S1 External Radio

§1.1 Features of the Radio

● S1(GDL25－F1) is a high-speed wireless data transmission system with high power and multiple transmission formats. It adopts a new design idea, simplifying the circuit system with high integration, which can simplify the production process and improve the production qualification rate. With bran-new RF(radio-frequency) circuit scheme and good heat dissipation characteristics, it achieves interconnection with SOUTH Radio, TRIM MDS.

● Digital processing technology and base band processing technology to ensure its long-term stable and reliable operation. S1 is a wireless module type half-duplex data transmission radio with high-speed at 19200, airborne transmission rate up to 9600BPS and large RF transmission power. It adopts GMSK modulation, 9600Bps, 19.2KBps,38.4 KBps, high transmission rate, low bit error rate. The radio frequency can cover band range 410~470MHz.

●Data transmission mode is Transparent. That is the received data is transmitted to the RTK receiver intact. The data interface provided is the standard RS232 interface, which can be connected to any terminal device with RS232 for data exchange.

● With LCD screen, you can modify parameters on the radio. It is allowed to add Bluetooth wireless application, RTK receiver connection, and handheld functions, reducing radio cable connection, easy to use.

● S1 supports 16 channels for receiving and sending. It can be changed according to the actual channel frequency, and the interval of transmitting frequency can be adjusted to 25KHz.

NO. Of Channel	Frequency
Channel 1	463.125
Channel 2	464.125
Channel 3	465.125
Channel 4	466.125
Channel 5	463.625
Channel 6	464.625

| Channel 7	465.625
Channel 8	466.625
Channel 9	460.125
Channel 10	460.625
Channel 11	461.125
Channel 12	461.625
Channel 13	462.125
Channel 14	462.625
Channel 15	467.125
Channel 16	467.625

§1.2 Technical specifications

Functions	Frequency range	410—470MHz
	Frequency stability	±1.5ppm
	Radio protocols	Two protocols: SOUTH, TRIM
	Radio output power	High (25W), low (10W), allowed to be directly modified by pressing the panel buttons.
	Baud Rate	Default air baud rate/Serial port baud rate: 9600,(19200/38400 optional).
Properties	Channel Spacing	25KHz
	Channel transmission rate	9600bps,19.2kBPS
	Stray radio frequency component	≤50uW
	Adjacent Channel Rejection Ratio	≥85dB
	Residential frequency modulation	≤-35dB
Working Environment	Humidity	10-90% relative humidity, no condensation
	Environmental Temperature	-30~65℃
Others	Dimensions (L*W*H)	180*135*70mm
	Weight	1.8kg
	Power	DC power supply, Voltage: 9-15V, Typical value: 12V.

§1.3 Radio appearance
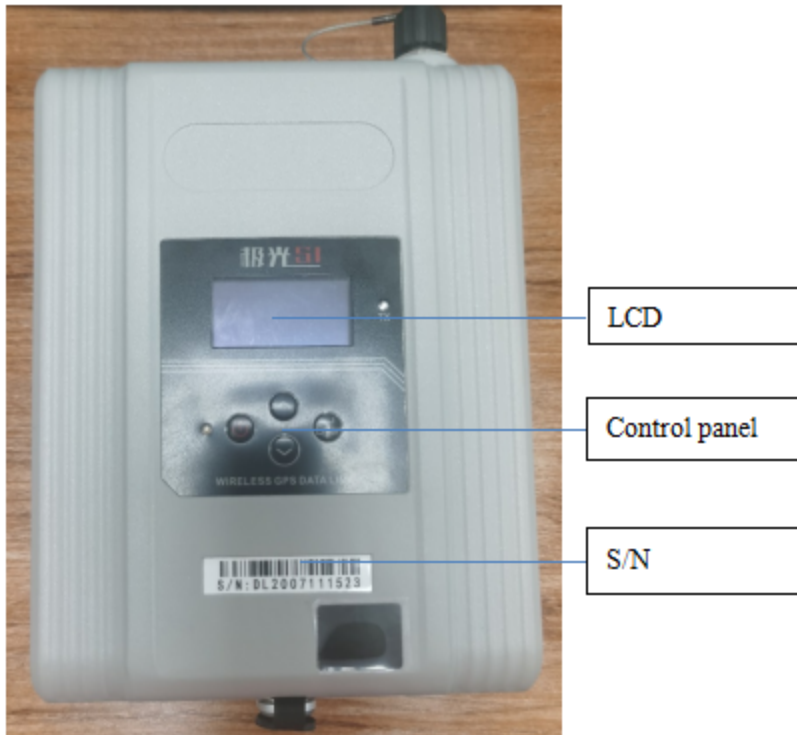
Display the working status and data of the radio and set the radio.

