Revised 5/17/61

AIRWORTHINESS COMPLIANCE CHECK SHEETS

INTRODUCTORY NOTE

For aircraft type certificated after the dates of the Airworthiness Compliance Check Sheets, the applicable regulations shall be reviewed for changes which may affect the modification. Particular attention should also be placed on the possible effect of special regulations, policies and interpretations, or other data issued subsequent to these ACCSs. Items of a questionable nature should be referred to the Engineering Service Representative.

There are four main headings under which compliance with the applicable regulations should be checked:

1. Structural requirements.

2. Hazards to the aircraft or its occupants.

3. Operating aspects.

4. Detail design standards.

The inspector should determine that all applicable airworthiness requirements are complied with. This will normally be accomplished if all items in the checklist which follows are found acceptable. The inspector should use caution in evaluating modifications, using these guidelines to insure that other sections of the regulations, not specific to the modification, are not affected, and that the modification is compatible with previous modifications and the original type design. In all cases, the CARs should be reviewed to determine that FAA policies and interpretations are uniformly applied.

AIRWORTHINESS COMPLIANCE CHECK SHEET INDEX

No.

1. Radio Installations (Except Antennas) Including Radio Racks (CAR 3)

2. Radio Antenna Installations (CAR 3)

3. Oxygen Systems (CAR 3 Non-Pressurized Aircraft)

4. Cancelled

5. Modification of an Exhaust Type Cabin Heater to Increase Heat Output Without Any Changes to the Existing Exhaust System (Car 3)

6. Anticollision Light Installations - CAR 3 Aircraft

7. Generator Installations - CAR 3 Aircraft

8. Cancelled

9. Modification of an Electric Starting System by Substitution of a Starter Made by a Different Manufacturer, Assuming that the Size and Shape of the Engine Mounting Pad is Correct (CAR 3)

10. Motor and Dynamotor Installations - CAR 3 Aircraft

11. Modification and/or Installation of Seats - CAR 3 Aircraft

12. Buffet and Cabinet Installations - CAR 3 Aircraft

13. Modification of an Airplane Involving Installation of a Fuel Flowmeter (CAR 3)

14. Modification of a Fuel System by the Installation of a Fuel Pump to Transfer Fuel from an Auxiliary to a Main Fuel Tank (CAR 3)

15. Modification of an Airplane to Relocate an Auxiliary Fuel Tank Without Altering the Fuel System Arrangement (CAR 3)

16. Instrument Installations - Relocating Instruments, CAR 3 Aircraft

17. Instrument Installations - Adding Instruments, CAR 3 Aircraft

18. Gyroscopic Instrument System Installations, CAR 3 Aircraft

19. Modification of an Airplane to Replace the Engine Exhaust System With One of New Design (CAR 3)

20. Cancelled

21. Battery Installations - CAR 3 Aircraft

22. Landing Light Installations - CAR 3 Aircraft

23. Interior Light Installations - CAR 3 Aircraft

24. Buffet Installation (Electrical Portion) - CAR 3 Aircraft

25. Appliance Outlet Installations - CAR 3 Aircraft

26. Flare Installations - CAR 3 Aircraft

27. Flare Installations - CAR 4b Aircraft

28. Anticollision Light Installations - CAR 4b Aircraft

29. Battery Installations (CAR 4b Aircraft)

30. Generator Installations - CAR 4b Aircraft

31. Instrument Installations - Adding Instruments, CAR 4b Aircraft

32. Radio Racks and Radio Equipment Installation - CAR 4b Aircraft

33. Radio Antenna Installations - CAR 4b Aircraft

34. Installations or Modifications of Windshields in Non-Pressurized Aircraft (CAR 3)

35. Instrument Installations - Relocating Instruments, CAR 4b Aircraft

36. Buffet and Cabinet Installations - CAR 4b Aircraft

37. Motor and Dynamotor Installations - CAR 4b Aircraft

38. Engine Lubricating Oil Filter Installation - CAR 3 Aircraft

39. Interior Light Installations - CAR 4b Aircraft

40. Appliance Outlet Installations - CAR 4b Aircraft

41. Buffet Installation (Electrical Portion) - CAR 4b Aircraft

42. Landing Light Installations - CAR 4b Aircraft

43. Gyroscopic Instrument System Installations, CAR 4b Aircraft

44. (a) Modification and/or (b) Installation of Seats - CAR 4b Aircraft

45. Substitution of Fixed Pitch Metal Propeller for Fixed Pitch Wood (CAR 3 Aircraft)

May 28, 1958
ACCS-1

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Radio Installations (Except Antennas) Including Radio Racks (CAR 3) (See Note 1)

INTRODUCTION:

Radio installations which are the same as those made by the airframe manufacturer or other installations which are already approved, may be accepted without further investigation. When installations are not like ones already approved, the following points should be checked to determine that they are satisfactory:

A GENERAL

(a) Is the equipment installed in such a manner that it can withstand the required loads? (Sec. B(d)2d - (CAR 3.171, 3.186, 3.188, 3.243)

Yes No

(b) Do shock mounted items have sufficient clearance for normal vibration and swaying of the equipment without hitting adjacent equipment or parts of the airplane? (CAR 3.721)

Yes No

(c) Is the battery-generator combination adequate for the electrical loads imposed? (CAR 3.682, 3.685, 3.721 and CAM 3.721-2(e)) The data in CAM 18.30-12(i) may be used to establish this.

Yes No

(d) Is the wiring such as to minimize the possibility of fire or smoke hazards? (CAR 3.721)

Yes No

(e) Are terminal strips designed or mounted so that loose metallic objects cannot fall across the terminal posts? (CAR 3.721)

Yes No

(f) If plug and receptacle type of connections are used, are the soldered connections of the wire to the plug and receptacle inserts individually insulated from each other and from metallic parts of the plug and receptacle? (CAR 3.721)

Yes No

(g) Have the necessary functional tests been performed? (CAR 3.652 and CAM 3.652-2)

Yes No

(h) Are junction boxes made of fire resistant or nonabsorbent plastic material? (CAR 3.721) Yes No

(i) Are junction boxes of sufficiently rigid construction to prevent "oil-canning" of the sides to avoid possibility of inside shorting? (CAR 3.721) Yes No

(j) Are interconnecting wires and cables supported by insulated clamps to avoid chaffing? (CAR 3.721) Yes No

(k) Is the equipment located where it will obtain sufficient cooling that it will not be a smoke hazard or ignite readily flammable parts of the airplane? (CAR 3.721) Yes No

B. INSTALLATION OF RADIO RACKS

(a) Will the method of fabrication used produce a consistently sound structure? (CAR 3.293) Yes No

(b) Are standard approved fasteners used? (CAR 3.294 Yes No

(c) Are all menbers of the structure suitably protected against deterioration or loss of strength in service due to weathering, corrosion, abrasion, or other causes? (CAR 3.295) Yes No

(d) Is the structure adequate to support the required loads? (CAR 3.174, 3.301, 3.386) Yes No

This answer can be determined by either of two methods.

1. By direct comparison with an existing approved installation having the same or similar (approx. the same wt., size, and arrangement) equipment installed.

2. By structural analysis or static test. Structures such as radio racks do not lend themselves readily to analysis but are normally adaptable to static test.

   In conducting a static test, the following procedure may be used:

   a. Determine the wt. and c. g. position of the equipment item.

   b. Mount the rack either in its position in the airplane or in a rig simulating the actual installation insofar as attachments to the airplane.

c. Dummy equipment or a rig simulating the equipment items should be installed utilizing the attaching points to which the equipment is to be attached. The dummy equipment or rig should be such that the required loads can be applied at the c.g. position of the actual equipment.

d. The required loads should then be applied by any suitable means.

In accordance with CAR 3.386 (d), all items of mass which would be apt to injure the passengers or crew in the event of a minor crash landing should have their supporting structure designed to the crash load requirements of CAR 3.386(a) insofar as the forward, upward, and sideward direction. The applicable downward load factor shall be the critical flight or landing load factor specified in CAR 3.186, 3.188, or 3.243. In lieu of calculated determination of the down load factor, the ultimate factors of 6.6, 6.6, and 9.0 may be used for the normal, utility, and acrobatic categories respectively. For equipment locations not covered by CAR 3.386(d), the required loads (Ref. 3.171(b) are the flight and landing load factors of CAR 3.186, 3.188, and 3.243. In lieu of a calculated determination of these loads the down load factors referenced above may be used.

(e) Is the rack installed such that it does not adversely effect other structure (either primary of secondary) or cause interference with any controls, emergency exits, or necessary access provisions? Yes No
(CAR 3.721)

(f) Are adequate means provided for inspection of the rack, related equipment, or adjacent components which require periodic inspection? (CAR 3.296) Yes No

(g) Will the installation of the rack and related equipment adversely affect wt. and balance and c.g. position. (CAR 3.71, 3.76, 3.778(d) (1) and (2) Yes No

(h) Are the materials used suitable for the purpose intended and is the workmanship of a high standard? Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Radio Antenna Installations (CAR 3) (See Note 1)

INTRODUCTION:

Radio antenna installations when made the same as installations by the airframe manufacturer or other installations which are already approved, may be accepted without further investigation. When installations are not the same as ones already approved, the following points should be checked to determine that they are satisfactory.

(a) Is the antenna mounted so as to not obstruct instrument static source areas? (Ref. CAR 3.721)

Yes No

(b) Is the attachment of the antenna adequate to prevent its dislodgment with possible damage to airplane surfaces? (Ref. CAR 3.721)

Yes No

(c) If the antenna is installed on the fin, have the flutter and vibration characteristics of the installation been evaluated? (Ref. CAR 3.311)

Yes No

(These characteristics can be evaluated by flight test at least up to VNE. In such tests, the fin should be excited by applying a force to the rudder sufficient to produce an impulsive deflection of the control surface of at least 3 degrees. The resulting vibrations of the fin and rudder should be checked to determine that adequate decay characteristics exist. These tests should be conducted with caution and attempted at varying speeds below VNE before VNE is attempted.)

(d) Is the installation structurally adequate? (Ref. CAR 3.721)

	Yes	No
(The information contained in CAM 18 for installation of anticollision lights may be used for guidance. Also, the adequacy of the structural attachment of a stub or mast type antenna or the support for a wire antenna may be determined by grasping it firmly and tugging at it to see that it is not flimsy and could be expected to withstand air loads. To determine that an antenna vibration characteristics are satisfactory, the airplane engine may be run on the ground through its operating range and if there are no speeds at which the antenna vibrates excessively the procedure should be repeated in flight.)		

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

May 28, 1958
ACCS-3
Revised July 1, 1959
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Oxygen Systems (CAR 3 Non-Pressurized Aircraft) (See Note 1)

INTRODUCTION:

Installation of or alteration to the oxygen system should be made im accordance with drawings and/or instructions furnished by the manufacturer or supplier of this equipment. Since oxygen system installations present a hazard unless certain precautions are followed, care should be taken to observe all recommendations concerning hazards associated with oil, grease, and foreign matter in line, fittings, and regulations.

In evaluating stystem installations, the following pertinent points should be considered.

(a) Is the supporting structure capable of withstanding the required loads? (CAR 3.171, 3.186, 3.188, 3.243) Yes No

In accordance with CAR 3.386(d), all items of mass which would be apt to injure the passengers or crew in the event of a minor crash landing should have their supporting structure designed to the crash load requirements of CAR 3.386(a) insofar as the forward, upward, and sideward direction. The applicable downward load factor shall be the critical flight or landing load factor specified in CAR 3.186, 3.188, or 3.243. In lieu of a calculated determination of the down load factor, the ultimate factors of 6.6, 6.6, and 9.0 may be used for the normal, utility and acrobatic categories respectively. For equipment locations not covered by CAR 3.386(d), the required loads (Ref. 3.171 (b) are the flight and landing load factors of CAR 3.186, 3.188, and 3.243. In lieu of a calculated determination of these loads the down load factors referenced above may be used.

(b) If the oxygen system installation has affected weight and balance, have proper corrections been made? Ref. 3.71 and 3.778(d) Yes No

(c) Are flexible connections used between all points having relative motion or differential motion? Ref. 3.652 Yes No

(d) Was the oxygen system leakage and pressure tested? Ref. 3.652 Yes No

(e) Are any oxygen lines so installed that escaping oxygen can cause ignition of accumulations of grease, fluids, or vapors which are likely to be present in normal operations or as a result of failure or malfunction of any system?

Yes No

(f) Is the oxygen cyclinder ICC approved?

Yes No

(g) Is the oxygen control valve identified as such?

Yes No

(h) Can the valve be operated by the pilot in flight?

Yes No

(1) Is the oxygen shutoff valve located as close as possible to the oxygen cylinder in order to prevent loss of the oxygen due to leakage in the system?

Yes No

(i) Is a pressure gage or other means provided to show amount of oxygen in the cylinder? (Ref. 3.652.)

Yes No

(j) Are means provided to indicate oxygen flow to each user?

Yes No

(1) Is one of the following acceptable means or equivalent provided for indicating oxygen flow to each user?

(a) Listening for audible indication of oxygen flow?

Yes No

(b) Watching for inflation of the rebreather or reservoir bag?

Yes No

(c) Installation of a flow indicator?

Yes No

(k) Are flexible connections, if used, designed specifically for use with oxygen? (Ref. 3.652.)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

August 18, 1958
ACCS - 5
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Modification of an Exhaust Type Cabin Heater to Increase Heat Output Without any Changes to the Existing Exhaust System - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CAR's:

   3.617 Exhaust Heat Exchangers
   3.618 Exhaust Heat Exchangers Used in Ventilating Air Heating Systems
   3.627 Powerplant Controls
   3.393 Ventilation

   The type of heater under consideration is a simple muff type assembly which encloses a portion of the exhaust manifold. Since the change being evaluated does not involve any modification of the exhaust manifold, these guidelines do not cover exhaust system changes. Inspector should refer to pertinent ACCS if exhaust system changes are involved.

2. Check List:

   A. Structural

      (1) Is the heater assembly constructed and supported to withstand vibration, inertia, and other loads which might be imposed during normal operation? (CAR 3.617.)

      Yes No

   B. Hazards

      (1) Are the design and construction features of the heater such as to prevent the leakage of exhaust gases from joints or discharge points into the ventilating air? (CAR 3.618.)

      Yes No

      (2) Is the ventilating air intake so located as to prevent the entrance of fumes or fluids from any source? (CAR 3.618.)

      Yes No

Note: Watch out for areas where breathers, drains or exhaust discharge.

C. Operational

(1) Do the heater controls maintain their setting with the engine running? (CAR 3.627.)

Yes No

(2) Do controls have adequate strength and rigidity to withstand operational loads? (CAR 3.627.)

Yes No

(3) Has every possible source of carbon monoxide contamination of cabin air been investigated and corrected? (CAR 3.393.)

Yes No

Note: If there is any evidence or suspicion that carbon monoxide might enter the cabin ventilating air, the Engineering Service Representative should be contacted to conduct a flight test. Carbon monoxide concentration shall not exceed one part in 20,000 parts of air, same as ACCS on engine exhaust system.

CAM 04.665 Test Procedure to Determine CO Content:

A carbon monoxide indicator should be used in determining compliance with the above requirement. The instrument manufactured by the Mines Safety Applicance Company or the Bulb Type Colorimetric Indicator may be used for this purpose, one of which is located at each Flight Engineering and Factory Inspection Branch Office. The following procedure should be used:

1. The aircraft should be flown in level flight at MC power or as nearly so as possible. Carburetor should be set full rich with all windows closed; readings should be taken in at least the following locations:

   a. Along the floor (approximately 4 inches above) in front of each occupant.

b. On each side of the cabin approximately a foot forward of each occupant.

c. A few inches in front of each occupant's face.

d. In front of the cabin heater opening(s) with heat on.

2. Conduct the same investigation as outlined in 1 a. through c. except with windows partially open, thus tending to produce a vacuum in the cabin.

3. The aircraft should then be flown in a glide with power off (idling) and readings taken a few inches in front of each occupant's face with both windows open and closed as above.

4. The highest reading obtained at any of the above points shall not exceed .005.

D. Detail Design

(1) Will the material used for this heater withstand continued operation at operating temperature? (CAR 3.617.)

Yes No

Note: Temperatures in the exhaust manifold at this point may run about 1000°. Temperatures in the muff portion may run about 400° -- 500° F. Steel muff construction is recommended; however, aluminum alloy or similarly heat resistant material is usually acceptable unless temperatures over 600° F. are expected.

(2) Are the critical areas which might affect the service life of the heater such as welds, sharp formed corners, etc., readily accessible for inspection? (CAR 3.617.)

Yes No

(3) Is the heater easily removable for necessary routine inspection of the exhaust manifold? (CAR 3.617.)

Yes No

(4) When installed, is the exchanger properly ventilated with the control valve in either the hot or cold position? (CAR 3.617.)

Yes No

The occurrence of hot spots under the muff could result in fatigue and failure. Any suspicion of such areas should be investigated using thermocouples to measure the temperatures. Consult the Engineering Service Representative for advice if excessive temperatures are suspected.

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

July 14, 1958
ACCS - 6

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Anticollision Light Installations - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CAR's:

   3.171 Loads
   3.174 Proof of structure
   3.186 Maneuvering load factors
   3.188 Gust load factors
   3.243 Load factor for landing conditions
   3.292 Material and workmanship
   3.293 Fabrication methods
   3.294 Standard fastenings
   3.295 Protection
   3.296 Inspection provisions
   3.301 Material strength properties and design values
   3.382 Vision
   3.386 Protection
   3.652 Functional and installational requirements
   3.681 Electrical system installation
   3.682 Batteries
   3.685 Generator
   3.688 Master switch arrangement
   3.690 Fuses or circuit breakers
   3.705 Anticollision light system

   Anticollision light installations which are the same as those made by the airframe manufacturer or other installations which are already approved, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory. The existing anticollision light system requirements in CAR 3.705 were effective April 1, 1957, and therefore apply only to aircraft for which an application for type certificate is made on or after that date. When anticollision lights are installed on aircraft for which application for a type certificate was made before April 1, 1957, the applicant may conform either to CAR 3.705 or the standards in CAM 3.705-1. This important distinction is made below in sections 2 and 3.

2. Check List. For installations made on aircraft for which an application for type certificate was made before April 1, 1957. The information contained in CAM 18.30-12(h) may be used in evaluating this modification.

   A. Structural Requirements:

(1) Is the installation capable of withstanding the required loads? The effect on other structure (primary or secondary) should be considered. (CAR 3.171, 3.186, 3.188, 3.243, 3.386.)

Yes No

Note: The information contained in CAM 18.30-12(h)(6) may be used for assistance in determining compliance.

B. Hazards to the Aircraft or its Occupants:

(1) Is the anticollision light so located that its output is not detrimental to the flight crew's vision? (CAM 3.705-1(a).)

