



## 1 Version History

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## 2 Page Index

This manual contains numbered pages 1 to 8.

## 3 Emergency procedures

If you suspect any malfunction of the ADLS1G or interference with other aircraft systems, deactivate the device by pulling / deactivating the aircraft circuit breaker for the device and its connected ADL device. Or pull the cigarette lighter plug, whichever is applicable. Do not reactivate the device until the problem has been investigated and resolved on the ground.

In case of a generator failure or similar situation requiring electric load shedding, deactivate the device by pulling / deactivating the aircraft circuit breaker or pulling the cigarette lighter plug, whichever is applicable.

## 4 Weather Warning

While we do everything we can to ensure quality, the ADLS1G and its connected ADL in flight weather device might not work at any time. In addition the system may display false information. **NEVER PENETRATE WEATHER BASED ON THE INFORMATION PROVIDED.** This information is for situational awareness only.

## 5 Overview ADLS1G Features

The ADLS1G module is a multi purpose extension box to other ADL devices. It is compatible with the ADL140, ADL150(B), ADL190 and ADL200 in flight weather devices. The ADLS1G adds features not supported by the ADL devices themselves. First it is able to translate the GDL90 formatted weather data transmitted by the ADL devices over the wired RS232 port to an actual FIS-B over the air type signal. This signal can be received by existing ADS-B UAT receivers as used in the USA by all major avionics vendors. This makes it possible to display ADL in flight weather on any avionics system able to display FIS-B weather data. This includes major platforms like GTN650/750, G500, G600, G1000, G3000 and many more. Second the ADLS1G can receive RS232 data from two sources simultaneously. It will adapt automatically to the baud rates of the input and send the combined data to the ADL device. This enables for example parallel "Aviation Format" flight plan and FLARM inputs.

## 6 Detailed Description ADLS1G

The ADLS1G receives GDL90 formatted weather data from the ADL device over the RS232 wire connection. It will transform this data into a FIS-B over the air signal. The signal leaves the ADLS1G through the SMA connector. You have two options to connect a receiver:

First you can establish a coax cable connection between the SMA output of the ADLS1G and the input of a suitable receiver. An example of such is the GDL39 device. The GDL39 will receive the signal and it will be all contained in the cable connection. The receiver will have to be a pure receiver. The ADLS1G outputs a very weak 0.1mW, so a receiver should be able to receive the full signal strength over a direct cable connection. DO NOT MAKE SUCH CONNECTION WITH A UNIT WHICH ALSO TRANSMITS LIKE A GTX345. The strong signal of the GTX345 could destroy the ADLS1G and on top the GTX345 output would no longer work properly.

Second you can connect an antenna or simply leave the connector open and let it act as a weak antenna. The FIS-B signal will be in the air and any capable receiver can pick it up with its own antenna. The advantage is FIS-B can be sent to combined transmitter and receivers like the GTX345. The ADLS1G will output a very weak 0.1mW signal, so it has got a very short range of only a few meters. In theory you could also introduce the signal into the antenna cable of receivers like the GTX345 by different means like a T with an attenuator etc. But this is highly discouraged as the cabling is very critical for proper ADS-B compliance.

Finally for added convenience the ADLS1G integrates all features of the ADLRS232 Combiner, so it offers two RS232 input with automatic baud rate detection. This allows for example to connect an Aviation Format flight plan source like a GTN650/750 and a FLARM to the ADL device at the same time.

Do not forget some avionics systems like the IFD440/540, EX5000 etc. are able to receive the FIS-B data directly over RS232 or RS422. In that case you can wire the ADL device directly to the IFD440/540 etc. which is usually easier and cheaper than using the ADLS1G. But that option is not available in many cases, especially for the GTN650/750, G500, G600, G1000, G3000 etc.

## **7 Certification ADLS1G**

Currently the ADLS1G is provided without any EASA or FAA paperwork. You can install it in experimental, ultra light aircraft or similar. For certified aircraft you will have to produce your own paperwork or wait until we might be able to provide such in the future.

## **8 Frequency Considerations**

By default the ADLS1G will transmit the FIS-B signal on 915 Mhz which is a license free ISM band. This is a perfect band for tests and if you can configure the frequency of your receiver will be a perfect solution. Unfortunately in most cases you cannot change the frequency of the receiver, so the ADLS1G also allows you to change the transmit frequency.

Obviously most users will be interested in the 978 MHz frequency which is used in the USA for FIS-B transmissions as commercial receivers will only listen on this frequency. 978 MHz is traditionally used for DME signals paired to the 108.00 MHz VOR frequency. The US choose to repurpose this frequency for FIS-B (and other ADS-B UAT signals) and many other countries seem to have stopped using 108.00 VOR/DME.

But remember when transmitting on 978 MHz this could interfere with a 108.00 paired DME signal. In real life as the ADLS1G FIS-B signal is only transmitted in a small timeframe, the number of received DME packets would probably still be sufficient for it to operate but do not rely on this.

If you route the ADLS1G output through a cable to the receiver, the signal will be contained and your case is simple. But if you decide to radiate the FIS-B signal over the air on 978 MHz, you do this at your own risk. In general the signal will be well below the noise level within meters from the transmitter, but different countries have different limits for such extremely low power transmissions in different application, so we cannot provide any legal advice.

## **9 Airspace with other FIS-B Sources (Mainly USA)**

The primary purpose of the ADLS1G is to cover the big rest of the world where no ground based FIS-B is available (Besides a few exceptions anywhere outside the USA). But if you still operate the ADLS1G in parallel to ground based FIS-B stations, a receiver should combine this data into an overall weather image. As every station only uses a small timeframe, many transmitters can operate simultaneously.

