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Chapter I  Summaries of Star S82

§1.1 Characters of Star S82

Star S82 is a new integrative RTK product, which integrates mainboard, radio, antenna, Bluetooth module, batteries etc. The rover is a whole integration and can be connected to handheld computer by Bluetooth easily.

§1.2 Three originality

1. Building Block System Structure (BBSS)

Star S82 adopts building block system structure. The BBSS design can effectively avoid the interference between built-in transmitter and mainboard and provides replacement function of GSM and GPRS module.

2. AutoRover

The Rover can search differential signal of Base and switch channels automatically as it is powered on, making channel searching much easier.

3. One Key On

There is only one key button on the mainframe. It is very easy to power on, shut down, initialize receiver and switch between RTK mode and STATIC mode. The operation is greatly simplified and personalized.

§1.3 Four Features

1. Perfect combination of integration and anti-interfering

Integrative design is the current of the same kind of products in the world, which completely get rid of the limit of too many cables. Modularization structure resolves the problem of interference in the
inner mainframe effectively.

2. Professional and adjustable radio, convenient to change frequency

The latest RTK data link technology can efficiently track all signals even in poor radio coverage area, ensuring reliability and decreasing false-code rate.

3. Industrial design (waterproof, dustproof, shockproof)

4. Double ports (USB, COM), rapid data transfers, Big Memory (32M)

Besides the COM port, Star S82 provide USB mode to transmit raw data. 32M memory can satisfy continuous static data collection for over 40 hours at 5 seconds intervals. The storage time could be longer, if the interval becomes longer.
Chapter II  Mainframe

§ 2.1 Mainframe Figure

You can find four indicator lights and a key-press on the panel. For Base, there is a little different from the Rover, Base has no antenna.

§ 2.2 Interface
Figure 2-2 Interfaces of Base

Note: Figure 2-1 shows the interfaces on the mainframe. Interface for data communication has two basic functions: one is used to download raw static data to the computer, the other is used to connect the handheld computer to Base by cable.

§2.3 Install Battery

Figure 2-3 Battery Module
The battery is installed at the bottom of mainframe. In RTK mode, you don’t need to install lithium battery for Base, because the power is provided by external car accumulator.

§ 2.4 Front Panel

LED1 for Data Link Status

LED2 for Radio status

LED3 for Satellite and Bluetooth

LED4 for Power

Function key
You can find four indicator lights and a function-key on the panel.

1. **LED1 (for data link Status)** indicates current status, in static mode the light blinks once every n seconds if the interval is n seconds (for example, the light blinks every five seconds if you set the interval to be 5 seconds).

   In RTK mode, the light blink red every second means the data link is in good health and if the light blink red without rule, it means data link is in poor health.

2. **LED2 (for radio status)** indicates status of radio, the light will blink twice quickly every five seconds in RTK Base mode and for the rover the light blinks every second, it means radio is working order.

   In Static mode, the light will light all long time for Base and Rover.

3. **LED3 (for Satellite and Bluetooth)** indicates status of satellite and the connection of Bluetooth, the light has two color, the left one indicates the satellite’s status, it will blink every 30 seconds (for example, if the light blinks six times it represent the receiver fixed six satellites). The right one will light all long time if the handhold computer is connected to rover with Bluetooth.

4. **LED4 (for Power)** indicates status of the power. When power supply is enough, the light remains light all long time, otherwise, it will blink (clue to replace battery). When power is lithium battery, the left light will light (red), when power is external power, the right light will light (green).

5. **Function key**: The key has two function: power on/off and switch survey mode(for example, remains pressing the key, when you hear
beep 3 times then you loosen the key quickly, it will power off the receiver; when you hear beep 4 times then loose the key, the receiver will be power off, continue to power on, it will be switch to RTK mode; when you hear beep 5 times then loosen the key, the receiver will be power off, continue to power on, it will be switch to Static mode; when you hear beep 6 times then loosen the key, the receiver will be power off, continue to power on, it will initialize the receiver.

Note:
1. **Error status:** When LED2 and LED3 all blink continuously, it will remind you there is something error. The error exists in the following situations.
   a. Error for testing internal memory.
   b. Failure to test receiver.
   c. The correct coordinate can not be obtained when the Base works in the mode of repeated Base setting.

