

Mode-S transponder 2020 compliance installation and options for MGL EFIS systems



General

This document describes installation requirements for 2020 compliance with ADS-B extended squitter transmissions using a Trig Avionics mode-s transponder.

This document assumes the following minimum firmware versions:

iEFIS G3: 1.0.4.4

Trig transponder interface: 110119 (11 January 2019)

SP-12: 100119 (10 January 2019)

How to check versions:

Assuming devices installed. Use the EFIS Diagnostics menu and select “Mode-S installation checks”. If this item does not exist, update your EFIS firmware to the latest release available from the MGL Avionics website.

Using this diagnostics function it will show you the Firmware versions installed in the Trig interface and SP-12. If any one of these does not meet the minimum version number it will show you “outdated”. In this case you can update the relevant device via the EFIS using firmware files you can download from the MGL Website- instructions are provided on the website.

Compliance options

You connect your Trig transponder via the MGL Trig interface to an MGL iEFIS. The Trig interface is connected to your EFIS via CAN bus.

You have two options:

- 1) You have the EFIS and the Trig transponder. Ensure both have firmware updated to at least the firmware levels mentioned in this document.

In this case your ADS-B transmissions are compliant to SIL/SDA of 1/1 and TABS TSO-C199 for a Class-B device. This does not meet 14 CFR §91.227c, AC 20-165B, Appendix B requirements. The GPS may be used in all conditions not excluded by these documents.

This setup is compliant to the requirements outlined in TSO-C199 A.1.2.5.6 and following paragraphs.

NIC is set to 0.5NM (6), SDA=1, SIL=1, HFOM and VFOM are set according to the formulas given in the document derived from HDOP and VDOP with UERE of 6 meters. NACv is set to 1 (10m/s).

The Navigation source (GPS in the EFIS) is a class Beta device to RTCA/DO-229D implementing the en-route case. The GPS is a WAAS GPS and implements RAIM with multiple satellite exclusion capability on pseudo range errors. The GPS will continue to provide position data with excluded satellites.

- 2) You have the EFIS and the Trig transponder. In addition you have the SP-12 TABS GPS module connected to the **SAME** CAN bus as the Trig transponder interface. Ensure all three devices have firmware updated to at least the firmware levels mentioned in this document.

In this case your ADS-B transmissions are compliant to SIL/SDA of 3/2 and TABS TSO-C199 for a Class-B device. This **DOES** meet 14 CFR §91.227c, AC 20-165B, Appendix B requirements.

In this case all ADS-B related transmission data items are set as required in DO-260B based on the data sent by the SP-12 GPS to the Trig interface. In this case the data is **NOT** routed via the EFIS and the link remains operational even with the EFIS switched off.

Note: In this case the GPS in the EFIS is still being received by the Trig interface as well. The Trig interface **SHALL** use the position and accuracy data from the SP-12 if it has a valid fix. The Trig interface **SHALL** default to the position and accuracy data from the EFIS as backup should the position from the SP-12 not be valid. In this case the provisions of section 1) above applies.

Other documents to reference

Please view the documents titled:

SP-12.pdf – User and installation manual for SP-12 GPS module

MGL Avionics Trig Transponder interface.pdf

Both documents are available for download from the MGL Website.

Configuring the EFIS for a mode-s transponder

You need to configure the use and parameters needed for your Trig transponder installation in your EFIS. This is quite simple to do. You will find the setup for this in the System Setup Menu under "Transponder setup menu".

Transponder Setup	
→ Type: Mode-S on CAN	
→ Aircraft call-sign: N-12345	
→ ICAO ID (Octal): 04432126	
→ VFR squawk code (1200 - U.S): 1200	
→ Aircraft speed: >150 <=300knts	
→ Category: Light<15500lbs	
→ Length of aircraft in meters: 8.0	
→ Width of aircraft in meters: 10.0	
→ UAT ADS-B and 1090ES Receiver installed	
→ Slave ADSB <-> Transponder	<input type="checkbox"/>
→ Squat-switch is EFIS flight detect	

Type

Select: Mode-S on CAN

Aircraft callsign

Enter your aircraft's identification. This information will be broadcast by your transponder.

ICAO ID

Enter the ICAO ID that has been obtained from you by your aviation authority. This is a unique number that will identify your aircraft and country of origin. This information is broadcast by your transponder and is a vital part of a mode-s interrogation.

Note that the number is entered in OCTAL notation. Should you have been given a number in decimal or hexadecimal – there are many freely available online converters that will convert your number to octal.

VFR Squawk code

Enter the code used in your area as VFR code. This information is used by your EFIS only. It is used for a “one button” selection of the code.

Aircraft speed

Select the speed range applicable for your aircraft. This information is broadcast by your transponder.