Yes No

(2) Is the light so located that it does not detract from the conspicuity of the position lights? (CAM 3.705-1(a).)

Yes No

(3) Is a fuse or circuit breaker of the rating appropriate to the cable used installed? (CAR 3.690.)

Yes No

(4) If a circuit breaker is used, is it of a type which will open the circuit irrespective of the position of the control in case of a fault? (CAM 3.690-2.)

Yes No

(5) Are the connecting cables in accordance with recognized standards for electric cable of a slow burning type? (Cable conforming to Military Specification MIL-W-5086 or the equivalent is acceptable.) (CAM 3.693-1.)

Yes No

(6) Is the pilot compartment free from glare and reflections which would interfere with the pilot's vision during operation of the anticollision light? (CAR 3.382.)

Yes No

Note: A night flight check should be performed to determine that there are no hazardous reflections from the prop disc, nacelle, or wing surfaces.

C. Operating Aspects:

(1) Is the anticollision light of the rotating beacon type? (CAM 3.705-1(a).)

Yes No

(2) Is the color of the light aviation red in accordance with the specifications in CAR 3.703(a)? (CAM 3.705-1(b).) (Light manufacturers or other laboratory test reports may be accepted as proof of color.)

Yes No

(3) Does the light provide an effective flash frequency of not less than 40 and not more than 100 cycles per minute? (CAM 3.705-1(c).)

Yes No

(4) Does the light have an on-off ratio not less than 1:75? (CAM 3.705-1(c).)

Yes No

D. Detail Design Standards:

(1) Are the electric cables for the light installed in such a manner that they are suitably protected from fuel, oil, water, and other detrimental substances, and mechanical damage? (CAR 3.681(a).)

Yes No

(2) Is the circuit to the light connected through the master switch arrangement? (CAR 3.688.)

Yes No

(3) Is the anticollision light located on the top of the fuselage or tail? (CAM 3.705-1(a).)

Yes No

(4) If the light is located on the bottom of the fuselage, is there no acceptable location on

top of the fuselage or tail? (CAM 3.705-1(a).)

Yes No

(5) After connection of the light to the electrical system, is the maximum probable continuous load on the system 80% or less of the total generator rating? (CAM 3.681-2.)

Yes No

(6) If the light is installed on the fin, have the flutter and vibration characteristics of the installation been evaluated? (CAR 3.311.) (These characteristics can be evaluated by flight test at least up to V_{NE}. On such tests, the fin should be excited by applying a force to the rudder sufficient to produce an impulsive deflection of the control surface of at least 3 degrees. The resulting vibrations of the fin and rudder should be checked to determine that adequate decay characteristics exist. These tests should be conducted with caution and attempted at varying speeds below V_{NE} before V_{NE} is attempted.

Yes No

3. **Check List.** For installations made on aircraft for which an application for type certificate was made after April 1, 1957.

A. Structural Requirements:

(1) Is the installation capable of withstanding the required loads? The effort on other structure (primary or secondary) should be considered. (CAR 3.171, 3.186, 3.188, 3.243, 3.386.)

Yes No

Note: The information contained in CAM 18.30-12(h)(6) may be used for assistance in determining compliance.

B. Hazards to the Aircraft or its Occupants:

(1) Is the anticollision light so located that its output is not detrimental to the flight crew's vision? (CAR 3.705 and CAR 3.382.)

Yes No

Note: A night flight check should be performed to determine that there are not hazardous

reflections from the prop disc, nacelles or wing surfaces.

(2) Is the light so located that it does not detract from the conspicuity of the position lights? (CAR 3.705.)

Yes No

(3) Is a fuse or circuit breaker of a rating appropriate to the cable used installed? (CAR 3.690.)

Yes No

(4) If a circuit breaker is used, is it of a type which will open the circuit irrespective of the position of the control in case of a fault. (CAM 3.690-2.)

Yes No

(5) Are the connecting cables in accordance with recognized standards for electric cable of a slow burning type? (Cable conforming to Military Specification MIL-W-5086 or the equivalent is acceptable.) (CAM 3.693-1.)

Yes No

C. Operating Aspects:

(1) Does the system illuminate in all directions within 30° above and 30° below the horizontal plane of the airplane, except for a solid angle obstructed visibility not exceeding .03 steradians in the rearward direction? (CAR 3.705(a).) (A relatively simple method to determine the solid angle obstruction due to the tail fin is as follows: Position the levelled aircraft in a darkened hangar so that its longitudinal axis is perpendicular to the hangar wall. Place a small light at the desired anticollision light location. Measure the area of the tail fin shadow on the wall above the height of the lamp. This area divided by the square of the distance from lamp to wall (in the same units) is approximately equal to the solid angle obstruction in steradians.* The distance from lamp to wall should be 20-30 feet (or more, if practicable) to keep errors low.)

Yes No

* See AE-35 Circular Letter dated April 12, 1958

(2) Is the obstructed visibility (if any) confined within a solid angle equal to 0.15 steradians centered about the longitudinal axis of the aircraft in the rearward direction? (CAR 3.705(a).) (See information under paragraph 1 above relative to measuring steradians.)

Yes No

(3) Is the effective flash frequency of the anti-collision light system (as observed from a distance if more than one light is used in the system) between 40 and 100 cycles per minute? (CAR 3.705(b).)

Yes No

(4) If the anticollision light system is made up of two or more individual lights, is the effective flash frequency less than 180 cycles per minute in the overlap regions? (CAR 3.705(b).)

Yes No

(5) Is the color of the light aviation red in accordance with CAR 3.703(a)? (CAR 3.705(a).) (Pending issuance of a TSO on these lights, light manufacturer's or other laboratory test reports may be accepted as proof of color.)

Yes No

(6) Are the minimum light intensities in all vertical planes, measured with the red filter and expressed in terms of "effective intensities," in accordance with Fig. 3-18? (CAR 3.705(d).)

Yes No

D. Detail Design Standards:

(1) Are the electric cables for the lights installed in such a manner that they are suitably protected from fuel, oil, water, and other detrimental substances, and mechanical damage? (CAR 3.681(a).)

Yes No

(2) Is the circuit to the light connected through the master switch arrangement? (CAR 3.688.)

Yes No

(3) After connection of the light to the electrical system, is the continuous load on the system 80% or less of the total generator rating? (CAM 3.681-2.)

Yes No

(4) If the light is installed in the fin, have the flutter and vibration characteristics of the installation been evaluated? (CAR 3.311.) (These characteristics can be evaluated by flight test at least up to V_{NE}. On such tests, the fin should be excited by applying a force to the rudder sufficient to produce an impulsive deflection of the control surface of at least 3 degrees. The resulting vibrations of the fin and rudder should be checked to determine that adequate decay characteristics exist. These tests should be conducted with caution and attempted at varying speeds below V_{NE} before V_{NE} is attempted.)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

Revised January 15, 1959
ACCS - 7
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Generator Installations - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

   3.296 Inspection Provisions
   3.635 Powerplant Accessories
   3.681 Electrical System Installation
   3.686 Generator Controls
   3.688 Master Switch Arrangement

   Generator installations which are the same as those made by the airframe manufacturer, or other installations which are already approved, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List:

   A. Structural Requirements:

      (1) When the generator is mounted on an engine accessory pad, is its weight and overhang moment within the rating of the pad? (CAR 3.635.) (Maximum weight and overhang moments for engine accessory drive pads are normally listed on the engine specifications.)

      Yes No

   B. Hazards to the Aircraft or its Occupants:

      (1) When the generator is mounted on an engine accessory pad, is the maximum continuous torque load on the drive shaft within the rating of the pad? (CAR 3.635; CAR 3.681(a).) (The maximum continuous torque rating of the pad is normally listed on the engine specifications. To determine the maximum continuous torque applied by the generator use the following equation:

$$T = \frac{8460\ VI}{e S_L}$$

      Where T = maximum continuous torque (in pound - inches)
      V = regulated system voltage (volts)

I = rated generator current (amperes)
$*e$ = generator efficiency (percent)
S_L = lowest generator speed (RPM) at which rated generator current and voltage can be maintained.

* 60% should be used unless generator manufacturer's data shows higher value.)

Yes No

(2) When the generator is mounted on an engine accessory pad, is the shear section on the generator such that it will fail at a torque lower than the maximum static torque of the engine pad? (CARs 3.636 and 3.681(a).) (The maximum static torque for accessory pads is normally listed in the engine specifications.)

Yes No

(3) Is the generator installed so as to minimize the possibility that arcing or sparks may come in contact with flammable fluids or vapors in a free state? (CAR 3.635.)

Yes No

Note: An evaluation should be made of the possibility of sparks or hot air from the generator cooling air outlets coming in contact with flammable fluids. An example would be locating the generator beneath an engine-driven fuel pump not properly fitted with overboard drain lines. A seal leak developing in the fuel pump could result in a fire.

(4) Is the electrical cable or wiring of the proper size for the electrical load involved and is it installed so as to minimize the possibility of fire or smoke? (CAR 3.681(a).)

Note: CAM 18.30-12(e).

Yes No

(5) If electrical wiring or equipment is installed near the compass, was the compass checked for possible error? (CAR 3.681(a).)

Yes No

(6) Can maximum engine RPM be attained without danger of overspeeding the generator? (Refer to the generator nameplate, engine specifications and engine operating instructions for evaluation information.)

Yes No

C. Operating Aspects:

(1) When the generator is required by the operating rules (for operation under IFR) is its capacity sufficient to supply all probable combinations of continuous loads with adequate reserve for battery charging? In no case shall the maximum probable continuous load exceed 80% of the total rated generator capacity. (CARs 3.681 and 3.681-2.)

Yes No

(2) Is the voltage regulator (associated with the generator) capable of maintaining rated voltage over the range of probable engine speeds at full electric system load? (CAR 3.686.)

Yes No

(3) Is a master switch provided which will disconnect the generator from the main distribution system at a point adjacent to the generator? (CAR 3.688.)

Yes No

D. Detail Design Standards:

(1) Is the generator installed so as to permit inspection of the condition of the brushes and wiring terminals without removal of adjacent equipment? (CAR 3.296.)

Yes No

(2) Is the generator installed so as to be protected from fuel, oil, water, and other detrimental substances and mechanical damage? (CAR 3.681.)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

July 14, 1958
ACCS - 9

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Modification of an Electric Starting System by Substitution of a Starter made by a Different Manufacturer, Assuming that the Size and Shape of the Engine Mounting Pad is Correct -- CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CAR's:

CAR 3.411 Components
CAR 3.635 Powerplant accessories
CAR 3.681 Installation
CAR 3.690 Fuses or circuit breakers

Consideration must be given to the fact that prescribed engine or starter mechanical limitations cannot be exceeded. Electrical limitations and devices such as relays, switches and the current carrying capacity of wires must also be evaluated.

2. Check List:

A. Structural:

(1) Is the starter constructed, arranged and installed to assure continued safe operation of the airplane and powerplant? (CAR 3.411(b).)

Yes No

(2) Is the allowable weight and overhang moment of the starter less than that recorded in the engine specification for the applicable mounting pad? (CAR 3.635.)

Yes No

Note: The overhang moment is the product of the weight (pounds) of the starter and the distance (inches) from the mounting end to the center of gravity of the starter.

B. Hazards:

(1) Does the starter incorporate electrical protective devices such as fuses or circuit breakers? (CAR 3.690.)

Yes No

Note: Fuses are not required in the main circuits of the starter motor; therefore, either answer is acceptable. This question has been incorporated to make this information a matter of record.

(2) Are the switches, relays, engaging solenoids and wire size proper for the starter and the electrical service provided by the battery or ground power source? (CAR 3.681.)

Yes No

(3) Is the starter motor installed so as to minimize contact with inflammables from fluid or vapor lines in the event of arcing or sparking of the motor?

Yes No

C. Operational:

(1) Does the starter dog properly mesh and fully engage the engine dog, when the meshing cable or solenoid is actuated? (CAR 3.635.)

Yes No

(2) Is there adequate clearance between the starter and engine dog in the fully retracted position, to prevent riding of the dogs? (Refer to manufacturer's instruction manual for clearance.) (CAR 3.635.)

Yes No

D. Detail Design:

(1) Is the starter of a type that is acceptable under one of the following means?

Yes No

(a) Qualification under an AN or MIL specification.

(b) Completing a qualification test approved by CAA.

(c) Prior satisfactory service record on another approved installation.

(CAR 3.635.)

(2) Will the starter dog turn in the direction of rotation required by the engine dog? (CAR 3.635.)

Yes No

(3) Is the speed ratio of the starter accessory drive correct as recorded in the engine specification? (CAR 3.635.)

Yes No

(4) Is the maximum static torque delivered by the starter less than that specified in the engine specification? (CAR 3.635.)

Yes No

(5) Is the starter overload prevention mechanism satisfactory to permit engaging and disengaging in order to deliver sufficient but not excessive cranking torque to motor the engine? (CAR 3.635.)

Yes No

(6) Is the starter clearance envelope satisfactory with respect to interference, accessibility, inspection, maintenance, removal and electrical connections to be made? (CAR 3.411(b).)

Yes No

(7) Is the starter motor suitably protected from fuel, oil, water and other detrimental conditions? (CAR 3.681.)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

July 14, 1958
ACCS - 10

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Motor and Dynamotor Installations - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CAR's:

3.171 Loads
3.174 Proof of Structure
3.186 Maneuvering Load Factors
3.188 Gust Load Factors
3.243 Load Factor for Landing Conditions
3.296 Inspection Provisions
3.301 Material Strength Properties and Design Values
3.386 Protection
3.635 Powerplant Accessories
3.652 Functional and Installational Requirements
3.681 Electrical System Installation
3.688 Master Switch Installation
3.690 Fuses or Circuit Breakers

Motor or dynamotor installations which are the same as those made by the airframe manufacturer, or other installations which are already approved, may be accepted without further investigation. On other installations the following points should be checked to determine that the installation is satisfactory.

2. Check List:

A. Structural Requirements:

(1) Is the motor or dynamotor installed in such a manner that it can withstand the required loads? (CAR 3.171, 3.186, 3.188, 3.243, 3.386.) (See paragraph 4 below.)

Yes No

(2) If a mounting bracket is used, will the method used in its fabrication produce a consistently sound structure? (CAR 3.293.)

Yes No

(3) If a mounting bracket is used, is it suitably protected against deterioration or loss of strength in service due to weathering, corrosion, abrasion or other causes? (CAR 3.295.)

Yes No

(4) If the equipment is mounted either on existing structure or on a bracket attached to existing structure, is all of the structure (including the bracket, if used) adequate to support the required loads? (CARs 3.171, 3.174, 3.186, 3.188, 3.243, 3.386.)

Yes No

The answer can be determined by either of two methods:

a. By direct comparison with an existing approved installation having the same or similar (approximately the same weight and size) equipment installed.

b. By structural analysis or static test. Such installations do not lend themselves readily to analysis, but are normally adaptable to static test.

In conducting a static test, the following procedure may be used:

1. Determine the weight and c.g. position of the equipment item.

2. Mount the equipment in its position in the airplane or simulate the equipment with a dummy so that the required loads can be applied at the c.g. position of the actual equipment.

3. The required loads should then be applied by any suitable means. If the motor or dynamotor is light in weight, the inspector could use his own strength and/or weight to determine that the mounted equipment meets the required loads.

In accordance with CAR 3.386(d), all items of mass which would be apt to injure the passengers or crew in the event of a minor crash landing should have their supporting structure designed to the crash load requirements of CAR 3.386(a) insofar as the forward, upward, and sideward direction are concerned. The applicable downward load factor shall be the critical flight or landing load factor specified in CARs 3.186, 3.188, or 3.243. In lieu of a calculated determination of the down load factor, the ultimate factors of 6.6, 6.6, and 9.0 may be used for the normal, utility, and acrobatic categories, respectively. For equipment locations not covered

by CAR 3.386(d), the required loads (ref. 3.171(b)) are the flight and landing load factorsof CARs 3.186, 3.188, and 3.243. In lieu of a calcuated determination of these loads, the load factors of 3.386(a) plus the down load factors referenced above may be used.

(5) Is the equipment so installed that it does not adversely affect other structure (either primary or secondary)? (CAR 3.721.)

Yes No

B. Hazards to the Aircraft and its Occupants

(1) Is a fuse or circuit breaker of the rating appropriate to the cable used installed? (CAR 3.690.)

Yes No

(2) If a circuit breaker is installed, is it of a type which will open the circuit irrespective of the position of the control in case of a fault? (CAR 3.690-2.)

Yes No

(3) Are the connecting cables in accordance with recognized standards for electric cable of a slow burning type? (Cable conforming to Military Specification MIL-W-5086 or the equivalent is acceptable.) (CAM 3.693-1.)

Yes No

(4) Is the equipment installed so as to minimize the possibility that arcing or sparks may come in contact with flammable fluids or vapors in a free state? (CAR 3.635.)

Yes No

(5) If the equipment can emit smoke when overheated, are means provided to prevent the overheat condition or to safely dissipate the smoke? (CAR 3.681.)

Yes No

C. Operation Aspects

(1) If the equipment is essential to the safe operation of the airplane, does it perform adequately the function for which it is to be used? (CAR 3.652.)

Yes No

D. Detail Design Standards

(1) Are adequate means provided to examine the equipment to determine brush condition and for lubrication, if required? (CAR 3.296.)

Yes No

(2) Are the electric cables installed in such a manner that they are suitably protected from fuel, oil, water, other detrimental substance, and mechanical damage? (CAR 3.681(a).)

Yes No

(3) Is the circuit to the equipment connected through the master switch arrangement? (CAR 3.688.)

Yes No

(4) After connection of the equipment to the electrical system, is the maximum probable continuous load on the system 80% or less of the total generator rating? (CAM 3.681-2.)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or 4a, with the exception of CAR 4a-T.

July 15, 1958
ACCS - 11
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Modification and/or Installation of Seats - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CAR's

3.71 Weight and Balance
3.76 Center of Gravity Position
3.171 Loads
3.174 Proof of Structure
3.292 Materials and Workmanship
3.293 Fabrication Methods
3.294 Standard Fastenings
3.295 Protection
3.301 Material Strength Properties and Design Values
3.386 Protection
3.387 Exits
3.390 Seats and Berths
3.652 Functional and Installation Requirements
3.715 Safety Belts

Modifications and/or installations of seats which are the same as those made by the manufacturer or other parties wherein previous approval has been obtained may be accepted without further investigation. When the modifications and/or installations are different from those previously approved, the following points are to be checked to assure satisfactory compliance.

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

July 15, 1958
ACCS - 11
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Seat Modification - CAR 3 Aircraft

2. Check List

A. Structural Requirements

1. Is the structure of the modified seat adequate to support the required loads? (CAR 3.171, 3.174, 3.386, 3.390)

Yes No

This can be determined by one of the following methods:

a. By direct comparison with an existing approved modification which has the same or similar weight, size, and design.

b. By structural analysis or static test. Seat structures may not always lend themselves readily to analysis, but are normally adaptable to static test.

