

APRS 51Track X1C3

GPS/Track/DIGI/BT/USB

APRS Tracker X1C3

Manual



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X1C3 Tracker Multifunction Edition is a state-of-the-art embedded APRS tracking device designed for the majority of HAM.

Basic features:

X1C3 is a professional APRS dual-segment station that uses standard APRS digital encoding to directly locate each other directly via radio U/V signals.

X1C3, no mobile phone network needed, can be directly used for transmission and reception, widely used in outdoor sports, rescue and other occasions.

Functions:

APRS Track

Support fixed station FIXED, sports SPORT, 2 site modes

Support complete TRACK tracker, support intelligent, timing, PTT linkage, queue beacon

Support beacon additional information, mileage, satellite number, voltage, temperature, air pressure, etc.

Support mileage calculation, support accumulated mileage or automatically clear 0

Support for automatic icons (TRACK smart mode)

Support GPS power saving mode (TRACK PTT linkage mode, TRACK timing mode)

Bluetooth

Built-in latest 2.0+4.0 dual-mode Bluetooth, compatible with Android, Apple

Support Bluetooth output KISS hex, UI, GPWPL, KISS ASC, GS232B and other protocols

Support Bluetooth output GPS data (GPRMC+GPGGA), support mixed output

Support Bluetooth KISS data bidirectional transparent transmission

Support Liyun, APRSdroid, LOCUS, Ovi and other APP

Support wireless Bluetooth setting parameters

APRS digipeater

Support full DIGI repeater function, support custom repeater name,

Support digipeater remote turn-off function

Remote

Remote control peripheral module sensor input and relay telemetry control module

GPS/Beidou/GLONASS

Built-in high-performance GPS\Beidou\GLONASS multi-mode hybrid positioning engine

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APRS algorithm

Built-in advanced CMX hardware programming algorithm

Built-in 8-level digital level adjuster (both transmitting and receiving)

Data analysis

Built-in advanced algorithm to support rich data analysis

Support heading, north position, relative motion position calculation

Support Maidenhead grid positioning system

Supports trigonometric calculations such as APRS distance, horizontal angle, and elevation angle

Support automatic tracking control of G5500 aircraft, ships, etc.

Host

Support battery USB direct charging

Built-in auxiliary sensors for temperature and voltage

Support user independent firmware upgrade

Support off-network use, no network, direct mutual positioning

software

Companion PC setup software (Chinese, English) (requires .NET 4.0)

CAUTION

Lithium batteries are not allowed to be placed in places exposed to high temperatures.

- 1, Pay attention to the positive and negative of the battery, it is strictly prohibited to reverse, the reverse of the motherboard will be damaged.
 2. Lithium batteries are forbidden to be placed in the car for high temperature exposure. For long-term storage and transportation, please unplug the battery.
 - 3, GPS test, please go to the outdoor test.
 4. The GPS signal is affected by the environment such as rain and fog weather and building signal reflection. The starting time is 1-5 minutes.
 5. The APRS beacon will be transmitted when the GPS is locked.
 - 6, the battery is lower than 3.05V will automatically shut down, protect the battery.
 - 7, boot STU, MODE light flash white, the state red light flashes several times, indicating the power.
6 flashes, greater than 4.1V 100%
5 times flash, greater than 3.8V 80%
Flash 4 times, greater than 3.5V 60%
Flash 3 times, greater than 3.2V 40%
Flash 2 times, greater than 3.05V 20%
Flash 1 time, less than 3.05V 0% The motherboard automatically shuts down to protect the battery.
-

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Motherboard hardware features:

Input working voltage: 3.3-5V

Standby current: less than 40uA

Emission current: about 0.35A

Motherboard size: 50*60mm

3.3V low voltage CPU STC8A8K

USB/TTL interface (9600 rate)

Support ISP firmware upgrade

Aluminum shell (black oxide treatment)

Motherboard resource support:

USB charging port, compatible with mobile phone jack

Integrated power management, the motherboard can work at the same time when charging

Built-in GPS module, GPS antenna

Integrated expansion PTT\MIC\SP\GND headphone jack

Integrated Kenwood K-type microphone connector

Support hand microphone to manually transmit

Tri-color LED indicator

1 touch function switch 1 touch power switch

Built-in 2000MA lithium battery (with protection)

Optional: DS18B20 temperature sensor

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Front panel

CHG charging indicator:

Always on: Charging

Off: no charging or charging completed

USB charging socket:

Micro USB phone universal

3.5+2.5 headphone jack

Connect K-type hand microphone

RJ11 socket

Connecting the HT (cable sequence NC SP PTT GND MIC NC)

Rear panel

POWER Tap the power switch: recessed design to prevent false triggering.

Press to power on or off.

MODE touch function switch: recessed design to prevent false triggering.

Bluetooth switch

Each time you press it, cycle through:

STU status LED light (tri-color lights):

Blue flashing: GPS power is on, positioning

Steady blue: GPS positioning succeeded

Red: launch beacon

Green: Received beacon

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The beacon will only be transmitted when the GPS is successfully locked.

STU status LED light other status:

1. When the motherboard is started, the LED is white for 1 second, indicating that the self-test is completed.

2. Power on, red LED indicates power.

6 flashes, greater than 4.1V 100%

5 times flash, greater than 3.8V 80%

Flash 4 times, greater than 3.5V 60%

Flash 3 times, greater than 3.2V 40%

Flash 2 times, greater than 3.05V 20%

Flash 1 time, less than 3.05V 0% Replace the battery as soon as possible

Note: When the battery voltage is lower than 3.05V, the device can still work for a long time.

