# Standard Serial Port ADS-B Ground Receiver ADSB-SS03

## User Manual

AvionixTech

# Contents

# 1. Introduction

ADSB-SS03 is a standard ADS-B ground receiver that complies with the RTCA DO260B/DO260C standards. Integrated with ADS-B signal processing module, the receiver can output raw ADS-B messages and decoded CSV plain-text data via USB or serial port. ADSB-SS03 supports simultaneous output of both raw ADS-B messages DF17/DF18 and decoded CSV plain-text data. The serial port output protocol supports RS232, RS422, and RS485(Serial interface supports RS232 protocol by default; optional RS485 or RS422 configuration available. Please specify the required configuration before shipment).

This ADS-B receiver supports both BDS and GPS, providing ADS-B data reception, processing, and display services. It is applicable in fields such as civil aviation flight tracking, airport management, general aviation aircrafts surveillance, Detect-and-Avoid (DAA) subsystem, ADS-B IN capability for UAS situational awareness, radar calibration, academic research and education.

Packing List:

| No. | Name | Quantity | Remarks |
|---|---|---|---|
| 1 | ADSB-SS03 | 1 unit | Included |
| 2 | Power Cable | 1 piece | Included |
| 3 | ADS-B Antenna and Bracket | 1 set | Included |
| 4 | ADS-B Antenna Cable | 1 piece (10 meters) | Included |
| 5 | Type-B USB Data Cable | 1 piece | Included |
| 6 | GPS/BDS Antenna | 1 set (includes 3-meter cable) | Included |

# 2. Specifications

ADSB-SS03:

| No. | Specifications | |
|---|---|---|
| 1 | Power Supply | DC12V 2A |
| 2 | Power Consumption | 3.6W |
| 3 | Receiving Frequency | 1090MHz |
| 4 | Sensitivity | ⩽ -95dBm |
| 5 | Dynamic Range | ⩽ 40 dB |
| 6 | Update Rate: | ⩾ 1 Hz |
| 7 | Target Capacity | > 600 targets |
| 8 | Processing Capacity | > 3000 messages/s |
| 9 | Receiving Range | > 350km(no interference, unobstructed) |
| 10 | Data Format | ADS-B raw message, CSV plain-text |
| 11 | Data Interface | Type-B USB and DB9 female (both interfaces can output data simultaneously) |
| 12 | Serial Port Protocol | RS232, RS422, RS485 (configuration needs to be selected before factory shipment) |
| 13 | ADS-B Antenna Interface | N female |
| 14 | GPS/BDS Antenna Interface | SMA female |

| | | |
|---|---|---|
| 15 | Dimensions | 220*160*72mm (main body) |
| 16 | Weight | 1250g |
| 17 | Operating Temperature | -10°C ~ +55°C |
| 18 | Storage Temperature | -15°C ~ +60°C |
| 19 | Storage Humidity | 10% ~ 80% |

ADS-B Antenna:

| No. | Specifications | |
|---|---|---|
| 1 | Frequency Range | 1089-1091MHz |
| 2 | Bandwidth | 60MHz |
| 3 | Gain | 6dBi |
| 4 | VSWR | ≤1.5 |
| 5 | Direction Type | Omnidirectional |
| 6 | Polarization | Vertical polarization |
| 7 | Length | 60cm |
| 8 | Weight | 0.6kg |
| 9 | Connector Type | N female |
| 10 | Mounting Type | Mast mount |

GPS/BDS Antenna:

| No. | Specifications | |
|---|---|---|
| 1 | Gain | 5dBi |
| 2 | VSWR | ≤1.5 |
| 3 | LNA Gain | 28dBi |
| 4 | Noise Figure | <1.0 |
| 5 | Connector Type | SMA male |
| 6 | Cable Length | 3m |
| 7 | Mounting Method | Magnetic mount |

# 3. Key Features and Benefits

- Cost-effective;
- Supports simultaneous data output via USB and two serial ports (selectable from RS232, RS422, or RS485);
- One receiver can simultaneously deliver data to three client terminals;
- Supports output of decoded plain-text data;
- Compact and lightweight design for convenient portable use;
- Filter data within a range (optional).

# 4. Interface Description


Interfaces:

| No. | Interface Name | Function |
|---|---|---|
| 1 | POWER | Power supply interface for main unit, DC 12V 2A |
| 2 | GPS/BDS | GPS/BDS antenna interface, SMA female |
| 3 | ADS-B ANT | ADS-B antenna interface, N female |
| 4 | USB | Data interface 1, Type-B connector, combined output for raw messages and decoded plaintext, displays as SERIAL-A, SERIAL-B when connected to a computer |
| 5 | SERIAL1 | Data interface 2, DB9 connector, raw message output, default protocol is RS232 (other protocols can be configured upon request) |
| 6 | SERIAL2 | Data interface 3, DB9 connector, decoded plaintext output, default protocol is RS232 (other protocols can be configured upon request) |

USB (SERIAL-A) / SERIAL1 Configuration (ADS-B Raw Messages):

| No. | Name | Configuration |
|---|---|---|
| 1 | Baud Rate | 115200 |
| 2 | Data Bits | 8 |
| 3 | Parity | none |
| 4 | Stop Bits | 1 |

