use the file name whose last digit is counted up sequentially.)	Input project name	NEW PROJECT INPUT PROJECT NAME [p03] ALP BS <>
5	Press the [ENT] key. Project "p03" is set.	[ENT]	NEW STATION INPUT STATION NAME [] NUM BS <>
6	Input occupied point name [a-1]. (Refer to Chapter 4.8 "File Name Input Assistant Function" if you wish to use the file name whose last digit is counted up sequentially.)	Input Occupied point name	NEW STATION INPUT STATION NAME [a-1] ALP BS <>
7	Press the [ENT] key.	[ENT]	PROJECT MENU

6.2 Selecting from Existing Projects

[Example] Select project name: p02

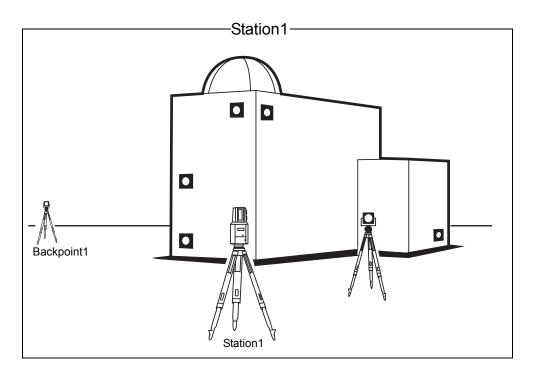
Operating procedure	Operation	Display
		MAIN MENU F1 STATION MENU F2 SCAN MENU P1/2 ↓
Press the [F3] (↓) key to display the second page of the main menu.	[F3]	MAIN MENU F1 PROJECT MENU F2 SETTING MENU P2/2
2 Press the [F1](PROJECT MENU) key.	[F1]	PROJECT MENU F1 NEW PROJECT F2 SELECT PROJECT
3 Press the [F2](SELECT PROJECT) key.	[F2]	SELECT PROJECT → p01 p02 ↑ ↓ SELECT
4 Select the project [p02] by pressing the [F2] or [F3] key.	[F2] or [F3]	SELECT PROJECT p01 → p02 ↑ ↓ SELECT
5 Press the [F4](SELECT) key. Project "p02" is selected.	[F4]	PROJECT MENU F1 NEW PROJECT F2 SELECT PROJECT

7 STATION SETTING

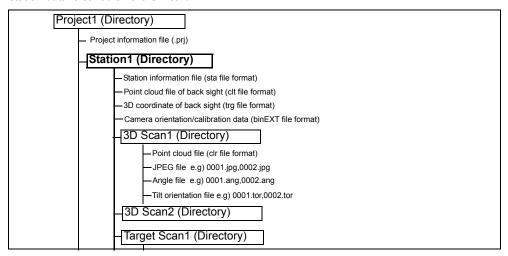
Data related to the scanning (occupied point name, backsight point name, target data, 3D data, etc.) are stored in the station.

Create a new station when moving to another station to scan the object.

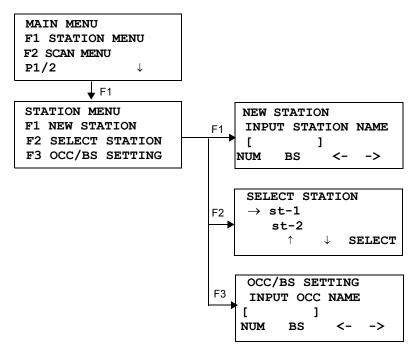
To continue scanning from the same station, or to control existing data, select from the existing stations.



Station data is saved on the SD card.



• Station menu operation



7.1 Creating a New Station

[Example] Station name: st-4

	Operating procedure	Operation	Display
			MAIN MENU F1 STATION MENU F2 SCAN MENU P1/2 ↓
1	Press the [F1](STATION MENU) key to select the station menu.	[F1]	STATION MENU F1 NEW STATION F2 SELECT STATION F3 OCC/BS SETTING
2	Press the [F1](NEW STATION) key.	[F1]	NEW STATION INPUT STATION NAME [] NUM BS <>
3	Input station name [st-4]. (Refer to Chapter 4.8 "File Name Input Assistant Function" if you wish to use the file name whose last digit is counted up sequentially.)	Input station name	NEW STATION INPUT STATION NAME [st-4] ALP BS <>
4	Press the [ENT] key. Station "st-4" is set.	[ENT]	STATION MENU F1 NEW STATION F2 SELECT STATION F3 OCC/BS SETTING

7.2 Selecting from Existing Stations

[Example] Select station name: st-2

	Operating procedure	Operation	Display
			MAIN MENU F1 STATION MENU F2 SCAN MENU P1/2
1	Press the [F1](STATION MENU) key to select the station menu.	[F1]	STATION MENU F1 NEW STATION F2 SELECT STATION F3 OCC/BS SETTING
2	Press the [F2](SELECT STATION) key.	[F2]	SELECT STATION → st-1 st-2 ↑ ↓ SELECT
3	Select the station [st-2] by pressing the [F2] or [F3] key.	[F2] or [F3]	$\begin{array}{c} \textbf{SELECT STATION} \\ & \textbf{st-1} \\ \rightarrow & \textbf{st-2} \\ & \uparrow \downarrow \textbf{SELECT} \end{array}$
4	Press the [F4](SELECT) key. Station "st-2" is selected.	[F4]	STATION MENU F1 NEW STATION F2 SELECT STATION F3 OCC/BS SETTING

7.3 Setting the Occupied Point Name and the Backsight Point Name

The occupied point name and backsight point name must be set in order to obtain the coordinates of the scanning object relative to a known point.