The actual minimum operating voltage of the motherboard is 3V, which is lower than 3.05V. The measured battery voltage value will be incorrect, and the measured voltage will be constant at 3.0V.

Client setup program

The following interface is for reference only, the version is constantly updated, there may be differences

Hardware connection:

1. Connect to X1C3 using the mobile phone USB data cable (supplied)
 2. Open the 51 series general setting program and select the correct port number.
 3. Read the settings or modify the settings, the host automatically saves.
-

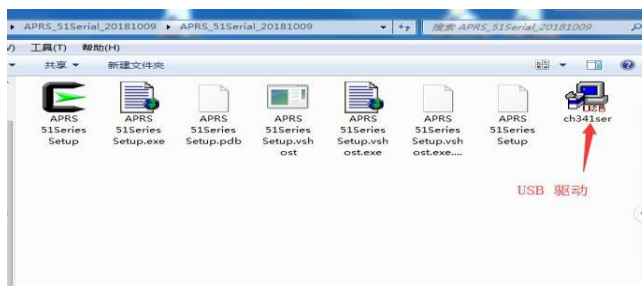
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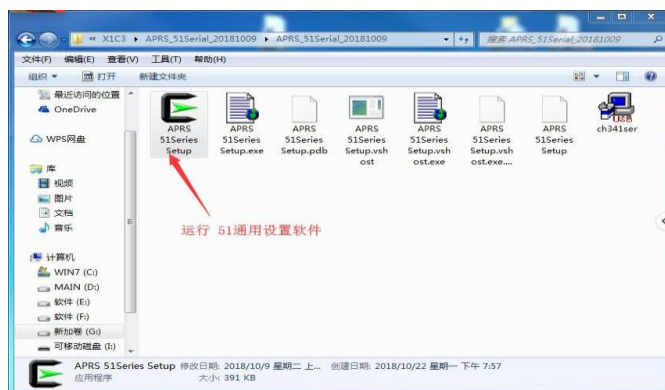
Note: Setting parameters - pay attention to input method, you should use English input, try not to copy information from other documents, so as not to bring in hidden characters. Writing implied characters may also make the X1C board work abnormally. When the setting data is garbled, delete the garbled data and rewrite it.



Power on X1C3, plug in USB Cable



Fist time use,install USB CH340 driver



Open APRS 51Series Setup program

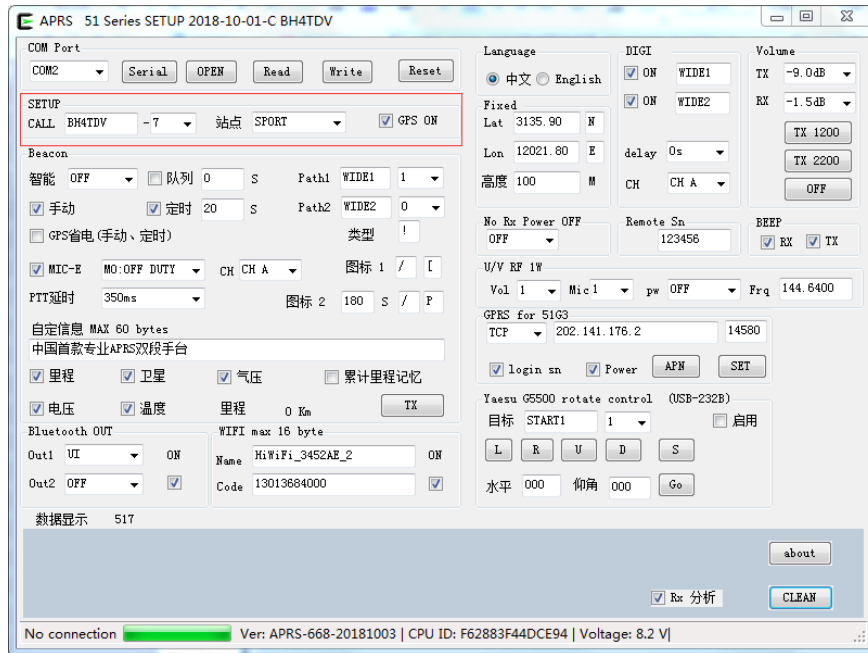
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APRS application program description

Note: The version is constantly updated, the interface is for reference only.

Note: The setup software supports all 51 series APRS devices, so some settings are not valid for X1C3.



Basic Settings

CALL sets the local call sign, default call sign NOCALL, numeric or English uppercase, up to 6 digits

SSID Beacon SSID, default 7, parameter range 0-15.

Site type:

SPORTS: Set this machine as a mobile site

Send various types of beacons using GPS real-time data

Use GPS real-time latitude and longitude data, calculate the relative distance from the other program, the north position, the relative direction, and so on.