USB(SERIAL-B) / SERIAL2 Configuration (CSV plaintext data):

| No. | Name | Configuration |
|---|---|---|
| 1 | Baud Rate | 115200 |
| 2 | Data Bits | 8 |
| 3 | Parity | none |
| 4 | Stop Bits | 1 |

RS232 Interface Pinout Description:

| Pin Number | Description |
|---|---|
| 2 | RXD |
| 3 | TXD |

| | |
|---|---|
| 5 | GND |

RS485 Interface Pinout Description:

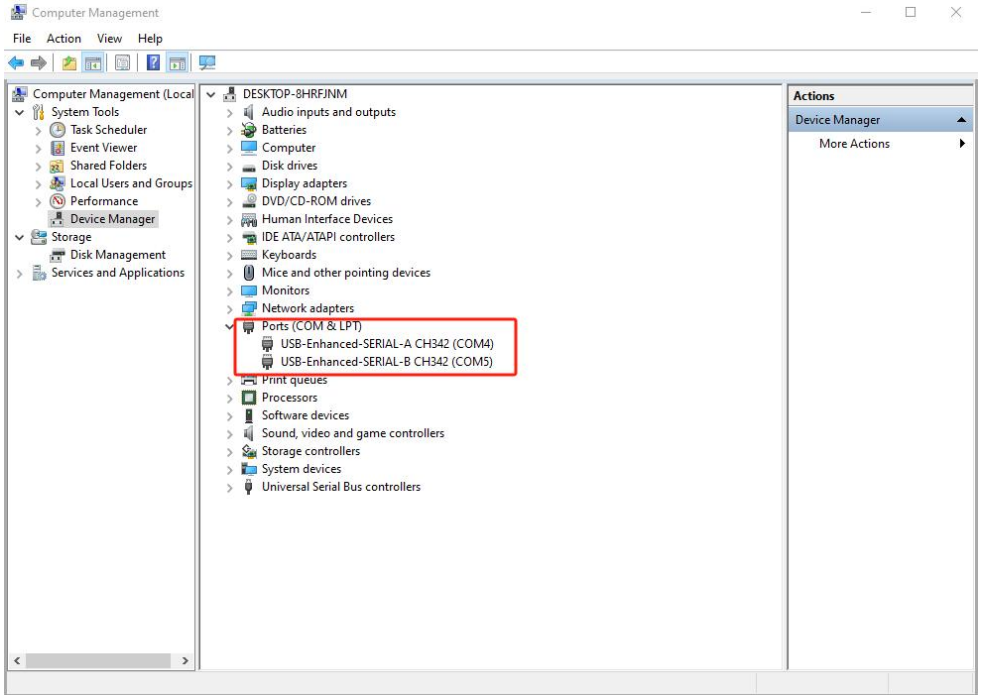
| Pin Number | Description |
|---|---|
| 1 | 485-A |
| 2 | 485-B |

RS422 Interface Pinout Description:

| Pin Number | Description |
|---|---|
| 1 | 422-R+ |
| 2 | 422-R- |
| 3 | 422-T+ |
| 4 | 422-T- |

# 5. Connection

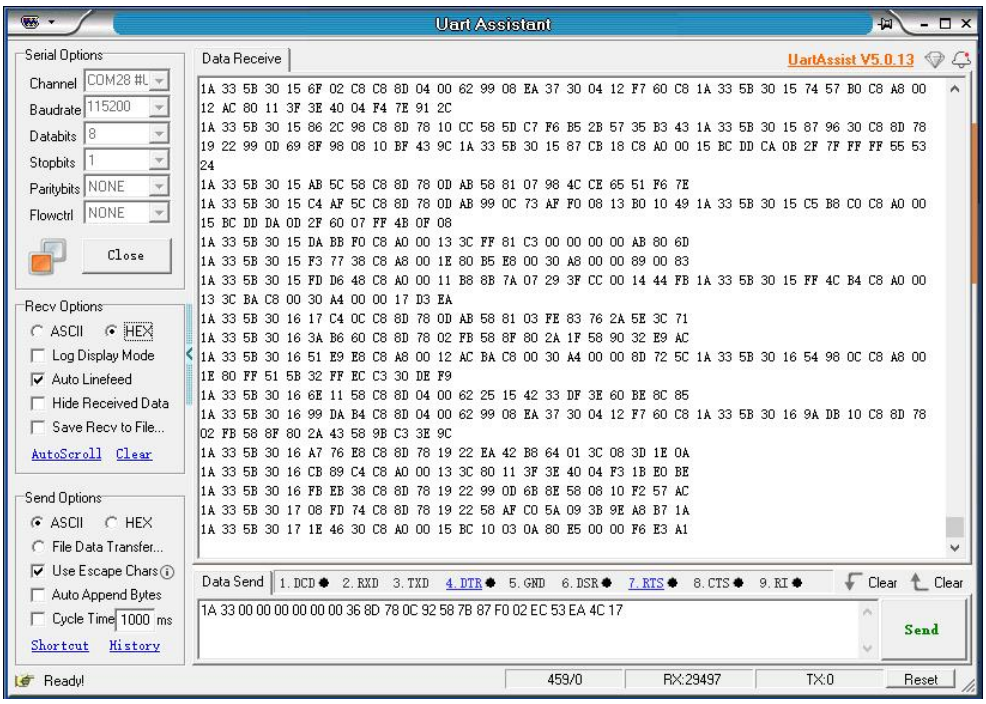
The ADSB-SS03 can be connected to a computer via the USB interface, and the computer will recognize two COM ports. The data received by the two COM ports will be the ADS-B raw messages and the decoded CSV plaintext, respectively.