§1.4 Radiator of the radio
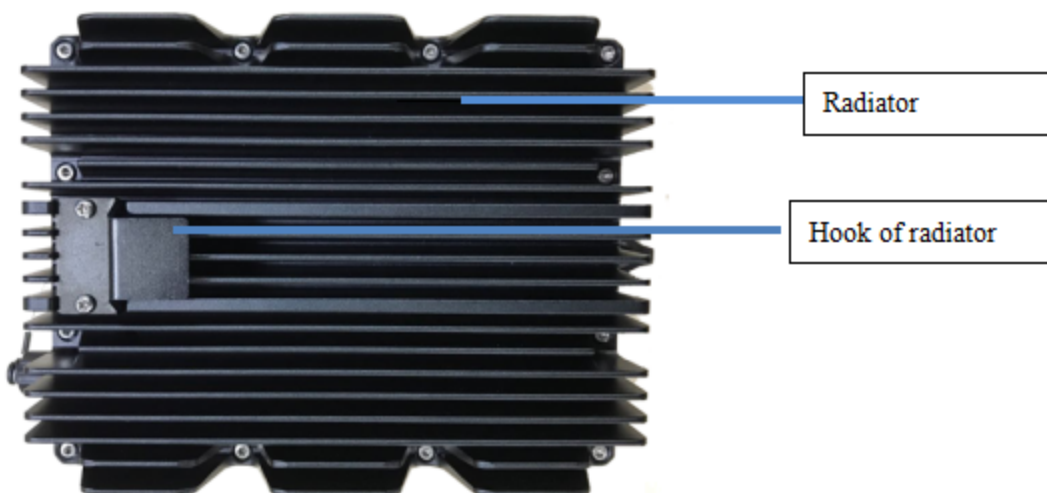
Radiator: A large amount of heat is generated when the radio emits

signals, which is dissipated by the radiator.

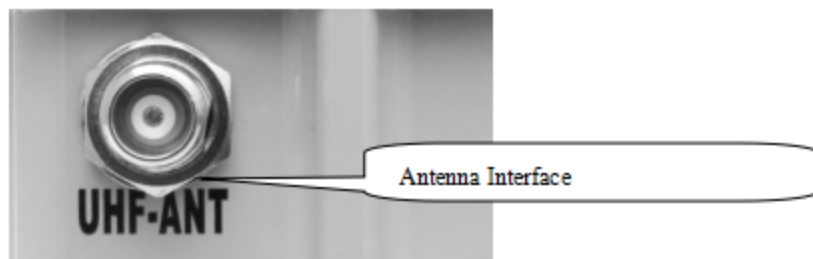**Hook:** It is used to mount this radio on a tripod, etc.