Enter the occupied point name, instrument height, backsight point name, and target name. Collimate the backsight point.

Start the target scanning, and record the backsight point data.

- The only target you can use is Topcon target sheets.
- The target sheet to use differs depending on the scanning distance. Refer to Chapter 4.9.1 "Selecting the Target Sheet".

[Example] Use the following settings.

Occupied point name : a-1

Instrument height : 1.5m (Entry range: -999.999m-999.999m)

Backsight point name : b-1 Target name : t-1

	Operating procedure	Operation	Display
1	Press the [F1](STATION MENU) key to select the station menu.	[F1]	MAIN MENU F1 STATION MENU F2 SCAN MENU P1/2 STATION MENU F1 NEW STATION F2 SELECT STATION
2	Press the [F3](OCC/BS SETTING) key to input the occupied point name.	[F3]	F3 OCC/BS SETTING OCC/BS SETTING INPUT OCC NAME [] NUM BS <>
3	Input the occupied point name [a-1]. (Refer to Chapter 4.8 "File Name Input Assistant Function" if you wish to use the file name whose last digit is counted up sequentially.)	Input occupied point name	OCC/BS SETTING INPUT OCC NAME [a-1] ALP BS <>
4	Press the [ENT] key.	[ENT]	OCC/BS SETTING INPUT HEIGHT []m <-
5	Input instrument height [1.5m]. Input unit is meters (m).	Input instrument height	OCC/BS SETTING INPUT HEIGHT [1.5]m <-
6	Press the [ENT] key.	[ENT]	OCC/BS SETTING INPUT BS NAME [] NUM BS <>

		1 1	
7	Input backsight point name [b-1]. (Refer to Chapter 4.8 "File Name Input Assistant Function" if you wish to use the file name whose last digit is counted up sequentially.)	Input backsight point name	OCC/BS SETTING INPUT BS NAME [b-1] ALP BS <>
8	Press the [ENT] key.	[ENT]	OCC/BS SETTING AIM TO TARGET
9	Collimate to the center of backpoint target by using Horizontal/Vertical jog.	Collimate to a target	AND PRESS ENT KEY
10	Press the [ENT] key.	[ENT]	OCC/BS SETTING BACKSIGHT SCAN START
			PRESS ENT KEY
11	Press the [ENT] key. Scanning of the backsight point will start. REMAIN: remaining time of the scan	[ENT]	OCC/BS SETTING SCANNING IN PROGRESS REMAIN 0h 0m 10S PAUSE STOP
			OCC/BS SETTING FINISHED PRESS ENT KEY
12	When scanning of the backsight point is correctly completed, an end message will be displayed. Then, press the [ENT] key. *1) *2)	[ENT]	OCC/BS SETTING PEEP TARGET TO CHECK F1 SAVE F2 REVOKE F3 SCAN AGAIN
13	The mirror will rotate toward the backsight point. Look into the sighting collimator and confirm the position of the backsight point that was scanned.		
	When the backsight point is correctly collimated, select the F1 (SAVE) key.	[F1]	STATION MENU F1 NEW STATION
	When the backsight point is not correctly collimated, there is a possibility of a reflecting object other than the target being scanned. Select either the F2 (REVOKE) or F3 (SCAN AGAIN) key and redo. The backsight point name and the occupied point name are set.		F2 SELECT STATION F3 OCC/BS SETTING
*1) If the instrument is tilted 10' or more, the screen		

^{*1)} If the instrument is tilted 10' or more, the screen shown below will be displayed.

TILT OVER

PRESS ENT KEY

After leveling the instrument, press the [ENT] key.

OCC/BS SETTING BACKSIGHT SCAN START

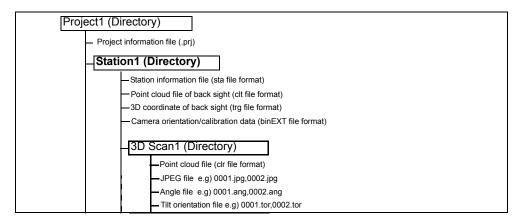
PRESS ENT KEY

*2) If the scan result exceeds the following conditions, the screen below will be displayed. Under unfavorable weather conditions or when scanning is interrupted, deviation may become large. Select OK, NG or RETRY depending on the precision you are seeking. Angle deviation (deviation of measured angle) Distance deviation (deviation of measured distance) : 10mm DEVIATION IS LARGE!! ANG DEV : 14.5asec DIST DEV: 12mm OK NG RETRY F2 OCC/BS SETTING OCC/BS SETTING STATION MENU FINISHED AIM TO TARGET F1 NEW STATION F2 SELECT STATION PRESS ENT KEY F3 OCC/BS SETTING AND PRESS ENT KEY

8 SCANNING

There are two types of scanning: target scanning, which measures only the target and 3-D scanning, which obtains 3-D data.

Scanning data is kept in the Station folder on the SD card.



Target scanning

Target scanning is used to scan a target set in the 3-D scanning area.

Target scanning data is used in the after-processing to align 3-D scanning data obtained from multiple points.

