Civil Aviation Safety Authority
of Papua New Guinea

Advisory Circular

AC43-12

Avionics Installations – Acceptable Technical Data

Issue 2

31 October 2022

GENERAL

Civil Aviation Safety Authority Advisory Circulars (AC) contain information about standards, practices and procedures that the Director has found to be an Acceptable Means of Compliance (AMC) with the associated rule.

An AMC is not intended to be the only means of compliance with a rule, and consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices or procedures are found to be acceptable, they will be added to the appropriate Advisory Circular.

This Advisory Circular also includes Explanatory Material (EM) where it has been shown that further explanation is required. Explanatory Material must not be regarded as an acceptable means of compliance.

PURPOSE

This Advisory Circular provides methods, acceptable to the Director, for showing compliance with 43.53(a)(3)(ii) and 43.53(a)(7). This advisory circular provides avionics installation technical instructions which are acceptable technical data under Part 21 Appendix C (a)(7).

RELATED CAR

This AC relates specifically to Civil Aviation Rule Parts 21 and 43.

CHANGE NOTICE

This AC replaces the Issue 1, dated 15 November 2018

APPROVAL

This AC has been approved for publication by the Director of Civil Aviation.

TABLE OF CONTENTS

GENERAL

All changes to aircraft installations should be carried out in accordance with approved or acceptable data. Acceptable data is listed in Part 21 Appendix C. Part 21 Appendix C(a)(7) specifically identifies data provided by the CASA in an advisory circular as acceptable technical data.

1. Application of this AC

This advisory circular provides acceptable technical data for avionics modifications. The data is restricted to:

(a) unpressurised aircraft of less than 5700kg MCTOW and less than 10 passenger seats; and

(b) where the modification is not classified as a major modification.

This advisory circular is divided into two parts. The first part of the circular provides general background information applicable to most modifications. The second part of the circular consists of a series of appendices which provide modification technical instructions for various types of installations.

Part 21 Appendix C lists the types of technical data that are considered to be acceptable for modifications and repairs to products and their associated systems and components. Part 21 Appendix C(a)(7) states that data provided by the CASA in an advisory circular is acceptable technical data.

A major modification or repair is one that could potentially affect the safety of an aircraft or its occupants where, as a result of its embodiment, one or more of a series of incidents may occur. For avionics modifications these incidents are covered in the definition in this advisory circular.

Provided the modification is not considered major, this advisory circular provides acceptable technical data for avionics modifications covering the installation of the following equipment:

- replacement fit-form-function systems
- FAA TSO-C91a or TSO-C126 ELTs
- transponder/encoder
- VFR GPS
- audio and intercom
- VHF communication
- VHF radio navigation and DME
- voltage converters
- non-aeronautical avionics equipment
- 12VDC electrical distribution system for gliders

Also included in Appendix 10 is acceptable technical data covering the removal of avionics equipment.

2. Definitions

Fit-form-function, in respect of avionics equipment, is equipment specified by a manufacturer to be a direct replacement for another item of equipment. The equipment must—

- utilise the same—
    - mounting provisions

- wiring
- connectors

- have an equivalent level of performance and certification
- In the case of communications and navigation equipment, be approved to the same level as defined in Part 91 Appendix A.9.

Major modification, in respect of an avionics installation means a modification to an avionics system, component, wiring, appliance or software if its embodiment could subsequently result in one or more of the following—

- structural collapse
- loss of control
- failure of motive power
- unintentional operation of, or inability to operate, any systems or equipment essential to the safety or operational function of the aircraft
- incapacitating injury to any occupant
- unacceptable unserviceability or maintainability
- change the operating characteristics and limitations of the product
- change the ability of the product to meet the instrument and equipment standards required under an operational rule
- could (adversely) affect the operation of systems required under an operational rule for a particular operation

Examples of major avionics modifications could include the installation of —

- an autopilot
- a pressure bulkhead connector
- an antenna installed on a pressurised aircraft

Non-aeronautical avionics equipment, in respect of equipment installed in accordance with this advisory circular, is:

- electrical or electronic equipment which is not required by an airworthiness or rule requirement; and
- is suitable for installation and use in aircraft and
- is installed on a no-hazard, no-interference basis.

Examples of non-aeronautical equipment are cellular telephones or CD players.

Stand-alone installation, in respect of an avionics installation is one where the equipment being installed is not interfaced with any other avionics systems or component other than connection to an existing approved electrical power distribution system. A stand-alone installation includes all components associated with the function being installed e.g. for a VHF installation it could include the transceiver, controller, antenna, rack and wiring. A major modification or a modification involving a change to a component or appliance is not to be considered a stand-alone installation.

3. Acceptable Technical Data

This advisory circular provides acceptable technical data at the appendices for various avionics installations, which are not considered major modifications. The appendices should be used in conjunction with the equipment manufacturers' data including—

- installation manuals
- installation and checkout manuals
- operation and installation instructions
- installation drawings

4. Equipment Installation

The equipment should be installed so that it will be adequately restrained throughout the flight envelope. Care should also be taken to ensure that the installation will not interfere with any controls. If necessary, restraints should be installed at the rear of avionics racks to provide additional support.

5. Equipment Cooling

The manufacturer's installation manual should be consulted with regards to any special cooling requirements for the equipment being installed. In particular the heating effect of installing a number of items of equipment in close proximity, eg, a radio stack, should be considered.

6. Antenna Location

Where possible, antennae should be located at a CAP 457 or aircraft manufacturer-approved location. Where an approved location cannot be determined for the antenna being installed, the following guidelines should be followed:

- antennae should not be located within 0.9m of each other
- due to the sensitivity of the receiver, GPS antennas should not be located within 1.1m of a transmitter antenna

Where an antenna is not installed in an approved location, ground and flight tests should be carried out to determine the suitability of the selected location. These tests should include tests for ensure the satisfactory operation of the system being installed and a check for no-interference between other avionics systems.

7. Cable Routing and Securing

Cables should be routed in accordance with the guidelines in FAA AC43.13-1B, Chapter 11, Section 7. For new installations, cables should be routed, where possible, with existing looms. Where this is not possible the following should be considered:

- chafing
- size of the loom (the current carrying capacity of a wire is inversely proportional to the size of the loom)
- protection against battery acids, solvents and fluids
- protection in wheel wells and landing gear areas
- protection against personnel and cargo
- protection against high temperature

- separation from flying control cables, throttle linkages etc
- separation from combustible fluid or oxygen lines

When securing looms, the installation of clamps and lacing should be in accordance with the guidelines in FAA AC43.13-1B, Chapter 11, Section 7, Paragraphs 518 and 519.

If excess cable is required to be stowed, the guidelines in the equipment manufacturer's installation manual should be followed. If guidelines are not published then the cable should be coiled with a bend of not less than 10 times the outside diameter of the wire group or bundle.

The use of plastic cable ties is also considered to be acceptable for securing looms. The following guidelines should be complied with.

7.1 Acceptable cable ties

Cable ties should conform to the requirements of MIL-S-23190E or equivalent.