Warning: Do not cover the radiator with anything. Poor heat dissipation may lead to overheating damage or be dangerous.
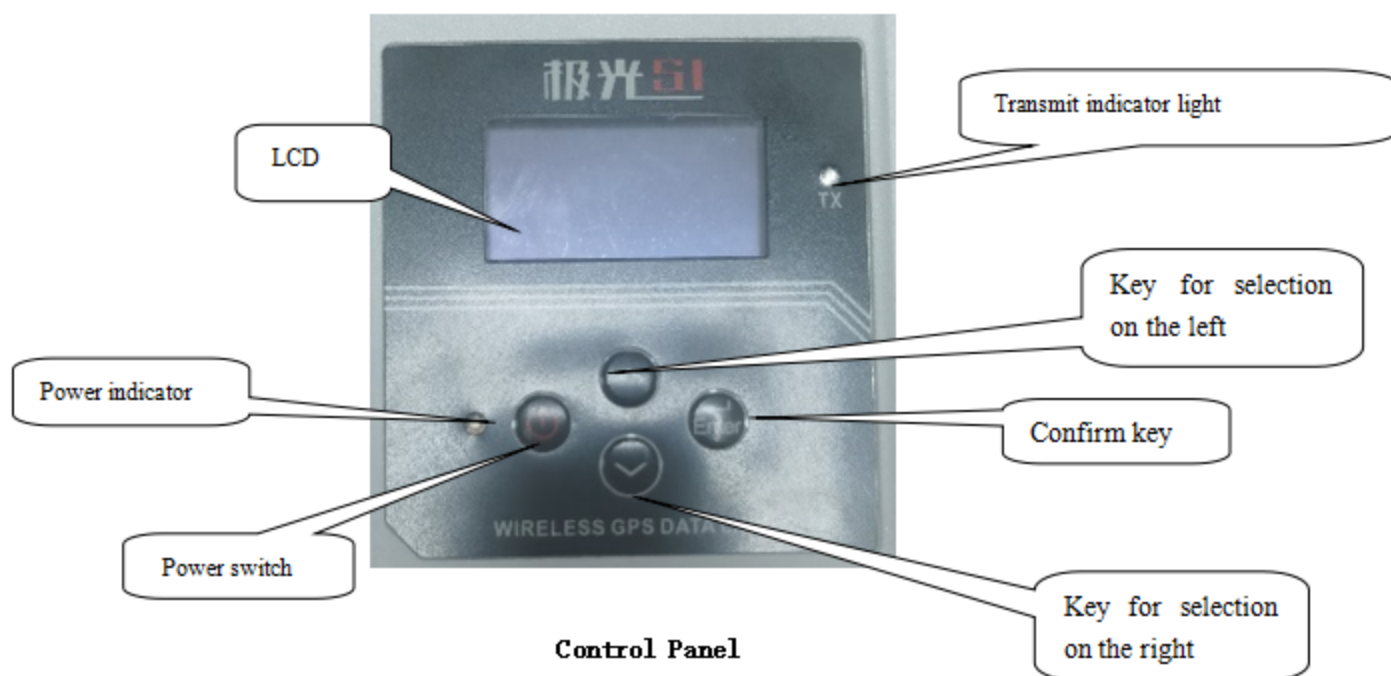
§1.5 Radio interface and panel

Receiver interface: 5-pin socket to connect to GPS receiver and power supply.

Antenna Interface: It is used to connect to the transmitting antenna.

Control panel: The indicator on the control panel shows the status of the radio, and the button operation is simple and convenient. One-to-one interface can effectively prevent from the connection error.

Control Panel

Labels on diagram:
- LCD
- Transmit indicator light
- Key for selection on the left
- Power indicator
- Confirm key
- Power switch
- Key for selection on the right

Power switch: This key controls the power switch of the radio.

Power indicator: It indicates whether the radio is turned on.

Working indicator light: this indicator light flashes once every second, indicating that the radio station is in the state of transmitting data, and the transmitting interval is 1 second.

Key for left selection: Move to the left selection.

Key for right selection: Move to the right selection.

Enter key: Confirm modified items and select the modified contents.