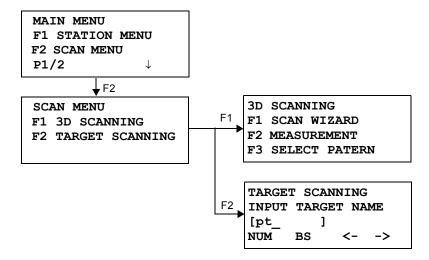
In target scanning, the coordinates of the center of the target are obtained.

3-D scanning

3-D scanning is used to obtain three-dimensional data.

Determine the scanning area first, and set the parameters (scanning density).

Measurement menu operation



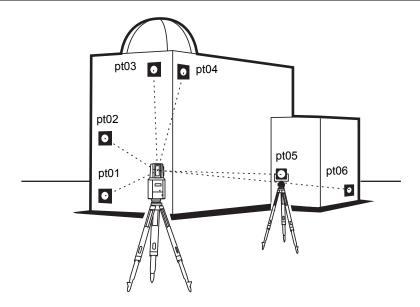
8.1 Target Scanning

Target scanning is necessary to coordinate positional information of multiple 3D scanning in the after-processing of the data.

It is therefore necessary to set the target so that it is also visible from the next station.

Place the target on or near the scanning object, and perform the scanning.

- The only target sheet you can use is Topcon's target sheets for GLS-1500. Do not use target sheets for GLS-1000.
- In order to coordinate positional information of the data, scanning data on 3 or more targets is needed. Set targets at 3 or more locations where it is possible to collimate from each station.
- 3D data cannot be obtained where the target sheets are placed, so avoid putting them on important scanning locations.
- Do not set the targets on a straight line. Also, spread out the targets equally so that they can cover the 3D scanning area fully.
- Use the appropriate target sheets depending on the scanning distance. Refer to Chapter 4.9.1 "Selecting the Target Sheet".



Example of Settings: Targets from pt01 to pt06 are to be scanned.

Target height for pt01:

0.5m (Range of entry -999.999m to 999.999m)

	Operating procedure	Operation	Display
			MAIN MENU F1 STATION MENU F2 SCAN MENU P1/2
1	Press the [F2](SCAN MENU) key to select the scan menu.	[F2]	SCAN MENU F1 3D SCANNING F2 TARGET SCANNING
2	Press the [F2](TARGET SCANNING) key to input target name.	[F2]	TARGET SCANNING INPUT TARGET NAME [_] NUM BS <>

١.		1 1	
3	Input target name [pt01]. (Refer to Chapter 4.8 "File Name Input Assistant Function" if you wish to use the file name whose last digit is counted up sequentially.)	Input target name	TARGET SCANNING INPUT TARGET NAME [pt01] ALP BS <>
4	Press the [ENT] key.	[ENT]	TARGET SCANNING INPUT TARGET HEIGHT []m <-
5	Enter the target height [0.5m] for the target name [pt01]. Enter the height in meters.	Input target height	TARGET SCANNING INPUT TARGET HEIGHT [0.5]m <-
6	Press the [ENT] key.	[ENT]	TARGET SCANNING
_			AIM TO TARGET AND PRESS ENT KEY
7	Aim to a target [pt01] by using Horizontal/Vertical jog.	Aim to target [pt01]	TARGET SCANNING SCAN START
8	Press the [ENT] key.	[ENT]	PRESS ENT KEY
9	Press the [ENT] key. Scanning starts.	[ENT]	TARGET SCANNING SCANNING IN PROGRESS
	REMAIN: remaining time of the scan		REMAIN 0h 0m 10S PAUSE STOP
	Target scanning is finished.		TARGET SCANNING FINISHED
			PRESS ENT KEY
10	When target scan is correctly completed, an end message will be displayed. Then, press the [ENT] key. *1) *2)	[ENT]	TARGET SCANNING PEEP TARGET TO CHECK F1 SAVE F2 REVOKE F3 SCAN AGAIN
11	The mirror will rotate toward the target. Look into the sighting collimator and confirm the position of the target that was scanned.		
	When the target is correctly collimated, select the F1 (SAVE) key.	[F1]	SCAN MENU F1 3D SCANNING F2 TARGET SCANNING
	When the target is not correctly collimated, there is a possibility of a reflecting object other than the target being scanned. Select either the F2 (REVOKE) or F3 (SCAN AGAIN) key and redo.		
	[pt01] target scanning is finished.		
12	Press the [F2](TARGET SCANNING) key to input the target name.	[F2]	TARGET SCANNING INPUT TARGET NAME [] NUM BS <>

13 Input the target name [pt02]. TARGET SCANNING Input (Refer to Chapter 4.8 "File Name Input Assistant target INPUT TARGET NAME Function" if you wish to use the file name whose name [pt02] last digit is counted up sequentially.) ALP BS <--> 14 Repeat step 4 - 12 to scan target name [pt03]. *1) If the instrument is tilted 10' or more, the screen shown below will be displayed. TILT OVER PRESS ENT KEY After leveling the instrument, ENT press the [ENT] key. TARGET SCANNING SCAN START PRESS ENT KEY *2) If the result of the target scanning exceeds the following conditions, the screen below will be displayed. Under unfavorable weather conditions or when scanning is interrupted, deviation may become large. Select OK, NG or RETRY depending on the precision you are seeking. Angle deviation (deviation of measured angle) : 10" Distance deviation (deviation of measured distance) : 10mm DEVIATION IS LARGE!! ANG DEV : 14.5asec DIST DEV: 12mm OK NG RETRY