FIXED: Set this device to a fixed site

Send various types of beacons using the fixed station latitude and longitude set

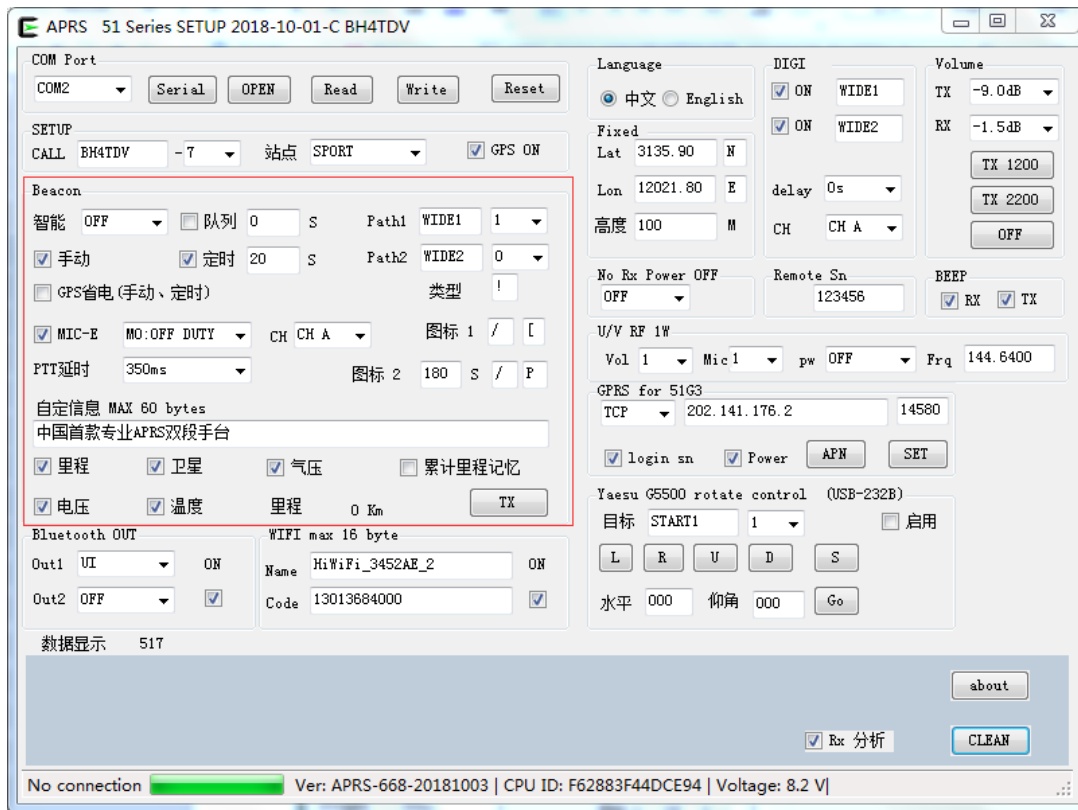
Use the fixed station latitude and longitude to calculate the relative distance to the other program, the north position, the relative direction, and so on.

GPS switch ON/OFF

If used at a fixed location, you can choose OFF to save battery.

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Track function settings

Note: In the Sport site type, no matter which of the following beacon modes is required, the GPS must be effectively locked before it will be transmitted.

Smart mode:

When the GPS is locked, the beacon is automatically transmitted according to the heading and speed.

Manual mode:

When the GPS is locked, each time the platform's own PTT button is pressed, when it is released, it automatically follows the beacon.

Timing mode:

When the GPS is locked, the beacon is automatically transmitted at the set time.

Queue mode:

Fired according to the set number of seconds in 1 minute,

Note: Unlike the regular timed transmission, the time base is not the same. The actual transmission time is always set to +1 second.

For example, if the queue time is 0 seconds, it will be transmitted according to the following

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时间	msg	
2018-09-20 10:05:01	3134.35N/12019.88E>0t@>/"4J}51X1C3 0001.0Km 4.1V 32.0C S02	BH4TDV-2>SQ:
2018-09-20 10:04:01	3134.35N/12019.88E>0t@>/"4Y}51X1C3 0001.0Km 4.1V 32.3C S02	BH4TDV-2>SQ:
2018-09-20 10:03:01	3134.34N/12019.88E>0tE>/"4W}51X1C3 0001.0Km 4.1V 32.5C S03	BH4TDV-2>SQ:
2018-09-20 10:02:01	3134.34N/12019.88E>0tE>/"4V}51X1C3 0001.0Km 4.1V 32.6C S02	BH4TDV-2>SQ:
2018-09-20 10:01:01	3134.33N/12019.87E>0s/>/"4V}51X1C3 0001.0Km 4.1V 32.8C S02	BH4TDV-2>SQ:
2018-09-20 10:00:01	3134.34N/12019.88E>0t>/"4J}51X1C3 0001.0Km 4.1V 32.5C S02	BH4TDV-2>SQ:
2018-09-20 09:59:01	3134.35N/12019.88E>0t>/"4V}51X1C3 0001.0Km 4.1V 32.1C S02	BH4TDV-2>SQ:
2018-09-20 09:58:01	3134.36N/12019.88E>0t&>/"4}51X1C3 0000.9Km 4.1V 30.4C S02	BH4TDV-2>SQ:

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GPS power saving function

When manually pressed, or when the time arrives, the GPS will be automatically turned on, the GPS will be hot-started, positioned within a few seconds, then launched, and the GPS will be turned off again.

Note: Only manual mode or timing mode is active.

PATH 1 , PATH 2

Requires the number of relay forwarding and forwarding names of WIDE1 or WIDE2.