In conducting the static tests on the modified seats, the procedure as described in TSO-C25/-C39 should be followed.

B. Hazards to Aircraft or its Occupants

1. Does the modification effect the amount of padding or cushioning material so that corners, fittings, knobs, or similar projections are more likely to cause serious injury by human impact? (CAR 3.386)

Yes No

2. Does change in fabric or upholstery materials comply with flame-resistant requirements? (TSO-C25/-C39)

Yes No

3. Does change adversely affect operating mechanism or other subcomponent of seat, in that it may effect the safety of occupant? (CAR 3.652)

Yes No

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Seat Modification - CAR 3 Aircraft

C. Detail Design Standards

1. Does change affect the strength of safety belt attachment? (CAR 3.715)

Yes No

2. Does change to seat design or seat installation have any effect regarding the access to emergency exit(s)? (CAR 3.387)

Yes No

3. Does quality of workmanship appear to be equivalent to the original? (CAR 3.292, 3.293)

Yes No

SUBJECT: Seat Installation - CAR 3 Aircraft

3. Check List

A. Structural Requirements

1. Is the seat to be installed an approved seat which complies with the requirements of TSO-C25 or C-39? (CAR 3.390)

Yes No

2. If the seat has been manufactured to conform with TSO requirements, has the strength of seat attachment to structure been determined by using the factor of 1.33 times (multiplied by) the acceleration loads precribed by CAR 3.386? (CAR 3.390)

Yes No

3. If the seat does not have TSO approval, is the seat structure and the strength of the seat attachment adequate to support the required loads? (CAR 3.171, 3.174, 3.386, 3.390)

Yes No

This can be determined by one of the methods described in CAM 3.390-2.

In conducting the static tests on the seat and seat attachment to structure, the procedure as described in TSO-C25/-C39 should be followed.

August 18, 1958
ACCS - 12
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Buffet and Cabinet Installations - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CAR's:

3.71	Weight and Balance
3.76	Center of Gravity Position
3.171	Loads
3.174	Proof of Structure
3.186	Maneuvering Load Factors
3.188	Gust Load Factors
3.243	Load Factor for Landing Conditions
3.265	Water Load Conditions
3.292	Materials and Workmanship
3.293	Fabrication Methods
3.294	Standard Fastenings
3.295	Protection
3.296	Inspection Provisions
3.301	Material Strength Properties and Design Values
3.386	Protection
3.387	Exits
3.652	Functional and Installation Requirements
3.766	Baggage Compartment - Limitations

Since CAR 3 design requirements do not adequately provide for buffet and cabinet installations, the following check list is intended to be used as guidance material when approving buffet and cabinet installations and is also to be used when approving modifications to existing buffet and cabinet installations.

2. Check List:

A. Structural Requirements:

(1) Is the structure adequate to support the required loads? (CAR's 3.171, 3.174, 3.186, 3.188, 3.243, 3.265, 3.386.)

Yes No

This answer can be determined by either of two methods:

a. By direct comparison with an existing approved installation having the same or similar characteristics of weight, size, and arrangement.

b. By structural analysis or static test. Structures, such as buffets and cabinets, do not lend themselves readily to analysis but are normally adaptable to static test.

In conducting the static test, the following procedure may be used:

1. Determine the weight and center of gravity position of the complete assembly to be tested.

2. Mount the unit either in its position in the airplane or in a rig simulating the actual installation in the airplane.

3. Dummy equipment items simulating the actual buffet units should be installed utilizing the attaching points by which the equipment is normally held in place. The dummy equipment should be such that the required loads can be applied at the c.g. position of the actual equipment.

4. The required loads should then be applied by any suitable means.

   In accordance with CAR 3.386(d), all items of mass which would be apt to injure the passengers or crew in the event of a minor crash landing should have their supporting structure designed to the crash load requirements of CAR 3.386(a) insofar as the forward, upward, and sideward direction are concerned. The applicable downward load factor shall be the critical flight or landing load factor specified in CAR 3.186, 3.188, or 3.243. In lieu of a calculated determination of the down load factor, the ultimate factors of 6.6, 6.6, and 9.0 may be used for the normal, utility, and acrobatic categories, respectively. For equipment locations not covered by CAR 3.386(d), the required loads (ref. 3.171(b)) are the flight and landing load factors of CAR's 3.186, 3.188, and 3.243. In lieu of a calculated determination of these loads, the load factors of 3.386(a) plus the down load factors referenced above may be used.

5. Is the buffet or cabinet installed so that it does not adversely affect other structure, either primary or secondary? (CAR 3.721.)

Yes No

6. If the buffet or cabinet is installed in a compartment which has a placarded weight limitation, has this placard been changed to reflect the weight of the added equipment? (CAR 3.766.)

Yes No

B. Hazards to the Aircraft or its Occupants:

(1) As the result of the buffet or cabinet being installed, is the accessibility of the exits and doors adversely affected? (CAR 3.387.)

Yes No

(2) Will an occupant, when making proper use of the safety belt, receive possible serious injury during minor crash conditions as the result of contact of his body with protruding or penetrating parts of the buffet or cabinet? (CAR 3.386.)

Yes No

C. Detail Design Standards:

(1) Will the installation of the buffet or cabinet, and their contents, adversely affect the weight and balance of the airplane for the most forward and most aft c.g. locations? (CAR's 3.71 and 3.76.)

Yes No

Electrical aspects of buffet and cabinet installations are the subject of another ACCS.

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

August 18, 1958
ACCS - 13
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Modification of an Airplane Involving Installation of a Fuel Flowmeter - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. **Applicable CAR's:**

3.433	Fuel Flow Rate
3.434	Fuel Flow Rate for Gravity Systems
3.435	Fuel Flow Rate for Pump Systems
3.436	Fuel Flow Rate for Auxiliary Fuel Systems and Fuel Transfer Systems
3.550	Fuel System Lines and Fittings
3.638	Lines and Fittings
3.673	Fuel Flowmeter System
TSO-C44	Fuel Flowmeters

Whenever a flowmeter is installed in the fuel system, the fuel flow rate will be affected. To determine if an adequate supply of fuel is available at the carburetor, it is necessary to conduct fuel flow tests. The tests may be conducted on the airplane or on a suitable mockup which duplicates the particular fuel system. The Engineering Service Representative should be contacted with reference to conducting the necessary tests.

2. **Check List:**

A. **Structural**

(1) If changes or alterations of the airplane structure are made, has the original strength and integrity of the structure been retained? (CAM 18.30.)

Yes No

Note: If the specific alteration cannot be evaluated using CAM 18 or equivalent references, it should be referred to the Engineering Service Representative.

(2) If additional lines are required for the installation, are they properly installed and supported? (CAR 3.550.)

Yes No

B. Hazards

(1) All lines and fittings installed in connection with the flowmeter will be under pressure. Does the installation comply with the powerplant fire protection provisions? (CAR 3.638.)

Yes No

C. Operational

(1) Do test results show an adequate supply of fuel at the carburetor during normal operation and with the metering element blocked? (CAR's 3.433, 3.434, and 3.435.)

Yes No

D. Detail Design

(1) To insure an airworthy installation, is the flowmeter of an approved type?

Yes No

Flowmeters approved for installation in civil aircraft prior to October 15, 1957, may continue to be used. New models of fuel flowmeters manufactured after October 15, 1957, shall conform to the requirements of TSO-C44. In either case, final approval is dependent on the satisfactory installation of the flowmeter in the airplane.

(2) Is the indicator and associated components properly installed?

Yes No

To insure that the indicator and its associated components have been properly installed, the manufacturer's installation instructions should be reviewed. The Engineering Service Representative should be contacted for assistance in making this determination unless a supplementary compliance check sheet is available which covers the instrument installation portion.

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

August 18, 1958
ACCS - 14

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Modification of a Fuel System by the Installation of a Fuel Pump to Transfer Fuel from an Auxiliary to a Main Fuel Tank - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CAR's:

   3.429 General
   3.430 Fuel System Arrangement
   3.432 Pressure Cross Feed Arrangements
   3.435 Fuel Flow Rate for Pump Systems
   3.436 Fuel Flow Rate for Auxiliary Fuel Systems and Fuel Transfer Systems
   3.449 Fuel Pump and Pump Installation
   3.611 Components
   3.635 Powerplant Accessories
   3.681 Installation
   3.690 Fuses or Circuit Breakers

   The main function of the fuel system is to deliver the required fuel flow rate and pressure to meet all engine demands; this is accomplished by the total performance of all fuel pumps (main or emergency, auxiliary or fuel transfer).

2. Check List:

   A. Structural

      (1) Is the fuel pump of a type that is acceptable under one of the following means? (CAR 3.635.)

                                                Yes No

      (a) Qualification under an AN or MIL specification.

      (b) Completing a qualification test approved by CAA.

      (c) Prior satisfactory service record on another approved installation.

      (2) Is the fuel pump constructed, arranged and installed in a manner which will assure the continued safe

operation of the airplane and powerplant? (CAR 3.411(b).)

Yes No

Note: The fuel pump pad of mechanically driven pumps shall be matched to the engine pad, type of drive, rotation of drive, and the pump weight and overhang moment shall not exceed that listed in the engine specification. In addition, the required torque (continuous or static) to drive the pump shall not exceed that specified in the engine specification.

B. Hazards

(1) Does the electric driven fuel pump incorporate electrical protective devices? Are the switches, relays and wire size proper for the motor? CAR's 3.681 and 3.690.)

Yes No

(2) Does the pressure cross feed line from the fuel pump to the main tank pass through personnel or cargo holds? (CAR 3.432.)

Yes No

Note: If the answer is affirmative, fuel valve shutoffs at the supply of fuel to these lines shall be provided unless possible sources of fuel leakage in these lines are enclosed in fuel- and fume-proof enclosure drained and vented to the exterior of the airplane.

C. Operational

(1) Is the fuel flow from the transfer system equal to 0.9 pound per hour for each maximum continuous horsepower or 125 percent of the actual maximum continuous fuel consumption of the engine? (CAR's 3.435 and 3.436.)

Yes No

Note: A lower flow rate is acceptable for a small auxiliary tank feeding into a large main tank, provided it is placarded requiring that auxiliary tank must only be opened to the main tank when a satisfactory fuel level still remains in the main tank.

D. Detail Design

(1) Does the fuel pump draw fuel from only one tank at a time? (CAR 3.430.)

Yes No

(2) Does the installation of the fuel pump provide fuel to each engine at the flow rate and pressure adequate for proper engine functioning? (CAR 3.429.)

Yes No

Note 1: The data herein reflects the requirements of CAR e in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

August 18, 1958
ACCS - 15

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Modification of an Airplane to Relocate An Auxiliary Fuel Tank Without Altering the Fuel System Arrangement - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CAR's:

3.433	Fuel Flow Rate
3.434	Fuel Flow Rate for Gravity System
3.435	Fuel Flow Rate for Pump System
3.436	Fuel Flow Rate for Auxiliary Fuel System and Fuel Transfer Systems
3.437	Determination of Unusable Fuel Supply and Fuel System Operation on Low Fuel
3.438	Fuel System Hot Weather Operation
3.439	Flow Between Interconnected Tanks
3.440	Fuel System - General
3.441	Fuel Tank Tests
3.442	Fuel Tank Installation
3.443	Fuel Tank Expansion Space
3.444	Fuel Tank Sump
3.445	Fuel Tank Filler Connection
3.446	Fuel Tank Vents and Carburetor Vapor Vents
3.447-A	Fuel Tank Vents
3.448	Fuel Tank Outlets

2. Check List:

A. Structural

(1) If changes or alterations of the airplane structure are made, has the original strength and integrity of the structure been retained? (CAM 18.30.)

Yes No

Note: If the specific alteration cannot be evaluated using CAM 18 or equivalent references, it should be referred to the Engineering Service Representative.

(2) Has the modification been evaluated to determine to what extent the c.g. of the airplane will be affected? (CAM 3.76-1.)

Yes No

(3) Is the fuel tank properly and adequately supported? (CAR 3.442.)

Yes No

(4) Are all lines properly supported? (CAR 3.550.)

Yes No

(5) Have nonabsorbent pads been provided between the tank and its supports? (CAR 3.442.)

Yes No

B. Hazards

(1) Does the installation provide proper ventilation and drainage for the tank compartment and also adjacent compartments? (CAR 3.442.)

Yes No

(2) Has the rerouting of existing fuel lines or installation of new lines or fittings created a fire hazard? (CAR 3.550 and 3.638.)

Yes No

(3) Has the tank been installed with the proper clearance between it and the firewall? (CAR 3.442.)

Yes No

C. Operational

(1) Have any changes been made in the fuel system which would require a redetermination of the fuel flow rate? (CAR 3.436.)

Yes No

Note: If the answer to item (1) is yes, check the following items to determine if fuel flow tests are necessary:

(a) Has the inside diameter of any of the plumbing been decreased?

(b) Have additional fittings or valves been added to the system?

(c) Has the overall length of the plumbing been increased?

(d) For gravity systems, has the height location of the tank been decreased in its relationship to the position of the carburetor?

(e) If fuel flow tests are necessary, contact the Engineering Service Representative.

(2) Has relocation affected the amount of unusable fuel in the tank? (CAR 3.437.)

Yes No

Note: If the answer to item (2) is yes, contact the Engineering Service Representative to conduct the flight tests necessary to make this determination.

(3) Has the fuel quantity gauge been calibrated to reflect any change in amount of unusable fuel? (CAR 3.440.)

Yes No

(4) Has the change in amount of unusable fuel affected the empty weight of the airplane? (CAR 3.440.)

Yes No

Note: If the unusable fuel exceeds five percent of the tank capacity or one gallon, whichever is greater, a placard shall be provided noting the quantity of fuel which is not available for flight. Notation to this effect shall also be made in the flight manual.

D. Detail Design

(1) Are all new lines, fittings and hoses suitable for the particular application? (CAR 3.550.)

Yes No

(2) Has the new location of the filler connection been properly marked? (CAR 3.445.)

Yes No

(3) Is it possible for spilled fuel to enter the fuel tank compartment? (CAR 3.445.)

Yes No

(4) Have the new locations of drains and vents been checked for fire hazards? (CAR 3.638.)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

August 25, 1958
ACCS - 16

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Instrument Installations - Relocating Instruments, CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CAR's:

   3.171 Loads
   3.550 Fuel System Lines, Fittings, and Accessories
   3.652 Functional and Installational Requirements
   3.661 Arrangement and Visibility of Instrument Installations
   3.662 Instrument Panel Vibration Characteristics
   3.666 Magnetic Direction Indicator
   3.671 Instrument Lines
   3.672 Fuel Quantity Indicator
   3.675 Cylinder Head Temperature Indicating System for Air-Cooled Engines
   3.758 Magnetic Direction Indicator

   Relocated instrument installations which are the same as those made by the airframe manufacturer or other installations which are already approved, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List:

   A. Structural Requirements

      1. If holes are added to the instrument panel, is the structural integrity of the panel or its supporting structure impaired? (CAR 3.171(b).)

         Yes No

         Note: This may normally be determined by a visual check. If the panel or its supporting structure is an integral part of the airplane structure, caution should be used in the evaluation.

   B. Hazards to the Aircraft or its Occupants

      1. If powerplant instruments are relocated, are their lines which carry inflammable fluids and gases under pressure provided with restricted orifices or other

safety devices at the source of pressure to prevent excessive escape of fluid or gas in case of line failure? (CAR 3.671.)

Yes No

C. Operation Aspects

1. Are relocated flight, navigation and powerplant instruments installed in such a manner that they are easily visible for use by the pilot? (CAR 3.661(a).)

Yes No

2. Are relocated identical powerplant instruments on multiengine aircraft so located as to prevent any confusion as to the engines to which they relate? (CAR 3.661(b).)

Yes No

3. Is the relocated magnetic compass installed so that its accuracy is not affected excessively by vibration and transient magnetic fields? (CAR 3.666.)

Yes No

4. Is the relocated magnetic compass compensated for deviation error not exceeding plus or minus ten degrees on any heading in level flight? (CAR 3.666.)

Yes No

5. If the magnetic compass is relocated, is a placard installed with the compass deviation error recorded? (CARs 3.666 and 3.758.)

Yes No

D. Detail Design Standards

1. Are the instrument panel vibration characteristics such as not to impair the accuracy of relocated instruments? (CAR 3.662.)

Yes No

2. If powerplant instruments are relocated, are their lines installed and supported to prevent excessive vibration and to withstand loads due to accelerated flight conditions? (CAR 3.550.)

Yes No

3. If powerplant instruments are relocated, do instrument lines incorporate provisions for flexibility when the lines are connected to components of the airplane and relative motion could exist between airframe and instruments? (CAR 3.550.)

Yes No

4. If powerplant instruments are relocated, is the use of flexible hose avoided in locations where exposure to excessive temperatures might adversely affect the hose during operation or shutdown? (CAR 3.550.)

Yes No

5. If a fuel quantity indicator sight gauge is relocated, is it installed and guarded in a manner to preclude the possibility of breakage or damage? (CAR 3.672.)

Yes No

6. If a relocated fuel sight gauge forms a trap in which water can collect and freeze, is a means provided to permit drainage on the ground? (CAR 3.672.)

Yes No

7. Are the applicable instrument connector tubings, flexible lines, electrical conductors, and cables to relocated instruments considered satisfactory to perform their intended function and are their installations satisfactory? (CARs 3.562, 3.662, 3.671, 3.672, and 3.675.)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

July 14, 1958
ACCS - 17

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Instrument Installations - Adding Instruments, CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CAR's:

3.171 Loads
3.385 Instruments and Markings
3.652 Functional and Installational Requirements - Equipment
3.661 Arrangement and Visibility of Instrument Installations
3.662 Instrument Panel Vibration Characteristics
3.666 Magnetic Direction Indicator
3.671 Instrument Lines
3.672 Fuel Quantity Indicator
3.675 Cylinder Head Temperature Indicating System for Air-Cooled Engines
3.756 Instrument Markings
3.758 Magnetic Direction Indicator
3.765 Accessory and Auxiliary Controls

Added instrument installations which are the same as those made by the airframe manufacturer or other installations which are already approved, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List.

A. Structural Requirements:

(1) If holes are added to instrument panel, is the structural integrity of the panel or its supporting structure impaired? (CAR 3.171(b).)

Yes No

Note: This may normally be determined by a visual check. If the panel or its supporting structure is an integral part of the airplane structure, caution should be used in the evaluation.

B. Hazards to the Aircraft or its Occupants:

(1) If powerplant instruments are added, are their lines which carry inflammable fluids and gases under pressure provided with restricted orifices or other safety

devices at the source of pressure to prevent excessive escape of fluid or gas in case of line failure? (CAR 3.671.)