In the serial port debugger, input the connection information for both COM ports.

After connecting, data can be received.

ADS-B Raw Message Reception:



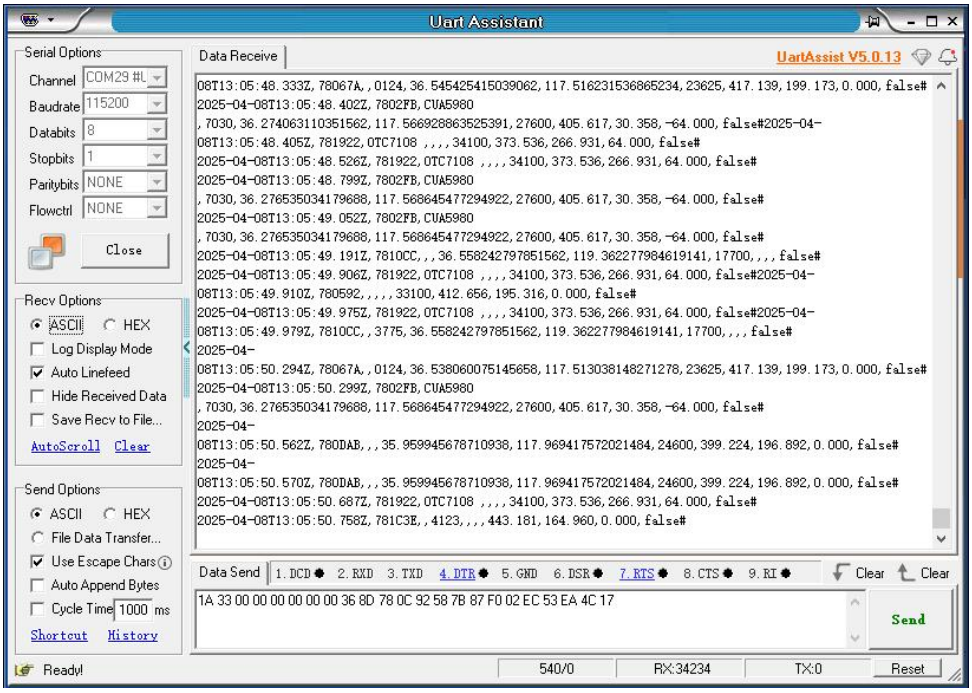

Example of Raw Message Data:

```
1A 33 11 82 1C 6F E1 8C C8 80 E1 91 B8 58 8F 80 2A CF 36 C6 25 61 2A
1A 33 11 82 1D B3 32 C4 C8 8D 39 4A 03 99 08 7A BF 90 04 95 F9 22 91
1A 33 11 82 1E 97 A0 20 C8 8D 78 08 F6 F8 23 00 02 00 49 B8 E9 62 A8
1A 33 11 82 1E C6 C7 04 C8 A0 00 12 B4 00 00 00 00 00 00 00 2D AE BC
```

Data Description:

| Data | Description |
|---|---|
| 1A | Start Byte |
| 33 | Type Byte |
| 11 82 1C 6F E1 8C | Timestamp Field (6bit) |
| C8 | Signal Strength Field (1bit) |
| 8D 78 05 86 99 09 DA 87 58 04 93 51 33 38 | Raw ADS-B Data (14bit) |

Decoded Plaintext Reception:




Example of Decoded CSV Plaintext Data:

2025-01-19T13:26:10.337Z,780DED,CDG2124 ,4121,36.251861572265625,117.37432479858
3984,31100,488.545,166.988,0.000,false#
2025-01-19T13:26:10.465Z,780DED,CDG2124 ,4121,36.251861572265625
,117.374324798583984,31100,488.545,166.988,0.000,false#