There are a variety of cable ties available. When selecting a cable tie the following should be considered:

- size of loom
- environment eg exposed to the moisture, ultraviolet, radiation, chemicals, high/low temperatures, vibration levels
- flammability requirements Plastic cable ties should not be used:
- in areas where the temperature is greater than 100°C
- where there is high vibration

Some acceptable manufacturers of cable ties are:

- Panduit
- Thomas & Betts
- Tyton

7.2 Installation of cable ties

Cable ties should be installed in accordance with the following guidelines:

- select a suitable cable tie
- place the cable tie on the wire harness so that:
- the ribbed side of the tie is against the wire harness
- the head of the cable tie does not touch an adjacent wire or wires

CAUTION

To prevent damage to any of the wires or cables in a wire harness, make sure that the wires or cable do not go across each other.

- tighten the cable tie to hold the wire harness sufficiently

CAUTION

To prevent damage to the wire harness, do not tighten the tie more than is necessary to hold the harness

CAUTION

When securing a wire harness that has a coaxial cable or fibre optic cable ensure that there is no deformation of the cable(s).

- cut the cable tie using a cable tie tool, as recommended by the cable tie manufacturer. As an alternative, a pair of pliers can be used to tension the cable tie. The cable tie should then be cut so that the end of the tie:
  - is a maximum of 0.01" from the head of the tie; and
  - does not have any sharp edges

8. Weight and balance

The change in weight and balance is to be amended in accordance with AC43-2. For the purposes of this advisory circular, the change in weight and balance can be considered as 'negligible' if the modification results in—

- a weight change of less than 0.1% of the aircraft maximum weight and
- a centre of gravity change of less than 0.5% of the permissible centre of gravity range at the maximum weight

9. Electrical load analysis

An electrical load analysis is to be carried out to determine that the—

- electrical load is less than 85% of the maximum continuous operating rating of the power generating system
- rated battery capacity is sufficient to operate emergency systems for 30 minutes following a failure the aircraft's power generating system

10. Post-Installation Testing

The installation is to be tested in accordance with the checkout procedures in the manufacturers' manuals and the applicable requirements of Part 43. The tests should include, but are not limited to, confirmation that:

- the system operates correctly in accordance with the manufacturers' specifications
- there is no interference between systems (see below)
- the equipment is suitable for the intended purpose
- the installation meets the relevant structural requirements and will be restrained throughout the flight envelope

  Where failure of the mount could prove hazardous to any occupants, the mount and equipment should be tested to ensure they will be restrained when subject to an upward load of 5½ times the total equipment weight and a forward load of 9 times the total equipment weight
- there is no effect on the aircraft's magnetic compass system
- the installation does not interfere with any controls. These checks should include but are not limited to:

- a check of all flying controls for full and free movement
- a check of engine control levers to ensure that there is no restriction throughout their range of movement.

10.1. Check for no-interference

Part of the post-installation checks should include a test to determine that there is no interference between avionics systems. Some factors to be considered when determining the extent of the no-interference check are the:

- type of system(s) being installed
- degree of complexity of the system interconnect
- physical location of equipment
- cable routing
- antenna locations
- consequence of any interference on the ability to safely operate the aircraft and systems

For systems being installed in accordance with this advisory circular, a simplified no-interference check should be acceptable. A simplified check to determine no-interference between avionics systems should incorporate the following guidelines:

- all avionics systems should be turned ON and the ELT should be ARMED
- each of the following items of equipment should be operated in sequence and all other systems checked for any interference:
- RF transmitters
- equipment with a high voltage switched power source such as a strobe
- equipment containing motors or generators
- GPS equipment should be specifically checked for interference when transmitting on each VHF for 20 seconds on each of the following frequencies:
  - 121.150 MHz
  - 121.175 MHz
  - 121.200 MHz
  - 131.250 MHz
  - 131.275 MHz
  - 131.300 MHz
- when looking for interference, the following should be considered:
  - is there any audible interference in the aircraft audio, intercom or communication systems?
  - is there any observable change in navigation information including:
    - heading pointers

- to/from indications
- deviation signals
- warning/message annunciations
- loss of navigation information

- is there any inadvertent operation or failure-to-operate of any system?

- flight testing may be required to check some systems for interference effects eg an existing autopilot. Flight evaluations should only be carried out after satisfactory ground tests have been completed

If there is any doubt about the acceptability of an aircraft system to successfully complete checks for no- interference, the details of the installation and problem should be referred to the CASA.

11. Modification documentation

The modification is to be recorded in the aircraft logbook quoting the applicable appendix of this advisory circular. The aircraft modification section of the logbook or aircraft records should be updated to reflect the incorporation of the modification.

Airworthiness Directives must be reviewed to determine whether any are applicable to the system being installed. Any outstanding Airworthiness Directives are to be actioned in accordance with rule 39.23.

11.1 Certification

The certification of release to service in respect of avionics modifications embodied using this advisory circular as approved technical data, must be issued by an appropriately qualified person. It is important to recognise that this advisory circular only provides for the approval of the technical data, and that it does not extend the certification privileges granted by any specific aircraft maintenance engineer licence category, Part 145 authorisation, or aviation maintenance specialist approval.

Rule 43.51, in part, promulgates the appropriate qualification for a person to perform maintenance as being either:

- a current aircraft maintenance engineer licence and appropriate rating issued under Part 66
- an authorisation issued by the holder of a Part 145 aircraft maintenance organisation certificate, to perform work within the scope of that certificate
- an aviation maintenance specialist certificate issued under Part 66.

The privileges of a aviation maintenance specialist certificate issued under Part 66 will be clearly indicated on the document. In the case of a Part 145 company authorisation, the company exposition will detail the privileges of each authorisation.

The privileges of an aircraft maintenance engineer licence issued under Part 66 are determined by the category in which the licence is issued and the ratings attached to the document. Rating scopes are listed in Part 66 Appendix.

Prior to exercising privileges of an AME licence in any category all licence holders must ensure that an appropriate rating is held and that they are familiar with the task to be undertaken.

11.2 CA 2129 action

A new CA 2129 must be completed for all changes in the avionics equipment installation in accordance with AC43-10. Where a change is made in accordance with this advisory circular, the Mod Ref column of the CA 2129 adjacent to the entry for the equipment being installed or removed should provide a reference to the applicable aircraft logbook entry.

Appendix 1 – Replacement 'Fit-Form-Function' Equipment

1. Description

1.1 Replacement of existing avionics equipment with equipment of identical fit, form and function.

2. Applicability

2.1. All unpressurised aircraft less than 5700kg and 10 passenger seats where the modification is not classified as a major modification.

3. General

3.1 Replacement fit-form-function equipment must:

3.1.1. perform an identical function to the equipment being replaced;

3.1.2. not alter the existing approved aircraft maintenance requirements;

3.1.3. be of an equivalent approval level as defined in Part 91 Appendix A.9;

3.1.4. be specified by the equipment manufacturer as being a direct replacement for the equipment being removed.

3.2 Replacement fit-form-function installations must utilise where applicable the existing:

3.2.1 equipment rack or mounting provisions; and

3.2.2 wiring.