2. **The work status of the buzzer.**
   1) If there is something error during the working, LED2 and LED3 will blink at the same time. The buzzer will beep hurried.
   2) The buzzer will beep when the rover didn’t receive radio beacon from Base.
   3) Press function key for several seconds to power off the instrument. The buzzer will beep three times. At the same time the power indicator light will crush out.

**Detailed explanation about indicator light**

1. **POWER indicator light**
<table>
<thead>
<tr>
<th></th>
<th>Base</th>
<th>Rover</th>
</tr>
</thead>
<tbody>
<tr>
<td>quench</td>
<td>Power off</td>
<td>Power off</td>
</tr>
<tr>
<td>Light (red)</td>
<td>Use lithium battery</td>
<td>Use lithium battery</td>
</tr>
<tr>
<td>Blink(red)</td>
<td>Lack of power</td>
<td>Lack of power</td>
</tr>
</tbody>
</table>

**2. Data link light**

<table>
<thead>
<tr>
<th></th>
<th>Base</th>
<th>Rover</th>
</tr>
</thead>
<tbody>
<tr>
<td>quench</td>
<td>No transmit</td>
<td>No receive radio signal</td>
</tr>
<tr>
<td>Blink twice</td>
<td>Being transmitting</td>
<td>Being transmitting differential signal</td>
</tr>
<tr>
<td>quickly every 5 seconds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blink every second</td>
<td></td>
<td>Being receiving radio signal</td>
</tr>
<tr>
<td>Light(red)</td>
<td>Static mode</td>
<td>Static mode</td>
</tr>
</tbody>
</table>

**3. Satellite/Bluetooth light**

<table>
<thead>
<tr>
<th></th>
<th>Base</th>
<th>Rover</th>
</tr>
</thead>
<tbody>
<tr>
<td>quench</td>
<td>Fix zero satellite or disconnect with Bluetooth</td>
<td>Fix zero satellite or disconnect with Bluetooth</td>
</tr>
<tr>
<td>Blink(red) n times every 30 seconds</td>
<td>The satellite number fixed is n</td>
<td>The satellite number fixed is n</td>
</tr>
<tr>
<td>Light(green)</td>
<td></td>
<td>Handhold computer is connected to Rover with Bluetooth</td>
</tr>
<tr>
<td>Blink(green)</td>
<td>Being downloading static raw data</td>
<td>Being downloading static raw data</td>
</tr>
</tbody>
</table>

**4. status light**
<table>
<thead>
<tr>
<th>Blink once(red) every n seconds</th>
<th>Base</th>
<th>Rover</th>
</tr>
</thead>
<tbody>
<tr>
<td>In static mode, Being collecting raw data (interval is n seconds)</td>
<td>In static mode, Being collecting raw data (interval is n seconds)</td>
<td></td>
</tr>
<tr>
<td>Blink red every second</td>
<td>The data link’s quality is in good health</td>
<td>The data link’s quality is in good health</td>
</tr>
<tr>
<td>Blink red without obvious rule</td>
<td>The data link’s quality is in poor health</td>
<td>The data link’s quality is in poor health</td>
</tr>
</tbody>
</table>
Chapter III  Accessories

§3.1  Case for S82

The case for S82 includes hard case outside and soft case inner. Hard case mainly used in the case of long distance transport.

Figure 3-1  Hard Box

The soft case is light, small and exquisite, convenient for you to take and you can assign space inside freely.

The soft case (Figure 3-2) contains the S82 mainframe and all accessories, including batter, charger, external power cable, communication cable, handhold computer, etc.
§3.2 Battery and Charger

1. Battery and Charger for mainframe:

   The lithium battery has a capacity of 2.2 amp-hours and should provide the S82 for over 5 hours in typical user scenarios. If you require additional battery power, an external power source can be used. An external DC power source connects to the S82 external power port via a dedicated power cable. Voltage must be between 8-12VDC.
The external power source can be connected at any time without concern for damage to the lithium battery. When both the lithium battery and an external power source are connected, the S82 will use power from the external source first.