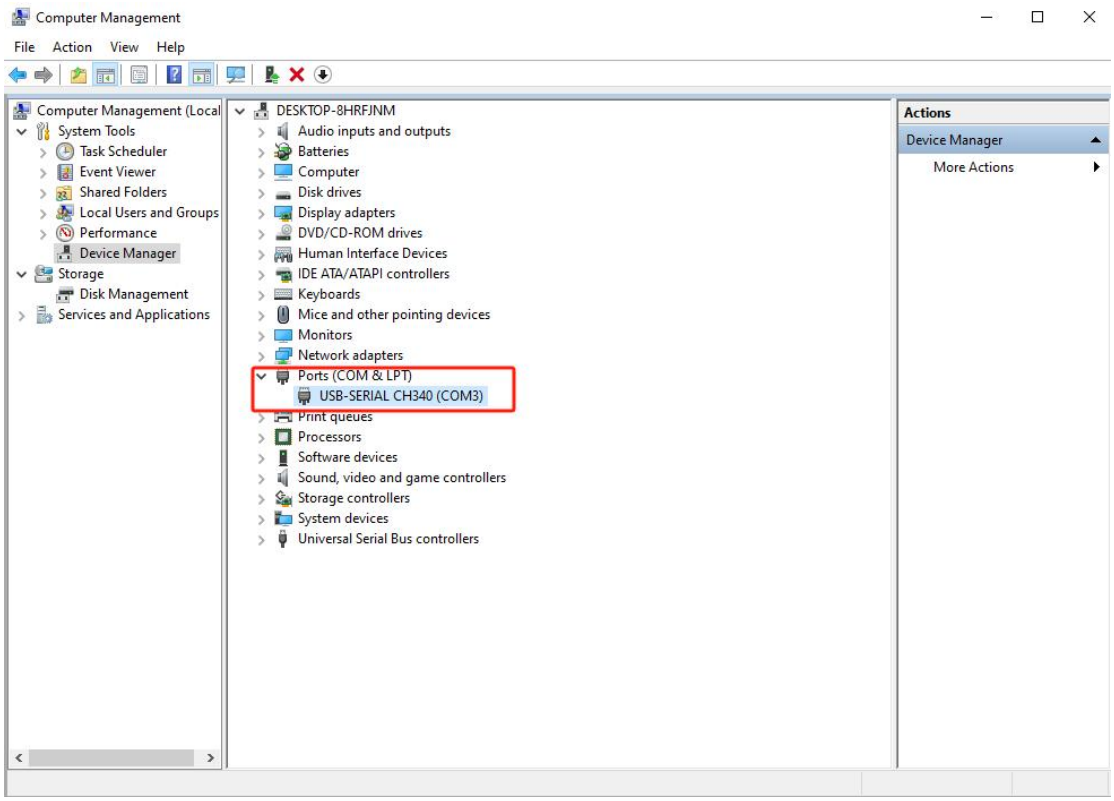
Data Description:

| Data | Description | Remarks |
|---|---|---|
| 2025-01-19T 13:26:10.337Z | Time | The time is the system device's time (reference format: ISO 8601), format: yyyy-MM-ddTHH:mm:ss.zzzZ |
| 780DED | ICAO 24-bit Address | 6-digit hexadecimal format data |
| CDG2124 | Call Sign | 8 characters output |
| 4121 | Secondary Code | 4-digit octal format number |
| 36.251861572265625 | Latitude | Latitude in decimal degrees, North is positive, South is negative |
| 117.37432479858398 4 | Longitude | Longitude in decimal degrees, East is positive, West is negative |
| 31100 | Pressure Altitude | Feet |
| 488.545 | Ground Speed | Knots per hour |
| 166.988 | Heading Angle | Decimal, in degrees |

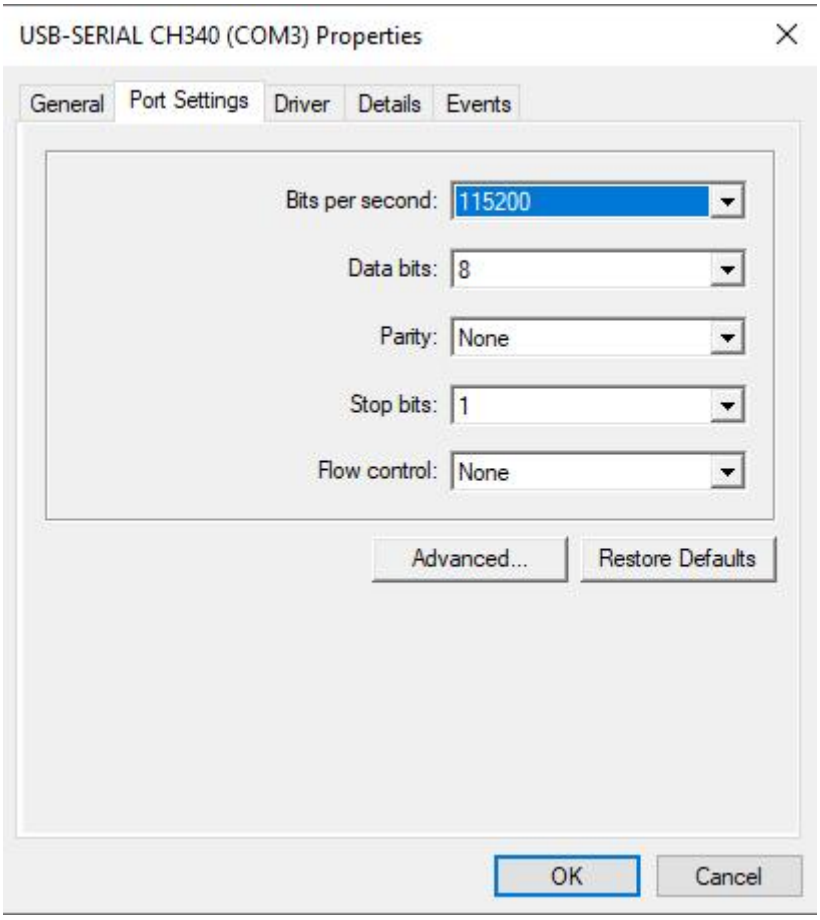
| | | |
|---|---|---|
| 0.000 | Pressure Vertical Rate | Meters per minute, negative for descent, positive for ascent |
| false | Air/Ground Indicator | true indicates ground, false indicates air |

Note: If data is missing, the value will be left empty and will not be output.