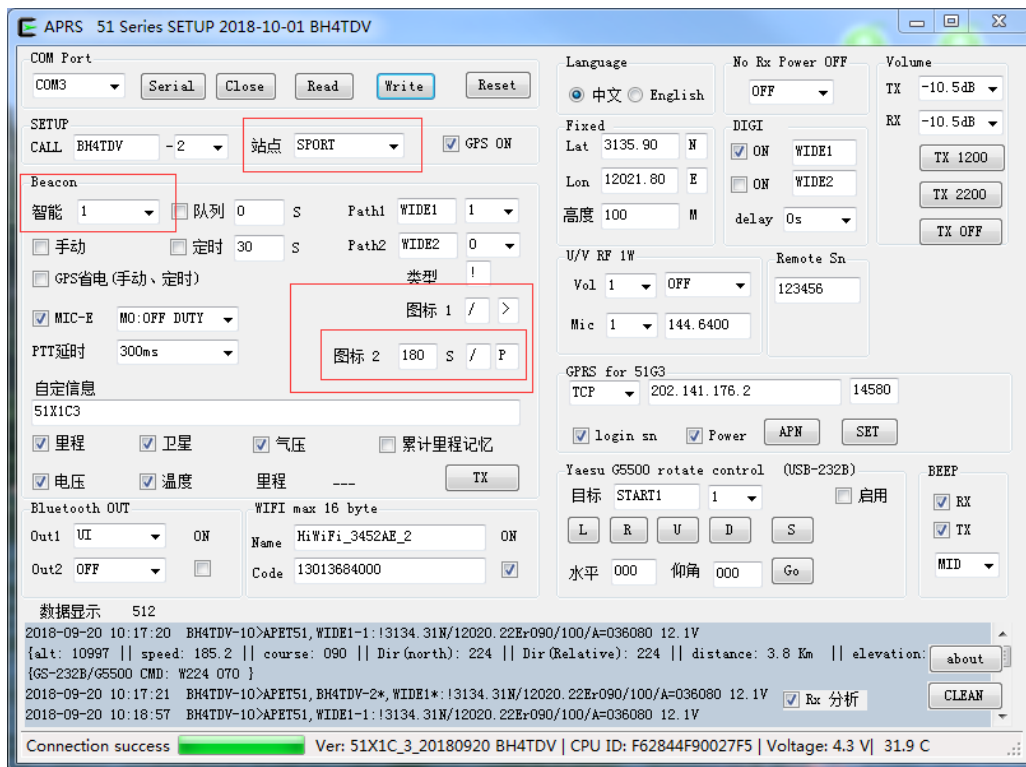
The default setting is WIDE1-1 WIDE2-0, which means that the relay named WIDE1 is forwarded once and WIDE2 is not required to be forwarded.

MIC-E

The beacon data is compressed and transmitted, which effectively shortens the transmission time, reduces the probability that the data is interfered by other signals in the air, and improves the decoding success rate of the receiver.

PTT delay

Before the signal is transmitted, the PTT triggers the delay. When the other party's SQL response is slow, the PTT delay parameter can be increased.



Icon 1:

! Indicates the data type character, fixed length 1 word, generally do not need to be changed. If you need to modify, refer to the APRS protocol manual.

/ indicates the icon set, generally do not need to be changed. For modifications, refer to the APRS protocol manual.

> Indicates the icon style displayed on the server map, with a fixed length of 1 word, refer to the APRS Icon Set to change.

Auto icon 2:

Three parameters: wait time, 2nd icon, and 2nd icon set.

180 waiting time, in seconds

/ indicates the second icon set P means the second icon

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In the smart mode, when the rest time reaches the set waiting time, the second icon is automatically converted.

Custom information

Up to 60 words in English and up to 20 words in Chinese.

Beacon option

Mileage: The mobile station beacon contains the automatically calculated mileage. Fixed station beacons are not included.

Satellite: The mobile station beacon contains the number of valid satellites. Fixed station beacons are not included.

Air pressure: The auxiliary air pressure sensor data is included in the mobile station and fixed station beacon.

Voltage: The battery voltage sensor data is included in the mobile station and fixed station beacons.

Temperature: The auxiliary station's beacon contains the auxiliary temperature sensor data.

Note: Temperature data is for reference only due to machine size and structure limitations.

Note: The shorter the custom information, the less beacon options.

The longer the data, the longer the transmission time, and the greater the probability that the signal will receive air interference, which may result in a lower decoding rate.

Mileage memory

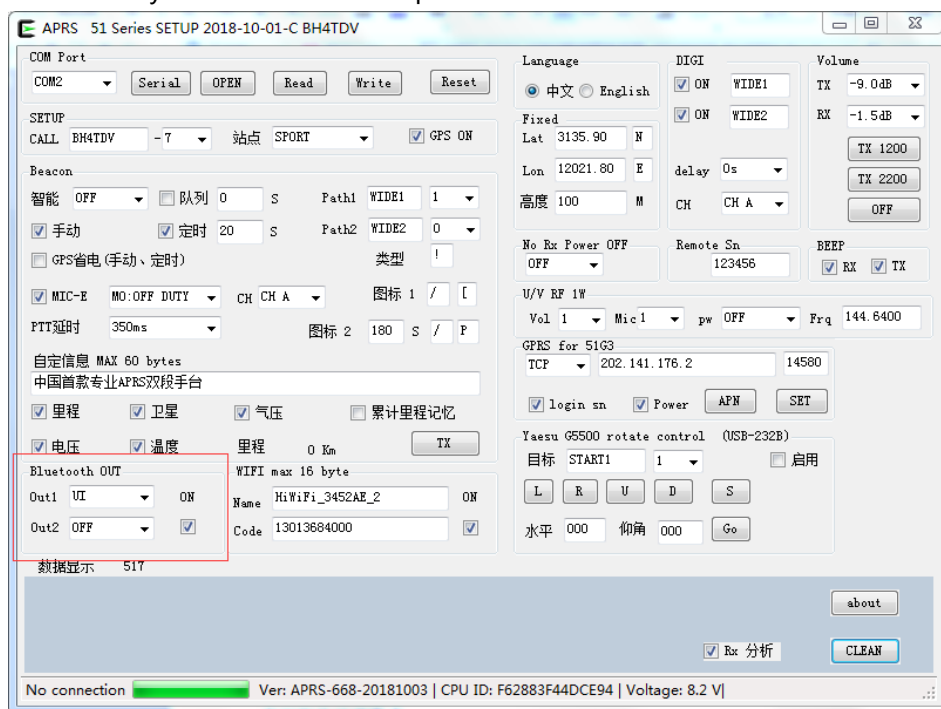
When this item is checked, the real-time mileage will be automatically saved in synchronization every time the beacon is transmitted.