Category

Select the aircraft category applicable to your aircraft. This information is broadcast by your transponder.

Length and Width of aircraft in meters

Enter the relevant dimensions of your aircraft. This information is broadcast by your transponder.

UAT ADS-B and 1090ES receiver installed

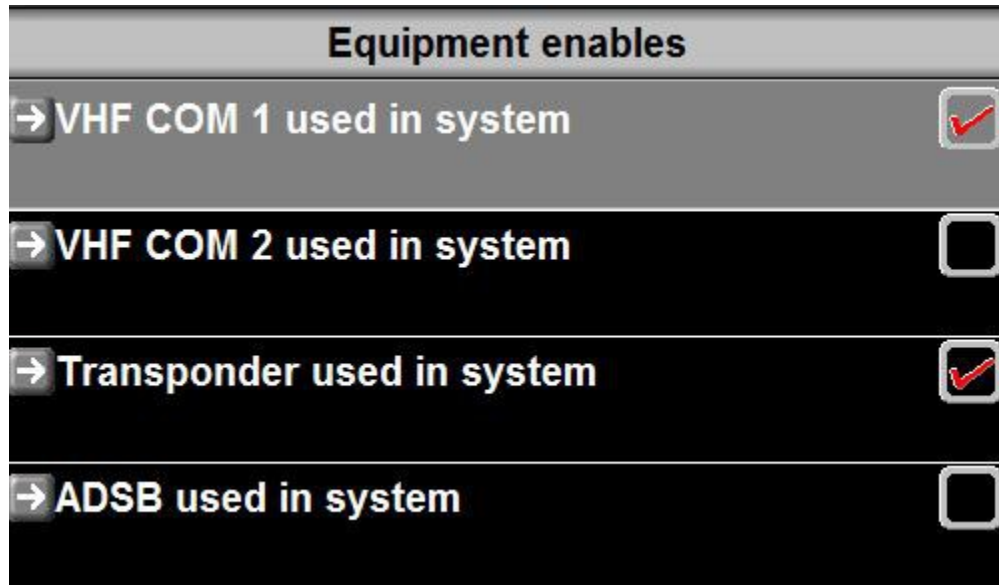
Select the appropriate setting for your aircraft. This information is broadcast by your transponder.

Slave ADS-B ↔ Transponder

If you have a compatible ADS-B transceiver connected you can use this setting to slave the two devices. In this case both will transmit the same squawk codes and you do not have to separately enter them.

Squat switch is...

Select how you would like to handle the “on-ground” detect. The transponder will transmit in ground or airborne mode. Make sure it will transmit airborne mode when you are flying or else you will have an unhappy ATC...



In the Equipment enables menu, please check the box for the transponder. This will enable the EFIS to control your transponder and also enable the transponder user interface.

Transponder operational interface and status



On all normal EFIS screens that have a transponder component you will see a small status display as above. You see the current squawk code, transponder operating mode - in this case “ALT” which means it is active and will transmit altitude information (mode-c).

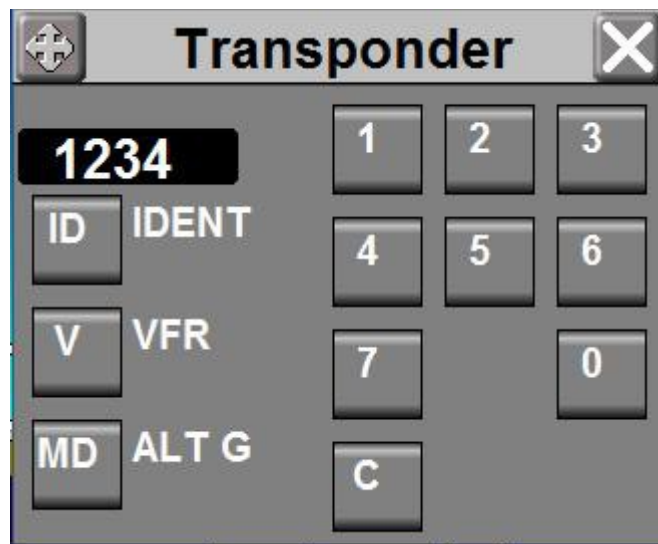
The transponder is in ground mode “G”.

The transponder is using a certified GPS source “C”. In this case it would be the SP-12. Alternatively it will show “E” for EFIS.

The first “RF” is for the EFIS. It means the transponder interface is receiving GPS information from the EFIS and this GPS has a valid FIX.

The second “RF” is for the certified source (SP-12). It means the transponder interface is receiving GPS information from the SP-12 and this GPS has a valid FIX.

Any item not available will be shown with a dash “-”.