Touch & Hold: Except the power button, the other three buttons support Touch & Hold. The effect of Touch & Hold is the same as that of repeatedly pressing the button at the same time.
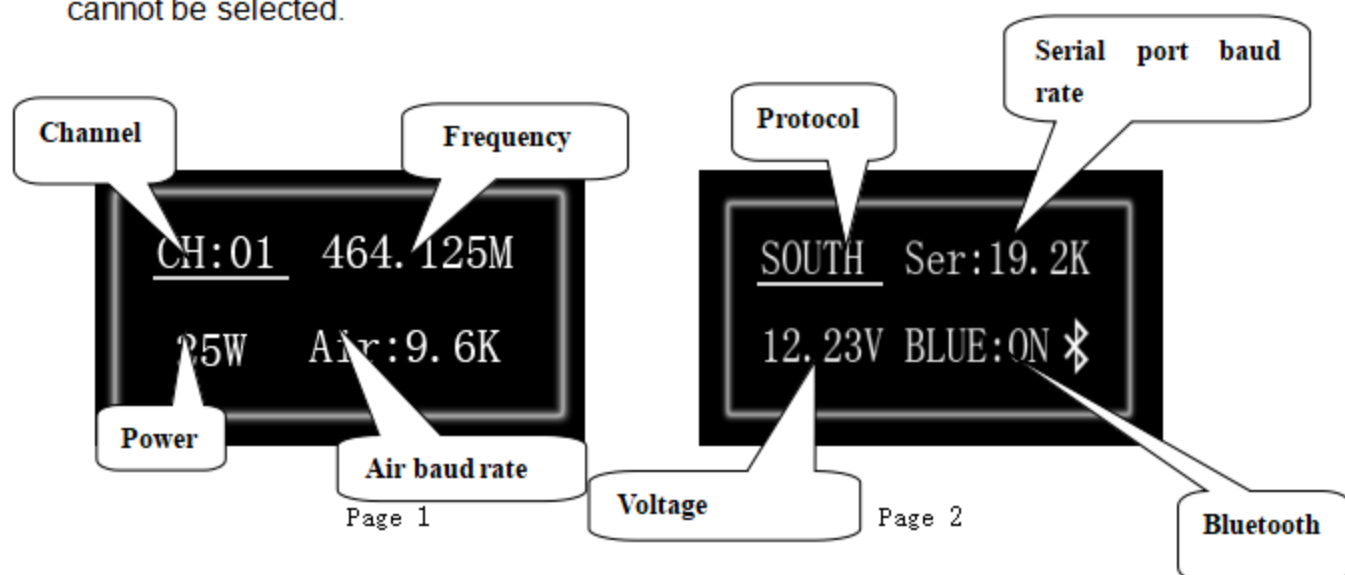
§1.6 Radio display interface

1.6.1 Information interface

```
GDL25-F1
VER:2.5
SN:DL1234567890
```

Every time when the radio is started, an information interface will appear, which displays information for three lines, including the radio model, version number and S/N from top to the bottom (the serial number behind the Bluetooth name is the same as the S/N).

1.6.2 Menu interface

After information interface, the menu interface will display. The menu interface is divided into the first page and the second page, total 8 menus in the menu interface, among which 7 menus are for users to set, but the seventh menu cannot be selected.

Channel

Frequency

Serial port baud rate

Protocol

```
CH:01   464.125M
25W    Air:9.6K
```

```
SOUTH  Ser:19.2K
12.23V BLUE:ON
```

Power

Air baud rate

Voltage

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Bluetooth

1.6.3 Power low interface

When the radio detects that the power supply voltage is below 10V, "POWER LOW" will be displayed on the radio LCD.

1.6.4 Sleep mode

When there is no operations on the menu interface for a period of time and the power supply voltage is not less than 10V, the LCD will enter the sleep mode and turn off the display to reduce power consumption. Corresponding interface will be displayed again until the menu interface is operated, or the power supply voltage is lower than 10V.

When the TX light is flashing, it indicates that the radio is working properly.

Note: It is forbidden to press the power button to check the status of the radio when under sleeping mode. Otherwise, it will cause the direct shutdown

The radio is powered on normally when the power indicator keeps on.

§ 1.7 Radio operation instructions

1. Channel CH: Press the key "Enter" to select channel CH. There are 16 channels for switching. Press keys for "Left and right selections" to switch channels back and forth. Select the required channel and press the key "Enter" to confirm the option.

2. **Radio frequency point:** Press the key "Enter" to enter the selections. Press the key for "Right selection" to select the digital number to the frequency point, and then press the key for "Left selection" to add its value. Press the key "Enter" to complete after parameter modification.

Channel frequency range: The channel frequency is set according to the fundamental frequencies. At present, only two fundamental frequencies, 410MHz and 450MHz, can be set for the radio. When the fundamental frequencies are 410MHz and 450MHz, the configurable frequency range is 410MHz~450MHz (excluding 450MHz) and 450MHz~470MHz respectively.

Fundamental frequency: It is determined by the frequency range corresponding to the fundamental frequency according to the channel frequency.   For example, if the channel frequency is 461.125 MHz, the fundamental frequency is 450MHz.

3. **Power:** Press the key "Enter" to select the option Power. Press the keys for "Left and right selections" to switch between high and low power. For transmitting, 25W is the high power and 10W is the low power. Then press the key "Enter" to confirm the selected option.