## **10 Receiver and Display Choices**

The ADLS1G is designed to bring your ADL weather to displays of third party manufacturers. We are in no means associated with those manufacturers, but would like to give you some guidance on popular choices.

For non certified aircraft or as portable solutions popular receiver choices are GDL39(3D), GDL50 or GDL52 Typical installed options are GTX345, GNX375, GDL39R, GTX45R or GDL88. Please note in many cases this will be a combined ADS-B out and ADS-B in solution. In such cases a coax cable connection to the ADLS1G is not possible. Only when operating a device as a pure receiver like the GDL39(3D/R) or GDL88 configured as receiver only, a direct coax cable connection is possible.

## **11 Installation**

The recommended method of installation is to glue the ADLS1G directly on the ADL150, ADL150B, ADL190 or ADL200 device. Please note the ADL140 contains an internal antenna, so the ADLS1G can only be glued to its bottom or will require some other installation solution. The ADLS1G will be supplied with suitable two sided adhesive tape. Attach it like shown below to the ADL device (expect ADL140).

Regarding the wiring take off the round connector from the ADL device and connect it to port 1 of the ADLS1G (port 2 will also work). Then connect the short cable integrated with the ADLS1G to the connector of the ADL device. The final installation will then look like shown below.



Figure 1 ADLS1G attached on top of an ADL150B

Now the ADLS1G is ready to operate and additional connections are optional. If you wish to connect an additional RS232 source, wire the second 4 pin connector. Also if you already had an ADLRS232 Combiner installed, remove it and connect both round connectors to the ADLS1G instead (order does not matter, the ADLS1G will detect baud rates automatically). If you wish to establish a cable connection for the FIS-B signal, connect a 50 Ohm coax cable to the SMA connector and run it to the receiver input with an appropriate connector.

## 12 Power and RS232 Connectors

The connectors on the ADLS1G are called "RSMHL 4" and a matching connector for installation purposes would be "RKMCK 4" from Belden or an equivalent from another manufacturer. The pin out is identical to the ADL140, ADL150(B), ADL190, ADL200, or ADLRS232 and described below. The ADLS1G features two such connectors but connecting the VCC and GND to one of those two is sufficient to power the ADLS1G (and the attached ADL device).



Figure 2 ADLS1G front with SMA connector (left) Port 2 (middle) and Port (right)

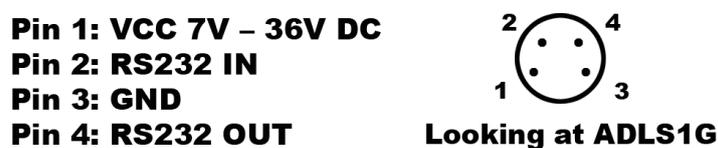


Figure 3 ADLS1G port 1 and 2 connector pins



Figure 4 RKMCK 4 connector

### 13 Configuration

Update the ADLConnect app to the latest version (8.96 or later). Then make sure the ADL device is running the latest firmware version (8.96 or later). Then go to the Config page and make sure the ADL RS232 port is running at 115200 baud, RS232 GDL90 is enabled and usually you will want the “Garmin” format enabled. We noted different receivers interpret the FIS-B data in slightly different ways. To provide you the best possible experience, there are different profiles available which customize the FIS-B data slightly depending on your receiver and display.

To change the transmit frequency of the ADLS1G power up the ADLS1G and its attached ADL device. Connect the WiFi and open the ADLConnect app on the iPad. When properly connected switch to the Config page, open the Expert Config and enter the following command in the Expert CMD field:

```
ADLS1G,915,-10
```

The first number, in this example 915, is the frequency in MHz used by the ADLS1G transmitter. So if you would like to change it adapt this number. The second is the transmit power. -10 dBm which equals 0.1mW and is as low as it will go. The next higher step would be 0 which equals 1mW, but we recommend to keep this to -10. After pressing “Send Expert CMD”, you can observe in the system messages visible on the Download page of the ADLConnect app, if the frequency was properly changed and the ADLS1G did restart properly with the new configuration.

### 14 Testing

Make sure you have a GPS fix on the ADL device. Download current weather data using the ADL device. Internet downloads using the ADLConnect app will not work, the data has to come from the ADL device itself. Then look at your display solution for incoming ADS-B FIS-B weather data. Different displays will be able to display different weather data. The ADL device will send METAR/TAF, regional radar, cloud tops and strike/lightning FIS-B data.

### 15 What About Traffic?

Besides FIS-B over the same technical channel also TIS-B traffic data can be transmitted. Currently the ADLS1G will not relay such traffic data as usually your FIS-B receiver will receive its own traffic data. But if this is not sufficient in a future software release such a feature might be added. It could forward all traffic data known to the ADL device as TIS-B to the FIS-B/TIS-B receiver and its display

## **16 Technical data**

Dimensions: 86 x 57 x 26mm (without connectors)

Mass: 100g

Power: 7-36V, below 1W

This is the same voltage as ADL140, ADL150(B), ADL190 or ADL200. The additional power consumption is minimal and all ADL installations running on 1A circuit breakers or bigger should accept an additional ADLS1G without modifications as a plug and play upgrade.

## **17 Contact**

Golze Engineering  
Bredowstr. 29  
10551 Berlin

<http://www.ing-golze.de>

[mail@ing-golze.de](mailto:mail@ing-golze.de)  
+49 30 39805204