

# ADS-B Receiver User Guide

UgCS 2.13.401



**ADS-B**

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## 1 ADSB Receiver Service User Guide



# ADSB-B

### 1.1 First time ADSB-B source device connection

See [Disclaimer](#).

Supported ADSB-B sources:

Device	Remarks
microADSB	May require manual configuration of VSM port detection settings

More devices will be supported in future

Please follow these steps to connect an ADSB-B source to the UgCS:

1. To connect an ADSB-B source to UgCS you need a physical device and a driver for your operating system of choice.
2. If you are using **microADSB** devices, you are highly advised to configure other VSM modules to exclude ports used by **microADSB**. See [microADSB port configuration](#).
3. UgCS client will detect connected ADSB-B sources. If at least one ADSB-B source is connected, an indicator will light up in the top right corner of the Client.

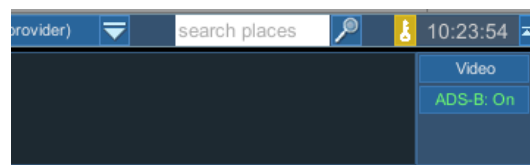


Figure 1: ADSB-B Connected

4. Collision possibility calculation is based on three parameters: H - horizontal distance (meters) V – vertical distance (meters) T – warning time (seconds)
5. Warnings about possible collisions appear in the log window if vehicles, during the minimal convergence, would, in the future, violate both boundaries (H / V) of any other vehicle in a time less than T. A warning is not displayed if the minimal convergence occurred in the past and the vehicles fly apart from one another.

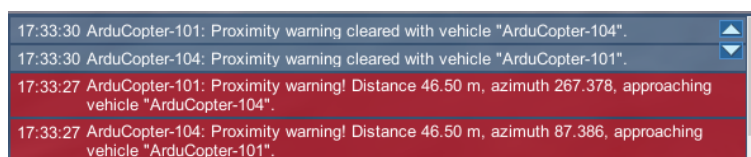


Figure 2: Collision warning

## 1.2 ADS-B safety parameters

The parameters below specify a "safety cylinder" with radius H and height V. Each aircraft has its own cylinder, based on its type. A Kalman filter is used to detect potential convergence, i.e., the possibility that among each pair of aircraft at least one will enter another's safety cylinder in T seconds. This is considered a potential collision and a warning will be issued.

- The following values have been adapted for use with UgCS ADS-B collision warning service, among two classes of aircraft:

Values for vehicles controlled by UgCS (assumed to be drones):

Parameter	Value	Unit of measurement
H (horizontal distance)	20	Metres
V (vertical distance)	15	Metres
T (warning time )	60	Seconds

Values for vehicles observed by UgCS (assumed to be planes, values based on ICAO recommendations):

Parameter	Value	Unit of measurement
H (horizontal distance)	9260 (5)	Metres (Nautical Miles)
V (vertical distance)	300	Metres
T (warning time )	60	Seconds

## 1.3 Configuration file

Default configuration file of the ADS-B Receiver VSM suits most needs and it is generally not necessary to modify it.

Configuration file location:

- **On Microsoft Windows:**

```
C:\Program Files (x86)\UgCS\bin\adsb-receiver.conf
```

- **On GNU/Linux:**

```
/etc/opt/ugcs/adsb-receiver.conf
```

- **On Apple OS X:**

```
/Users/[user name]/Library/Application Support/UGCS/configuration/adsb-receiver.conf
```

### 1.3.1 Common parameters

All VSMs share a common set of configuration file parameters described in [Common configuration file parameters](#). ADS-B Receiver VSM configuration file prefix is:

```
adsb-receiver
```

Within this prefix, each ADS-B source device has its specific section that includes device connection info.

### 1.3.2 microADSB port configuration

This section is related to **microADSB** devices and contains device connection and detection parameters.

- **Name:** adsb-receiver.micro\_adsb.1.name = /dev/ttyACM[0-9]+|com[0-9]+
- **Description:** Serial port configuration, for more details see [Serial port configuration](#). Default port communication speed is 115200 bps.

- **Example:**

```
adsb-receiver.micro_adsb.1.name = /dev/ttyACM[0-9]+|com[0-9]+
adsb-receiver.micro_adsb.1.baud.1 = 115200
```

**IMPORTANT** While *adsb-receiver.conf* file should be adequate for most systems, conflicts may arise if another VSM attempts to detect devices on the same port as **microADSB**, and doesn't shut it down properly afterwards. To avoid **microADSB** devices locking up please configure other VSMs to exclude ports it uses from detection.

If microADSB uses port COM27, then the following line for ardupilot in *vsm-ardupilot.conf* should list this port:

- **Example:**

```
vehicle.ardupilot.serial_port.exclude.1=COM27
```

In an event a **microADSB** device has locked up, just unplug it, then plug it back in.

## 1.4 Common configuration file parameters

VSM configuration file is a text file specified via command line argument - *-config* of the VSM application. Example:

```
--config /etc/opt/ugcs/vsm-ardupilot.conf
```

Each configuration parameter is defined as a line in the configuration file with the following structure:

```
name1.name2...nameX = value
```

where name1, name2 ... nameX are arbitrary names separated by dots to divide a variable into logical blocks and a value which can be a number value or a text string depending on the context. See below the description about common VSM configuration parameters.

### 1.4.1 UgCS server configuration

#### 1.4.1.1 Listening address

Mandatory.

- **Name:** ucs.local\_listening\_address = [IP address]
- **Description:** Local TCP address to listen for incoming connections from UgCS server. Specify *0.0.0.0* to listen from all local addresses.
- **Example:** ucs.local\_listening\_address = 0.0.0.0

#### 1.4.1.2 Listening port

Mandatory.