F2

F1 3D SCANNING F2 TARGET SCANNING

SCAN MENU

TARGET SCANNING

PRESS ENT KEY

FINISHED

TARGET SCANNING

AIM TO TARGET

AND PRESS ENT KEY

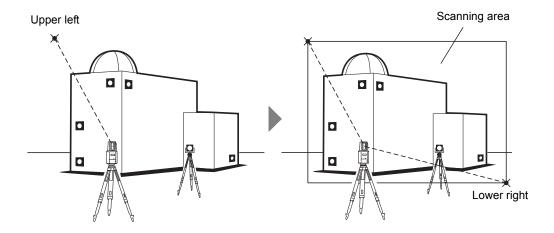
8.2 3D Scanning

3D scanning obtains 3D data of the scanning object.

To start 3D scanning, determine the scanning area, and set the various settings related to the scanning. If target scanning data is to be used, make sure the scanning area includes the common targets.

8.2.1 Scanning Area

To determine the scanning area, collimate the upper left corner and lower right corner of the area to be scanned. The internal camera will take a photograph of the provided area (if [SCAN + IMG] or [IMAGE] has been selected).



8.2.2 Setting the Scanning Density

Set the scanning density of the scanning area determined.

Set the scanning density in both vertical and horizontal directions of the scanning area. The horizontal and vertical scanning density settings can be entered by any of the following three ways. Each value will be linked.

- 1: Enter the horizontal distance and the intervals between scanning points. (Distance, Interval V,H)
- 2: Enter the total number of scanning points (Point Num V,H) (Maximum VxH point value: 100000000 points)
- 3: Enter the angle between scanning points (Scan Degree V,H)

Se	Selecting items		What is set
	DISTANCE (m)	1-300	Enter the rough distance from the instrument to the scanning object. (Refer to Chapter 5.1.4 "Measuring Distance to the Scanning Object" for measuring method.)
1	INTERVAL V (mm)	0.1-1000	Enter the vertical distance between scanning points in the scanning area.
	INTERVAL H (mm)	0.1-1000	Enter the horizontal distance between scanning points in the scanning area.
2	POINT NUM V (point)	10-129600	Enter the number of scanning points in the vertical direction of the scanning area.
	POINT NUM H (point)	10-25200	Enter the number of scanning points in the horizontal direction of the scanning area.
3	SCAN DEGREE V (deg)	0.0027-10	Enter the angle between scanning points in the vertical direction of the scanning area.
J	SCAN DEGREE H (deg)	0.0027-10	Enter the angle between scanning points in the horizontal direction of the scanning area.

8.2.3 Registration of scanning pattern

Register scanning area and scanning density for 3D scanning, with a scanning pattern name. A registered scanning pattern can be selected and used for 3D scanning. Up to 20 scanning patterns can be registered.

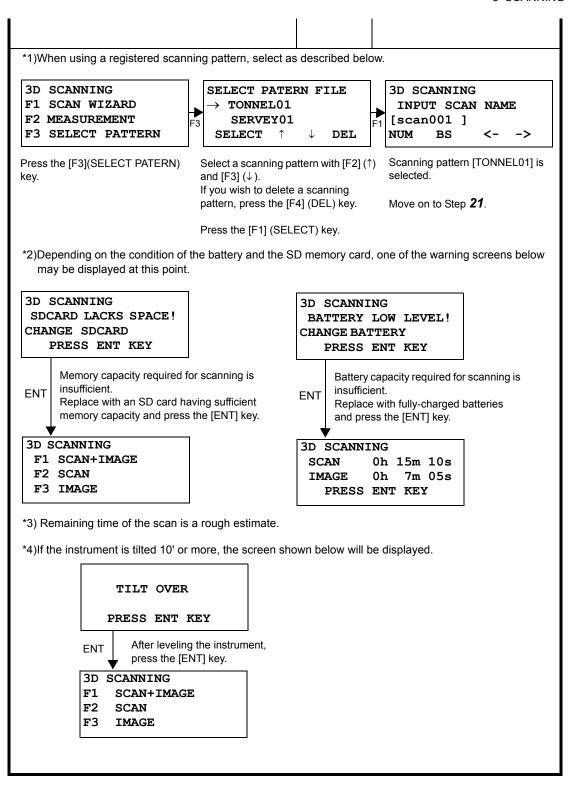
8.2.4 Performing 3D Scanning

Example: SCAN DEGREE H:0.1°, SCAN DEGREE V:0.1°, SCAN NAME:hill

	Operating procedure	Operation	Display
	[Setting the scanning area]		MAIN MENU F1 STATION MENU F2 SCAN MENU P1/2
1	Press the [F2](SCAN MENU) key to select the scan menu.	[F2]	SCAN MENU F1 3D SCANNING F2 TARGET SCANNING P1/2
2	Press the [F1](3D SCANNING) key.	[F1]	3D SCANNING F1 SCAN WIZARD F2 MEASUREMENT F3 SELECT PATTERN
3	Press the [F1](SCAN WIZARD) key.*1)	[F1]	3D SCANNING AREA SELECT AIM TO TOP-LEFT AND PRESS ENT KEY
4	Aim to upper left by using Horizontal/Vertical jog.	Aim to upper left	3D SCANNING AREA SELECT
5	Press the [ENT] key.	[ENT]	AIM TO BTTM-RIGHT AND PRESS ENT KEY
6	Aim to lower right by using Horizontal/Vertical jog.	Aim to	3D SCANNING
7	Press the [ENT] key.	lower right [ENT]	AREA SELECT COMPLETE PRESS ENT KEY
	The scanning area has been set.		
8	Press the [ENT] key.	[ENT]	→ DISTANCE [100] INTERVAL_V [0.5] INTERVAL H [0.5] UNIT EDIT PTTN ↓
	[Setting the scanning density, scanning pattern]		
9	<example: degree="" scan="" setting="" the=""> Press the [F1](UNIT) key.</example:>	[F1]	3D SCANNING POINT NUM_H [100] POINT NUM_V [100] UNIT EDIT PTTN ↓