Yes No

C. Operation Aspects:

(1) Are added flight, navigation and powerplant instruments installed in such a manner that they are easily visible for use by the pilot? (CAR 3.661(a).)

Yes No

(2) Are added identical powerplant instruments on multi-engine aircraft so located as to prevent any confusion as to the engines to which they relate? (CAR 3.661(b).)

Yes No

(3) Is the added magnetic compass installed in the aircraft so that its accuracy is not affected excessively by vibration and transient magnetic fields? (CAR 3.666.)

Yes No

(4) Is the added magnetic compass compensated for deviation error not exceeding plus or minus 10 degrees on any heading in level flight? (CAR 3.666.)

Yes No

(5) If a magnetic compass is added, is a placard installed with the compass deviation error recorded? (CAR's 3.666 and 3.758.)

Yes No

D. Detail Design Standards:

(1) Are the instrument panel vibration characteristics such as not to impair the accuracy of added instruments? (CAR 3.662.)

Yes No

(2) Are the applicable instrument connector tubings, flexible lines, electrical conductors, and cables to the added instruments, considered satisfactory to perform their intended function and are their installations satisfactory? (CAR's 3.652, 3.662,

3.671, 3.672, and 3.675.)

Yes No

(3) Are instruments properly range marked or placarded? (CAR 3.756 and CAR 3.761.)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

August 25, 1958
ACCS - 18

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Gyroscopic Instrument System Installations, CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CAR's:

   3.171 Loads
   3.652 Functional and Installational Requirements
   3.668 Gyroscopic Indicators
   3.661 Arrangement and Visibility of Instrument Installations

   Gyroscopic instrument installations which are the same as those made by the airframe manufacturer, or other installations which are already approved, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List:

   A. Structural Requirements

      1. If holes are added to the instrument panel, is the structural integrity of the panel or its supporting structure impaired? (CAR 3.171(b).)

         Yes No

         Note: This may normally be determined by visual check. If the panel or its supporting structure is an integral part of the airplane structure, caution should be used in the evaluation.

   B. Hazards to the Aircraft or its Occupants

      1. Are instruments securely mounted?

         Yes No

   C. Operation Aspects

      1. Do the instruments perform adequately the function for which they were intended? (CAR 3.652.)

         Yes No

2. Are the instruments installed in such a manner that they are easily visible for use by the pilot? (CAR 3.661(a).)

Yes No

D. Detail Design Standards

1. Is the suction power source of sufficient capacity to operate all of the air operated gyro instruments installed at all airplane speeds above the best rate of climb speed? (CAR 3.668.)

Yes No

2. Is an indicating means provided which will indicate that the instruments are receiving adequate suction for their required performance? (CAR 3.668.)

Yes No

3. If the airplane is multiengine, does the suction air system provide satisfactory protection, in case of line breakage or leakage to an instrument, so as not to impair the performance of the other instruments? (CAR 3.668(b).)

Yes No

4. Is the electrical power supply of adequate capacity to operate all of the electrically operated gyro instruments installed? (CAR 3.668.)

Yes No

5. Does the power failure warning indication provide adequate warning to indicate when proper power is not being received by the instruments? (CAR 3.668.)

Yes No

6. If the airplane is multiengine, are two completely independent power sources provided which are actuated by separate means? (CAR 3.668(a).)

Yes No

7. If the airplane is multiengine, is the power source circuitry such as not to impair the operation of the instruments should breakage of an electrical conductor to an instrument occur? (CAR 3.668(b).)

Yes No

8. If the airplane is multiengine, is a positive means provided for selecting either power source? (CAR 3.668(a).)

Yes No

9. If the airplane is multiengine, is a means provided for indicating the power source output? (CAR 3.668(a).)

Yes No

10. Are the gyroscopic instruments and their systems installed to preclude malfunctioning due to rain, oil, and other detrimental elements? (CAR 3.668.)

Yes No

11. If an engine-driven suction air pump(s) is installed, is it compatible with the engine mounting pad and drive provided for such pumps? (CAR 3.652.)

Yes No

12. If an engine-driven suction air pump(s) is installed, are flexible type pump connector lines provided? (CAR 3.652.)

Yes No

13. Are the shock absorbing characteristics of the instrument panel satisfactory after adding equipment? (CAR 3.662.)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

August 18, 1958
ACCS - 19

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Modification of an Airplane to Replace the Engine Exhaust System With One of New Design - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CAR's:

   3.615 Exhaust System - General
   3.616 Exhaust Manifold

   The primary function of the exhaust manifold is to conduct exhaust gases overboard with minimum hazard to the airplane and pilot. The system must be reliable, exert a minimum back pressure, be accessible for inspection and not interfere with engine-cooling airflow. The material must be particularly suitable for operation under high temperature and corrosive effects of the gas and the weight should be held to a minimum consistent with the needs of the system.

2. Check List:

   A. Structural:

      (1) For any change or alteration of the airplane structure, has the original strength and integrity of the structure been retained? (CAM 18.30.)

      Yes No

      Note: If the specific alteration cannot be evaluated using CAM 18 or equivalent reference, it should be referred to the Engineering Service Representative.

      (2) Is the exhaust manifold properly supported and attached to the engine so that vibration and any other loads imposed during normal operation will not affect the service life of the manifold? (CAR 3.616.)

      Yes No

      Note: Brackets supporting the manifold should be properly attached to the engine. Attachment to any highly stressed components, such as cylinder hold down studs, crankcase studs, and through bolts should be avoided.

B. Hazards:

(1) Are any of the exhaust system components located near any systems carrying flammable fluids or vapors? (CAR 3.615.)

Yes No

(2) Where exhaust system components are unavoidably located near systems carrying flammable fluids or vapors, have suitable precautions been taken to preclude a fire hazard? (CAR 3.615.)

Yes No

(3) Are any drain lines or fittings which may be subject to leakage located over exhaust manifolds, thus creating a fire hazard? (CAR 3.615.)

Yes No

(4) Have fireproof shields been provided between the exhaust manifold and any flammable parts of the airplane structure? (CAR 3.615.)

Yes No

(5) Is the exhaust tailpipe so located so that glare could affect the pilot's visibility, particularly during night flight? (CAR 3.615.)

Yes No

(6) Is it possible for exhaust gas to enter any part of the airplane, particularly personnel compartments? (CAR 3.615.)

Yes No

Note: If the answer to item (6) is "yes" or questionable, the Engineering Service Representative should be contacted to conduct tests to determine if carbon monoxide contamination of cabin air is occurring. Carbon monoxide content should not exceed one part in 20,000.

CAM 04.655 Test Procedure to Determine CO Content:

A carbon monoxide indicator should be used in determining

compliance with the above requirement. The instrument manufactured by the Mines Safety Appliance Company or the Bulb Type Colorimetric Indicator may be used for this purpose, one of which is located at each Flight Engineering and Factory Inspection Branch Office. The following procedure should be used:

1. The aircraft should be flown in level flight at MC power or as nearly so as possible. Carburetor should be set full rich with all windows closed; readings should be taken in at least the following locations:

   a. Along the floor (approximately 4 inches above) in front of each occupant.

   b. On each side of the cabin approximately a foot forward of each occupant.

   c. A few inches in front of each occupant's face.

   d. In front of the cabin heater opening(s) with heat on.

2. Conduct the same investigation as outlined in 1 a. through c. except with windows partially open, thus tending to produce a vacuum in the cabin.

3. The aircraft should then be flown in a glide with power off (idling) and readings taken a few inches in front of each occupant's face with both windows open and closed as above.

4. The highest reading obtained at any of the above points shall not exceed .005.

C. Operational:

(1) Does the new exhaust manifold appear to be substantially the same in design, dimensions and attachment as the old one?

Yes No

Note: Check the following in making this comparison:

a. Has the arrangement been changed?

b. Has the diameter (cross sectional area) of any of the pipe sections been decreased?

c. Has the length of any of the pipe sections been changed?

If the comparison reveals a substantial change, refer to the Engineering Service Representative for a back pressure test.

D. Detail Design:

(1) Is the manifold constructed of suitable fireproof, corrosion-resistant material? (CAR 3.616.)

Yes No

(2) Will expansion due to operating temperatures result in failure of the components? (CAR 3.616.)

Yes No

(3) Where necessary, are provisions incorporated for flexibility? (CAR 3.616.)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

August 25, 1958
ACCS - 21

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Battery Installations - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CAR's:

3.171 Loads
3.174 Proof of Structure
3.186 Maneuvering Load Factors
3.188 Gust Load Factors
3.243 Load Factor for Landing Conditions
3.293 Fabrication Methods
3.301 Material Strength Properties and Design Values
3.386 Protection
3.682 Batteries
3.683 Storage Battery Design and Installation
3.684 Battery Vents

Battery installations which are the same as those made by the airframe manufacturer, or other installations which are already approved, may be accepted without further investigation. On other installations the following points should be checked to determine that the installation is satisfactory.

2. Check List:

A. Structural Requirements

1. Is the battery installed in such a manner that it can withstand the required loads? (CARs 3.171, 3.186, 3.188, 3.243 (see paragraph 3 below).)

Yes No

2. If a mounting bracket is used, will the method u its fabrication produce a consistently sound st (CAR 3.293.)

Yes No

3. If the equipment is mounted either on existing structure or on a bracket attached to existing structure, is all of the structure (including the bracket, if used) adequate to support the required

loads? (CARs 3.174, 3.301, 3.386.)

Yes No

This answer can be determined by either of two methods:

a. By direct comparison with an existing approved installation having the same or similar (approximately the same weight and size) equipment installed.

b. By structural analysis or static test. Such installations do not lend themselves readily to analysis, but are normally adaptable to static test.

In conducting a static test, the following procedure may be used:

(1) Determine the weight and c.g. position of the equipment item.

(2) Mount the equipment in its position in the airplane or simulate the equipment with a dummy so that the required loads can be applied at the c.g. position of the actual equipment.

(3) The required loads should then be applied by any suitable means. If the equipment is light in weight, the inspector could use his own strength and/or weight to determine that the mounted equipment meets the required loads.

In accordance with CAR 3.386(d), all items of mass which would be apt to injure the passengers or crew in the event of a minor crash landing should have their supporting structure designed to the crash load requirements of CAR 3.386(a) insofar as the forward, upward, and sideward directions are concerned. The applicable downward load factor shall be the critical flight or landing load factor specified in CAR 3.186, 3.188, or 3.243. In lieu of a calculated determination of the down load factor, the ultimate factors of 6.6, 6.6, and 9.0 may be used for the normal, utility, and acrobatic categories, respectively. For equipment locations not covered by

CAR 3.386(d), the required loads (ref. 3.171(b)) are the flight and landing load factors of CARs 3.186, 3.188, and 3.243. In lieu of a calculated determination of these loads, the down load factors referenced above may be used.

4. Is the equipment so installed that it does not adversely affect other structure (either primary or secondary)? (CAR 3.721.)

Yes No

B. Hazards to the Aircraft and its Occupants

1. Are the parts of the airplane adjacent to the battery protected against corrosion from any products likely to be emitted by the battery during servicing or flight? (CAR 3.683.)

Yes No

(Methods which may be used to obtain protection include: acid proof paint which will resist corrosive action by emitted electrolyte, drain to discharge corrosive liquids clear of the aircraft, positive pressure vents to carry corrosive fumes outside the aircraft, enclosed battery cases which would contain any amount of electrolyte that might be spilled, or combinations of these methods.)

2. Is the battery container or compartment vented in such a manner that any explosive gases released by the battery during flight are carried outside the airplane? (CAR 3.684.)

Yes No

3. Is the battery container or compartment vented in such a manner that any noxious gases emitted by the battery are directed away from the crew and passengers? (CAR 3.684.)

Yes No

4. Are the battery connector terminals or other exposed parts protected against electrical contact with the battery

container or compartment? (CAR 3.681.)

Yes No

C. Operation Aspects

1. If a battery is the only source of electrical power, does the battery have sufficient capacity to supply the electrical power necessary for dependable operation of all electrical equipment essential to the safe operation of the airplane? (CAR 3.682.)

Yes No

(The necessary capacity can be determined by assuming the loads (including nonessential loads) connected in probable combination and for probable durations under those flight conditions which would require the greatest amount of electrical energy. The current drained from the battery will have different values during the flight. Obtain the average current and multiply by the maximum flight duration in hours. This is the ampere-hour capacity required for the battery at a discharge time rate equal to the maximum flight duration time of the airplane.)

D. Detail Design Standards

1. Is the battery accessible for inspection or servicing on the ground? (CAR 3.683.)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with exception of 4a-T. If the applicant so desires, he may obtain approval under the regulations applicable to the particualr aircraft as noted in the aircraft specification. In this case, the applicable regulations should be reviewed for variances with these guidelines. It is suggested that the Engineering Service Representative of the Regional Aircraft Engineering Division be contacted for assistance in reviewing the pertinent regulations.

USCOMM-DC

January 15, 1959
ACCS - 22

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Landing Light Installations - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

   3.171 Loads
   3.174 Proof of Structure
   3.186 Maneuvering Load Factors
   3.188 Gust Load Factors
   3.243 Load Factor for Landing Conditions
   3.292 Material and Workmanship
   3.293 Fabrication Methods
   3.294 Standard Fastenings
   3.295 Protection
   3.296 Inspection Provisions
   3.698 Landing Lights
   3.699 Landing Light Installations
   3.652 Functional and Installational Requirements
   3.681 Electrical System Installation
   3.685 Generator
   3.688 Master Switch Arrangement
   3.690 Fuses or Circuit Breakers

   An electric landing light is required by the operating rules (CARs 43.30(b)(4) and 43.30(c)(1)) only when (1) the aircraft is operated for hire and (2) the aircraft is operated at night or under IFR. Landing light installations which are the same as those made by the airframe manufacturer or other installations which are already approved, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List:

   A. Structural Requirements:

      (1) Is the installation capable of withstanding the required loads? The effect on other structure (primary or secondary) should be considered. (CARs 3.171, 3.174, 3.186, 3.188, 3.243.)

      Yes No

      Note: Particular care should be taken on the installation of landing lights since they are usually recessed into existing structure in the wing or fuselage.

The leading edges of stress skinned (and some fabric covered) wings are usually structural to a large degree and would be adversely affected by cutouts which are not sufficiently or correctly reinforced. While the extreme nose sections of the fuselage are usually not primary structure, care should be taken on these installations. It is recommended if there is any doubt as to whether the proposed installation in the wing or fuselage is affecting primary or secondary structure, that the Engineering Service Representative be contacted for assistance. It is further recommended if the structure is definitely primary that the Engineering Service Representative be contacted for assistance in the evaluation of the installation.

(2) Is the material used in the installation suitable for the purpose intended and is the workmanship of a high standard? (CAR 3.292.)

Yes No

(3) Will the fabrication methods used result in a consistently sound installation and are standard approved fasteners used? (CARs 3.293 and 3.294.)

Yes No

(4) Is adequate protection provided to protect against deterioration or loss of strength in service due to weathering, abrasion or other causes? Are adequate inspection means provided and will the installations have an adverse effect on the inspection provisions for other components of the aircraft? (CARs 3.295 and 3.296.)

Yes No

B. <u>Hazards to the Aircraft or its Occupants</u>:

(1) Is the pilot compartment free from dangerous glare, halations or reflections which would interfere with the pilot's vision during operation of the landing light? (CAR 3.699.)

Yes No

Note: A night-flight check should be performed to assure that no interference with pilot vision exists. Reflections from the propeller disc are particularly troublesome.

(2) Is a fuse or circuit breaker of the rating appropriate to the cable used installed? (CAR 3.690.)

Yes No

(3) If a circuit breaker is used, is it of a type which will open the circuit irrespective of the position of the control in case of a fault? (CAM 3.690-2.)

Yes No

(4) Are the connecting cables in accordance with recognized standards for electric cable of a slow-burning type? (Cable conforming to military specification MIL-W-5086 or the equivalent is acceptable.) (CAM 3.693-1.)

Yes No

C. Operating Aspects:

(1) Does the landing light provide sufficient properly directed runway illumination to permit safe landings during night VFR operations? (CARs 3.698 and 3.699.)

Yes No

Note: A night-flight check should be performed to check landing light effectiveness.

(2) Is the landing light switch located so as to be readily accessible to the pilot? (CAR 3.652.)

Yes No

(3) Is the landing light switch adequately labeled as to operation and function performed? (CAR 3.652.)

Yes No

D. Detail Design Standards:

(1) Are the electric cables for the landing light installed in such a manner that they are suitably protected from fuel, oil, water and other detrimental substances, and mechanical damage? (CAR 3.681(a).)

Yes No

(2) Is the circuit to the landing light connected through the master switch arrangement? (CAR 3.688.)

Yes No

Note: A flight check should be performed to determine possible adverse flight characteristics with light in extended position.

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

January 15, 1959
ACCS - 23

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Interior Light Installations - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

   3.382 Vision
   3.652 Functional and Installational Requirements
   3.681 Electrical System Installations
   3.685 Generator
   3.688 Master Switch Arrangement
   3.690 Fuses or Circuit Breakers
   3.696 Instrument Lights
   3.697 Instrument Light Installations

   Interior light installations which are the same as those made by the airframe manufacturer or other installations which are already approved, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List:

   A. Structural Requirements:

      Note: Caution should be used in attaching lights, receptacles, or wire bundles to primary structure. Holes or notches may have an adverse effect on the structural integrity and should be judiciously placed.

   B. Hazards to the Aircraft or its Occupants:

      (1) If instrument lights are installed, are they of such construction that there is sufficient distance or insulating material between current carrying parts and the housing so that vibration in flight will not cause shorting? (CAR 3.696.)

      Yes No

      (2) Are the instrument lights and other cabin lights so installed that their direct rays (or reflected rays from the windshield or other surfaces) are shielded from the pilot's eyes? (CARs 3.382 and 3.697.)

      Yes No

(3) Are interior lighting fixtures so installed that lamps do not come in close proximity with combustibles such as interior trim or baggage? (CAR 3.681.)

Yes No

(4) Is a fuse or circuit breaker of the rating appropriate to the cable used installed? (CAR 3.690.)

Yes No

(5) If a circuit breaker is used, is it of a type which will open the circuit irrespective of the position of the control in case of a fault? (CAM 3.690-2.)

Yes No

(6) Are the connecting cables in accordance with recognized standards for electric cable of a slow-burning type? (Cable conforming to military specification MIL-W-5086 or the equivalent is acceptable.) (CAM 3.693-1.)

Yes No

C. Operating Aspects:

(1) If instrument lights are installed, do they provide sufficient illumination to make all instruments and controls easily readable and discernible? (CAR 3.696.)

Yes No

(2) Are all interior lighting switches (which are significant to safety) readily accessible to the pilot and suitably labeled as to operation and function performed? (CAR 3.652.)