4. **Air baud rate:** Press the key "Enter" to enter the selections. Press the keys for "Left and right selections" to select the option Air baud rate, and press the key "Enter" to confirm the modification. Air baud rate options includes: 9.6K 19.2K 38.4K.

5. **Protocol:** Press the key "Enter" to enter the selections. Press the keys for "Left and right selections" to select the option Protocol, and then press the key "Enter" to modify the protocol. Currently, two protocols, SOUTH and TRIM   are supported. (Note: It can be resolved only the built-in radio transmission protocol and frequency point for the Base and the Rover are consistent.)

6. **Serial port baud rate:** Press the key "Enter" to enter the selections.Press the keys for "Left and right selections" to select the option Air baud rate. Press the key "Enter" to confirm modification. Serial port baud rate options include: 9.6K 19.2K 38.4K.

7. **Voltage:** Not optional. This menu displays the voltage value of the power supply under the current voltage.

8. **Bluetooth:**   Press the key "Enter" to enter the selections. Press the keys for "Left and right selections" to select the option Bluetooth, and then press the key "Enter" to enter the modification. ON means to close, OFF means to open. Choose whether to enable Bluetooth module. The Function of Bluetooth module is almost the same as that of serial port, which can be used to transmit data and send commands.

§1.8 Radio transmitting antenna and Y cable

1) Radio transmitting antenna: It adopts UHF transmitting antenna which is especially suitable for field use. The omnidirectional antenna 450MHz is used for receiving antenna. The characteristics of antennae are that they are small, portable, attractive and durable.

Interface

Connecting screw hole
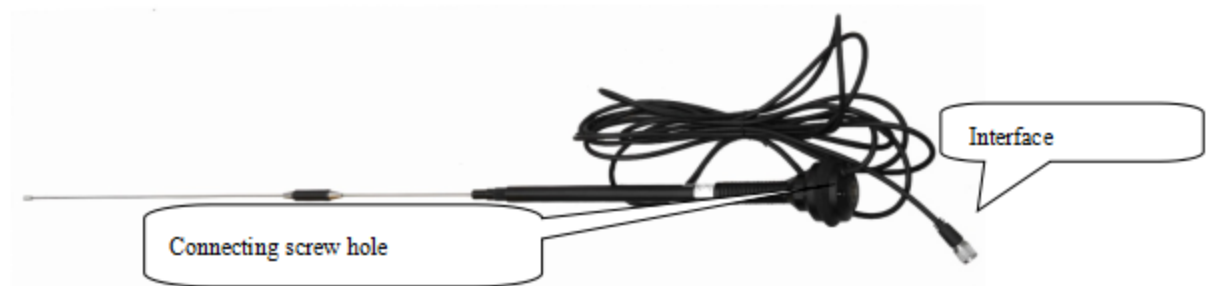
2) RADIO Y-type data cable: The multi-purpose cable is a "Y" shaped connection line, which is used to connect to the receiver of the Base (five-pin red socket), the transmitting radio (black socket) and the external battery (red and black clips). This cable plays a role in power supply and data transmission.

Interface of RTK receiver (Red)

Radio interface(Black)

Battery clips

2)
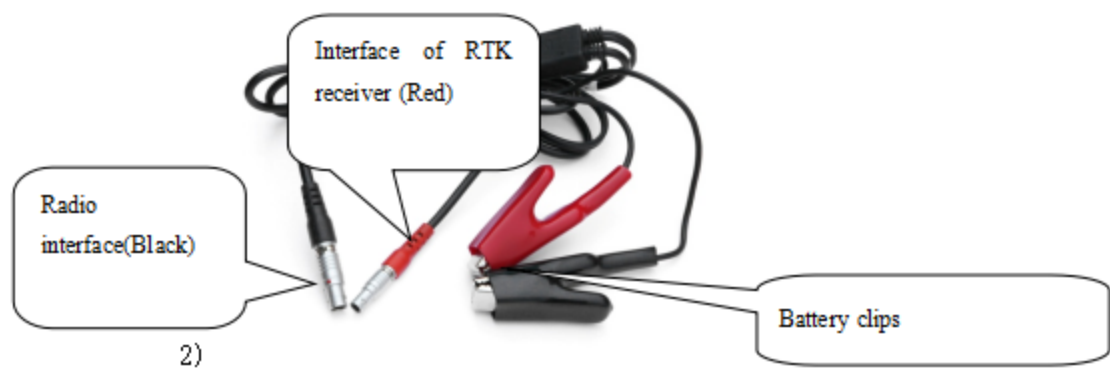
Attached: Product configuration list

NO.	Name	Model
1	External radio	S1
2	Radio multipurpose cable	LE52X
3	Additional line for changing radio frequency	F9440
4	Antenna gaskets	XPDZ01
5	Radio transmitting and receiving antenna	QC450A-T
6	Antenna support rod(without words)	