The charger is designed to work with a 110-240 VAC power source and delivers 8.4 VDC of input voltage with at least 400mA current. The lithium-ion batteries do not have a memory effect, meaning that they can be recharged without being fully discharged with no effect on the battery capacity. In other words, recharge battery whenever it’s convenient. The charging of the lithium battery from a fully discharged state takes about five hours.

The status lights on the charger indicate the following:
- Red: Charging
- Green: Charged

2. Battery and Charger for handhold computer.
§3.3 Car Accumulator battery for radio

We don’t provide client with car accumulator, thus client should contact with local car accumulator provider to purchase it. You need to make sure the voltage of accumulator is in the range of 12V—15V. The capability of car accumulator had better to be 36 amp-hours or more.

§3.4 Transmitter Antenna

In any case, you must attach transmitter antenna to radio, or the
radio probably be burned.

§3.5  External Radio GDL25

The appearance of radio GDL25

- CHANNEL key: you can switch radio channel by pressing this key.
- ON/OFF key: on/off the radio.
- AMP PWR indicator light: when the light lights means radio is working on low power, when it quench, means it is working on high power.

Figure 3-6 Appearance of Radio
4. TX indicator light: in normal condition the light blinks every seconds, means it is transmitting beacon.
Size: 175mm×157mm×67mm
Weight: 1000 gram
Note:

1. We recommend you to transmit beacon with low power. High power transmitting will work out the capability of car battery quickly.

2. The voltage for radio is 12-15v (typical 13.8v), current is less than 7.0A.

3. Before you power on radio, please make sure the anode and cathode are correct to car battery or the radio will be burn out.
Chapter Ⅳ  Operation Instruction

§4.1 Switch Survey Mode

Figure 4-1 Function key

has two function: power on/off and switch survey mode.

**Power on and power off**

Power on : Press the function key.

Power off: Remains pressing the key, when you hear beep 3 times then you lose the key quickly, it will power off.

1) **Switch survey mode manually**

Switch to RTK mode:

Remains pressing the key, when you hear beep 4 times then lose the key, the receiver will be powered off, continue to power on, it will be switched to RTK mode.

Switch to Static mode:

Remains pressing the key, when you hear beep 5 times then lose the key, the receiver will be powered off, continue to power on, it will be switched to Static mode.

Initialize instrument:

Keep pressing the key, when you hear beep 6 times then lose the key, the receiver will be powered off, continue to power on, it will be initialized.
2) Switch survey mode by handhold computer

You can switch surveying mode manually from front panel as above, also you can realize switch by handhold computer. Using handhold computer, you can switch from RTK mode to Static mode only, but can’t from Static mode to RTK mode.

§4.3 Logging parameters

For Base:

You must connect handhold computer to the Base by cable (Base has no Bluetooth device), and choose communication port to be COM1 (see Figure 4-2 Port Set).

Steps: Click “Set” → “Receiver Set”, select “Static mode” (see Figure 4-3 Static State):
You can set the static collection parameter such as Collection Interval and Mask Angle (see Figure 4-4). The unit for collection interval is “second”, mask angle is “degree”. Click OK, Engineering Star program will exit. Check the indicator light on the front panel, you will find the DL indicator light lights and STA indicator light blink as your setting (for example, the light blinks red every 5 seconds if you
set the interval to be 5 seconds).

For Rover:
The step is the same as Base.

Note: You should set communication port to be COM1 when you use cable connection mode and COM3 compared with Bluetooth connection mode.

§4.3 Basic Working Status
1. Static mode
   After powering on, LED2 (indicator light for radio) will remain light all the time. Once received enough satellites. The receiver will log data and LED1 will blink according to preset interval.

2. RTK mode
   Base:
   The data link light (LED2) will blink twice quickly every 5 seconds and status light (LED1) blink every second. If you want to change radio beacon format (RTCA, CMR, RTCM) and interval of transmitting, you can set it by handhold computer. Detailed manipulation please refer to Engineer Star Manual.
   Rover:
   The Rover can search radio beacon from Base automatically as it is powered on. When there is no radio beacon, it will keep searching and buzzer will give off beep alarm about every six seconds. Once Rover has received signal from Base, it will stop beep alarm and LED2 will blink every second and LED1 will blink every
second (means data link is in good health).