10 Press the [F1](UNIT) key.	[F1]	3D SCANNING →SCAN ANG_H[0.3] SCAN ANG_V[0.3] UNIT EDIT PTTN ↓
11 Press the [F2](EDIT) key to input the scan degree.	[F2]	3D SCANNING INPUT SCAN ANGLE_H [0.3]deg <-
12 Input horizontal scan degree [0.1]. Input unit is degrees.	Input horizontal scan degree	3D SCANNING INPUT SCAN ANGLE_H [0.1]deg <-
13 Press the [ENT] key.	[ENT]	3D SCANNING →SCAN ANG_H[0.1] SCAN ANG_V[0.3] UNIT EDIT PTTN ↓
14 Select SCAN DEGREE V by pressing [F4](↓) key.	[F4]	3D SCANNING SCAN ANG_H[0.1] →SCAN ANG_V[0.3] UNIT EDIT PTTN ↓
15 Press the [F2](EDIT) key to input the scan degree.	[F2]	3D SCANNING INPUT SCAN ANGLE_V [0.3]deg <-
16 Input vertical scan degree [0.1].	Input vertical scan degree	3D SCANNING INPUT SCAN ANGLE_V [0.1]deg <-
17 Press the [ENT] key.	[ENT]	3D SCANNING SCAN ANG_H[0.1] →SCAN ANG_V[0.1] UNIT EDIT PTTN ↓
18 Press the [F3](PTTN) key.	[F3]	3D SCANNING INPUT PATTERN NAME [] NUM BS <>
19 Input scanning pattern name [RIVER].	Input scanning pattern name	3D SCANNING INPUT SCAN PATTERN [RIVER] NUM BS <>
20 Press the [ENT] key. The scanning pattern name has been registered.	[ENT]	3D SCANNING INPUT SCAN PATTERN [scan001] NUM BS <>

21 Input scan name [hill]. (Refer to Chapter 4.8 "File Name Input Assistant Function" if you wish to use the file name whose last digit is counted up sequentially.) 22 Press the [ENT] key.	Input scan name [ENT]	3D SCANNING INPUT SCAN NAME [hill] NUM BS <> 3D SCANNING F1 SCAN+IMAGE
22 Calcat the desired to use of data *O\		F2 SCAN F3 IMAGE
23 Select the desired type of data.*2) F1:SCAN + IMAGE: 3D data and image data F2:SCAN: 3D data only F3:IMAGE: image data only The scanning settings are finished, and 3D scanning information is displayed. SCAN: remaining time of the 3D scan *3) (approximate figures) IMAGE: remaining time of the image scan (approximate figures) Scanning settings are finished. [Starting 3D scanning]	[F1]	3D SCANNING SCAN 0h 15m 10s IMAGE 0h 7m 05s PRESS ENT KEY
24 Press the [ENT] key. Scanning starts. REMAIN: remaining time of the scan [F2]PAUSE: Scanning paused. Press again to restart. [F3]STOP: Scanning stopped. When the 3D scanning is finished, the screen shown on the right will be displayed.*4)	[ENT]	3D SCANNING SCANNING IN PROGRESS REMAIN 0h 10m 30s PAUSE STOP 3D SCANNING ETHICHED
Press the [ENT] key, and the screen shown on the right will be displayed.	[ENT]	FINISHED PRESS ENT KEY 3D SCANNING F1 SCAN WIZARD F2 MEASUREMENT F3 SELECT PATTERN



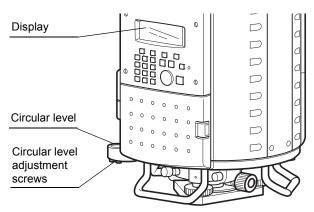
9 CHECK AND ADJUSTMENT

Perform regular inspection and adjustment in order to maintain accurate measuring operation.

9.1 Circular Level Adjustment (main unit)

Display the slope of the main unit on the display screen with the tilt sensor. (Refer to Chapter 4.2.1 "Leveling and Centering the Instrument".)

1 Accurately level the instrument while viewing the slope displayed on the display screen. Adjustment is not required if the bubble of the circular level is centered properly.



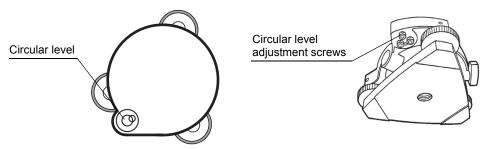
2 If the bubble is not centered, shift the bubble to the center of the circular level by rotating the three circular level adjustment screws on the circular level with the adjustment pin included in the package.