If this item is not checked, the next boot mileage will be cleared automatically.

TX test button

When in the fixed station, press this button, the hand station automatically transmits once, to be the beacon of the fixed station position.

When the mobile station is in the mobile station, when the GPS is effectively locked, pressing the button, the radio automatically transmits a real-time position beacon.



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OUT 1 Bluetooth data output 1, 9600 rate

KISS HEX outputs standard KISS data instructions for various standard APRS computers or PC software

UI outputs standard UI text data for uploading the server, or secondary development by the user.

GPWPL outputs standard GPWPL waypoint data, user GARMIN navigator

KISS ASC outputs standard KISS ASC data instructions for secondary development of users

GS232B output standard GS232B data command for G5500 rotator control

OFF closes the output data

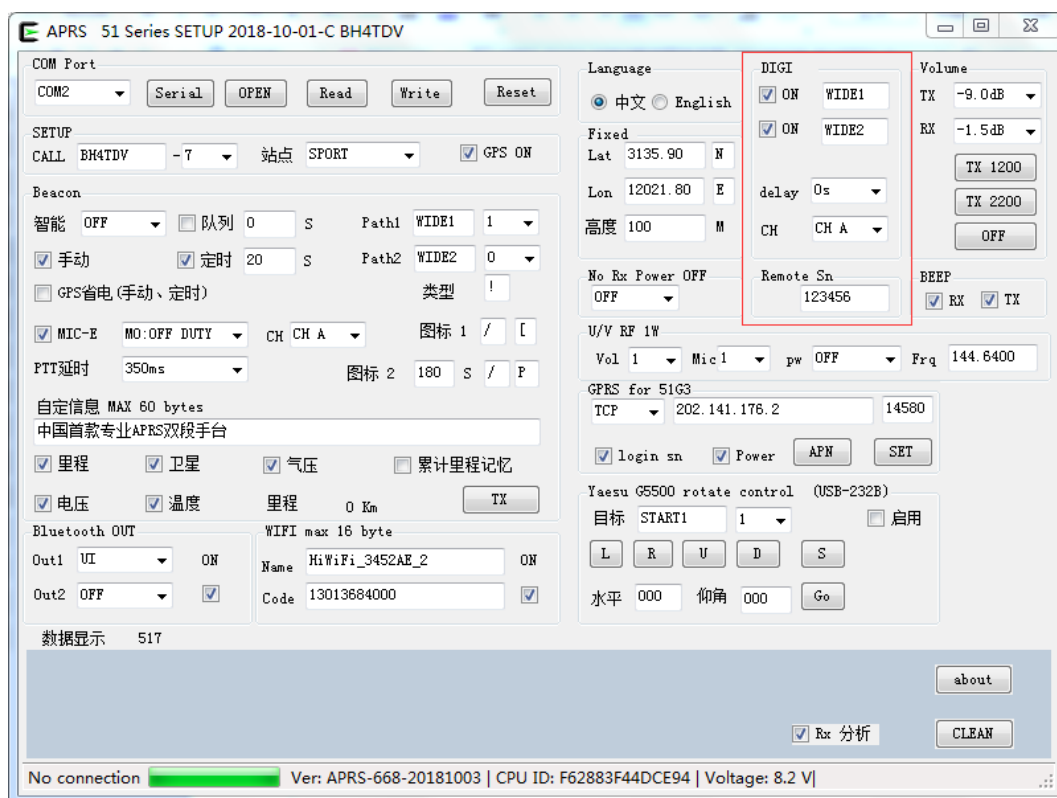
OUT 2 Bluetooth data output 2, 9600 rate

GPS outputs GPS data (GNRMC+GNGGA), which can be mixed with OUT 1 at the same time.

OFF t turns off GPS output

Bluetooth power switch

ON/OFF



APRS digital repeater DIGI function

Able to set 2 repeater names

Repeater Name 1: Default WIDE1 number or English uppercase, up to 6 digits

Repeater Name 2: Default WIDE2 number or English uppercase, up to 6 digits

Forwarding condition: When the device receives is a valid beacon,

And the beacon contains the local repeater name, and the number of forwarding times is greater than 1,

The device will forward once, and reset the number of forwarding times, reduce it once, and repackage it.

If the number of forwardings is 0 in the beacon, it will not be forwarded.

APRS digital repeater, each forwarding, is the process of receiving, decoding, re-encoding, and transmitting. Therefore, no matter how many times of forwarding, the signal quality is always the best, which is the difference from the traditional analog voice repeater.

APRS digital trunk, because the beacon contains the specified number of forwarding, so it will not forward indefinitely