3.3 The interface with existing systems must not be altered.

4. Technical Instructions

4.1 Ensure the aircraft is safe for servicing.

4.2 Open circuit breakers or remove fuses as required to isolate power from the system(s) to be replaced.

4.3 Remove access panels etc. as required in accordance with the aircraft manufacturer's maintenance manual.

4.4 Remove the equipment(s) to be replaced. Existing associated wiring and rack(s) or mounting provisions are to be retained.

4.5 Install the replacement equipment(s) in accordance with the manufacturer's installation instructions and the aircraft maintenance manual in the space vacated in procedure 4.4. The existing rack(s) or mounting provisions are to be utilised.

4.6 Replace the access panels removed in procedure 4.3 in accordance with the aircraft manufacturer's maintenance manual.

4.7 Close the circuit breakers or reinstall the fuses removed in procedure 4.2.

4.8 Carry out a functional test of the installed system and all other disturbed systems in accordance with the applicable Part 43 appendix and the manufacturer's installation/operation instructions. A check is to be carried out to ensure that there is no interference between avionics systems, that there is no effect on the aircraft compass system and that there is no interference with the aircraft flight controls.

4.9 Amend the aircraft's weight and balance records in accordance with AC 43-2.

4.10 Amend the aircraft's CA 2129 in accordance with AC 43-10.

4.11 Make a certified statement of release to service in accordance with 43.105, detailing the work carried out and conformity with this appendix.

Appendix 2 – Installation of FAA TSO-C91a or TSO-C126 ELTs

1. Description

1.1. Installation of FAA TSO-C91a or TSO-C126 ELTs including the associated remote switch/ monitor and antenna.

2. Applicability

2.1. All unpressurised aircraft less than 5700kg and 10 passenger seats where the modification is not classified as a major modification.

3. General

3.1 CAR Part 91 Appendix A.15 (a) requires that all ELTs meet the requirements of either TSO-C91a or TSO-C126.

3.2 Emergency locator transmitters should be installed in accordance with the requirements of—

3.2.1 the manufacturers' installation instructions;

3.2.2 Part 91 Appendix A.15; and

3.2.3. AC43.11.

4. Technical Instructions

4.1. Ensure the aircraft is safe for servicing.

4.2. Remove access panels etc. as required in accordance with the aircraft manufacturer's maintenance manual.

4.3. If an existing ELT is to be removed:

4.3.1. Open the ELT circuit breaker or remove the ELT fuse, as required, to isolate power from the existing ELT.

4.3.2. Remove the existing ELT, remote switch/monitor (if installed), ELT mounting tray, antenna and wiring.

4.4. Install the ELT as follows:

4.4.1. Determine a suitable location for the ELT. The ELT should be located:

4.4.1.1. where the ELT can be mounted to primary structure;

4.4.1.2. where the probability of damage in an accident or impact is minimised;

4.4.1.3. for fixed and deployable automatic ELTs, as far aft as possible;

4.4.1.4. to prevent inadvertent operation of the crash activation sensor; and

4.4.1.5. with the axis orientated to sense a primary crash pulse along the longitudinal axis of the aircraft. For helicopter, installations the ELT is usually installed at 45 degrees to the horizontal axis of the aircraft, but in any instance should be located in accordance with the manufacturer's installation instructions.

4.4.2. Install the ELT mounting tray at the location determined in procedure 4.4.1. The installation is to be carried out in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC43.13-1B. The installation should conform to the following requirements:

4.4.2.1. The ELT should be mounted to primary load-carrying structure such as trusses, bulkheads, longerons or floor beams (not aircraft skin) in such a manner that it does not degrade the aircraft structural capability.

For aircraft using composite technology without the usual trusses, bulkheads, longerons, or floor beams composite structural techniques may be used to attach the equipment to the moulded structure provided the same structural requirements of this Appendix are met.

4.4.2.2. Manufacturer-supplied or standard parts should be used.

4.4.2.3. When a force of 450 newtons (100 lbf) is applied to the mount in the most flexible direction there is no static deflection greater than 2.5mm (0.1 inch) relative to a section of adjacent structure located between 0.3m (1 foot) and 1.0m (3 feet) from the mount site.

4.4.2.4. Where a stiffening modification is required to the aircraft structure to show compliance with procedure 4.4.2.3, the modification is to be carried out in accordance with the aircraft maintenance manual and the guidelines in FAA AC43.13-1B.

4.4.2.5. The installed transmitter should be able to support a 100g load in the plus and minus directions of the three principle axes of the aircraft e.g. for an ELT weighing 0.9kg (2 lb), this is a load of 900 newtons (200 lb) in any direction.

4.4.3. Install a placard, which readily and clearly identifies the ELT location.

4.5. Install the ELT remote switch/monitor assembly as follows:

4.5.1. Determine a suitable location for the remote switch/monitor assembly which must be located in a position which is accessible and viewable by the pilot from his/her normally seated position.

4.5.2. Install the ELT remote switch/monitor assembly in the location determined in procedure 4.5.1 in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC43.13-1B.

4.6. Install the ELT antenna as follows:

4.6.1. Determine a suitable location for the ELT antenna using the following criteria:

4.6.1.1. The ELT antenna should be located on the upper fuselage and not within the manufacturer's recommended distance from other antennas. In any case, the ELT antenna is not to be located within 0.6m (24 inches) from other VHF antennas.

4.6.1.2. The ELT antenna should be located so as to be vertically polarized.

4.6.1.3. The ELT antenna should be located as close as possible to the ELT transmitter. The antenna location should also ensure that the routing of the ELT transmitter-to-antenna coaxial cable does not cross any fuselage breaks.

4.6.1.4. If the ELT antenna is mounted internally in the aircraft, the antenna is to be exposed to an 'electronic' window at least 0.3 m (1 foot) square and insulated from metal parts.

4.6.2. Install the ELT antenna in the location determined in procedure 4.6.1 in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC 43.13-1A. The ELT antenna should be capable of supporting a 100g load in the plus and minus directions of the three principle axis of the aircraft.

4.7. If required, install and placard a suitably rated circuit breaker or fuse.

4.8. Interconnect the ELT transmitter, remote switch/monitor and antenna in accordance with the manufacturer's installation instructions using the manufacturer-supplied loom where applicable. If the loom is to be locally-manufactured, mil spec wire or equivalent is to be utilised. Ensure that the transmitter-antenna coaxial cable is fitted with vibration proof RF connectors on each end.

4.9. Replace the access panels removed in procedure 4.2 in accordance with the aircraft manufacturer's maintenance manual.

4.10. Close the ELT circuit breaker or install the fuse.

4.11. Carry out a functional test of the ELT in accordance with CAR Part 43 Appendix F and the manufacturer's installation/operation instructions. Checks are also to be carried out to determine satisfactory operation of all disturbed systems, that there is no interference between avionics systems, no effect on the aircraft compass system and that there is no interference with the aircraft flight controls.

4.12. Amend the aircraft's weight and balance records in accordance with AC 43-2.

4.13. Amend the aircraft's CA 2129 in accordance with AC 43-10.

4.14. Make a certified statement of release to service in accordance with 43.105, detailing the work carried out and conformity with this appendix.