Yes No

D. Detail Design Standards:

(1) Are the electric cables for the interior lights installed in such a manner that they are suitably protected from fuel, oil, water and other detrimental

substances, and mechanical damage? (CAR 3.681(a).)

Yes No

(2) Is the circuit to all interior lights connected through the master switch arrangement? (CAR 3.688.)

Yes No

(3) After connection of the interior light to the electrical system, is the maximum probable continuous load on the system 80 percent or less of the total generator rating? (CAM 3.681-2.)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

January 15, 1959
ACCS - 24
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Buffet Installation (Electrical Portion)- CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs (Electrical Portion Only):

   3.681 Electrical System Installations
   3.685 Generator
   3.688 Master Switch Arrangement
   3.690 Fuses or Circuit Breakers
   3.693 Electric Cables

2. Check List:

   A. Structural Requirements

      None (See ACCS on Buffet Installations)

   B. Hazards to the Aircraft or its Occupants

      (1) Is a fuse or circuit breaker, of appropriate rating to protect the cable, installed in the circuits to the buffet? (CAR 3.690.)

      Yes No

      (2) If a circuit breaker is used, is it of a type which will open the circuit irrespective of the position of the control in case of a fault? (CAM 3.690-2.)

      Yes No

      (3) Are the connecting cables to the buffet in accordance with recognized standards for electric cable of a slow-burning type? (Cable conforming to military specification MIL-W-5086 or the equivalent is acceptable.) (CAM 3.693-1.)

      Yes No

   C. Operating Aspects

      None

D. Detail Design Standards

(1) Are the electric cables to the buffet installed in such a manner that they are suitably protected from fuel, oil, water (including probable drippings from the buffet itself), and other mechanical damage? (CAR 3.681.)

Yes No

(2) Is the circuit to the buffet connected through the master switch arrangement? (CAR 3.688.)

Yes No

(3) Assuming the buffet drawing its maximum current, is the maximum probable continuous load on the electric power system 80 percent or less of the total generator rating? (CAM 3.681-2.)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

January 15, 1959
ACCS - 25

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Appliance Outlet Installations - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

   3.681 Electrical System Installations
   3.685 Generator
   3.688 Master Switch Arrangement
   3.690 Fuses or Circuit Breakers
   3.693 Electric Cables

   Appliance outlet installations which are the same as those made by the airframe manufacturer or other installations which are already approved may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List:

   A. Structural Requirements

      Note: Caution should be used in attaching outlets or wire bundles to primary structure; holes or notches may have an adverse effect on the structural integrity and should be judiciously placed.

   B. Hazards to the Aircraft or its Occupants

      (1) Is a fuse or circuit breaker, of appropriate rating to protect the cable, installed in the circuit to the outlet receptacle? (CAR 3.690.)

      Yes No

      (2) If a circuit breaker is used, is it of a type which will open the circuit irrespective of the position of the control in case of a fault? (CAM 3.690-2.)

      Yes No

      (3) Are the connecting cables to the outlet receptacle in accordance with recognized standards for electric cable

of a slow-burning type? (Cable conforming to military specification MIL-W-5086 or the equivalent is acceptable.) (CAM 3.693-1.)

Yes No

(4) Is the outlet receptacle capable of transmitting full outlet current (fuse or circuit breaker rating) without overheating? (CAR 3.681.)

Yes No

C. Operating Aspects

(1) Is the appliance outlet identified as to function and as to system voltage, frequency (if alternating current) and maximum current? (CAR 3.681.)

Yes No

D. Detail Design Standards

(1) Are the electric cables to the appliance outlet installed in such a manner that they are suitably protected from fuel, oil, water and other detrimental substances and mechanical damage? (CAR 3.681.)

Yes No

(2) Is the circuit to the appliance outlet connected through the master switch arrangement? (CAR 3.688.)

Yes No

(3) Assuming the appliance draws maximum current (same as rating of fuse or circuit breaker) from the appliance outlet, is the maximum probable continuous load on the aircraft electric power system 80 percent or less of the total generator rating? (CAM 3.681-2.)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

January 15, 1959
ACCS - 26

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Flare Installations - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

   3.71 Weight and Balance
   3.76 Center of Gravity Position
   3.171 Loads
   3.174 Proof of Structure
   3.186 Maneuvering Load Factors
   3.188 Gust Load Factors
   3.243 Load Factor for Landing Conditions
   3.292 Materials and Workmanship
   3.293 Fabrication Methods
   3.294 Standard Fastenings
   3.295 Protection
   3.296 Inspection Provisions
   3.301 Material Strength Properties and Design Values
   3.384 Cockpit Controls
   3.386 Protection
   3.652 Functional and Installation Requirements
   3.681 Installation
   3.711 Marking
   3.713 Flare Requirements
   3.714 Flare Installation
   3.778 Operating Limitations

   Flare installations which are the same as those made by the airframe manufacturer or other installations which are already approved may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List: (Reference should be made to CAM 18.30-0(c) for precautions to be followed in performing the flare installation inspection.)

   A. Structural Requirements

      (1) Is the installation capable of withstanding the required loads? The effect on other structure (primary or secondary should be considered. (CARs 3.171, 3.186, 3.188, 3.243, 3.386.)

      Yes No

Caution should be exercised in cutting holes in the external skin or attaching flare brackets to primary structure. Inadequately stiffened holes or loads applied perpendicular to axial load carrying member may adversely affect their structural integrity. It is suggested that if holes are to be cut in external skin which is primary structure, the Engineering Service Representative should be contacted for assistance in evaluating the modification.

For other portions of the installation, the structural integrity can be determined by either of two methods:

a. By direct comparison with an existing approved installation having the same or similar flares installed.

b. By structural analysis or static test. Such installations do not lend themselves readily to analysis but are normally adaptable to static test.

In conducting a static test, the following procedure may be used:

1. Determine the weight and c.g. position of the equipment item.

2. Mount the equipment in its position in the airplane or simulate the equipment with a dummy so that the required loads can be applied at the c.g. position of the actual equipment.

3. The required loads should then be applied by any suitable means. The inspector could use a pull scale and by means of his own strength and/or weight determine that the mounted equipment meets the required loads.

   In accordance with CAR 3.386(d), all items of mass which would be apt to injure the passengers or crew in the event of a crash landing should have their supporting structure designed to the crash load requirements of CAR 3.386(a) insofar as the forward, upward, and sideward directions are concerned. The applicable downward load factor shall be the critical flight or landing load factor

specified in CARs 3.186, 3.188 or 3.243. In lieu of a calcualted determination of the down load factor, the ultimate factors of 6.6, 6.6 and 9.0 may be used for the normal, utility, and acrobatic categories, respectively. For equipment locations not covered by CAR 3.386(d), the required loads (ref. 3.171(b)) are the flight and landing load factors of CARs 3.186, 3.188, and 3.243. In lieu of a calculated determination of these loads, the down load factors referenced above may be used.

(2) Will the method used in the fabrication of the mounting brackets produce a consistently sound structure? (CAR 3.293.)

Yes No

(3) Are the mounting brackets suitably protected against deterioration or loss of strength in service due to weathering, corrosion, abrasion, or other causes? (CAR 3.295.)

Yes No

(4) If recoil loads are involved, have such loads been considered in the design of the supporting structure? (CAR 3.714.)

Yes No

B. Hazards to the Aircraft or its Occupants

(1) Is the release mechanism located where it may be inadvertently operated? (CAR 3.714.)

Yes No

(2) Is the routing of the control cable and housing such to permit adequate inspection? (CAR 3.296.)

Yes No

(3) Is the control cable and housing adequately supported along its entire length? (CAR 3.292.)

Yes No

(4) Does the location of the flares create a hazard to the aircraft or its occupants? (CARs 3.652, 3.681.)

Yes No

C. Operating Aspects

(1) Is the release mechanism readily accessible to the crew and plainly marked as to its method of operation? (CAR 3.711.)

Yes No

(2) Has the flare installation been demonstrated to operate satisfactorily? (CAR 3.714.)

Yes No

This should be done by ejecting the flares during flight, except in those cases where inspection indicates a ground test will be adequate.

(3) Will the installation of the flares adversely affect the c.g. position or loading schedule of the aircraft? (CARs 3.76. 3.778.)

Yes No

D. Detail Design Standards

(1) Are the flares of an approved type; i.e., are they manufactured in accordance with TSO-C24? (CAR 3.713.)

Yes No

(2) Is the stowage location of the flares marked for the benefit of passengers and crew? (CAR 3.711.)

Yes No

(3) For electrically operated flares:

a. Are the proper shielded cables used or are the flare circuits separated to preclude induction

of current in the flare circuit? (CAM 3.681-1.)

Yes No

b. Are the electric cables installed in such a manner that they are suitably protected from fuel, oil, water, and other detrimental substances, and mechanical damage? (CAR 3.681.)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

January 15, 1959
ACCS - 27

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Flare Installations - CAR 4b Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

4b.18 Approval of Materials, Parts, Processes and Appliances
4b.102 C.G. Limitations
4b.200 Loads
4b.201 Strength and Deformation
4b.202 Proof of Structure
4b.210 - 4b.216 Flight Loads
4b.230 - 4b.236 Ground Loads
4b.260 Emergency Landing Conditions
4b.270 Fatigue Evaluation
4b.301 Materials
4b.302 Fabrication Methods
4b.303 Standard Fastenings
4b.304 Protection
4b.305 Inspection Provisions
4b.306 Material Strength Properties and Design Values
4b.601 Functional and Installation Requirements
4b.606 Equipment Systems and Installations
4b.625 Electrical Equipment and Installations
4b.642 Flare Installation
4b.646 Stowage of Safety Equipment
4b.730 Markings and Placards, General

Flare installations which are the same as those made by the airframe manufacturer or other installations which are already approved may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check Lists: (Reference should be made to CAM 18.30-9(c) for precautions to be followed in performing the flare installation inspection.)

A. Structural Requirements

(1) Is the installation capable of withstanding the required load? The effect on other structure (primary or secondary) should be considered. (CARs 4b.200, 4b.201, 4b.202, 4b.210 -4b.216, 4b.230-4b.236, 4b.270.)

Yes No

Caution should be exercised in cutting holes in the external skin or attaching flare brackets to primary structure. Inadequately stiffened holes or loads applied perpendicular to axial load carrying members may adversely affect their structural integrity. If holes are to be cut in external skin which is primary structure, the Engineering Service Representative should be contacted for assistance in evaluating the modification.

For other portions of the installation, the structural integrity can be determined by either of two methods:

a. By direct comparison with an existing approved installation having the same or similar flares installed.

b. By structural analysis or static test. Such installations do not lend themselves readily to analysis but are normally adaptable to static test.

In conducting a static test, the following procedure may be used:

1. Determine the weight and c.g. position of the equipment item.

2. Mount the equipment in its position in the airplane or simulate the equipment with a dummy so that the required loads can be applied at the c.g. position of the actual equipment.

3. The required loads should then be applied by any suitable means. The inspector could use a pull-scale and by means of his own strength and/or weight determine that the mounted equipment meets the required loads.

   All items of mass which would be apt to injure the passengers or crew in the event of a crash landing should have their supporting structure designed to the crash load requirements of CAR 4b.260 insofar as the forward, upward, and sideward directions are concerned. The applicable downward load factor shall be the critical flight or landing load factor specified in CARs 4b.210-4b.216, 4b.230-4b.236, or 4b.260.

(2) Will the method used in the fabrication of the mounting brackets produce a consistently sound structure? (CARs 4b.270, 4b.302.)

Yes No

(3) Are the mounting brackets suitably protected against deterioration or loss of strength in service due to weathering, corrosion, abrasion, or other causes? (CAR 4b.304.)

Yes No

(4) If recoil loads are involved, have such loads been considered in the design of the supporting structure? (CAR 4b.642.)

Yes No

B. Hazards to the Aircraft or its Occupants

(1) Is the release mechanism located where it may be inadvertently operated? (CAR 4b.642.)

Yes No

(2) Is the control cable and housing adequately supported along its entire length? (CAR 4b.303.)

Yes No

(3) Is the routing of the control cable and housing such to permit adequate inspection? (CAR 4b.305.)

Yes No

(4) Does the location of the flares create a hazard to the aircraft or its occupants? (CARs 4b.606, 4b.646.)

Yes No

C. Operating Aspects

(1) Is the release mechanism readily accessible to the crew and plainly marked as to its method of operation? (CAR 4b.601.)

Yes No

(2) Did the ejection of the flares during flight satisfactorily demonstrate proper operation of the system without any hazard? (CAR 4b.642.) (Refer to CAM 4b.642-1 for test procedure.)

Yes No

D. Detail Design Standards

(1) Are the flares of an approved type; i.e., are they manufactured in accordance with TSO-C24? (CAR 4b.18.)

Yes No

(2) Is the stowage location of the flares marked for the benefit of passengers or crew? (CARs 4b.601, 4b.730.)

Yes No

(3) For electrically operated flares:

a. Has consideration been given to the critical environmental conditions that may affect the operation of the flare electrical system? (CAR 4b.625.)

Yes No

b. Are the proper shielded cables used or are the flare circuits separated to preclude induction of current in the flare circuit? (CAR 4b.625.)

Yes No

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircrafy type certificated prior to this date under CAR 4b or CAR 4a-T.

January 15, 1959
ACCS - 28

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Anticollision Light Installations - CAR 4b Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

4b.200	Loads
4b.201	Strength and Deformation
4b.202	Proof of Structure
4b.210-.216	Flight Loads
4b.230-.236	Ground Loads
4b.260	Emergency Landing Conditions
4b.301	Materials
4b.302	Fabrication Methods
4b.303	Standard Fastenings
4b.304	Protection
4b.305	Inspection Provisions
4b.308	Flutter, Deformation and Vibration
4b.351	Pilot Compartment Vision
4b.606	Equipment Systems and Installations
4b.624	Electrical Protection
4b.625	Electrical Equipment and Installations
4b.637	Anticollision Light System

Anticollision light installations which are the same as those made by the airframe manufacturer, or their installations which are already approved, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory. The existing anticollision system requirements in CAR 4b.637 were effective April 1, 1957, and, therefore, apply only to aircraft for which an application for a type certificate was made on or after that date. Anticollision lights now installed on earlier aircraft (for which application for a type certificate was made before April 1, 1957) do not necessarily comply with latest regulations. The information contained in CAM 18.30-12(h) may be used in evaluating anti-collision light modifications on such aircraft. The material below should be used when the applicant is required to (or elects to) comply with the existing requirements.

2. Check List

A. Structural Requirements

(1) Is the installation capable of withstanding the required loads? The effect on other structure (primary or secondary) should be considered. (CARs 4b.200-.202, 4b.210-.216, 4b.230-.236, 4b.260.)

Yes No

Note: The information contained in CAM 18.30-12(h)(6) may be used for assistance in determining compliance. For installations involving cutting of pressurized fuselage structure or fin and rudder installations, the regional Engineering Service Representative should be contacted for assistance in the evaluation.

(2) Will the installation affect the flutter and vibration characteristics of the aircraft? (CAR 4b.308.)

Yes No

Note: The regional Engineering Service Representative should be contacted for assistance in evaluating this installation, particularly if it involves the fin, rudder, or top of fuselage just forward of the fin.

B. Hazards to the Aircraft or its Occupants

(1) Are the anticollision lights so located that their output is not detrimental to the flight crew's vision? (CARs 4b.351, 4b.637.)

Yes No

Note: A night-flight check should be performed to determine that there are no hazardous reflections from such sources as the propeller discs, nacelles or wing surfaces.

(2) Are the anticollision lights so located that they do not detract from the conspicuity of the position lights? (CAR 4b.637.)

Yes No

(3) Is a fuse or circuit breaker (of a rating appropriate to the cable used) installed? (CAR 4b.624(a).)

Yes No

(4) If a circuit breaker is used, is it of a type which will open the circuit irrespective of the position of the control, in case of a fault? (CAR 4b.624(c).)

Yes No

C. Operating Aspects

(1) Does the system illuminate in all directions within 30° above and 30° below the horizontal plane of the aircraft, except for a solid angle obstructed visibility not exceeding 0.03 steradians in the rearward direction? (CAR 4b.637(a).) (A relatively simple method to determine the solid angle obstruction due to the tail fin is as follows:

Position the levelled aircraft in a darkened hangar so that its longitudinal axis is perpendicular to the hangar wall. Place a small light at the desired top anticollision light location. Measure the areas of the tail fin shadow on the wall above the height of the lamp. This area, divided by the square of the distance from lamp to wall (in the same units), is approximately equal to the solid angle obstruction in steradians. The distance from lamp to wall should be as large as practicable, to keep errors low.)

Yes No

(2) Is the obstructed visibility (if any) confined within a solid angle equal to 0.15 steradians centered about the longitudinal axis of the aircraft in the rearward direction? (CAR 4b.637(a).) (See information under paragraph (1) above on measurements of steradians.)

Yes No

(3) Is the effective flash frequency of the anticollision light system, as observed from a distance, between 40 and 100 cycles per minute? (CAR 4b.637(b).)

Yes No

(4) If the anticollision light system is made up of two or more individual lights, is the effective flash frequency less than 180 cycles per minute in the overlap regions? (CAR 4b.637(b).)

Yes No

(5) Is the color of the lights aviation red in accordance with the specifications of CAR 4b.635(a)? (CAR 4b.637(c).) (Pending issuance of a TSO on these lights, light manufacturers' or other laboratory test reports may be accepted as proof of color.)

Yes No

(6) Are the minimum light intensities in all vertical planes measured with the red filter and expressed in terms of "effective intensities", in accordance with Figure 4b.27? (CAR 4b.637(d).)

Yes No

D. Detail Design Standards

(1) Are the lights and wiring components designed to withstand probable environmental extremes (of temperature, vibration, pressure, etc.) to which they could be exposed? (CAM 4b.625-1.)

Yes No

(2) Are approved materials used in the installation, including standard fastenings? (CARs 4b.301, 4b.303.)

Yes No

(3) Will the fabrication methods used result in a consistently sound structure? (CAR 4b.302.)

Yes No

(4) Is the installation protected against deterioration due to weathering, corrosion, abrasion or other causes? (CAR 4b.304.)

Yes No

(5) Are adequate inspection provisions made for this and other affected components? (CAR 4b.305.)

Yes No

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 4b or CAR 4a-T.

January 15, 1959
ACCS - 29

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Battery Installations - CAR 4b Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

4b.200	Loads
4b.201	Strength and Deformation
4b.202	Proof of Structure
4b.210-.216	Flight Loads
4b.230-.236	Ground Loads
4b.260	Emergency Landing Conditions
4b.301	Materials
4b.302	Fabrication Methods
4b.303	Standard Fastenings
4b.304	Protection
4b.305	Inspection Provisions
4b.306	Material Strength Properties and Design Values
4b.625	Electrical Equipment and Installations

Battery installations which are the same as those made by the airframe manufacturer, or other installations which are already approved, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List:

A. Structural Requirements

(1) Is the battery installed in such a manner that the installation can withstand the required loads? The effect on other structure (primary or secondary) should be considered. (CARs 4b.200, 4b.201, 4b.202, 4b.210-.216, 4b.230-.236, 4b.260.)