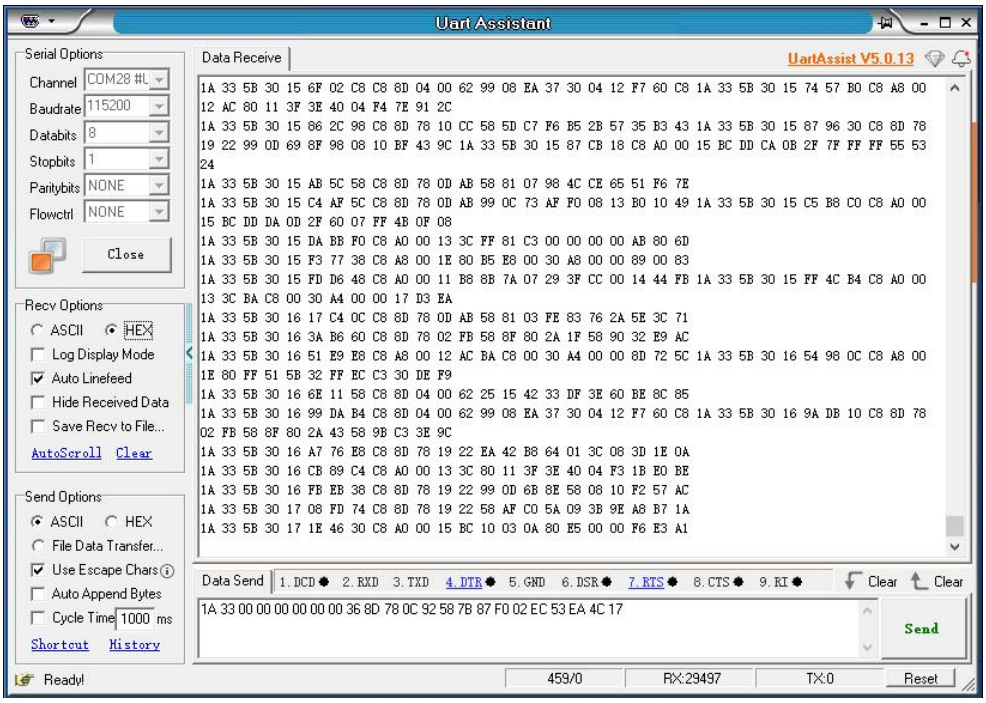
The ADSB-SS03 can also be connected to a device via serial port. Below is a demonstration of connecting through a USB-to-serial cable to a computer, where the connection is made to the SERIAL1 port and outputs raw messages.




In the Device Manager, right-click on the recognized USB-to-serial device, select Properties, and configure the settings as follows.




Connect the serial port using a serial debugging tool. Once connected, data can be received.

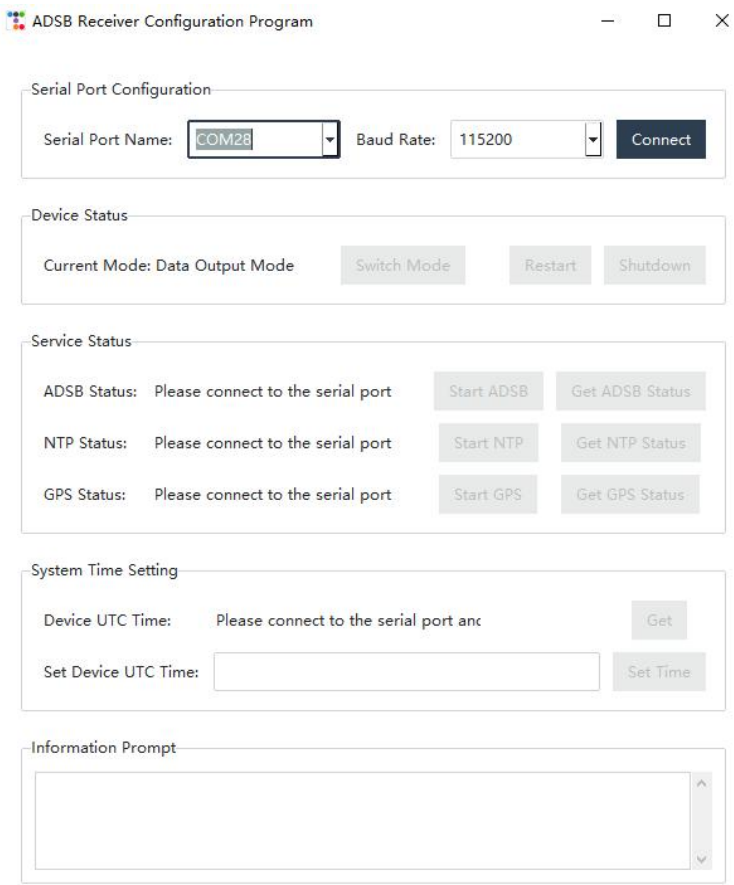


# 6. Device Configuration

The ADSB-SS03 is equipped with a device configuration program for viewing and starting device services. The following are the operation instructions:

