

Installation guide: MGL SP-12 GPS receiver to Trig TT21 transponder

Introduction

This guide is how to fit and configure an MGL SP-12 GPS receiver into an existing Trig TT21 installation. It is not an installation guide for the transponder- for that you should refer to the transponder manufacturer's instructions. It assumes the transponder has been installed, tested and certified as required by CAA.

This guide provides step-by-step practical instructions for the installation, but you should also refer to the User and Installation Manual supplied with the SP-12 for additional information.

Part 103 aircraft owners may install the SP-12 themselves, but due care must be taken to ensure the correct, safe and reliable operation of the equipment.

- Correct antenna placement.
- Secure module fixings and connections.
- Adequately rated and fused power supply.
- Tidy, correctly routed and secured wiring.
- **Installation checked, tested and certified by an appropriately qualified inspector/LAME.**
- You should aim for a quality, tidy installation to the standard of a good LAME.

Antenna installation

ADS-B is a GPS based system. It is critical that an accurate, reliable and continuous GPS fix is available. The GPS antenna positioning and wiring routing is an important factor here.

- Mount the antenna in a position with a clear, unobstructed sky view under all normal flight attitudes. Under GRP, perspex, plastics or similar is OK. Under aluminium, other metals, carbon fibre is NOT OK.
- As far away as possible from other antennas (GPS, VHF, transponder) and interference sources (engine ignition systems, hand-held transceivers).
- Face up on a metal surface or ground plane disc at least 100mm diameter.
- Route the antenna cable well away from high current wiring, gas discharge strobe wiring, and other transmitting antenna cables.
- Avoid tight bends, tension, strain or long unsupported runs.
- Do not shorten the antenna cable. Wrap any excess into a loop and flatten it into a tight 'dog-bone' using cable ties.

For conventional 3-axis aircraft, the turtle-deck behind the cockpit is a good spot.

For pushers and rotor-craft, the nose or pod is a good spot.

SP-12 installation and configuring

Choose a mounting spot for the SP-12 module close to the instrument panel (for power, ground and data connections) but within reach of the antenna cable. Behind the instrument panel or on the cabin side of the firewall is a good spot.

The module can be mounted in any orientation, but it is useful to have visibility of the green LED indicator for diagnostic purposes. Be sure to provide adequate clearance for the Sub-D 9-pin and antenna connectors.

Mount it securely via the four mounting lugs using machine screws into captive or nylock nuts.

To make life easier, it is best to configure the SP-12 internal DIP switches BEFORE mounting.

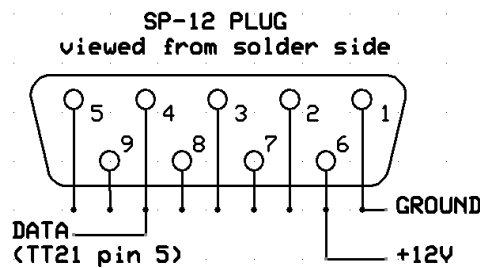
- Remove the two screws from one end of the module and carefully slide the PCB out.
- Locate the 3 DIP switches labelled 1,2,3 as shown.



- Set the Baud rate to **19200- switch 1 ON, 2 ON, 3 OFF**
- Replace the PCB and refit the screws.

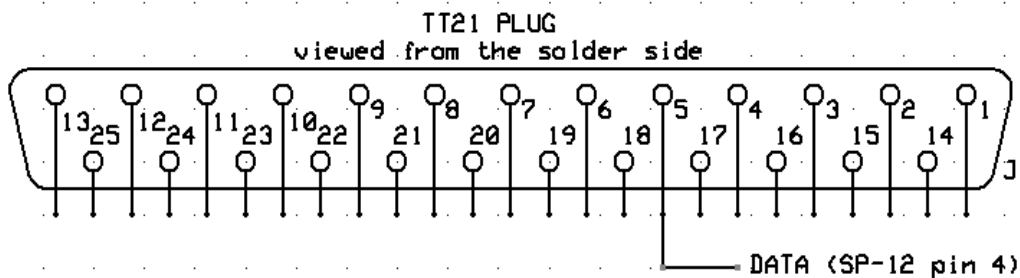
SP-12/TT21 connections

SP12 connections



- GROUND- 14g wire to the aircraft ground bus bar
- +12V- 14g wire to the switched/fused supply shared with the transponder. The total current draw is transponder 500mA (~5W) plus SP-12 400mA, so a fuse/circuit breaker rated at 2A is suitable.
- RS232 DATA- 22g wire to the TT21 pin 5

TT21 connections



Note- only the additional SP-12 connections shown

- RS232 DATA- 22g wire from SP-12 pin 4

TT21 configuration

Refer also to the TT21/22 Installation Manual section 6.

- Enter **set-up mode** by holding down the FN key while powering up, and set up the following menu items-
- GPS INPUT to **C199 TABS** protocol
- GPS/TIS line speed- **19200**
- GPS certification level- ignore
- GPS NAC velocity- ignore
- Aircraft length and width- as required
- GPS antenna offset- as required
- 1090MHz Rx installed- **No**
- UAT receiver installed- **No**

Installation testing

SP-12 tests

- Ensure the aircraft is out in the open, preferably with a 360° horizontal and horizon-to-horizon sky view.
- Power up the transponder/GPS and observe the green LED on the SP-12
- It should initially show a 2 flash/pause cadence. This is while it is acquiring a valid GPS fix. This can take a few minutes if it has been a while since the last fix or in a different position since the last fix.
- The cadence should then change to a 3 flash/pause cadence as a **2D fix** (3 satellites) is acquired.
- Then to a 4 flash/pause cadence as a **3D fix** (4 satellites) is acquired.
- And finally a 5 flash/pause cadence as a full **3D fix with RAIM** (5+ satellites) is acquired.
- If any other cadence shows, refer to the SP-12 Installation Manual SP-12 LED section for guidance.

TT21 tests

- Under the same conditions as above.
- Power the TT21 up in normal mode.
- Once the SP-12 indicates a full 3D/RAIM fix, press the FN button and select **ADS-B monitor**. The current GPS position should be displayed. This indicates the TT21 is receiving valid data from the SP-12.
- If no joy, check the SP-12 to TT21 wiring.

System tests

- The entire system should be inspected and tested by a qualified inspector/LAME with the appropriate test gear to confirm the quality and operation of the installation.
- The system is then good to go, subject to retesting every 24 months.
- If there is any issue with the quality or content of the ADS-B data Airways will advise the operator.

Operational notes

ADS-B is based on valid and continuous GPS data being transmitted. If departing from an airfield in controlled airspace this data must be valid from before take-off until after landing. It takes some time for a GPS receiver to obtain a 3D fix, so time must be given to achieve this before take-off. It is good practice to power up the GPS prior to taxi, and as part of take-off checks confirm the TT21 is indicating valid GPS data.

Revision notes:

Rev 0

- This is the initial version based on a confirmed installation.
 - If any details are unclear or incorrect please contact the author.
 - Further installation guides for integration with other transponders will be issued as experience is gained.
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