Appendix 3 – Installation of ATC Mode 3/A Transponder with Mode C Altitude Reporting

1. Description

1.1. Installation of an FAA TSO-C74 (or equivalent) transponder and/or a TSO-C88 altitude encoder.

2. Applicability

2.1. All unpressurised aircraft less than 5700kg and 10 passenger seats where the modification is not classified as a major modification.

3. General

3.1. CAR Part 91 Appendix A.22 (1) requires that all Mode 3/A transponders shall meet the requirements of TSO-C74.

3.2. CAR Part 91 Appendix A.23 requires that each altitude encoder shall meet the requirements of TSO-C88.

3.3. This appendix is divided into two parts:

3.3.1. Part A – Installation of a transponder; and

3.3.2. Part B – Installation of an altitude encoder.

4. Technical Instructions – Part A (Installation of a Mode 3/A transponder)

4.1. Ensure the aircraft is safe for servicing.

4.2. Remove access panels etc. as required in accordance with the aircraft manufacturer's maintenance manual.

4.3. If an existing transponder is to be removed:

4.3.1. Open the transponder circuit breaker or remove the transponder fuse, as required, to isolate power from the existing transponder.

4.3.2. Remove the existing transponder, mounting tray, antenna and wiring as required.

4.4. Install the transponder as follows:

4.4.1. If the transponder is being installed in a new location, determine a suitable location for the transponder. The transponder should be located in a position which is viewable and accessible to the pilot from his/her normally seated position. The preferred location is a standard manufacturer-installed avionics rack.

4.4.2. Install the transponder mounting tray at the location determined in procedure 4.4.1. The installation is to be carried out in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC43.13-1B. The installation should conform to the following requirements:

4.4.2.1. Manufacturer-supplied or standard parts should be used.

4.4.2.2. The transponder mounting should be tested to ensure that the transponder and rack will be restrained throughout the flight envelope.

4.4.2.3. Where a modification is required to the aircraft structure to show compliance with procedure 4.4.2.2, the modification is to be carried out in accordance with the aircraft maintenance manual and the guidelines in FAA AC43.13-1B.

4.5. Install the transponder antenna as follows:

4.5.1. Determine an approved location for the transponder antenna in accordance with CAP457 or the aircraft manufacturer's instructions. The antenna should not be located within 0.9m of any other antenna.

4.5.2. Install the transponder antenna in the location determined in procedure 4.5.1 in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC 43.13-1A. The transponder antenna installation should be tested to ensure that it will be restrained throughout the flight envelope.

4.6. Install and placard a suitably rated circuit breaker or fuse.

4.7. Interconnect the transponder, altitude encoder (if required) and antenna in accordance with the manufacturer's installation instructions. Mil spec wire or equivalent is to be utilised.

4.8. Replace the access panels removed in procedure 4.2 in accordance with the aircraft manufacturer's maintenance manual.

4.9. Close the transponder circuit breaker or install the fuse.

4.10. Carry out a functional test of the transponder in accordance with CAR Part 43 Appendix E and the manufacturer's installation/operation instructions. If the transponder is interfaced with an altitude encoder, a functional test of the transponder/encoder system should be carried out in accordance with CAR Part 43 Appendix D.3 and the manufacturer's installation/operation instructions. Checks are also to be carried out to determine satisfactory operation of all disturbed systems, that there is no interference between avionics systems, no effect on the aircraft compass system and that there is no interference with the aircraft flight controls.

4.11. Amend the aircraft's weight and balance records in accordance with AC 43-2.

4.12. Amend the aircraft's CA 2129 in accordance with AC 43-10.

4.13. Make a certified statement of release to service in accordance with 43.105, detailing the work carried out and conformity with this appendix.

5. Technical Instructions – Part B (Installation of a Mode C altitude encoder)

5.1. Ensure the aircraft is safe for servicing.

5.2. Remove access panels etc. as required in accordance with the aircraft manufacturer's maintenance manual.

5.3. If an existing altitude encoder is to be removed:

5.3.1. Open the encoder circuit breaker or remove the encoder fuse, as required, to isolate power from the existing encoder.

5.3.2. Remove the existing encoder, mounting provisions, and static connections as required. Ensure any unused static lines are blanked and stowed in such a manner so as to prevent a new low point being introduced in the aircraft static system.

5.4. Install the altitude encoder as follows:

5.4.1. If the encoder is being installed in a new location, determine a suitable location for the encoder. The encoder should be located in a position which is accessible to the aircraft static lines and will not introduce a new low point in the aircraft static system.

5.4.2. Install the encoder at the location determined in procedure 5.4.1. The installation is to be carried out in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC43.13-1B. The installation should conform to the following requirements:

5.4.2.1. Manufacturer-supplied or standard parts should be used.

5.4.2.2. The encoder installation should be tested to ensure that the encoder will be restrained throughout the flight envelope.

5.4.2.3. Where a modification is required to the aircraft structure to show compliance with procedure 5.4.2.2, the modification is to be carried out in accordance with the aircraft maintenance manual and the guidelines in FAA AC43.13-1B.

5.4.3. The encoder is to be connected to the aircraft static system in accordance with the manufacturer's installation instructions using manufacturer-approved connections. No new low point is to be introduced in the aircraft static system.

5.5. Install and placard a suitably rated circuit breaker or fuse.

5.6. Interconnect the altitude encoder and transponder in accordance with the manufacturer's installation instructions. Aeronautical mil spec wire or equivalent is to be utilised.

5.7. Replace the access panels removed in procedure 5.2 in accordance with the aircraft manufacturer's maintenance manual.

5.8. Close the altitude encoder circuit breaker or install the fuse.

5.9. Carry out a leak test of the aircraft static system in accordance with CAR Part 43 Appendix D.1.

5.10. Carry out a functional test of the transponder/encoder system in accordance with CAR Part 43 Appendix D.3 and the manufacturer's installation/operation instructions. Checks are also to be carried out to determine satisfactory operation of all disturbed systems, that there is no interference between avionics systems, no effect on the aircraft compass system and that there is no interference with the aircraft flight controls.

5.11. Amend the aircraft's weight and balance records in accordance with AC 43-2.

5.12. Amend the aircraft's CA 2129 in accordance with AC 43-10.

5.13. Make a certified statement of release to service in accordance with 43.105, detailing the work carried out and conformity with this appendix.

Appendix 4 – Installation of En-route GPS Equipment Approved 'For VFR Use Only'

1. Description

1.1. Installation of a stand-alone GPS system used for en-route, VFR navigation.

2. Applicability

2.1. All unpressurised aircraft less than 5700kg and 10 passenger seats where the modification is not classified as a major modification.

3. General

3.1. This appendix provides installation instructions for stand-alone GPS systems used for en-route, VFR navigation only. The GPS deviation signal is not to be switched to a remote indicator or coupled to an autopilot. The GPS deviation signal may be directly coupled to a dedicated remote indicator.

3.2. IFR and Differential GPS (DGPS) installation approval applications, via either a CA 337 or Supplemental Type Certificate, are to be approved by either the CAA or a design organisation certificated under Part 146.