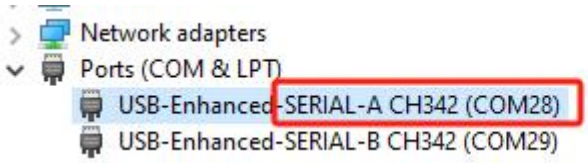
(1) Open the Program

Open the "ADSB Receiver Configuration Program.exe" program file, and the following interface will appear:

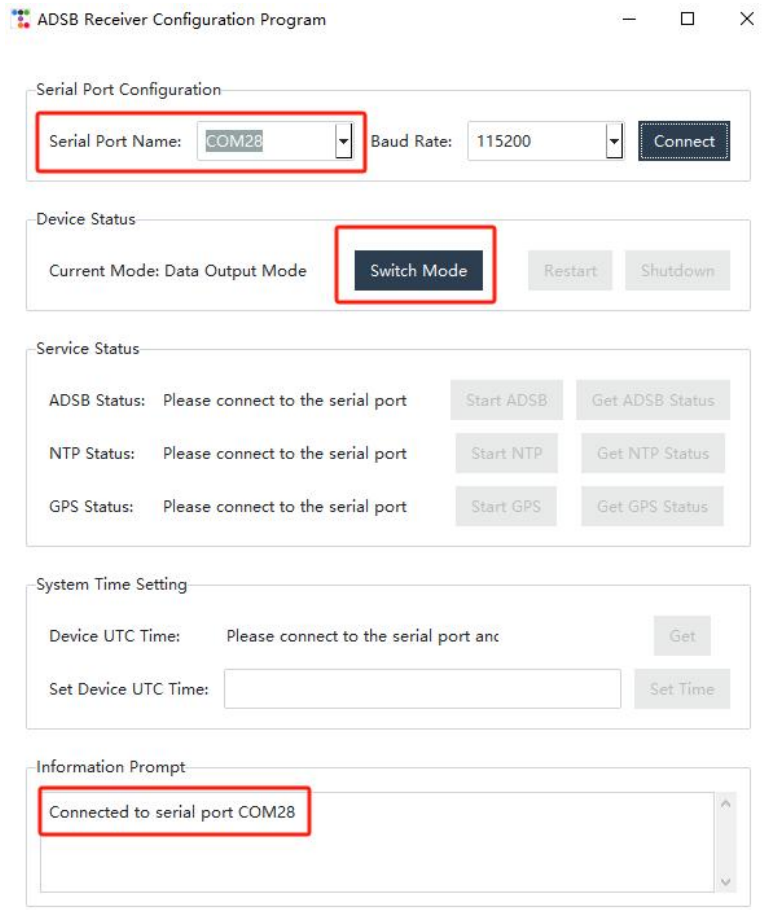



(2) Connect to Serial Port

After connecting the device's USB port to the computer, find the SERIAL-A COM port name in the computer's Device Manager, such as COM28.



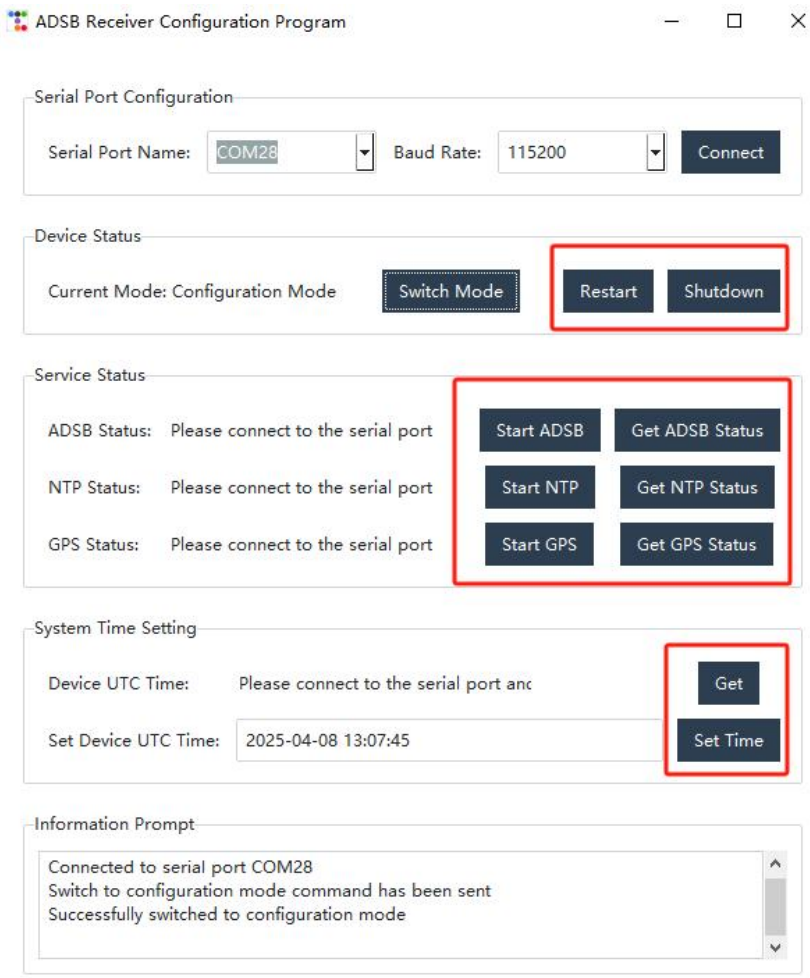
Then, in the configuration program, select the COM28 serial port, with the baud rate set to 115200 (no need to modify), and click the "Connect Serial Port" button. After a successful connection, the information prompt window will show a reminder, and the "Switch Mode" button will be activated.