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Remote password

Default password 123456,it must be 6 digits

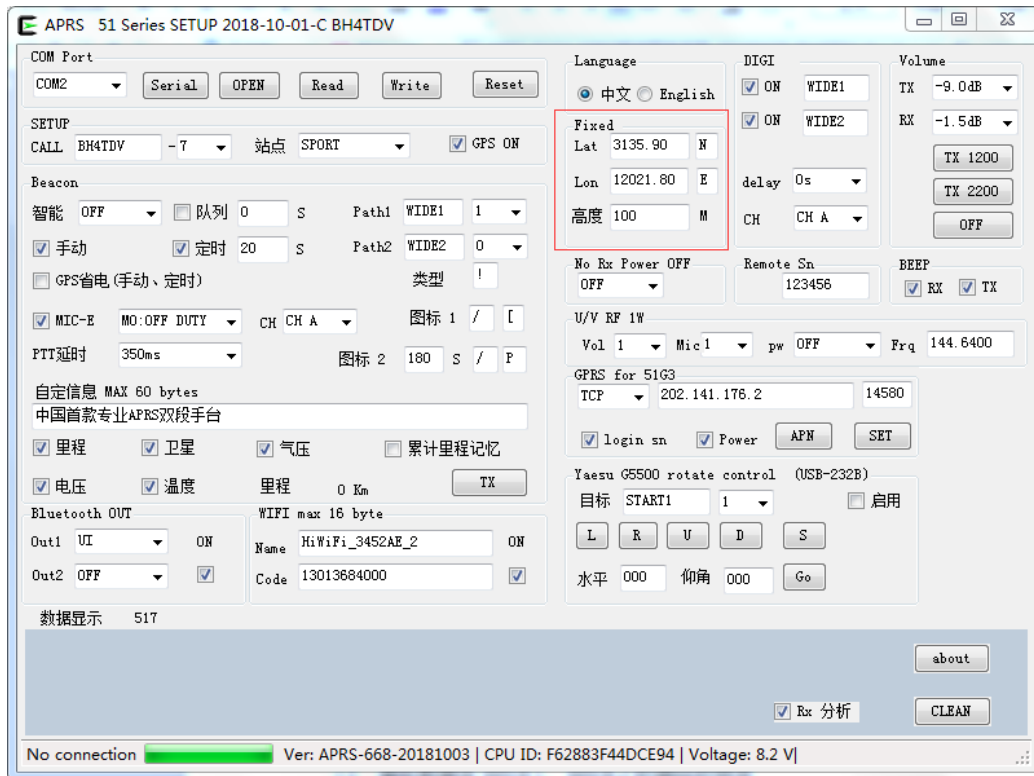
Be able to remote operate digipeater, control external relays and sensors

When a valid beacon is received and the beacon contains a password and an instruction, the following operations will be performed.

- 1, Command A0 closes DIGI 1
2. Command A1 opens DIGI 1
- 3, Command B0 closes DIGI 2
4. Command B1 opens DIGI 2
- 5, Command R0 reset



For example: Send custom information through 51TNC, fill in the custom information 123456A0 After sending this beacon, the repeater DIGI 1 will be closed.



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Fixed station setting

Lat represents the latitude used by the fixed station, with a fixed length of 7 digits (including the decimal point) and a degree. Sub-format.

N/S fixed length 1 bit

Lon indicates the longitude used by the fixed station, with a fixed length of 8 digits (including the decimal point) and degrees. Sub-format.

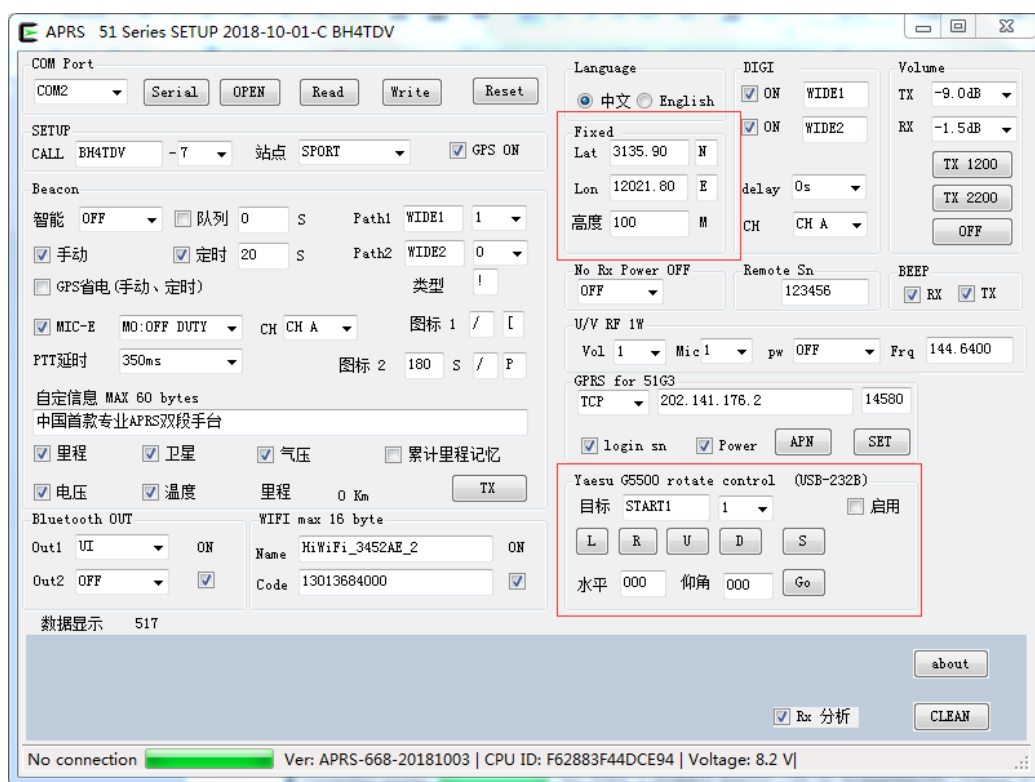
W/E fixed length 1 bit

Height, in meters, when tracking the aircraft, you must set the height of the station.