4. Technical Instructions

4.1. Ensure the aircraft is safe for servicing.

4.2. Remove access panels etc. as required in accordance with the aircraft manufacturer's maintenance manual.

4.3. Install the GPS as follows:

4.3.1. Determine a suitable location for the GPS. The GPS should be located in a position which is viewable and accessible to the pilot from his/her normally seated position. The installed GPS should not:

4.3.1.1. restrict access to or view of any control, display or indicator;

4.3.1.2. restrict movement of the flight controls;

4.3.1.3. interfere with the pilot's vision along the flight path; or

4.3.1.4. restrict pilot/passenger egress.

4.3.2. Install the GPS at the location determined in procedure 4.3.1. The installation is to be carried out in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC43.13-1B. The installation should conform to the following requirements:

4.3.2.1. Manufacturer-supplied or standard parts should be used.

4.3.2.2. If a 'non-standard' method of installation is utilised, e.g. velcro, the manufacturer's recommended procedures are to be followed.

4.3.2.3. The GPS mounting should be tested to ensure that it will be restrained throughout the flight envelope.

4.3.2.4. Where a modification is required to the aircraft structure to show compliance with procedure 4.3.2.3, the modification is to be carried out in accordance with the aircraft maintenance manual and the guidelines in FAA AC43.13-1B.

4.4. If required, install a remote GPS antenna as follows:

4.4.1. Determine a suitable location for the GPS antenna on the upper fuselage. The antenna should not be located within 1.1m of any other antenna. Particular care should be taken to ensure that at least the minimum separation is maintained between the GPS antenna and VHF communications and ELT antennas.

4.4.2. Install the manufacturer-approved GPS antenna in the location determined in procedure 4.4.1 in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC 43.13-1A. The GPS antenna installation should be tested to ensure that it will be restrained throughout the flight envelope.

4.4.3. If using an internally-mounted, manufacturer-supplied remote antenna, install the antenna in accordance with the manufacturer's installation instructions. Ensure that the antenna and associated cable will not interfere with pilot's vision, aircraft controls or displays, or pilot/passenger egress.

4.5. If the GPS is to be connected to the aircraft power supply, install and placard an appropriately rated circuit breaker or fuse.

4.6. If required, install a remote GPS indicator as follows:

4.6.1. Determine a suitable location for the GPS indicator. The indicator should be located in the instrument panel and readily viewable to the pilot from his/her normally seated position.

4.6.2. Install the indicator in the location determined in procedure 4.6.1 in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC 43.13-1A.

4.7. Interconnect the GPS, power supply, indicator and antenna (as required) in accordance with the manufacturer's installation instructions. Aeronautical mil spec wire or equivalent is to be utilised.

4.8. Replace the access panels removed in procedure 4.2 in accordance with the aircraft manufacturer's maintenance manual.

4.9. Install the following placard in the vicinity of the GPS and in clear view of the pilot:

GPS APPROVED FOR VFR USE ONLY

4.10. Close the GPS circuit breaker or install the fuse.

4.11. Carry out a functional test of the GPS installation in accordance with the manufacturer's installation/operation instructions. Checks are also to be carried out to determine satisfactory operation of all disturbed systems, that there is no interference between avionics systems, no effect on the aircraft compass system and that there is no interference with the aircraft flight controls.

4.12. Amend the aircraft's weight and balance records in accordance with AC 43-2.

4.13. Amend the aircraft's CA 2129 in accordance with AC 43-10.

4.14. Make a certified statement of release to service in accordance with 43.105, detailing the work carried out and conformity with this appendix.

Appendix 5 – Installation of Audio Panel and Intercoms

1. Description

1.1. Installation of audio panel and intercom systems.

2. Applicability

2.1. All unpressurised aircraft less than 5700kg and 10 passenger seats where the modification is not classified as a major modification.

3. General

3.1. This appendix covers the procedures to be carried out when installing audio panel and intercom equipment.

3.2. Consideration must be taken into account on whether the aircraft is to be operated under IFR or VFR and the approval level of the equipment to be installed (refer AC43.10).

3.2.1. For aircraft operating under IFR, the audio panel and intercom should be approved to Level 1. A Level 2 or 3 intercom may be used if the audio system can be configured to connect the pilot's mic and tels directly to the Level 1 audio panel or the VHF. This could be accomplished by the provision of emergency jacks.

3.2.2. For aircraft operating under VFR, the audio panel and intercom should be approved to Level 1 or 2. A Level 3 intercom may be used if the audio system can be configured to connect the pilot's mic and tels directly to the Level 1 or 2 audio panel or the VHF. This could be accomplished by the provision of emergency jacks.

4. Technical Instructions

4.1. Ensure the aircraft is safe for servicing.

4.2. Open the circuit breakers and/or remove the fuses for any equipment which is to be interfaced with the audio panel and/or intercom to be installed.

4.3. Remove access panels etc. as required in accordance with the aircraft manufacturer's maintenance manual.

4.4. Determine a suitable location(s) for the audio panel, intercom and headset/mic jacks (as required) to be installed. Consideration should be given to:

4.4.1. accessibility and visibility of the equipment to the pilot;

4.4.2. required operating environment for the equipment;

4.4.3. required structural mounting provisions;

4.4.4. no possibility of headstrike on the installed equipment for crew or passengers; and

4.4.5. no restriction during emergency egress.

4.5. Install the equipment in the location(s) determined in procedure 4.4. The installation is to be carried out in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC 43.13-1A. The installation should be tested to ensure that it will be restrained throughout the flight envelope.

4.6. Interconnect the audio system, intercom and associated transmitters/receivers (as required) in accordance with the relevant manufacturer's installation instructions. Aeronautical mil spec wire or equivalent is to be utilised.

4.7. Replace the access panels removed in procedure 4.3 in accordance with the aircraft manufacturer's maintenance manual.

4.8. Close the audio panel/intercom circuit breaker or install the fuse.

4.9. Close the circuit breakers and/or install the fuses opened/removed in procedure 4.2.

4.10. Post installation ground and, if required, flight tests are to be carried out in accordance with the manufacturer's installation/operations manual to determine satisfactory operation of the installed equipment. Checks are also to be carried out to determine satisfactory operation of all disturbed systems, that there is no interference between avionics systems, no effect on the aircraft compass system and no interference with the aircraft flight controls. A check is also to be carried out to determine satisfactory fail-safe operation of the VHF in the event of an audio panel or intercom failure.

4.11. Amend the aircraft's weight and balance records in accordance with AC 43-2.

4.12. Amend the aircraft's CA 2129 in accordance with AC 43-10.

4.13. Make a certified statement of release to service in accordance with 43.105, detailing the work carried out and conformity with this appendix.

Appendix 6 – Installation of VHF Radio Communications

1. Description

1.1. Installation of an aeronautical VHF transceiver.

2. Applicability

2.1. All unpressurised aircraft less than 5700kg and 10 passenger seats where the modification is not classified as a major modification.

3. General

3.1. This appendix provides installation instructions for aeronautical VHF transceivers. The transceivers must meet the appropriate approval level for the intended type of operation as required by Part 91 Appendix A.9(a).

3.2. For IFR operations the VHF must be approved to Level 1 and for VFR operations approved to either Level 1 or 2. Approval levels for commonly used equipment are detailed in AC43-10.