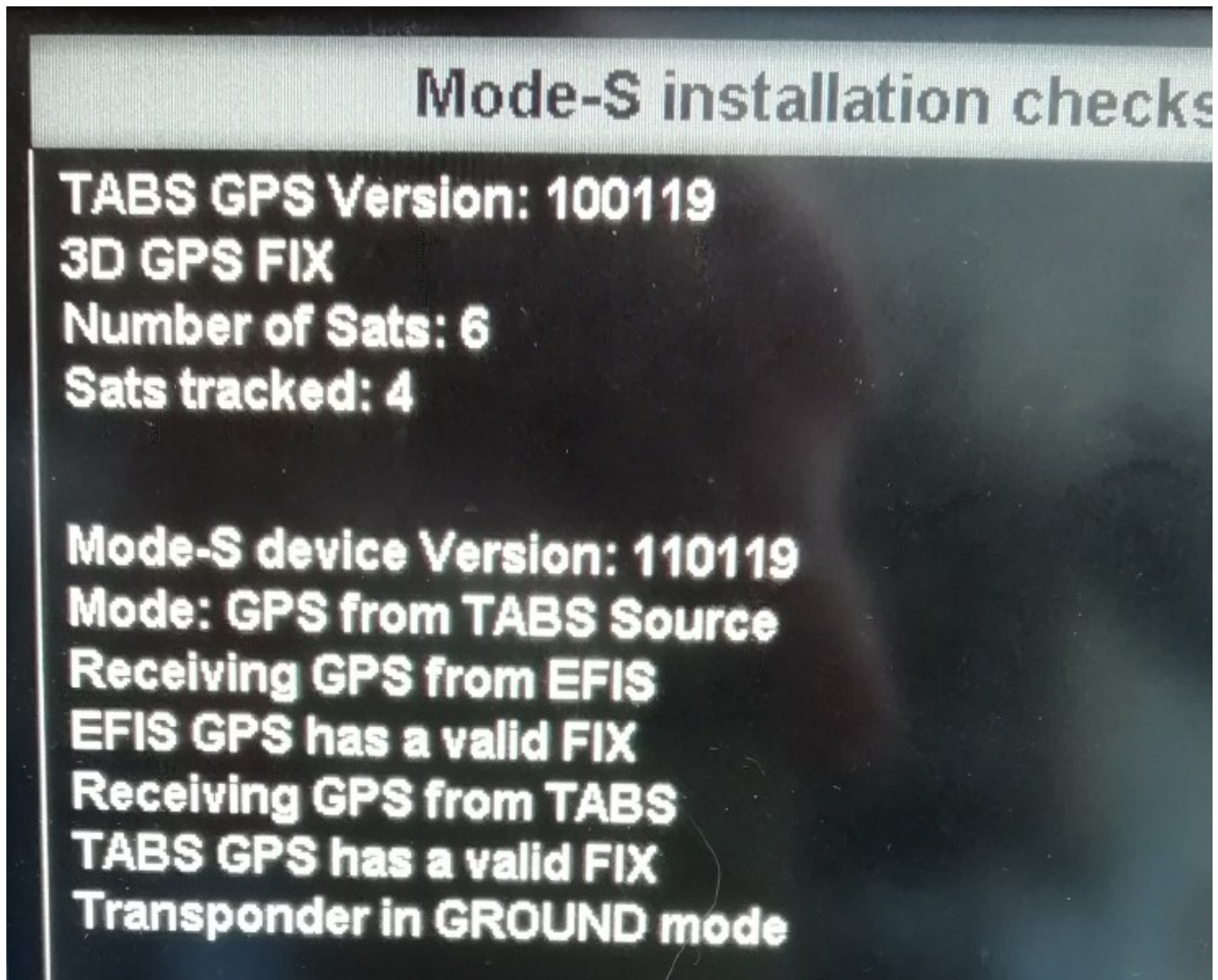
Tapping on the transponder status display opens the transponder control shown above.

If you have an EFIS with buttons under the display you will notice that the buttons can also be used instead of the touch screen.

Note: If you enter a squawk code the code display turns yellow until you have entered all four digits.

Using the mode-s diagnostic function

Under the EFIS Diagnostics menu find and select “Mode-S installation checks”. You will get a display similar to:



The first section is dedicated to the SP-12 GPS (if available). It shows you the version number of the installed firmware, GPS FIX status, number of satellites in view and how many are tracked.

Note that you can get more detailed information using the GPS status and selecting “CAN” as GPS source. The GPS status is available by tapping on the GPS information display on any EFIS screen where this has been included as component. Here you can find out information such as signal strength for the various satellites, location in orbit relative to your position and a lot of other detail.

The second section is dedicated to your Trig transponder interface,

You can verify the installed firmware version and get an overview of the selection and status of connected GPS sources.