Yes No

Note: This answer can be determined by a direct comparison with an existing approved installation having the same or similar (approximately same weight and size) equipment installed, by structural analysis, or by static test. Such installations do not necessarily lend themselves to analysis but are adaptable to static test. In conducting this test, the following procedure may be used:

(1) Determine the weight and c.g. of the equipment.

(2) Mount the equipment in the position in the airplane or simulate the equipment with a dummy so that the required loads can be applied at the c.g. position of the actual equipment.

(3) The required loads should then be applied by any suitable means. If the equipment is light in weight, the inspector could use his own strength and/or weight to determine that the installation will withstand the required loads.

All items of mass which would be apt to injure the passengers or crew in the event of a crash landing should have their supporting structure designed to the crash load requirements of CAR 4b.260 or the applicable critical flight or landing load factors of CARs 4b.210-.216, 4b.230-.236, whichever is greater.

Supporting structure of other mass items should be designed to the critical flight or landing load factors of CARs 4b.210-.216 or 4b.230-.236. The values shown in CAR 4b.260 may be used in lieu of determination of these values.

(2) Are suitable materials used in the construction, including standard fasteners, and will the method of fabrication result in a consistently sound structure? (CARs 4b.301, 4b.302, 4b.303, 4b.306, 4b.18.)

Yes No

(3) Are means provided to permit proper inspections of the installation and related adjacent parts as components? (CAR 4b.305.)

Yes No

B. <u>Hazards to the Aircraft and its Occupants</u>

(1) Is the battery container or compartment vented in such a manner that any gases or fumes emitted by the battery are carried outside the airplane? (CAR 4b.625(d).)

Yes No

(2) Are the parts of the airplane adjacent to the battery protected against corrosion from any products likely to be emitted by the battery during servicing or flight? (CARs 4b.625(d), 4b.304(b).)

Yes No

(Methods which may be used to obtain protection include: acid proof paint which will resist corrosion by emitted electrolyte, drains to discharge corrosive liquids clear of the aircraft, positive pressure vents to carry corrosive fumes outside the aircraft, enclosed battery cases which would contain any amount of electrolyte that might be spilled, or combinations of these methods.)

(3) Is adequate provision made for the drainage of spilled or excess battery fluid? (CAR 4b.625(d).)

Yes No

C. Operation Aspects

None

D. Detail Design Standards

None

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 4b or CAR 4a-T.

January 15, 1959
ACCS - 30

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Generator Installations - CAR 4b Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

   4b.305 Inspection Provisions
   4b.477 Powerplant Accessories
   4b.606 Equipment, Systems, and Installations
   4b.621 Electrical System Capacity
   4b.622 Generating System
   4b.624 Electrical Protection

   Generator installations which are the same as those made by the airframe manufacturer, or other installations which are already approved, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List:

   A. Structural Requirements

      (1) When the generator is mounted on an engine accessory pad, is its overhang moment within the rating of the pad? (CAR 4b.477(a).) (Maximum overhang moments for engine accessory drive pads are normally listed on the engine specifications.)

      Yes No

   B. Hazard to the Aircraft or its Occupants

      (1) When the generator is mounted on an engine accessory pad, is the maximum continuous torque load on the drive shaft within the rating of the pad? (CAR 4b.477(a).) (The maximum continuous torque rating of the pad is normally listed on the engine specification. To determine the maximum continuous torque applied by direct current generators, use the following formula:

$$T = \frac{8460\ VI}{eS_L}$$

      Where T = maximum continuous torque (in pound-inches)
      V = regulated system voltage (volts)
      I = rated generator current (amperes)

e = generator efficient (percent); 60% should be used unless generator manufacturer's data shows higher value.

S_L = lowest generator speed (RPM) at which rated generator current and voltage can be maintained.

Yes No

(2) When the generator is mounted on an engine accessory pad, is the shear section on the generator such that it will fail at a torque lower than the maximum static torque of the engine pad? (CAR 4b.477(a).) (The maximum static torque for accessory pads is normally listed in the engine specifications.)

Yes No

(3) Does the rated continuous rotational speed of the generator correspond approximately with drive shaft RPM when the engine is operated at cruise RPM? (CAR 4b.477(a).)

Yes No

(4) Is the generator installed so as to minimize the possibility that arcing or sparks may come in contact with flammable fluids or vapors in a free state? (CAR 4b.477(b).)

Yes No

(5) Is the generating system (including regulators and controls) so designed that no probable malfunction can result in permanent loss of electrical service to utilization systems which are necessary to maintain controlled flight or effect a safe landing? (CAM 4b.622-1(b) and (c).)

Yes No

(6) Is the generating system provided with a device which will disconnect a generator which produces hazardous overvoltage? (CAR 4b.624(b).) (By hazardous overvoltage is meant an overvoltage of such magnitude and duration as could render essential electrical equipment inoperative.)

Yes No

C. Operating Aspects

(1) Are the generators so rated and distributed among the engines that the electric power system is capable of supplying (in probable operating combinations and for probable durations) (a) all loads connected to the system with the system functioning normally? (b) all essential loads after failure of any one engine, generator or storage battery? (c) all essential loads after failure of any two engines on four-or-more-engine airplanes? CARs 4b.606(c), 4b.622(b).)

Yes No

Note: A load is defined as essential when its functioning is necessary in showing compliance with the regulations (CAR 4b.606(c)). Load reduction is permissible if the generator(s) can safely handle any temporary overload condition and if the crew is warned that partial electric power system failure has occurred (CAM 4b.622-1). If a particular load is not required to maintain controlled flight, it need not be considered as an essential load in condition (c) above. (CAR 4b.606(c)(4).)

(2) Are accessible controls provided to permit independent disconnection of each generator from the electric power system during flight? (CAR 4b.622(b).)

Yes No

(3) Are the generator controls (provided in (2) above) so grouped so as to permit expeditious disconnection of all generators? (CAR 4b.622(b).)

Yes No

(4) Are means provided to indicate to appropriate crew members those generating system quantities which are essential for the safe operation of the system? (For direct current systems, the voltage and current supplied by each generator are considered essential.) (CAR 4b.622(d).)

Yes No

D. Detail Design Standard

(1) Is the generator capable of withstanding the probable

extremes in environmental conditions to which it will be subjected? (CAR 4b.625.)

Yes No

Environmental conditions which should be considered would include vibration, temperature, altitude, and cooling.

(2) Is the generator installed so as to permit inspection of the condition of the brushes and wiring terminals without removal of adjacent equipment? (CAR 4b.305.)

Yes No

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 4b or CAR 4a-T.

January 15, 1959
ACCS - 31
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Instrument Installations - Adding Instruments, CAR 4b Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

4b.200 Loads
4b.354 Instrument Arrangement
4b.355 Instrument Markings
4b.601 Functional and Installatior Requirements - Equipment
4b.606 Equipment, Systems, and Installations
4b.611 Arrangement and Visibility of Instrument Installations
4b.612 Flight and Navigation Instruments
4b.613 Powerplant Instruments
4b.658 Vacuum Systems
4b.730 Markings and Placards
4b.731 Instrument Markings
4b.732 Air Speed Indicator
4b.733 Magnetic Direction Indicator
4b.734 Powerplant Instruments
4b.735 Oil Quantity Indicator
4b.736 Fuel Quantity Indicator

2. Check List:

A. Structural Requirements:

(1) If holes are added to instrument panel, is the structural integrity of the panel or its supporting structure impaired? (CAR 4b.200.)

Yes No

Note: This may normally be determined by a visual check. If the panel or its supporting structure is an integral part of the airplane structure, caution should be used in the evaluation.

B. Hazards to the Aircraft or its Occupants:

(1) If powerplant instruments are added, are their lines which carry inflammable fluids and gases under pressure provided with restricted orifices or other safety devices at the source of pressure to prevent excessive escape of fluid or gas in case of line failure?

(CARs 4b.432 and 4b.613.)

Yes No

C. Operation Aspects:

(1) Are added flight, navigation and powerplant instruments installed in such a manner that they are easily visible for use by the pilot? (CAR 4b.611(a), (b), (c), and (e).)

Yes No

(2) Are added identical powerplant instruments so located as to prevent any confusion as to the engines to which they relate? (CAR 4b.611(d).)

Yes No

(3) Is the added magnetic compass installed in the aircraft so that its accuracy is not affected excessively by vibration and transient magnetic fields? (CAR 4b.612(c).)

Yes No

(4) Is the added magnetic compass compensated for deviation error not exceeding plus or minus 10 degrees on any heading in level flight? (CAR 4b.612(c).)

Yes No

(5) If a magnetic compass is added, is a placard installed with the compass deviation error recorded? (CARs 4b.612(c) and 4b.733.)

Yes No

D. Detail Design Standards:

(1) Are the instrument panel vibration characteristics so as not to impair the accuracy of added instruments? (CAR 4b.612(f).)

Yes No

(2) Are the applicable instrument connector tubings, flexible lines, electrical conductors, and cables to the added

instruments considered satisfactory to perform their installations satisfactorily? (CARs 4b.432, 4b.606, 4b.612(b), (e), (f), and 4b.613(a).)

Yes No

(3) Are instruments properly range marked or placarded? (CARs 4b.730, 4b.731, 4b.732, 4b.733, 4b.734, 4b.735, and 4b.736.)

Yes No

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 4b or CAR 4a-T.

January 21, 1959
ACCS - 32
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Radio Racks and Radio Equipment Installation - CAR 4b Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

4b.18 Approval of Materials, Parts, Processes and Appliances
4b.101 Weight Limitations
4b.102 Center of Gravity Limitations
4b.200 Loads
4b.201 Strength and Deformation
4b.202 Proof of Structure
4b.210 - .216 Flight Loads
4b.230 - .236 Ground Loads
4b.260 Emergency Landing Conditions
4b.301 Materials
4b.302 Fabrication Methods
4b.303 Standard Fastenings
4b.304 Protection
4b.305 Inspection Provisions
4b.306 Material Strength Properties and Design Values
4b.606 Equipments, Systems, and Installations
4b.621 Electrical System Capacity
4b.624 Electrical Protection
4b.650 Radio and Electronic Equipment

Radio racks and radio equipment installations which are the same as those made by the airframe manufacturer, or other installations which are already approved, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory:

2. Check List:

A. Structural Requirements

(1) Is the equipment installed in such a manner that it can withstand the required loads? (CARs 4b.200, 4b.201, 4b.202, 4b.210-.216, 4b.230-.236, 4b.260.)

Yes No

Note: See item (4) below.

(2) Do shock mounted items have sufficient clearance for normal vibration and swaying of the equipment without hitting adjacent equipment or parts of the airplane? (CAR 4b.606)

Yes No

(3) Are junction boxes of sufficiently rigid construction to prevent "oil-canning" of the sides to avoid possibility of inside shorting? (CARs 4b.200, 4b.201, 4b.606.)

Yes No

(4) Is the structure of the radio rack adequate to support the required loads? The effect on other structure (either primary or secondary) should be considered. (CARs 4b.200, 4b.201, 4b.202, 4b.210-.216, 4b.230-.236, 4b.260.)

Yes No

This answer can be determined by either of two methods:

1. By direct comparison with an existing approved installation having the same or similar (approximately the same weight, size, and arrangement) equipment installed.

2. By structural analysis or static test. Such installations do not necessarily lend themselves to analysis but are adaptable to static test. In conducting the test, the following procedure may be used:

   a. Determine the wt. and c.g. position of the equipment item.

   b. Mount the rack either in its position in the airplane or in a rig simulating the actual installation insofar as attachments to the airplane are concerned.

   c. Dummy equipment or a rig simulating the equipment items should be installed utilizing the attaching points to which the equipment is to be attached. The dummy equipment or rig should be so that the required loads can be applied at the c.g. position of the actual equipment.

   d. The required loads should then be applied by any suitable means.

All items of mass which would be apt to injure the passengers or crew in the event of a crash landing should have their supporting structure designed to the crash load requirements of CAR 4b.260 or the applicable critical flight or landing load factors of CARs 4b.210-.216, 4b.230-.236, whichever is greater.

Supporting structure of other mass items should be designed to the critical flight or landing load factors of CARs 4b.210-.216 or 4b.230-.236. The values shown in CAR 4b.260 may be used in lieu of a determination of these values.

(5) Are suitable materials used in the construction, including standard fasteners, and will the method of fabrication result in a consistently sound structure? (CARs 4b.301, 4b.302, 4b.303, 4b.306, 4b.18.)

Yes No

B. Hazards to the Aircraft or its Occupants:

(1) Is the rack installed so that it does not adversely affect other structure (either primary or secondary or cause interference with any controls, emergency exits, or necessary access provisions? (CAR 4b.606.)

Yes No

(2) Will the installation of the rack and related equipment adversely affect weight and balance and c.g. position? (CARs 4b.101, 4b.102.)

Yes No

(3) Is a fuse or circuit breaker of the rating appropriate to the cable used installed? (CAR 4b.623.)

Yes No

C. Operating Aspects:

(1) In the case of dual installations, are the operating controls and instruments suitably identified to prevent misapplication by the pilot? (CAR 4b.606.)

Yes No

(2) Have the necessary operational tests been performed to assure that the equipment will not adversely affect the operation of other communication or navigation systems? (CAR 4b.650.)

Yes No

D. Detail Design Standards:

(1) Is the battery-generator combination adequate for the electrical loads imposed? (CARs 4b.606, 4b.621.)

Yes No

(2) Are terminal strips designed or mounted so that loose metallic objects cannot fall across the terminal posts? (CAR 4b.606.)

Yes No

(3) If plug and receptacle type of connections are used, are the soldered connections of the wire to the plug and receptacle inserts individually insulated from each other and from metallic parts of the plug and receptacle? (CAR 4b.606.)

Yes No

(4) Are junction boxes made of fire-resistant or nonabsorbent plastic material? (CAR 4b.606.)

Yes No

(5) Are interconnecting wires and cables supported by insulated clamps to avoid chafing? (CAR 4b.606.)

Yes No

(6) Are the interconnecting cables and wires installed in such a manner that they are suitably protected from fuel, oil, water, and other detrimental substances, and mechanical damage? (CAR 4b.606.)

Yes No

(7) Is the equipment located where it will obtain sufficient cooling and will not be a smoke hazard or ignite readily flammable parts of the airplane? (CAR 4b.606.)

Yes No

(8) Are adequate means provided for inspection of the rack, related equipment, or adjacent components which require periodic inspections? (CAR 4b.305.)

Yes No

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 4b or CAR 4a-T.

January 21, 1959
ACCS - 33

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Radio Antenna Installations - CAR 4b Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

   4b.190 Flutter and Vibration
   4b.200 Loads
   4b.308 Flutter, Deformation, and Vibration
   4b.601 Functional and Installation Requirements
   4b.606 Equipment, Systems, and Installation
   4b.612 Flight and Navigational Instruments
   4b.650 Radio and Electronic Equipment

   Radio antenna installations, when made the same as installations by the airframe manufacturer or other installations which are already approved, may be accepted without further investigation. When installations are not the same as ones already approved, the following points should be checked to determine that they are satisfactory.

2. Check List:

   A. Structural Requirements:

      (1) Is the installation structurally adequate? (CARs 4b.200, 4b.601, 4b.650.)

      Yes No

      Note: The information contained in CAM 18 for the installation of anticollision lights may be used for guidance in this evaluation. Extreme caution should be used in evaluating installations involving the cutting of primary structure, particularly where the pressurized portion of the aircraft is affected. Manufacturers' maintenance or repair manuals may be of some assistance in evaluating the significance of the structure affected. Once it is established that the point of installation is satisfactory, the effect of airloads and possible vibration of the antenna itself should be considered. If the antenna is of the stub or mast type, this can usually be evaluated by grasping the antenna and tugging on it to ascertain that the installation is reasonably rigid. Vibration characteristics can be ascertained by observation during engine operation on the ground and a flight check up to at least Vne.

(2) Will the installation affect the flutter and vibration characteristics of the aircraft? (CARs 4b.190, 4b.308.)

Yes

Note: The regional engineering service representative should be contacted for assistance in this evaluation, particularly for those installations involving the fin, rudder, or top of the fuselage just forward of the fin.

B. Hazards to the Aircraft or its Occupants:

(1) Is the antenna mounted so as not to obstruct instrument pitot and static source areas? (CARs 4b.606, 4b.612.)

Yes No

(2) Is the attachment of the antenna adequate to prevent its dislodgment with possible damage to airplane surfaces? (CAR 4b.606.)

Yes No

(3) Is the antenna installed so that it does not adversely affect other structure (either primary or secondary) or cause interference with any controls, emergency exits, or necessary access provisions? (CAR 4b.606.)

Yes No

C. Operating Aspects:

(1) Have the necessary operational tests been performed to assure that the equipment will not adversely affect the operation of other communication or navigation systems? (CARs 4b.601, 4b.606.)

Yes No

D. Detail Design Standards:

None.

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 4b or CAR 4a-T.

January 15, 1959
ACCS - 34

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Installations or Modifications of Windshields in Non-Pressurized Aircraft (CAR 3) (See Note 1)

GUIDELINES:

1. Applicable CARs:

   3.171 Loads
   3.174 Proof of Structure
   3.181-3.191 Flight Loads
   3.241-3.257 Ground Loads
   3.292 Materials and Workmanship
   3.293 Fabrication Methods
   3.294 Standard Fastenings
   3.301 Material Strength Properties & Design Values
   3.382 Vision
   3.383 Windshields, Windows and Canopies

   These guidelines are applicable to windshields in non-pressurized airplanes. Windshield installations which are the same as those made by the airframe manufacturer or other installations on the same type aircraft which are already approved, may be accepted without further investigation. Caution should be used in making such an evaluation in that hidden details may affect such installations to a considerable extent, such as the method of containing the glass or plastic. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List:

   A. Structural Requirements:

      (1) Can the windshield and its supporting structure support the required loads? (CARs 3.171, 3.174, 3.181-3.191, and 3.241-3.257.)

      Yes No

      Note: Installations involving merely replacement of plastic material with another material of the same dimensions and type may be accomplished in accordance with CAM 18.30-10. Glass windshield replacements should be evaluated as outlined below.

If the installation involves modification of the basic aircraft structure, a change (i.e., plastic to glass) in the material, material thickness, or the method of mounting the transparent material, extreme caution should be used in the evaluation. Simple changes or modifications where it can be determined that equivalent or better structure has been installed may be accepted after satisfactory completion of a dive test to V_D. This test should be conducted with caution and the speed V_D approached in increments.

If some doubt exists or if the installation is quite complex, then the Engineering Service Representative should be contacted.