4. Technical Instructions

4.1. Ensure the aircraft is safe for servicing.

4.2. Remove access panels etc. as required in accordance with the aircraft manufacturer's maintenance manual.

4.3. Install the VHF as follows:

4.3.1. Determine a suitable location for the VHF. The VHF should be located in a position which is viewable and accessible to the pilot from his/her normally seated position. The installed VHF should not:

4.3.1.1. restrict access to or view of any control, display or indicator;

4.3.1.2. restrict movement of the flight controls;

4.3.1.3. interfere with the pilot's vision along the flight path; or

4.3.1.4. restrict pilot/passenger egress.

4.3.2. Install the VHF at the location determined in procedure 4.3.1. The installation is to be carried out in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC43.13-1B. The installation should conform to the following requirements:

4.3.2.1. Manufacturer-supplied or standard parts should be used.

4.3.2.2. The VHF mounting should be tested to ensure that the VHF and rack will be restrained throughout the flight envelope.

4.3.2.3. Where a modification is required to the aircraft structure to show compliance with procedure 4.3.2.2, the modification is to be carried out in accordance with the aircraft maintenance manual and the guidelines in FAA AC43.13-1B.

4.4. If required, install an antenna as follows:

4.4.1. Determine a suitable location for the VHF antenna. Antennas should be installed in CAP 457 or aircraft manufacturer approved locations. The antenna is not to be installed within 0.9m of any other antenna. If an antenna is to be installed in other than an approved location, post-installation ground and flight tests are to be carried out to determine the suitability of the antenna location.

4.4.2. Install the manufacturer-approved VHF antenna in the location determined in procedure 4.4.1 in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC 43.13-1A and –2A, Chapter 3, Paragraphs 37 and 38. The VHF antenna installation should be tested to ensure that it will be restrained throughout the flight envelope.

4.5. Install and placard an appropriately rated circuit breaker or fuse.

4.6. Interconnect the VHF, power supply, audio panel and intercom (as required) in accordance with the manufacturer's installation instructions. Aeronautical mil spec wire or equivalent is to be utilised.

4.7. Replace the access panels removed in procedure 4.2 in accordance with the aircraft manufacturer's maintenance manual.

4.8. Close the VHF circuit breaker or install the fuse.

4.9. For aircraft approved for IFR operations, carry out an electrical load analysis to determine that the electrical load is within the maximum continuous operating rating of the power generating system.

4.10. Carry out a functional test of the VHF installation in accordance with the manufacturer's installation/operation instructions and Part 43 Appendix B. Checks are also to be carried out to determine satisfactory operation of all disturbed systems, that there is no interference between avionics systems, no effect on the aircraft compass system and that there is no interference with the aircraft flight controls. For aircraft approved for night operations, ensure that the equipment lighting is satisfactory and that there are no unwanted reflections present.

4.11. Amend the aircraft's weight and balance records in accordance with AC 43-2.

4.12. Amend the aircraft's CA 2129 in accordance with AC 43-10.

Make a certified statement of release to service in accordance with 43.105, detailing the work carried out and conformity with this appendix.

Appendix 7 – Installation of VHF Radio Navigation Receivers and Distance Measuring Equipment

1. Description

1.1. Installation of an aeronautical VHF navigation receiver, indicator and Distance Measuring Equipment (DME).

2. Applicability

2.1. All unpressurised aircraft less than 5700kg and 10 passenger seats where the modification is not classified as a major modification.

3. General

3.1. This appendix provides installation instructions for aeronautical VHF navigation receivers, an associated indicator and DME systems. The receiver, indicator and DME must meet the appropriate approval level for the intended type of operation as required by Part 91 Appendix A.9(a).

3.2. For IFR operations the equipment must be approved to Level 1. Approval levels for commonly used equipment are detailed in AC43-10.

4. Technical Instructions

4.1. Ensure the aircraft is safe for servicing.

4.2. Remove access panels etc. as required in accordance with the aircraft manufacturer's maintenance manual.

4.3. Install the navigation receiver or DME as follows:

4.3.1. Determine suitable locations for the receiver, DME and indicator. The receiver and DME should be located in a position which is viewable and accessible to the pilot from his/her normally seated position. If required for approach navigation, the indicator should be located in the pilot's primary field-of-view so that the indicator is viewable by the pilot when looking along the aircraft's flight path. The installed receiver, DME and indicator should not:

4.3.1.1. restrict access to or view of any control, display or indicator;

4.3.1.2. restrict movement of the flight controls;

4.3.1.3. interfere with the pilot's vision along the flight path; or

4.3.1.4. restrict pilot/passenger egress.

4.3.2. Install the receiver, DME and indicator at the locations determined in procedure 4.3.1. The installations are to be carried out in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC43.13-1B. The installations should conform to the following requirements:

4.3.2.1. Manufacturer-supplied or standard parts should be used.

4.3.2.2. The equipment mounting should be tested to ensure that the receiver, indicator and associated rack(s) will be restrained throughout the flight envelope.

4.3.2.3. Where a modification is required to the aircraft structure to show compliance with procedure 4.3.2.2, the modification is to be carried out in accordance with the aircraft maintenance manual and the guidelines in FAA AC43.13-1B.

4.4. If required, install an antenna as follows:

4.4.1. Determine a suitable location for the antenna. Antennas should be installed in CAP 457 or aircraft manufacturer approved locations. The antenna is not to be installed within 0.9m of any other antenna. If an antenna is to be installed in other than an approved location, post-installation ground and flight tests are to be carried out to determine the suitability of the antenna location.

4.4.2. Install the manufacturer-approved antenna in the location determined in procedure 4.4.1 in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC 43.13-1A and –2A, Chapter 3. The antenna installation should be tested to ensure that it will be restrained throughout the flight envelope.

4.5. Install and placard an appropriately rated circuit breaker or fuse.

4.6. Interconnect the navigation receiver, DME, power supply, navigation indicator and audio panel (as required) in accordance with the manufacturer's installation instructions. Aeronautical mil spec wire or equivalent is to be utilised.

4.7. Replace the access panels removed in procedure 4.2 in accordance with the aircraft manufacturer's maintenance manual.

4.8. Close the receiver circuit breaker or install the fuse.

4.9. For aircraft approved for IFR operations, carry out an electrical load analysis to determine that the electrical load is within the maximum continuous operating rating of the power generating system.

4.10. Carry out a functional test of the navigation receiver installation in accordance with the manufacturer's installation/operation instructions and Part 43 Appendix B. Checks are also to be carried out to determine satisfactory operation of all disturbed systems, that there is no interference between avionics systems, no effect on the aircraft compass system and that there is no interference with the aircraft flight controls. For aircraft approved for night operations, ensure that the equipment lighting is satisfactory and that there are no unwanted reflections present.

4.11. Amend the aircraft's weight and balance records in accordance with AC 43-2.

4.12. Amend the aircraft's CA 2129 in accordance with AC 43-10.

4.13. Make a certified statement of release to service in accordance with 43.105, detailing the work carried out and conformity with this appendix.

Appendix 8 – Installation of Voltage Converters

1. Description

1.1. Installation of voltage converters.

2. Applicability

2.1 All unpressurised aircraft less than 5700kg and 10 passenger seats where the modification is not classified as a major modification.

