

PilotAware External Antennas Installation Notes 2021.

PilotAware was initially developed as portable equipment to be carried onto all types of aircraft, EASA, C of A and permit aircraft. However, a permanent or semi- permanent installation is a much better installation for the following reasons.

- Antenna location can be optimised for better transmission and reception of the 1090MHz and 869.5 MHz frequencies that PilotAware uses.
- GPS antenna location can be optimised for maximum satellite signals and strength.
- The main PilotAware unit can be located out of sight anywhere on the aircraft for convenience usually behind the dashboard
- A power supply can be connected so that PilotAware starts to boot up as soon as the master switch is thrown.
- There will be no cables showing and the installation will be neatly installed out of the way.
- PilotAware will run cooler away from the heat of the dashboard top

INSTALLING EQUIPMENT IN YOUR AIRCRAFT IS A SPECIALISED OPERATION. IF YOU DO NOT FEEL COMPETENT IN DOING THIS PLEASE CONSULT A QUALIFIED ENGINEER. THESE GENERIC INSTALLATION INSTRUCTIONS ARE FOR INFORMATION ONLY AND PROVIDED IN GOOD FAITH BUT MAY PROVIDE ERRORS. IT IS UP TO YOU AS PILOT IN CHARGE TO ENSURE THAT THE INSTALLATION IS FIT FOR PURPOSE AND SAFE OPERATION.

A PilotAware installation kit contains

- 1 off 869.5MHz TED antenna (The longer one) with internal BNC connector.
- 1 off 1090Mhz TED antenna (The shorter one) with internal BNC connector.
- 2 off 2metre LM240 low loss coaxial cable with BNC-SMA connectors.
- 1 off Remote GPS antenna.
- 1 off Anker Cigarette Lighter Power Supply
- 1 off 12V Power Socket.
- Cable ties.
- Downloadable Installation instructions†

†Please note that if you are installing using an existing PilotAware Classic unit rather than a PilotAware Rosetta you will have to add an SMA to MCX converter or pigtail to connect to the RTL-SDR dongle. Additionally from 2021 the antennas used are aircraft quality TED antennas and will look slightly different from the picture below.



Removing Parts from the Rosetta Unit.

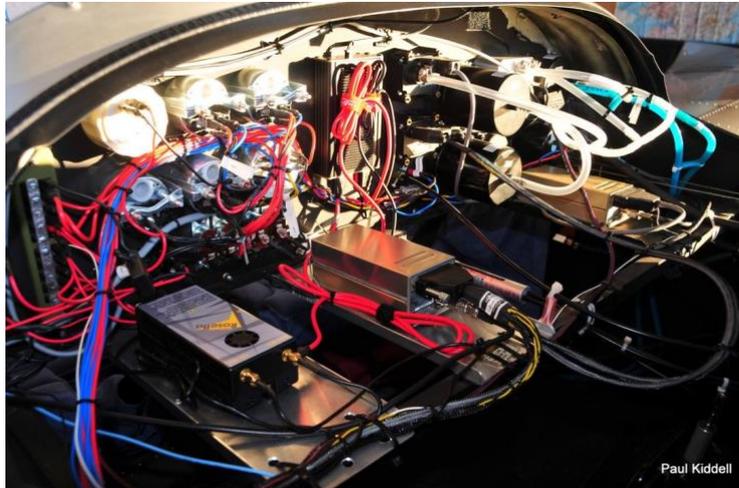
Using the standard PilotAware Rosetta you need to remove the two black antennas connected to the gold SMA connectors and the GPS PCB dongle attached to the USB socket. The GPS dongle is located under the slide off panel at the end of the Rosetta unit and is the one that does not have a pigtail connected to it. These 3 items are **not used in the installation** so can be set aside. (note these **will not have been supplied with a Rosetta + installation kit combination**).

The Rosetta, or Classic unit should be installed, hidden conveniently in the aircraft, with access to; 5.2V, 1.2A power (using the standard 1 meter lead) supplied with the Rosetta. Cables will also be run for the remote antennas, the remote GPS and an audio cable for the intercom or headsets. (An audio cable is not supplied as cable lengths will vary. Audio cables with a 3.5mm jack are readily and inexpensively available from Amazon Basics.) The Rosetta should be attached locally using the

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tie wraps provided or by any other preferred means. There is a ¼ inch standard camera mount screw thread in the Rosetta case which may be useful for securing the unit, but do not screw in too tightly or too deep. Locate the Rosetta unit as far away from the Mode-S transmitting antenna as possible to avoid the possibility of transmission broad banding.

The picture below shows a neat PilotAware Rosetta installation in a Eurostar Microlight out of the way with the antennas installed underneath the aircraft.



Installing the remote GPS antenna.