§4.4 Measure Antenna Height

Antenna Height is the vertical length from the surveying point to the phase center of antenna. But in actually, but it is always hard to get the Antenna Height, so we always turn to measure the oblique height (from the surveying point to the brim of rubber ring). Software will calculate the Antenna Height automatically according to oblique height you measured. See Figure 4-5.

Receiver Size:
- Height : 94mm
- Diameter : 180mm
- From center of bottom to center of rubber ring : 65mm
- From center of bottom to center of phase : 85.5mm
Chapter Ⅴ Appendices

§ 5.1 Connection with USB

S82 can be connected to computer not only by serial port but also by USB. We show you how to use USB mode, the detailed step is as follows (take Win2000 Operating System as an example):

Firstly, you have to install South Gps Processor (special software for vector processing) and then you must install driver manually.

Installation steps:

Insert USB plug into the USB slot of the computer and another end connect to S82, then power on mainframe, it will appear a prompt “Finding the new hardware” on your computer screen. Such as Figure 5-1:

![Figure 5-1 Finding the New Hardware](image)

Then, there will appear an installation guide Such as Figure 5-2.
Select "Install from a list or specify a location", press "NEXT"
Such as Figure 5-3, press “Browse”, search catalog which include the driver file, the path is “C:\Program Files\South Surveying Mapping Instrument\South Gps Processor\9800USB”, such as Figure 5-4.

![Browse for Folder](image)

**Figure 5-4 Select 9800USB Directory**

After you enter the 9800USB directory, select driver information file, for example SOUTHLR80.inf, such as Figure 5-5.
Figure 5-5 select “Southlr80.inf” file

After you select the file, press “OK” in Figure 5-3, it will appear a prompt “Find driver program” in system, select NEXT.
You can complete installation after press “Finish”. Such as Figure 5-6.

You should run “South Survey Static Data Transfer” if you want to download raw data. Particular manipulation please refer to manual “GPS software”(Chapter IV Data Transmission).

§ 5.2 Firmware Update

Our company will update inner firmware continuously so user can update firmware by themselves.

Method:

You should visit our company website: [http://www.southsurvey.com](http://www.southsurvey.com) and download particular updating program. During the updating course, you must not shut down the mainframe or
break off the power supply. Otherwise it will shatter the apparatus. Please update the firmware according to the steps strictly.

**Manipulation steps:**

Connect mainframe to computer by the cable, then run the software of updating. Refer to Figure 5-7.

Click “Update”:

![Figure 5-7 Operating the Updating Procedure](image)

![Figure 5-8 Counting Down(15 seconds)](image)

26
Refer to Figure 5-8, you should power on receiver in 15 seconds when it is counting down.

![Figure 5-9 The Rate of Progress](image)

**Figure 5-9 The Rate of Progress**

![Figure 5-10 Update Is Successful](image)

**Figure 5-10 Update Is Successful**
As Figure 5-10, it means updating is finished. Please make sure restart the mainframe before you use it.

When you power on mainframe out of the time limited (15 seconds) in Figure 5-8 Counting Down (15 seconds), it will prompt “Time Over”:

![Time Over Prompt](image)

Figure 5-11 Time Over Prompt

In this condition, you need to re-do the step according to the guide above.

§5.3 Set the radio frequency of the S82

When there are many Base working in the same area, they probably interfere each other. So in this case you need to change the frequency of Base and Rover. Setting the frequency required special software, so if you want to change it please contact with technicians of our company.
§5.4 Specification of S82
Channel: independent 24 channels
Tracking signal: L1/L2
Static horizontal accuracy: 3mm+1ppm
Static vertical accuracy: 5mm+3ppm
Static operation range: <=100km
Static memory: inner 32M
RTK horizontal accuracy: 1cm+1ppm
RTK vertical accuracy: 3cm+1ppm
RTK operation range: <=10km
Communication mode: USB, Bluetooth, series
Data link: 25w/15w (transmitting power)
RTK initialization time: typically 15 seconds