B. Hazards:

(1) If glass is used, is it a nonsplintering safety type? (CAR 3.383.)

Yes No

C. Operating Aspects:

(1) Is the pilot's view through the windshield undistorted, sufficiently extensive and clear for safe operation of the airplane, particularly during a moderate rain condition? (CAR 3.382.)

Yes No

Note: CAM 3.382-1 and -2 should be reviewed in this evaluation. For aircraft intended for night operation a flight test is required. (CAR 3.382.)

D. Detail Design Standards:

(1) Are the materials used suitable for the purpose intended, and are they approved? Will the method of fabrication result in a consistently sound structure? Are standard fasteners used? (CARs 3.292, 3.293, 3.294, 3.301.)

Yes No

Note: Caution should be used in mounting glass or plastic windshields due to the difference between their thermal coefficient of expansion and that of metals. The material contained in CAM 18.30-10 should be reviewed in this respect.

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

January 21, 1959
ACCS - 35

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Instrument Installations - Relocating Instruments, CAR 4b Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

4b.200 Loads
4b.354 Instrument Arrangement
4b.355 Instrument Markings
4b.601 Functional and Installational Requirements - Equipment
4b.606 Equipment, Systems, and Installations
4b.611 Arrangement and Visibility of Instrument Installations
4b.612 Flight and Navigation Instruments
4b.613 Powerplant Instruments
4b.658 Vacuum Systems
4b.730 Markings and Placards
4b.731 Instrument Markings
4b.732 Air Speed Indicator
4b.733 Magnetic Direction Indicator
4b.734 Powerplant Instruments
4b.735 Oil Quantity Indicator
4b.736 Fuel Quantity Indicator

Relocated instrument installations which are the same as those made by the airframe manufacturer or other installations which are already approved, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List:

A. Structural Requirements

(1) If holes are added to the instrument panel, is the structural integrity of the panel or its supporting structure impaired? (CAR 4b.200.)

Yes No

Note: This may normally be determined by a visual check. If the panel or its supporting structure is an integral part of the airplane structure, caution should be used in the evaluation.

B. Hazards to the Aircraft or its Occupants

(1) If powerplant instruments are relocated, are their lines which carry inflammable fluids and gases under pressure provided with restricted orifices or other safety devices at the source of pressure to prevent excessive escape of fluid or gas in case of line failure? (CARs 4b.432 and 4b.613.)

Yes No

C. Operation Aspects

(1) Are relocated flight, navigation and powerplant instruments installed in such a manner that they are easily visible for use by the pilot? (CARs 4b.611(a), (b), (c), and (e).)

Yes No

(2) Are relocated identical powerplant instruments on multiengine aircraft so located as to prevent any confusion as to the engines to which they relate? (CAR 4b.611(d).)

Yes No

(3) Is the relocated magnetic compass installed so that its accuracy is not affected excessively by vibration and transient magnetic fields? (CAR 4b.612(c).)

Yes No

(4) Is the relocated magnetic compass compensated for deviation error not exceeding plus or minus ten degrees on any heading in level flight? (CAR 4b.612(c).)

Yes No

(5) If the magnetic compass is relocated, is a placard installed with the compass deviation error recorded? (CARs 4b.612(c) and 4b.733.)

Yes No

D. Detail Design Standards

(1) Are the instrument panel vibration characteristics such as not to impair the accuracy of relocated instruments? (CAR 4b.612(f).)

Yes No

(2) If powerplant instruments are relocated, are their lines installed and supported to prevent excessive vibration and to withstand loads due to accelerated flight conditions? (CAR 4b.613(a).)

Yes No

(3) If powerplant instruments are relocated, do instrument lines incorporate provisions for flexibility when the lines are connected to components of the airplane and relative motion could exist between airframe and instruments? (CAR 4b.613(a).)

Yes No

(4) If powerplant instruments are relocated, is the use of flexible hose avoided in locations where exposure to excessive temperatures might adversely affect the hose during operation or shutdown? (CAR 4b.613(a).)

Yes No

(5) If a fuel quantity indicator sight gauge is relocated, is it installed and guarded in a manner to preclude the possibility of breakage or damage? (CAR 4b.613(b)(2).)

Yes No

(6) If a relocated fuel sight gauge forms a trap in which water can collect and freeze, is a means provided to permit drainage on the ground? (CAR 4b.613(b)(2).)

Yes No

(7) Are the applicable instrument connector tubings, flexible lines, electrical conductors, and cables to relocated instruments considered satisfactory to perform their intended function and are their installations satisfactory? (CARs 4b.432, 4b.606, 4b.612(b), (e), (f), and 4b.613(a).)

Yes No

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 4b or CAR 4a-T.

January 21, 1959
ACCS - 36

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Buffet and Cabinet Installations - CAR 4b Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

4b.18	Approval of Material, Parts, Processes, and Appliances
4b.200	Loads
4b.201	Strength and Deformation
4b.202	Proof of Structure
4b.210-.216	Flight Loads
4b.230-.236	Ground Loads
4b.260	Emergency Landing Conditions
4b.301	Materials
4b.302	Fabrication Methods
4b.303	Standard Fastenings
4b.304	Protection
4b.305	Inspection Provisions
4b.306	Material Strength Properties and Design Values
4b.362	Emergency Evacuation
4b.601	Functional and Installation Requirements
4b.606	Equipment, Systems, and Installations
4b.625	Electrical Equipment and Installations
4b.741	Operating Limitations

Buffet and cabinet installations which are the same as those made by the airframe manufacturer or other installations which are already approved may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List

A. Structural Requirements

(1) Is the structure adequate to support the requir
(CARs 4b.200, 4b.201, 4b.202, 4b.210-.216, 4b.?
4b.260)

Yes No

This answer can be determined by either of

a. By direct comparison with an existing approved installation having the same or similar characteristics of weight, size and arrangement.

b. By structural analysis or static test. Structures, such as buffets and cabinets, do not lend themselves readily to analysis, but are normally adaptable to static test.

In conducting the static test the following procedure may be used:

(1) Determine the weight and center of gravity position of the complete assembly to be tested.

(2) Mount the unit either in its position in the airplane or in a rig simulating the actual installation insofar as attachments to the airplane are concerned.

(3) Dummy equipment items simulating the actual buffet units should be installed utilizing the attaching points by which the equipment is normally held in place. The dummy equipment should be so that the required loads can be applied at the c.g. position of the actual equipment.

(4) The required loads should then be applied by any suitable means.

All items of mass which would be apt to injure the passengers or crew in the event of a crash landing should have their supporting structure designed to the crash load requirements of CAR 4b.260. Other mass items should have their supporting structure designed to the critical load factors of 4b.210-.216 or 4b.230-.236. The load factors of 4b.260 may be used in lieu of these factors.

(2) Is the buffet or cabinet installed in such a manner so that it does not adversely affect other structure, either primary or secondary? (CAR 4b.202)

Yes No

B. Hazards to the Aircraft or its Components

(1) As the result of the buffet or cabinet being installed, is the accessibility of the exits and doors adversely affected? (CAR 4b.362)

Yes No

(2) Will an occupant, when making proper use of the safety belt, receive possible serious injury during minor crash conditions as the result of contact of his body with protruding or penetrating parts of the buffet or cabinet? (CAR 4b.260)

Yes No

(3) Is the installation and surrounding area suitably protected to prevent corrosion resulting from spillage of corrosive liquids in the vicinity of the buffet? (CAR 4b.304)

Yes No

C. Detail Design Standards

(1) Will the installation of the buffet or cabinet, and their contents, adversely affect the weight and balance of the airplane? (CAR 4b.741(c).)

Yes No

(2) Are the locks and catches on each of the doors adequate to retain the buffet units stored within during emergency landing and severe gust conditions? (CAR 4b.201)

Yes No

(3) Are the materials used suitable for the purpose intended and the method of fabrication such that it will result in a consistently sound structure? (CAR 4b.303, 4b.306, 4b.18, 4b.301, 4b.302)

(4) Are satisfactory inspection means provided for the installation and the surrounding area? (CAR 4b.305)

Yes No

The electrical aspects of these installations will be covered in another ACCS.

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 4b or CAR 4a-T.

January 21, 1959
ACCS - 37

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Motor and Dynamotor Installations - CAR 4b Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

4b.18 Approval of Materials, Parts, Processes and Appliances
4b.200 Loads
4b.201 Strength and Deformation
4b.202 Proof of Structure
4b.210-.216 Flight Loads
4b.230-.236 Ground Loads
4b.260 Emergency Landing Conditions
4b.301 Materials
4b.302 Fabrication Methods
4b.303 Standard Fastenings
4b.304 Protection
4b.305 Inspection Provisions
4b.306 Material Strength Properties and Design Values
4b.385 Flammable Fluid Fire Protection
4b.606 Equipment, Systems, and Installations
4b.624 Electrical Protection
4b.625 Electrical Equipment and Installations
4b.626 Electrical System Fire and Smoke Protection

Motor or dynamotor installations which are the same as those made by the airframe manufacturer, or other installations which are already approved, may be accepted without further investigation. On other installations the following points should be checked to determine that the installation is satisfactory:

2. Check List:

A. Structural Requirements:

(1) Is the equipment installed in such a manner that the installation can withstand the required loads? The effect on other structure (primary or secondary) should be considered. (CARs 4b.200, 4b.201, 4b.202, 4b.210-.216, 4b.230-.236, 4b.260).

Yes No

Note: This answer can be determined by a direct comparison with an existing approved installation having the same or similar (approximately same weight and size) equipment installed, by structural analysis, or by static test.

Such installations do not necessarily lend themselves to analysis but are adaptable to static test. In conducting this test, the following procedure may be used:

(1) Determine the weight and c.g. of the equipment.

(2) Mount the equipment in the position in the airplane or simulate the equipment with a dummy so that the required loads can be applied at the c.g. position of the actual equipment.

(3) The required loads should then be applied by any suitable means. If the equipment is light in weight, the inspector could use his own strength and/or weight to determine that the installation will withstand the required loads.

All items of mass which would be apt to injure the passengers or crew in the event of a crash landing should have their supporting structure designed to the crash load requirements of CAR 4b.260 or the applicable critical flight or landing load factors of CAR 4b.210-.216 or 4b.230-.236, whichever is greater.

Supporting structure of other mass items should be designed to the critical flight or landing load factors of CAR 4b.210-.216 or 4b.230-.236. The values shown in CAR 4b.260 may be used in lieu of a determination of these values.

(2) Are suitable materials used in the construction, including standard fasteners, and will the method of fabrication result in a consistently sound structure? (CARs 4b.301, 4b.302, 4b.303, 4b.306, 4b.18).

Yes No

(3) Are means provided to permit proper inspections of the installation and related or adjacent parts and components? (CAR 4b.305).

Yes No

B. Hazards to the Aircraft and its Occupants:

(1) Is a fuse or circuit breaker of the appropriate rating installed in the connecting cables? (CAR 4b.624(a).)

Yes No

(2) If a circuit breaker is installed, is it of a type which will open the circuit irrespective of the position of the control in case of a fault? (CAR 4b.624(c).)

Yes No

(3) If the motor or dynamotor performs a function essential to safety, is its circuit protective device (fuse or circuit breaker) located so that it is accessible for replacement or resetting in flight? (CAR 4b.624(d).)

Yes No

(4) Are any connecting cables which are necessary in emergency procedures, and located in designated fire zones, fire-resistant? (CAR 4b.626 and CAM 4b.626-1).

Yes No

An accepted criterion for "fire-resistant" is that the cable should withstand a 2000°F. oxidizing flame impinging on its surface for at least 5 minutes without adverse effect on the circuit function. The 2000°F. oxidizing flame should envelop at least a 12 inch section of the cable, using a test setup simulating the actual aircraft installation. Thermocouples for measurement of flame temperature should be located within one-fourth inch of the surface exposed to the flame.

(5) If the motor or dynamotor is located in areas of the airplane where flammable fluids or vapors might be liberated by leakage or failure in fluid systems, are design precautions made to either prevent ignition of such fluids (due to operation of the motor or dynamotor) or to control any fire resulting from such ignition? (CARs 4b.385 and 4b.626).

Yes No

(6) If a probable malfunction in motor or dynamotor can generate hazardous quantities of smoke within the cabin, are adequate means provided to detect the faulty machine and to disconnect it from the source of power? (CAM 4b.606-1(f).)

Yes No

C. Operation Aspects:

None.

D. Detail Design Standards:

(1) If the motor or dynamotor performs a function which is essential to safety, will this function be performed reliably under all reasonably foreseeable environmental conditions? (CARs 4b.606(a) and 4b.625).

Yes No

Note: Environmental conditions may include extremes of temperature, pressure, humidity, ventilation, position, acceleration, vibration and presence of detrimental substances.

(2) Are adequate means provided to examine the equipment to determine brush condition and for lubrication, if required? (CAR 4b.305).

Yes No

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 4b or CAR 4a-T.

January 21, 1959
ACCS - 38

(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Engine Lubricating Oil Filter Installation - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

3.171	Loads
3.570	Oil system lines, fittings, and accessories
3.573	Oil filters
3.574	Oil system drains
3.615	Exhaust system, general
3.638	Lines and fittings
3.671	Instrument lines

Engine lubricating oil filters designed to remove solid particles and other contaminants from the oil during circulation are of two general types: (a) full flow filters in which the entire flow of oil passes through the filter, and (b) bypass filters in which a small portion of the total oil flow is diverted through the filter and returned to the engine sump or oil tank.

The installation of an oil filter shall not be a substitute for the engine screen, strainer, or cleaner provided by the engine manufacturer, unless the installation has been evaluated by the engine manufacturer and found to provide equivalent or better protection. Oil filter installations approved on an STC have been coordinated with the engine manufacturer and are acceptable in lieu of the engine screen. Filter installations which are the same as those made by the engine or aircraft manufacturer, or other installations which are already approved for a particular model of aircraft or engine, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List:

A. Structural Requirements:

(1) If the filter housing is mounted on existing structure or on a bracket attached to such structure, is all of the structure adequate to support the required loads? (CAR 3.171)

Yes No

B. Hazards to the Aircraft and its Occupants:

(1) Is the pressure line to the filter* provided with a restricted orifice at the point of pressure takeoff at the engine, to minimize escape of oil in case of connecting line failure? (CAR 3.671)

Yes No

*This applies to a bypass filter only, since a restricted orifice would prevent the proper oil flow rate through a full flow filter.

(2) Are the filter and connecting lines installed away from or under the exhaust system, to minimize the possibility of oil leakage contacting the exhaust manifold? (CAR 3.615)

Yes No

C. Operating Aspects:

(1) Does an investigation, at all power ratings, of the engine oil pressure prior to and subsequent to the filter installation indicate that there is no difference in engine oil pressure? (CAR 3.573)

Yes No

D. Detail Design Standards:

(1) If the filter is mounted in the engine compartment, are the lines and fittings (which are under pressure, or which attach directly to the engine, or which are subject to relative motion between components) flexible, fire-resistant lines with fire-resistant end fittings of the permanently attached, detachable or other approved type? (CARs 3.570 and 3.638)

Yes No

(2) Is the filter* constructed so that complete stoppage of flow through the filter element will not jeopardize the continued operation of the engine oil supply system? (CAR 3.573)

Yes No

*Not a critical item for a bypass filter, since the oil circulation system will continue to function even if the filter is completely clogged. A full flow filter must be equipped with a flow relief valve that opens when a preset differential pressure across the filter element is exceeded. This condition will exist for starting when the oil is cold and, also, when the service life of the filter element is reached and no additional solids can be retained by the filter element.

(3) Has the filter been substantiated for the pressure to which it will be subjected when installed? (CAR 3.573)

Yes No

(4) If the filter housing is equipped with a drain, does the drain plug or valve incorporate means for positive locking or safetying? (CAR 3.574)

Yes No

(5) If the filter housing is equipped with a removable cover, does the cover wing nut or bolt incorporate means for locking after tightening? (CAM 18.30-6)

Yes No

Note 1: The data herein reflects the requirements of CAR 3 in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

December 5, 1958
ACCS - 39
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Interior Light Installations-CAR 4b Aircraft
(See Note 1)

GUIDELINES:

1. Applicable CAR's

4b.601 Functional and installational requirements
4b.606 Equipment, systems, and installations
4b.621 Electrical system capacity
4b.624 Electrical protection
4b.625 Electrical equipment and installations
4b.627 Electrical system tests and analyses
4b.630 Instrument lights

Interior light installations which are the same as those made by the airframe manufacturer or other installations which are already approved, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List:

A. Structural Requirements:

Note: Caution should be used in attaching lights, receptacles or wire bundles to primary structure. Holes or notches may have an adverse effect on the structural integrity and should be judiciously placed.

B. Hazards to the Aircraft or its Occupants:

(1) Are the instrument lights and other interior lights of such design that there is sufficient distance or insulating material between current carrying parts and the housing so that vibration in flight will not cause shorting? (CAR 4b.606).

Yes No

(2) Are the interior lighting fixtures so installed that a probable malfunction will not expose the crew or passengers to harmful electric shock? (CAR 4b.606-1).

(3) Are the instrument lights and other cabin lights so installed that their direct rays (or reflected rays from the windshield or other surfaces) are shielded from the pilot's eyes? (CAR 4b.630).

(4) Are interior lighting fixtures so installed that lamps do not come in close proximity with combustibles such as interior trim or baggage? (CAR 4b.606-1).

Yes No

(5) Is a fuse or circuit breaker, of appropriate rating to protect the cable, installed in the lighting circuit? (CAR 4b.624).

Yes No

(6) If a circuit breaker is used, is it of a type which will open the circuit irrespective of the position of the control in case of a fault? (CAR 4b.624).

Yes No

C. Operating Aspects:

(1) Are the instrument lights so installed that they provide sufficient illumination to make all instruments and switches easily readable? (CAR 4b.630).

Yes No

(2) Is a means of controlling the intensity of the instrument lights provided, except where it can be shown that nondimmed lights are satisfactory under all expected conditions of flight? (CAR 4b.630).

Yes No

(3) Are all interior lighting switches (which are significant to safety) readily accessible to the crew and suitably labeled as to operation and function performed? (CAR 4b.601).

Yes No

D. Detail Design Standards:

(1) Are all lighting fixtures and cables capable of withstanding critical environmental conditions? (Cable conforming to Military Specification MIL-W-5086 or the equivalent is acceptable). (CAR 4b.625).

Yes No

(2) Are all lights and cables so installed that the operation of any one unit or system of units will not affect adversely the simultaneous operation of any other electrical unit or system or units essential to the safe operation of the airplane? (CAR 4b. 625).

Yes No

(3) Is the electric power system capable of supplying the added lighting load without electrical or thermal distress?

This may be determined by revision of the original load analysis, conducting a new load analysis, or by actual flight or ground tests. In any case, it should be determined that the system is not overloaded. (CAR 4b.606(c), 4b.621, 4b.627).