9.2 Circular Level Adjustment (tribrach)

- 1 Remove the tribrach from the main unit.
- **2** Attach correctly adjusted instrument (total station, theodolite, etc.) on to the tribrach.
- 3 Level the instrument with the plate level. Adjustment is not required if the bubble of the circular level is centered properly.



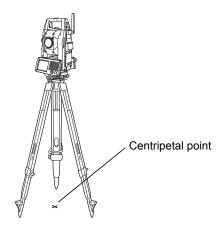
4 If the bubble is not centered, shift the bubble to the center of the circular level by rotating the three circular level adjustment screws on the circular level with the adjustment pin included in the package.



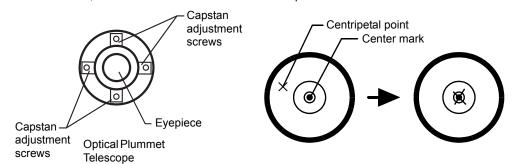
9.3 Optical Plummet Telescope Adjustment

Optical plummet telescope for the GLS-1500 tribrach should be checked to ascertain that it corresponds to the optical plummet telescope of other units (total station, theodolite, etc.)

- 1 Remove the tribrach from the GLS-1500 main unit.
- 2 Attach GLS-1500 tribrach on the correctly adjusted instrument (total station, theodolite, etc.).
- **3** Attach the above to a tripod.
- **4** Using the optical plummet telescope of the instrument, make the point on the ground.



- 5 Using the optical plummet telescope of the GLS-1500 Tribrach, collimate the point marked in 4 with the center mark.
 Adjustment is not required if the point is properly centered in the center mark.
- 6 If not centered, turn the four to coincide with the center point marked in 4.



Note:

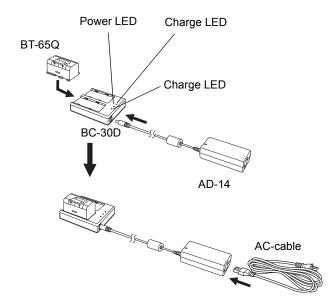
Focal mirror is screwed on from the top, bottom, right and left. In order to move the center mark, first loosen the capstan adjustment screw on the side to which the center mark must be moved, then tighten the adjustment screw on the opposite side. Finally, tighten both screws to hold in place.

9.4 Adjustment of Installation Error of the Tilt Sensor

Perform adjustment from "SETTING MENU." Perform 5.2.8 "Adjusting the Tilt Sensor Installation Error".

10 CHARGING THE INTERNAL POWER SOURCE (BT-65Q)

- · To charge
- 1 Connect the AC/DC converter and AC-Cable to the charger. *1)
- 2 Plug the AC-Plug into the outlet. (The Power LED will light.)
- 3 Attach the battery in the charger. Charging will start. (The Charge LED will Orange.) Charging will take approximately 5 hours per discharged battery. (The Charge LED will Green.) If two batteries are attached to the charger, it will take about 10 hours to charge them completely. In this case, the batteries are charged one by one. If battery power is at a very low level when beginning charging, such as after the instrument has been in storage over an extended period of time in a discharge state, a full charge may not be possible with a single charging. In such a case, recharge a second time.
- 4 After charging, remove the battery from the charger. Remove the charger from the outlet.



The power LED

Red ON : Power is on.

The charge LED will indicate charging status;

OFF : Wait for charging.

Orange ON : Charging.

Green ON : Charging completed.

Orange Flashing: Charging error.

Charge LED will flash when the battery life is over or the battery is

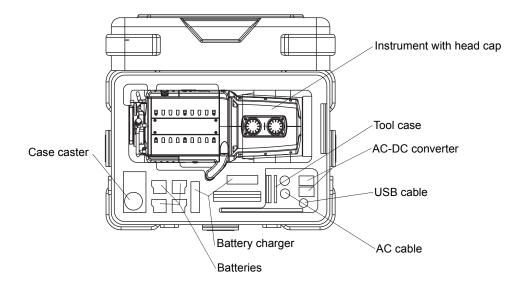
broken down. Replace the battery to new one.

*1) Always use the AC/DC converter provided with the product.

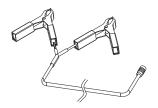
- Do not charge continuously, otherwise the battery and the charger may be deteriorated.
 If charging is necessary, use the charger after stopping charge for approximately 30 minutes.
- Do not charge the battery in right after the battery is charged, it causes deterioration of the battery in rare cases.
- · The charger may develop heat while charging, there is no problem of it.
- Recharging should take place in a room with an ambient temperature range of 10°C to 40°C (50°F to 104°F).
- If charging is done at high temperature, charging time of the battery may take longer.
- Exceeding the specified charging time may shorten the life of the battery and should be avoided if possible.
- The battery source will discharge when stored and should be checked before using with instrument.
- If the instrument is not used over an extended period of time, store in a place at 30°C or below in a 50% charged state.
 - Over discharge will lower performance and a full charge may become impossible. Please charge once every few months.

11 PRECAUTIONS

- For cleaning the instrument after use, remove dust using a cleaning brush, then wipe off with a cloth
- 2) For cleaning the window surface, use a cleaning brush to remove the dust, then use a clean lintless cotton cloth. Moisten it with alcohol (or mixture with ether) to wipe gently in a rotational motion from the center out.
- 3) The instrument should be stored in the room temperature range of -10°C to +60°C.
- 4) To remove the dust on the case, never use thinner or benzine. Use a clean cloth moistened with neutral detergent.
- 5) Do not store the wet instrument in the case. If the instrument is wet, wipe off any moisture with a soft cloth, let dry, and store in the case.
- 6) If the tripod is used for a long time, some parts may wear away; the tips may loosen up and the butterfly screw may break. From time to time, check each part.
- 7) When storing the instrument in the case, make sure to attach the head cap, and to place the instrument so it fits into the concave shape inside the case.