3. General

3.1 This appendix covers the procedures to be carried out when installing voltage converters.

3.2 The procedure is only applicable for installations which can be installed on a 'no hazard, no interference' basis. If comprehensive testing or analysis is required, the modification documentation is to be submitted for approval, using a CA 337, to either the CASA or a design organisation certificated under Part 146.

3.3 When using this procedure, the following points should be observed:

3.3.1 The equipment is to be suitable for use in aircraft. Examples of items to be considered are:

3.3.1.1 the operating environment;

3.3.1.2 structural integrity of the equipment throughout the flight envelope;

3.3.1.3 flammability requirements.

3.3.2 The equipment should be suitable for the intended purpose. The equipment must also be compatible with other systems on the aircraft. If the equipment interfaces with other systems, eg power supplies, audio panel, intercom units etc., it must not affect the operation of the other systems.

3.3.3 The equipment must not present a hazard either by its:

3.3.3.1 construction;

3.3.3.2 installation;

3.3.3.3 interface; or

3.3.3.4 operation.

3.3.4 If being used to provide power for required IFR equipment (e.g. VHF communication or navigation equipment) then the voltage converter must be Level 1 approved e.g. FAA TSO approved.

4. Technical Instructions

4.1 Ensure the aircraft is safe for servicing.

4.2 Remove access panels etc. as required in accordance with the aircraft manufacturer's maintenance manual.

4.3 Determine a suitable location for the voltage converter. Consideration should be given to :

4.3.1 required operating environment for the equipment;

4.3.2 any cooling requirements for the voltage converter; and

4.3.3 required structural mounting provisions.

4.4 Install the equipment in the location determined in procedure 4.3. The installation is to be carried out in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC 43.13-1A. The installation should be tested to ensure that it will be restrained throughout the flight envelope.

4.5 Electrically connect the voltage converter in accordance with the manufacturer's installation instructions and the aircraft maintenance manual. The voltage converter is to be powered via an appropriately rated, placarded circuit protective device. Aeronautical mil spec wire or equivalent is to be utilised.

4.6 Replace any access panels removed in procedure 4.2.

4.7 Post installation ground and, if required, flight tests are to be carried out to determine satisfactory operation of the installed equipment. Checks are also to be carried out to determine satisfactory operation of all disturbed systems, that there is no interference between avionics systems, no effect on the aircraft compass system and no interference with the aircraft flight controls.

4.8 Amend the aircraft's weight and balance records in accordance with AC 43-2.

4.9 Amend the aircraft's CA 2129 in accordance with AC 43-10.

4.10 Make a certified statement of release to service in accordance with 43.105, detailing the work carried out and conformity with this appendix.

Appendix 9 – Installation of 'Non-Aeronautical' Avionics Equipment

1. Description

1.1. Installation of 'non-aeronautical' avionics equipment.

2. Applicability

2.1. All unpressurised aircraft less than 5700kg and 10 passenger seats where the modification is not classified as a major modification.

3. General

3.1. This appendix covers the procedures to be carried out when installing 'non-aeronautical' avionics equipment. Examples of non-aeronautical avionics equipment covered by this appendix are:

3.1.1. Cellular telephones;

3.1.2. Audio entertainment systems; and

3.1.3. FM transceivers.

3.2. The procedure is only applicable for installations which can be installed on a 'no hazard, no interference' basis. If extensive testing or analysis is required, the modification documentation is to be submitted for approval, using a CA 337, to either the CASA or a design organisation certificated under Part 146.

3.3. When using this procedure, the following points should be observed:

3.3.1. The equipment is to be suitable for use in aircraft. Examples of aspects to be considered when determining this are:

3.3.1.1. the operating environment;

3.3.1.2. structural integrity of the equipment throughout the flight envelope;

3.3.1.3. ability of the antenna installation to withstand aerodynamic loads; and

3.3.1.4. flammability requirements.

3.3.2. The equipment should be suitable for the intended purpose. The equipment must have the required functionality and be suitable for operation in aircraft by crew or passengers as applicable. The equipment must also be compatible with other systems on the aircraft. If the equipment interfaces with other systems, eg power supplies, audio panel, intercom units etc., it must not affect the operation of the other systems.

3.3.3. The equipment must not present a hazard either by its:

3.3.3.1. construction;

3.3.3.2. installation;

3.3.3.3. interface; or

3.3.3.4. operation.

3.3.4. Installed cellular telephones are to be:

3.3.4.1. approved for connection to the Telecom cellular network only; and

3.3.4.2. disabled during approach and take-off when operating under IFR.

3.3.5. The installed equipment should be compatible eg:

3.3.5.1. an antenna being utilised must be suitable for the intended purpose and matched to the transceiver with which it is being used;

3.3.5.2. if installing a radio it must be compatible with the aircraft audio system.

4. Technical Instructions

4.1. Ensure the aircraft is safe for servicing.

4.2. Remove access panels etc. as required in accordance with the aircraft manufacturer's maintenance manual.

4.3. Determine a suitable location(s) for all equipment to be installed. Consideration should be given to:

4.3.1. accessibility and visibility of the equipment to the pilot;

4.3.2. required operating environment for the equipment;

4.3.3. required structural mounting provisions;

4.3.4. no possibility of headstrike on the installed equipment for crew or passengers; and

4.3.5. no restriction during emergency egress.

4.4. Install the equipment in the location(s) determined in procedure 4.3. The installation is to be carried out in accordance with the manufacturer's installation instructions, the aircraft maintenance manual and the guidelines in FAA AC 43.13-1A. The installation should be tested to ensure that it will be restrained throughout the flight envelope.

4.5. Electrically connect the equipment in accordance with the manufacturer's installation instructions and the aircraft maintenance manual. The equipment is to be powered via an appropriately rated, placarded circuit protective device. Aeronautical mil spec wire or equivalent is to be utilised.

4.6. Antennas should be installed in CAP 457 or aircraft manufacturer approved locations. If an antenna is to be installed in other than an approved location:

4.6.1. the antenna is not to be installed within 0.9m of another antenna; and

4.6.2. post-installation ground and flight tests are to be carried out to determine the suitability of the antenna location.

4.7. Replace any access panels removed in procedure 4.2.

4.8. Post installation ground and, if required, flight tests are to be carried out to determine satisfactory operation of the installed equipment. Checks are also to be carried out to determine satisfactory operation of all disturbed systems, that there is no interference between avionics systems, no effect on the aircraft compass system and no interference with the aircraft flight controls.

4.9. Amend the aircraft's weight and balance records in accordance with AC 43-2.

4.10. Amend the aircraft's CA 2129 in accordance with AC 43-10.

4.11. Make a certified statement of release to service in accordance with 43.105, detailing the work carried out and conformity with this appendix.

Appendix 10 – Installation of 12VDC Electrical Distribution System for Gliders

1. Description

1.1. Installation of a 12VDC electrical distribution system in gliders where no electrical system has been provided by the manufacturer.

2. Applicability

2.1. All gliders without a 12VDC electrical system installed by the glider's manufacturer where the modification is not classified as a major modification.