Yes No

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 4b or 4a-T.

December 5, 1958
ACCS - 40
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Appliance Outlet Installations-CAR 4b Aircraft
(See Note 1)

GUIDELINES:

1. Applicable CAR's

4b.606 Equipment, systems, and installations
4b.621 Electrical system capacity
4b.624 Electrical protection
4b.625 Electrical equipment and installations
4b.627 Electrical system tests and analyses

Appliance outlet installations which are the same as those made by the airframe manufacturer or other installations which are already approved may be accepted without further investigations. On other installations, the following points would be checked to determine that the installation is satisfactory.

2. Check List:

A. Structural Requirements:

Note: Caution should be used in attaching outlets or wire bundles to primary structure. Holes or notches may have an adverse effect on the structural integrity and should be judiciously placed.

B. Hazards to the Aircraft or its Occupants:

(1) Is a fuse or circuit breaker, of appropriate rating to protect the cable, installed in the circuit to the outlet receptacle? (CAR 4b.624).

Yes No

(2) If a circuit breaker is used, is it of a type which will open the circuit irrospective of the position of the control in case of a fault? (CAR 4b.624).

Yes No

(3) Is the outlet receptacle capable of transmitting full outlet current (fuse or circuit breaker rating) without overheating? (CAM 4b.606-1 (f).

Yes No

C. Operating Aspects:

(1) Is the appliance outlet identified as to function and as to system voltage, frequency (if alternating current), and maximum current? (CAR 4b.606).

Yes No

D. Detail Design Standards:

(1) Are all items of equipment used in connection with the outlet capable of withstanding critical environmental conditions? (Cable conforming to Military Specification MIL-W-5086 or the equivalent is acceptable.) (CAR 4b.621).

Yes No

(2) Are the cables to the appliance outlet and the receptacle itself installed in such a manner that use of the outlet will not affect adversely the simultaneous operation of any other electrical unit or system of units essential to the safe operation of the airplane? (CAR 4b.625).

Yes No

(3) Is the electric power system capable of supplying the added appliance outlet load (assuming full rating) without electrical or thermal distress? This may be determined by revision of the original load analysis, conducting a new load analysis, or by actual flight or ground tests. In any case, it should be determined that the system is not overloaded. (CAR 4b.606(c), 4b.621, 4b.627).

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 4b or CAR 4a-T.

December 5, 1958
ACCS - 41
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Buffet Installation (Electrical Portion)- CAR 4b Aircraft (See Note 1)

GUIDELINES

1. Applicable CAR's (Electrical Portion Only):

   4b.606 Equipment, systems, and installations
   4b.621 Electrical system capacity
   4b.624 Electrical protection
   4b.625 Electrical equipment and installations
   4b.627 Electrical system tests and analyses

2. Check List:

   A. Structural Requirements:

      None. (See ACCS on Buffet Installation.)

   B. Hazards to the Aircraft or its Occupants:

      (1) Is a fuse or circuit breaker, of appropriate rating to protect the cable, installed in the circuits to the buffet? (CAR 4b.624).

      Yes No

      (2) If a circuit breaker is used, is it of a type which will open the circuit irrespective of the position of the control in case of a fault? (CAR 4b.624).

      Yes No

      (3) Is the buffet electrical equipment so installed that a probable malfunction will not expose the crew or passengers to harmful electric shock? (CAR 4b.606-1).

      Yes No

   C. Operating Aspects:

      None

   D. Detail Design Standards:

      (1) Are the electric cables to the buffet installed in such a manner that they are suitably protected from spillage of liquids or other detrimental substances? (CAR 4b.625).

      Yes No

(2) Are the electrical cables and the electrical components of the buffet installed in such a manner that operation of any one unit or system of units will not affect adversely the simultaneous operation of any other electrical unit or system of units essential to the safe operation of the airplane? (CAR 4b.625).

Yes No

(3) Is the electric power system capable of supplying the added maximum buffet load without electrical or thermal distress? This may be determined by revision of the original load analysis, conducting a new load analysis, or by actual flight or ground tests. In any case, it should be determined that the system is not overloaded. (CAR 4b.606(c), 4b.621, 4b.627).

Yes No

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 4b or CAR 4a-T.

December 19, 1958
ACCS - 42
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Landing Light Installations - CAR 4b Aircraft
(See Note 1)

GUIDELINES:

1. Applicable CAR's

4b.18 Approval of Materials, Parts, Processes and Appliances
4b.200 Loads
4b.201 Strength and Deformation
4b.202 Proof of Structure
4b.210-.216 Flight Loads
4b.230-.236 Ground Loads
4b.260 Emergency Landing Conditions
4b.301 Materials
4b.302 Fabrication Methods
4b.303 Standard Fastenings
4b.304 Protection
4b.305 Inspection Provisions
4b.306 Material Strength Properties and Design Values
4b.601 Functional and Installational Requirements
4b.606 Equipment, Systems and Installations
4b.621 Electrical System Capacity
4b.624 Electrical Protection
4b.625 Electrical Equipment and Installations
4b.627 Electrical System Tests and Analyses
4b.631 Landing Lights

Landing light installations which are the same as those made by the airframe manufacturer or other installations which are already approved, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory.

2. Check List:

A. Structural Requirements:

(1) Is the installation capable of withstanding the required loads? The effect on other structure (primary or secondary) should be considered. (CAR 4b.200, 4b.201, 4b.202, 4b.210-.216, 4b.230-.236, 4b.260).

Yes No

Particular care should be taken on the installation of landing lights since they are usually recessed into existing structure in the wing or fuselage. The leading edges of stress skinned wings are usually structural to a large degree and would be adversely affected by cutouts

which are not sufficiently or correctly reinforced. While the extreme nose sections of fuselage are usually not primary structure, care should be taken on these installations. It is recommended if there is any doubt as to whether the proposed installation in the wing or fuselage is affecting primary or secondary structure, that the Engineering Service Representative be contacted for assistance. It is further recommended if the structure is definitely primary that the ESR be contacted for assistance in the evaluation of the installation.

(2) Is the material used in the installations suitable for the purpose intended and is the workmanship of a high standard? (CAR 4b.18, 4b.301, 4b.306).

Yes No

(3) Will the fabrication methods used result in a consistently sound installation and are standard approved fasteners used? (CAR 4b.301, 4b.302, 4b.303).

Yes No

(4) Is adequate protection provided to protect against deterioration or loss of strength in service due to weathering, abrasion or other causes? Are adequate inspection means provided and will the installations have an adverse effect on the inspection provisions for other components of the aircraft? (CAR 4b.304, 4b.305).

Yes No

B. <u>Hazards to the Aircraft or its Occupants</u>:

(1) Are the landing lights so installed that there is no glare, reflection, or halation which would interfere with the pilot's vision during operation of the lights? (CAR 4b.631).

Yes No

Note: A night flight check should be performed to assure that no interference with pilot vision exists. Reflection from the propeller discs is particularly troublesome.

(2) Is a fuse or circuit breaker of appropriate rating to protect the cable installed in the landing light circuit? (CAR 4b.624).

Yes No

(3) If a circuit breaker is used, is it of a type which will open the circuit irrespective of the position of the control in case of a fault? (CAR 4b.624).

Yes No

(4) Are the cables to the landing lights so installed that damage to essential circuits will be minimized in the event of a fault in a landing light cable? (CAR 4b.625).

Yes No

C. Operating Aspects:

(1) Are the landing lights so installed that they provide sufficient illumination to permit safe landings during night VFR operations? (CAR 4b.631).

Yes No

Note: A nightflight check should be performed to check landing light effectiveness.

(2) Are the landing light switches readily accessible to the crew and suitably labeled as to operation and function performed? (CAR 4b.601).

Yes No

(3) Is a separate switch provided for each landing light? (CAR 4b.631).

Yes No

Note: If two or more lights are installed in each wing, a switch for each set of lights is acceptable.

(4) Is a means provided to indicate to the pilots when the landing lights are extended? (CAR 4b.631).

Yes No

D. Detail Design Standards:

(1) Are the landing lights and cables capable of withstanding critical environmental conditions? (Cable conforming to Military Specification MIL-W-5086 or the equivalent is acceptable.) (CAR 4b.625).

Yes No

(2) Are the landing lights and cables so installed and designed that operation of the lights will not affect adversely the operation of any other unit or system of units essential to the safe operation of the airplane? (CAR 4b.625).

Yes No

(3) Is the electric power system capable of supplying the added lighting load without electrical or thermal distress? This may be determined by revision of the original load analysis, conducting a new load analysis, or by actual flight or ground tests. In any case, it should be determined that the system is not overloaded. (CAR 4b.606(c), 4b.621, 4b.627).

Yes No

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 4b or CAR 4a-T.

April 9, 1959
ACCS - 43
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Gyroscopic Instrument System Installations, CAR 4b Aircraft (See Note 1)

GUIDELINES:

1. Applicable CAR's:

4b.200 Loads
4b.477 Powerplant Accessories
4b.603 Flight and Navigational Instruments
4b.611 Arrangement and Visibility of Instrument Installations
4b.612 Functional and Installational Requirements
4b.658(a) and (b) Vacuum Systems

Gyroscopic instrument installations which are the same as those made by the airframe manufacturer, or other installations which are already approved, may be accepted without further investigation. On other installations, the following points should be checked to determine that the installation is satisfactory:

2. Check List:

A. Structural Requirements:

If holes are added to the instrument panel, is the structural integrity of the panel or its supporting structure impaired? (CAR 4b.200).

Yes No

This may normally be determined by a visual check. If the panel or its supporting structure is an integral part of the airplane structure, caution should be used in the evaluation.

B. Hazards to the Aircraft or its Occupants:

1. None

C. Operation Aspects:

1. Do the instruments perform adequately the function for which they were intended? (CAR 4b.601).

Yes No

2. Are the instruments installed in such a manner that they are readily visible for use by the pilot? (CAR 4b.611).

Yes No

D. Detail Design Standards:

1. Is the power source of sufficient capacity to operate all of the air operated gyro instruments installed adequately during flight. (CAR 4b.612(e).

Yes No

2. Is an indicating means provided which will indicate that the instruments are receiving adequate suction for their required performance? (CAR 4b.612(e)).

Yes No

3. If the airplane is multiengine, does the suction air system provide satisfactory protection, in case of line breakage or leakage to an instrument, so as not to impair the performance of the other instruments? (CAR 4b.612(e)).

Yes No

4. Is the power supply of adequate capacity to operate all of the electrically operated gyro instruments installed? (CAR 4b.612(e)).

Yes No

5. Does the power failure warning indication provide adequate warning to indicate when proper power is not being received by the instruments? (CAR 4b.612(e)).

Yes NO

6. Is the power source circuitry such as not to impair the operation of the instruments should breakage of an electrical conductor to an instrument occur? (CAR 4b.612(e)),

Yes No

7. If the airplane is multiengine, are two completely independent power sources provided which are actuated by separate means? (CAR 4b.612(e)). Yes No

8. Is a positive means provided for selecting either power source? (CAR 4b.612(e)).

Yes No

9. Is a means provided for indicating the power source outputs? (CAR 4b.612(e)).

Yes No

10. Are the gyroscoptic instruments and their systems installed to preclude malfunctioning due to rain, oil, and other detrimental elements? (CAR 4b.612(e)).

Yes No

11. If an engine-driven suction air pump(s) is installed, is it compatible with the engine mounting pad and drive provided for such pumps? (CAR 4b.477).

Yes No

12. If an engine-driven suction air pump(s) is installed, are fire resistant flexible type pump connector lines provided? (CAR 4b.658(b)).

Yes NO

13. If an engine-driven suction air pump(s) is installed, is a means provided to automatically relieve unsafe air temperatures on the exhaust (high pressure) port side of the pump? (CAR 4b.658(a)).

Yes NO

14. If engine oil is used as a lubricant and seal in a suction air pump, is the exhaust (high pressure) port outlet connected directly to an air/oil separator with a fire resistant line? (CAR 4b.658(b)).

Yes No

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 4b or CAR 4a-T.

Equipment Group-FM
ACCS - 44
January 28, 1959
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: (a) Modification and/or (b) Installation of Seats-CAR 4b Aircraft

GUIDELINES: **(See Note 1)**

1. Applicable CAR's.

4b.18	Approval of Material, Parts, Processes, and Appliances
4b.101	Weight Limitations
4b.102	Center of Gravity Limitations
4b.200	Loads
4b.201	Strength and Deformation
4b.202	Proof of Structure
4b.260	Emergency Landing Conditions
4b.301	Materials
4b.302	Fabrication Methods
4b.303	Standard Fastenings
4b.304	Protection
4b.306	Material Strength Properties and Design Values
4b.358	Seats, Berths, and Safety Belts
4b.362	Emergency Evacuation
4b.381	Cabin Interiors
4b.601	Functional and Installation Requirements
4b.643	Safety Belts

Modification and/or installations of seats which are the same as those made by the manufacturer or other parties wherein previous approval has been obtained may be accepted without further investigation. When the modifications and/or installations are different from those previously approved, the following points are to be checked to assure satisfactory compliance.

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Seat Modification CAR 4b Aircraft

2. Check List

A. Structural Requirements

1. Is the structure of the modified seat adequate to support the required loads? (CAR 4b.200, 4b.201, 4b.202, 4b.260, 4b.358)

Yes No

This can be determined by one of the following methods:

a. By direct comparison with an existing approved modification which has the same or similar weight, size, and design.

b. By structural analysis or static test. Seat structures may not always lend themselves readily to analysis, but are normally adaptable to static test.

In conducting the static tests on the modified seats, the procedure as described in TSO-C25/C39 should be followed.

B. Hazards to Aircraft or its Occupants

1. Does the modification affect the amount of padding or cushioning material so that corners, fittings, knobs, or similar projections are more likely to cause serious injury by human impact? (CAR 4b.260)

Yes No

2. Does change in fabric or upholstery materials comply with flame-resistant requirements? (CAR 4b.381)

Yes No

3. Does change adversely affect operating mechanism or other subcomponent of seat, in that it may effect the safety of occupant? (CAR 4b.601)

Yes No

4. Does the modification affect weight and balance of aircraft (CAR 4b.101, 4b.102)

Yes No

AIRWORTHINESS COMPLIANCE CHECK SHEET

C. Detail Design Standards

1. Does change affect the strength of safety belt attachment? (CAR 4b.643)

Yes No

2. Does change to seat design or seat location have any affect regarding the access to emergency exit(s) or width of main passenger aisle? (CAR 4b.362)

Yes No

3. Are acceptable government and industry standards followed with respect to:
materials, fastenings, fabrication methods, protection of seat structure, and design criteria? (CAR 4b.301, 4b.302, 4b.303, 4b.304, 4b.306)

Yes No

Note: See also TSO C-39 or C-25

SUBJECT: Seat Installation-CAR 4b Aircraft

2. Check List

A. Structural Requirements

1. Is the seat to be installed an approved seat which complies with the requirements of TSO C-25 or C-39? (CAR 4b.18, 4b.358)

Yes No

2. If the seat has been manufactured to conform with TSO requirements, has the strength of seat attachment to structure been determined by using the factor of 1.33 times (multiplied by) the acceleration loads prescribed by CAR 4b. 260? (CAR 4b.358)

Yes No

3. If the seat does not have TSO approval and is thus being approved as part of the aircraft, is the seat structure and the strength of the seat attachment adequate to support the required loads? (CAR 4b.260, 4b.358)

Yes No

This can be determined by the application of loads as described in CAM 4b.358-1. In conducting the static tests on the seat and seat attachment to structure, the procedure as described in TSO-C25/-C39 should be followed.

B. Hazards to Aircraft or its Occupants

1. Does the seat installation create any hazard to other passengers or can it contribute to a serious injury in the event of a minor crash landing? (CAR 4b.260)

Yes No

2. Has it been demonstrated that the seat installation functions properly in the airplane? (CAR 4b.601)

Yes No

3. Has the weight and balance effect of the seat installation been considered? (CAR 4b.101, 4b. 102)

Yes No

4. Does seat installation have any adverse affect regarding the access to emergency exit (s) or width of the main passenger aisle? (CAR 4b.362)

Yes No

C. Detail Design Standards

1. If the seat does not have TSO approval, do the design standards comply with approved requirements? (CAR 4b.358)

Yes No

Note 1: The data herein reflects the requirements of CAR 4b in effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 4b or CAR 4a-T.

February 2, 1959
ACCS - 45
(Rev. 5/17/61)

AIRWORTHINESS COMPLIANCE CHECK SHEET

SUBJECT: Substitution of Fixed Pitch Metal Propeller for Fixed Pitch Wood Propeller - CAR 3 Aircraft (See Note 1)

GUIDELINES:

1. Applicable CARs:

3.416	Propellers
3.417	Propeller Vibration
3.418	Propeller Pitch and Speed Limitations
3.419	Speed Limitations for Fixed-Pitch Propellers, Ground Adjustable Propellers, and Automatically Varying Pitch Propellers which Cannot be Controlled In Flight
3.422	Propeller Clearance
CAM 3.444-1	Propeller Clearance on Tricycle Gear Airplanes
CAM 3.422-2	Propeller Clearance on Aircraft With Leaf Spring Type Shock Struts

2. Check List:

A. Structural

(1) Has the change been evaluated to determine to what extent the center of gravity of the airplane may be affected? (CAM 1.25-1(a) footnote 7)

Yes No

Note: Any increase in maximum weight or change in center of gravity limits must be referred to Regional Aircraft Engineering Office.

B. Hazards

(1) Does the propeller conform to the required ground and structural clearances? (CAR 3.422)

Yes No

C. Operational

(1) Are the static r. p. m. and diameter limits of the metal propeller within those limits already established for the wood propeller? (CAr 3.418)

Yes No

(2) Have any restrictions imposed against operation in a specific engine r. p. m. range been indicated, either by a red arc on the engine tachometer or by installing a placard? (CAR 3.759)

Yes No

D: Detail Design

(1) Has the propeller been certificated in accordance with CAR-14? (CAR 3.416)

Yes No

(2) Does the metal propeller have r. p. m. and power ratings equal to or greater than the engine? (CAR 3.416)

Yes No

(3) Has propeller-engine vibration approval been established? (CAR 3.417)

Yes No

(4) Have the proper bolts been used to install the metal propeller?

Yes No

(5) Has the propeller been installed in accordance with the manufacturer's instructions?

Yes No

Bolts used to retain the wood propeller should not be used for the replacement propeller. Although bolt diameters will usually be the same, the bolt length will be different. It is important that the correct length bolt be used. Do Not attempt to shim bolts for proper fit.

Note 1: The data herein reflects the requirements of CAR 3 if effect upon the date of issuance of the ACCS. It may be applied to aircraft type certificated prior to this date under CAR 3 or CAR 4a, with the exception of CAR 4a-T.

GPO 912084