- **Name:** ucs.local\_listening\_port = [port number]
- **Description:** Local TCP port to listen for incoming connections from UgCS server. Default is 5556.
- **Example:** ucs.local\_listening\_port = 5556

## 1.4.2 Logging configuration

### 1.4.2.1 Level

Optional.

- **Name:** `log.level = [error|warning|info|debug]`
- **Description:** Logging level.
- **Default:** `info`
- **Example:** `log.level = debug`

### 1.4.2.2 File path

Optional.

- **Name:** `log.file_path = [path to a file]`
- **Description:** Absolute or relative (to the current directory) path to a logging file. Logging is disabled if logging file is not defined. File should be writable. Backslash should be escaped with a backslash.
- **Example:** `log.file = /var/opt/ugcs/log/vsm-ardupilot/vsm-ardupilot.log`
- **Example:** `log.file = C:\\Users\\John\\AppData\\Local\\UGCS\\logs\\vsm-ardupilot\\vsm-ardupilot.log`

### 1.4.2.3 Maximum single file size

Optional.

- **Name:** `log.single_max_size = [size]`
- **Description:** Maximum size of a single log file. When maximum size is exceeded, existing file is renamed by adding a time stamp and logging is continued into the empty file. [size] should be defined as a number postfixed by a case insensitive multiplier:
  - Gb, G, Gbyte, Gbytes: for Giga-bytes
  - Mb, M, Mbyte, Mbytes: for Mega-bytes
  - Kb, K, Kbyte, Kbytes: for Kilo-bytes
  - no postfix: for bytes
- **Default:** `100 Mb`
- **Example:** `log.single_max_size = 500 Mb`

## 1.4.3 Serial port configuration

Optional. VSM which communicates with vehicles via serial ports should define at least one serial port, otherwise VSM will not try to connect to the vehicles. Port name and baud rate should be both defined. [prefix] is unique for each VSM.

### 1.4.3.1 Port name

Optional.

- **Name:** `[prefix].[port index].name = [regular expression]`
- **Description:** Ports which should be used to connect to the vehicles by given VSM. Port names are defined by a [regular expression] which can be used to define just a single port or create a port filtering regular expression. Expression is case insensitive on Windows. [port index] is a arbitrary port indexing name.
- **Example:** `vehicle.ardupilot.serial_port.1.name = /dev/ttyUSB[0-9]+|com[0-9]+`
- **Example:** `vehicle.ardupilot.serial_port.2.name = com42`

### 1.4.3.2 Port baud rate

Optional.

- **Name:** [prefix].[port index].baud.[baud index] = [baud]
- **Description:** Baud rate for port opening. [baud index] is an optional arbitrary name used when it is necessary to open the same serial port using multiple baud rates. [port index] is an arbitrary port indexing name.
- **Example:** vehicle.ardupilot.serial\_port.1.baud.1 = 9600
- **Example:** vehicle.ardupilot.serial\_port.1.baud.2 = 57600
- **Example:** vehicle.ardupilot.serial\_port.2.baud = 38400

### 1.4.3.3 Excluded port name

Optional.

- **Name:** [prefix].exclude.[exclude index] = [regular expression]
- **Description:** Ports which should not be used for vehicle access by this VSM. Port names are defined by a [regular expression] which can be used to define just a single port or create a port filtering regular expression. Filter is case insensitive on Windows. [exclude index] is a arbitrary indexing name used when more than one exclude names are defined.
- **Example:** vehicle.ardupilot.serial\_port.exclude.1 = /dev/ttyS.\*
- **Example:** vehicle.ardupilot.serial\_port.exclude = com1

### 1.4.3.4 Serial port arbiter

Optional.

- **Name:** [prefix].use\_serial\_arbiter = [yes|no]
- **Description:** Enable (yes) or disable (no) serial port access arbitration between VSMs running on the same machine. It is recommended to have it enabled to avoid situation when multiple VSMs try to open the same port simultaneously.
- **Default:** yes
- **Example:** vehicle.ardupilot.serial\_port.use\_serial\_arbiter = no

## 1.4.4 Network connection configuration

Optional. VSM which communicates with vehicles via network should define at least one network connection, otherwise VSM will not try to connect to vehicles. [prefix] is unique for each VSM.

### 1.4.4.1 Local IP-address for UDP

Optional.

- **Name:** [prefix].detector.[con index].udp\_local\_address = [IP-address]
- **Description:** Local IP-address to listen for incoming UDP packets on. Specify 0.0.0.0 if you want to listen on all local addresses.
- **Example:** vehicle.ardrone.detector.1.udp\_local\_address = 0.0.0.0

#### 1.4.4.2 Local UDP port

Optional.

- **Name:** [prefix].detector.[con index].udp\_local\_port = [port number]
- **Description:** Local UDP port to listen for incoming packets on.
- **Example:** vehicle.ar drone.detector.1.udp\_local\_port = 14550

#### 1.4.4.3 Remote IP-address for UDP

Optional.

- **Name:** [prefix].detector.[con index].udp\_address = [IP-address]
- **Description:** Remote IP-address to send outgoing UDP packets to.
- **Example:** vehicle.ar drone.detector.1.udp\_address = 192.168.1.1

#### 1.4.4.4 Remote UDP port

Optional.

- **Name:** [prefix].detector.[con index].udp\_port = [port number]
- **Description:** Remote UDP port to send outgoing packets to.
- **Example:** vehicle.ar drone.detector.1.udp\_port = 14551

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