§ 1.9 Cautions for use of the radio

1）Low battery power: When Power Low appears on the LCD, it indicates that the battery power is insufficient. Replace the battery in time. Otherwise, the data link is unstable or transmission is unavailable.

2）S1 radio power supply: Voltage is 12-15V (typical 13.8V), RF transmitting power is 25W, and electric current is 7.0A.

3）Radio transmitting power: The radio transmitting power is related to the voltage of the power supply. Please check the voltage before use.

4）Use of high and low power: When low power can meet the operation, use low power to transmit as far as possible, because transmission at high power will double the consumption of battery power, and excessive use will reduce the service life of the battery. The radio shall be set up as high as possible.

5）Ripple coefficient of power supply: The ripple coefficient of power supply should be less than 40mV. The smaller the ripple coefficient is, the smaller the impact on the radio spectrum is, and the higher the communication quality is.

6）Power connection: The positive and negative poles of the power supply shall be correctly connected.

7）Electromagnetic environment: Before using the radio, it is best to measure the electromagnetic environment first to avoid communication blind area.

8）Radio matching antenna: The basic parameters of antenna selection include frequency band width, frequency used, transmission gain, directivity, impedance, standing-wave ratio and other indicators. Generally, the effective band width of an antenna is 3-5mhz. When selecting an antenna, it should be selected according to the frequency band used. For long-distance transmission, it is better to choose directional antenna and high-gain antenna, and pay attention to that the impedance of the antenna and feeder shall match with the antenna interface of GDL20 radio(50Ω).
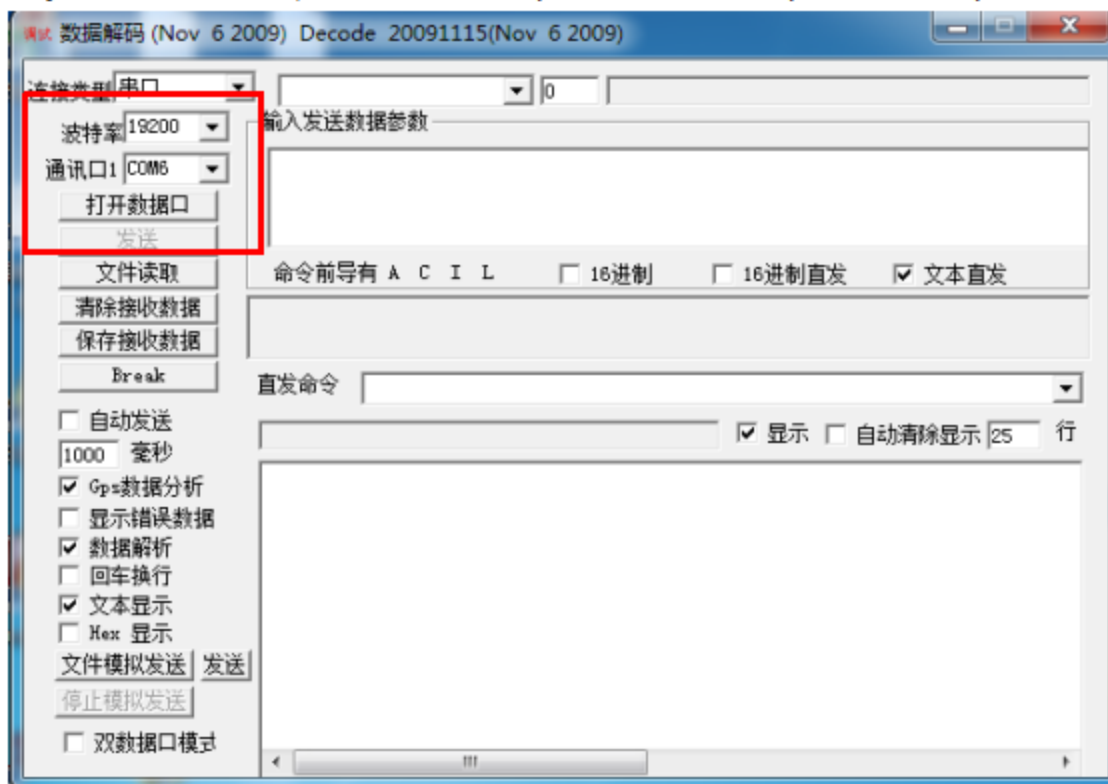
§ 2.0 Restoration to factory settings for large radio