Firstly, the GPS antenna should be located so that it has a full view of the sky. This is usually on the dashboard. It can be in other locations but be aware that the GPS signals will be attenuated (weakened) by metal, water (human bodies) or carbon fibre. The GPS supplied is not weather proof and therefore unsuitable for external mounting if the aircraft is expected to get wet. Find a suitable location and drill or cut a slot for the GPS cable USB connector to pass through the dashboard for onwards cable dressing to where the Rosetta unit is to be mounted. 3 metres of cable is supplied with the remote GPS for this to be accomplished. Ensure that the GPS mouse is mounted the right way up and not upside down as it will not work correctly.

Installing the Radio Antennas.

Both antennas (The PilotAware one is the longer one at 869.5MHz and the Short one is the 1090MHz antenna) are installed in a similar way. The antennas are 'Monopole Antennas' and therefore **need a ground plane to work properly**. Metal aircraft will provide this ground plane. None Metal aircraft will require a local ground plane similar to that used for your transponder and/or permanent air band radio. The local ground plane should be thin aluminium or copper, as large as possible but as a minimum 20-25cm square. Drill a 12mm hole through the outer skin of the fuselage and the ground plane. A step drill is very useful for this. It may be desirable to use thin stainless steel penny washers to spread the load, particularly on plastic carbon or fabric surfaces. It is important that there is electrical connectivity between the antenna case and the aircraft/ground plane. Tighten up the nut and apply Loctite as required. A little petroleum jelly will also provide weatherproofing.

Do the same for the second antenna. Positioning of the antenna will be different from aircraft type to aircraft type and is subject to avoiding the mass of the engine or the water in the bodies of the occupants to avoid attenuation. The antennas should ideally be a minimum of 150mm away from other antennas and as far away as possible from each other for best operation.

Connect the BNC end of the coaxial cable to the antenna and route the cable to the location of the Rosetta case. Secure the cable with the cable ties supplied or other preferred methods.

Connecting Antennas to Certified aircraft

Connecting the Antennas to EASA certified aircraft is permitted using CS-STAN issue 3 (<https://www.easa.europa.eu/sites/default/files/dfu/CS-STAN%20Issue%203.pdf>) CS-SC004a — Installation of antennas.

Connecting Antennas to Permit Aircraft

Connecting the antennas to permit aircraft is also permitted. This is allowed by the user using good engineering practices so long as the integrity of the airframe is not compromised. If in any doubt contact your inspector before proceeding.

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Connecting the Power Supply.

It is most important that the power cable supplied with the Classic or Rosetta Unit is used in the installation. Avoid runs longer than 1 metre between the Rosetta unit and the Anker power supply. Included in the installation kit is an Anker Cigarette lighter charger which has been shown to provide an excellent inexpensive noise free USB supply for PilotAware. A Cigarette lighter socket is also provided. This should be cabled to the switched 12V supply (**NOT 24V**) of your aircraft via a suitable fuse or circuit breaker. PilotAware will draw a max of 2.1 amps at 5.2V from the ANKER charger which translates to less than 1A from the 12V supply. A 2A fuse will suffice. Cable and fuses are not supplied as this will be bespoke to the installation and type of aircraft in which it is fitted. It is recommended that low smoke and fume cable is used 20AWG.

The Anker Charger will be a secure fit in the cigarette lighter socket. A cable tie can be used for greater security. The assembly should be cable tied in a suitable location, securely but not too tight. With this installation, the PilotAware will boot up when the master switch is operated. ENSURE THAT THERE IS ELECTRICAL FIDELITY AND THAT ALL CONTACTS ARE INSULATED. If you do not feel confident to do this yourself get a qualified engineer to do this. Alternatively, you could use a Charge 2 Charge 4 EASA approved USB power supply. The latter being suitable for 24V, as well as 12V systems.

Additional Information. Good Engineering Practise.

- (1) Use low smoke and fume cable where possible.
- (2) With the antennas extended the PilotAware unit can be located anywhere in the aircraft. The WiFi signal can be increased to 100mW if required. This is done on the Network Page of the PilotAware Web pages via 192.168.1.1
- (3) Affix the PilotAware unit using Velcro and cable ties so the unit is secure but not too tight.
- (4) Crimp don't solder apart from the inner conductors of the coaxial cable.
- (5) Don't run cables parallel for too long to avoid induction.
- (6) Tie cables well but not too tight.
- (7) Smear some petroleum jelly around the edge of the outside of the external antenna screw as a moisture barrier.

Every installation will be different. However, we trust that this information helps you to make a neat and more permanent installation. If you need help don't forget to visit the PilotAware Forum where there will be advice from fellow pilots who will have possibly installed PilotAware in aircraft similar to yours. Also, reciprocate if you have done a successful installation and add to the knowledge. For the full PilotAware operating instructions please visit <https://pilotaware.com/wp-content/uploads/2018/08/180520-Operating-Instructions-.pdf>