(3) Change Device Mode

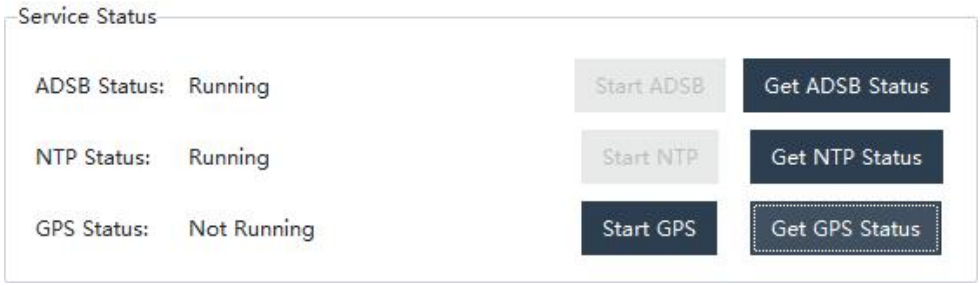
The default mode of the device is data output mode. To configure the device, it needs to be switched to configuration mode. Click the "Switch Mode" button to toggle between the two modes. When switched to configuration mode, corresponding functional buttons will be activated.

You can also restart or shut down the device.



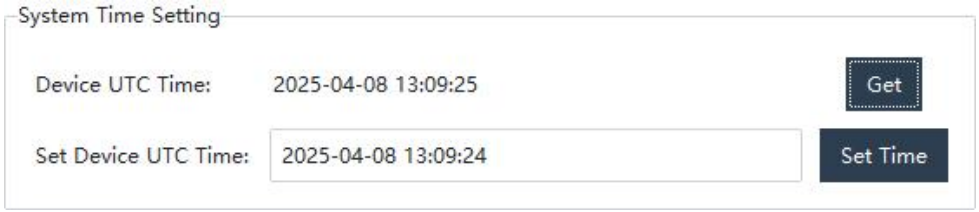

(4) View Service Status

Click the "Get Service Status" button in the service status area to check whether the service is running normally. If it is not running, click the "Start Service" button to start the service.




(5) View Device Time

Click the "Get" button in the system time area to retrieve the current device time, which is in UTC. If the time deviation is too large, you can manually set the time to the current time. The device will automatically update to the accurate time through the time service.

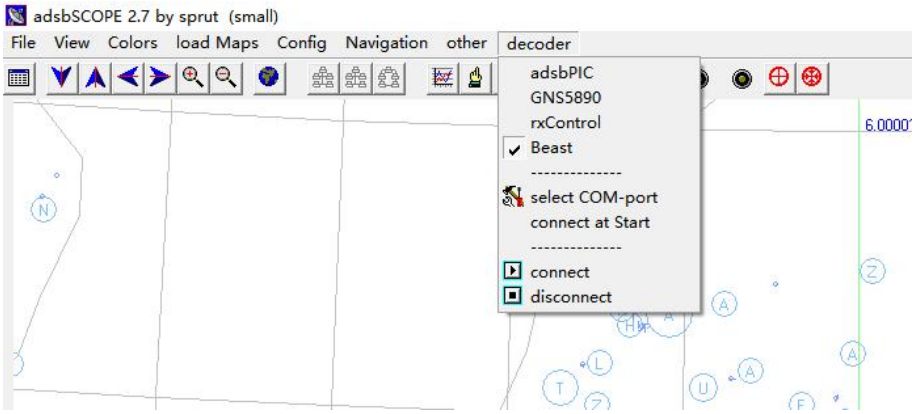



# 7. Software Connection

ADSB-SS03 can be connected to the display software adsbScope. The operation steps are as follows:

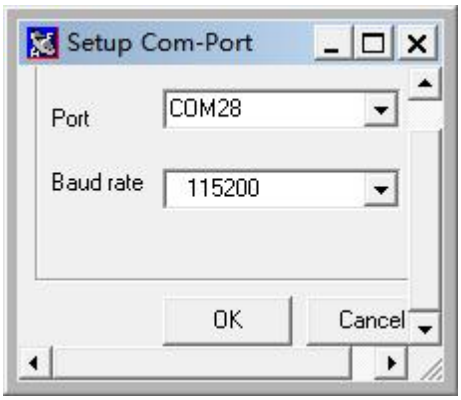
(1) Open the display software adsbScope, such as: adsbscope27_256.exe.