1. Prepare a radio multipurpose cable LE52X, an additional line for changing radio frequency, F9440, a cable changing USB to serial, a power supply with stable voltage at 12V.
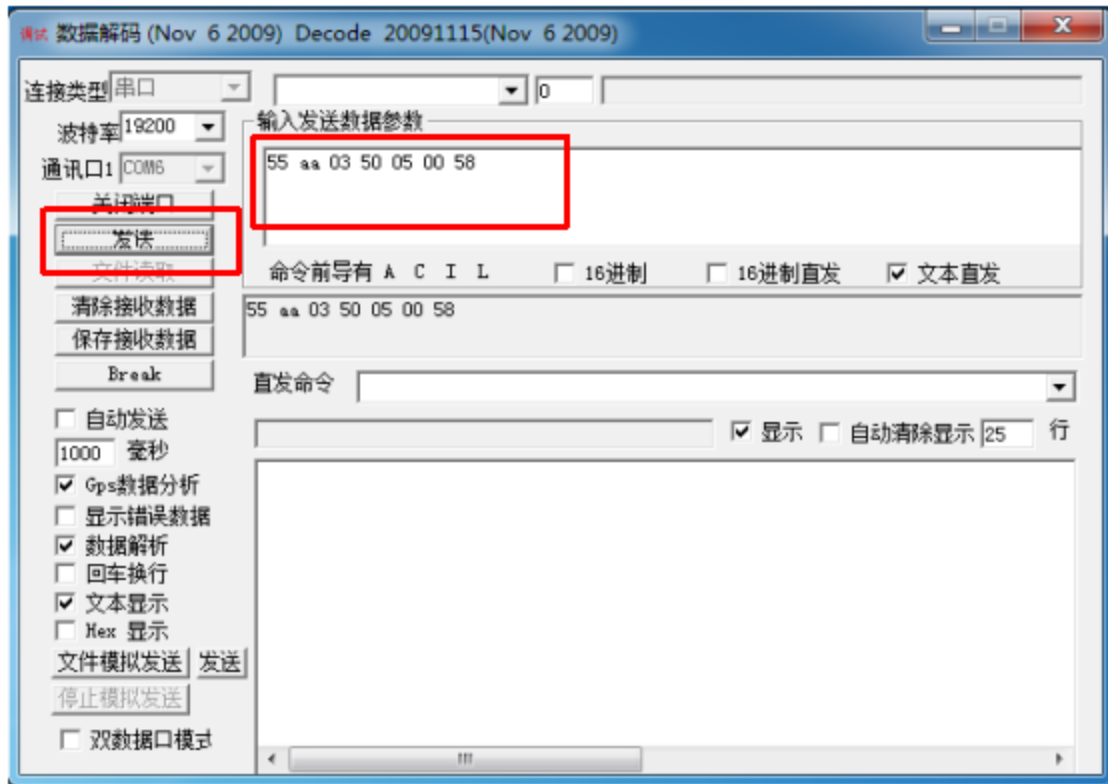
2. Open the software for serial port debugging.

Adjust the baud rate, communication port and click to open the data port.

3. Enter the command. Click Send.

4. Restoration of the large radio to factory settings is finished.

What we recommend:

It is recommended that you please use external batteries of 12V/40Ah or higher. When using external power supplies, ensure that the voltage current is 10A.

It is recommended that you shall charge the battery in time when using storage batteries. Do not overuse battery power, or the service life of the battery will be reduced.

It is recommended to replace your storage batteries after using for six months to one year to ensure the working distance of the radio.

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