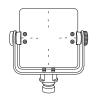


12 SPECIAL ACCESSORIES



Power cord PC-21

Connect to an external power source (12V, commercially available)





Target board (Large, Small)

 Place the target sheet(magnet type) and attach to the prism holder.













Target sheet [Large, Middle, Small]

Target sheets for GLS-1500
 Select the target sheet based on the scanning distance.

Do not use target sheets for GLS-1000.

Target sheet(Magnet type) [Large, Middle, Small]

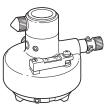
Target sheets for GLS-1500
 Select the target sheet based on the scanning distance.

Do not use target sheets for GLS-1000.



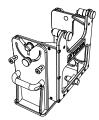
Tribrach

Holds the prism adapter



Prism adapter

Holds the target board



TILT STAND-1

• Range of set angle : 0° to ±90° (15° interval)

13 ERROR DISPLAYS

Message code	Description	Countermeasures	
BATTERY CTRL ERROR	An error occurred in the battery control.	Unable to scan or photograph. Long-push the power key and restart. If long-pushing the power key does not work, remove the internal and external batteries and restart. If the error persists, have the instrument repaired.	
ROTARY LINK ERROR	An error occurred during internal data transfer.	Unable to scan or photograph. Turn the power off and restart. If the error persists, have the instrument repaired.	
NETWORK INIT ERROR	Failed to initialize a wireless network.	Unable to operate with the PC control mode. Open the WLAN cover and check that the LED lamp on the WLAN card is lit. (You can still operate the instrument using a USB connection or stand-alone.)	
SERVO ERROR	An error occurred in the mirror or drive.	Unable to scan or photograph. Turn the power off and restart. If the error persists, have the instrument repaired.	
CALIBRATION ERROR	Failed internal calibration required at initialization.	Unable to scan. Turn the power off and restart. If the error	
APD ERROR	An error occurred in the laser beam receiving system.	persists, have the instrument repaired.	
INTERNAL ERROR	An error occurred in the built-in calculator.	Unable to scan or photograph. Turn the power off and restart. If the error persists, have the instrument repaired.	
LEASER ERROR	An error occurred in the laser beam emitting system.	Unable to scan. Turn the power off and restart. If the error persists, have the instrument repaired.	
TILT CONTROL ERROR	Failed to communicate with the tilt controller.	Unable to use the tilt sensor. Turn the power off and restart. If the error persists, have the instrument repaired.	
SDCARD NOT SEATED PLEASE RE-SEAT	An SD card was not recognized.	Check that the SD card is inserted correctly. If the error	
FORMAT FAILED! PLEASE CHECK A CARD	An error occurred during SD card formatting.	persists, format the card using a PC with the SD format tool provided by the SD Association on the web. (Download from: http://www.sdcard.org/consumers/formatter/) If the SD card cannot be formatted using this tool, the SD card may be broken. Use another SD card. If the second SD card cannot be formatted, have the instrument repaired.	
EXCEEDED THE NUMBER OF REGISTRATION	Registered scanning patterns have exceeded 20.	Delete unnecessary scanning patterns.	

PLEASE INPUT WEPKEY IN SHARED KEY MODE	The WEP key is not entered when a shared key is selected for authorization.	When a shared key is selected for authorization, a WEP key rentry will be required. Either enter the WEP key or change the authorization setting to "open."	
SDCARD LACKS SPACE!	The remaining capacity of an SD card is lower than required for the data to be scanned.	Delete unnecessary data in the SD card or insert an SD card with sufficient capacity.	
NAME NOT DIRECTORY PLEASE START OVER	Displayed when attempting to open a file instead of a directory.	Designate a directory.	
FILE NAME EXISTS ENTER NEW NAME	A designated filename already exists.	Enter a different name.	
INPUT 5,13 CHARS OR 10,26 DEGITS IN HEX	When the WEP key is entered, this "error" text is displayed if you enter the number of characters or digits that is different from the designated one.	Enter 5 or 13 characters in ASCII, or 10 or 26 digits in hexadecimal.	
TILT OVER	When the tilt sensor is set to on, the instrument is tilted at ±6' or more. At the [TILT 0 ADJUST] setting, the screen will display the tilt angle of ±30" or more.	Accurately level the instrument.	
TILT ERROR	At the [TILT 0 ADJUST] setting, the instrument is tilted at the error 1' or more.	Set the instrument firmly on a flat and solid surface to make adjustments.	
SCAN AREA TOO SMALL PLEASE START OVER	The starting point and end point of the designated scan range are too close together.	Designate a wider range.	
INAPPROPRIATE VALUE PLEASE INUPUT AGAIN		Enter a value within the limited range.	
TOO MANY H POINTS PLEASE INUPUT AGAIN		Enter a value not exceeding the maximum horizontal points.	
TOO FEW H POINTS PLEASE INUPUT AGAIN		Enter a value equal to or above the minimum horizontal points.	
TOO MANY V POINTS PLEASE INUPUT AGAIN	The entered value is out of the limited range.	Enter a value not exceeding the maximum vertical points.	
TOO FEW V POINTS PLEASE INUPUT AGAIN		Enter a value equal to or above the minimum vertical points.	
TOO MANY TOTAL PTS PLEASE INUPUT AGAIN		Enter a value not exceeding the maximum total points	
TOO FEW TOTAL PTS PLEASE INUPUT AGAIN		Enter a value equal to or above the minimum total points.	
H INTERVAL TOO SMALL PLEASE INUPUT AGAIN		Enter a value equal to or above the minimum horizontal interval.	
H INTERVAL TOO LARGE PLEASE INUPUT AGAIN"		Enter a value not exceeding the maximum horizontal interval.	
V INTERVAL TOO SMALL PLEASE INUPUT AGAIN		Enter a value equal to or above the minimum horizontal angle.	