(2) Find the "decoder" menu at the top and select Beast from the menu.



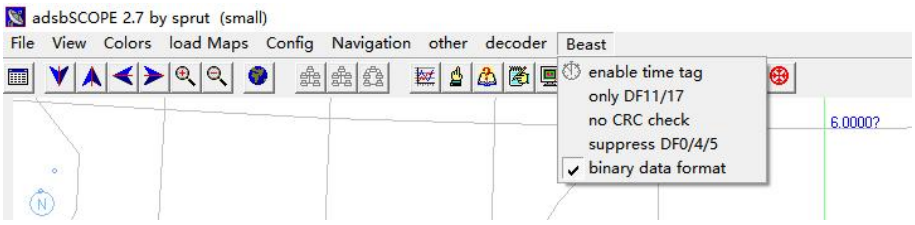

(3) Click the "select COM-port" option from the menu.

(4) In the pop-up window, select the COM port corresponding to the USB connection (for example, COM28), set the Baudrate to 115200, and click the OK button.

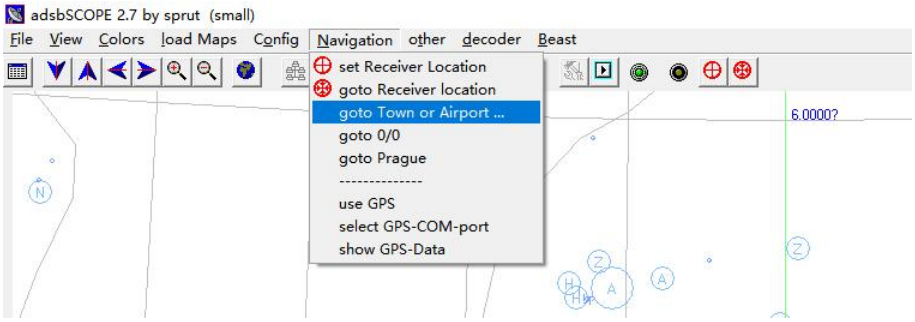



(5) Click the "connect" button in the "decoder" menu to connect the serial port.

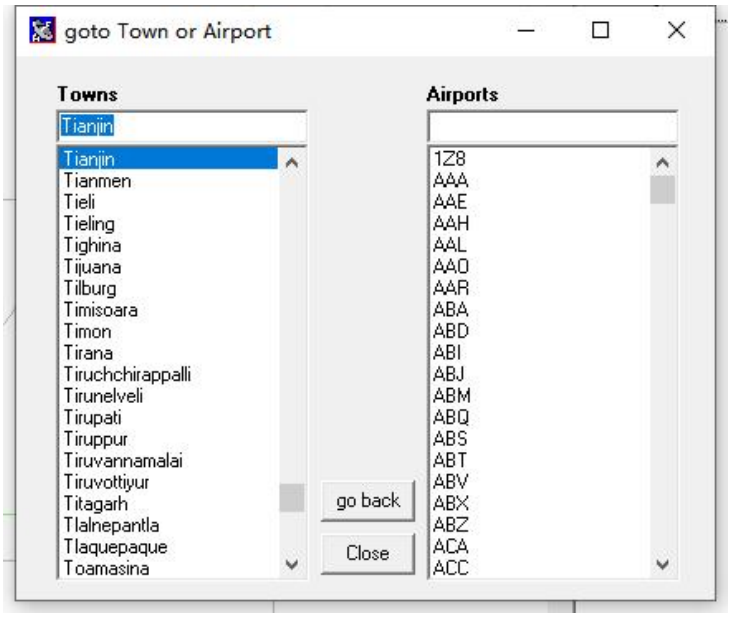
(6) Then, in the newly appeared Beast menu, select: Binary Data Format. After selecting it, you will notice that data can be received on the right side.



(7) Select "goto Town or Airport..." from the "Navigation" menu.




(8) In the pop-up window, type the English name of the nearest airport in the input box under "Towns," then select the airport from the query list below, and click the close button at the top-right corner.




(9) The display software will now be able to show the aircraft's location correctly.

# 8. Customization

All our products can be supplied tailored to your specific needs and customized with your brand and logo. We tailor designs, enclosures, features, and data formats to meet your specifications. Our OEM services empower you to launch unique products swiftly and risk-free.

# 9. Why Choose Us

- Comprehensive product range to meet users' needs for various levels of ADS-B ground station systems.
- Easy installation and use, with no complex configuration or high technical requirements for engineers. Simple and user-friendly.
- Complete after-sales service, providing technical support and services to help users maximize product benefits.
- Support for remote upgrades, assisting users in accessing the latest product features.
- Independent product development with customization options based on user requirements, including form factors, logo, software, hardware, performance, and functionality.