3. General

3.1. This appendix provides installation instructions for a 12VDC electrical distribution system in a glider and does not provide for the installation of a battery. This appendix assumes that the installed battery is, or batteries are, appropriately rated for the maximum electrical load of the distribution system.

3.2. If required, the installation of a battery should be carried out in accordance with a modification approved by either:

3.2.1. the glider manufacturer;

3.2.2. the CASA; or

3.2.3. a design organisation certificated under Part 146.

3.3. This modification will result in the installation of the following electrical system components:

3.3.1. **A master switch** located on the instrument panel. When in the OFF position, the switch shall electrically isolate the battery from all other components and instruments,. The switch should be of aeronautical quality and appropriately rated for the maximum electrical load.

3.3.2. **A master circuit breaker**. An electrical load analysis of the instruments and equipment to be powered from the distribution system should be carried out to determine the maximum load. The master circuit breaker should be rated to 1.5 times the maximum load.

3.3.3. **In-line fusing** of both the positive and negative wires, located as close as practical to the battery. The fuse in the positive line of each battery should be double the value of the circuit breaker, and the fuse in the negative line of each battery should be double the value of the fuse in the positive line. This fusing is compliant with DCA/ELECT/8 requirements for composite and wooden airframes.

3.3.4. **A terminal block** to terminate the supply and allow multiple distribution to the equipment requiring power. The terminal block should be suitable for use in aeronautical applications.

3.3.5. **Aeronautical mil spec wire**. Two mil spec wires from a single battery, and three mil spec wires from dual battery sources are to be installed. Wires are to be sized by using the intermittent rating chart in FAA AC43.13-1B, Chapter 11, Page 444.

4. Technical Instructions

4.1. Ensure the glider is safe for servicing.

4.2. Remove access panels as required in accordance with the glider manufacturer's maintenance manual to afford access for the running of wires and the installation of electrical components.

4.3. Determine suitable locations for the master switch, circuit breaker and terminal block:

4.3.1. The master switch is to be located in the instrument panel in a position which is readily accessible and viewable to the pilot.

4.3.2. The master circuit breaker is to be located in a position which is viewable and accessible to the pilot from his or her normally seated position.

4.3.3. The terminal block is to be located in a position forward of the instrument panel where the terminals will not contact the pilot or any structure, components or controls.

4.4. Install the master switch, circuit breaker and terminal block in the positions determined in procedure 4.3 in accordance with the relevant manufacturers' instructions and the guidelines in FAA AC43.13-1B.

4.5. Route and connect wiring in accordance with Figure 1:

4.5.1. Aeronautical mil spec wire as specified in procedure 3.3.5 is to be utilised.

4.5.2. Connect the supply lines from the battery via a polarized connector to ensure that the battery, or batteries, cannot be connected in such a way as to apply reverse polarity to the distribution system.

4.5.3. The master circuit breaker and battery fuses should be rated as determined in procedures 3.3.2 and 3.3.3.

4.5.4. Cable routing is to be in accordance with FAA AC43.13-1B, Chapter 11.

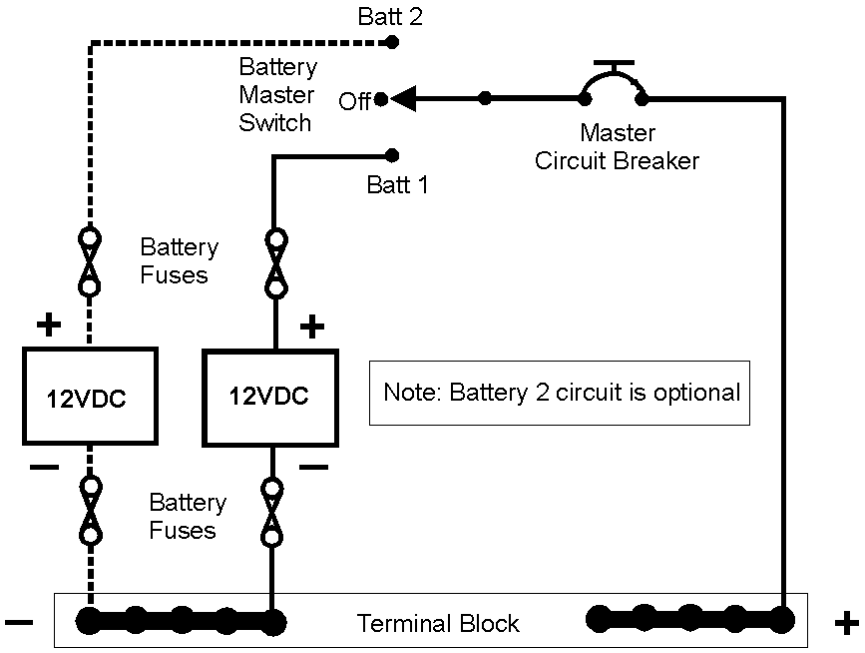

Figure 1

4.6. Placard the master switch, master circuit breaker, battery fuses and terminal block.

4.7. Replace any access panels removed in procedure 4.2.

4.8. Post installation ground tests are to be carried out to determine satisfactory operation of the electrical distribution system. Checks are to be carried out to determine the correct polarity voltage of the distribution system and satisfactory operation of the Master Switch. Checks are also to be carried out to determine satisfactory operation of all disturbed systems, that there is no interference between avionics systems, no effect on the glider compass and no interference with the flight controls.

4.9. A circuit diagram of the electrical system should be inserted into the maintenance section of the flight manual, with the note that the system is to be maintained in accordance with the current approved maintenance program for the glider.

4.10. Make a certified statement of release to service in accordance with 43.105, detailing the work carried out and conformity with this appendix.

Appendix 11 – Removal of Avionics Systems

1. Description

1.1. Removal of avionics systems.

2. Applicability

2.1. All unpressurised aircraft less than 5700kg and 10 passenger seats where the modification is not classified as a major modification.

3. General

3.1. This appendix covers the procedures to be carried out when removing avionics equipment.

4. Technical Instructions

4.1. Ensure the aircraft is safe for maintenance.

4.2. Remove access panels etc. as required in accordance with the aircraft manufacturer's maintenance manual.

4.3. Open the circuit breaker(s) or remove the fuse(s) for the system to be removed.

4.4. Remove the equipment and associated racks, wiring, switches, indicators, antennas, circuit breakers, fuses and antennas as required.

4.5. Any retained indicators or switches should be placarded 'inoperative' as applicable.

4.6. Any retained wiring looms should be bagged, stowed and secured as applicable.

4.7. Any holes (equipment, instrument, switch, antenna mounting holes etc.) are to be blanked as applicable. The holes are to be blanked in accordance with aircraft maintenance manual and the guidelines in FAA AC43.13-1B.

4.8. Replace any access panels removed in procedure 4.2.

4.9. Checks are to be carried out to determine satisfactory operation of all disturbed systems, that there is no interference between avionics systems, no effect on the aircraft compass system and no interference with the aircraft flight controls.

4.10. Amend the aircraft's weight and balance records in accordance with AC 43-2.

4.11. Amend the aircraft's CA 2129 in accordance with AC 43-10.

4.12. Make a certified statement of release to service in accordance with 43.105, detailing the work carried out and conformity with this appendix.