After locking, when in fixed station mode,

Various types of fixed station beacons will be sent using this set latitude and longitude

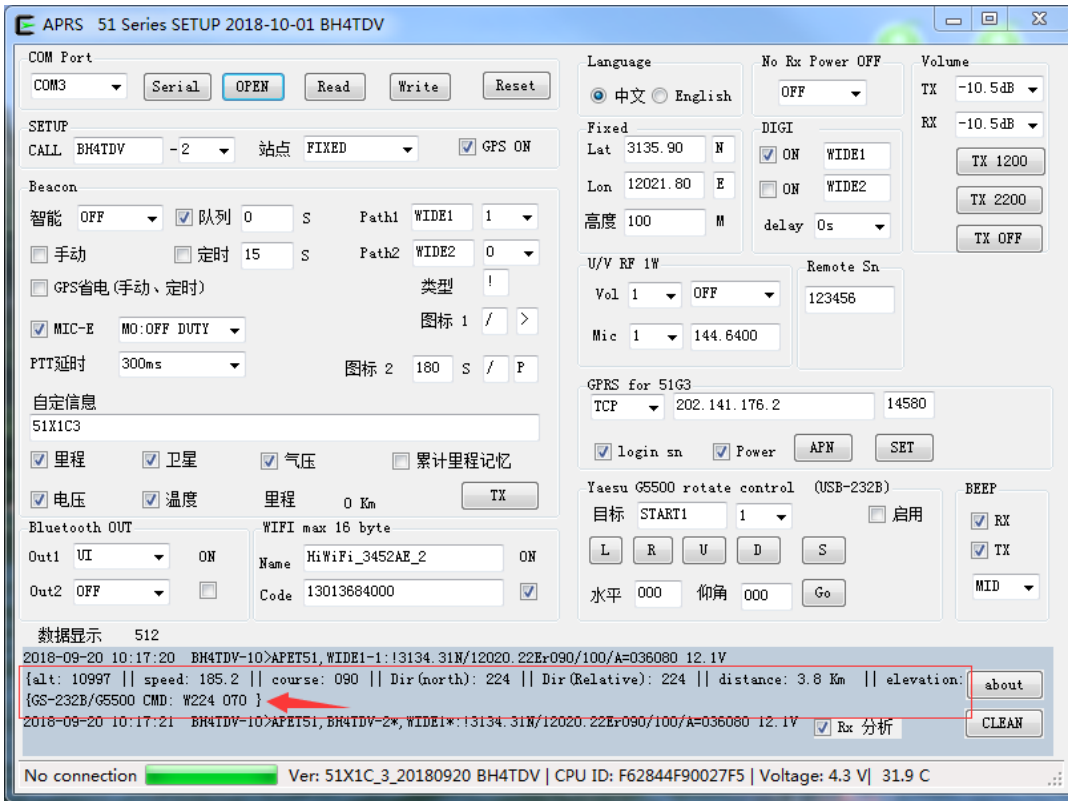
The latitude and longitude of this setting will be used to calculate the relative distance to the other program, the north position, the relative direction, and so on.



When used to track the aircraft, you need to set the local latitude and longitude, altitude, and the call sign of the

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aircraft

This tracker has multiple analysis algorithms such as distance, azimuth and elevation angle.

When an aircraft beacon is received, it will analyze the relative direction and elevation angle to control the G5500 rotator to achieve automatic tracking.

APRS X1C3 firmware upgrade

Turn on the power, connect the USB cable, open the upgrade software, select the serial port number, and click



Upgrade

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How to query my track on the computer

The APRS-51 X1C3 uses the standard APRS protocol. When there is an APRS gateway nearby, when the local beacon is received, the local track and other information will be displayed on the APRS map.

APRS.IS server : <http://aprs.fi/>

Client setup program (For expert only)

Following interface is for reference only, the version is constantly updated, there may be differences

Hardware connection:

- 1, open the X1C3 box by using proper tools
2. Use the USB-TTL data cable (optional) to connect to the APRS X1C3 motherboard ISP download port.
3. Open the universal serial port debugging software and select the correct port number. The default rate is 9600.
4. Enter the command and modify the parameters you need.

Note: Setting parameters - pay attention to input method, you should use English status inputmtry not to copy information from other documents, so as not to bring in hidden characters,and the X1C3 board will not work properly.

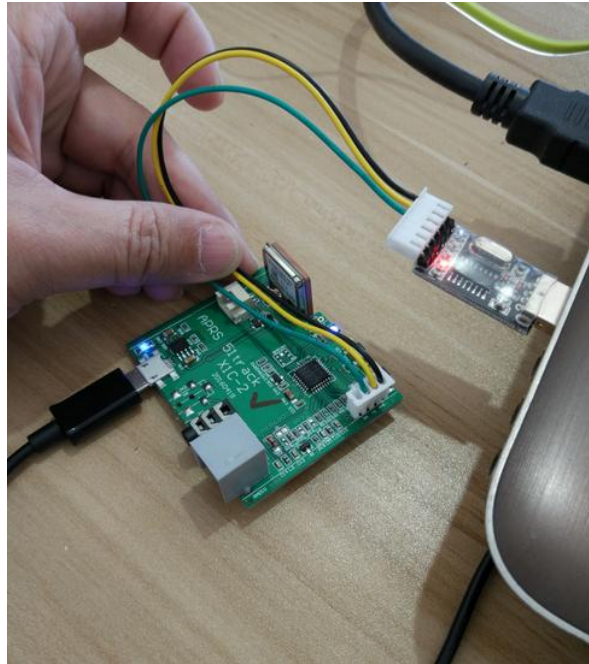
When the setting data is garbled, delete the garbled data and rewrite it.