V INTERVAL TOO LARGE PLEASE INUPUT AGAIN	The entered value is out of the limited range.	Enter a value not exceeding the maximum horizontal angle.	
INTERNAL SCAN ERROR PLEASE START OVER	An error occurred during scanning.	Unable to scan. Long-push the power key and restart. If long-pushing the power key does not work, remove the internal and external batteries and restart. If the error persists, have the instrument repaired.	
LINK ERR ATTEMPTING RECOVERY	An error occurred during internal data transmission and automatic recovery process is executed.	Wait until the automatic recovery process is completed. The instrument can be used after the process is completed. If automatic recovery fails, [ROTARY LINK ERROR] will be displayed. In such a case, turn the power off and restart. If the error persists, have the instrument repaired.	
BATTERY LOW	The battery is low. Or the battery	Replace with fully-charged batteries.	
LOW BATTERY IS EXPECTED IN SCANNING	may become depleted while scanning.		
CAN NOT FIND TARGET PLEASE START OVER	The target center cannot be found.	The target may not be correctly collimated or may have been blocked during scanning. Reconfirm the position and scan again. If the error persists, restart the instrument and scan once again. If correction is still not seen, adjustment will be required.	
MEASUREMENT FAILED PLEASE START OVER	An error occurred during target center measurement.		

If error still persist after attempting to clear them, contact your local Topcon dealer or Topcon head office.

14 **SPECIFICATIONS**

General specification

Dimensions Instrument : 240 (L)x240 (W)x566 (H) mm

carrying case : 760x540x380 mm (excluding casters)

Instrument : 16kg (without battery, tribrach) Weight

carrying case : 8.5kg (excluding casters)

Instrument height : 410mm (from the attaching surface of the tribrach to the center

of the rotating mirror)

Input voltageInternal battery : 7.4V

External battery : 14±1V (commercially available 12-volt lead car battery is enabled.)

Operation temperature range : 0°C to +40°C Conservation temperature range : -10°C to +60°C

Protection against water and dust : IP52 (Based on the standard IEC60529) Dust-proof category 2

Scanning Unit

Range*1)

: 150m 18% reflectivity 90% reflectivity : 330m

Single Point Accuracy*1), *2)

Distance : 4mm (σ) (at 1 - 150m)

: 6" Angle (vertical) : 6" Angle (horizontal)

Scan Rate*3) : Maximum 30,000Hz

Scan Density (Resolution)

Spot Size : 6mm or less (1m to 40m) (1/e2)

Approximately 16mm at 100m

Sample Density : Maximum 1mm at 20m (selectable) Maximum point number*4) : VxH: 100,000,000 points

Field-of-view (Per scan)

: 360°(maximum) Horizontal : ±35°(maximum) Vertical

Laser

Laser class : Class1 (IEC EN60825-1) : 1535nm (invisible) Wave Lengths Maximum average output : 10mW (stop-beam) 100mW (scan-beam)

30,000Hz (maximum) Pulse frequency

Target detection accuracy*1) : 3"[σ] at 50m

*1) Differs depending on weather condition and atmospheric stability.

*2) Differs depending on the reflectivity and surface condition of the scanning target.

*3) Differs depending on scanning range.

*4) When used stand-alone.

Camera Unit

Field of view : Approximately 22deg (V) x Approximately 16.5deg (H)

Number of the pixels : 2M pixel (1600x1200)

Tilt Unit

Model : Automatic adjustment of vertical angle and horizontal angle

Compensation range : +6' Correction unit : 1"

Display

Type : Character-type LCD

: LED with Backlight

Number of the indication letters : 20 character x 4 line

Complying with the SD memory card/SDHC memory card standards

Wireless LAN : IEEE 802.11b **USB** : Rev. 2.0

Type mini B

Level

Shape : Circular type Sensitivity : 10'/2mm

Plummet

Magnification : 2.2x

Focusing : Fixed type :1.4m (using range 0.7-1.8m)

Image : Erect Field of view : 5°

On-Board Battery(BT-65Q)

Capacity : 5000mAh Voltage : 7.4V Weight : 0.2kg

Operating time(+20°C) : 4h/4pcs *1) (continuous scanning use)

*1) Operating time depends on the ambient temperature, and the instrument's condition of use.

Battery Charger(BC-30D)

Input voltage : AC100V to 240V

Frequency : 50/60Hz
Operating temperature range : -10°C to +40°C
Charging time : Approx 5h /pc

Weight : 0.4kg



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.

This is a CLASS A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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