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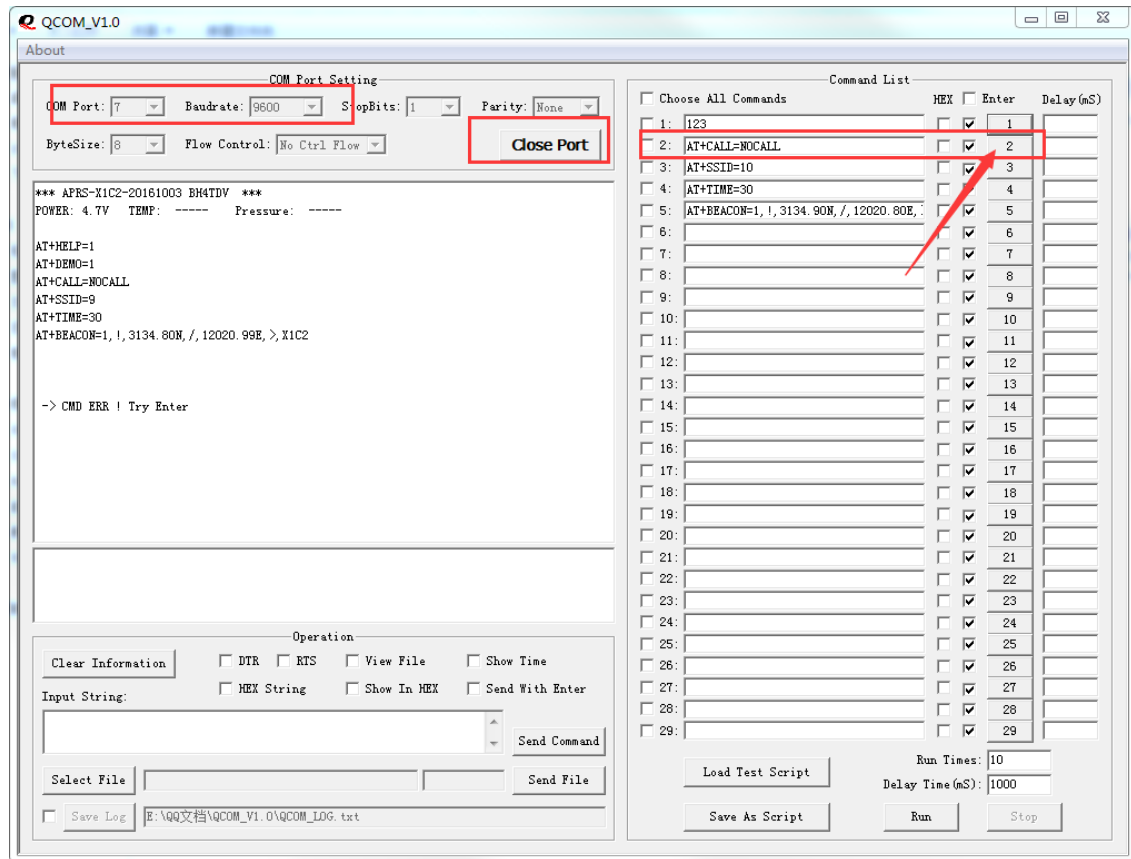
Instructions for setting instructions:

Note: **All setup commands must be + Enter (ENTER)**. After setting the parameters, the motherboard will reset and output all parameters.



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Setting tips:

Connect the RX TX GND 3 wires of the motherboard ISP port with a USB to TTL data cable.

1. You don't need to enter the instructions word by word.

2. Just enter any character and return to the full list of instructions.

3, in the list, copy the instructions you need to the software send area, modify the parameters, point to send.

4, pay attention to the end of the instruction plus a carriage return.

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Return command list

```
*** APRS-X1C2-20161003 BH4TDV ***
```

```
POWER: 4.7V  TEMP:  -----  Pressure:  -----
```

```
AT+HELP=1
```

```
AT+DEMO=1
```

```
AT+CALL=NOCALL
```

```
AT+SSID=9
```

```
AT+TIME=30
```

```
AT+BEACON=1, !, 3134.80N, /, 12020.99E, >, X1C2
```

-> CMD ERR ! Try Enter

Command description

```
*** APRS-X1C2-20161003 BH4TDV ***
```

```
POWER: 4.7V  TEMP:  -----  Pressure:  -----
```

The first line returns the firmware version number, battery voltage, temperature, and air pressure.

The air pressure and temperature are both installed to display the data.

Command: AT+HELP=1 Enter

Description: List all commands.

Command: AT+DEMO=1 Enter

Description: Use this setting to restore the motherboard defaults.

Command: AT+CALL=NOCALL Enter

Description: Set the beacon call sign, the default call sign is NOCALL, uppercase, up to 6 digits.

Command: AT+SSID=9 Enter

Description: Set the beacon SSID, the default is 9, the parameter value range is 0-15.

Command: AT+TIME=30 Enter

Description: Set the interval for transmitting beacons at regular intervals. The parameter value ranges from 0 to 65535 seconds. The default is 30 seconds for easy testing.

Command: AT+BEACON=1, !, 3143.55N, /, 12020.66E, >, X1C

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Description: Set the path requirements, type, latitude, icon set, longitude, icon, custom information of the beacon among them:

1 repeater forwarding path

0=No path, no need for other relay forwarding

1=Includes WIDE1-1 (default)

2=Includes WIDE1-1, WIDE2-1

! Indicates the type character, a fixed length of 1 word, generally do not need to be changed. For modifications, refer to the APRS protocol manual.

3134.55N means latitude, non-fixed length, filled in format, no need to change. Not related to actual launch, used for factory testing.

/ indicates the icon set, generally do not need to be changed. For modifications, refer to the APRS protocol manual.

12020.66E indicates longitude, non-fixed length, filled in format, no need to change. Not related to actual launch, used for factory testing.

> Indicates the icon style displayed on the server map, with a fixed length of 1 word, refer to the APRS Icon Set to change.

X1C represents custom information, up to 50 words in English.

* Voltage, temperature, and air pressure reports are automatically inserted at the end of the message section. The temperature and pressure sensors are installed to report accordingly.

Firmware upgrade guide: Refer to the 51TNC series upgrade process.

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